IQML User Guide

Version 2.41

May 3, 2020

Fully compatible with:
Windows, Linux, Mac OS
DTN IQFeed 5.0 - 6.1
MATLAB R2008b - R2020a

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http://IQML.net
https://UndocumentedMatlab.com/IQML

Undocumented Matlab
The engineering choice for professional Matlab solutions
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1 Introduction

DTN provides financial data-feed services via its IQFeed service (www.iqfeed.net). IQFeed customers use its services using a specialized application (“client”) that can be installed on the user’s computer. User programs can interface to IQFeed’s client application in order to retrieve market data from the IQFeed servers.

Matlab is a programming platform that is widely-used in the financial sector. Matlab enables users to quickly analyze data, display results in graphs or interactive user interfaces, and to develop decision-support and automated trading programs.

IQFeed does not come with a Matlab API connector. This is the role of IQML (www.IQML.net). IQML is a program that runs in Matlab and connects it to IQFeed. IQML provides a seamless Matlab interface to IQFeed data and functionality, via easy-to-use Matlab commands. Users avoid the complexities of IQFeed’s API integration.

IQML consists of three software components (in addition to this User Guide):

1. A Java package (IQML.jar) that connects Matlab to IQFeed’s client application.
2. A Matlab function (IQML.p) that provides IQFeed’s data in an easy-to-use manner, without needing to know anything about the underlying connector.
3. A Matlab file (IQML.m) that serves as a help file. This file contains no code, just the help comment; the code itself is contained in the two other software components. The help text is displayed when you run Matlab’s help function.

IQFeed queries (for trades and tick quotes, historical data, market info etc.) can be initiated with simple one-line Matlab code, using the Matlab function (IQML.p).

Users can easily attach Matlab code (callbacks) to incoming IQFeed messages. This enables users to trigger special operations (for example, adding an entry in an Excel file, sending an email or text message, sending a trade order to an OMS application) whenever a certain condition is detected, for example if a specified price is reached.

This document explains how to install and use IQML. Depending on the date that you installed IQML, your version may be missing some features discussed in this document. You can always download the latest IQML version from http://IQML.net/files/IQML.zip or https://UndocumentedMatlab.com/IQML/files/IQML.zip.

1 IQConnect.exe on Windows, IQFeed application on MacOS. or ran as a Windows app on Mac/Linux using Parallels/Wine. Note: some MacOS users have reported problems with the “native” app (which is basically just a bottled Wine installation) compared to a standard Wine install. This is a pure IQFeed/Mac issue, and not an IQML one; using Wine seems to solve it. In any case, only the IQFeed client needs to run under Wine - Matlab itself can run natively, but note that certain Windows-only functionality (such as discussed in §9.5 and §12.2) will not work in native mode, only under Parallels/Wine.
2 Installation and licensing

2.1 Installing IQML

IQML requires the following in order to work:
1. An active account at DTN IQFeed
2. An installation of the IQFeed client (IQConnect)
3. An installation of Matlab R2008a or a newer release

On older Matlab releases, some IQML functionality may still be available. Contact info@IQML.net or info@UndocumentedMatlab.com for details.

Installing IQML is simple:
1. Read IQML’s license agreement. This is required even for the trial version of IQML. If you do not accept the agreement you cannot use IQML.
2. Download IQML.zip to a local folder (e.g.: C:\IQML\).
3. Unzip the downloaded IQML.zip file in this local folder.
4. Add the local folder to your Matlab path using the path tool (run the Matlab pathtool command, or in the Matlab Desktop’s toolstrip, click HOME / ENVIRONMENT / Set path... and save). The folder needs to be in your Matlab path whenever you run IQML.
5. If you are running the Production (non-trial) version of IQML, you will need to activate your license at this point. When you purchase your license you will be given specific instructions for this. See §2.2 for licensing details.
6. Ensure that the IQFeed client is working and can be used to log-in to IQFeed.
7. You can now run IQML within Matlab. To verify that IQML is properly installed, retrieve the latest IQFeed server time, as follows (see §9.2):
   >> t = IQML('time');
8. You can query the installed version using IQML’s ‘version’ action, as follows:
   >> disp(IQML('version'))
   Version: 1.0
   Release: '23-Feb-2018'
   License: 'Professional'
   Expiry: '16-Jun-2018'
9. Once the IQML product is installed, you will be notified in the Matlab console (Command Window) whenever there is a new version available. You can always update your installation to the latest version, as follows:
   >> IQML('update')
Download the latest IQML version from http://IQML.net/files/IQML.zip into C:\IQML\...
   Download complete - installing...
   Installation of the latest IQML version is now complete.

---

2 http://IQML.net/files/IQML_License_Agreement.pdf or https://UndocumentedMatlab.com/IQML/files/IQML_License_Agreement.pdf
4 IQConnect.exe on Windows, IQFeed application on MacOS, or ran as a Windows app on Mac/Linux using Parallels/Wine. Note: some MacOS users have reported problems with the “native” app (which is basically just a bottled Wine installation) compared to a standard Wine instal. This is a pure IQFeed/Mac issue, and not an IQML one; using Wine seems to solve it. In any case, only the IQFeed client needs to run under Wine - Matlab itself can run natively, but note that certain Windows-only functionality (such as discussed in §9.5 and §12.2) will not work in native mode, only under Parallels/Wine.
5 In some cases, you may need (or want) to specify the IQFeed Username,Password for the initial connection – see §9.1
2.2 Licensing and activation

IQML’s license uses an activation that is specific to the installed computer. This uses a unique fingerprint hash-code that is reported by the Operating System, which includes the Windows ID (on Windows systems), computer name, and the list of hardware MAC addresses used by the computer.

Once the computer’s license is activated, the activation key is stored on the IQML webserver. This activation key automatically validates online whenever IQML connects to IQFeed (i.e., at the beginning of an IQFeed session), and once every few hours while it is connected. Validating the license online only takes a second or two. Since it is only done at the initial connection to the IQFeed client and once every few hours, it does not affect IQML’s run-time performance. If you have a special concern regarding the online activation, please contact us for clarifications.

A corollary of the computer fingerprint is that whenever you modify components that affect the fingerprint, IQML will stop working. This could happen if you reinstall the operating system (OS), modify the computer name, change network adapters (e.g., switch between wifi/cellular/wired connection, or use a new USB networking device), modify MAC addresses, or use software that creates dynamic MACs. In such cases, you might see an error message such as the following when you try to use IQML:

```
Error using IQML
IQML is not activated on this computer.
```

Some additional information may be presented to help you diagnose the problem.

To fix such cases, simply revert back to the original hardware/networking configuration, and then IQML will resume working. If you wish to make the configuration change permanent, you can contact us for an activation switch to the new configuration (see the following section §2.3 for details).

Computer fingerprints are typically stable, and are not supposed to change dynamically. However, some software programs (especially on MacOS, but also sometimes on Windows) create dynamic MAC addresses and/or dynamically modify the computer name (hostname). This may then be reflected in the OS-reported fingerprint, possibly causing IQML to stop working. The solution is to find a way to keep the fingerprint components static, with the same values as the activated fingerprint.\(^6\) You can determine the nature of the OS-reported fingerprint as follows:

```
>> IQML('license', 'debug',1)
```

Using this command, you can determine which fingerprint component has changed and take the appropriate action to fix it so that the reported fingerprint will match the activated fingerprint. If you decide that the fingerprint changes are permanent, contact us to change the activated fingerprint (see §2.3).

A short time before your license term is over, you will start to see a notification message in your Matlab console (Command Window) alerting you about this:

```
*** Your IQML license will expire in 3 days (10-Mar-2018).
*** To extend your license please email info@IQML.net
```

---

\(^6\) For example, the computer’s name can be set using the OS hostname command, or the following method on Mac OS:

https://knowledge.autodesk.com/support/smoke/learn-explore/caas/sfdoc/articles/sfdoc/articles/Setting-the-Mac-hostname-or-computer-name-from-the-terminal.html
This informational message will only appear during the initial connection to IQFeed, so it will not affect your regular trading session.

When the license term is over, IQML will stop working and display an error message:

*** Your IQML license has expired on 10-Mar-2018.
*** To extend your license please email info@IQML.net

You can always renew or extend your license using the payment links on http://IQML.net or https://UndocumentedMatlab.com/IQML. If you wish to be independent of such renewals, you can select a discounted long-term license.

You can query the installed version using IQML’s 'version' action, as follows:

```matlab
>> data = IQML('version')
data =
    Version: 1.0
    Release: '23-Feb-2018'
    License: 'Professional'
    Expiry: '16-Jun-2018'
```

Multiple IQML license options are available for purchase. Longer license terms are naturally more cost-effective than shorter ones. At the end of any license term you can decide to renew the same term, or purchase any other term:

- **2-, 4- or 6-months** license: these short-term licenses can be repeatedly renewed beyond the free trial, for product evaluation or program development.
- **1-year** license: this is the standard, most popular license term.
- **Multi-year** license: these discounted long-term licenses will work for a longer duration than the standard license year without requiring a renewal, as long as IQFeed continues to provide its API service and your environment remains stable.
- **Volume (multi-computer)** license: the same license as for a single computer, but when you purchase multiple licenses at once, you get a volume discount.
- **Site** license: enables to run IQML on an unlimited number of computers within the same Windows Domain. This license does not require end-user activation, only a single centralized activation. It supports cloud deployment, where computer hardware fingerprints (but not the domain) often change.
- **Deployment (compiled or OEM)** license: enables to use IQML within a compiled program that runs on an unlimited number of computers, in any site or domain. This license does not require any end-user activation, only a single centralized activation of the parent executable to which the license is tied.
- **Source-code** license: unlimited in duration, can be installed on an unlimited number of computers within the organization, and requires no activation. This license requires signing a dedicated NDA (non-disclosure agreement).
- **Bundle** license: a discounted bundle of licenses for IQML and IB-Matlab (the InteractiveBrokers-Matlab connector). The combination of IB+IQFeed+Matlab is quite common in trading systems.

Each of these licenses can be selected in one of two variants: **Standard** and **Pro**. The Standard license contains most IQFeed functionality; the Pro license provides access to the full set of IQFeed data. A detailed comparison is provided in §3.1 and §3.4.
2.3 Switching activated computers

You can switch the IQML license activation between computers or computer hardware configurations (i.e., fingerprint hash-code) whenever you purchase a license renewal. For license terms of 1 year or longer, up to 2 activation switches per year are also included, at no extra cost. A handling fee will be incurred for other re-activations.

In order to change the activation fingerprint, simply email us the new configuration’s fingerprint and we will make the switch on IQML’s activation server.

Activation switches can take up to two business days to process, but typically complete within a few hours during European business hours. You will receive a confirmation email when the activation switch is complete.

2.4 Updating the installed version

Once IQML is installed, you will be notified in the Matlab console (Command Window) whenever a new version is available. An example of such a notification is:

```matlab
>> IQML(...) % some IQML command
A newer version of IQML (2.32) is available. Updates include:
  2.32 (2019-12-16)
  - [2.4] Modified the hyperlinks in the new-version message
  - [5.*] Improved processing speed of historic data queries
where [#.#] indicates the corresponding sections in the User Guide.
To install the new version, run IQML('update'), or download IQML.zip from http://undocumentedmatlab.com/files/IQML/IQML.zip and unzip it in C:\IQML
```

You can decide to ignore this notification and keep using your existing IQML version, or to follow the notification’s advice and update your version – the choice is yours.

You can update IQML to the latest version any time during the license term, as follows:

```matlab
>> IQML('update')
Downloading the latest IQML version from http://iqml.net/files/IQML.zip into C:\IQML\...
Download complete - installing...
Installation of the latest IQML version is now complete.
```

This update process preserves the current version as backup, so you could revert to it later (see below). Following the update, you can verify the new release’s version:

```matlab
>> data = IQML('version')
data =
  Version: 2.32
  Release: '16-Dec-2019'
  License: 'Professional'
  Expiry: '30-Jun-2020'
```

After installing the latest version, if you discover that this version does not work well, you can always revert back to a previous version:

1. run IQML('revert'), which replaces the current version with a previous version that was preserved in the last IQML('update'), or:
2. download http://iqml.net/files/IQML_previous.zip, unzip this file in your IQML folder, then restart Matlab. The current version is not preserved as backup, so you will not be able to revert to it later by running IQML('revert').

After a version update by any method, restart Matlab, and run data=IQML('version') to verify the new version. Then email us to let us know why you reverted, so that we could correct the problem in upcoming versions.
3 Using IQML

3.1 General usage

IQML uses the IQFeed client\(^7\) to connect to the IQFeed server. If an active IQFeed client is not detected, IQML will automatically attempt to start the IQFeed client and to connect to it. Note that this may not work for some IQFeed client installations. You can always start the IQFeed client manually, before running IQML. In any case, if an IQFeed connection is unsuccessful, IQML will error.

IQML’s Matlab wrapper function is called IQML, contained within the IQML.p file. Its accompanying IQML.m file provides basic usage documentation using standard Matlab syntax, e.g.:

\[
\begin{align*}
\text{>> help('IQML')} \\
\text{>> help IQML} & \text{ % equivalent alternative} \\
\text{>> doc IQML}
\end{align*}
\]

The IQML function accepts a variable number of input parameters, and returns data in a single output argument, with an optional errorMsg output. The general syntax is:

\[
\begin{align*}
\text{>> [data, errorMsg] = IQML(action, parameters);} \\
\end{align*}
\]

where:

- **data** is the output value. If this output value is requested, then Matlab processing will block data until the result is available; if the output data is not requested then the Matlab processing will proceed immediately (non-blocking) – the IQFeed data will stream asynchronously (see below).
- **errorMsg** is the latest error message that was reported (if any); see §3.5.
- **action** is a string that denotes the requested query type (mandatory input).
- **parameters** can be specified, depending on the requested action. There are several ways to specify parameters, which are described below.

For example:

\[
\begin{align*}
\text{>> data = IQML('time'); } & \text{ %'time' action (blocking), 0 parameters} \\
\text{>> IQML('quotes', 'Symbol', 'IBM'); } & \text{%streaming 'quotes' action, 1 parameter} \\
\text{>> IQML('command', 'String', command, 'PortName', 'Admin'); } & \text{%2 parameters}
\end{align*}
\]

Note that when an output data is requested, IQML treats the request as blocking (synchronous), meaning that Matlab processing will wait for IQFeed’s data (or a timeout) before proceeding with the next Matlab command. For example:

\[
\begin{align*}
\text{>> t = IQML('time'); } & \text{ % blocking until data is available}
\end{align*}
\]

When an output data is not requested, IQML treats the request as streaming (non-blocking, a-synchronous) and Matlab processing will proceed immediately. This non-blocking mode is typically useful for sending IQFeed requests (for example, to start streaming trades/ticks), without waiting for a response from IQFeed. The streamed data is accumulated by IQML in the background, and can later be retrieved using the mechanism that is discussed in §6. Examples of such non-blocking commands:

\[
\begin{align*}
\text{>> IQML('quotes', 'Symbol', 'IBM'); } & \text{%start non-blocking IBM quotes stream} \\
\text{>> IQML('command', 'String', command); } & \text{%asynchronous/non-blocking command}
\end{align*}
\]

\(^7\) IQConnect.exe on Windows, IQFeed application on MacOS. or ran as a Windows app on Mac/Linux using Parallels/Wine
Here are the action values recognized by IQML, in the Standard and Professional licenses; trial licenses have the full functionality of a Professional license:

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
<th>User Guide Section(s)</th>
<th>Standard</th>
<th>Pro &amp; trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>'version'</td>
<td>Display product version information</td>
<td>§2.1</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'license'</td>
<td>Display the license fingerprint &amp; activation key</td>
<td>§2.2</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'update'</td>
<td>Update the IQML installation to the latest version</td>
<td>§2.4</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'revert'</td>
<td>Update the IQML installation to a previous version</td>
<td>§2.4</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'doc'</td>
<td>Display this User Guide in a separate window</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'quotes'</td>
<td>Fetch quotes/trades information on a ticker</td>
<td>§4.1, §6.1</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'fundamental'</td>
<td>Fetch fundamental information on a ticker</td>
<td>§4.2</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'intervalbars'</td>
<td>Fetch custom streaming interval bars on a ticker</td>
<td>§4.3, §6.3</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'marketdepth'</td>
<td>Fetch level 2 market depth information on a ticker</td>
<td>§4.4, §6.4</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>'greeks'</td>
<td>Report option Greeks, fair value, implied volatility</td>
<td>§4.5</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>'history'</td>
<td>Fetch historical or intra-day data bars from IQFeed</td>
<td>§5</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'summary'</td>
<td>Fetch historical market summary data from IQFeed</td>
<td>§5.6</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>'regional'</td>
<td>Fetch regional update information on a ticker</td>
<td>§6.2</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>'news'</td>
<td>Fetch news headlines or stories from IQFeed</td>
<td>§7</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>'lookup'</td>
<td>Fetch list of symbols/codes matching a set of criteria</td>
<td>§8</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'chain'</td>
<td>Fetch futures/options chain matching a set of criteria</td>
<td>§8.2</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>'disconnect'</td>
<td>Disconnect IQML from IQFeed</td>
<td>§9.1</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'reconnect'</td>
<td>Disconnect and then re-connect IQML to IQFeed</td>
<td>§9.1</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'time'</td>
<td>Retrieve the latest IQFeed server &amp; message times</td>
<td>§9.2</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'stats'</td>
<td>Retrieve connection and network traffic statistics</td>
<td>§9.3</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'command'</td>
<td>Send a custom command to IQFeed</td>
<td>§9.4</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'registry'</td>
<td>Open Windows Registry Editor at IQFeed’s settings</td>
<td>§9.5</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>'alert'</td>
<td>Alert the users upon IQFeed streaming events</td>
<td>§11</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>'log'</td>
<td>Control IQFeed logging of messages and events</td>
<td>§12.2</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

IQML accepts input parameters in several alternative formats, which are equivalent – you can use whichever format that you prefer:

- As name-value pairs – for example:
  
  ```matlab
  >> IQML('command', 'String', command, 'PortName', 'Admin'); %2 parameters
  ```

- As a Matlab struct, with parameters contained in corresponding struct fields e.g.:
  
  ```matlab
  >> params = []; % initialize
  >> params.String = command;
  >> params.PortName = 'Admin';
  >> IQML('command', params);
  ```

- As a Matlab class, with parameters contained in corresponding class properties.

- As a Matlab table, with parameters contained in corresponding table variables.

- As field-separated rows in an Excel input file – for example:
  
  ```matlab
  >> IQML('command', 'C:\MyData\inputFile.xlsx');
  ```

  where:

  - Each column contains a separate parameter
  - Row #1 contains the parameter names, and rows 2+ contain their corresponding values, one row per command
  - All commands use the same action ('command' in this example)
Each parameter must have an associated value. The value’s data type depends on the specific parameter: it could be numeric, a string, a function handle etc. The definition of all the parameters and their expected data types is listed in the appropriate section in this User Guide that explains the usage for the associated action.

Note: if you specify parameters using a struct/class/table format, and then reuse this object for different IQML commands (by altering a few parameters), the entire set of parameters will be used, possibly including some leftover parameters from previous IQML commands. This may lead to unexpected results. For example:

```matlab
% 1st IQML command - stop streaming timestamp messages every 1 second
>> params = []; % initialize
>> params.String = 'S,TIMESTAMPSOFF';
>> IQML('command', params);
% 2nd IQML command - stop streaming client stats messages every 1 sec
>> params.String = 'S,CLIENTSTATSOFF'; %reuse existing params struct
>> IQML('command', params);
% 3rd IQML command - start streaming quotes messages for IBM
>> params.Symbol = 'IBM'; %reuse existing params struct
>> IQML('quotes', params);

In this example, the 2nd IQML command above will have no effect, because the PortName parameter in the params struct from the 1st IQML command will be reused in the 2nd command, sending it to the Level1 port, instead of to the Admin port. Similarly, the 3rd IQML command will result in a warning, because the 'quotes' action does not expect the String and PortName parameters that were carried over (reused) from the 2nd command. To avoid such unexpected results, it is therefore best to reset the object (params=[] for a struct) before preparing each IQML command.

IQML is quite tolerant of user input: parameter names (but generally not their values) are case-insensitive, parameter order does not matter, non-numeric parameter values can be specified as either char arrays ('abc') or strings ('abc'), and some of these can be shortened. For example, the following commands are all equivalent:

```matlab
>> IQML('quotes', 'Symbol','IBM');
>> IQML('quotes', 'symbol','IBM');
>> IQML('Quotes', "Symbol","IBM");
>> IQML('Quotes', 'Symbol','IBM');
>> IQML('QUOTES', 'symbol','IBM');
```

The full list of acceptable input parameters, and their expected values, is listed in the following sections, grouped by usage. If you specify an unexpected parameter, it will be ignored and a warning message will be displayed in the Matlab Command Window:

```matlab
>> IQML('quotes', 'badName',1)
Warning: 'badName' is not a valid parameter for the 'quotes' action in IQML
```

When using IQML, there is no need to worry about connecting or disconnecting from the IQFeed client – IQML handles these activities automatically, without requiring user intervention. Users only need to ensure that the IQFeed client is active and logged-in when the IQML command is invoked in Matlab.

IQML reads data using the IQFeed account to which the IQFeed client is connected. In other words, the IQFeed account type is transparent to IQML: the only way to control which IQFeed data is available to IQML is to login to the IQFeed client using the appropriate username/password. Refer to \$9.1 for additional details.
3.2 Common request properties

The following properties can be specified in IQML, with most actions:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>string</td>
<td>(none)</td>
<td>The asset symbol, as known by IQFeed.⁸</td>
</tr>
<tr>
<td>Timeout</td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds (0-9000) to wait for data in a blocking request (0 means infinite).</td>
</tr>
<tr>
<td>Debug</td>
<td>logical</td>
<td>false or 0</td>
<td>If true or 1, additional information is displayed.</td>
</tr>
</tbody>
</table>
| MsgParsingLevel   | number    | 2       | One of:  
|                   |           |         | • 2 – parse all the data in incoming IQFeed messages (default; most verbose, slowest)  
|                   |           |         | • 1 – do not parse lookup codes (e.g. trade condition, price formats, market id).  
|                   |           |         | The corresponding Description fields will either be missing, or contain empty strings. The codes can be parsed separately (see §8).  
|                   |           |         | • 0 – do not parse lookup code; also do not convert string data into numeric values (i.e. all data fields will remain strings: ‘3.14’). This is the fastest but least verbose option.  
| RaiseErrorMsgs    | logical   | true or 1 | If true or 1, IQFeed error messages raise a Matlab error in blocking (non-streaming) mode (see §12). |
| ProcessFunc       | function handle | [] | Custom user callback function to process incoming IQFeed data messages (see §10). |
| NumOfEvents       | integer   | inf     | The maximal number of messages to process. |

Additional properties are request-specific and are listed below in the relevant sections. For example, the 'history' action has additional properties that control the parameters of the historic data request (start/end date, data type, etc.).

3.3 Blocking & non-blocking modes

Whenever you specify an output parameter in a call to IQML, the program will block until a response is available (i.e., a synchronous request). If no output parameter is specified, IQML will immediately return (non-blocking, a-synchronous) and additional Matlab commands can immediately be issued. This non-blocking mode is typically useful for sending IQFeed requests to start streaming data (for example, streaming trades/ticks or news headlines), without waiting for any response from IQFeed. The streamed data is accumulated by IQML in the background, and can later be retrieved using the mechanism that is discussed in §6. For example:

```
>> t = IQML('time'); % blocking until data is available
>> IQML('quotes', 'Symbol', 'IBM'); % start non-blocking IBM quotes stream
>> IQML('command', 'String', command); % asynchronous/non-blocking command
```

⁸ In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization.
⁹ https://iqfeed.net/symbolguide

Using the 2nd (optional) output parameter of IQML implies a default value of false (0) for RaiseErrorMsgs (see §3.5)
3.4 Common causes of confusion

1. A common cause of error is specifying symbols incorrectly. IQFeed is very sensitive about this: if the specified symbol is invalid,\(^{11}\) or if your account does not have the corresponding market subscription, IQFeed will report an error:

   ```matlab
   >> IQML('quotes', 'Symbol','xyz123')
   Symbol 'XYZ123' was not found!
   ```

   If the request is blocking, an error (exception) will be thrown (raised), which can be trapped and handled by the user, using a Matlab `try-catch` construct:

   ```matlab
   try
   data = IQML('fundamental', 'Symbol','xyz123');
   catch err
   fprintf(2, 'Error: %s
', err.message);
   % do some intelligent processing here...
   end
   ```

   IQFeed’s website includes a detailed symbol-lookup search engine.\(^{12}\) If you are still unsure about a symbol name, please contact IQFeed’s customer support.

2. If any request parameter is invalid or if the request is not accepted by IQFeed, a run-time error will result, which can be trapped as shown above. For example:

   ```matlab
   IQML historic data query (EURGBP.FXCM) error: Unauthorized user ID (your IQFeed account is not authorized for this data)
   ```

3. A common confusion source is specifying numeric values as strings or vice versa. For example, `IQML(...,'Timeout','10')` rather than `IQML(...,'Timeout',10)`. Each `IQML` parameter expects a value of a specific data type, as listed in the parameter tables in this user guide. `IQML` is sometimes smart enough to automatically convert to the correct data type, but you should not rely on this: it is better to always use the correct data type. Otherwise, Matlab might get confused when trying to interpret the string `'10'` as a number, and odd results might happen.

4. While most of `IQML`’s functionality is available in all license types, some actions/functionality are only available in the Professional `IQML` license:\(^{13}\)
   - Parallelized queries (§3.6)
   - Customizable data fields in quotes data (§4.1, §6.1)
   - Level 2 market depth quotes (§4.4, §6.4, §10.5)
   - Option Greeks, Fair Value and Implied Volatility (§4.5)
   - Regional updates (§6.2)
   - News (§7)
   - Options/futures chain lookup (§8.2)
   - Alerts (§11)

   If you have a Standard license and try to access Professional-only functionality, a run-time error will result:

   ```matlab
   >> data = IQML('news');
   The 'news' action is not available in your Standard license of IQML, only in the Professional license. Contact info@iqml.net to upgrade your license.
   ```

---

\(^{11}\) For example, EURUSD.FXCM is a valid symbol, but EURUSD and USDEUR.FXCM are invalid
\(^{12}\) [https://iqfeed.net/symbolguide](https://iqfeed.net/symbolguide)
\(^{13}\) A Standard license can be converted into a Professional license at any time; contact info@iqml.net for details.
5. IQFeed reports dates in different formats, depending on the specific query: either in the standard American mm/dd/yyyy format (for example: '01/29/2018'), or in yyyyymmdd format (for example: '2018-01-29' or '20180129 12:29:48'). Dates are usually reported as strings. In some cases, a corresponding Matlab datenum value is also reported, for example (§5.5, §6.1):

- Symbol: 'IBM'
  - Timestamp: '2018-03-07 13:23:02.036440'
  - Datenum: 737126.557662458

- Symbol: '@VX#'
  - LatestEventDatenum: 737128.637260451
  - LatestEventTimestamp: '20180309 15:17:39'

Depending on the data field, the timestamp is either your local computer’s time, or IQFeed servers (New York) time – not the exchange time. To get the exchange time, you would need to do the appropriate time-zone arithmetic.

6. By default, Matlab displays data in the console (“Command Window”) using “short” format, which displays numbers rounded to 4 digits after the decimal. The data actually has higher precision, so when you use it in a calculation the full precision is used, but this is simply not displayed in the console.

**IQML does not truncate/round/modify the IQFeed data in any manner!**

To display the full numeric precision in the Matlab console, change your Command Window’s Numeric Format from “short” to “long” (or “long g”) in Matlab’s Preferences window, or use the “format long” Matlab command:

```matlab
>> data = IQML('quotes', 'symbol', 'ONLIB.X'); %overnight LIBOR rate
>> data.Close % short format (only 4 digits after decimal)
ans = 1.4463
>> format long g % long format (full precision displayed)
>> data.Close
ans = 1.44625
```
3.5 Returned data format

Many queries in IQML return their data in the form of a struct-array (a Matlab array of structs), for example (see §8.6):

```
>> data = IQML('lookup', 'DataType', 'NAICS')
data =
   1175×1 struct array with fields:
   id
   description
>> data(1)
an =
   id: 111110
   description: 'Soybean Farming'
>> data(2)
an =
   id: 111120
   description: 'Oilseed (except Soybean) Farming'
```

For various purposes (readability, maintainability, performance, usability), users may wish to modify this data structure. You can easily convert the data using Matlab’s built-in functions `struct2cell()` (which converts the struct-array into a cell-array), or `struct2table()` (which converts the struct-array into a Matlab table object):

```
>> disp(struct2cell(data))

    111110    'Soybean Farming'
    111120    'Oilseed (except Soybean) Farming'
    111130    'Dry Pea and Bean Farming'
    111140    'Wheat Farming'
    111150    'Corn Farming'
    111160    'Rice Farming'
...
>> disp(struct2table(data))

    id    description
    ______    ___________________________________________________
    111110    'Soybean Farming'
    111120    'Oilseed (except Soybean) Farming'
    111130    'Dry Pea and Bean Farming'
    111140    'Wheat Farming'
    111150    'Corn Farming'
    111160    'Rice Farming'
...
```

Note that empty data cannot be converted using `struct2table()` or `struct2cell()`:

```
>> data = IQML('lookup', 'DataType', 'NAICS', 'Description', 'xyz')
data =
   []
>> struct2cell(data)
    Undefined function 'struct2cell' for input arguments of type 'double'.
>> struct2table(data)
    Error using struct2table (line 26)
    S must be a scalar structure, or a structure array with one column or one row.
```

When requesting data for multiple symbols, IQML automatically tries to merge the data into an NxM array of structs (N data points for each of M symbols). If this is impossible (e.g. different number of data points per symbol), the results are reported as a cell array. For example:
>> data = IQML('history', 'Symbol', 'IBM,AAPL,T')
data =
100×3 struct array with fields:
    Symbol
    Datestamp
    Datenum
    High
    Low
    Open
    Close
    PeriodVolume
    OpenInterest
>> data = IQML('history', 'Symbol', 'IBM,AAPL,T,@ESH20C120000')
data =
1×4 cell array
{100×1 struct}  {100×1 struct}  {100×1 struct}  {65×1 struct}

A second, optional, output parameter of IQML returns the latest error message (if any):¹⁴

>> [data, errorMsg] = IQML('quotes', 'Symbol', 'IBM', 'Timeout', 0.1)
data =
[]
errorMsg =
'IQML timeout: either IQFeed has no data for this query, or the Timeout parameter should be set to a value larger than 0.1'

¹⁴ Using the 2nd (optional) output parameter of IQML implies a default value of false (0) for the RaiseErrorMsgs parameter.
3.6 Run-time performance

3.6.1 General considerations

IQML’s standard processing has an overhead of 1-2 milliseconds per IQFeed message, depending on several factors:

- Message type/complexity – simple messages such as the periodic timestamp updates are simpler to process than complex messages (e.g. fundamental data).
- The Debug parameter (see §3.2) – A value of 1/true is ~1 msec slower per message, compared to the default value of 0/false (depending on message type).
- The MsgParsingLevel parameter (§3.2) – A value of 0 is ~1 msec faster per message, compared to the default value of 2 (depending on message type).
- The UseParallel parameter (see below) enables query parallelization (faster).
- The Fields parameter (§4.1, §5.1-§5.5, §6.1) – fewer fields are faster.
- User-defined callbacks (§10) add their own processing time per message. See §10.2 for suggested ways to speed-up this callback processing overhead.
- Each active alert (§11) uses 1-2 msecs per message (depending on alert type, and only for the alert’s corresponding message type). If the alert action is triggered, then its processing time is added. For example, displaying a popup message might take 1 sec, and sending an email might take a few seconds.
- Computer capabilities – faster CPU and memory (RAM) enable faster processing, if your computer has enough physical memory to avoid swapping. Adding memory is typically much more cost-effective than upgrading the CPU.

This means that without any defined alert or user-specified callback, nor any other code running in the background (for example, a Matlab data analysis program), we can expect IQML to process up to 500-1000 IQFeed messages per second by default.

This is a relatively fast throughput, but if you stream real-time quotes for hundreds of liquid securities concurrently then you might reach this limit. When this happens, Matlab may be so bogged-down from the flood of incoming messages that it will become unresponsive, and you may need to restart IQConnect and/or Matlab.

Similarly, if you request a blocking (non-streaming) request with multiple data items (for example, thousands of historical data or news items), the query may take a while to process, requiring us to set a higher-than-default Timeout parameter value. For example, if you issue a blocking request for 20K data bars, IQFeed will send 20K data messages (one message per bar). If each of these messages takes 1-2 msecs to process, the total processing time for the IQML query will be 20-40 secs.

When IQFeed is connected, it continuously sends messages to IQML: periodic “heartbeat” and status messages, and messages for any active streaming quotes or news events that you requested. These messages are automatically processed by IQML in the background, reducing the CPU time that is left available to process other IQML queries (e.g., a blocking historical data query) or Matlab analysis functions. It is therefore advisable to stop streaming IQFeed data when not needed, even if only temporarily.
3.6.2 Paralellization

With the Professional and trial IQML licenses, you can use Matlab’s Parallel Computing Toolbox to parallelize IQFeed queries. This can be done both externally (placing IQML commands in parfor/spmd blocks, so that they will run independently), and internally (for some IQML query types, using the UseParallel parameter). If you have the Standard IQML license, or if you do not have Matlab’s Parallel Computing Toolbox, you can still run concurrent IQML commands in separate Matlab sessions, just not in the same session.

IQML automatically tries to parallelize queries when the UseParallel parameter value (default: false) is set to 1 or true. The list of parallelizable queries includes:

- Requests resulting in multiple blocking queries in a single IQML command (for example, historical data for multiple symbols or a date range – see §5)
- Requests for full news-story of all returned news headlines in a blocking query, using the GetStory parameter (see §7.2)
- Requests for fundamental/quotes data on all symbols in an options-chain or futures-chain, using the WhatToShow parameter (see §8.2)

When setting UseParallel to 1 or true, IQML will use parallel Matlab tasks (so-called ‘headless workers’ or ‘labs’) from the currently-active parallel pool created by the Parallel Computing Toolbox. If no pool is active, the default local pool is automatically started.

IQML parallelization has several performance implications:

- Starting the parallel pool can take some time (a few seconds, up to a minute or two, depending on configuration). It is therefore best to start the parallel pool before time-critical operations, to avoid this startup time upon the first parallel query. Starting the pool can be done using Matlab’s parpool function.
- The default pool uses the same number of workers as the number of physical cores on your computer. This makes sense for CPU-intensive programs, but IQML queries are limited by I/O, not CPU. Therefore, unless you also use the parallel pool for CPU-intensive computations in your program, it makes sense to start a pool that has more workers than the number of CPU cores. You can configure your local cluster for this.15 Note that the parallel pool size should be set to ≤14, since IQFeed limits the number of concurrent connections.16
- In addition to the workers startup time, each worker independently connects to IQFeed upon the first IQML command it encounters, taking an extra few secs.
- It is only possible to parallelize workers on the local computer, not on other (distributed) computers in a grid/cluster/cloud. This is due to IQFeed/exchange limitations, which prohibit distribution of data to other computers.
- Due to parallelization overheads, inter-task memory transfers, and CPU task-switches (especially in a case of more workers than cores), speedup will always be smaller than the number of workers. The actual speedup will depend on query type and computer/OS configuration. Parallelization may even cause slowdown in some cases (e.g. quote queries, due to waiting for market events, not CPU).

---

16 IQFeed’s actual limit is 15, but one connection is used by the main (non-parallel) Matlab process, in addition to the workers.
Here is a run-time example showing the effect of using a 4-worker pool to parallelize a news-story query, resulting in a 3.5x speedup (not 4x, due to parallelization overheads):

```matlab
>> tic, data = IQML('news', 'DataType', 'headlines', 'MaxItems', 100, ...
    'GetStory', 1); toc
Elapsed time is 56.311768 seconds.

>> parpool('local', 4) % start 4 workers in parallel pool (optional)
>> tic, data = IQML('news', 'DataType', 'headlines', 'MaxItems', 100, ...
    'GetStory', 1, 'UseParallel', 1); toc
Elapsed time is 15.799185 seconds.
```

### 3.6.3 Reported data-fields

Also in the Professional IQML license, you can customize the fields that IQML reports for market data quotes and historic data bars. The **Fields** parameter can be set to a cell-array of strings ({'Bid','Ask','Last'}), or a comma-separated string ('Bid,Ask,Last'). All subsequent queries of the same type will only report the requested fields. For example:

```matlab
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', {'Bid', 'Ask', 'Last'})
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', 'Bid,Ask,Last') % equivalent
```

```matlab
data =
    Symbol: 'AAPL'
     Bid: 222.71
     Ask: 222.91
    Last: 222.11
```

Note: the fewer fields that you request, the faster the required processing time, by both IQFeed and IQML (see §4.1, §5.1-§5.5, §6.1 for details). Requesting fewer fields (as in the example above, which only requested 3 quote fields) will result in faster run-time processing and reduced memory consumption. To improve run-time performance and reduce memory usage, it is advisable to request only those data fields that your program actually requires.
4 Querying the latest market data

4.1 Snapshot (top of book) quotes

We start with a simple example to retrieve the latest market information for Alphabet Inc. Class C, which trades using the GOOG symbol, using IQML’s 'quotes' action:

```matlab
>> data = IQML('quotes', 'Symbol', 'GOOG')
data =
    Symbol: 'GOOG'
    Most_Recent_Trade: 1092.14
    Most_Recent_Trade_Size: 1
    Most_Recent_Trade_Time: '09:46:31.960276'
    Most_Recent_Trade_Market_Center: 25
    Total_Volume: 113677
    Bid: 1092.13
    Bid_Size: 100
    Ask: 1092.99
    Ask_Size: 100
    Open: 1099.22
    High: 1099.22
    Low: 1092.38
    Close: 1090.93
    Message_Contents: 'Cbaohlc'
    Message_Description: 'Last qualified trade; A bid update occurred; An ask update occurred; An open declaration occurred; A high declaration occurred; A low declaration occurred; A close declaration occurred'
    Most_Recent_Trade_Conditions: '3D87'
    Trade_Conditions_Description: 'Intragarket Sweep; Odd lot trade'
    Most_Recent_Market_Name: 'Direct Edge A (EDGA)'
```

As can be seen, the returned data object is a Matlab struct with self-explanatory fields. To access any specific field, use the standard Matlab dot-notation:

```matlab
>> bidPrice = data.Bid;  \%=1092.13 in this specific case
```

If the symbol is not currently trading, some fields return empty values:

```matlab
>> data = IQML('quotes', 'Symbol', 'GOOG')
data =
    Symbol: 'GOOG'
    Most_Recent_Trade: 1078.99
    Most_Recent_Trade_Size: 1
    Most_Recent_Trade_Time: '19:58:47.052099'
    Most_Recent_Trade_Market_Center: 26
    Total_Volume: 0
    Bid: 1077.6
    Bid_Size: 100
    Ask: 1079.89
    Ask_Size: 200
    Open: []
    High: []
    Low: []
    Close: 1078.92
    Message_Contents: 'Cbav'
    Message_Description: 'Last qualified trade; A bid update occurred; An ask update occurred; A volume update occurred'
    Most_Recent_Trade_Conditions: '0517'
    Trade_Conditions_Description: 'Average Price Trade; Form-T Trade'
    Most_Recent_Market_Name: 'Direct Edge X (EDGX)'
```

17 The textual Description fields depend on the MspParsingLevel parameter having a value of 2 or higher (see § 3.2 and § 8). The Bid and Ask fields are typically NBBO (National Best Bid and Offer) quotes.
In this example, the query was sent outside regular trading hours (on Sunday) so Open, High and Low are empty. As expected, the data indicates this was a “Form-T” trade.

Other fields may sometimes be empty. For example, overnight LIBOR rate (Symbol=‘ONLIB.X’) reports empty Bid, Ask, Most_Recent_Trade_Size (and Total_Volume=0).

In rare cases, you might see invalid field values (e.g. 0), which may indicate a data error. IQML does not modify the data reported by IQFeed, so if you see this problem consistently for a certain security or exchange, please contact IQFeed’s support.

If you specify an incorrect security name or classification properties, or if you do not have the necessary market subscription, then no data is returned, and an error message is displayed (see discussion in §3.4).

```python
>> IQML('quotes', 'Symbol', 'xyz123')
Symbol 'XYZ123' was not found!
```

You may request more than a single snapshot quote: To get the next N real-time quotes, specify the NumOfEvents parameter. The result is an array of structs in the same format as above (or an empty array if no data is available):

```python
>> data = IQML('quotes', 'Symbol', 'IBM', 'NumOfEvents', 4)
data = 4×1 struct array with fields:
    Symbol
    Most_Recent_Trade
    Most_Recent_Trade_Size
    ...
>> data(1)
an =
    Symbol: 'IBM'
    Most_Recent_Trade: 159.16
    Most_Recent_Trade_Size: 75
    Most_Recent_Trade_Time: '09:36:15.534201'
    Most_Recent_Trade_Market_Center: 24
    Total_Volume: 135267
    ...
```

Note that it is possible that not all the requested quotes will be received before IQML’s timeout (default value: 5 secs) returns the results:

```python
>> data = IQML('quotes', 'Symbol', 'IBM', 'NumOfEvents', 4)

Warning: IQML timeout: only partial data is returned. Perhaps the Timeout parameter should be set to a value larger than 5 or the NumOfEvents parameter to a value smaller than 4
```

```python
data = 2×1 struct array with fields:
    Symbol
    Most_Recent_Trade
    Most_Recent_Trade_Size
    ...
```

To control the maximal duration that IQML will wait for the data, set the Timeout parameter. For example, to wait up to 60 secs to collect the next 4 upcoming quotes:

```python
>> data = IQML('quotes', 'Symbol', 'IBM', 'NumOfEvents', 4, 'timeout', 60);
```

18 Some older versions of IQML returned a different form struct (the same as that reported by streaming quotes - §6.1). This was corrected to match the documentation starting in IQML version 2.00.
You can request quotes for multiple symbols at the same time, in a single `IQML` command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
>> data = IQML('quotes', 'symbols', {'IBM', 'GOOG', 'AAPL'});
>> data = IQML('quotes', 'symbols', 'IBM:GOOG:AAPL'); % equivalent
```

The result will be an array of Matlab structs that correspond to the requested symbols:

```matlab
data =
1×3 struct array with fields:
Symbol
Most_Recent_Trade
Most_Recent_Trade_Size
Most_Recent_Trade_Time
Most_Recent_Trade_Market_Center
Total_Volume
Bid
...
```

```matlab
>> data(2)
ans =
struct with fields:
Symbol: 'GOOG'
Most_Recent_Trade: 1078.99
Most_Recent_Trade_Size: 1
Most_Recent_Trade_Time: '19:58:47.052099'
Most_Recent_Trade_Market_Center: 26
Total_Volume: 0
Bid: 1077.6
Bid_Size: 100
Ask: 1079.89
Ask_Size: 200
Open: []
High: []
Low: []
Close: 1078.92
Message_Contents: 'Cbav'
Message_Description: 'Last qualified trade; A bid update occurred; An ask update occurred; A volume update occurred'
Most_Recent_Trade_Conditions: '0517'
Trade_Conditions_Description: 'Average Price Trade; Form-T Trade'
Most_Recent_Market_Name: 'Direct Edge X (EDGX)'
```

If you have the Professional license of `IQML` and also Matlab’s Parallel Computing Toolbox, then setting the `UseParallel` parameter to `true` (or 1) will process the quotes query for all the specified symbols in parallel (see discussion in §3.6). Note that in the case of quote queries, there is often little or no speedup in parallelization, because the delay is caused by waiting for market quote events, not due to CPU processing:

```matlab
>> data = IQML('quotes', 'symbols', {'IBM', 'GOOG', 'AAPL'}, 'UseParallel', true);
```

Note that if you request quotes for a very large number of symbols in a single `IQML` command, and especially if you set `UseParallel` to `true`, you might run into your IQFeed account’s symbols-limit (MaxSymbols; see §9.3). In such a case, IQFeed-generated error messages such as the following will be displayed on the Matlab console:

```
Warning: Requesting 3258 symbol quotes, which is more than your IQFeed account’s concurrent symbols limit (500) - quotes for some symbols may not be available.
(Type "warning off IQML:MaxSymbols" to suppress this warning.)
Level1 symbol limit reached - symbol 'IBM' not serviced!
```
By default, IQFeed reports 16 data fields for each quote: Symbol, Most Recent Trade, Most Recent Trade Size, Most Recent Trade Time, Most Recent Trade Market Center, Total Volume, Bid, Bid Size, Ask, Ask Size, Open, High, Low, Close, Message Contents, and Most Recent Trade Conditions. If the **Fields** parameter is set to an empty value ({} or ''), the current set of fields and the full list of available fields, are reported (in this case, a **Symbol** parameter is unnecessary):

```matlab
>> data = IQML('quotes', 'fields', {})
data =
    CurrentFields: {1x16 cell}
    AvailableFields: {1x68 cell}

>> data.AvailableFields
ans =
    1x68 cell array
    Columns 1 through 5
      {'Symbol'}  {'Exchange ID'}  {'Last'}  {'Change'}  {'Percent Change'}
    Columns 6 through 11
      {'Total Volume'}  {'High'}  {'Low'}  {'Bid'}  {'Ask'}  {'Bid Size'}
    Columns 12 through 17
      {'Ask Size'}  {'Tick'}  {'Range'}  {'Open Interest'}  {'Open'}  {'Close'}
    Columns 18 through 22
      {'Spread'}  {'Settle'}  {'Delay'}  {'Restricted Code'}  {'Net Asset Value'}
```

If you have the Professional (or trial) **IQML** license, you can request IQFeed to report more than 50 additional data fields, and/or change the reported fields and their order, using the optional **Fields** parameter, as follows:

*We can set **Fields** to 'All' (or 'all') to request all available data fields in reported quotes.*

```matlab
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', 'all')
data =
    Symbol: 'AAPL'
    x7_Day_Yield: []
    Ask: 222.91
    Ask_Change: []
    Ask_Market_Center: 28
    Ask_Size: 100
    Ask_Time: '19:59:42.031900'
    Available_Regions: []
    Average_Maturity: []
    Bid: 222.71

The field names in the reported Matlab struct are the same as the IQField field names, except for the following minor changes to create valid Matlab field identifiers:

- spaces are replaced by '_' ("Ask Change" \(\rightarrow\) **Ask_Change**)
- 'x' is prefixed to fields that start with numbers ("7 Day Yield" \(\rightarrow\) **x7_Day_Yield**)

A complete table of available fields is provided for convenience at the bottom of this section. If you are uncertain about the meaning of a certain field, or wish to know

---

19 The additional textual fields **Message_Description**, **Trade_Conditions_Description** and **Most_Recent_Market_Name** are **IQML**-generated textual interpretations of the codes in the IQFeed-generated **Message_Contents**, **Trade_Conditions** and **Most_Recent_Trade_Market_Center** fields, respectively, as governed by the **MsgParsingLevel** parameter (see §3.2).

20 Additional description fields will be generated by **IQML** for those fields that report value codes (for example, the Fraction Display Code and Financial Status Indicator fields), as governed by the **MsgParsingLevel** parameter (see §3.2).
which field reports certain data, please ask your DTN IQFeed representative (after all, *IQML* just reports the data as provided by IQFeed).

Some of the reported field values may be empty. For example, AAPL’s `Average_Maturity` value is empty since this field is only relevant for bonds, not stocks. Similarly, EURUSD.FXCM’s `Market_Capitalization` value is empty because Forex securities have no market cap. Likewise, `Net_Ascet_Value` is only relevant for funds.

`Delay=[]` indicates a real-time quote, whereas `Delay=15` indicates that the quote was delayed 15 minutes by the exchange (presumably because you do not possess a real-time data subscription for this exchange/security-type).

The **Fields** parameter can be set to any subset of `AvailableFields`, as either a cell-array of strings, or as a comma-separated string. In this case, any subsequent quotes query will report the requested fields, in the specified order. For example:

```plaintext
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', {'Bid','Ask','Last'})
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', 'Bid,Ask,Last')  % equivalent
```

The order of the specified **Fields** indicates the order in which the data fields will be reported. For example, to change the order of the reported data fields above:

```plaintext
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', 'Last,Ask,Bid')
data =
  Symbol: 'AAPL'
  Last: 222.11
  Ask: 222.91
  Bid: 222.71
```

Note that the `Symbol` field is always reported in the first position, regardless of whether or not it was specified in the **Fields** list, or of its specified position order in the **Fields** list (also note the optional spaces between the comma-separated field names):

```plaintext
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', 'Bid, Ask, Last, Symbol')
data =
  Symbol: 'AAPL'
  Bid: 222.71
  Ask: 222.91
  Last: 222.11
```

As noted, **Fields** can be set to any subset of the `AvailableFields`. If a bad field is specified (one which is not available in IQFeed), an error message will be displayed:

```plaintext
>> data = IQML('quotes', 'Symbol', 'AAPL', 'Fields', 'Bid, Ask, xyz')
Error using IQML
Bad field 'xyz' was requested in IQML quotes command (check the capitalization/spelling).
Available fields are: 7 Day Yield, Ask, Ask Change, Ask Market Center, ...
```

Note: the more fields that you request, the longer the required processing time, by both IQFeed and *IQML*. To improve run-time performance and reduce latency, request only those data fields that are actually needed by your program.

---

21 `AvailableFields` is reported by an `IQML('quotes','fields',{})` command – see the previous page in this User Guide.
The following parameters affect quotes data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symbol or Symbols</strong></td>
<td>colon or comma-delimited string, or cell-array of strings</td>
<td>(none)</td>
<td>Limits the query to the specified symbol(s). Examples: <em>'@VX#'</em>&lt;br&gt; <em>'IBM:AAPL:GOOG'</em>&lt;br&gt; *'IBM,AAPL,GOOG'**&lt;br&gt; <em>{'IBM', 'AAPL', 'GOOG'}</em>&lt;br&gt; This parameter must be set to valid symbol name(s). Multiple symbols can be parallelized using the <strong>UseParallel</strong> parameter (see below).</td>
</tr>
<tr>
<td><strong>NumOfEvents</strong></td>
<td>integer</td>
<td>1</td>
<td>Returns up to the specified number of quotes</td>
</tr>
<tr>
<td><strong>Timeout</strong></td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds to wait for incoming data (0-9000, where 0 means infinite)</td>
</tr>
<tr>
<td><strong>UseParallel</strong></td>
<td>logical (true/false)</td>
<td>false</td>
<td>If set to true or 1, and if Parallel Computing Toolbox is installed, then querying multiple symbols will be done in parallel (see §3.6; Professional IQML license only).</td>
</tr>
<tr>
<td><strong>Fields</strong></td>
<td>colon or comma-separated string, or cell-array of strings</td>
<td>'Symbol, Most Recent Trade, Most Recent Trade Size, Most Recent Trade Time, Most Recent Trade Market Center, Total Volume, Bid, Bid Size, Ask, Ask Size, Open, High, Low, Close, Message Contents, Most Recent Trade Conditions'</td>
<td>Sets the list of data fields reported by IQFeed for each quote. IQFeed’s default set has 16 fields; 50+ additional fields can be specified (a detailed list of fields is provided below). If <strong>Fields</strong> is set to an empty value ({}) or &quot;&quot;, the list of current, available fields is returned. If <strong>Fields</strong> is not empty, subsequent quotes queries will return the specified fields, in the specified order (Professional IQML license only). The Symbol field is always returned first, even if not specified. Examples: <em>'Bid:Ask:Last'</em>&lt;br&gt; *'Bid, Ask, Last'**&lt;br&gt; <em>{'Bid', 'Ask', 'Last'}</em>&lt;br&gt; <em>'All' (indicates all available fields)</em></td>
</tr>
</tbody>
</table>

The full list of available fields in IQFeed as of July 2019 is listed below. Note that some of these fields may not be available, and IQFeed may also add/modify this list at any time. The list of fields that are actually available can be retrieved in IQML using the IQML('quotes', 'fields', {}) command, as explained above. For details about any of these fields, please contact your DTN/IQFeed representative (IQML just reports the data, it has no control over the reported values or definition of the data fields).

22 In IQML, the **Symbol** and **Symbols** parameters are synonymous – you can use either of them, in any capitalization.
<table>
<thead>
<tr>
<th>Field Name</th>
<th>Field Type</th>
<th>Description</th>
<th>Data origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Day Yield</td>
<td>float</td>
<td>Value of a Money Market fund over past 7 days.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Ask</td>
<td>float</td>
<td>Min price a market maker/broker accepts for a security.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Ask Change</td>
<td>float</td>
<td>Change in Ask since last offer.</td>
<td>IQConnect</td>
</tr>
<tr>
<td>Ask Market Center</td>
<td>integer</td>
<td>Market Center that sent the ask information (see §8.3).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Ask Size</td>
<td>integer</td>
<td>The share size available for the ask price</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Ask Time</td>
<td>hh:mm:ss.ffffff</td>
<td>The time of the last ask. May be reported as 99:99:99 outside trading hours to indicate an invalidated quote.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Available Regions</td>
<td>string</td>
<td>Dash-delimited list of available regional exchanges.</td>
<td>IQConnect</td>
</tr>
<tr>
<td>Average Maturity</td>
<td>float</td>
<td>Average number of days until maturity of a Money Market Fund's assets.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Bid</td>
<td>float</td>
<td>Max price a market maker/broker will pay for a security.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Bid Change</td>
<td>float</td>
<td>Change in Bid since last offer.</td>
<td>IQConnect</td>
</tr>
<tr>
<td>Bid Market Center</td>
<td>integer</td>
<td>Market Center that sent the bid information (see §8.3).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Bid Size</td>
<td>integer</td>
<td>The share size available for the bid price</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Bid Time</td>
<td>hh:mm:ss.ffffff</td>
<td>The time of the last bid. May be reported as 99:99:99 outside trading hours to indicate an invalidated quote.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Change</td>
<td>float</td>
<td>Today's change (Last - Close)</td>
<td>IQConnect</td>
</tr>
<tr>
<td>Change From Open</td>
<td>float</td>
<td>Change in last price since last open.</td>
<td>IQConnect</td>
</tr>
<tr>
<td>Close</td>
<td>float</td>
<td>The closing price of the day. For commodities this will be the last trade price of the session.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Close Range 1</td>
<td>float</td>
<td>For commodities only. Range value for closing trades that aren’t reported individually.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Close Range 2</td>
<td>float</td>
<td>For commodities only. Range value for closing trades that aren’t reported individually.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Days to Expiration</td>
<td>string</td>
<td>Number of days to contract expiration.</td>
<td>IQConnect</td>
</tr>
<tr>
<td>Decimal Precision</td>
<td>string</td>
<td>Last Precision used.</td>
<td>DTN</td>
</tr>
<tr>
<td>Delay</td>
<td>integer</td>
<td>The number of minutes a quote is delayed when not authorized for real-time data.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Exchange ID</td>
<td>hexadecimal</td>
<td>The Exchange Group ID.</td>
<td>DTN</td>
</tr>
<tr>
<td>Extended Trade</td>
<td>float</td>
<td>Price of the most recent extended trade (last qualified trades + Form T trades).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Extended Trade Date</td>
<td>MM/DD/CCYY</td>
<td>Date of the extended trade.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Extended Trade Market Center</td>
<td>integer</td>
<td>Market Center of the most recent extended trade (last qualified trades + Form T trades); see §8.3.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Extended Trade Size</td>
<td>integer</td>
<td>Size of the most recent extended trade (last qualified trades + Form T trades).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Extended Trade Time</td>
<td>hh:mm:ss.ffffff</td>
<td>Time (including microseconds) of the most recent extended trade (last qualified trades + Form T trades).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Extended Trading Change</td>
<td>float</td>
<td>Extended Trade minus Yesterday's close.</td>
<td>IQConnect</td>
</tr>
<tr>
<td>Extended Trading Difference</td>
<td>float</td>
<td>Extended Trade minus Last.</td>
<td>IQConnect</td>
</tr>
</tbody>
</table>

---

23 In this table, “exchange/other” means either the exchange, or some other 3rd-party that provides data to DTN/IQFeed.


<table>
<thead>
<tr>
<th>Field Name</th>
<th>Field Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Status Indicator</td>
<td>char</td>
<td>Denotes if an issuer has failed to submit its regulatory filings on a timely basis, has failed to meet the exchange's continuing listing standards and/or filed for bankruptcy. A corresponding description field will be generated by IQML for this field when <code>MsgParsingLevel</code> ≥ 2 (see §3.2)</td>
</tr>
<tr>
<td>Fraction Display Code</td>
<td>string</td>
<td>Display formatting code. A corresponding description field will be generated by IQML for this field when <code>MsgParsingLevel</code> ≥ 2 (see §3.2)</td>
</tr>
<tr>
<td>High</td>
<td>float</td>
<td>Today's highest trade price.</td>
</tr>
<tr>
<td>Last Date</td>
<td>MM/DD/CCYY</td>
<td>Date of the last qualified trade.</td>
</tr>
<tr>
<td>Last Market Center</td>
<td>integer</td>
<td>Market Center of most recent last qualified trade.</td>
</tr>
<tr>
<td>Last Size</td>
<td>integer</td>
<td>Size of the most recent last qualified trade.</td>
</tr>
<tr>
<td>Last Time</td>
<td>hh:mm:ss.ffffff</td>
<td>Time (including microseconds) of the most recent last qualified trade.</td>
</tr>
<tr>
<td>Low</td>
<td>float</td>
<td>Today's lowest trade price.</td>
</tr>
<tr>
<td>Market Capitalization</td>
<td>float</td>
<td>Real-time calculated market cap (Last price * Common Shares Outstanding).</td>
</tr>
<tr>
<td>Market Open</td>
<td>integer</td>
<td>1 = market open, 0 = market closed. Note: valid for Futures and Future Options only.</td>
</tr>
<tr>
<td>Message Contents</td>
<td>non-delimited</td>
<td>string of single characters of message identification code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Possible single character values include:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C – Last Qualified Trade</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E – Extended Trade = Form T trade</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O – Other Trade = Any trade not accounted for by C or E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b – A bid update occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a – An ask update occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o – An Open occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>h – A High occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 – A Low occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c – A Close occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>s – A Settlement occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>v – A volume update occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Notes: you can get multiple codes in a single message but you will only get one trade identifier per message. It is also possible to receive no codes in a message if the fields that updated were not trade or quote related. A corresponding description field is generated by IQML for this field when <code>MsgParsingLevel</code> ≥ 2 (see §3.2)</td>
</tr>
<tr>
<td>Most Recent Trade</td>
<td>float</td>
<td>Price of most recent trade (inc. non-last-qualified trades).</td>
</tr>
<tr>
<td>Most Recent Trade Aggressor</td>
<td>integer</td>
<td>Identifies if the trade was executed at the bid or the ask price. As of IQFeed 6.1, this feature is only supported for CME and ICE exchanges; unsupported symbols return []. Possible values: 0 – invalid or unsupported 1 – most recent trade was executed at the Ask price 2 – most recent trade was executed at the Bid price 3 – most recent trade was executed at some other price [ ] – unknown or unsupported (requires IQFeed client 6.1 or newer)</td>
</tr>
<tr>
<td>Most Recent Trade Conditions</td>
<td>string of 2-digit hex numbers</td>
<td>Conditions that identify the type of most recent trade. A corresponding description field is generated by IQML for this field when <code>MsgParsingLevel</code> ≥ 2 (see §3.2, §8.7)</td>
</tr>
<tr>
<td>Field Name</td>
<td>Field Type</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Most Recent Trade Date</td>
<td>MM/DD/CCYY</td>
<td>Date of most recent trade.</td>
</tr>
<tr>
<td>Most Recent Trade Day Code</td>
<td>integer</td>
<td>The day of month (1-31) in which the most recent trade occurred. (requires IQFeed client 6.1 or newer)</td>
</tr>
<tr>
<td>Most Recent Trade Market Center</td>
<td>integer</td>
<td>Market Center of most recent trade. A corresponding description field will be generated by IQML for this field when MsgParsingLevel ≥ 2 (see §3.2, §8.3)</td>
</tr>
<tr>
<td>Most Recent Trade Size</td>
<td>integer</td>
<td>Size of most recent trade.</td>
</tr>
<tr>
<td>Most Recent Trade Time</td>
<td>hh:mm:ss.ffffff</td>
<td>Time (including microseconds) of most recent trade.</td>
</tr>
<tr>
<td>Net Asset Value</td>
<td>float</td>
<td>The market value of a mutual fund share. Equal to net assets / total number of shares outstanding. Duplicates the Bid field. Valid for Mutual Funds only.</td>
</tr>
<tr>
<td>Number of Trades Today</td>
<td>integer</td>
<td>The number of trades for the current day.</td>
</tr>
<tr>
<td>Open</td>
<td>float</td>
<td>The opening price of the day. For commodities this will be the first trade of the session.</td>
</tr>
<tr>
<td>Open Interest</td>
<td>integer</td>
<td>IEOptions, Futures, FutureOptions, SSFutures only.</td>
</tr>
<tr>
<td>Open Range 1</td>
<td>float</td>
<td>For commodities only. Range value for opening trades that aren’t reported individually.</td>
</tr>
<tr>
<td>Open Range 2</td>
<td>float</td>
<td>For commodities only. Range value for opening trades that aren’t reported individually.</td>
</tr>
<tr>
<td>Percent Change</td>
<td>float</td>
<td>= Change / Close</td>
</tr>
<tr>
<td>Percent Off Average Volume</td>
<td>float</td>
<td>Current Total Volume / Average Volume</td>
</tr>
<tr>
<td>Previous Day Volume</td>
<td>integer</td>
<td>Previous Day's Volume.</td>
</tr>
<tr>
<td>Price-Earnings Ratio</td>
<td>float</td>
<td>Real-time calculated PE (Last / Earnings Per Share).</td>
</tr>
<tr>
<td>Range</td>
<td>float</td>
<td>Trading range for the current day (high - low)</td>
</tr>
<tr>
<td>Restricted Code</td>
<td>string</td>
<td>&quot;N&quot;=Short Sale is not restricted, &quot;R&quot;=Restricted.</td>
</tr>
<tr>
<td>Settle</td>
<td>float</td>
<td>Settle price (Futures or FutureOptions only).</td>
</tr>
<tr>
<td>Settlement Date</td>
<td>MM/DD/YYYY</td>
<td>The date that the Settle field is valid for.</td>
</tr>
<tr>
<td>Spread</td>
<td>float</td>
<td>The difference between Bid and Ask prices.</td>
</tr>
<tr>
<td>Symbol</td>
<td>string</td>
<td>The symbol name of the security</td>
</tr>
<tr>
<td>Tick</td>
<td>integer</td>
<td>173=Up, 175=Down, 183=No Change. Based on the previous trade. Only valid for Last qualified trades.</td>
</tr>
<tr>
<td>TickID</td>
<td>integer</td>
<td>Identifier for tick (not necessarily sequential).</td>
</tr>
<tr>
<td>Total Volume</td>
<td>integer</td>
<td>Today's cumulative volume in number of shares.</td>
</tr>
<tr>
<td>Type</td>
<td>string</td>
<td>“Q”=Update message, “P”=Summary Message.</td>
</tr>
<tr>
<td>Volatility</td>
<td>float</td>
<td>Real-time calculated volatility: (High - Low) / Last.</td>
</tr>
<tr>
<td>VWAP</td>
<td>float</td>
<td>Volume Weighted Average Price.</td>
</tr>
</tbody>
</table>
4.2 Fundamental information

Fundamental data on a symbol can be fetched using a 'fundamental' action, as follows:

```python
>> data = IQML('fundamental', 'symbol', 'IBM')
data =
```

```python
Symbol: 'IBM'
Exchange_ID: 7
PE: 25.7
Average_Volume: 4588000
x52_Week.High: 180.95
x52_Week.Low: 139.13
Calendar.Year.High: 171.13
Calendar.Year.Low: 144.395
Dividend_Yield: 3.79
Dividend_Amount: 1.5
Dividend_Rate: 6
Pay_Date: '03/10/2018'
Ex_dividend_Date: '02/08/2018'
Short_Interest: 17484332
Current.Year_EPS: 6.17
Next.Year_EPS: []
Five_year_Growth_Percentage: -0.16
Fiscal_Year_End: 12
Company_Name: 'INTERNATIONAL BUSINESS MACHINE'
Root_Option_Symbol: 'IBM'
Percent_Held_By_Institutions: 59.9
Beta: 1.05
Leaps: []
Current_Assets: 49735
Current_Liabilities: 37363
Balance_Sheet_Date: '12/31/2017'
Long_term_Debt: 39837
Common_Shares_Outstanding: 921168
Split_Factor_1: '0.50 05/27/1999'
Split_Factor_2: '0.50 05/28/1997'
Market_Center: []
Format_Code: 14
Precision: 4
SIC: 7373
Historical_Volatility: 25.79
Security_Type: 1
Listed_Market: 7
x52_Week.High_Date: '03/08/2017'
x52_Week.Low_Date: '08/21/2017'
Calendar.Year.High_Date: '01/18/2018'
Calendar.Year.Low_Date: '02/09/2018'
Year_End_Close: 153.42
Maturity_Date: []
Coupon_Rate: []
Expiration_Date: []
Strike_Price: []
NAICS: 541512
Exchange_Root: []
Option_Premium Multiplier: []
Option_Multiple_Deliverable: []
Session_Open_Time: []
Session_Close_Time: []
Base_Currency: []
Contract_Size: []
Contract_Months: []
Minimum_Tick_Size: []
First_Delivery_Date: []
FIGI: 'BBG000BLNNH6'
```
Security_SubType: 
Price_Format_Description: 'Four decimal places'
Exchange_Description: 'New York Stock Exchange (NYSE)'
Listed_Market_Description: 'New York Stock Exchange (NYSE)'
Security_Type_Description: 'Equity'
Security_SubType_Description: ''
SIC_Description: 'COMPUTER INTEGRATED SYSTEMS DESIGN'
NAICS_Description: 'Computer Systems Design Services'
SIC_Sector_Name: 'Services'
NAICS_Sector_Name: 'Professional, Scientific, Technical services'

Notes:

1. the naming, interpretation and order of returned data fields is controlled by IQFeed, not by IQML – DTN might change these fields in the future.

2. Splits – when only one split is available, Split_Factor_2 will be empty; when no splits are known to IQFeed, both split fields will be empty. Splits are reported as '#.## <mm/dd/yyyy date>', i.e. an American-format date rounded to 2 decimal digits.²⁶ In any case, only the last 2 splits are reported by IQFeed.²⁷

3. the inclusion of the *Description fields (Price_Format_Description, Exchange_Description, etc.) depends on the MsgParsingLevel parameter having value of 2 or higher (see §3.2 for details). When MsgParsingLevel is 1 or 0, these fields will not be part of the returned data struct.

4. Depending on your IQFeed client version, additional fundamental data fields may be returned. For example, the following fields were added in client 6.1 (some fields only have values for certain security types, e.g. futures/options):
   Session_Open_Time, Session_Close_Time, Base_Currency, Contract_Size, FIGI, Contract_Months, Minimum_Tick_Size, First_Delivery_Date, and Security_SubType.

For example, (redacted for clarity):

```python
>> data = IQML('fundamental', 'symbol', '@ES#')
data =
struct with fields:
  Symbol: '@ES#'
  Exchange_ID: 34
  PE: []
  Average_Volume: []
  x52_Week_High: 3006
  x52_Week_Low: 2350
  ... 
  Company_Name: 'E-MINI S&P 500 SEPTEMBER 2019'
  Expiration_Date: '09/20/2019'
  Exchange_Root: 'ES'
  Session_Open_Time: '18:00:00'
  Session_Close_Time: '17:00:00'
  Base_Currency: 'USD'
  Contract_Size: 50
  Contract_Months: '---H---M---U--Z'
  Minimum_Tick_Size: 0.25
  Underlying_Contract: '@ESU19'
  Exchange_Description: 'Chicago Mercantile Exchange (CME)' 
  Listed_Market_Description: 'Chicago Mercantile Exchange Mini Sized Contracts (CMEMINI)'
  Security_Type_Description: 'Future'
```

²⁶ http://forums.iqfeed.net/index.cfm?page=topic&topicID=5582. Note that this could lead to numeric inaccuracies, for example GOOGL’s split on 4/3/2014 is reported as 0.50 rather than the more accurate 1.998 = 0.5005. Also note that some splits (e.g. GOOG’s 1:2.002 split on 3/27/2014) are not reported by IQFeed for some reason (probably a data error).

²⁷ For additional (and more accurate) splits history, refer to https://www.stocksplithistory.com
To improve run-time performance, fundamental data is cached in Matlab memory for each symbol. IQFeed is queried for fundamental data for a symbol only if the symbol was not previously queried in the current Matlab session. This is typically a good thing, because fundamental data is relatively stable. To force IQML to re-query IQFeed for fundamental data even when it is cached, set the **Debug** parameter:

```matlab
>> data = IQML('fundamental', 'symbol', 'AAPL', 'debug', true); % re-query IQFeed
>> data = IQML('debug', false); % exit debug mode
```

It is possible to fetch fundamental data of multiple symbols in a single IQML command, by specifying a colon-delimited or cell-array list of symbols:

```matlab
>> data = IQML('fundamental', 'symbol', 'AAPL:GOOG') % or: { 'AAPL', 'GOOG' }
```

The list of fundamental data fields in IQFeed as of 1/7/2019 is listed below. Note that IQFeed may modify this list at any time (for example, IQFeed client 6.1 has added several fields). For details about any of these fields, please ask DTN/IQFeed. IQML just reports the data, it has no control over the reported values or definition of data fields. Note that the fundamental data fields cannot be modified, unlike quotes fields.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Field Type</th>
<th>Description</th>
<th>Data origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol</td>
<td>string</td>
<td>The Symbol ID to match with watch request</td>
<td>DTN</td>
</tr>
<tr>
<td>Exchange ID</td>
<td>hexadecimal</td>
<td>This is the Exchange Group ID (code). Convert to decimal and use the Listed Markets lookup to decode this value.</td>
<td>DTN</td>
</tr>
<tr>
<td>PE</td>
<td>float</td>
<td>Price/Earnings ratio</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Average Volume</td>
<td>integer</td>
<td>Average daily volume (4 week average)</td>
<td>DTN</td>
</tr>
<tr>
<td>52 Week High</td>
<td>float</td>
<td>Highest price of the last 52 weeks. For futures, this is the contract High.</td>
<td>DTN</td>
</tr>
</tbody>
</table>

28 In IQML, the **Symbol** and **Symbols** parameters are synonymous — you can use either of them, in any capitalization.

29 In this table, “exchange/other” means either the exchange, or some other 3rd-party that provides data to DTN/IQFeed.
<table>
<thead>
<tr>
<th>Field Name</th>
<th>Field Type</th>
<th>Description</th>
<th>Data origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>52 Week Low</td>
<td>float</td>
<td>Lowest price of the last 52 weeks. For futures, this is the contract Low.</td>
<td>DTN</td>
</tr>
<tr>
<td>Calendar year high</td>
<td>float</td>
<td>High price for the current calendar year.</td>
<td>DTN</td>
</tr>
<tr>
<td>Calendar year low</td>
<td>float</td>
<td>Low price for the current calendar year.</td>
<td>DTN</td>
</tr>
<tr>
<td>Dividend yield</td>
<td>float</td>
<td>The annual dividends per share paid by the company divided by current market price per share of stock, as a % value.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Dividend amount</td>
<td>float</td>
<td>The current quarter actual dividend</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Dividend rate</td>
<td>float</td>
<td>The annualized dividend expected to be paid by company</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Pay date</td>
<td>MM/DD/YYYY</td>
<td>Date on which a company made its last dividend payment</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Ex-dividend date</td>
<td>MM/DD/YYYY</td>
<td>The actual date in which a stock goes ex-dividend, typically about 3 weeks before the dividend is paid to shareholders of record. The amount of the dividend is reflected in a reduction of the share price on this date.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Short Interest</td>
<td>integer</td>
<td>Total number of shares of a security that were sold short by customers and securities firms that have not been repurchased to settle outstanding short market positions</td>
<td>3rd party</td>
</tr>
<tr>
<td>Current year earnings per share</td>
<td>float</td>
<td>The portion of a company's profit allocated to each outstanding share of common stock</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Next year earnings per share</td>
<td>float</td>
<td>Total amount of earnings per share a company is estimated to accumulate over the next 4 quarters of current fiscal year</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Five-year growth percentage</td>
<td>float</td>
<td>Earnings Per Share growth rate over a five year period</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Fiscal year end</td>
<td>integer</td>
<td>The two-digit month that the fiscal year ends for a company. For example, 4=April.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Company name</td>
<td>string</td>
<td>Company name or contract description</td>
<td>DTN</td>
</tr>
<tr>
<td>Root Option symbol</td>
<td>string</td>
<td>A space separated list (there may be more than one)</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Percent held by institutions</td>
<td>float</td>
<td>A percentage of outstanding shares held by banks and institutions.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Beta</td>
<td>float</td>
<td>A coefficient measuring a security’s relative volatility; the covariance of this security’s price in relation to the rest of the market. 30 day historical volatility.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Leaps (there may be more than one)</td>
<td>string</td>
<td>Long term equity anticipation securities</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Current assets</td>
<td>float</td>
<td>The amount of total current assets held by a company as of a specific date in Millions (lastADate)</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Current liabilities</td>
<td>float</td>
<td>The amount of total current liabilities held by a company as of a specific date in Millions (lastADate).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Balance sheet date</td>
<td>MM/DD/YYYY</td>
<td>Last date that a company issued their quarterly report.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Long-term debt</td>
<td>float</td>
<td>The amount of long term debt held by a company as of a specific date in Millions (lastADate).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Common shares outstanding</td>
<td>float</td>
<td>The amount of common shares outstanding (in thousands).</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Split factor 1</td>
<td>string</td>
<td>A float a space, then MM/DD/YYYY. For example: '0.5 12/20/2013'</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Split factor 2</td>
<td>string</td>
<td>A float a space, then MM/DD/YYYY. For example: '0.5 12/20/2013'</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Format Code</td>
<td>string</td>
<td>Display format code</td>
<td>DTN</td>
</tr>
<tr>
<td>Precision</td>
<td>integer</td>
<td>Number of decimal digits</td>
<td>DTN</td>
</tr>
<tr>
<td>Field Name</td>
<td>Field Type</td>
<td>Description</td>
<td>Data origin</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SIC</td>
<td>integer</td>
<td>Standard Industrial Classification – a 4-digit federal code that identifies the security’s specific industry.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Historical Volatility</td>
<td>float</td>
<td>30-trading day volatility, calculated using Black-Scholes</td>
<td>DTN</td>
</tr>
<tr>
<td>Security Type</td>
<td>string</td>
<td>The security type code</td>
<td>DTN</td>
</tr>
<tr>
<td>Listed Market</td>
<td>string</td>
<td>The listing market ID</td>
<td>DTN</td>
</tr>
<tr>
<td>52 Week High Date</td>
<td>MM/DD/YYYY</td>
<td>The date of the highest price of the last 52 weeks. For futures, this is the contract High Date.</td>
<td>DTN</td>
</tr>
<tr>
<td>52 Week Low Date</td>
<td>MM/DD/YYYY</td>
<td>The date of the lowest price of the last 52 weeks. For futures, this is the contract Low Date.</td>
<td>DTN</td>
</tr>
<tr>
<td>Calendar Year High Date</td>
<td>MM/DD/YYYY</td>
<td>Date at which the High price for the current calendar year occurred.</td>
<td>DTN</td>
</tr>
<tr>
<td>Calendar Year Low Date</td>
<td>MM/DD/YYYY</td>
<td>Date at which the Low price for the current calendar year occurred.</td>
<td>DTN</td>
</tr>
<tr>
<td>Year End Close</td>
<td>float</td>
<td>Price of Year End Close (Equities Only)</td>
<td>DTN</td>
</tr>
<tr>
<td>Maturity Date</td>
<td>MM/DD/YYYY</td>
<td>Date of maturity for a Bond.</td>
<td>DTN</td>
</tr>
<tr>
<td>Coupon Rate</td>
<td>float</td>
<td>Interest Rate for a Bond.</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>Expiration Date</td>
<td>MM/DD/YYYY</td>
<td>IEOptions, Futures, FutureOptions, and SSFutures only</td>
<td>IEOptions by the exchange; others by DTN</td>
</tr>
<tr>
<td>Strike Price</td>
<td>float</td>
<td>IEOptions only</td>
<td>Exchange/other</td>
</tr>
<tr>
<td>NAICS</td>
<td>integer</td>
<td>North American Industry Classification System code</td>
<td>3rd party</td>
</tr>
<tr>
<td>Exchange Root</td>
<td>string</td>
<td>The root symbol under which this symbol is listed at the exchange.</td>
<td>Exchange</td>
</tr>
<tr>
<td>Options Premium Multiplier</td>
<td>float</td>
<td>IEOptions only</td>
<td>3rd party</td>
</tr>
<tr>
<td>Options Multiple Deliverables</td>
<td>integer</td>
<td>IEOptions only. 1 means they exist, 0 means they do not.</td>
<td>3rd party</td>
</tr>
<tr>
<td>Session Open Time</td>
<td>hh:mm:ss</td>
<td>Futures and Future Options Only (IQFeed 6.1 or newer)</td>
<td>3rd party</td>
</tr>
<tr>
<td>Session Close Time</td>
<td>hh:mm:ss</td>
<td>Futures and Future Options Only (IQFeed 6.1 or newer)</td>
<td>3rd party</td>
</tr>
<tr>
<td>Base Currency</td>
<td>string</td>
<td>Futures and Future Options Only (IQFeed 6.1 or newer)</td>
<td>3rd party</td>
</tr>
<tr>
<td>Contract Size</td>
<td>string</td>
<td>Deliverable quantity of a future or option contract. (IQFeed 6.1 or newer)</td>
<td>3rd party</td>
</tr>
<tr>
<td>Contract Months</td>
<td>string</td>
<td>non-delimited string of upper-case single character month codes (IQFeed 6.1 or newer)</td>
<td>3rd party</td>
</tr>
<tr>
<td>Minimum Tick Size</td>
<td>float</td>
<td>Minimum price movement. (IQFeed 6.1 or newer)</td>
<td>3rd party</td>
</tr>
<tr>
<td>First Delivery Date</td>
<td>MM/DD/YYYY</td>
<td>Futures and Future Options Only (IQFeed 6.1 or newer)</td>
<td>3rd party</td>
</tr>
<tr>
<td>FIGI</td>
<td>string</td>
<td>Financial Instrument Global Identifier (IQFeed 6.1 or newer). For example: 'BBG000BLNNH6' (IBM)</td>
<td>3rd party</td>
</tr>
<tr>
<td>Security SubType</td>
<td>integer</td>
<td>The security’s SubType code (IQFeed 6.1 or newer). 1=Binary option, 2=weekly option, 3=ETF, []=other</td>
<td>DTN</td>
</tr>
<tr>
<td>Underlying Contract</td>
<td>string</td>
<td>The specific future contract that underlies a continuous future. For example, for @ES# this might be '@ESU19'</td>
<td>IQML</td>
</tr>
</tbody>
</table>

30 https://www.census.gov/eos/www/naics

Unlike all other fields, this field is not reported by IQFeed but rather computed by IQML, based on the reported fields (Symbol and Expiration Date). It contains a non-empty value only for continuous future contracts (e.g. @ES#).
4.3 Interval bars

Interval bars data for one or more symbols can be fetched using the 'intervalbars' action. For example, to fetch the latest 60-second interval bar for the current E-Mini contract:

```plaintext
>> data = IQML('intervalbars', 'Symbol','@ES#')
data =
    Symbol: '@ES#'
    BarType: 'Complete interval bar from history'
    Timestamp: '2018-09-05 12:57:00'
    Open: 2887.75
    High: 2888.25
    Low: 2887.5
    Close: 2888.25
    CumulativeVolume: 1117565
    IntervalVolume: 913
    NumberOfTrades: 0
```

In the returned data struct, we can see the following fields:

- **Symbol** – the requested Symbol.
- **BarType** – typically ‘Complete interval bar from history’, but in some cases might be ‘Complete interval bar from stream’ or ‘Updated interval bar’.
- **Timestamp** – server timestamp (string format) for this interval bar. The timestamp is of the end of the bar, not the beginning.
- **Open** – price at the start of this interval bar.
- **High** – highest price during this interval bar.
- **Low** – lowest price during this interval bar.
- **Close** – price at the end of this interval bar.
- **CumulativeVolume** – total trade volume since start of the current trading day.
- **IntervalVolume** – trade volume during this interval bar.
- **NumberOfTrades** – number of trades during this interval bar. Relevant only when IntervalType is set to 'ticks'/trades'.

The **IntervalType** (default: 'secs') and **IntervalSize** (default: 60) parameters should typically be specified together. Note that **IntervalSize** must be a positive integer value (i.e. its value cannot be 4.5 or 0). If **IntervalType** is 'ticks'/trades', **IntervalSize** must be 2 or higher. If **IntervalType** is 'volume', **IntervalSize** must be 100 or higher. If **IntervalType** is 'secs', **IntervalSize** must be any integer between 1-300 (5 minutes), or any multiple of 60 (1 minute) between 300-3600 (1 hour), or 7200 (2 hours).  

We can ask for multiple bars by setting **NumOfEvents** or **MaxItems** to a positive integer, resulting in an array of structs in the format above (empty array if no data is available):

```plaintext
>> data = IQML('intervalbars', 'Symbol','@VX#', 'NumOfEvents',4)
data =
    4×1 struct array with fields:
    Symbol
    BarType
    ...
```

33 Note that IQFeed’s limitations on live 'secs' interval bars are stricter than the limitations on historical interval bars (§5.4): http://forums.dtn.com/index.cfm?page=topic&topicID=5529
IQML only returns interval bars that had market ‘action’. Other bars are not sent from IQFeed – they will appear in IQML’s returned data as gaps in the Timestamp.

Also note that it is possible that not all the requested bars will be received before IQML’s timeout (default value: 5 secs) returns the results:

```
>> data = IQML('intervalbars', 'Symbol', 'IBM', 'NumOfEvents', 4)

Warning: IQML timeout: only partial data is returned. Perhaps the Timeout parameter should be set to a value larger than 5 or the NumOfEvents parameter to a value smaller than 4

```

To control the maximal duration that IQML will wait for the data, set the Timeout parameter. For example, to wait up to 60 secs to collect 4 bars:

```
>> data = IQML('intervalbars', 'Symbol', 'IBM', 'NumOfEvents', 4, 'timeout', 60);
```

Interval bars query fetches historical bars data, starting from the date/time that is set by the BeginDateTime parameter (see the parameters table below). This is similar to (and subject to the same limitations as) fetching historical interval data (see §5.4), but with no specified end point. IQML will return both the historical bars, as well as new (live) real-time streaming interval bars, as they become available. BeginDateTime’s default value is 00:00:00 today (server time), so you will almost always get historical bars before live streaming bars. If you run the query at mid-day, you may get hundreds of historical bars before you get the first live streaming bar. So, if you set NumOfEvents to a low value, you might receive only historical bars, without any live streaming bars.

Unlike quotes (§4.1), when you specify NumOfEvents > 1, IQML does not wait for new bars to arrive; instead, it returns previous (historic) bars, as long as this does not conflict with the specified BeginDateTime. For example, if you set NumOfEvents=5, you will receive the latest 5 bars: 4 complete historic bars, as well as the current (incomplete) bar. If you require live (future) interval bars, then set BeginDateTime, or use the streaming mechanism that is described in §6.3. For example, if you set BeginDateTime to 5 bars ago and NumOfEvents=15, then IQFeed will return the 5 historic bars and wait for 10 additional future bars (subject to the specified Timeout).

Additional data filtering parameters: MaxDays, BeginFilterTime and EndFilterTime.
You can query multiple symbols at the same time, in a single IQML command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
>> data = IQML('intervalbars', 'symbols', {'IBM', 'GOOG', 'AAPL'});
>> data = IQML('intervalbars', 'symbols', 'IBM:GOOG:AAPL'); % equivalent
```

If the query returns the same number of data elements for all symbols, the results will be returned as a struct array, with columns corresponding to the requested symbols:

```matlab
data =
100×3 struct array with fields:
    Symbol
    BarType
    Timestamp
    Open
    High
    Low
    Close
    CumulativeVolume
    IntervalVolume
    NumberOfTrades
```

However, if IQML returns a different amount of data for various symbols, the results are returned as a cell array, with cell elements corresponding to the requested symbols. For example, in the following query, there is no symbol ‘XXX’ so IQML returns empty results for this particular symbol:

```matlab
>> data = IQML('intervalbars', 'Symbol', 'IBM:GOOG:XXX', 'UseParallel', true)
data =
1×3 cell array
    {100×1 struct}    {100×1 struct}    {0×0 double}
```

If you have the Professional license of IQML and also Matlab’s Parallel Computing Toolbox, then setting the UseParallel parameter to true (or 1) will process the quotes query for all the specified symbols in parallel (see discussion in §3.6):

```matlab
>> data = IQML('intervalbars', 'symbols', {'IBM', 'GOOG', 'AAPL'}, ...
    'UseParallel', 1);  
```

The following parameters affect interval bars data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma-delimited string or cell-array of strings</td>
<td>(none)</td>
<td>Limits the request to the specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- '@VX#'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 'IBM: AAPL: GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- {'IBM', 'AAPL', 'GOOG'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s) when NumOfEvents&gt;0. Multiple symbols can be parallelized using the UseParallel parameter (see below).</td>
</tr>
</tbody>
</table>

---

34 The UseParallel parameter is set here in order to avoid the runtime error of “Symbol ‘XXX’ was not found”
35 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UseParallel</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If set to true or 1, and if Parallel Computing Toolbox is installed, then querying multiple symbols will be done in parallel (see §3.6; Professional IQML license only).</td>
</tr>
<tr>
<td>NumOfEvents</td>
<td>integer</td>
<td>Inf</td>
<td>One of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• inf – continuous endless streaming interval bars for specified symbol(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• N&gt;1 – stream only N interval bars</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 1 – get only a single interval bar</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 0 – stop streaming interval bars</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• -1 – return latest interval bars data while continuing to stream new bars</td>
</tr>
<tr>
<td>MaxItems</td>
<td>integer</td>
<td>100</td>
<td>Returns up to the specified number of bars (if available).</td>
</tr>
<tr>
<td>MaxDays</td>
<td>integer</td>
<td>1</td>
<td>Max number of trading days to retrieve</td>
</tr>
<tr>
<td>IntervalType</td>
<td>string</td>
<td>'secs'</td>
<td>Sets the type of interval size. One of the following values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 's' or 'secs' – time [seconds] (default)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'v' or 'volume' – traded volume</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 't' or 'ticks' – number of ticks</td>
</tr>
<tr>
<td>IntervalSize</td>
<td>integer</td>
<td>60</td>
<td>Size of bars in IntervalType units. Must be ≥1 for secs, ≥2 for ticks, ≥100 for volume.</td>
</tr>
<tr>
<td>BeginFilterTime</td>
<td>string</td>
<td>'00:00:00'</td>
<td>Only return bars that begin after this time of day (US Eastern time-zone). Format: 'hhmm', 'hh:mm', 'hhmmss' or 'hh:mm:ss'.</td>
</tr>
<tr>
<td>EndFilterTime</td>
<td>string</td>
<td>'23:59:59'</td>
<td>Only return bars that end before this time of day (US Eastern time-zone). Format: 'hhmm', 'hh:mm', 'hhmmss' or 'hh:mm:ss'.</td>
</tr>
<tr>
<td>BeginDateTime</td>
<td>integer or string or datetime object</td>
<td>'' meaning today at 00:00:00</td>
<td>Only return bars that begin after this date/time (US Eastern time-zone). Format: Matlab datenum, or 'yyyymmdd hhmmss', or 'yyyy-mm-dd hh:mm:ss' etc.</td>
</tr>
<tr>
<td>Timeout</td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds to wait (0-9000) for data in blocking mode (0 means infinite)</td>
</tr>
</tbody>
</table>
4.4 Market depth (Level 2)

Level 2 (II) market data on a symbol can be fetched using a 'marketdepth' action. Deep order-book rows (market depth) are reported for futures, and the top Bid/Ask for each separate market maker (market width) are reported for equities. The following example fetches market-depth data for the S&P E-Mini continuous future:

```matlab
>> data = IQML('marketdepth', 'symbol', '@ES#')
data = 10×1 struct array with fields:
    Symbol    ID    Bid   Ask   BidSize   AskSize   BidTime   Date   AskTime   BidInfoValid   AskInfoValid   Condition   Condition_Description   ID_Description
```

The latest data (i.e., state of the market-depth table) is returned as a Matlab struct array, whose elements correspond to the market-depth rows. For example, to see the data for row #3 (i.e., 2 rows below the top-of-book row), you can access array element #3:

```matlab
>> data(3)
ans =
    struct with fields:
        Symbol: '@ES#'
        ID: 'MD03'
        Bid: 2926.75
        Ask: 2928
        BidSize: 94
        AskSize: 129
        BidTime: '03:21:15.037291'
        Date: '2019-05-02'
        AskTime: '03:21:19.064197'
        BidInfoValid: 1
        AskInfoValid: 1
        Condition: 52
        Condition_Description: 'regular'
        ID_Description: 'Order book row #3'
```

BidInfoValid and AskInfoValid values are logical (true/false) values, which appear as 1 or 0 (respectively) in the returned data struct. The ID field ('MD03' in this case) indicates that this is market-depth row 3 (also note the related ID_Description field).

Each incoming market depth message provides information on a single Level 2 data row. IQFeed’s messages arrive at a random, unsorted, unpredictable order in two groups: first the messages that define the current (snapshot) baseline of all rows, then update messages for individual rows when traders add, cancel or modify orders.

---

36 Until IQFeed version 6.1, IQFeed did not offer deep market depth for equities, nor market width for futures. For such detailed information you could use premium services such as Nasdaq TotalView (http://nasdaqtrader.com/Trader.aspx?id=Totalview2). IQFeed 6.2 enabled deep market depth (so-called “Market-By-Order”), which are supported starting with IQML version 2.30.
Depending on the requested **Symbol**, IQFeed may report 5 to 15 market-depth rows. To ensure that all the baseline data rows are received, set the **NumOfEvents** parameter to at least the total number of rows expected for the **Symbol**. For example:

```matlab
>> data = IQML('marketdepth', 'symbol', '@ES#', 'NumOfEvents', 15)
data = 10×1 struct array with fields:
  Symbol     ID     Bid    Ask    BidSize   AskSize   BidTime   ... 
     '@ES#'  'MD01'  2927.25 2927.5  58    121  '03:21:25.213504'
     '@ES#'  'MD02'  2927  2927.75  78   111  '03:21:22.040253'
     '@ES#'  'MD03'  2926.75 2928   94    129  '03:21:15.037291'
     '@ES#'  'MD04'  2926.5  2928.25  95   107  '03:21:04.023779'
     '@ES#'  'MD05'  2926.5  2928.75 104   184  '03:42:19.025285'
     '@ES#'  'MD06'  2926.25 2929   123   181  '03:42:43.020801'
     '@ES#'  'MD07'  2926  2929.25  137   127  '03:42:01.042949'
     '@ES#'  'MD08'  2925.75 2929.5  86   135  '03:42:01.029094'
     '@ES#'  'MD09'  2925.5  2929.75 183   161  '03:42:02.021818'
     '@ES#'  'MD10'  2925.25 2930  152   382  '03:42:07.003202'
```

The returned struct array can be converted into a Matlab table object, as follows:

```matlab
>> struct2table(data)
ans =
  10×14 table
   Symbol    ID    Bid     Ask    BidSize   AskSize    BidTime   ... 
     '@ES#'  'MD01'  2927.25 2927.5  58    121  '03:21:25.213504'
     '@ES#'  'MD02'  2927  2927.75  78   111  '03:21:22.040253'
     '@ES#'  'MD03'  2926.75 2928   94    129  '03:21:15.037291'
     '@ES#'  'MD04'  2926.5  2928.25  95   107  '03:21:04.023779'
     '@ES#'  'MD05'  2926.5  2928.75 104   184  '03:42:19.025285'
     '@ES#'  'MD06'  2926.25 2929   123   181  '03:42:43.020801'
     '@ES#'  'MD07'  2926  2929.25  137   127  '03:42:01.042949'
     '@ES#'  'MD08'  2925.75 2929.5  86   135  '03:42:01.029094'
     '@ES#'  'MD09'  2925.5  2929.75 183   161  '03:42:02.021818'
     '@ES#'  'MD10'  2925.25 2930  152   382  '03:42:07.003202'
```

For equities, IQFeed returns market **width** (not **depth**) data – the top bid/ask row (but not order-book depth) for each market maker that trades the equity. For example:

```matlab
>> data = IQML('marketdepth', 'symbol', 'MSFT', 'NumOfEvents', 50)
data = 4×1 struct array with fields:
  Symbol     ID     Bid    Ask    BidSize   AskSize   BidTime   ... 
     'MSFT'   'BATS'   0     129.39  0      600  '18:29:49.000347'
```

Some fields at the table’s right side are not shown here due to space limitations, but are available in the actual Matlab object.
In this example, which was ran outside regular trading hours (early morning of 2019-05-02), BATS reported a valid Ask from the previous evening, but no valid Bid. The other market makers (NSDQ, EDGX and ARCX) reported both valid Bid and Ask.

Note that the reported market-maker rows are not sorted. Depending on the time of your query, you may receive a different set of market-makers: market makers who do not have any valid Bid/Ask are not reported. Depending on the specific equity and request time, you may receive between 0 and dozens of market maker rows.

Using the reported Level 2 data from different market makers enables arbitrage trading: buying a security from market maker A (who offers the lowest Ask price) and selling to market maker B (who offers the highest Bid price).

If you wish to receive Level 2 quotes even when they are empty (invalid Bid and Ask), set the `IncludeEmptyQuotes` parameter to true or 1 (default value: false). For example:

```
>> struct2table(IQML('marketdepth', 'symbol', 'MSFT', 'NumOfEvents', 70, ...  
                'IncludeEmptyQuotes', true))
ans =
67×14 table
  Symbol     ID    Bid      Ask    BidSize  AskSize  BidTime  Date         ...
'MSFT' 'SDLR' 0     0       0       0       '99:99:99.000000' '2019-05-01'
'MSFT' 'STXG' 0     0       0       0       '99:99:99.000000' '2019-05-01'
'MSFT' 'BATS' 0     129.39  0       600     '18:29:49.000347' '2019-05-01'
'MSFT' 'NSDQ' 127.91 130.09 100     100     '04:03:41.004392' '2019-05-02'
'MSFT' 'EDGX' 127.54 127.98 200     4800    '19:53:35.049950' '2019-05-01'
'MSFT' 'ARCX' 127.97 128.71 100     100     '04:17:13.037004' '2019-05-02'
...```
If your IQFeed account is not authorized/subscribed for Level 2 data, you will receive an error message whenever you request market depth data:

Account not authorized for Level II

If your IQFeed account is authorized for Level 2 data but not for a certain exchange, you will receive an error message when requesting market depth info from that exchange:

```matlab
>> data = IQML('marketdepth', 'Symbol', 'IBM') % not subscribed to NYSE Level2
Error using IQML
Symbol 'IBM' was not found!
```

The following parameters affect market depth data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma- delimited string, or cell-array of strings</td>
<td>(none)</td>
<td>Limits the request to the specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'ES#'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM:AAPL:GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM,AAPL,GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• {'IBM', 'AAPL', 'GOOG'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s) when NumOfEvents&gt;0</td>
</tr>
<tr>
<td>NumOfEvents</td>
<td>integer</td>
<td>10 42</td>
<td>One of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• inf – continuous endless streaming Level 2 data for specified symbol(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• N&gt;1 – only process N incoming quotes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 1 – get only a single quote</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 0 – stop streaming market depth data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• -1 – return the latest Level 2 data while continuing to stream new data updates</td>
</tr>
<tr>
<td>IncludeEmpty Quotes</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If set to true or 1, empty Level 2 quotes (with neither a valid Bid nor valid Ask) will also be returned. By default (false), they will not be.</td>
</tr>
<tr>
<td>Timeout</td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds to wait (0-9000) for data in blocking mode (0 means infinite)</td>
</tr>
</tbody>
</table>

Note: Market Depth (Level 2) data is only available in the Professional IQML license.

---

40 Old versions of IQML used to automatically try to establish a connection with IQFeed’s L2 server during IQML startup, causing the error message to display for users without an IQFeed Level 2 subscription. This was confusing, since the L2 connection attempt during IQML’s startup was automatic, not caused by a user marketdepth request. In IQML version 2.17 (released on 2019-05-05) the mechanism was changed: IQML now connects to L2 server only as needed (first IQML marketdepth request).

41 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization

42 The default value of NumOfEvents was changed from inf to 10 in IQML version 2.17 (released on 2019-05-05)
4.5 Greeks, fair value, and implied volatility

Extra data can be fetched (calculated) for asset options using the 'greeks' action:

- Greeks (Delta, Vega, Theta, Rho, Gamma etc.)
- Fair value for the derivative and the difference vs. actual trading price
- Implied volatility based on the fair vs. trading prices

```matlab
>> data = IQML('greeks', 'symbol', 'IBM1814L116')
data =
    Symbol: 'IBM1814L116'
    Asset_Name: 'IBM DEC 2018 C 116.00'
    Strike_Price: 116
    Expiration_Date: '12/14/2018'
    Days_To_Expiration: 30
    Inferred_Asset_Side: 'Call'
    Underlying_Symbol: 'IBM'
    Underlying_Asset_Name: 'INTERNATIONAL BUSINESS MACHINE'
    Underlying_Spot: 121.3
    Underlying_Historic_Volatility: 37.1
    Assumed_Risk_Free_Rate: 0
    Assumed_Dividend_Yield: 0
    Asset_Fair_Value: 8.1193
    Asset_Latest_Price: 7.05
    Asset_Price_Diff: 1.0693
    Implied_Volatility: 0.28242
    Volatility_Used_By_Greeks: 0.371
    Delta: 0.68197
    Vega: 0.1240
    Theta: -0.076697
    Rho: 6.1318
    CRho: 6.7992
    Omega: 10.189
    Lambda: 10.189
    Gamma: 0.027646
    Vanna: -0.3527
    Charm: 0.0021809
    Vomma: 5.8043
    Veta: 2.4262
    Speed: -0.0012419
    Zomma: -0.061581
    Color: -0.00038078
    Ultima: -45.238
    Annual_Factor_Used: 365
    This_Asset_Latest_Quote: [1x1 struct]
    Underlying_Latest_Quote: [1x1 struct]
    This_Asset_Fundamentals: [1x1 struct]
    Underlying_Fundamentals: [1x1 struct]
```

The reported Matlab struct contains a few fields with basic information on the derivative and its underlying, followed by fair-value, implied volatility and Greek values.

At the bottom of the returned data-struct, four sub-structs provide direct access to the latest quotes data (§4.1, for example data.This_Asset_Latest_Quote.Total_Volume) and fundamenta data (§4.2, for example data.Underlying_Fundamentals.Average_Volume), for both the option asset and its underlying stock.

Note that the returned quotes data is subject to the Fields parameter value that was set in the most recent quotes data query (see §4.2). If the most recent Fields value does not include pricing data (Most_Recent_Trade, Bid, Ask, Last, or Close fields), then some returned data fields (for example Asset_Price_Diff and Implied_Volatility) will be empty.
The following Greek values are reported by *IQML*:

<table>
<thead>
<tr>
<th>Field</th>
<th>Symbol</th>
<th>Derivative order</th>
<th>Definition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>Δ</td>
<td>1</td>
<td>∂V/∂S</td>
<td>Sensitivity of fair value to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s spot price</td>
</tr>
<tr>
<td>Vega</td>
<td>ν</td>
<td>1</td>
<td>∂V/∂σ</td>
<td>Sensitivity of fair value to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s volatility; also called Kappa</td>
</tr>
<tr>
<td>Theta</td>
<td>Θ</td>
<td>1</td>
<td>-∂V/∂τ</td>
<td>Sensitivity of fair value to maturity time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(decay)</td>
</tr>
<tr>
<td>Rho</td>
<td>ρ</td>
<td>1</td>
<td>∂V/∂τ</td>
<td>Sensitivity of fair value to risk-free rate</td>
</tr>
<tr>
<td>CRho</td>
<td></td>
<td>1</td>
<td>∂V/∂b</td>
<td>Sensitivity of fair value to the carry-rate</td>
</tr>
<tr>
<td>Omega,</td>
<td>Ω</td>
<td>1</td>
<td>Δ × S/V</td>
<td>% change in fair value due to a 1% change in</td>
</tr>
<tr>
<td>Lambda,</td>
<td>λ</td>
<td></td>
<td></td>
<td>the underlying asset price (these are synonym</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>fields, both are reported for convenience)</td>
</tr>
<tr>
<td>Gamma</td>
<td>Γ</td>
<td>2</td>
<td>∂Δ/∂S</td>
<td>Sensitivity of Delta to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s spot price</td>
</tr>
<tr>
<td>Vanna</td>
<td>-</td>
<td>2</td>
<td>∂Δ/∂σ</td>
<td>Sensitivity of Delta to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s volatility</td>
</tr>
<tr>
<td>Charm</td>
<td>-</td>
<td>2</td>
<td>-∂Δ/∂τ</td>
<td>Sensitivity of Delta to maturity time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(decay)</td>
</tr>
<tr>
<td>Vomma</td>
<td>-</td>
<td>2</td>
<td>∂V/∂σ</td>
<td>Sensitivity of Vega to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s volatility; also sometimes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>called Volga</td>
</tr>
<tr>
<td>Veta</td>
<td>-</td>
<td>2</td>
<td>∂V/∂τ</td>
<td>Sensitivity of Vega to the maturity time</td>
</tr>
<tr>
<td>Speed</td>
<td>-</td>
<td>3</td>
<td>∂Γ/∂S</td>
<td>Sensitivity of Gamma to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s spot price</td>
</tr>
<tr>
<td>Zomma</td>
<td>-</td>
<td>3</td>
<td>∂Γ/∂σ</td>
<td>Sensitivity of Gamma to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s volatility</td>
</tr>
<tr>
<td>Color</td>
<td>-</td>
<td>3</td>
<td>∂Γ/∂τ</td>
<td>Sensitivity of Gamma to maturity time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(decay)</td>
</tr>
<tr>
<td>Ultima</td>
<td>-</td>
<td>3</td>
<td>∂3V/∂σ3</td>
<td>Sensitivity of Vomma (Volga) to changes in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underlying asset’s volatility</td>
</tr>
</tbody>
</table>

You can request data for multiple symbols at the same time, in a single *IQML* command, by specifying the symbols using a colon-delimited string or a cell-array. For example:

```matlab
>> data = IQML('greeks', 'symbols', {'IBM1814L116','IBM1814X116'});
>> data = IQML('greeks', 'symbols', 'IBM1814L116:IBM1814X116'); % equivalent
```

The result will be an array of Matlab structs that correspond to the requested symbols:

```matlab
    data =  
    2×1 struct array with fields:  
    Symbol  
    Asset_Name  
    Strike_Price  
    ...
```

If you have Matlab’s Parallel Computing Toolbox, set the *UseParallel* parameter to true (or 1) to process the Greeks query for the specified symbols in parallel (see §3.6):

```matlab
>> data = IQML('greeks', 'symbols', {'IBM1814L116','IBM1814X116'}, 'UseParallel',true);
```
Notes:

1. Greeks and related derivative data (the `greeks' action in general) are only available in IQML Professional and trial licenses, not in the Standard license.

2. Greeks, fair-price and implied vol values are computed by IQML on your local computer. They are NOT provided by IQFeed, and are NOT approved by DTN.

3. There is a performance impact: the calculations require some data fetches from IQFeed. These extra fetches and calculations may take up to 0.3-1 secs per query, depending on CPU, IQFeed round-trip latency, and the specific parameters.

4. The calculations assume vanilla European-style options using Black-Scholes-Merton’s model. Using IQML’s calculations with other derivatives (American/Asian/barrier/exotic options etc.) may result in incorrect/misleading values.

5. There are various possible ways to estimate implied volatility from the option’s trading price and fair value. IQML uses a standard Newton-Raphson iterative approximation method; other methods may result in slightly different values.

6. Certain fields sometimes report invalid values. For example, Implied Volatility may contain –Inf or +Inf when the Newton-Raphson algorithm fails to converge to a valid value. Likewise, some Greeks may contain a NaN value in certain cases (for example, a contract so far out-of-the-money that it has no trading price).

7. Some Greeks are also known by other names: Vega is sometimes called Kappa; Vomma is also known as Volga or vega convexity; Omega is also called Lambda or elasticity; Charm is also known as delta decay; and Color as gamma decay.

8. Various sources/systems calculate Greeks in different manners. For example, Vega, Rho, Veta and Ultima values are sometimes divided by 100 (but not in IQML); Theta, Charm, Veta and Color are sometimes annualized and sometimes divided by a representative number of days per year (365/364/360/253/252) to provide 1-day estimates (customizable in IQML, 365 by default). The foreign rate/dividends yield is ignored by some sources and included by others in the calculations; Some sources report Color as the positive rate of change of Gamma relative to maturity time, while others report it as the negative rate of change. In addition, some sources apparently have buggy math implementations. The result is that different sources provide different Greek values for the same inputs. IQML’s values are generally identical to those of Matlab’s Financial Toolbox, NAG and Maple. Unfortunately, IQFeed’s standalone Option Chains utility reports different values. IQML adheres to the core math formulae and we believe that IQML provides mathematically-accurate results. However, the discrepancy between the values reported by different systems means that you must carefully ensure that IQML’s reported values fit your needs and expectations.

---

41 Support for American options is planned in a future release of IQML; there are no current plans to support Asian/exotic options.
42 Matlab’s Financial Toolbox, NAG and Maple report annualized values; for annual values in IQML, set the AnnualFactor to 1.
43 For example, the reported Color value is negative in NAG compared to IQML and Maple.
44 This does not imply that there are no calculation bugs in IQML’s implementation; the Greeks calculation is not trivial.
45 Excluding a few quirks, such as a negative Color value reported by NAG, or Maple’s Lambda calculation, or the AnnualFactor of 1 used by both NAG & Maple. Also compare the very similar values reported by the online calculator http://option-price.com.
46 John Hull, Options, Futures, and Other Derivatives (ISBN 9780134472089); https://en.wikipedia.org/wiki/Greeks_(Finance)
By default, IQML uses the derivative’s fundamental data and default 0% rates in its calculations. You can override these defaults using the following optional parameters:

- **UnderlyingSymbol** – by default this is the `Asset_Name`’s first string token, or the first portion of `Symbol`. For example, for IBM1814L116, `Asset_Name`='IBM DEC 2018 C 116.00' so Underlying Symbol is set to 'IBM' (the first token in the `Asset_Name`); for @BOF20P28500 the Underlying Symbol is set to '@BOF20' (Soybean Oil Jan 2020 Future). To check the auto-inferred UnderlyingSymbol, check the Underlying_Asset_Name field in the returned data. The Underlying Symbol value can be overrriden using the UnderlyingSymbol parameter. For example, you could specify that the underlying symbol for Greeks computation of GOOG1816K1000 is not the default 'GOOG' (Alphabet Inc Class C), but rather 'GOOGL' (Class A).

- **Side** – by default, the option side ('Call' or 'Put') is determined by IQML from the derivative contract’s `Asset_Name`. For example, for IBM1814L116, `Asset_Name`='IBM DEC 2018 C 116.00', which is automatically inferred to be a Call option. You can override the inferred side for contracts that have a non-standard `Asset_Name` (or one which is not properly reported by IQFeed in its Fundamental Data message) that IQML cannot properly analyze.

- **HistoricVolatility** – this is usually reported by IQFeed in the underlying asset’s fundamental data (`data.Underlying_Fundamentals.Historical_Volatility`) and this is used in IQML by default. Instead of this reported value, you can specify another value (for example, the S&P 500 volatility), as a fixed percent value.

- **UseImpliedVolatility** – by default, IQML uses HistoricVolatility to calculate Greek values. Set UseImpliedVolatility to 1 or true to calculate Greeks using the Implied Volatility instead (this may be useful for some commodities).

- **RiskFreeRate** – this is the domestic risk-free rate. IQML uses 0% by default; you can specify any other fixed percentage rate (based on e.g. LIBOR or T-bill).

- **DividendsYield** – this is the underlying asset’s dividend yield. IQML uses 0% by default; you can specify any other fixed percentage value. In the context of Forex currencies, this value may represent the foreign risk-free (carry) rate.

- **DaysToExpiration** – by default, IQML determines the duration until contract expiry (maturity) based on its `Expiration_Date`. This duration can be set to any positive number of days (not necessarily an integer value).

- **AnnualFactor** – by default, IQML normalizes the reported `Theta`, `Charm`, `Veta` and `Color` values by dividing the computed annualized value by 365 in order to provide 1-day estimates. You can override this scaling factor to any positive number. Setting a value of 1 provides annualized results (i.e., not 1-day estimates), as reported by Matlab’s Financial Toolbox, NAG and Maple. For various uses you could also use other factors such as 364, 360, 253, 252, 12 or 4.

---

49 Some short-listed future contracts do not have an immediately inferable UnderlyingSymbol. For example, the underlying symbol of @CF20C4000 (Corn Jan 2020 Call 4000) is not @CF20 (which does not exist). In such cases, IQML tries to use a corresponding contract of the next or the following months (in this case @CH20 - Corn March 2020). Sometimes this mechanism fails. For example, the underlying of @SZZ19C8700 (Soybeans Week 2 Dec 2019 Call 8700) is not @SZZ19, @S2F20 etc. (which do not exist) but rather @S2Z20 (Soybeans Jan 2020). In such cases, you must specify the UnderlyingSymbol manually.

50 You can query the current LIBOR rate with IQML, for example using symbol ONLIB.X (overnight rate), 1MLIB.X (1 month), 3MLIB.X (3 months), or 1YLIB.X (1 year). Additional durations are also available (http://iqfeed.net/symbolguide/index.cfm?pick=indexRATES&guide=mktindices), but a 1-month rate is often used even for shorter or longer option durations, for consistency. Also see http://forums.iqfeed.net/index.cfm?page=topic&topicID=4387.

51 You can query the current T-bill rate with IQML, for example using symbol TB30.X (30-day rate), IRX.XO (91 days), TB180.X (180 days), or 1YCMY.X (1 year). Also see http://forums.iqfeed.net/index.cfm?page=topic&topicID=4387.
Here is a usage example with some non-default parameters:

```python
>>> data = IQML('greeks', 'symbol', 'IBM1814L116', 'DaysToExpiration', 13.5, ...
                 'RiskFreeRate', 2.5, 'DividendsYield', 3.2, 'AnnualFactor', 1)
```

The following parameters affect Greeks data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon-delimited</td>
<td>(none)</td>
<td>Limits the query to the specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td>string, or cell-array of strings</td>
<td></td>
<td>• 'GOOG1816K1000'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM1814L116:GOOG1816K1000'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• {'IBM1814L116', 'GOOG1816K1000'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s). Multiple symbols can be parallelized using the UseParallel parameter (see below).</td>
</tr>
<tr>
<td>UseParallel</td>
<td>logical</td>
<td>false</td>
<td>If set to true or 1, and if Parallel Computing Toolbox is installed, then querying multiple symbols will be done in parallel (see §3.6).</td>
</tr>
<tr>
<td>Underlying Symbol</td>
<td>string</td>
<td>&quot;(i.e. taken from the contract name)&quot;</td>
<td>Symbol of the derivative’s underlying asset</td>
</tr>
<tr>
<td>Side</td>
<td>string</td>
<td>&quot;(i.e. taken from the contract name)&quot;</td>
<td>Either 'Call' or 'Put'</td>
</tr>
<tr>
<td>HistoricVolatility</td>
<td>number</td>
<td>-1 (i.e. taken from the underlying asset’s reported historic volatility)</td>
<td>Value that represents the underlying’s price volatility (in percent). 1.0 means 1%; -1 means a dynamic value based on the underlying asset’s reported historic volatility.</td>
</tr>
<tr>
<td>UseImpliedVolatility</td>
<td>logical</td>
<td>false</td>
<td>If set to true or 1, the Implied_Volatility (not HistoricVolatility) will be used for Greeks</td>
</tr>
<tr>
<td>RiskFreeRate</td>
<td>number</td>
<td>0.0</td>
<td>Domestic risk-free rate Specified in percent; 1.0 means 1%.</td>
</tr>
<tr>
<td>DividendsYield</td>
<td>number</td>
<td>0.0</td>
<td>Underlying stock’s dividends yield, or the foreign currency risk-free (carry) rate. Specified in percent; 1.0 means 1%.</td>
</tr>
<tr>
<td>DaysToExpiration</td>
<td>number</td>
<td>-1 (i.e. taken from the contract’s expiration date)</td>
<td>Number of days until the contract expires (matures)</td>
</tr>
<tr>
<td>AnnualFactor</td>
<td>number</td>
<td>365</td>
<td>The computed Theta, Charm, Veta and Color values are divided by this factor before being reported. Typical values are 365, 364, 360, 253, 252, 12, 4 or 1.</td>
</tr>
</tbody>
</table>

Note: The Greeks functionality is only available in the Professional and trial IQML licenses, not in the Standard license.

52 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization.
4.6 Market summary data and scanner

All the queries described so far in this chapter return data for individually-specified Symbols. We can retrieve a complete market snapshot of all traded securities of a specific SecType and Exchange, using a 'summary' query:

```matlab
>> data = IQML('summary') % latest 5-minute data for all NYSE equities
data =
   4749×1 struct array with fields:
         Symbol Exchange  Type     Last  TradeSize  TradedMarket TradeDate  TradeTime  Open  High  Low  Close  Bid  BidMarket  BidSize  Ask  AskMarket  AskSize  Volume  PDayVolume  UpVolume  DownVolume  NeutralVolume  TradeCount  UpTrades  DownTrades  NeutralTrades  VWAP
...   (total of 28 data fields)
```

```matlab
>> data(1)
ans =
   struct with fields:
         Symbol: 'A' 
             Exchange: 7 
                Type: 1 
                 Last: 72.5315 
              TradeSize: 5 
         TradedMarket: 5 
         TradeDate: 20190711 
            TradeTime: 103502 
               Open: 73.77 
                High: 73.78 
                 Low: 72.5315 
                 Close: 73.37 
                 Bid: 72.51 
        BidMarket: 18 
           BidSize: 200 
             Ask: 72.54 
        AskMarket: 5 
           AskSize: 100 
               Volume: 257497 
       PDayVolume: 1785225 
            UpVolume: 84799 
            DownVolume: 80276 
       NeutralVolume: 92422 
          TradeCount: 2371 
             UpTrades: 733 
             DownTrades: 832 
       NeutralTrades: 806 
                VWAP: 73.1309
```

This query shows that 4749 equities are currently trading on NYSE. This data is daily (i.e., the cumulative day’s Open/High/Low/Volume etc.), and is updated on IQFeed’s servers every 5 minutes. DTN says that “the timing of the snapshot is not guaranteed, but data will be gathered every 5 minutes”. Therefore, you should assume for safety that the data is up to 5 minutes old. To get the latest data, use real-time snapshot (§4.1) and fundamental (§4.2) queries, or streaming quotes (§6.1).

---

53 This query was run on July 11, 2019 at 11am EDT
The default **DataType** parameter value ('snapshot') fetches trading data. To fetch a market summary of fundamental data, set **DataType**='fundamental'. For example:

```matlab
>> data = IQML('summary', 'DataType', 'fundamental')
data = 4749x1 struct array with fields:
    Symbol
    Description
    PeRatio
    AvgVolume
...
    (total of 41 data fields)
>> data(1)
ans = struct with fields:
    Symbol: 'A'
    Description: 'AGILENT TECHNOLOGIES'
    PeRatio: 21
    AvgVolume: 1908
    DivYield: 0.89
    DivRate: 0.656
    PayDate: 20190724
    ExDivDate: 20190701
    CurrentEps: 3.5
    SIC: 3825
    Precision: 4
    Display: 14
    GrowthPercent: -0.14
    FiscalYearEnd: 20181001
    Volatility: 16.5
    ListedMarket: 7
    OptionRoots: 'A'
    InstitutionalPercent: 86.905
    YearEndClose: 67.46
    Beta: 1.35
    Assets: 3848
    Liabilities: 1171
    BalanceSheetDate: 20190430
    LongTermDebt: 1799
    CommonSharesOutstanding: 315993
    MarketCap: 23184
    x52WeekHigh: 82.27
    x52WeekHighDate: 20190321
    x52WeekLow: 61.01
    x52WeekLowDate: 20181024
    CalHigh: 82.27
    CalHighDate: 20190321
    CalLow: 62
    CalLowDate: 20190103
    LastSplit: []
    LastSplitDate: []
    PrevSplit: []
    PrevSplitDate: []
    NAICS: 334516
    ShortInterest: 4130628
```  

You can control the query using the **DataType** (default: 'snapshot'), **SecType** (default: 'equity') and/or **Exchange** (default: 'NYSE') parameters:

```matlab
>> data = IQML('summary', 'SecType', 'bond', 'Exchange', 'NYSE', ...
               'DataType', 'fundamental');
```
>> struct2table(data)
ans =
 6326×11 table
Symbol                  Description                  Precision Display ListedMarket MaturityDate CouponRate ...
'A20.CB'    'AGILENT TECHNOLOGIES INC. 5.0% SR NTS'        [ ]   12  ?    20200715     [ ]
'A21.CB'    'AGILENT TECHNOLOGIES INC. 3.875% SR NTS'      [ ]   12  ?    20230715 3.875
'A26.CB'    'AGILENT TECHNOLOGIES INC 3.05% 09/22/2026'    [ ]   12  ?    20260922 3.050
'AA.28.CB'  'ALUMINUM CO OF AMERICA 6.75% NTS 1/15/28'    [ ]   12  ?    20280115     [ ]
'AA20.CB'   'ALCOA INC. 6.15% SR NTS'                      [ ]   12  ?    20200815     [ ]
'AA21.CB'   'ALCOA INC. 5.4% SR NTS'                       [ ]   12  ?    20210415     [ ]
'AA22.CB'   'ALCOA INC 3.05% 09/22/2026'                  [ ]   12  ?    20260922 3.050
'AA24.CB'   'ALCOA INC 5.125% 10/01/2024'                 [ ]   12  ?    20241001     [ ]
'AA27.CB'   'ALCOA INC 5.9% NTS 2/1/27'                   [ ]   12  ?    20270201     [ ]
'AA37.CB'   'ALCOA INC 5.95% NTS 2/1/37'                  [ ]   12  ?    20270201 5.900
'AAP20.CB'  'ADVANCE AUTO PARTS INC. 5.75%'               [ ]   12  ?    20200501     [ ]
'AAP22.CB'  'ADVANCE AUTO PARTS INC 4.5%'                  [ ]   12  ?    20220115     [ ]
'AAP3.2.CB' 'ADVANCE AUTO PARTS 4.5 12/01/23'             [ ]   12  ?    20231201     [ ]
'AAP2L22.CB' 'APPLE INC 1.00% NOTES 22'                   [ ]   12  ?    20221110     [ ]

... 

Note that there is no Symbol parameter in a 'summary' query – data for all the symbols that match the specified SecType and Exchange is returned. For historic market summaries, add the Date parameter (see §5.6).

By default, only data fields that contain information are returned. For example, in the snapshot query for equities, only 28 of 35 data fields are reported; 7 fields are removed from the returned struct array since they contain an empty ([ ]) value for all securities: MutualDiv, SevenDayYield, OpenInterest, Settlement, SettlementDate, ExpirationDate, Strike.\(^{54}\) Similarly, 3 additional fields (High, Low and VWAP) are not reported for bonds (only 25 fields contain information). To include all these fields (with their empty data values) in the reported data, set the ReportEmptyFields parameter to true (or 1):

```matlab
>> data = IQML('summary', 'ReportEmptyFields', true)
data =
 4749×1 struct array with fields:
    Symbol
    Exchange
   ...  (total of 35 data fields)
```

Likewise, with a 'fundamental' query, only 41 of 47 possible fields are reported for equities (EstEps, MaturityDate, CouponRate, LEAPs, WRAPs and Expiration fields are not reported);\(^{55}\) for bonds only 11 fields are reported (Symbol, Description, Precision, Display, ListedMarket, MaturityDate, CouponRate, x52WeekHigh, x52WeekHighDate, x52WeekLow and x52WeekLowDate), while 36 other fields are not. As before, to include these fields (with their empty data values) in the reported data, set ReportEmptyFields to true (or 1).

\(^{54}\) Additional fields (for example, Open, High, Low) are missing when the query is run early in the day, before start of trading.

\(^{55}\) The EstEps field was reported by IQFeed in some runs but not others; the reason for this is unclear.
Market summary queries can take a long time to download data, depending on amount of data and your computer speed. To ensure the query does not time-out before completing the download, the default Timeout value for summary queries is set to 300 secs, unlike other queries (5 secs). In some cases, you may need to specify an even larger Timeout.

To reduce processing time, numeric codes (e.g., Exchange, TradedMarket and NAICS) are not interpreted into textual form, unlike the corresponding real-time snapshot (§4.1) and fundamental (§4.2) queries. Use a lookup query (§8) to fetch a description of such codes.

The returned data can be filtered based on multiple criteria, effectively serving as a market scanner (for the latest data by default, or for any other historic date). This is done by setting the Filter parameter to the relevant criteria. For example, to return all NYSE equities whose latest market capitalization is larger than $5Bn, we set a condition on the MarketCap data field (which reports values in $Mn, so $5Bn=5000):

```matlab
data = IQML('summary', 'SecType','Equity', 'DataType','fundamental', ...
'Exchange','NYSE', 'Filter','MarketCap>5000');
```

This query only returns 1398 equities, compared to the unfiltered 4749. Multiple filter criteria can be specified using a cell-array. For example (this returns just 100 equities):

```matlab
data = IQML('summary', 'SecType','Equity', 'DataType','fundamental', ...
'Exchange','NYSE', 'Filter',[['MarketCap>5000', 'PeRatio<9']]);
```

Multiple filter criteria are AND’ed, meaning that all of the criteria conditions must be met for a security to be reported. If you want to use an OR condition (for example, Market-cap>$5B or P/E<9), combine the conditions within a single filter criterion:

```matlab
data = IQML('summary', 'SecType','Equity', 'DataType','fundamental', ...
'Exchange','NYSE', 'Filter',[['MarketCap>5000', 'PeRatio<9']]);
```

In general, any Matlab expression (arithmetic, function etc.) that involves the reported data field(s) and results in a scalar logical value, is acceptable as Filter criteria.

Criteria conditions are case-sensitive and must use exactly the same field names as the reported data fields, otherwise the criteria will be ignored. For example:

```matlab
data = IQML('summary', 'SecType','Equity', 'DataType','fundamental', ...
'Exchange','NYSE', 'Filter','marketcap>5000');
Warning: ignoring bad summary filter 'marketcap>5000': Unrecognized function or variable 'marketcap'
(Type "warning off IQML:summary:filter" to suppress this warning.)
```

Whenever any field is included in a filter condition, securities that do not have data for that field (have an empty [] value) will automatically be filtered out of the returned data – they are considered to have failed the entire condition, even if it was only a part of an or condition. For example, if your filter condition is MarketCap>5000, then securities that have MarketCap=[] (i.e. unknown) will not be reported.

Note that the filtering/scanning is not applied at the data source (IQFeed) but rather in IQML, after the full set of data has been downloaded from IQFeed. Therefore, filtered queries will always take longer to process than regular (unfiltered) summary queries.
Note: Market summaries are only available with IQFeed client 6.1 or newer, and only if you are subscribed to the requested data at DTN and there is a relevant data for download (summary data is only available for some combinations of SecType and Exchange). In all other cases, you may receive an error such as one of the following:

- The 'summary' query is only supported by IQFeed client 6.1 or newer; you are using version 6.0.
- IQML market summary query error: 50004, User not authorized for market summary file requested.
- IQML market summary query error: 50007, No file available.

A related mechanism for fetching pre-filtered market scans for a select number of Exchanges and Filters is available by setting DataType='Top'. This scanner type does not depend on DTN subscription or IQFeed 6.1, and is much faster than snapshot queries. However, it is limited to just 13 predefined filters and 3 US exchanges (AMEX, NYSE, NASDAQ), only supports equities, does not provide historic data, and only returns only up to top 50 matching equity symbols with a few relevant data fields (far fewer fields than the snapshot queries), updated every 5 minutes during the trading day:

```matlab
>> data = IQML('summary', 'DataType', 'top', 'Exchange', 'NYSE', 'Filter', 'active')
data = 50x1 struct array with fields:
...  
>> data(1)
ans =
    struct with fields:
      Last_Update_Time: '2019/07/12 16:25 EST'
      Exchange: 'NYSE'
      Symbol: 'ABEV'
      Company_Name: 'AMBEV S.A.'
      Last_Price: 4.84
      Previous_Price: 4.95
      Price_Change_Dollars: -0.11
      Price_Change_Percent: -2.222
      Last_Volume: 50633779
      Previous_Volume: 27402071
      Volume_Change_Percent: 84.78
```

Several Filter types return additional data fields, depending on the filter. For example:

```matlab
>> data = IQML('summary', 'DataType', 'top', 'Filter', 'volume spike');
>> data(1)
ans =
    struct with fields:
      Last_Update_Time: '2019/07/16 16:25 EST'
      Exchange: 'NYSE'
      Symbol: 'CPE'
      Company_Name: 'CALLON PETROLEUM'
      Last_Price: 5.73
      Previous_Price: 5.38
      Price_Change_Dollars: 0.35
      Price_Change_Percent: 6.506
      Last_Volume: 55574971
      Previous_Volume: 57244474
      Volume_Change_Percent: -2.92
      Average_Volume: 8296000
      Volume_vs_Avg_Change_Percent: 569.9
```

The reported equities must not only match the predefined Filter condition, but also have a close price > $2 and volume > 0.
Here’s another example – top NASDAQ equities with last price lower than their VWAP:

```matlab
>> data = IQML('summary', 'DataType','top', 'Exchange','NASDAQ',...
                 'Filter','vwap % down');
```

```
>> data(1)
```

```matlab
ans =
    struct with fields:
      Last_Update_Time: '2019/07/16 16:25 EST'
      Exchange: 'NASDAQ'
      Symbol: 'IMRN'
      Company_Name: 'IMMURON LTD ADR'
      Last_Price: 4.3
      Previous_Price: 2.93
      Price_Change_Dollars: 1.37
      Price_Change_Percent: 46.7
      Last_Volume: 11022919
      Previous_Volume: 4704
      Volume_Change_Percent: 234230.76
      VWAP: 5.427
      Last_Minus_VWAP_Chng_Pct: -20.77
```

Note that the 'Top' query may return empty ([]) data for some combinations of Exchange and Filter on certain dates, depending on the market data and availability of the requested scanner on IQFeed’s servers. Also note that the reported data may by up to 5 minutes old during the trading day (depending on the query time).

The following table summarizes the differences between market summary query types:

<table>
<thead>
<tr>
<th></th>
<th>Snapshot</th>
<th>Fundamental</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DataType</strong></td>
<td>'snapshot'</td>
<td>'fundamental'</td>
<td>'top'</td>
</tr>
<tr>
<td><strong>Exchange</strong></td>
<td>Multiple</td>
<td>Only AMEX, NYSE, NASDAQ</td>
<td></td>
</tr>
<tr>
<td><strong>SecType</strong></td>
<td>Multiple</td>
<td>Only 'equity'</td>
<td></td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>Latest (intra-day) or historic (end of day)</td>
<td>Only latest (updated every 5 minutes during the trading day)</td>
<td></td>
</tr>
<tr>
<td><strong>Filter type</strong></td>
<td>Any Matlab function of any combination of data fields</td>
<td>Only one of 13 predefined types</td>
<td></td>
</tr>
<tr>
<td><strong>Filter combinations</strong></td>
<td>Multiple criteria supported</td>
<td>Not supported</td>
<td></td>
</tr>
<tr>
<td><strong>Processing time</strong></td>
<td>Tens/hundreds of secs</td>
<td>&lt;1 sec</td>
<td></td>
</tr>
<tr>
<td><strong>IQFeed client</strong></td>
<td>Requires client 6.1 or newer</td>
<td>Any (client 5.0 or newer)</td>
<td></td>
</tr>
<tr>
<td><strong>IQFeed connection</strong></td>
<td>Requires an active IQFeed connection (<em>IQConnect</em> login)</td>
<td>Does not require an active IQFeed connection</td>
<td></td>
</tr>
<tr>
<td><strong>Result data fields</strong></td>
<td>Up to 35 fields</td>
<td>Up to 47 fields</td>
<td>Only 11-13 data fields</td>
</tr>
<tr>
<td><strong>Result records</strong></td>
<td>All securities that fit the parameters (many thousands)</td>
<td>Only the top 50 securities</td>
<td></td>
</tr>
</tbody>
</table>

---

53 As of December 2019, IQFeed has a server problem causing AMEX data to return no results. DTN is working on a fix for this.
The following parameters affect market summary data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DataType</strong></td>
<td>string</td>
<td>'snapshot'</td>
<td>Either 'snapshot', 'fundamental' or 'top'</td>
</tr>
<tr>
<td><strong>Exchange</strong></td>
<td>string</td>
<td>'NYSE'</td>
<td>One of the markets listed in §8.3</td>
</tr>
<tr>
<td><strong>SecType</strong></td>
<td>string</td>
<td>'Equity'</td>
<td>One of the security types listed in §8.4. <strong>SecType</strong> is ignored when <strong>DataType</strong>='top'</td>
</tr>
</tbody>
</table>
| **Date**        | integer or string or datetime object | now (latest available data) | Date for which to fetch the end-of-day data. Examples:  
  - 737089 (Matlab datenum format)  
  - datetime('Jan 29, 2018')  
  - 20180129 (yyyymmdd format)  
  - '20180129'  
  - '2018/01/29'  
  - '2018-01-29'  
  **Date** is ignored when **DataType**='top' |
| **ReportEmptyFields** | logical  | false or 0 | If true, then irrelevant data fields (which contain empty [] values for all securities) are reported; if false (default), they are not |
| **Filter**      | string    | 'active' | When **DataType**='top', one of:  
  - 'active' – most active (highest volume)  
  - 'gainer' – highest positive price $ change  
  - 'loser' – lowest negative price $ change  
  - '% gainer' – highest pos. price % change  
  - '% loser' – lowest neg. price % change  
  - '52 week high' – daily high > 52-week  
  - '52 week low' – daily low < 52-week  
  - 'volume up' – compared to previous  
  - 'volume spike' – compared to average  
  - 'VWAP up' – last price > VWAP  
  - 'VWAP down' – last price < VWAP  
  - 'VWAP % up' – % above VWAP  
  - 'VWAP % down' – % below VWAP |
| **Timeout**     | number    | 300     | Max number of seconds to wait for incoming data (0-9000, where 0 means infinite) |

Note: market summary functionality is only available in the Professional IQML license
5 Historical and intra-day data

Historical data can be retrieved via the 'history' action, subject to your account subscription rights, and IQFeed’s pacing limitations. Several data-types are available, which can be set using the **DataType** parameter (default: 'day').

5.1 Daily data

To retrieve historic daily data bars, set **DataType** to 'd' or 'day' (or just leave this parameter out, since 'day' is the default data type), and set the asset’s **Symbol**:

```matlab
>> data = IQML('history', 'symbol','IBM');
>> data = IQML('history', 'symbol','IBM', 'dataType','day') %equivalent

data =
100×1 struct array with fields:
Symbol
Datestamp
Datenum
High
Low
Open
Close
PeriodVolume
OpenInterest
```

We received an array of Matlab structs containing daily bars, one per each of the last N trading days (excluding currently-trading day’s bar for IQFeed clients 6.0 or older; including the current day’s bar for 6.1 or newer). By default, we receive up to N=100 data bars, ordered from oldest to newest. We ran the query above using IQFeed client 5.2 on March 6, 2018 so we received daily data from 2017-10-10 until 2018-03-05:

```matlab
>> data(1)
ans =
    Symbol: 'IBM'
    Datestamp: '2017-10-10'
    Datenum: 736978
    High: 148.95
    Low: 147.65
    Open: 147.71
    Close: 148.5
    PeriodVolume: 4032601
    OpenInterest: 0

>> data(end)
ans =
    Symbol: 'IBM'
    Datestamp: '2018-03-05'
    Datenum: 737124
    High: 157.49
    Low: 153.75
    Open: 154.12
    Close: 156.95
    PeriodVolume: 3670630
    OpenInterest: 0
```

You can aggregate the numeric values into Matlab arrays as follows:

```matlab
dates = {data.Datestamp}; % cell-array of strings
closes = [data.Close]; % array of numeric values
```

You can then use these arrays for vectorized processing, plotting etc. For example:

```matlab
dates2 = datetime(dates); % array of datetime objects
[maxVal, maxIdx] = max(closes); % maximal value and location index
[minVal, minIdx] = min(closes); % minimal value and location index
```

---

58 [http://iqfeed.net/dev/api/docs/HistoricalviaTCPPIP.cfm](http://iqfeed.net/dev/api/docs/HistoricalviaTCPPIP.cfm)
You can change the order at which the data bars are reported, using the DataDirection parameter (1 means oldest-to-newest (default); -1 means newest-to-oldest):

```matlab
>> data = IQML('history', 'symbol', 'IBM', 'dataDirection', -1);
```

It is possible that there may be fewer than N=100 daily bars for an asset. For example, the symbol @EMF19 (1-month Euro-Dollar Jan 2019 future on CME) started trading on 2018-01-12, so we only get 35 daily bars when we run the query on 2018-03-06:

```matlab
>> data = IQML('history', 'symbol', '@EMF19');
```

You can ask IQFeed to limit the maximal number of data bars (N) using the MaxItems parameter:

```matlab
>> data = IQML('history', 'symbol', 'IBM', 'maxItems', 20)
```

In this example, data(1).Datestamp='2018-02-05', i.e. 20 trading days ago.

Note that the MaxItems parameter only has an effect if the additional data bars actually exist. In other words, it controls the maximum number of returned data bars – the actual number of bars may be less than this value.59

59 For example, IQFeed’s trial account is limited to 1-year of daily data points; IQFeed automatically trims trial-account queries down to this limit; http://forums.dtn.com/index.cfm?page=topic&topicID=5535
When the number of data bars that IQFeed sends is very large, it could take a while for the information to be sent. In such a case, IQML might time-out on the request and return only partial data. Such a case is detected and reported by IQML:

```matlab
>> data = IQML('history', 'symbol', 'IBM', 'maxItems',-1)
```

```
Warning: IQML timeout: only partial data is returned: the Timeout parameter should be set to a value larger than 5
```

```
data = 1274x1 struct array with fields:
    Symbol ...
```

As suggested by the message, you can set the `Timeout` parameter to a high value in order to allow IQML more time to gather the data before returning the results:

```matlab
>> data = IQML('history', 'symbol', 'IBM', 'maxItems',-1, 'timeout',60)
```

```
data = 5577x1 struct array with fields:
    Symbol ...
```

You can also specify a `BeginDate/EndDate` interval for the returned data. Dates can be specified in several formats: numeric Matlab datenum (737089), Matlab datetime object, numeric yyyymmdd (20180129), string ('2018/01/29', '2018-01-29', '20180129'). Note that `MaxItems` takes precedence over `BeginDate`, regardless of `DataDirection`. For example, if `MaxItems`=5, you will only get the 5 latest bars, for any `BeginDate`.  

You can request historical data for multiple symbols at the same time, in a single IQML command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
>> data = IQML('history', 'symbol', {'IBM','GOOG','AAPL'}, 'maxItems',20)
```

```matlab
>> data = IQML('history', 'symbol', 'IBM:GOOG:AAPL', 'maxItems',20) %equivalent
```

The result will be an array of Matlab structs that correspond to the requested symbols (3 symbols with 20 data-points each, in this example):

```matlab
data = 20x3 struct array with fields:
    Symbol ...
```

```matlab
>> data(1,2) % 2nd index (column) is the symbol; GOOG data is in data(:,2)
```

```matlab
ans =
struct with fields:
    Symbol: 'GOOG'
    Datestamp: '2018-07-10'
    Datenum: 737251
    High: 1159.59
    Low: 1149.59
    Open: 1156.98
    Close: 1152.84
    PeriodVolume: 798412
    OpenInterest: 0
```

In certain cases, when you request historic data for multiple symbols, you might receive a different number of data bars for different symbols, depending on data availability. In such cases, the result will not be an N-by-M struct array, but a cell array (one cell for each symbol) that contains struct arrays. For example:

```matlab
data = 1x3 cell array
    (77x1 struct)    (100x1 struct)    (55x1 struct)
```

Note: Regular IQFeed accounts have access to 15+ years of daily data, but IQFeed limits its trial account to just 365 days of historical daily data – see [https://help.dtniq.com/support/faqs](https://help.dtniq.com/support/faqs)
IQML queries for multiple symbols or dates (if **BeginDate** and **EndDate** are specified) can be parallelized using the **UseParallel** parameter, if you have a Professional IQML license and Matlab’s Parallel Computing Toolbox (§3.6):

```matlab
>> data = IQML('history', 'UseParallel', true, 'symbol', symbols) % multi-symbols
>> data = IQML('history', 'UseParallel', true, 'symbol', 'IBM', ...
   'BeginDate',19900102, 'EndDate',20181028) % date range
```

By default, IQML reports 9 data fields for each daily history bar: Symbol, Datestamp, Datenum, High, Low, Open, Close, PeriodVolume, and OpenInterest. If the **Fields** parameter is set to an empty value ({}) or "", the current set of fields and the full list of available fields, are reported (in this case, a **Symbol** parameter is unnecessary):

```matlab
>> data = IQML('history', 'fields',{})
data =
   struct with fields:
   CurrentFields: {1x9 cell}
   AvailableFields: {1x9 cell}
>> data.AvailableFields
ans =
   1x9 cell array
   Columns 1 through 6
      'Symbol'    'Datestamp'    'Datenum'    'High'    'Low'    'Open'
   Columns 7 through 9
      'Close'    'PeriodVolume'    'OpenInterest'
```

If you have the Professional (or trial) IQML license, you can request IQML to report fewer data fields, and/or change the reported fields order, using the optional **Fields** parameter. **Fields** can be set to any subset of the **AvailableFields**, as either a cell-array of strings, or as a comma-separated string. All subsequent daily history queries will report the requested fields, in the specified order, until **Fields** is changed again. For example:

```matlab
>> data = IQML('history', 'Symbol', 'IBM', 'Fields',{Datenum,'Close'})
>> data = IQML('history', 'Symbol', 'IBM', 'Fields','Datenum,Close') % equivalent
data =
   100x1 struct array with fields:
      Datenum
      Close
>> data(1)
ans =
   struct with fields:
      Datenum: 737751
      Close: 134.34
```

The order of the specified **Fields** indicates the order in which the data fields will be reported. For example, to change the order of the reported data fields above:

```matlab
>> data = IQML('history', 'Symbol', 'IBM', 'Fields','Close,Datenum ')
data =
   100x1 struct array with fields:
      Close
      Datenum
>> data(1)
ans =
   struct with fields:
      Datenum: 737751
      Close: 134.34
```

As noted, **Fields** can be set to any subset of the AvailableFields. If a bad field is specified (one which is not available in IQFeed), an error message will be displayed:

```matlab
>> data = IQML('history', 'Symbol', 'IBM', 'Fields', 'Close, xyz')
Error using IQML
   Bad field 'xyz' was requested in IQML history command (check the spelling).
   Available fields are: Symbol,Timestamp,Datenum,High,Low,Open,Close,...
As noted above, whenever we change the set of fields (or even just their order), this new set of fields is used in all subsequent daily history queries in the current Matlab session.

To revert the reported set of fields to the default set (AvailableFields), set Fields to 'All' (or 'all'):

```matlab
>> data = IQML('history', 'Symbol','IBM', 'Fields','all')
data =
   100×1 struct array with fields:
     Symbol
     Datestamp
     Datenum
     High
     Low
     Open
     Close
     PeriodVolume
     OpenInterest
```

Note: there are several important differences between the Fields parameter in history queries and in quotes queries (§4.1):

1. The Symbol field is not mandatory in history queries, and does not necessarily need to be the first reported data field, unlike in quotes queries.

2. IQML reports all available history data fields by default. You can use the Fields parameter to reduce the reported data fields, even down to just a single data field. In contrast, quotes queries report only some of the available fields by default.

The fewer fields that you request, the faster the processing time and the smaller the memory usage. To improve run-time performance and reduce memory consumption, request only those data fields that are actually needed by your program.

The following parameters affect daily history data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma-delimited string or cell-array of strings</td>
<td>(none)</td>
<td>Limits query to specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• '@VX#'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM:AAPL:GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM,AAPL,GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• {'IBM', 'AAPL', 'GOOG'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s). Multiple symbols can be parallelized using the UseParallel parameter (see below).</td>
</tr>
<tr>
<td>DataDirection</td>
<td>integer</td>
<td>1</td>
<td>Sets the order of data bars in the returned struct array. One of the following values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 1 means oldest-to-newest (default)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• -1 means newest-to-oldest</td>
</tr>
<tr>
<td>MaxItems</td>
<td>integer</td>
<td>100</td>
<td>Returns up to the specified number of data bars (if available). -1 means all available.</td>
</tr>
</tbody>
</table>

In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| BeginDate    | integer or string or datetime object          | '1900/01/01' (i.e., from as early as data is available) | Earliest bar date. Examples:  
  - 737089 (Matlab datenum format)  
  - datetime('Jan 29, 2018')  
  - 20180129 (yyyymdd format)  
  - '20180129'  
  - '2018/01/29'  
  - '2018-01-29'  
  Note: **MaxItems** has precedence over **BeginDate**: If there are more data points than **MaxItems** between **BeginDate**–**EndDate**, only the last **MaxItems** data points (from **EndDate** backward) will be returned, regardless of **BeginDate**. |
| EndDate      | integer or string or datetime                 | '2099/12/31' (i.e., until now)               | Latest bar date.  
  See **BeginDate** parameter above for details. |
| Timeout      | number                                        | 5.0                                          | Max # of seconds to wait for incoming data (0-9000, where 0 means infinite)                                                                                                                                 |
| UseParallel  | logical (true/false)                          | false                                        | If set to true or 1, and if Parallel Computing Toolbox is installed, then querying multiple symbols or dates will be done in parallel (see §3.6; Professional IQML license only). |
| Fields       | colon or comma-separated string, or cell-array of strings | 'Symbol, Datestamp, Datenum, High, Low, Open, Close, PeriodVolume, OpenInterest' | Sets the list of data fields reported by IQML for each data bar, as a sub-set of IQFeed’s default set of 9 fields.  
If **Fields** is set to an empty value ({} or ""), the list of current, available fields is returned.  
If **Fields** is not empty, subsequent history queries in the same Matlab session will return the specified fields, in the specified order (Professional IQML license only).  
Examples:  
- 'Datestamp:Open:Close'  
- 'Datestamp, Open, Close'  
- {'Datestamp', 'Open', 'Close'}  
- 'All' (indicates all available fields) |
5.2 Weekly data

To retrieve historic weekly data bars, set **DataType** to 'w' or 'week':

```
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'week')
```

As with the daily bars, we received an array of Matlab structs containing weekly bars, one per each of the last N weeks (**excluding** currently-trading day for IQFeed clients 6.0 or older; **including** the current day for 6.1 or newer). By default we receive up to N=100 data bars (~2 years), ordered from oldest to newest. We ran the query above on Tuesday March 6, 2018 using IQFeed client 5.2 so we received weekly data from Friday 2016-04-15 (the data bar for April 11-15, 2016) until 2018-03-05 (the data bar for Monday March 5, 2018 only, excluding March 6). Each bar’s Datestamp indicates the end-date of the bar. Note that all data bars except for the latest have a Friday date.

As with the daily bars, you can change the data bars order, using the **DataDirection** parameter (1 means oldest-to-newest (default); -1 means newest-to-oldest).

```
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'week', 'dataDirection', -1);
```

As with the daily bars, you can ask IQFeed to limit the maximal number of data bars (N) using the **MaxItems** parameter:

```
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'week', 'maxItems', 20);
```

In this example, data(1).Datestamp='2017-10-27', i.e. the Friday 20 weeks ago.

As with the daily bars, you can set the **Timeout** parameter to a high value in order to allow IQML more time to gather data before returning the results. This is typically not necessary for weekly data requests, because of the relatively small amount of data.

You can also specify a **BeginDate** for the returned data. Dates can be specified in various formats: as a numeric Matlab datenum (737089), a Matlab datetime object, numeric yyyyymmdd (20180129), or as a string ('2018/01/29', '2018-01-29', '20180129').

For example, if we a query with a **BeginDate** of Monday Jan 29, 2018, we will receive data bars starting on Friday Feb 2, 2018 (which includes the weekly data of Jan 29):

```
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'week', 'BeginDate', 20180129);
```

Note: **unlike** daily data requests, you cannot specify **EndDate** in a request for historic weekly data bars. All weekly data bars up to yesterday/today will be returned.

Also note that **MaxItems** has precedence over **BeginDate**, regardless of **DataDirection**.

For example, if **MaxItems=5**, we’ll only get the 5 latest bars, regardless of **BeginDate**.

---

62 Note: Regular IQFeed accounts can access 15+ years of historic data, but IQFeed limits trial accounts to just one year – see [https://help.dtniq.com/support/faqs](https://help.dtniq.com/support/faqs). Also note that in some cases, depending on current day-of-week compared to the requested **BeginDate**, an addiditional (older) bar might be returned that includes the week that was prior to the requested **BeginDate**.

63 Yesterday if using IQFeed client 6.0 or earlier; today if using IQFeed client 6.1 or newer.
As with daily data requests, you can request historical data for multiple symbols at the same time, in a single IQML command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
>> data = IQML('history', 'symbol', {'IBM','GOOG','AAPL'}, ... 
              'dataType','week', 'maxItems',20)
>> data = IQML('history', 'symbol', 'IBM:GOOG:AAPL', ... 
              'dataType','week', 'maxItems',20) %equivalent
```

The result will be an array of Matlab structs that correspond to the requested symbols (3 symbols with 20 data-points each, in this example):

```matlab
data = 20×3 struct array with fields:
    Symbol
    Datestamp
    ...
```

In certain cases, when you request historic data for multiple symbols, you might receive a different number of data bars for different symbols, depending on data availability. In such cases, the result will not be an N-by-M struct array, but a cell array (one cell for each symbol) that contains struct arrays. For example:

```matlab
data = 1×3 cell array
{77×1 struct}    {100×1 struct}    {55×1 struct}
```

IQML queries for multiple symbols can be parallelized using the `UseParallel` parameter, if you have a Professional IQML license and Matlab’s Parallel Computing Toolbox (`§3.6`):

```matlab
>> data = IQML('history', 'symbol', symbols, 'UseParallel',true, ... 
              'dataType','week', 'maxItems',20)
```

By default, IQML reports 9 data fields for each weekly history bar: Symbol, Datestamp, Datenum, High, Low, Open, Close, PeriodVolume, and OpenInterest. If the `Fields` parameter is set to an empty value (`{}` or `''`), the current set of fields and the full list of available fields, are reported (in this case, a `Symbol` parameter is unnecessary). If you have the Professional (or trial) IQML license, you can request IQML to report fewer data fields, and/or change the reported fields order, using the optional `Fields` parameter. All subsequent weekly history queries will report only the requested fields, in the specified order. Fewer fields mean faster processing time and smaller memory usage. Refer to `§5.1` for a description of the `Fields` parameter usage.

The following parameters affect weekly history data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma-delimited string or cell-array of strings</td>
<td>(none)</td>
<td>Limits the query to the specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- @VX#</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- IBM: AAPL: GOOG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- IBM, AAPL, GOOG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- {IBM, 'AAPL', 'GOOG'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s). Multiple symbols can be parallelized using the <code>UseParallel</code> parameter (see below).</td>
</tr>
</tbody>
</table>

64 In IQML, the `Symbol` and `Symbols` parameters are synonymous – you can use either of them, in any capitalization.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| DataDirection | integer       | 1       | Sets the order of data bars in the returned struct array. One of the following values:  
|             |                | meaning | - 1 means oldest-to-newest (default)  
|             |                | oldest   | -1 means newest-to-oldest  
| MaxItems   | integer        | 100     | Returns up to the specified number of data bars (if available). -1 means all available.  
| BeginDate  | integer or string or datetime object | '1900/01/01' | Earliest bar that includes a date. Examples:  
|            |                | (i.e., from as early as data is available) | - 737089 (Matlab datenum format)  
|            |                |         | - datetime('Jan 29, 2018')  
|            |                |         | - 20180129 (yyyymmd format)  
|            |                |         | - '20180129'  
|            |                |         | - '2018/01/29'  
|            |                |         | - '2018-01-29'  
|            |                |         | Note: MaxItems has precedence over BeginDate: If there are more data points than MaxItems between BeginDate and yesterday/today, only the last MaxItems data points (from yesterday/today backward) will be returned, regardless of BeginDate.  
| Timeout    | number         | 5.0     | Max number of seconds to wait for incoming data (0-9000, where 0 means infinite)  
| UseParallel | logical (true/false) | false | If set to true or 1, and if Parallel Computing Toolbox is installed, then querying multiple symbols will be done in parallel (see §3.6; Professional IQML license only).  
| Fields     | colon or comma-separated string, or cell-array of strings | 'Symbol, Datestamp, Datenum, High, Low, Open, Close, PeriodVolume, OpenInterest' | Sets the list of data fields reported by IQML for each data bar, as a sub-set of IQFeed’s default set of 9 fields.  
|            |                |         | If Fields is set to an empty value ({} or ""), the list of current, available fields is returned.  
|            |                |         | If Fields is not empty, subsequent history queries in the same Matlab session will return the specified fields, in the specified order (Professional IQML license only).  
|            |                |         | Examples:  
|            |                |         | - 'Datestamp:Open:Close'  
|            |                |         | - 'Datestamp,Open,Close'  
|            |                |         | - {'Datestamp', 'Open', 'Close'}  
|            |                |         | - 'All' (indicates all available fields)  

65 Yesterday if using IQFeed client 6.0 or earlier; today if using IQFeed client 6.1 or newer
5.3 Monthly data

To retrieve historic monthly data bars, set **DataType** to 'm' or 'month':

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'month')
```

```
data = 100×1 struct array with fields:
  Symbol
  Datestamp
  Datenum
  High
  Low
  Open
  Close
  PeriodVolume
  OpenInterest
```

As with the daily bars, we received an array of Matlab structs containing monthly bars, one per each of the last N months (**excluding** currently-trading day for IQFeed clients 6.0 or older; **including** the current day for IQFeed clients 6.1 or newer). By default we receive up to N=100 data bars (~8 years), ordered from oldest to newest. We ran the example query above on March 6, 2018 using IQFeed client 5.2 so we received monthly data from 2009-12-31 (the data bar for 12/2009) until 2018-03-05 (the data bar for March 2018 up to March 5, 2018, excluding data from March 6).

As with the daily bars, you can change the data bars order, using the **DataDirection** parameter (1 means oldest-to-newest (default); -1 means newest-to-oldest).

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'month', ...
               'dataDirection', -1);
```

As with the daily bars, you can ask IQFeed to limit the maximal number of data bars (N) using the **MaxItems** parameter:

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'month', 'maxItems', 20);
```

In this example, `data(1).Datestamp='2016-08-31'`, i.e. 20 months ago.

As with the daily bars, you can set the **Timeout** parameter to a high value in order to allow IQML more time to gather data before returning the results. This is typically not necessary for monthly data requests, because of the relatively small amount of data.

You can also specify a **BeginDate** for the returned data. Dates can be specified in various formats: as a numeric Matlab datenum (737089), a Matlab datetime object, numeric yyyyymmdd (20180129), or as a string ('2018/01/29', '2018-01-29', '20180129').

For example, if we a query with a **BeginDate** of Jan 29, 2018, we will receive data bars starting on Jan 31, 2018 (which includes the monthly data of Jan 29):

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'month', 'BeginDate', '20180129');
```

**Note:** **unlike** daily data requests, you cannot specify **EndDate** in a request for historic monthly data bars. All monthly data bars up to yesterday/today\(^{66}\) will be returned.

Also note that **MaxItems** has precedence over **BeginDate**, regardless of **DataDirection**. For example, if **MaxItems**=5, we’ll only get the 5 latest bars, regardless of **BeginDate**.\(^{67}\)

\(^{66}\) Yesterday if using IQFeed client 6.0 or earlier; today if using IQFeed client 6.1 or newer

\(^{67}\) Note: Regular IQFeed accounts can access 15+ years of historic data, but IQFeed limits trial accounts to just one year – see [https://help.dtniq.com/support-faqs](https://help.dtniq.com/support-faqs)
As with daily data requests, you can request historical data for multiple symbols at the same time, in a single IQML command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
>> data = IQML('history', 'symbol', {'IBM','GOOG','AAPL'}, ... 'dataType','month', 'maxItems',20)
>> data = IQML('history', 'symbol', 'IBM:GOOG:AAPL', ... 'dataType','month', 'maxItems',20) %equivalent
```

The result will be an array of Matlab structs that correspond to the requested symbols (3 symbols with 20 data-points each, in this example):

```matlab
data = 20×3 struct array with fields:
    Symbol
    Datestamp
...
```

In certain cases, when you request historic data for multiple symbols, you might receive a different number of data bars for different symbols, depending on data availability. In such cases, the result will not be an N-by-M struct array, but a cell array (one cell for each symbol) that contains struct arrays. For example:

```matlab
data = 1×3 cell array
{77×1 struct}    {100×1 struct}    {55×1 struct}
```

IQML queries for multiple symbols can be parallelized using the UseParallel parameter, if you have a Professional IQML license and Matlab’s Parallel Computing Toolbox (§3.6):

```matlab
>> data = IQML('history', 'symbol', symbols, 'UseParallel',true, ... 'dataType','month', 'maxItems',20)
```

By default, IQML reports 9 data fields for each monthly history bar: Symbol, Datestamp, Datenum, High, Low, Open, Close, PeriodVolume, and OpenInterest. If the Fields parameter is set to an empty value ({}) or '', the current set of fields and the full list of available fields, are reported (in this case, a Symbol parameter is unnecessary). If you have the Professional (or trial) IQML license, you can request IQML to report fewer data fields, and/or change the reported fields order, using the optional Fields parameter. All subsequent monthly history queries will report only the requested fields, in the specified order. Fewer fields mean faster processing time and smaller memory usage. Refer to §5.1 for a description of the Fields parameter usage.

The following parameters affect monthly history data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma-delimited string or cell-array of strings</td>
<td>(none)</td>
<td>Limits the query to the specified symbol(s). Examples: • '@VX#' • 'IBM:AAPL:GOOG' • 'IBM,AAPL,GOOG' • {'IBM', 'AAPL', 'GOOG'} This parameter must be set to valid symbol name(s). Multiple symbols can be parallelized using the UseParallel parameter (see below).</td>
</tr>
</tbody>
</table>

68 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DataDirection</td>
<td>integer</td>
<td>1</td>
<td>Sets the order of data bars in the returned struct array. One of the following values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>meaning oldest bar is first, newest is last</td>
<td>• 1 means oldest-to-newest (default)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• -1 means newest-to-oldest</td>
</tr>
<tr>
<td>MaxItems</td>
<td>integer</td>
<td>100</td>
<td>Returns up to the specified number of data bars (if available). -1 means all available.</td>
</tr>
<tr>
<td>BeginDate</td>
<td>integer or string or datetime object</td>
<td>'1900/01/01' (i.e., from as early as data is available)</td>
<td>Earliest bar that includes a date. Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 737089 (Matlab datenum format)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• datetime('Jan 29, 2018')</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 20180129 (yyyymmdd format)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• '20180129'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• '2018/01/29'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• '2018-01-29'</td>
</tr>
<tr>
<td>Note: MaxItems has precedence over BeginDate: If there are more data points than MaxItems between BeginDate and yesterday/today, only the last MaxItems data points (from yesterday/today backward) will be returned, regardless of BeginDate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeout</td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds to wait for incoming data (0-9000, where 0 means infinite)</td>
</tr>
<tr>
<td>UseParallel</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If set to true or 1, and if Parallel Computing Toolbox is installed, then querying multiple symbols will be done in parallel (see §3.6; Professional IQML license only).</td>
</tr>
<tr>
<td>Fields</td>
<td>colon or comma-separated string, or cell-array of strings</td>
<td>'Symbol, Datestamp, Datenum, High, Low, Open, Close, PeriodVolume, OpenInterest'</td>
<td>Sets the list of data fields reported by IQML for each data bar, as a sub-set of IQFeed’s default set of 9 fields. If Fields is set to an empty value ({} or &quot;&quot;), the list of current, available fields is returned. If Fields is not empty, subsequent history queries in the same Matlab session will return the specified fields, in the specified order (Professional IQML license only). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'Datestamp:Open:Close'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'Datestamp,Open,Close'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• '{Datestamp, 'Open', 'Close'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'All' (indicates all available fields)</td>
</tr>
</tbody>
</table>

69 Yesterday if using IQFeed client 6.0 or earlier; today if using IQFeed client 6.1 or newer
5.4 Interval data

To retrieve historic data bars having a custom width, possibly as short as a single second, set `DataType` to 'i' or 'interval', and set the asset's `Symbol`:

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'interval')
data = 100×1 struct array with fields: Symbol Timestamp Datenum High Low Open Close TotalVolume PeriodVolume NumberOfTrades
```

```matlab
>> data(end)
ans =
    Symbol: 'IBM'
    Timestamp: '2018-03-07 09:43:00'
    Datenum: 737126.404861111
    High: 156.97
    Low: 156.77
    Open: 156.83
    Close: 156.77
    TotalVolume: 215082
    PeriodVolume: 16080
    NumberOfTrades: 0
```

The returned data struct here is similar to the struct returned by the daily, weekly and monthly historical data queries. Unlike those queries, interval-query result does not include an `OpenInterest` field, but does include two new fields: `TotalVolume` (which indicates the total daily volume up to that bar), and `NumberOfTrades`. Also note that we get a `Timestamp` field (US Eastern timezone), not `Datestamp` as with other history queries.

Bars that had no trading action are **not** reported. In the example query above, we see the following `Timestamp` values, where we clearly see a gap during non-trading hours:

```matlab
>> {data.Timestamp}'
ans =
    100×1 cell array
    {'2018-03-06 14:59:00'}
    {'2018-03-06 15:00:00'}
    {'2018-03-06 15:01:00'}
    ... % contiguous data bars
    {'2018-03-06 15:59:00'}
    {'2018-03-06 16:00:00'}
    {'2018-03-06 16:03:00'}
    {'2018-03-06 16:11:00'}
    ... % contiguous data bars
    {'2018-03-07 08:45:00'}
    {'2018-03-07 09:22:00'}
    {'2018-03-07 09:31:00'}
    {'2018-03-07 09:32:00'}
    ... % contiguous data bars
    {'2018-03-07 09:43:00'}
    {'2018-03-07 09:44:00'}
```

As with the other queries, the current (partial) interval bar is never reported, nor bars that have no data (e.g., 16:04-16:10, 8:34-8:44, 8:46-9:21 in the example above).
The default interval size is 60 secs (aligned on the full-minute mark). You can specify different interval sizes using the `IntervalSize` parameter. For example, a 15-sec interval:

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'interval', 'intervalSize', 15);
```

IQFeed is smart enough to automatically align data bars to full minutes/hours when the requested `IntervalSize` enables this (as is the case for 15 or 60-sec intervals). For example, with 15-sec `IntervalSize` we may get bars for 10:04:30, 10:04:45, 10:05:00. When such alignment is not possible, you will get non-aligned bars. For example, with a 13-sec `IntervalSize`: 09:59:18, 09:59:31, 09:59:57, 10:00:10.

By default, `IntervalSize` specifies the interval’s size in seconds and all the bars have this same duration. You can change this by setting the `IntervalType` parameter (default: ‘secs’) to ‘volume’ or ‘ticks’/‘trades’. Naturally, if you change `IntervalType`, the data bars will now have non-equal durations.

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'interval', ...
             'intervalType', 'ticks');
```

The `IntervalType` (default: ‘secs’) and `IntervalSize` (default: 60) parameters should typically be specified together. Note that `IntervalSize` must be a positive integer value (i.e. its value cannot be 4.5 or 0). If `IntervalType` is ‘ticks’/‘trades’, `IntervalSize` must be 2 or higher; If `IntervalType` is ‘volume’, `IntervalSize` must be 100 or higher; If `IntervalType` is ‘secs’, `IntervalSize` must be between 1 and 86400 (1 day).

By default, `IQML` reports data in intervals whose labels are set at the end of the interval. For example, a data item at 11:12:34 with `IntervalSize`=60 (1 minute) will be included in the interval labeled ‘11:13:00’. You can modify this default behavior by setting the `LabelAtBeginning` parameter to 1 (or true), so that the labels are set at the beginning. In this example, the data item will be reported in the ‘11:12:00’ interval. Note: using `LabelAtBeginning` parameter requires IQFeed client version 6.0 or newer.

By default, `IQML` only reports interval data from today. This means that if you run a query during the weekend, you will not see any data:

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'interval')
IQML historic data query (D-FB) error: !NO_DATA!
```

You can ask to see additional (older) calendar days by specifying a positive `Days` parameter value. If you set `Days` to -1, then all available information will be reported, subject to the other filter criteria.

Similarly, you can specify a date/time window for the returned data: only bars between the specified `BeginDateTime` and `EndDateTime` (US Eastern time) will be reported, regardless of the value of the `Days` parameter.

Note: queries having `UseParallel=true` are only parallelized if `BeginDateTime` is specified, or if multiple `Symbols` are specified (see below). Single-`Symbol` queries that have an empty (unspecified) `BeginDateTime` are not parallelizable.

In addition, you can specify a daily time-window: only bars between `BeginFilterTime` and `EndFilterTime` in each day (US Eastern time-zone) will be reported. This could be useful, for example, to limit the results only to the regular trading hours.

---

Note that IQFeed’s limitations on live ‘secs’ interval bars (§4.3, §6.3) are stricter than the limitations on historical interval bars: [http://forums.dtn.com/index.cfm?page=topic&topicID=5529](http://forums.dtn.com/index.cfm?page=topic&topicID=5529)
As with the daily bars, you can change the data bars order, using the **DataDirection** parameter (1 means oldest-to-newest (default); -1 means newest-to-oldest).

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'interval', 'dataDirection', -1);
```

As with the daily bars, you can ask IQFeed to limit the maximal number of data bars (N) using the **MaxItems** parameter:

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'interval', 'maxItems', 20);
```

Note that **MaxItems** takes precedence over **BeginDateTime**, regardless of **DataDirection**. For example, if **MaxItems** = 5, you will only get the 5 latest bars (before **EndDateTime**), regardless of the specified **BeginDateTime**.

As with the daily bars, you can set the **Timeout** parameter to a high value in order to allow IQML more time to gather data before returning the results.

As with daily data requests, you can request historical data for multiple symbols at the same time, in a single IQML command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
>> data = IQML('history', 'symbol', {'IBM', 'GOOG', 'AAPL'}, ...
              'dataType', 'interval', 'maxItems', 20)
```

```matlab
>> data = IQML('history', 'symbol', 'IBM:GOOG:AAPL', ...
              'dataType', 'interval', 'maxItems', 20)  % equivalent
```

The result will be an array of Matlab structs that correspond to the requested symbols (3 symbols with 20 data-points each, in this example):

```
data = 20×3 struct array with fields:  Symbol  Datestamp ...
```

In certain cases, when you request historic data for multiple symbols, you might receive a different number of data bars for different symbols, depending on data availability. In such cases, the result will not be an N-by-M struct array, but a cell array (one cell for each symbol) that contains struct arrays. For example:

```matlab
data = 1×3 cell array
       {77×1 struct}    {100×1 struct}    {55×1 struct}
```

**IQML** queries for multiple symbols or a date/time range (i.e., if **BeginDateTime** is specified) can be parallelized using the **UseParallel** parameter, if you have a Professional IQML license and Matlab’s Parallel Computing Toolbox (see §3.6):

```matlab
>> data = IQML('history', 'dataType', 'interval', 'UseParallel', true, ...
              'symbol', symbols)  % multiple symbols parallelized
```

```matlab
>> data = IQML('history', 'dataType', 'interval', 'UseParallel', true, ...
              'symbol', 'IBM', ..., % single-symbol date-range parallelized
              'BeginDateTime', 20181026100000, ...
              'EndDateTime', 20181026110000)
```

In some cases, users may be tempted to use the historical data mechanism to retrieve real-time data. This is relatively easy to set-up. For example, using an endless Matlab loop that sleeps for 60 seconds, requests the latest historical data for the past minute and then goes to sleep again, or using a periodic timer object that wakes up every minute. In such cases, consider using streaming rather than historical queries (see §6).
Some software vendors make a distinction between intra-day and historical information. However, as far as IQFeed and IQML are concerned, this is merely a semantic difference and there is no practical difference.

Note: IQFeed limits interval data to the past 180 calendar days if you make the request outside trading hours, but just past 8 days for requests during US trading hours (9:30-16:30 US Eastern time, Mon-Fri). So, if you request month-old data during trading hours you will get empty results, even if the request was just for a single hour.\textsuperscript{71}

The only exception to the 8/180-day limitation are interval bars of full minutes (\texttt{IntervalType}='secs' and \texttt{IntervalSize} a multiple of 60), since these bars are pre-computed and have a lesser impact on IQFeed’s servers. The other interval types are computed on-the-fly from tick data, and so are limited in duration in order not to overload IQFeed’s servers, especially during trading hours when server load is high.

IQFeed imposes other limitations based on interval size: minute data is only available since 2005-2007,\textsuperscript{72} longer intervals (daily/weekly/monthly) can access up to 15+ years.\textsuperscript{73}

IQFeed subscriptions for daily and intra-day data are different. If you only subscribed for daily data, you will receive a run-time error when fetching intra-day interval data:

```
IQML historic data query (EURGBP.FXCM) error: Unauthorized user ID
(your IQFeed account is not authorized for this data)
```

Also note that IQFeed’s interval data typically exclude irregular “O” trades (see §5.5).

By default, \textit{IQML} reports 10 data fields for each interval bar: Symbol, Timestamp, Datenum, High, Low, Open, Close, TotalVolume, PeriodVolume, and NumberOfTrades. If the \texttt{Fields} parameter is set to an empty value (\{\} or "), the current set of fields and the full list of available fields, are reported (in this case, a \texttt{Symbol} parameter is unnecessary). If you have the Professional (or trial) IQML license, you can request \textit{IQML} to report fewer data fields, and/or change the reported fields order, using the optional \texttt{Fields} parameter. All subsequent interval history queries will report only the requested fields, in the specified order. Fewer fields mean faster processing time and smaller memory usage. Refer to §5.1 for a description of the \texttt{Fields} parameter usage.

Finally, note that whereas sub-daily data may report data from non-trading days (e.g., Sunday night, when ES starts trading), these are typically added to the following trading day’s bar with daily/weekly/monthly bars.\textsuperscript{74}

\textsuperscript{71} The above is true for IQFeed regular accounts; IQFeed trial accounts are limited to only 4 days of intraday data and just one year of daily data (see \url{https://help.dtniq.com/support-faqs}).

\textsuperscript{72} Specifically for minute (60 sec) intervals, IQFeed’s developer FAQ indicates that “Minute interval data dating back to mid 2005 for select contracts and mid 2007 for all others [is available]”.

\textsuperscript{73} Again, these values are for regular IQFeed accounts: IQFeed limits trial accounts (see note #71 above)

\textsuperscript{74} \url{http://forums.dtn.com/index.cfm?page=topic&topicID=5608}
The following parameters affect interval history data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Symbol or Symbols** | colon or comma-delimited string or cell-array of strings | (none)  | Limits the query to the specified symbol(s). Examples:  
- '@VX#'  
- 'IBM:AAPL:GOOG'  
- 'IBM,AAPL,GOOG'  
- {'IBM', 'AAPL', 'GOOG'}  
This parameter must be set to valid symbol name(s). Multiple symbols can be parallelized using the UseParallel parameter (see below). |
| **DataDirection** | integer                        | 1, meaning oldest bar is first, newest is last | Sets the order of data bars in the returned struct array. One of the following values:  
- 1 means oldest-to-newest (default)  
- -1 means newest-to-oldest |
| **LabelAtBeginning** | logical (true/false) | false | • 0: data at 11:17:41 is reported as '11:18'  
• 1: same data is reported as '11:17' |
| **MaxItems**     | integer                        | 100     | Returns up to the specified number of data bars (if available). -1 means all available. |
| **Days**         | integer                        | 1       | Number of preceding calendar days to process. -1 means unlimited (all available data, subject to the other criteria), 1 means today, 2 means today & yesterday, etc. |
| **IntervalType** | string                         | 'secs'  | Sets the type of interval size. One of the following values:  
- 's' or 'secs' – time [seconds] (default)  
- 'v' or 'volume' – traded volume  
- 't', 'trades' or 'ticks' – number of ticks |
| **IntervalSize** | integer                        | 60      | Size of bars in IntervalType units. Must be ≥1 for secs, ≥2 for ticks, ≥100 for volume bars |
| **BeginFilterTime** | string                        | '00:00:00' | Only return bars that begin after this time of day (US Eastern time-zone). Only relevant when Days>0 or BeginDateTime is not ".
Format: hhmm, hh:mm, hhmmss or hh:mm:ss |
| **EndFilterTime** | string                         | '23:59:59' | Only return bars that end before this time of day (US Eastern time-zone). Only relevant when Days>0 or BeginDateTime is not ".
Format: hhmm, hh:mm, hhmmss or hh:mm:ss |

75 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BeginDateTime</td>
<td>integer or string or</td>
<td>''</td>
<td>Only return bars that begin after this date/time (US Eastern time-zone). Overrides the Days parameter. Format: Matlab datenum, or 'yyyyymmdd hhmms', or 'yyyy-mm-dd hh:mm:ss' etc.</td>
</tr>
<tr>
<td></td>
<td>datetime object</td>
<td></td>
<td>Note: MaxItems has precedence over BeginDateTime: If there are more data points than MaxItems between Begin/EndDateTime, only the last MaxItems data points (from EndDateTime backward) are returned, regardless of BeginDateTimeTime.</td>
</tr>
<tr>
<td>EndDateTime</td>
<td>integer or string or</td>
<td>''</td>
<td>Only return bars that end before this date/time (US Eastern time-zone). Overrides the Days parameter. Format: Matlab datenum, or 'yyyyymmdd hhmms', or 'yyyy-mm-dd hh:mm:ss' etc.</td>
</tr>
<tr>
<td></td>
<td>datetime object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeout</td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds to wait for incoming data (0-9000, where 0 means infinite)</td>
</tr>
<tr>
<td>UseParallel</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If true or 1, and Parallel Computing Toolbox is installed, then querying multiple symbols or a date/time range will be done in parallel (see §3.6; Professional IQML license only).</td>
</tr>
<tr>
<td>Fields</td>
<td>colon or comma-separated</td>
<td>'Symbol, Timestamp,</td>
<td>Sets the list of data fields reported by IQML for each data bar, as a sub-set of IQFeed’s default set of 10 fields. If Fields is set to an empty value ({} or ''), the list of current, available fields is returned. If Fields is not empty, subsequent history queries in the same Matlab session will return the specified fields, in the specified order (Professional IQML license only).</td>
</tr>
</tbody>
</table>
|                    | string, or cell-array of  | Datenum, High, Low,     | Examples:  
- 'Timestamp:Open:Close'  
- 'Timestamp, Open, Close'  
- {'Timestamp', 'Open', 'Close'}  
- 'All' (indicates all available fields) |
|                    | strings                    | Open, Close, TotalVolume, |                                                                                                                                         |
5.5 Tick data

Unlike data bars, which aggregate ticks and provide summary information, it is also possible to retrieve historic individual trades ("ticks"). To retrieve this data, set **DataType** to 't' or 'ticks', and set the asset’s **Symbol**:

```plaintext
>> data = IQML('history', 'symbol', 'AAPL', 'dataType', 'ticks')
data = 100×1 struct array with fields:
    Symbol    Timestamp    Datenum    Last    LastSize    TotalVolume    Bid    Ask    TickID    BasisForLast    TradeMarketCenter    TradeConditions    TradeAggressorCode    DayOfMonth    BasisDescription    TradeMarketName    TradeDescription    AggressorDescription

>> data(end)
an =
    Symbol: 'AAPL'
    Timestamp: '2019-10-04 09:45:03.862626'
    Datenum: 737702.406294699
    Last: 224.67
    LastSize: 100
    TotalVolume: 5226196
    Bid: 224.66
    Ask: 224.68
    TickID: 7432
    BasisForLast: 'C'
    TradeMarketCenter: 19
    TradeConditions: '01'
    TradeAggressorCode: 0
    DayOfMonth: 4
    BasisDescription: 'Last qualified trade'
    TradeMarketName: 'Nasdaq Trade Reporting Facility (NTRF)'
    TradeDescription: 'Normal Trade'
    AggressorDescription: 'Unknown/unsupported'
```

The data struct here is quite different than the historical bar queries above. Notice the **Timestamp** field, specified in micro-second precision (US Eastern time-zone). See a discussion of the time resolution in the next page. The **DayOfMonth**, **TradeAggressorCode** and **AggressorDescription** fields only appear if you use IQFeed client 6.1 or newer.

Note that the textual **Description** fields depend on the **MsgParsingLevel** parameter having a value of 2 or higher (see §3.2 and §8). Also note that only trade ticks are provided, along with the Bid and Ask prices at the time of the trade. IQFeed does not report historic non-trading ticks (i.e., Bid/Ask changes that occurred between the trades).
The Last and LastSize fields typically refer to the last trade. The type ("basis") of data in these fields is determined according to the BasisForLast field, which is explained in the BasisDescription field for convenience.\(^76\) Possible basis values are:\(^77\)

- C – Last qualified trade.
- E – Extended trade = form T trade.
- O – Other trade = any trade not accounted for by C or E.
- S – Settle = daily settle (only applicable to commodities).

In general, algo-trading should rely only on “C” trades, and potentially also “E” trades. “O” trades often have wide price swings (i.e. large variation from mainstream trading prices); this adds noise to charts and may confuse data analytics.\(^78\) IQFeed’s interval data (§5.4) typically exclude such irregular “O” trades.

Note that TickID values are not always increasing, and almost never contiguous. They are generally provided by the exchange as unique trade identifiers and so should not be used as an indicator of missing data, and their order is not quarantined. Instead, it is better to rely on the Timestamp or Datenum fields.

In some cases, implied (rather than normal trade) ticks are reported. For example, the following tick was retrieved for the VIX index continuous future (@VX#):

```latex
>> data = IQML('history', 'symbol','@VX#', 'dataType','ticks');
>> data(1)
ans =
    Symbol: '@VX#'
    Timestamp: '2019-10-04 09:42:41.499000'
    Datenum: 737702.404646979
    Last: 18.68
    LastSize: 1
    TotalVolume: 16711
    Bid: 18.65
    Ask: 18.7
    TickID: 6118279
    BasisForLast: 'O'
    TradeMarketCenter: 32
    TradeConditions: '4D'
    TradeAggressorCode: 0
    DayOfMonth: 4
    BasisDescription: 'Other trade = any trade not accounted for by C or E'
    TradeMarketName: 'CBOE Futures Exchange (CFE)'
    TradeDescription: 'Implied'
    AggressorDescription: 'Unknown/unsupported'
```

Note that in the case of @VX# on CBOE, the ticks are only reported in millisecond resolution, not microseconds as for IBM. In this case, Timestamp still shows 6 digits after the seconds decimal, but they always end in 000 (…:57.899000). The actual time resolution of reported ticks depends on the specific exchange and security type.\(^79\)

You can limit the data that is returned, as with the historical-bars queries above:

\(^76\) Note that the textual Description fields depend on the MsgParsingLevel parameter having a value of 2 or higher (see §3.2)

\(^77\) Additional basis codes may be added by IQFeed in the future.

\(^78\) http://forums.iqfeed.net/index.cfm?page=topic&topicID=3898

\(^79\) Micro-second resolution is only available with IQFeed client 5.2 or newer, and only in certain setups (e.g. CMEGroup and equity markets). Contact IQFeed support if you are unsure about the resolution provided by a certain setup configuration.
By default, IQML only reports ticks data from today. This means that if you run a query during the weekend, you will not see any data:

```matlab
>> data = IQML('history', 'symbol', 'FB', 'dataType', 'ticks')
IQML historic data query (D-FB) error: !NO_DATA!
```

You can ask to see additional (older) calendar days by specifying a positive Days parameter value. If you set Days to -1, then all available information will be reported, subject to the other filter criteria.

Similarly, you can specify a date/time window for the returned data: only bars between the specified BeginDateTime and EndDateTime (both of them US Eastern time-zone) will be reported, regardless of the value of the Days parameter.

Note: queries having UseParallel=true are only parallelized if BeginDateTime is specified, or if multiple Symbols are specified (see below). Single-Symbol queries that have an empty (unspecified) BeginDateTime are not parallelizable.

In addition, you can specify a daily time-window: only ticks between BeginFilterTime and EndFilterTime in each day (US Eastern time-zone) will be reported. This could be useful, for example, to limit the results only to the regular trading hours.

You can also limit the maximal number of ticks using the MaxItems parameter.

Note: by default IQFeed limits ticks data to the past 180 calendar days if you make the request outside trading hours, but just past 8 days for requests during US trading hours (9:30-16:30 US Eastern time). This means that if during trading hours you request historic data from a month ago, you will get none (empty results), even if the request was just for a single hour of data.

You can change the order of the reported ticks, using the DataDirection parameter (1 means oldest-to-newest (default); -1 means newest-to-oldest). MaxItems has precedence over BeginDateTime, regardless of DataDirection. For example, if MaxItems=5, we’ll only get the 5 latest ticks (before EndDateTime), regardless of BeginDateTime.

As with daily data requests, you can request data for multiple symbols at the same time, in a single IQML command by specifying a colon-delimited or cell-array list of Symbols:

```matlab
>> data = IQML('history', 'symbol', {'IBM','GOOG','AAPL'}, ...
              'dataType', 'ticks', 'maxItems', 20)
>> data = IQML('history', 'symbol', 'IBM:GOOG:AAPL', ...
              'dataType', 'ticks', 'maxItems', 20) %equivalent
```

The result will be an array of Matlab structs that correspond to the requested symbols (3 symbols with 20 data-points each, in this example):

```matlab
data = 20×3 struct array with fields:
    Symbol
    Datestamp
    ...
```

---

80 Historic ticks older than 180 days can be purchased from DTN – [http://forums.iqfeed.net/index.cfm?page=topic&topicID=4376](http://forums.iqfeed.net/index.cfm?page=topic&topicID=4376)

81 The above is true for IQFeed regular accounts; IQFeed trial accounts are limited to only 4 days of intraday data (see [https://help.dtniq.com/support-faqs](https://help.dtniq.com/support-faqs))
In certain cases, when you request historic data for multiple symbols, you might receive a different number of data bars for different symbols, depending on data availability. In such cases, the result will not be an N-by-M struct array, but a cell array (one cell for each symbol) that contains struct arrays. For example:

```matlab
data = 1x3 cell array
    {77×1 struct}    {100×1 struct}    {55×1 struct}
```

`IQML` queries for multiple symbols or a date/time range (i.e., if `BeginDateTime` is specified) can be parallelized using the `UseParallel` parameter, if you have a Professional `IQML` license and Matlab’s Parallel Computing Toolbox (see §3.6):

```matlab
>> data = IQML('history', 'dataType', 'ticks', 'UseParallel', true, ...
               'symbol', symbols) % multiple symbols parallelized
```

```matlab
>> data = IQML('history', 'dataType', 'ticks', 'UseParallel', true, ...
               'symbol', 'IBM', ...
               'BeginDateTime', 20181026100000, ...
               'EndDateTime', 20181026110000) % single-symbol date-range parallelized
```

By default, `IQML` reports 18 data fields for each tick: Symbol, Timestamp, Datenum, Last, LastSize, TotalVolume, Bid, Ask, TickID, BasisForLast, TradeMarketCenter, TradeConditions, TradeAggressorCode, DayOfMonth, BasisDescription, TradeMarketName, TradeDescription, and AggressorDescription. If the `Fields` parameter is set to an empty value (`{}` or `''`), the current set of fields and the full list of available fields, are reported (in this case, a `Symbol` parameter is unnecessary). If you have the Professional (or trial) `IQML` license, you can request `IQML` to report fewer data fields, and/or change the reported fields order, using the optional `Fields` parameter. All subsequent tick history queries will report only the requested fields, in the specified order. Fewer fields mean faster processing time and smaller memory usage. Refer to §5.1 for a description of the `Fields` parameter usage.

Finally, as with other `IQML` commands, you can set the `Timeout` parameter to a high value in order to allow `IQML` more time to gather data before returning the results. This is especially important for historic ticks queries, where the data amount could be considerable.

---

82 The textual fields BasisDescription, TradeMarketName, TradeDescription and AggressorDescription are `IQML`-generated textual interpretations of the codes in the IQFeed-generated BasisForLast, TradeMarketCenter, TradeConditions and TradeAggressorCode fields, respectively, as governed by the `MsgParsingLevel` parameter (see §3.2).
The following parameters affect ticks history data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma-delimited string or cell-array of strings</td>
<td>(none)</td>
<td>Limits the query to the specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* '@VX#'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* 'IBM:AAPL:GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* 'IBM,AAPL,GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* {'IBM', 'AAPL', 'GOOG'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s). Multiple symbols can be paralleled using the UseParallel parameter (see below).</td>
</tr>
<tr>
<td>DataDirection</td>
<td>integer</td>
<td>1</td>
<td>Sets the order of ticks in the returned struct array. One of the following values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>meaning</td>
<td>* 1 meaning oldest tick is first, newest last</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oldest-to-newest (default)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-1</td>
<td>-1 means newest-to-oldest</td>
</tr>
<tr>
<td>MaxItems</td>
<td>integer</td>
<td>100</td>
<td>Returns up to the specified number of ticks (if available). -1 means all available.</td>
</tr>
<tr>
<td>Days</td>
<td>integer</td>
<td>1</td>
<td>Number of preceding calendar days to process. -1 means unlimited (all available data, subject to the other criteria), 1 means today, 2 means today &amp; yesterday, etc.</td>
</tr>
<tr>
<td>BeginFilterTime</td>
<td>string</td>
<td>'00:00:00'</td>
<td>Only return ticks that begin after this time of day (US Eastern). Only relevant when Days&gt;0 or BeginDateTime is not ''. Format:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* ‘hhmm’, ‘hh:mm’, ‘hhmmss’ or ‘hh:mm:ss’.</td>
</tr>
<tr>
<td>EndFilterTime</td>
<td>string</td>
<td>'23:59:59'</td>
<td>Only return ticks that end before this time of day (US Eastern). Only relevant when Days&gt;0 or BeginDateTime is not ''. Format:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* ‘hhmm’, ‘hh:mm’, ‘hhmmss’ or ‘hh:mm:ss’.</td>
</tr>
<tr>
<td>BeginDateTime</td>
<td>integer or string or datatime object</td>
<td>&quot;</td>
<td>Only return ticks that begin after this date/time (US Eastern time-zone). Overides the Days parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(empty string) meaning from as early as data is available</td>
<td>Format: Matlab datenum, or 'yyyyymmdd hhmmss', or 'yyyy-mm-dd hh:mm:ss' etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: MaxItems has precedence over BeginDateTime: If there are more data points than MaxItems between BeginDateTime and EndDateTime, only the last MaxItems data points (from EndDateTime backward) will be returned, regardless of BeginDateTime.</td>
</tr>
</tbody>
</table>

83 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EndDateTime</td>
<td>integer or string or datetime object</td>
<td>“” (empty string) meaning now</td>
<td>Only return ticks that end before this date/time (US Eastern time-zone)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Overrides the Days parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Format: Matlab datenum, or 'yyyyymmdd hhmmss', or 'yyyy-mm-dd hh:mm:ss' etc.</td>
</tr>
<tr>
<td>Timeout</td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds to wait for incoming data (0-9000, where 0 means infinite)</td>
</tr>
<tr>
<td>UseParallel</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If set to true or 1, and if Parallel Computing Toolbox is installed, then querying multiple symbols or a date/time range will be done in parallel (see §3.6; Professional IQML license only).</td>
</tr>
</tbody>
</table>
| Fields       | colon or comma-separated string, or cell-array of strings | 'Symbol, Timestamp, Datenum, Last, LastSize, TotalVolume, Bid, Ask, TickID, BasisForLast, TradeMarket-Center, TradeConditions, TradeAggressorCode, DayOfMonth, BasisDescription, TradeMarket-Name, TradeDescription, AggressorDescription' | Sets the list of data fields reported by IQML for each data bar, as a sub-set of IQFeed’s default set of 18 fields. If Fields is set to an empty value ('{}' or ''), the list of current, available fields is returned. If Fields is not empty, subsequent history queries in the same Matlab session will return the specified fields, in the specified order (Professional IQML license only). Examples:  
  - 'Timestamp:Bid:Ask'  
  - 'Timestamp,Bid,Ask'  
  - {'Timestamp', 'Bid', 'Ask'}  
  - 'All' (indicates all available fields) |
5.6 Market summary data and scanner

All the queries described so far in this chapter return historic data for individually-specified Symbols. We can retrieve historic end-of-day market state (quotes/trades and fundamental data) of all traded securities as-of a single historic date (May 20, 2018 or later), using a 'summary' query (see §4.6) with a non-default Date parameter:

```matlab
>> data = IQML('summary', 'Date', 20190110) % all NYSE equities on Jan 10, 2019
data = 4706x1 struct array with fields:
   Symbol
   Exchange
   Type
   Last
   ...
   (total of 28 data fields)
>> data(1)
ans =
   struct with fields:
      Symbol: 'A'
      Exchange: 7
      Type: 1
      Last: 69.9
      TradeSize: 3350
      TradeMarket: 7
      TradeDate: 20190110
      TradeTime: 180131
      Open: 69.05
      High: 69.95
      Low: 68.6
      Close: 69.25
      Bid: 50
      BidMarket: 11
      BidSize: 400
      Ask: 69.9
      AskMarket: 11
      AskSize: 100
      Volume: 1080882
      PDayVolume: 2442291
      UpVolume: 413506
      DownVolume: 231604
      NeutralVolume: 435772
      TradeCount: 10340
      UpTrades: 3070
      DownTrades: 2819
      NeutralTrades: 4447
      VWAP: 69.5782
```

This query shows that 4706 equities were traded on NYSE on Jan 10, 2019. The data may change over time, as DTN retroactively fixes its historic records.

The default DataType parameter value ('snapshot') fetches end-of-day trading data. To fetch end-of-day fundamental data, set DataType='fundamental':

```matlab
>> data = IQML('summary', 'Date', 20190110, 'DataType','fundamental');
```

Note that there is no Symbol parameter in a 'summary' query – data for all the symbols that match the specified SecType (default: 'equity'), Exchange (default: 'NYSE') and/or Date (default: now/latest) is returned. For historic snapshot trading data of specific symbols, use one of the other query types (§5.1-§5.5). Unfortunately, there is no corresponding alternative for historic fundamental data of specific symbols.

---

84 Note that we only receive 4705 securities in the fundamental query compared to 4706 securities for the snapshot query (ASXw has snapshot data but no fundamentals) – this is a data error. With NYSE bonds on the same date we see a similar phenomenon: three symbols (CVS24.CB, DUK46B.CB, TXT27.CB) have snapshot data but no fundamentals. All of these are data errors.
We can filter the returned data for various criteria using the **Filter** parameter (see §4.6), effectively serving as a market scanner for the requested historic date.

Using end-of-day historic summary query enables fetching the data for expired contracts and delisted securities, which are no longer traded. Fetching historic data for such non-trading symbols using any other query type is not possible.\(^{85}\)

Note: Market summaries are only available with IQFeed client 6.1 or newer, and only if you are subscribed to the requested data at DTN and there is a relevant history for download (data is only available since May 20, 2018, and only for some combinations of **SecType/Exchange**). In all other cases, you may receive an error such as one of these:

- The 'summary' query is only supported by IQFeed client 6.1 or newer; you are using version 6.0.
- IQML market summary query error: Code: 50004 - User not authorized for market summary file requested.
- IQML market summary query error: Code: 50007 - No file available.

The following parameters affect historic market summary queries (see §4.6 for details):

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DataType</strong></td>
<td>string</td>
<td>'snapshot'</td>
<td>Either 'snapshot' or 'fundamental' (not 'top')</td>
</tr>
<tr>
<td><strong>Exchange</strong></td>
<td>string</td>
<td>'NYSE'</td>
<td>One of the markets listed in §8.3</td>
</tr>
<tr>
<td><strong>SecType</strong></td>
<td>string</td>
<td>'Equity'</td>
<td>One of the security types listed in §8.4</td>
</tr>
</tbody>
</table>
| **Date**        | integer or string or datetime object | now (latest available data) | Date for which to fetch the end-of-day data. Examples:  
- 737089 (Matlab datenum format)  
- datetime('Jan 29, 2018')  
- 20180129 (yyyymmdd format)  
- '20180129'  
- '2018/01/29'  
- '2018-01-29' |
| **ReportEmptyFields** | logical | false or 0 | If true, then irrelevant data fields (which contain empty [] values for all securities) are reported; if false (default), they are not |
| **Filter**      | string or cell-array of strings | {} | Zero or more filter criteria (condition strings) – Matlab expression(s) involving the reported data fields, which result in a logical (true/false) value. Examples:  
- 'MaturityDate > 20241231'  
- 'MarketCap > 5000 & PeRatio < 9'  
- {'MarketCap > 5000', 'Beta >= 1.2'} |
| **Timeout**     | number    | 300      | Max number of seconds to wait for incoming data (0-9000, where 0 means infinite) |

Note: market summary functionality is only available in the Professional **IQML** license.

---

\(^{85}\) A [huge] static text file containing a [very long] list of expired symbols is available for download from DTN’s FTP site ([ftp://www.dtniq.com/beta/IEOPTION.zip](ftp://www.dtniq.com/beta/IEOPTION.zip); see [http://forums.iqfeed.net/index.cfm?page=topic&topicID=3326](http://forums.iqfeed.net/index.cfm?page=topic&topicID=3326) for details). Note that this file is not actively maintained, so it is better to use the API functionality via **IQML**.
6 Streaming data

Streaming data is a near-real-time mechanism, where IQFeed sends ongoing asynchronous update messages to IQML of tick (quote and trade) and news events. These events are accumulated in IQML memory buffers. They can either be queried asynchronously (via ad-hoc queries that “peek” at the latest accumulated data without disturbing the ongoing streaming, as shown in §6.1-§6.4), or handled synchronously (immediately as each event is received, using callbacks (§10) or alerts (§11)). Depending on your IQFeed subscription, streaming may be delayed by 10+ minutes compared to a real-time feed (a real-time data subscription is needed for live data).

6.1 Streaming quotes

The streaming quotes mechanism has two distinct parts:

1. Request IQFeed to start sending a stream of quotes for a specified security. This is done by using the 'quotes' action and setting a NumOfEvents parameter to a positive >1 value.
2. At any later time(s), you can access the accumulated quotes using either of the following alternatives:
   a. Use 'quotes' action and NumOfEvents of -1 (minus one). This will return the latest streamed data, without stopping the background streaming.
   b. If you set the AssignTo variable in the original request, you can directly access the streamed data in the specified base workspace variable.

For example, to request 100 streaming quotes for a continuous VIX future contract:

IQML('quotes', 'Symbol', '@VX%', 'NumOfEvents', 100)

IQFeed will start sending quotes to IQML in the background, without affecting normal Matlab processing. You can continue to work in Matlab, process/display information etc., while quotes accumulate in the background.

Quotes will only stream in the background in non-blocking mode. If you assign the IQML command results to a variable, the request is treated as blocking and IQML will wait for all the events to accumulate (or Timeout to occur), as described in §4.1:

IQML('quotes', 'Symbol', '@VX%', 'NumOfEvents', 100); % streaming, non-blocking
data = IQML('quotes', 'Symbol', '@VX%', 'NumOfEvents', 100); % blocking

NumOfEvents can be any number >1 for streaming (a value of 1 is the standard snapshot query in §4.1). To collect streaming quotes endlessly, set NumOfEvents to inf. Note that in Matlab, inf is a number (not a string), so do not enclose it in quotes ('inf').

The quotes are collected into an internal data buffer in IQML. A different buffer is maintained for each symbol. The buffer size can be controlled using the MaxItems parameter, which has a default value of 1. This means that by default only the latest streaming quote of each type (bid/ask) is stored, along with high/low/close data.

If you set a higher value for MaxItems, then up to the specified number of latest quotes will be stored. For example, to store the latest 5 quotes:

IQML('quotes', 'Symbol', '@VX%', 'NumOfEvents', 100, 'MaxItems', 5)

86 MaxItems is a numeric parameter like NumOfEvents, so don’t enclose the parameter value within string quotes (‘)
Note: **MaxItems** increases memory usage, multiplied by the number of streamed symbols.\(^{87}\) Subsequent requests to retrieve the latest accumulated quotes buffer data, without stopping the background streaming, should use **NumOfEvents** = -1 (minus one). These requests return a Matlab data struct similar to the following:

```matlab
>> data = IQML('quotes', 'Symbol', '@VX#', 'NumOfEvents', -1)
data =
    Symbol: '@VX#'
    Command: 'w@VX#'
    isActive: 1
    EventsToProcess: 100
    EventsProcessed: 57
    LatestEventDatenum: 737128.637260451
    LatestEventTimestamp: '20180309 15:17:39'
    DataType: 'quotes and trades'
    ProcessType: 'stream'
    AssignTo: ''
    errorMsg: ''
    BufferSize: 5
    Buffer: [5x1 struct]
    LatestData: [1x1 struct]
```

In the returned data struct, we can see the following fields:

- **Symbol** – the requested Symbol.
- **Command** – the command sent to IQFeed, including the requested Symbol.
- **isActive** – logical flag indicating whether quotes are currently streamed for this security. When **NumOfEvents** ticks are received, this flag is set to false (0).
- **EventsToProcess** – total number of streaming ticks requested for the security (using the **NumOfEvents** parameter).
- **EventsProcessed** – number of streaming ticks received for this security. When EventsProcessed >= EventsToProcess, streaming quotes are turned off and isActive is set to false (0). Note that it is possible that EventsProcessed > EventsToProcess, since it takes a while for the streaming cancellation request to reach IQFeed, and during this time a few additional ticks may have arrived.
- **LatestEventDatenum** – Matlab numeric datenum representation of the LatestEventTimestamp (local timezone).
- **LatestEventTimestamp** – timestamp (string format) when this quote event was received by **IQML** (local timezone).
- **DataType** – type of data to stream (set by **DataType** parameter, see below).
- **ProcessType** – always equal to 'stream' for streaming quotes.
- **AssignTo** – the name of the assigned variable in the base Matlab workspace (=**AssignTo** parameter, see below). In normal cases, this field is empty ('').
- **errorMsg** – contains the error message in case streaming cannot be processed (for example: 'Symbol not found'). In normal cases, this field is empty ('').
- **BufferSize** – size of the data buffer (=**MaxItems** parameter, see below).
- **Buffer** – buffer of size BufferSize, accumulating the latest quote updates.
- **LatestData** – latest quote event received from IQFeed.

\(^{87}\) Quotes use up to ~16KB of Matlab memory (depending on the selected **Fields**). So, if **MaxItems**=1000, each streamed symbol would need up to 1000*16KB = 16MB of Matlab memory when its buffer becomes full (which could take a while). Streaming 100 symbols will require up to ~1.6GB. Such large memory usage might significantly degrade overall performance.
Here is a simulated timeline that illustrates the use of streaming data in *IQML*:

<table>
<thead>
<tr>
<th>Time</th>
<th>Events so far</th>
<th>User command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:50:00</td>
<td>0</td>
<td><code>IQML('quotes', 'Symbol','IBM', 'MaxItems',100,'NumOfEvents',100)</code></td>
<td>Streaming data for IBM starts. Up to 100 events to accumulate.</td>
</tr>
<tr>
<td>9:50:20</td>
<td>42</td>
<td><code>data = IQML('quotes', 'symbol','IBM', 'NumOfEvents',-1)</code></td>
<td>Return the 42 accumulated quotes; background streaming continues.</td>
</tr>
<tr>
<td>9:50:30</td>
<td>57</td>
<td><code>IQML('quotes', 'Symbol','IBM', 'MaxItems',80,'NumOfEvents',80)</code></td>
<td>Reduce max # of events 100→80. Only 57 events accumulated until now, so streaming continues.</td>
</tr>
<tr>
<td>9:50:40</td>
<td>65</td>
<td><code>data = IQML('quotes', 'symbol','IBM', 'NumOfEvents',-1)</code></td>
<td>Return the 65 accumulated quotes; background streaming continues.</td>
</tr>
<tr>
<td>9:50:50</td>
<td>72</td>
<td><code>IQML('quotes', 'Symbol','IBM', 'NumOfEvents',0)</code></td>
<td>Reduce max # of events 80→0. 72 events accumulated until now, so streaming stops immediately.</td>
</tr>
</tbody>
</table>

Different quotes are sent independently from IQFeed server with a unique timestamp.

**Note:** *data.LatestEventDatenum* and *data.LatestEventTimestamp* are specified in local time-zone. In contrast, *data.LatestData.Most_Recent_Trade_Time* and *data.Buffer.-Most_Recent_Trade_Time* use the server time-zone, typically US Eastern.

To get the quotes data, simply read the fields of the returned *data* struct, for example:

```python
>> data.LatestData
ans =
    Symbol: '@VX#'
    Most_Recent_Trade: 17.08
    Most_Recent_Trade_Size: []
    Most_Recent_Trade_Time: '08:06:20.716000'
    Most_Recent_Trade_Market_Center: 32
    Total_Volume: 4507
    Bid: 17.05
    Bid_Size: 63
    Ask: 17.1
    Ask_Size: 244
    Open: 17.2
    High: 17.35
    Low: 17
    Close: 17.23
    Message_Contents: 'Cbasohlcv'
    Message_Description: 'Last qualified trade; A bid update occurred; An ask update occurred; A settlement occurred; An open declaration occurred; A high declaration occurred; A low declaration occurred; A close declaration occurred; A volume update occurred'
    Most_Recent_Trade_Conditions: '4D'
    Trade_Conditions_Description: 'Implied'
    Most_Recent_Market_Name: 'CBOE Futures Exchange (CFE)'
```

---

88 The textual description fields depend on the *MsgParsingLevel* parameter having a value of 2 or higher (see §3.2 and §8)
Note that `data.LatestData` is typically the same as `data.Buffer(end)`, regardless of the values of `MaxItems` or `NumOfEvents`.89

Each streaming security asset can have a different `BufferSize`, by specifying a different `MaxItems` value in the command (large for heavily-traded assets, small for others).

Once the data is retrieved, you can direct IQML to clear (empty) the internal `Buffer`, by setting `ClearBuffer` to true or 1. The latest buffer will be returned, and the internal `Buffer` (but no other field) will be immediately emptied, awaiting new streaming quotes:

```matlab
data = IQML('quotes', 'symbol', 'IBM', 'NumOfEvents', -1, 'ClearBuffer', true);
```

To stop collecting streaming quotes, simply resend a request with `NumOfEvents`=0:

```matlab
IQML('quotes', 'symbol', 'IBM', 'NumOfEvents', 0);
```

IQFeed reports 16 standard data fields by default. If you have the Professional (or trial) IQML license, you can customize the returned data fields by requesting up to 50+ additional fields, removing standard fields, and setting the order of the reported fields. This can be done using the `Fields` parameter, as explained in §4.1. For example:

```matlab
IQML('quotes', 'symbol', 'IBM', 'fields', 'Last,Ask,Bid', 'numOfEvents', 6);
```

When `DataType` is 'q' or 'quotes', whenever any of the requested data fields (either the standard 16 fields, or a customized set) gets updated (not necessarily to a different value), a new tick (update/quote) message is sent/streamed. Adding data fields means a corresponding increase in tick messages. It is not possible in IQFeed to request data fields without the corresponding update messages for these fields (or vice versa). The only exception to this rule is setting `DataType` to 't' or 'trades': in this case only trade updates (containing all the requested fields) will be streamed, but no field updates.

In summary, the fewer data fields that are requested, the faster the run-time processing, and the lower the corresponding tick message rate, thus enabling a larger number of usable quotes to be streamed and processed by your Matlab program each second.

You can specify multiple symbols for streaming at the same time, in a single `IQML` command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
IQML('quotes', 'symbols', {'IBM','GOOG','AAPL'}, 'numOfEvents', 6);
IQML('quotes', 'symbols', 'IBM:GOOG:AAPL', 'numOfEvents', 6); % equivalent
```

And similarly, when retrieving the accumulated streaming data:

```matlab
>> data = IQML('quotes', 'symbol', 'IBM:GOOG:AAPL', 'numOfEvents', -1);
data =
1x3 struct array with fields:
Symbol
Command
isActive
EventsToProcess
EventsProcessed
LatestEventDatenum
LatestEventTimestamp
DataType
ProcessType
BufferSize
Buffer
LatestData
```

89 When `NumOfEvents` events have been received, IQFeed is instructed to stop streaming updates, but some update messages may already be on their way from IQFeed before streaming actually stops. These extra update messages are not accumulated in the `Buffer`, but the latest of these messages will be reflected in `LatestData` field.

90 During the buffer clear operation some streaming data may be lost, so it is advised not to clear too often.
To get the latest data for all streamed symbols, omit the `Symbol` parameter (or set it to empty ['']) in the `IQML` command. Note: this will return both active and non-active streams:

```matlab
>> data = IQML('quotes', 'numOfEvents', -1); % no symbol: return ALL streams
data = 1x5 struct array with fields:
  Symbol  Command...

Similarly, to cancel all active streams in a single command, omit `Symbol` (or set it to '):

```matlab
>> IQML('quotes', 'numOfEvents', 0); % no symbol: stop ALL streams
```

IQFeed typically allows streaming up to 500 symbols. This limit can be increased by paying DTN for increased data subscriptions. In any case, the actual maximal number of concurrently-streaming symbols is limited by performance considerations (see §3.6).

Note that during non-trading hours, there is no streaming data (of course). To test the streaming-data mechanism during non-trading hours, use the dummy symbol TST$Y, for which IQFeed sends a continuous 24/7 stream of pre-recorded data.

When debugging streaming, it is sometimes useful to assign the streamed data to a base Matlab workspace variable, which can be monitored live using Matlab’s Variable Explorer or directly checked/used within a Matlab script, without a need to call `IQML('quotes',..., 'numOfEvents',-1)` to constantly refetch the latest data. This data mirroring can be done by setting the `AssignTo` parameter to any valid Matlab variable name or assignment target, for example: `myData` or 'streamed.VX' or 'data{3}'.

```matlab
>> IQML('quotes', ..., 'AssignTo', 'myData');
% streaming data in background is mirrored in base workspace variable myData:
>> myData
myData =
  struct with fields:
    Symbol: '@VX#'
    Command: 'BW,@VX#,60,20200421 000000,7,100,,,B,s,,5'
    isActive: 1
    EventsToProcess: Inf
    EventsProcessed: 129
    LatestEventDatenum: 737902.831878183
    LatestEventTimestamp: '20200421 19:57:54'
    DataType: 'quotes and trades'
    ProcessType: 'stream'
    AssignTo: 'myData'
    errorMsg: '
    MaxDaysToProcess: 7
    BufferSize: 100
    Buffer: [100x1 struct]
    LatestData: [1x1 struct]
```

---

91 Note that cancelling all active streams cancels streaming regional updates (§6.2) in addition to streaming quotes.

92 IQFeed’s streaming functionality of TST$Y is currently broken. To get notified when DTN reports that the functionality is fixed, follow this forum thread: [http://forums.dtn.com/index.cfm?page=topic&topicID=4286](http://forums.dtn.com/index.cfm?page=topic&topicID=4286)
Here is a summary of the IQML parameters that directly affect streaming quotes:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| Symbol or Symbols | colon or comma-delimited string, or cell-array of strings | (none) | Limits request to specified symbol(s). E.g.:
- '@VX#'
- 'IBM:AAPL:GOOG'
- 'IBM:AAPL:GOOG'
- {'IBM', 'AAPL', 'GOOG'}
This parameter must be set to valid symbol name(s) when NumOfEvents > 0 |
| NumOfEvents | integer | MaxItems | One of:
- inf – continuous endless streaming quotes for the specified security
- N>1 – stream only N quotes
- 1 – get only a single quote (default)
- 0 – stop streaming quotes
- -1 – return latest accumulated quotes data while continuing to stream new quotes data |
| MaxItems | integer | 1 | Number of streaming quotes stored in cyclic buffer. Once this number of quotes are received old quotes are discarded as new quotes arrive. |
| DataType | string | 'q' | One of:
- 'q' or 'quotes' (default) – stream both trades & quote (bid/ask update) events
- 't' or 'trades' – stream trade events only |
| Fields | colon or comma-separated string, or cell-array of strings | 'Symbol, Most Recent Trade, Most Recent Trade Size, Most Recent Trade Time, ...' (see §4.1) | Sets the list of data fields reported by IQFeed for each quote. IQFeed’s default set has 16 fields; 50+ additional fields can be specified.
If Fields is set to an empty value ({} or ''), the list of current, available fields is returned.
If Fields is not empty, subsequent quotes queries will return the specified fields, in the specified order (Professional IQML license only). The Symbol field is always returned first, even if not specified.
Examples:
- {'Bid', 'Ask', 'Last'}
- 'Bid, Ask, Last'
- 'Bid:Ask:Last'
- 'All' (indicates all available fields) |
| ClearBuffer | logical (true/false) | false | If true or 1, the internal cyclic quotes buffer is cleared after the data is returned to the caller. |
| AssignTo | string | '' (empty string) | Contains the assignment target (typically a variable name) in the base Matlab workspace, useful for stream debugging. |

---

93 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization
6.2 Regional updates

Regional quotes are Bid and Ask prices delivered from various regional markets (exchanges). The streaming regional market update mechanism has two parts, just like streaming ticks (§6.1):

1. Request IQFeed to start sending a stream of regional updates. This is done by using the ‘regional’ action and setting a `NumOfEvents` parameter to a positive > 1 value. You must specify the `Symbol(s)` for which regional updates will stream.

2. At any later time(s), you can access the accumulated regional updates using either of the following alternatives:
   a. Use 'regional' action and `NumOfEvents` of -1 (minus one). This will return the latest streamed data, without stopping the background streaming.
   b. If you set the `AssignTo` variable in the original request, you can directly access the streamed data in the specified base workspace variable.

For example, to request 100 streaming regional updates for Facebook:

```
IQML('regional', 'Symbol','FB', 'NumOfEvents',100)
```

This causes IQFeed to start sending regional updates to `IQML` in the background, up to the specified `NumOfEvents`, without affecting normal Matlab processing. You can continue to work with Matlab, process and display information etc., while the regional updates accumulate in the background.

Regional updates will only stream in the background in non-blocking mode. If you assign the `IQML` command results to a variable, the request is treated as blocking and `IQML` will wait for all data to accumulate (or `Timeout` to occur), as described in §7.2:

```
IQML('regional', 'Symbol','FB', 'NumOfEvents',100); % streaming, non-blocking
```

```
data = IQML('regional', 'Symbol','FB', 'NumOfEvents',100); % blocking
```

`NumOfEvents` can be any number higher than 1 for streaming to work (a value of 1 is the standard snapshot regional-update request described in §7.2). To collect streaming regional updates endlessly, set `NumOfEvents` to the value `inf`. Note that in Matlab, `inf` is a number (not a string), so do not enclose it in quotes ('`inf`').

The regional updates are collected into an internal data buffer in `IQML`. A different buffer is maintained for each symbol. The buffer size can be controlled using the `MaxItems` parameter, which has a default value of 1^94. This means that by default only the latest streaming regional update that affect the specified symbols will be stored in the buffer and become accessible for later processing.

If you set a higher value for `MaxItems`, then up to the specified number of latest regional update items will be stored. For example, to store the latest 5 updates:

```
IQML('regional', 'Symbol','FB', 'NumOfEvents',100, 'MaxItems',5)
```

Note that using a large `MaxItems` increases memory usage. This could have an adverse effect if you set a very large buffer size (many thousands) and/or streaming of a large number of different securities.95

---

94 Note that `MaxItems` is a numeric parameter like `NumOfEvents`, so don’t enclose the parameter value within string quotes (‘’).

95 Each regional update item uses 2KB of Matlab memory. During trading hours, there could be dozens of updates per second for highly liquid symbols (i.e., 500MB or more per hour, if all updates are saved). Limiting `MaxItems` to some finite value ensures that the memory usage and performance impact remain low.
Subsequent requests to retrieve the latest accumulated regional updates buffer data, without stopping the background streaming, should use `NumOfEvents = -1` (minus one). These requests return a Matlab data struct similar to the following:

```matlab
>> data = IQML('regional', 'Symbol', 'FB', 'NumOfEvents', -1)
data =
    Symbol: 'FB'
    Command: 'S,REGON,FB'
    isActive: 1
    EventsToProcess: 100
    EventsProcessed: 83
    LatestEventDatenum: 737146.784037153
    LatestEventTimestamp: '20180327 18:49:00'
   DataType: 'regional'
    ProcessType: 'stream'
    AssignTo: '
    errorMsg: '
   BufferSize: 5
    Buffer: [5x1 struct]
    LatestData: [1x1 struct]
```

In the returned `data` struct, we can see the following fields:

- **Symbol** — the requested Symbol.
- **Command** — the command sent to IQFeed, including the requested Symbol.
- **isActive** — a logical flag indicating whether regional updates are currently being streamed for this security. When `NumOfEvents` ticks have been received, this flag is set to false (0).
- **EventsToProcess** — total number of streaming regional updates requested (using the `NumOfEvents` parameter).
- **EventsProcessed** — number of streaming regional updates received. When `EventsProcessed >= EventsToProcess`, streaming updates are turned off and `isActive` is set to false (0).

Note that it is possible that `EventsProcessed > EventsToProcess`, since it takes a while for the streaming cancellation request to reach IQFeed and during this time a few additional update messages may have arrived.

- **LatestEventDatenum** — Matlab numeric datenum representation of the `LatestEventTimestamp` (local timezone).
- **LatestEventTimestamp** — timestamp (string format) when this regional update event was received by `IQML` (local timezone).
- **DataType** — always equal to 'regional' for streaming regional updates.
- **ProcessType** — always equal to 'stream' for streaming regional updates.
- **AssignTo** — the name of the assigned variable in the base Matlab workspace (=`AssignTo` parameter, see below). In normal cases, this field is empty ("").
- **errorMsg** — contains the error message in case streaming cannot be processed (for example: 'Symbol not found'). In normal cases, this field is empty ("").
- **BufferSize** — size of the data buffer (=`MaxItems` parameter, see below).
- **Buffer** — buffer of size `BufferSize`, accumulating the latest regional updates.
- **LatestData** — latest regional update event received from IQFeed.

To get the regional updates data, simply read the fields of the returned `data` struct.96

---

96 The textual Description fields depend on the `MsgParsingLevel` parameter having a value of 2 or higher (see §3.2 and §8)
Each update has an associated timestamp, since different regional updates are sent separately and independently from IQFeed server.

**Note:** `data.LatestEventDatenum` and `data.LatestEventTimestamp` are specified in the local time-zone; in contrast, `data.LatestData.RegionalBidTime` and `RegionalAskTime` are specified in the server’s time-zone (typically US Eastern time zone).

**Note** that `data.LatestData` is typically the same as `data.Buffer(end)`, regardless of the values of `MaxItems` or `NumOfEvents`.\(^\text{97}\)

Each streaming security asset can have a different `BufferSize`, by specifying a different `MaxItems` value in the streaming command. This can be used for specifying a larger `MaxItems` for heavily-traded assets vs. lightly-traded ones.

Once the data is retrieved, you can direct IQML to clear (empty) the internal `Buffer`, by setting `ClearBuffer` to true or 1. The latest buffer will be returned, and the internal `Buffer` (but no other field) will be immediately emptied, awaiting new regional updates:\(^\text{98}\)

```matlab
data = IQML('regional', 'symbol', 'FB', 'NumOfEvents', -1, 'ClearBuffer', true);
```

To stop collecting regional updates, simply resend a request with `NumOfEvents=0`:

```matlab
IQML('regional', 'symbol', 'FB', 'NumOfEvents', 0);
```

You can specify multiple symbols for streaming at the same time, in a single IQML command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
IQML('regional', 'symbols', {'IBM', 'GOOG', 'AAPL'}, 'numOfEvents', 6);
IQML('regional', 'symbols', {'IBM:GOOG:AAPL'}, 'numOfEvents', 6); % equivalent
```

As with streaming quotes (§6.1), to get the latest data for all streamed symbols, omit the `Symbol` parameter or set it to empty `[]`. This returns all streams (both active/not):

```matlab
>> data = IQML('regional', 'numOfEvents', -1); % no symbol: get ALL streams
```

Data = 1×5 struct array with fields:
- Symbol
- Command
- isActive
- EventsToProcess

Similarly, to cancel all active streams in a single command, omit `Symbol` (or set it to `"\`).\(^\text{99}\)

```matlab
>> IQML('regional', 'numOfEvents', 0); % no symbol: ALL streams are stopped
```

---

\(^\text{97}\) When `NumOfEvents` events have been received, IQFeed is instructed to stop streaming updates, but one or more update messages may already be on their way from IQFeed before streaming actually stops. These extra update messages are not accumulated in the `Buffer`, but the latest of these messages will be reflected in `LatestData` field.

\(^\text{98}\) During and around the time of the buffer clear, some streaming data may be lost, so it is advised not to clear to often…

\(^\text{99}\) Note that cancelling all active streams cancels streaming quotes (§6.1) in addition to streaming regional updates.
When debugging streaming, it is sometimes useful to assign the streamed data to a base Matlab workspace variable, which can be monitored live using Matlab’s Variable Explorer or directly checked/used within a Matlab script, without a need to call IQML('regional',...,'numOfEvents',-1) to constantly refetch the latest data. This data mirroring can be done by setting the AssignTo parameter to any valid Matlab variable name or assignment target, for example: 'myData' or 'streamed.FB' or 'data{3}'.

```
>> IQML('regional', ..., 'AssignTo','myData');
% streaming data in background is mirrored in base workspace variable myData:
>> myData
myData =
    Symbol: 'FB'
  Command: 'S,REGON,FB'
     isActive: 1
EventsToProcess: 100
EventsProcessed: 83
...
```

Here is a summary of the IQML parameters that affect streaming regional updates:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma-delimited string, or cell-array of strings</td>
<td>(none)</td>
<td>Limits the request to the specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- '@VX#'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 'IBM:AAPL:GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 'IBM', 'AAPL', 'GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s) when NumOfEvents&gt;0</td>
</tr>
<tr>
<td>NumOfEvents</td>
<td>integer</td>
<td>MaxItems</td>
<td>One of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- inf – continuous endless streaming regional updates for specified security</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- N&gt;1 – stream only N regional updates</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 1 – get only a single update (default)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 0 – stop streaming regional updates</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- -1 – return the latest accumulated regional updates data while continuing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>to stream new regional updates data</td>
</tr>
<tr>
<td>MaxItems</td>
<td>integer</td>
<td>1</td>
<td>Number of streaming regional updates stored in a cyclic buffer. Once this</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>number of updates has been received, the oldest update is discarded when a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>new update arrives.</td>
</tr>
<tr>
<td>ClearBuffer</td>
<td>logical</td>
<td>false</td>
<td>If true or 1, the internal cyclic quotes buffer is cleared after the data</td>
</tr>
<tr>
<td></td>
<td>(true/false)</td>
<td></td>
<td>is returned to the caller.</td>
</tr>
<tr>
<td>AssignTo</td>
<td>string</td>
<td>&quot; (empty string)</td>
<td>Contains the assignment target (typically a variable name) in the base Matlab</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>workspace, useful for stream debugging.</td>
</tr>
</tbody>
</table>

Note: Regional updates data is only available in the Professional IQML license.

---

100 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization
6.3 Interval bars

The streaming interval bars feature has two parts, just like streaming ticks (§6.1):

1. Request IQFeed to start sending a stream of interval bars for a specified security. This is done by using the 'intervalbars' action and setting a NumOfEvents parameter to a positive >1 value.

2. At any later time(s), you can access the accumulated interval bars using either of the following alternatives:
   a. Use 'intervalbars' action and NumOfEvents of -1 (minus one). This will return the latest streamed data, without stopping the background streaming.
   b. If you set the AssignTo variable in the original request, you can directly access the streamed data in the specified base workspace variable.

For example, request 80 streaming interval bars of a continuous VIX future contract:

\[
\text{IQML('intervalbars', 'Symbol','@VX#', 'NumOfEvents',80)}
\]

This causes IQFeed to start sending interval bars to IQML in the background, up to the specified NumOfEvents, without affecting normal Matlab processing. This means you can continue to work with Matlab, process data, display information etc.

Quotes will only stream in the background in non-blocking mode. If you assign the IQML command results to a variable, the request is treated as blocking and IQML will wait for all the events to accumulate (or Timeout to occur), as described in §4.1:

\[
\text{IQML('intervalbars', 'Symbol','@VX#', 'NumOfEvents',80); % streaming, non-blocking}
\]
\[
\text{data = IQML('intervalbars', 'Symbol','@VX#', 'NumOfEvents',80);} % blocking
\]

NumOfEvents can be any number higher than 1 for streaming to work. To collect streaming quotes endlessly, set NumOfEvents to the value inf. Note that in Matlab, inf is a number (not a string), so do not enclose it in quotes ('inf').

The quotes are collected into an internal data buffer in IQML. A different buffer is maintained for each symbol. The buffer size can be controlled using the MaxItems parameter, which has a default value of 1. This means that by default only the latest streaming interval bar is stored.

If you set a higher value for MaxItems, then up to the specified number of latest quotes will be stored, subject to IQFeed server limitations:

\[
\text{IQML('intervalbars', 'Symbol','@VX#', 'NumOfEvents',80, 'MaxItems',3)}
\]

Note that using a large MaxItems increases memory usage. This may have an adverse effect if you use a large buffer (many thousands) and/or stream multiple Symbols.

Each streaming security asset can have a different BufferSize, by specifying a different MaxItems value in the streaming command. This can be used for specifying a larger MaxItems for heavily-traded assets vs. lightly-traded ones.

---

101 MaxItems is a numeric parameter like NumOfEvents, so don’t enclose the parameter value within string quotes (‘’)
102 The number of reported bars may possibly be limited by the IQFeed server, depending on your data subscriptions and exchange.
103 Interval bars use ~2KB of Matlab memory. So, if MaxItems=1000, each streamed symbol would need 1000*2KB = 2MB of Matlab memory when its buffer becomes full (which could take a while). Streaming 100 symbols will require up to ~200MB.
Subsequent requests to retrieve the latest accumulated interval bars buffer data, without stopping the background streaming, should use `NumOfEvents = -1` (minus one). These requests return a Matlab data struct similar to the following:

```matlab
>> data = IQML('intervalbars', 'Symbol', '@VX#', 'NumOfEvents', -1)
data =
    Symbol: '@VX#
    Command: 'BW,@VX#,60,,1,3,,B'
    isActive: 0
    EventsToProcess: 80
    EventsProcessed: 80
    LatestEventDatenum: 737902.504044143
    LatestEventTimestamp: '20200421 12:05:49.414'
    DataType: 'intervalbars'
    ProcessType: 'stream'
    AssignTo: ''
    errorMsg: ''
    MaxDaysToProcess: 1
    BufferSize: 3
    Buffer: [3×1 struct]
    LatestData: [1×1 struct]
```

In the returned `data` struct, we can see the following fields:

- **Symbol** – the requested `Symbol`.
- **Command** – the command sent to IQFeed, including the requested `Symbol`.
- **isActive** – logical flag indicating whether interval bars are currently streamed for the security. Once `NumOfEvents` bars are received this flag is set to `false` (0).
- **EventsToProcess** – total number of streaming interval bars requested for the security (using the `NumOfEvents` parameter).
- **EventsProcessed** – number of streaming interval bars received for this security. When `EventsProcessed >= EventsToProcess`, streaming is turned off and `isActive` is set to `false` (0). Note: it is possible that `EventsProcessed > EventsToProcess`, since it takes a while for the streaming cancellation request to reach IQFeed, and during this time a few additional bars may have arrived.
- **LatestEventDatenum** – Matlab numeric datenum representation of the `LatestEventTimestamp` (local timezone).
- **LatestEventTimestamp** – timestamp (string format) when this bar event was received by `IQML` (local timezone).
- **DataType** – always equal to 'intervalbars' for streaming interval bars.
- **ProcessType** – always equal to 'stream' for streaming interval bars.
- **AssignTo** – the name of the assigned variable in the base Matlab workspace (=`AssignTo` parameter, see below). In normal cases, this field is empty ('').
- **errorMsg** – contains the error message in case streaming cannot be processed (for example: 'Symbol not found'). In normal cases, this field is empty ('').
- **MaxDaysToProcess** – maximal number of days with intervals data to process.
- **BufferSize** – size of the data buffer (=`MaxItems` parameter, see below).
- **Buffer** – buffer of size `BufferSize`, accumulating the latest quote update.
- **LatestData** – single latest interval bar received from IQFeed.
To retrieve the interval bars data, read the fields of the returned data struct:

```matlab
>> data.LatestData
ans =
    Symbol: '@VX#'
    BarType: 'Complete interval bar from history'
    Timestamp: '2020-04-21 04:50:00'
     Open: 38.95
     High: 38.95
     Low: 38.85
    Close: 38.9
CumulativeVolume: 6381
    IntervalVolume: 18
  NumberofTrades: 0
   BarTypeCode: 'BH'
 EventDatenum: 737902.504044143
 EventTimestamp: '20200421 12:05:49.414'
```

Note that `data.LatestData` is typically the same as `data.Buffer(end)`, regardless of the values of `MaxItems` or `NumOfEvents`.\(^\text{104}\)

IQFeed sends interval bars asynchronously, with a `Timestamp` that identifies each bar (`server` timezone, typically US Eastern timezone). Note that `data.LatestEventDatenum=data.LatestData.EventDatenum` and `data.LatestEventTimestamp=data.LatestData.Timestamp` are specified in the `local` timezone (your computer’s time). Also note that `LatestEventTimestamp` and `EventTimestamp` have a different format than `Timestamp`.

The `data.LatestData.NumberOfTrades` field indicates the number of trades that occurred within this bar (i.e., not cumulative). This field is only relevant when `IntervalType` is 'ticks'/trades'. In all other cases, the field will be empty ([ ]) or 0.

The `IntervalType` (default: 'secs') and `IntervalSize` (default: 60) parameters should typically be specified together. Note that `IntervalSize` must be a positive integer value (i.e. its value cannot be 4.5 or 0). If `IntervalType` is 'ticks'/trades', `IntervalSize` must be 2 or higher. If `IntervalType` is 'volume', `IntervalSize` must be 100 or higher. If `IntervalType` is 'secs', `IntervalSize` must be any integer between 1-300 (5 minutes), or any multiple of 60 (1 minute) between 300-3600 (1 hour), or 7200 (2 hours).\(^\text{105}\)

The `data.LatestData.BarType` and `BarTypeCode` fields indicate if this is a historic bar (BH), a complete bar from the live (real-time) stream (BC), or an update bar (BU).

Unlike other streaming types, intervalbar queries also fetch historic bars data, starting from the date/time that is set by the `BeginDateTime` parameter. This is similar to (and subject to the same limitations as) historic interval data (§5.4), but with no specified end point. `BeginDateTime`’s default value is 00:00:00 today (server time), so we almost always get historic (BH) bars before live streaming (BC) bars. IQML will immediately return the historic bars, and new realtime streaming bars as they become available. If we run the query at mid-day, we may get hundreds of historic bars before the first live streaming bar. Depending on the specified `BeginDateTime`

---

\(^{104}\) When `NumOfEvents` events have been received, IQFeed is instructed to stop streaming updates, but some update messages may already be on their way from IQFeed before streaming actually stops. These extra update messages are not accumulated in the `Buffer`, but the latest of these messages will be reflected in `LatestData` field.

\(^{105}\) Note that IQFeed’s limitations on live 'secs' interval bars are stricter than the limitations on historical interval bars (§5.4): [http://forums.dtn.com/index.cfm?page=topic&topicID=5529](http://forums.dtn.com/index.cfm?page=topic&topicID=5529)
and \texttt{NumOfEvents}, we may receive only historic bars without any live streaming bars. Historic and streaming data bars can be distinguished based on their \texttt{BarType} field.

Note: the initial set of historic bars also includes the latest (incomplete) bar. For example, if we query at 21:34, we get the complete historic (BH) intervalbars for 21:20, 21:25, 21:30 and also the current (incomplete) bar for 21:35. A minute later, at exactly 21:35:00, IQFeed sends the complete BC bar for 21:35. This BC bar is added at the end of the buffer, so we will see two 21:35 bars in the buffer.

By default, IQFeed only sends historic BH bars followed by streaming BC bars. If the \texttt{MaxUpdateDuration}>0, IQFeed also sends BU bar update messages when the specified number of seconds have passed since the last trade or BC bar message. For example, if \texttt{IntervalSize}=60 and \texttt{MaxUpdateDuration}=15, the following scenario may occur.\footnote{\url{http://forums.iqfeed.net/index.cfm?page=topic&topicID=1341} IQFeed’s term “update interval” was renamed \texttt{MaxUpdateDuration} in \texttt{IQML} in order to avoid confusion with the interval bars. Note: the described scenario depends on IQFeed’s implementation of the “update interval” mechanism – this implementation is not in \texttt{IQML}’s control.}

\begin{verbatim}
9:30:03 - A trade occurs - no message is sent by IQFeed (15-sec timer is reset to 0)
9:30:06 - A trade occurs - no message is sent by IQFeed (15-sec timer is reset to 0)
9:30:21 - No trade or BC message for 15 seconds, so IQFeed sends an update (BU) message
9:30:57 - A trade occurs - no message is sent by IQFeed (15-sec timer is reset to 0)
9:31:12 - No trade or BC message for 15 seconds, so IQFeed sends a new update (BU) message
9:31:15 - A trade occurs - this is the first trade outside the 9:30 minute, so IQFeed sends a bar complete (BC) message for the 9:30 bar. (15-sec timer is reset to 0)
9:31:29 - A trade occurs - no message is sent by IQFeed (15-sec timer is reset to 0)
9:31:40 - A trade occurs - no message is sent by IQFeed (15-sec timer is reset to 0)
9:31:53 - A trade occurs - no message is sent by IQFeed (15-sec timer is reset to 0)
9:32:03 - A trade occurs - IQFeed sends a bar complete (BC) message for the 9:31 bar; only 10 seconds have passed since the last trade, so no BU message is sent by IQFeed before the BC.
\end{verbatim}

Note: IQFeed only sends BC bar complete messages when the first trade outside the bar occurs. This may occur a long time after the bar has ended. Use the \texttt{MaxUpdateDuration} parameter to receive more timely BU bar update messages.

BU update bars are appended to the buffer like other bar messages, so we may see bars with the same \texttt{Timestamp}. These bars do not necessarily have the same data, since they were sampled at different times (per their respective \texttt{EventDatenum}, \texttt{EventTimestamp}). The most updated data is always the last bar for each unique \texttt{Timestamp}. For example:

\begin{verbatim}
>> IQML('intervalbars', 'Symbol', '@VX$', 'NumOfEvents', inf, 'MaxItems', 9, ...
     'IntervalSize', 60, 'IntervalType', 'secs', 'MaxUpdateDuration', 15);
... % wait a while...
>> data = IQML('intervalbars', 'Symbol', '@VX$', 'NumOfEvents', -1);
>> struct2table(data.Buffer)
ans =
   9x12 table
         Symbol   BarType                              Timestamp     Open ...
     '@VX$
     'Complete interval bar from history'    '2020-04-21 03:51:00'    39.45 ...
     '@VX$
     'Complete interval bar from history'    '2020-04-21 03:52:00'    39.45 ...
     '@VX$
     'Complete interval bar from history'    '2020-04-21 03:53:00'    39.35 ...
     '@VX$
     'Complete interval bar from stream'    '2020-04-21 03:53:00'    39.65 ...
     '@VX$
     'Updated interval bar'                 '2020-04-21 03:54:00'    39.45 ...
     '@VX$
     'Complete interval bar from stream'    '2020-04-21 03:54:00'    39.45 ...
     '@VX$
     'Updated interval bar'                 '2020-04-21 03:55:00'    39.45 ...
     '@VX$
     'Updated interval bar'                 '2020-04-21 03:55:00'    39.45 ...
     '@VX$
     'Complete interval bar from stream'    '2020-04-21 03:55:00'    39.45 ...
\end{verbatim}
Once the data is retrieved, you can direct IQML to clear (empty) the internal Buffer, by setting ClearBuffer to true or 1. The latest buffer will be returned, and the internal Buffer (but no other field) will be immediately emptied awaiting new interval bars:

```matlab
data = IQML('intervalbars', 'symbol', 'IBM', 'NumOfEvents', -1, ...
    'ClearBuffer', true);
```

To stop collecting interval bars, simply resend a request with NumOfEvents=0:

```matlab
IQML('intervalbars', 'symbol', 'IBM', 'NumOfEvents', 0);
```

You can specify multiple symbols for streaming at the same time, in a single IQML command, by specifying a colon-delimited or cell-array list of symbols. For example:

```matlab
IQML('intervalbars', 'symbols', {'IBM', 'GOOG', 'AAPL'}, 'numOfEvents', 6);
IQML('intervalbars', 'symbols', 'IBM:GOOG:AAPL', 'numOfEvents', 6); % equivalent
```

As with streaming quotes (§6.1), to get the latest data for all streamed symbols, omit the Symbol parameter or set it to empty ['']. This returns all streams (both active/not). In the following example, we get a struct array of size 5, one struct for each symbol for which that we have requested intervalbars during this Matlab session:

```matlab
>> data = IQML('intervalbars', 'numOfEvents', -1); % no symbol: get ALL streams
data = 1x5 struct array with fields:
    Symbol
    Command
    isActive
...
```

Similarly, to cancel all active streams in a single command, omit Symbol (or set it to "):

```matlab
>> IQML('intervalbars', 'numOfEvents', 0); % no symbol: stop ALL streams
```

When debugging streaming, it is sometimes useful to assign the streamed data to a base Matlab workspace variable, which can be monitored live using Matlab’s Variable Explorer or directly checked/used within a Matlab script, without a need to call IQML('intervalbars',...,'numOfEvents','-1) to constantly refetch the latest data. This data mirroring can be done by setting the AssignTo parameter to any valid Matlab variable name or assignment target, for example: ‘myData’ or ‘streamed.VX’ or ‘data{3}’.

```matlab
>> IQML('intervalbars', ..., 'AssignTo','myData');
% streaming data in background is mirrored in base workspace variable myData:
>> myData
myData = struct with fields:
    Symbol: '@VX#'
    Command: 'BW,@VX#,60,20200421 000000,7,100,,,B,s,,5'
    isActive: 1
    EventsToProcess: Inf
    EventsProcessed: 129
    LatestEventDatenum: 737902.831878183
    LatestEventTimestamp: '20200421 19:57:54'
    DataType: 'intervalbars'
    ProcessType: 'stream'
    AssignTo: 'myData'
    errorMsg: ''
    MaxDaysToProcess: 7
    BufferSize: 100
    Buffer: [100x1 struct]
    LatestData: [1x1 struct]
```

During and around the time of the buffer clear, some streaming data may be lost, so it is advised not to clear to often…
The following parameters affect interval bars data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symbol</strong> or <strong>Symbols</strong></td>
<td>colon or comma-delimited string, or cell-array of strings</td>
<td>(none)</td>
<td>Limits the request to the specified symbol(s). Examples: • '@VX#' • 'IBM:AAPL:GOOG' • 'IBM,AAPL,GOOG' • {'IBM', 'AAPL', 'GOOG'} This parameter must be set to valid symbol name(s) when NumOfEvents&gt;0</td>
</tr>
<tr>
<td><strong>NumOfEvents</strong></td>
<td>integer</td>
<td><strong>MaxItems</strong></td>
<td>One of: • inf – continuous endless streaming interval bars for specified symbol(s) • N&gt;1 – stream only N interval bars • 1 – get only a single interval bar • 0 – stop streaming interval bars • -1 – return latest interval bars data while continuing to stream new bars</td>
</tr>
<tr>
<td><strong>MaxItems</strong></td>
<td>integer</td>
<td>100</td>
<td>Returns up to the specified number of bars (if available). This is the max Buffer size.</td>
</tr>
<tr>
<td><strong>MaxDays</strong></td>
<td>integer</td>
<td>1</td>
<td>Max number of trading days to retrieve</td>
</tr>
<tr>
<td><strong>IntervalType</strong></td>
<td>string</td>
<td>'secs'</td>
<td>Sets the type of interval size. One of the following values: • 's' or 'secs' – time [seconds] (default) • 'v' or 'volume' – traded volume • 't' or 'ticks' – number of ticks</td>
</tr>
<tr>
<td><strong>IntervalSize</strong></td>
<td>integer</td>
<td>60</td>
<td>Size of bars in IntervalType units. Must be ≥1 for secs, ≥2 for ticks, ≥100 for volume.</td>
</tr>
<tr>
<td><strong>BeginFilterTime</strong></td>
<td>string</td>
<td>'00:00:00'</td>
<td>Only return bars that begin after this time of day (US Eastern time-zone). Format: ‘hhmm’, ‘hh:mm’, ‘hhmsss’ or ‘hh:mm:ss’.</td>
</tr>
<tr>
<td><strong>EndFilterTime</strong></td>
<td>string</td>
<td>'23:59:59'</td>
<td>Only return bars that end before this time of day (US Eastern time-zone). Format: ‘hhmm’, ‘hh:mm’, ‘hhmsss’ or ‘hh:mm:ss’.</td>
</tr>
<tr>
<td><strong>BeginDateTime</strong></td>
<td>integer or string or datetime object</td>
<td>&quot; (empty string) meaning today at 00:00:00</td>
<td>Only return bars that begin after this date/time (US Eastern time-zone). Format: Matlab datenum, or ‘yyyyymmdd hhmsss’, or ‘yyyy-mm-dd hh:mm:ss’ etc. Note: there is no corresponding <strong>EndDateTime</strong> parameter for streaming intervalbars (only for historic bars: §5.4).</td>
</tr>
</tbody>
</table>

108 In IQML, the **Symbol** and **Symbols** parameters are synonymous – you can use either of them, in any capitalization.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MaxUpdateDuration</td>
<td>integer</td>
<td>0</td>
<td>Max number of seconds to wait after a trade before receiving a bar update message</td>
</tr>
<tr>
<td>Timeout</td>
<td>number</td>
<td>5.0</td>
<td>Max number of seconds to wait (0-9000) for data in blocking mode (0 means infinite)</td>
</tr>
<tr>
<td>ClearBuffer</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If true or 1, the internal cyclic quotes buffer is cleared after data is returned to the caller</td>
</tr>
<tr>
<td>AssignTo</td>
<td>string</td>
<td>'' (empty string)</td>
<td>Contains the assignment target (typically a variable name) in the base Matlab workspace, useful for stream debugging.</td>
</tr>
</tbody>
</table>
6.4 Market depth (Level 2)

The streaming market depth mechanism also has two distinct parts, just like streaming level 1 quotes (§6.1):

1. Request IQFeed to start sending a stream of market depth quotes for a specified security. This is done by using the 'marketdepth' action.

2. At any later time(s), you can access the current market depth data using either of the following alternatives:
   a. Use 'marketdepth' action and **NumOfEvents** of -1 (minus one). This will return the latest streamed data, without stopping the background streaming.
   b. If you set the **AssignTo** variable in the original request, you can directly access the streamed data in the specified base workspace variable.

For example, let’s request market depth quotes for a continuous E-mini contract:

```matlab
IQML('marketdepth', 'Symbol', '@ES#')
```

This causes IQFeed to start sending market depth updates to IQML in the background, up to the specified **NumOfEvents**, without affecting normal Matlab processing. This means you can continue to work with Matlab, process data, display information etc.

Note that each incoming quote message updates the data for a single market depth row. The market depth row cannot be specified nor predicted by the user, and the order of messages is unrelated to the market depth row, for example, an update for row #3 can follow an update of row #5.

Market depth data will only stream in the background in non-blocking mode. If you assign the **IQML** command results to a variable, the request is treated as blocking and **IQML** will wait for all the events to accumulate (or **Timeout** to occur), as described in §4.1:

```matlab
IQML('marketdepth', 'Symbol', '@ES#', 'NumOfEvents', 600); % streaming, non-blocking
```

```matlab
data = IQML('marketdepth', 'Symbol', '@ES#', 'NumOfEvents', 600); % blocking
```

**NumOfEvents** is an optional input parameter and can be any number >1 for streaming. To collect market depth data endlessly, set **NumOfEvents** to the value **inf**. Note that in Matlab, **inf** is a number (not a string), so do not enclose it in quotes (`'inf'`).

The quotes are collected into an internal data structure in **IQML**. A different structure is maintained for each symbol.

Subsequent requests to retrieve the latest accumulated interval bars buffer data, without stopping the background streaming, should use **NumOfEvents** = -1 (minus one). These requests return a Matlab data struct similar to the following:

```matlab
>> data = IQML('marketdepth', 'Symbol', '@ES#', 'NumOfEvents', -1)
```

```matlab
data =
    Symbol: '@ES#'
    Command: 'w@ES#'
    EventsToProcess: 600
    EventsProcessed: 437
    LatestEventDatenum: 737195.518211377
    LatestEventTimestamp: '20180515 12:26:13'
    AssignTo: ''
    errorMsg: ''
    IncludeEmptyQuotes: 0
    LatestData: [1×10 struct]
```
In the returned data struct, we can see the following fields:

- **Symbol** – the requested Symbol.
- **Command** – the command sent to IQFeed, including the requested Symbol.
- **EventsToProcess** – total number of streaming interval bars requested for the security (using the `NumOfEvents` parameter).
- **EventsProcessed** – number of streaming market depth data quotes received for this security. When `EventsProcessed >= EventsToProcess`, streaming market depth data for this security is turned off.
- **LatestEventDatenum** – Matlab numeric datenum representation of the `LatestEventTimestamp` (local timezone).
- **LatestEventTimestamp** – timestamp (string format) when this market depth quote event was received by IQML (local timezone).
- **AssignTo** – the name of the assigned variable in the base Matlab workspace (=`AssignTo` parameter, see below). In normal cases, this field is empty ('').
- **errorMsg** – contains the error message in case streaming cannot be processed (for example: 'Symbol not found'). In normal cases, this field is empty ('').
- **IncludeEmptyQuotes** – value of the specified `IncludeEmptyQuotes` parameter (default value: false). If true or 1, then empty quotes (having no valid Bid or Ask) will be reported and be counted as a valid “event”; otherwise they will not.
- **LatestData** – latest data received by IQFeed for each market depth row.

To retrieve the market depth data at the n\textsuperscript{th} market depth row, simply read the fields of the `LatestData` at the n\textsuperscript{th} location, for example:

```matlab
>> data.LatestData(4)
ans =
    Symbol: '@ES#'
     ID: 'MD04'
      Bid: 2725.5
       Ask: 2727.25
    BidSize: 65
   AskSize: 148
    BidTime: '05:25:59.761191'
       Date: '2018-05-15'
     AskTime: '05:25:59.760278'
BidInfoValid: 1
AskInfoValid: 1
    Condition: 52
Condition_Description: 'regular'
   ID_Description: 'Order book row #4'
```

`BidInfoValid` and `AskInfoValid` values are logical (true/false) values, which appear as 1 or 0, respectively, in the struct display above. The `ID` field indicates the corresponding order-book row (for futures) or market-maker name (for equities).

Different market depth quotes are sent independently from the IQFeed server with a unique timestamp, in a non-ordered manner. Note that `data.LatestEventDatenum` and `data.LatestEventTimestamp` are specified in the local time-zone.

Note: unlike streaming quotes (§6.1), regional updates (§6.2), and interval bars (§6.3), the streaming market depth mechanism does not store an internal buffer of quote updates, so there is no `Buffer` field and previous updates are not stored. Only the latest snapshot of the order book (in the `LatestData` field) is updated.
To stop collecting market depth quotes for a security, simply send the request again, this time with `NumOfEvents`=0.

IQML('marketdepth', 'Symbol', '@ES#', 'NumOfEvents', 0);

You can specify multiple symbols for streaming at the same time, in a single `IQML` command, by specifying a colon-delimited or cell-array list of symbols. For example:

IQML('marketdepth', 'symbols', {'IBM', 'GOOG', 'AAPL'});
IQML('marketdepth', 'symbols', 'IBM:GOOG:AAPL');  % equivalent

As with the blocking request (§4.4), you’ll receive an error message when requesting market depth info from an exchange for which you have no Level 2 data subscription:

```matlab
>> data = IQML('marketdepth', 'Symbol', 'IBM', ...)
Error using IQML
Symbol 'IBM' was not found!
```

As with streaming quotes (§6.1), to get the latest data for all streamed symbols, omit the `Symbol` parameter or set it to empty `[]`. This returns all streams (both active/not):

```matlab
>> data = IQML('marketdepth', 'numOfEvents', -1);  % no symbol: get ALL streams
```

```matlab
data = 1x5 struct array with fields:
   Symbol
   Command
   isActive
   EventsToProcess
   ...
```

Similarly, to cancel all active streams in a single command, omit `Symbol` (or set it to `[]`):

```matlab
>> IQML('marketdepth', 'numOfEvents', 0);  % no symbol: ALL streams are stopped
```

When debugging streaming, it is sometimes useful to assign the streamed data to a base Matlab workspace variable, which can be monitored live using Matlab’s Variable Explorer or directly checked/used within a Matlab script, without a need to call `IQML('marketdepth', ..., 'numOfEvents', -1)` to constantly refetch the latest data. This data mirroring can be done by setting the `AssignTo` parameter to any valid Matlab variable name or assignment target, for example: `myData` or `streamed.VX` or `data{3}`.

```matlab
>> IQML('marketdepth', ..., 'AssignTo', 'myData');
```

% streaming data in background is mirrored in base workspace variable myData:

```matlab
>> myData
myData =
   struct with fields:
      Symbol: '@ES#'
      Command: 'w@ES#'
      EventsToProcess: 600
      EventsProcessed: 437
      LatestEventData: [737195.518211377 737195.518211377]
      LatestEventTimestamp: '20180515 12:26:13'
      AssignTo: 'myData'
      errorMsg: ''
      IncludeEmptyQuotes: 0
      LatestData: [1x10 struct]
The following parameters affect market depth data queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma- delimited string, or cell-array of strings</td>
<td>(none)</td>
<td>Limits the request to the specified symbol(s). Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ’@ES#’</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM:AAPL:GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM,AAPL,GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• {'IBM', 'AAPL', 'GOOG'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This parameter must be set to valid symbol name(s) when NumOfEvents&gt;0</td>
</tr>
<tr>
<td>NumOfEvents</td>
<td>integer</td>
<td>10</td>
<td>One of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• inf – continuous endless streaming Level 2 data for specified symbol(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• N&gt;1 – only process N incoming quotes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 1 – get only a single quote</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 0 – stop streaming market depth data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• -1 – return the latest Level 2 data while continuing to stream new data updates</td>
</tr>
<tr>
<td>IncludeEmpty Quotes</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If set to true or 1, empty Level 2 quotes (with neither a valid Bid nor valid Ask) will also be returned. By default (false), they will not be. See §4.4 for details.</td>
</tr>
<tr>
<td>ClearBuffer</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If true or 1, the internal cyclic quotes buffer is cleared after the data is returned to the caller.</td>
</tr>
<tr>
<td>AssignTo</td>
<td>string</td>
<td>&quot;</td>
<td>Contains the assignment target (typically a variable name) in the base Matlab workspace, useful for stream debugging.</td>
</tr>
</tbody>
</table>

Note: Market Depth (Level 2) data is only available in the Professional IQML license.

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109 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization

110 The default value of NumOfEvents was changed from inf to 10 in IQML version 2.17 (released on 2019-05-05)
7 News

News headlines and stories can be retrieved via the 'news' action. Several data-types are available, which can be set using the **DataType** parameter.

**Note**: News data is only available in the Professional *IQML* license.

7.1 Configuration

To retrieve the news configuration for your account, set **DataType** to 'config':

```matlab
>> data = IQML('news', 'DataType', 'config')
data =
    Category: 'All News'
    Majors: [1×7 struct]
>> {data.Majors.Source}
an =
    1×7 cell array
    {'DTN'}   {'CPR'}   {'CBW'}   {'RTT'}   {'CPZ'}   {'CIW'}   {'BEN'}
>> {data.Majors.Description}
an =
    1×7 cell array
    {'DTN News'}   {'PR Newswire'}   {'Business Wire'}   {'Real-Time Trader'}   {'GlobeNewswire Inc'}   {'Marketwire'}   {'Benzinga Pro'}
```

This shows that we are connected to 7 major news sources. We can drill-down for details about these news sources:

```matlab
>> data.Majors(1)
an =
    Source: 'DTN'
    Description: 'DTN News'
    AuthenticationCode: '1D'
    IconID: 10
    Minors: [1×4 struct]
>> data.Majors(1).Minors(1)
an =
    Source: 'DT5'
    Description: 'Treasuries, Most Actives, Gainers, Losers'
    AuthenticationCode: '1D'
>> data.Majors(1).Minors(2)
an =
    Source: 'RTL'
    Description: 'Derivatives - Selected Futures and Options'
    AuthenticationCode: '2Ab'
    IconID: 10
```

**Note** that some news sources have no “Minor” news-sources:

```matlab
>> data.Majors(2)
an =
    Source: 'CPR'
    Description: 'PR Newswire'
    AuthenticationCode: '1X'
    IconID: 5
    Minors: [1×0 struct]
>> data.Majors(7)
an =
    Source: 'BEN'
    Description: 'Benzinga Pro'
    AuthenticationCode: '1a'
    IconID: 10
    Minors: [1×0 struct]
```

News configuration queries do not have any user-settable parameters.
7.2 Story headlines

To retrieve the latest news headlines (in blocking mode), set \texttt{DataType} to \texttt{'headlines'}:

\begin{verbatim}
>> data = IQML('news', 'DataType','headlines')
data = 1000×1 struct array with fields:
    Source    ID    Symbols    Timestamp    Text
    Story
>> data(1)
ans =
    Source: 'CPR'
    ID: 21988707473
    Symbols: {}
    Timestamp: 20180305064553
    Text: 'The Surface Disinfectants Market is Expected to Grow at a CAGR of 8.3% to a USD '
    Story: ''
>> data(2)
ans =
    Source: 'BEN'
    ID: 21988707468
    Symbols: {'BZFDA' 'CVRS'}
    Timestamp: 20180305064533
    Text: 'Corindus Receives FDA Clearance for First Automated Robotic Movemen...
    Story: ''
>> data(3)
ans =
    Source: 'RTB'
    ID: 21988701358
    Symbols: {'BSX'}
    Timestamp: 20180305064233
    Text: 'Boston Scientific Corp Q4 adjusted earnings Miss Estimates'
    Story: ''
\end{verbatim}

As can be seen, some stories are specific to particular symbols (BZFDA and CVRS in story #21988707468, BSX in #21988701358), while others are not (#21988707473).

Also note that the news stories’ \texttt{Timestamp} is reported in \texttt{yyyyymmddHHMMSS} format, where the time is specified in US Eastern time-zone.

When you retrieve news headlines, you might run into a timeout problem: by default, IQFeed send the latest 1000 news headlines and only some of them might be received by \texttt{IQML} before the built-in \texttt{Timeout} (default: 5 secs) forces \texttt{IQML} to return the data to the user (remember, this is blocking mode, where a timeout applies):

\begin{verbatim}
>> data = IQML('news', 'DataType','headlines')
Warning: IQML timeout: only partial data is returned. Perhaps the Timeout parameter should be set to a value larger than 5 or the NumOfEvents parameter to a value smaller than Inf
data =
    738×1 struct array with fields:
        Source    ID    Symbols    Timestamp    Text
\end{verbatim}
As suggested by the message, you can set the **Timeout** parameter to a high value in order to allow **IQML** more time to gather the data before returning the results.\(^\text{111}\)

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'Timeout', 10)
data =
    1000×1 struct array with fields:
      Source
      ID
      ...
```

You can filter the headlines to a specific set of symbols by specifying **Symbols** as a colon-delimited or cell-array list of symbols.\(^\text{112}\) For example, to filter only headlines that relate to symbols BSX, BSX/AAPL, and BSX/AAPL/GOOG, respectively:

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'Symbols', 'BSX')
data =
    60×1 struct array with fields:
      ...
>> data = IQML('news', 'DataType', 'headlines', 'Symbols', {'BSX', 'AAPL'})
data =
    677×1 struct array with fields:
      ...
>> data = IQML('news', 'DataType', 'headlines', 'Symbols', 'BSX:AAPL:GOOG')
data =
    841×1 struct array with fields:
      ...
```

You can also limit the search to specific news sources, by specifying a colon-separated or cell-array list of sources in the **Sources** parameter. For example:

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'Symbols', 'BSX:GOOG:AAPL', ...
  'Sources', 'DTN:CPR:BEN')
data =
    745×1 struct array with fields:
      ...
```

In this example, we see that when we limit our search to DTN (DTN News), CPR (PR Newswire), and BEN (Benzinga Pro), we only get 745 headlines, compared to 841 headlines from all the news sources. The news source names are the ones reported by the **Majors.Source** field, in the news configuration query (see \S7.1).

In addition to limiting the search to a certain news source, you can also limit it to certain meta-tags that are assigned by some news sources, using the **Symbols** parameter. For example, to limit the search to “Benzinga Ratings”:

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'Symbols', 'BZRatings');
```

You can limit the reported headlines to only a specific date, using the **Date** parameter:

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'Date', 20180304, ...
  'Symbols', {'BSX', 'AAPL'})
data =
    14×1 struct array with fields:
      ID
      ...
```

**Date** can be specified in various formats: as a Matlab datetime object, a numeric Matlab datenum (737089), a numeric yyyymmdd value (20180129), or a string ('2018/01/29', '2018-01-29' or '20180129'). Note: IQFeed only stores headlines of the past 180 days.\(^\text{113}\)

---

\(^{111}\) The **Timeout** parameter is automatically set to a minimal value of 60 [secs] when **GetStory** parameter is requested (see below)

\(^{112}\) In **IQML**, the **Symbol** and **Symbols** parameters are synonymous – you can use either of them, in any capitalization
You can also limit the maximal number of reported headlines using the `MaxItems` parameter. This will report the latest `MaxItems` news headlines (fewer headlines may actually be reported, depending on their availability):

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'MaxItems', 50)
data = 50×1 struct array with fields:
   Source
   ID
   ...
```

By default, only the headline text is returned. To also fetch the full news-story text that is associated with each headline, set `GetStory` to `true`:

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'GetStory', true);
>> data(1)
ans =
    Source: 'CBW'
    ID: 22017456356
    Symbols: {}
    Timestamp: '20180524 092926'
    Text: 'Global Barium Nitrate Market - Emergence of Environment-Friendly Ox...' 
    Story: '09:28 Thursday, May 24, 2018. (RTTNews.com) - Babcock & Wilcox Enterprises, Inc. (BW) confirmed that it had received a non-binding indication of interest from Steel Partners to acquire B&W in a transaction in which B&W...
    For comments and feedback: contact editorial@rttnews.com
    Copyright(c) 2018 RTTNews.com All Rights Reserved'
```

Each news story takes 0.3-0.5 secs to download, so querying the story text for multiple headlines can take a long time. For example, such a query might take a full minute for 100 headlines. If you have Matlab’s Parallel Computing Toolbox and the Professional `IQML` license, you can parallelize this query by setting `UseParallel` to `true`:

```matlab
>> tic
>> data = IQML('news', 'DataType', 'headlines', 'MaxItems', 100, 'GetStory', true);
```

News headlines queries with `GetStory` are composed of an initial headlines query, followed by multiple news-story queries (§7.3) for each of the reported headline IDs. Such queries with `GetStory` have an automatic minimal `Timeout` value of 60 [secs]. The `Timeout` parameter has a practical effect only on the initial headlines query, not the subsequent story text queries, which take much longer in total. A `Timeout` of 60 (the default/min value for such queries) allows fetching up to ~10-20k headlines in theory (depending on network/computer speed and `MaxItems/Date` parameter values), but only up to 4k headlines are returned in practice (IQFeed’s undocumented limit). The news-story queries for these 4k headlines could take an extra 20-40 minutes (depending on network/computer speed), unless you parallelize the query. This would not be cut short by `Timeout`, since `Timeout` affects each news-story query separately. You can only stop the query by typing Ctrl-C in Matlab’s console (Command Window).

---

113 https://help.dtniq.com/support-faqs

114 IQFeed ignores `MaxItems`>4000, returning only 4000 headlines: http://forums.dtn.com/index.cfm?page=topic&topicID=5702
The following parameters affect (filter) news headlines queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| Symbol or Symbols | colon or comma-delimited string or cell-array of strings | "" (empty string), meaning all | Limits the query to the specified symbols and meta-tags only (or to all symbols, if empty). Examples:  
  - 'IBM'  
  - 'IBM:AAPL:GOOG'  
  - 'IBM,AAPL,GOOG'  
  - {'IBM', 'AAPL', 'GOOG'}  
  - 'BZRatings:BZTradingIdeas' |
| Sources         | colon or comma-delimited string or cell-array of strings | "" (empty string), meaning all | Limits query to the specified news sources only (or to all sources, if empty). Examples:  
  - 'DTN'  
  - 'DTN:CPR:BEN'  
  - 'DTN,CPR,BEN'  
  - {'DTN', 'CPR', 'BEN'} |
| Date            | integer or string or datetime object | [] meaning all | Date at which the news headline was published (or all dates, if empty). Examples:  
  - 737089 (Matlab datenum format)  
  - datetime('Jan 29, 2018')  
  - 20180129 (yyyymmdd format)  
  - '20180129'  
  - '2018/01/29'  
  - '2018-01-29' |
| MaxItems        | integer (1-4000) | 1000                            | Maximal # of headlines to be reported by IQFeed. Note that a lower number of headlines may be reported, depending on their availability, based on the other filters. |
| GetStory        | logical (true/false) | false | If false (default), only store the incoming headline messages.  
  If true or 1, automatically fetch and store the full story text for each incoming headline. This can be parallelized using the UseParallel parameter (see below). |
| Timeout         | number            | 5.0                             | Max # of seconds to wait for incoming data (0-9000 where 0 means infinite). If GetStory was requested Timeout is set to minimum 60. |
| UseParallel     | logical (true/false) | false | If set to true or 1, and if Parallel Computing Toolbox is installed, then querying stories for headlines using GetStory=true will be done in parallel (see §3.6; Professional IQML license only). |

115 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization.

7.3 Story text

To read a particular story in full (blocking mode), specify `DataType` = 'story' and `ID` (numeric ID, as provided in the story-headlines query, see §7.2). Different news sources provide their news stories in different formats, for example:

```matlab
>> data = IQML('news', 'DataType', 'story', 'ID', 21988707468)
data =
    ID: 21988707468
Symbols: {'BZFDA' 'CVRS'}
    Text: 'Corindus Receives FDA Clearance for First Automated Robotic Movement in technIQ Series for CorPath GRX Platform.'
>> data = IQML('news', 'DataType', 'story', 'ID', 21988701358)
data =
    ID: 21988701358
Symbols: {'BSX'}
    Text: '06:42 Monday, March 05, 2018. (RTTNews.com) - Boston Scientific Corp (BSX) released earnings for fourth quarter that declined from the same period last year... % full text redacted here
Read the original article on RTTNews (http://alpha.rttnews.com/9583/boston-scientific-corp-q4-adjusted-earnings-miss-estimates.aspx) For comments and feedback: contact editorial@rttnews.com. Copyright(c) 2018 RTTNews.com All Rights Reserved.'
```

In many cases, the news story is not specifically related to any particular symbol:

```matlab
>> data = IQML('news', 'DataType', 'story', 'ID', 21991159700)
data =
    ID: 21991159700
Symbols: {}
```

In some cases, the story may be assigned one or more meta-symbol tags. For example, the following story is tagged for “Benzinga Ratings”:

```matlab
>> data = IQML('news', 'DataType', 'story', 'ID', 21991162633)
data =
    ID: 21991162633
Symbols: {'BZRatings' 'MNTX'}
    Text: 'Manitex International Sees Q4 Sales $64.40M vs $64.45M Est. Manitex International (NASDAQ: MNTX) sees Q4 sales of $64.40M vs $64.45M estimate.'
```

Note that separate paragraphs in the news story text are separated by a newline (char(10)) in the reported `data.Text` field. This enables display of the story text in a human-readable format, when you output the text to the Matlab console or GUI.
If the requested **ID** is invalid or does not exist, the returned data will be empty (no error is reported):

```matlab
>> IQML('news', 'DataType', 'story', 'ID', 123456) % non-existing headline ID
ans =
    []
```

Aside from **ID**, the news story-text query does not have any user-settable parameters.

You can specify multiple **IDs** in a single *IQML* query command, by specifying an array of values. For example:

```matlab
>> data = IQML('news', 'DataType', 'story', 'ID', [22018991229, 22018991585])
data =
    2x1 struct array with fields:
        ID     Symbols   Text
>> data(1)
ans =
    ID: 22018991229
    Symbols: {}
    Text: 'May 29, 2018
    Dublin, May 29, 2018 (GLOBE NEWSWIRE) -- The European Financing in Cleantech Innovation report...'
>> data(2)
ans =
    ID: 22018991585
    Symbols: {'BZEarnings'  'MOMO'}
    Text: 'Momo Inc. Earlier Reported Q1 EPS $0.69 Beat $0.50 Estimate, Sales $435.129M Beat $396.17M Estimate *Momo Inc. ...
```
7.4 Story count

It is sometimes useful to know the number of distinct news stories, from all news sources (even those to which you are not subscribed), that relate to different symbols, indicating level of news interest in those symbols. Set **DataType** to 'number' and the **Symbols, Sources** and/or dates, to receive a Matlab struct with a numeric count for each symbol:

```matlab
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BSX')
data =
    BSX: 14
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BSX:HP:AAPL:GOOG')
data =
    AAPL: 7
    BSX: 14
    GOOG: 2
    HP: 0
```

In this example, we see that BSX has a higher news-count today than AAPL or GOOG. Symbols having no news items will appear at the bottom of the struct with a count of 0.

You can limit the search to specific news sources, by specifying a colon-separated or cell-array list of sources in the **Sources** parameter. For example:

```matlab
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BSX:GOOG:AAPL',...
              'Sources', 'DTN:CPR:BEN')
data =
    AAPL: 2
    BSX: 3
```

In this example, we see that when we limit our search to DTN (DTN News), CPR (PR Newswire), and BEN (Benzinga Pro), AAPL and BSX have fewer news items, and GOOG has none. The news source names are the ones reported by the *Majors.Source* field, in the news configuration query (see §7.1).

You can also filter the search to only look at news items published at specific dates, by specifying the **BeginDate, EndDate** and/or **Date** parameters. Dates can be specified in several formats: as a Matlab **datetime** object, Matlab numeric datenum (737089), numeric **yyyymmdd** (20180129), or string ('2018/01/29', '2018-01-29', '20180129'):

```matlab
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BSX:GOOG:AAPL',...
              'BeginDate',20180301)
data =
    AAPL: 45
    BSX: 19
    GOOG: 15
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BSX:GOOG:AAPL',...
              'BeginDate',20180301, 'EndDate',20180303)
data =
    AAPL: 37
    BSX: 3
    GOOG: 13
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BSX:GOOG:AAPL',...
              'EndDate',20180305)
data =
    AAPL: 2038
    BSX: 191
    GOOG: 996
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BSX:GOOG:AAPL',...
              'Date',20180301)
data =
    AAPL: 16
    BSX: 1
    GOOG: 3
IQML returns a Matlab struct, so the reported symbols need to be valid field names, and non-alphanumeric characters are automatically converted. For example:

```
>> data = IQML('news', 'DataType', 'number', 'Symbols', 'BOL.ST:BOL@SS:0QLL.L')
data =
    x0QLL_L: 3
    BOL_ST: 1
    BOLxSS: 1
```

The following parameters affect (filter) news story-count queries:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma-delimited string or cell-array of strings</td>
<td>'' (empty string), meaning all</td>
<td>Limits query to specified symbols, meta-tags only (or to all symbols, if empty). Examples:</td>
</tr>
</tbody>
</table>
|           |                    |         | - 'IBM'
|           |                    |         | - 'IBM:AAPL:GOOG'
|           |                    |         | - {'IBM', 'AAPL', 'GOOG'}
|           |                    |         | - 'BZRatings,BZTradingIdeas' |
| Sources   | colon or comma-delimited string or cell-array of strings | '' (empty string), meaning all | Limits the query to specified news sources only (or to all sources, if empty). Examples: |
|           |                    |         | - 'DTN'
|           |                    |         | - 'DTN:CPR:BEN'
|           |                    |         | - 'DTN,CPR,BEN'
|           |                    |         | - {'DTN', 'CPR', 'BEN'} |
| Date      | integer or string or datetime object | [] meaning today | Specific date at which the news items were published. Examples: |
|           |                    |         | - 737089 (Matlab datenum format)
|           |                    |         | - datetime('Jan 29, 2018')
|           |                    |         | - 20180129 (yyyyymmdd format)
|           |                    |         | - '20180129'
|           |                    |         | - '2018-01-29' |
| BeginDate | integer or string or datetime object | '1900/01/01' (i.e., from as early as data is available) | Earliest date at which the news items were published. Examples: see Date above. |
| EndDate   | integer or string or datetime object | '2099/12/31' (i.e., until now) | Latest date at which the news items were published. Examples: see Date above. |

\[^{117}\] In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization
7.5 Streaming news headlines

The streaming news mechanism has two parts, just like streaming ticks (§6.1):

1. Request IQFeed to start sending a stream of news headlines. This is done by using the 'news' action and setting a **NumOfEvents** parameter to a positive \( >1 \) value. You can limit the headlines to certain news source(s) using the **Sources** parameter, and/or to certain symbol(s) using the **Symbols** parameter.

2. Later, whenever you wish to process the latest news headline(s), simply use the 'news' action and **NumOfEvents** of \(-1\) (minus one). This will return the latest information (a data struct), without stopping the background streaming.

For example, let’s request 100 streaming headlines for Facebook and Apple:

```
IQML('news', 'Symbols','FB:AAPL','NumOfEvents',100)
```

This causes IQFeed to start sending news headlines to *IQML* in the background, up to the specified **NumOfEvents**, without affecting normal Matlab processing. This means that you can continue to work with Matlab, process and display information etc.

Headlines will only stream in the background in non-blocking mode. If you assign the *IQML* command results to a variable, the request is treated as blocking and *IQML* will wait for all the events to accumulate (or **Timeout** to occur), as described in §7.2:

```
IQML('news', 'NumOfEvents',100);       % streaming, non-blocking
data = IQML('news', 'NumOfEvents',100); % blocking
```

**NumOfEvents** can be any number higher than 1 for streaming to work (a value of 1 is the standard snapshot news-headline request described in §7.2). To collect streaming headlines endlessly, set **NumOfEvents** to the value \( \text{inf} \). Note that in Matlab, \( \text{inf} \) is a number (not a string), so do not enclose it in quotes ('\text{inf}')

The headlines are collected into an internal data buffer in *IQML*. Unlike streaming quotes, all headlines, for all symbols, are collected in a single buffer. The buffer size can be controlled using the **MaxItems** parameter, which has a default value of \( \text{inf} \)\(^{118}\). This means that by default all the streaming headlines that affect the specified symbols will be stored in the buffer and become accessible for later processing.\(^{119}\)

If you set a higher value for **MaxItems**, then up to the specified number of latest news headline items will be stored. For example, to store the latest 50 headlines:

```
IQML('news', 'NumOfEvents',100, 'MaxItems',50)
```

Note that using a large **MaxItems** increases memory usage, which could have an adverse effect if you set a very large buffer size (many thousands) and/or streaming for a large number of different securities.\(^{120}\)

---

\(^{118}\) Note that this too is different from the streaming quotes mechanism, where the default **MaxItems** value is 1. Note that **MaxItems** is a numeric parameter like **NumOfEvents**, so don’t enclose the parameter value within string quotes (‘’)

\(^{119}\) This might have a memory and performance implication if you leave streaming news on for a long time, for a large number of symbols. See the discussion of memory and performance implications further below.

\(^{120}\) Each news headline item uses 1-2KB of Matlab memory. During trading hours, there could be 10-20 headlines per minute for all symbols (i.e., 1K headlines, or 1-2MB per hour, unless you limit **Symbols** to certain symbols). Limiting **Symbols** to certain symbols and/or setting **MaxItems** to some finite value, ensures that memory usage and performance impact remain low.
Subsequent requests to retrieve the latest accumulated headlines buffer data, without stopping the background streaming, should use **NumOfEvents** = -1 (minus one). These requests return a Matlab data struct similar to the following:

```matlab
>> data = IQML('news', 'NumOfEvents', -1)
```

```
data =
    Command: 'S,NEWSON'
    isActive: 1
    EventsToProcess: 100
    EventsProcessed: 13
    LatestEventDatenum: 737146.726041343
    LatestEventTimestamp: '20180327 17:25:29'
    DataType: 'news'
    ProcessType: 'stream'
    Sources: {}
    Symbols: {}
    BufferSize: 50
    Buffer: [13x1 struct]
    LatestData: [1x1 struct]
```

In the returned `data` struct, we can see the following fields:

- **Command** – the command sent to IQFeed.\(^{121}\)
- **isActive** – a flag indicating whether headlines are currently being streamed. **When NumOfEvents** ticks have been received, this flag is set to false (0).
- **EventsToProcess** – total number of streaming headlines requested (using the **NumOfEvents** parameter).
- **EventsProcessed** – number of streaming headlines received. **When EventsProcessed >= EventsToProcess**, streaming headlines are turned off and **isActive is set to false (0)**. **Note that it is possible that EventsProcessed > EventsToProcess**, since it takes a while for the streaming cancellation request to reach IQFeed and during this time a few additional items may have arrived.
- **LatestEventDatenum** – Matlab numeric datenum representation of the **LatestEventTimestamp**.
- **LatestEventTimestamp** – local timestamp (string format) when this headline was received by **IQML**.
- **DataType** – always equal to 'news' for streaming headlines.
- **ProcessType** – always equal to 'stream' for streaming headlines.
- **Sources** – cell array of acceptable news sources, set by the **Sources** parameter. Headline events from all other sources are ignored. **When Sources is empty**, no headline is ignored based on its source.
- **Symbols** – cell array of acceptable symbols, set by the **Symbols** parameter. Headline events that affect all other symbols are ignored. **When Symbols is empty**, no headline is ignored based on its related symbol(s).
- **BufferSize** – size of the data buffer (**MaxItems** parameter, see below).
- **Buffer** – buffer of size **BufferSize**, accumulating the latest headline updates.
- **LatestData** – latest headline event received from IQFeed.

\(^{121}\) Note that this is not specific to symbols/sources: filtering based on symbol/source is done on the incoming headline messages.
To get the headline data, read the fields of the returned `data` struct, for example:

```matlab
>> data.LatestData
ans =
    Source: 'BEN'
    ID: 21996096022
    Symbols: {'BZRatings'  'FB'}
    Timestamp: '20180326 083326'
    Text: 'Baird Maintains Outperform on Facebook Lowers Price Target to $210'
    Story: ''
```

Each headline has an associated timestamp, since different headlines are sent separately and independently from IQFeed server.

By default, `GetStory` is set to `false`, resulting in empty `data.LatestData.Story`. To automatically retrieve the full story text associated with each streamed headline, set `GetStory` to `true` (see §7.2). In any case, it is always possible to retrieve individual story texts using their headline ID (see §7.3).

Note: while `data.LatestEventDatenum` and `data.LatestEventTimestamp` are specified in the local time-zone, `data.LatestData.Timestamp` is specified in the server’s time-zone.

Note that `data.LatestData` is typically the same as `data.Buffer(end)`, regardless of the values of `MaxItems` or `NumOfEvents`.

To stop collecting streaming headlines for a security, simply send the request again, this time with `NumOfEvents`=0.

You can specify one or more symbols for streaming, by specifying a colon-delimited or cell-array list of symbols. If `Symbols` is specified, then any headline that does not relate to one or more of the specified `Symbols` will be ignored (skipped). For example:

```matlab
IQML('news', 'symbols', {'IBM','GOOG','AAPL'}, 'numOfEvents',6);
IQML('news', 'symbols','IBM:GOOG:AAPL', 'numOfEvents',6); % equivalent
```

You can also specify meta-tags assigned by some news sources. For example, to limit streaming headlines to “Benzinga Ratings” and anything related to Facebook or Apple:

```matlab
IQML('news', 'Symbols','BZRatings:FB:AAPL', 'numOfEvents',6);
```

Note: if you omit the `Symbols` parameter in your `IQML` command, no filtering of headlines based on affected symbols is performed, and all headlines will be collected.

Similarly, you can specify one or more news sources, by specifying a colon-delimited or cell-array list of sources. If `Sources` is specified, then any headline that does not originate from one of the specified `Sources` will be ignored and will not be recorded:

```matlab
IQML('news', 'sources', {'DTN','CPR','BEN'}, 'numOfEvents',6);
IQML('news', 'sources','DTN:CPR:BEN', 'numOfEvents',6); % equivalent
```

---

122 When `NumOfEvents` events have been received, IQFeed is instructed to stop streaming updates, but one or more update messages may already be on their way from IQFeed before streaming actually stops. These extra update messages are not accumulated in the `Buffer`, but the latest of these messages will be reflected in `LatestData` field.
As before, if you omit the Sources parameter in your IQML command, no filtering of headlines based on their source will be performed, and all headlines will be collected.

Here is a summary of the IQML parameters that affect streaming news headlines:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| Symbol or Symbols | colon or comma-delimited string or cell-array of strings | '' (empty string), meaning all | Limits the query to the specified symbols and meta-tags only (or to all symbols, if empty). Examples:  
  - 'IBM'  
  - 'IBM:AAPL:GOOG'  
  - 'IBM,AAPL,GOOG'  
  - {'IBM', 'AAPL', 'GOOG'}  
  - 'BZRatings:BZTradingIdeas' |
| Sources      | colon or comma-delimited string or cell-array of strings | '' (empty string), meaning all | Limits the query to the specified news sources only (or to all sources, if empty). Examples:  
  - 'DTN'  
  - 'DTN:CPR:BEN'  
  - 'DTN,CPR,BEN'  
  - {'DTN', 'CPR', 'BEN'} |
| NumOfEvents  | integer    | Inf     | One of:  
  - inf – continuous endless streaming headlines for the specified security  
  - N>1 – stream only N headlines  
  - 1 – get only a single headline (default)  
  - 0 – stop streaming headlines  
  - -1 – return the latest accumulated headlines data while continuing to stream new headlines data |
| MaxItems     | integer    | Inf     | Number of streaming headlines stored in a cyclic buffer. Once this number of headlines has been received, the oldest headline is discarded whenever a new headline arrives. |
| DataType     | string     | 'headline' | Ignored – only headlines can be streamed |
| GetStory     | logical (true/false) | false | If false (default), only store the incoming headline messages.  
If true or 1, automatically fetch and store the full story text for each incoming headline. |

123 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization
8 Lookup of symbols and codes

A list of symbols and lookup codes that match a specified set of criteria can be retrieved using the 'lookup' and 'chain' actions. Various different lookups can be requested, which differ by the **DataType** parameter.

8.1 Symbols lookup

To retrieve a list of symbols that match certain criteria, set the action to 'lookup', **DataType** to 'symbols' and add one or more filtering criteria: **Name**, **Description**, **Market**, **SecType**, **SIC**, and/or **NAICS**:

```matlab
data = IQML('lookup', 'DataType','symbols', 'Name', 'IBM')
data =
1086×1 struct array with fields:
Symbol
Description
Market_ID
Market_Name
Sec_Type_ID
Sec_Type
>> data(1)
ans =
Symbol: 'IBM'
Description: 'INTERNATIONAL BUSINESS MACHINE'
Market_ID: 7
Market_Name: 'New York Stock Exchange (NYSE)'
Sec_Type_ID: 1
Sec_Type: 'Equity'
>> data(2)
ans =
Symbol: 'IBMG'
Description: 'ISHARES IBONDS SEP 2018 MUNI BOND'
Market_ID: 11
Market_Name: 'NYSE Archipelago (NYSE_ARCA)'
Sec_Type_ID: 1
Sec_Type: 'Equity'
>> data(9)
ans =
Symbol: 'IBM1804E120'
Description: 'IBM MAY 2018 C 120.00'
Market_ID: 14
Market_Name: 'OPRA System'
Sec_Type_ID: 2
Sec_Type: 'Index/Equity Option'
>> data(end)
ans =
Symbol: 'IBZ18-IBM19'
Description: '30 DAY INTERBANK CASH RATE DEC 18/JUN 19'
Market_ID: 64
Market_Name: 'ASX24 Commodities Exchange (ASXCM)'
Sec_Type_ID: 10
Sec_Type: 'Future Spread'
```

IQFeed returns a list of symbols whose symbol name contains (not necessarily begins with) the term 'IBM', from different markets (exchanges) and different security types.

Note that the **Name** and **Description** filtering criteria are case-insensitive (so 'IBM', 'Ibm' and 'ibm' would all result in the same list of symbols), and also that they match their string value anywhere within the corresponding asset field.
You can narrow down the results by entering more specific parameter values (e.g. 'IBM180' rather than 'IBM'), or by specifying additional filtering parameters. For example, to filter the IBM list just to assets that include ‘business’ in their Description:

```matlab
>> data = IQML('lookup', 'DataType','symbols', 'name','ibm', ...
              'Description','business')
```

```matlab
data =
8x1 struct array with fields:
Symbol
Description
Market_ID
Market_Name
Sec_Type_ID
Sec_Type
```

```matlab
>> data = struct2table(data)
data =
8x6 table
```

Unlike the Name and Description (which match strings), the SIC and NAICS parameters are numeric and match the beginning of the corresponding SIC/NAICS sector/industry code. For example, the following query returns all assets that have 'inc' in their Description and belong to any sector whose SIC code begins with 83:

```matlab
>> data = IQML('lookup', 'DataType','symbols', 'Description','inc', 'SIC',83)
data =
6x1 struct array with fields:
Symbol
Description
Market_ID
Market_Name
Sec_Type_ID
Sec_Type
SIC_ID
SIC_Desc
```

```matlab
>> data(1)
ans =
Symbol: 'HQGE'
Description: 'HQ GLOBAL ED INC'
Market_ID: 3
Market_Name: 'Nasdaq other OTC'
Sec_Type_ID: 1
Sec_Type: 'Equity'
SIC_ID: 8331
SIC_Desc: 'JOB TRAINING AND VOCATIONAL REHABILITATION SERVICES'
```

```matlab
>> disp({data.Symbol; data.Description; data.SIC_ID; data.SIC_Desc})
'HQGE' 'HQ GLOBAL ED INC' [8331] 'JOB TRAINING AND VOCATIONAL REHABILITATION SERVICES'
'KVIL' 'KIDVILLE INC' [8351] 'CHILD DAY CARE SERVICES'
'DRWN' 'A CLEAN SLATE INC.' [8361] 'RESIDENTIAL CARE'
'NVOS' 'NOVO INTEGRATED SCIENCES INC...' [8361] 'RESIDENTIAL CARE'
'SPRV' 'SUPURVA HEALTHCARE GROUP INC...' [8361] 'RESIDENTIAL CARE'
```

---

124 In this example, the matching SIC codes were 8331 (HQGE), 8351 (KVIL), 8361 (DRWN, NVOS, SPRV). IQFeed has a bug (as of October 2019): no data is returned if SIC/NAICS < 10 (http://forums.iqfeed.net/index.cfm?page=topics&topicID=5653).
When you specify a SIC or NAICS filtering criteria, the result contains two additional fields (either SIC_ID and SIC_Desc, or NAICS_ID and NAICS_Desc, respectively), in addition to the standard fields (Symbol, Description, Market_ID, Market_Name, Sec_Type_ID and Sec_Type).\textsuperscript{125}

Note that it is possible that not all the requested symbols will be received before \emph{IQML}'s timeout (default value: 5 secs) returns the results.\textsuperscript{126}

```matlab
>> data = IQML('lookup', 'DataType', 'symbols', 'Name', 'GOOG')
Warning: IQML timeout: only partial data is returned. Perhaps the Timeout parameter should be set to a value larger than 5

data = 3848×1 struct array with fields:
Symbol
Description
Market_ID
Market_Name
Sec_Type_ID
Sec_Type
```

To control the maximal duration that \emph{IQML} will wait for the data, set the \textbf{Timeout} parameter. For example, to wait up to 30 secs to collect the complete list of symbols:

```matlab
>> data = IQML('lookup', 'DataType', 'symbols', 'Name', 'GOOG', 'timeout', 30)
data = 6812×1 struct array with fields:
.
```

Naturally, it is quite possible that no symbol is found that matches the requested criteria. In such a case, the result will be empty (and cannot be displayed using Matlab's \texttt{struct2table()} or \texttt{struct2cell()} functions):

```matlab
>> data = IQML('lookup', 'DataType', 'symbols', 'Description', 'inc', 'NAICS', 83)
data = []

>> struct2cell(data)
Undefined function 'struct2cell' for input arguments of type 'double'.
```

An error message will result if you try to specify both SIC and NAICS filtering criteria – only one (or none) of them is permitted in a lookup query:

```matlab
>> data = IQML('lookup', 'DataType', 'symbols', 'NAICS', 1234, 'SIC', 83)
You can specify either SIC or NAICS parameter, but not both of them, in a symbol lookup query
```

An error message will also result if you do not specify at least one of the filtering criteria \texttt{Name, Description, SIC, NAICS}:

```matlab
>> data = IQML('lookup', 'DataType', 'symbols')
Either Name, Description, SIC or NAICS parameters must be specified in a symbol lookup query
```

\textsuperscript{125} The description of the various numeric codes for Market_ID, Sec_Type_ID, SIC and NAICS can be fetched separately – see \S\S8.3-8.6 for details

\textsuperscript{126} \emph{IQML} can process \textasciitilde1000 symbols per second; coupled with the network and server-processing latencies we can expect \textasciitilde4000 symbols to accumulate before the default timeout of 5 seconds kicks in.
You can filter the results based on one or more markets, and/or security types, using the Market and SecType parameters (see §8.3, §8.4 for valid values). For example:

```matlab
>> struct2table(IQML('lookup', 'datatype','symbols', 'name','GOOG', 'SecType','Equity'))
ans =
2x6 table
Symbol       Description     Market_ID Market_Name       Sec_Type_ID Sec_Type
'GOOG' 'ALPHABET INC CLASS C' 21 'Nasdaq Global Select Market (NGSM)' 1 'Equity'
'GOOGL' 'ALPHABET INC CLASS A' 21 'Nasdaq Global Select Market (NGSM)' 1 'Equity'
```

Multiple Markets and/or SecTypes\(^\text{127}\) can be specified using a cell array. For example, to get the list of all active (non-expired) GOOG equities and options:\(^\text{128}\)

```matlab
>> data = IQML('lookup', 'datatype','symbols', 'name','GOOG', 'Markets','NGSM');
```

You can specify both Market(s) and SecType(s) to get an even more granular filtering. For example, to lookup only future options traded on CBOT:

```matlab
>> data = IQML('lookup', 'datatype','symbols', 'name',symbol, ...
              'SecTypes',{ 'Equity','IEOption'}, 'Timeout',20)
```

Similarly, to lookup VIX (volatility) futures and future-spreads (but not combined future volume OI symbols such as @VX1.O1.Z) on the CBOE Futures Exchange (CFE):

```matlab
>> data = IQML('lookup', 'datatype','symbols', 'name','vx', ...
              'SecTypes',{ 'Future','Spread'}, 'Markets','CFE');
```

If you specify one or more invalid Market(s) or SecType(s), you will get an error. For example, a typical error is to specify a SecType of 'Option' instead of 'IEOption':

```matlab
>> d = IQML('lookup', 'datatype','symbols','name','GOOG', 'SecTypes',{ 'Equity','Option'})
Invalid SecType(s) "OPTION". Allowed values: ARGUS, ARGUSFC, BONDS, CALC, COMBINED_FOPTION, COMBINED_FUTURE, COMM3, EQUITY, FAST_RACKS, FOPTION, FOPTION_TV, FOREX, FORWARD, FUTURE, ICSPREAD, IEOPTION, INDEX, ISO, JACOBSEN, MKTSTATS, MONEY, MUTUAL, NP_CAPACITY, NP_FLOW, NP_POWER, PETROCHEMWIRE, PRECMIL, RACKS, RFSPOT, SNL_ELEC, SNL_NG, SPOT, SPREAD, STRATSPREAD, STRIP, SWAPS, TREASURIES
```

Instead of Market name(s) or SecType name(s), you can specify their corresponding numeric codes,\(^\text{129}\) as a scalar integer value or as a numeric array of integers:

```matlab
>> data = IQML('lookup', 'datatype','symbols','name','GOOG', 'SecTypes',1);  
>> data = IQML('lookup', 'datatype','symbols','name','GOOG', 'SecTypes',[1,2]);  
>> data = IQML('lookup', 'datatype','symbols','name','GOOG', 'Markets',21);  
>> data = IQML('lookup', 'datatype','symbols','name','GOOG', 'Markets',[21,14]);  
```

\(^{127}\) Note that you can use either Market or Markets as the parameter name, and similarly, either SecType or SecTypes.

\(^{128}\) IQFeed only returns the symbols of active (non-expired) options/futures. See §8.2 for details about expired contracts.

\(^{129}\) See §8.3 and §8.4 for the list of numeric codes that correspond to each market and security type.
Here is a summary of the *IQML* parameters that affect symbols lookup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>string</td>
<td>&quot;&quot; (empty string)</td>
<td>Limits the query to assets that contain the specified string in their symbol name (case insensitive, <em>anywhere</em> within the symbol name)</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>string</td>
<td>&quot;&quot; (empty string)</td>
<td>Limits the query to assets that contain the specified string in their description (case insensitive, <em>anywhere</em> within the description)</td>
</tr>
<tr>
<td><strong>Market or Markets</strong></td>
<td>integer, numeric array, string, or cell-array of strings</td>
<td>[] (empty)</td>
<td>Limits the query to assets that belong to the specified market code(s) (scalar integer or numeric array), or market name(s) (case-insensitive string or cell-array of strings). See §8.3 for details on valid values.</td>
</tr>
<tr>
<td><strong>SecType or SecTypes</strong></td>
<td>integer, numeric array, string, or cell-array of strings</td>
<td>[] (empty)</td>
<td>Limits the query to assets that have the specified security type code(s) (scalar integer or numeric array), or security type name(s) (case-insensitive string or cell-array of strings). See §8.4 for details on valid values.</td>
</tr>
<tr>
<td><strong>SIC</strong></td>
<td>integer</td>
<td>[] (empty)</td>
<td>Limits the query to assets that belong to the specified SIC sector/industry (matches the <em>beginning</em> of the SIC number) See §8.5 for details on valid values.</td>
</tr>
<tr>
<td><strong>NAICS</strong></td>
<td>integer</td>
<td>[] (empty)</td>
<td>Limits the query to assets that belong to the specified NAICS sector/industry (matches the <em>beginning</em> of the NAICS number) See §8.6 for details on valid values.</td>
</tr>
<tr>
<td><strong>Timeout</strong></td>
<td>number</td>
<td>5.0</td>
<td>Max # of seconds to wait for incoming data (0-9000, where 0 means infinite)</td>
</tr>
</tbody>
</table>

---

130 In *IQML*, the **Market** and **Markets** parameters are synonymous – you can use either of them, in any capitalization.

131 In *IQML*, the **SecType** and **SecTypes** parameters are synonymous – you can use either of them, in any capitalization.
8.2 Options/futures chain

To retrieve a list of symbols that belong to a certain options/futures chain and match certain criteria, set the action to 'chain'; **DataType** to one of 'options' (default), 'futures', 'foptions' (future options), or 'spreads'; **Symbol** to the underlying contract’s symbol; and then add optional filtering criteria. For example:

```matlab
>> symbols = IQML('chain', 'Symbol', 'GOOG') % options chain for GOOG
symbols =
1×1454 cell array
Columns 1 through 4
'GOOG1803H1000' 'GOOG1803H1010' 'GOOG1803H1020' 'GOOG1803H1030'
Columns 5 through 8
'GOOG1803H1040' 'GOOG1803H1050' 'GOOG1803H1055' 'GOOG1803H1060'
Columns 9 through 12
'GOOG1803H1065' 'GOOG1803H1070' 'GOOG1803H1075' 'GOOG1803H1077.5'
...
```

Depending on **DataType**, several filtering parameters can be specified: All chain queries support the **Symbol**, **Months**, and **NearMonths** parameters. Options-related queries (**DataType**='options' or 'foptions') also support a **Side** parameter. Index/equity options query (**DataType**='options') also supports **IncludeBinary**, **MinStrike**, **MaxStrike**, **NumInMoney**, **NumOutOfMoney** parameters. All chain queries except 'options' also support the **Years** parameter. Here’s an example filtered chain query:

```matlab
% Report GOOG options having strike price between $1000-$1010 in next 4 months
>> symbols = IQML('chain', 'symbol', 'GOOG', 'NearMonths', 4, ...
      'MinStrike', 1000, 'MaxStrike', 1010)
symbols =
1×58 cell array
Columns 1 through 4
'GOOG1803H1000' 'GOOG1803H1010' 'GOOG1810H1000' 'GOOG1810H1005'
Columns 5 through 8
'GOOG1810H1010' 'GOOG1813G1000' 'GOOG1813G1002.5' 'GOOG1813G1005'
Columns 9 through 12
'GOOG1813G1007.5' 'GOOG1813G1010' 'GOOG1817H1000' 'GOOG1817H1005'
...
```

The following table lists the valid combinations of filtering parameters per **DataType**:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Future</th>
<th>Spread</th>
<th>Foption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>Side</td>
<td>ok</td>
<td>N/A</td>
<td>N/A</td>
<td>ok</td>
</tr>
<tr>
<td>Months</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>NearMonths</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>Years</td>
<td>N/A</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>IncludeBinary</td>
<td>ok</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>MinStrike</td>
<td>ok</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>MaxStrike</td>
<td>ok</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>NumInMoney</td>
<td>ok</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>NumOutOfMoney</td>
<td>ok</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

---

132 The option contract names in IQFeed use a variant of the OPRA OSI format. See http://www.iqfeed.net/symbolguide/index.cfm?symbolguide=guide&displayaction=support%C2%A7ion=guide&web=iqfeed &guide=options&web=IQFeed&type=stock. Note that the name might change when corporate actions (such as splits) occur, for example: BBD1918A15 vs. BBD1918A15.45 (http://forums.iqfeed.net/index.cfm?page=topic&topicID=5495).
Note that if you filter by **MinStrike** and/or **MaxStrike**, you cannot also filter by **NumInMoney/ NumOutOfMoney** (and vice versa):

```matlab
>> IQML('chain', 'symbol','FB', 'NumInMoney',2, 'NumOutOfMoney',2, 'MinStrike',90)
```

You cannot specify both a strike range and number of contracts in/out of money in 'chain' query - choose only one set.

Similarly, you can only specify one of the **Months, NearMonths** parameters, not both:

```matlab
>> IQML('chain', 'symbol','FB', 'Months',2:6, 'NearMonths',3)
```

Either the Months or the NearMonths parameter can be specified, but not both, in a 'chain' query.

If no symbols match the specified criteria, or if you do not have the necessary market permissions (subscription), then the **IQML** query will return an empty cell array:

```matlab
>> symbols = IQML('chain', 'datatype', 'spreads', 'symbol', 'C', 'years', 2010:2019)
symbols =
0x0 empty cell array
```

Note: IQFeed only returns active (non-expired) contracts. A [huge] static text file containing a [very long] list of expired symbols is available for download, and starting with IQFeed client 6.1 you can also fetch this data using **IQML** (see §5.6).

If you set **WhatToShow** to 'quotes', you'll receive an array of structs that contain the corresponding latest (top-of-market) quotes data for the corresponding symbols:

```matlab
>> data = IQML('chain', 'symbol','GOOG', 'NearMonths',4, 
               'MinStrike',1000, 'MaxStrike',1010, ... 
               'WhatToShow','quotes')
data =
58x1 struct array with fields:
  Symbol
... 
>> data(1)
ans =
  struct with fields:
      Symbol: 'GOOG1803H1000'
      Most_Recent_Trade: 120
      Most_Recent_Trade_Size: 1
      Most_Recent_Trade_Time: '15:57:12.930497'
      Total_Volume: 0
          Bid: 140.5
          Bid_Size: 3
          Ask: 150.1
          Ask_Size: 1
... 
      Close: 120
      Message_Contents: 'Cbacv'
      Message_Description: ...
      Most_Recent_Trade_Conditions: 1
      Trade_Conditions_Description: 'Normal Trade'
      Most_Recent_Market_Name: 'MIAX PEARL Options exchange'
```

```matlab
>> symbols = {data.Symbol}
symbols =
1x58 cell array
Columns 1 through 4
  'GOOG1803H1000'
  'GOOG1803H1010'
  'GOOG1810H1000'
  'GOOG1810H1005'
Columns 5 through 8
  'GOOG1813G1000'
  'GOOG1813G1002.5'
  'GOOG1813G1005'
... 
```

Note: if you request quotes for multiple chain symbols, especially if you set `UseParallel` to `true`, you might reach your IQFeed account’s symbols-limit (`MaxSymbols`; see §9.3). In such cases, IQFeed-generated error messages will be displayed on the Matlab console:

```
Level1 symbol limit reached - symbol 'GOOG2019R600' not serviced!
```

Also note that the returned quotes data is subject to the `Fields` parameter value that was set in the most recent quotes data query (see §4.2).

Also note that some of these structs (especially for out-of-money contracts) may contain empty/invalid data, since their corresponding contract was never traded. For example:

```matlab
>> data(7)
ans =
    struct with fields:
    Symbol: 'GOOG1813G1002.5'
    Most_Recent_Trade: []
    Most_Recent_Trade_Size: []
    Most_Recent_Trade_Time: []
    Most_Recent_Trade_Market_Center: []
    Total_Volume: 0
    Bid: 133.4
    Bid_Size: 2
    Ask: 140.2
    Ask_Size: 1
    Open: []
    High: []
    Low: []
    Close: []
    Message_Contents: 'bav'
    Message_Description: 'A bid update occurred; An ask update occurred; A volume update occurred'
    Most_Recent_Trade_Conditions: 1
    Trade_Conditions_Description: 'Normal Trade'
    Most_Re
```

For this reason, you should be careful when concatenating the struct array’s data into numeric arrays. In this example, only 40 of the 58 contracts had a Close price, so concatenating into a numeric array results in an array that only has 40 data items:

```matlab
>> [data.Close]
ans =
    Columns 1 through 8
          120    130.7   140.67   131.99   150.1   138.8   139.5   99.47
    Columns 9 through 16
       103.28   130.9   179.5   137.5   190.17   89.3   145.0   3.84
    Columns 17 through 24
               6     7.5     7.14     0.3     0.3     1.1     1.32
    Columns 25 through 32
          1.05     5.66     9.9     6.35     0.67     0.75     1.23     10
    Columns 33 through 40
      15.43    16.33    27.21    32.33    33.49     6.49     2.5     3.37
```

…instead, it is better in most cases to use cell arrays, where we can see empty cells:

```matlab
>> [data.Close]
ans =
    1x58 cell array
    Columns 1 through 8
          120     []     130.7     []     []    140.67     []     []
    Columns 9 through 16
          []     []     131.99    150.1    138.8    139.5     []     []
    Columns 17 through 24
          []     []     99.47
    Columns 25 through 33
          []     []     []     []    89.3
```

…
Similarly, set `WhatToShow='fundamental'` to get the fundamental data for all symbols in the requested chain. For example:

```matlab
>> data = IQML('chain', 'symbol', 'GOOG', 'NearMonths', 4, ... 'MinStrike', 1000, 'MaxStrike', 1010, ... 'WhatToShow', 'fundamental')
```

```
data = 58*1 struct array with fields:
    Symbol
    Exchange_ID
    PE
    Average_Volume
    x52_Week_High
    x52_Week_Low
    Calendar_Year_High
    Calendar_Year_Low
...
```

```matlab
>> data(1)
ans =
    struct with fields:
        Symbol: 'GOOG1803H1000'
        Exchange_ID: 'E'
        PE: []
        Average_Volume: []
        x52_Week_High: 120
        x52_Week_Low: 120
        Calendar_Year_High: []
        Calendar_Year_Low: []
        Fiscal_Year_End: []
        Company_Name: 'GOOG AUG 2018 C 1000.00'
        Strike_Price: 1000
        NAICS: []
        Exchange_Root: []
        Option_Premium_Multiplier: 100
        Option_Multiple_Deliverable: 0
        Price_Format_Description: 'Two decimal places'
        Exchange_Description: 'Euronext Index Derivatives (ENID)'
        Listed_Market_Description: 'OPRA System'
        Security_Type_Description: 'Index/Equity Option'
        SIC_Description: ''
        NAICS_Description: ''
```

```matlab
>> [data.Strike_Price]
ans =
    Columns 1 through 8
          1000  1010  1000  1005  1010  1000  1002.5  1005
    Columns 9 through 16
          1007.5  1010  1000  1005  1010  1000  1002.5  1005
    Columns 17 through 24
          1007.5  1010  1000  1005  1010  1000  1005  1010
    Columns 25 through 32
          1000  1005  1010  1000  1010  1000  1010  1000
    Columns 33 through 40
          1005  1010  1000  1002.5  1005  1007.5  1010  1000
    Columns 41 through 48
          1005  1010  1000  1002.5  1005  1007.5  1010  1000
    Columns 49 through 56
          1005  1010  1000  1005  1010  1000  1005  1010
    Columns 57 through 58
          1000  1010
```
Here is a summary of the *IQML* parameters that affect chain symbols lookup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol</td>
<td>string</td>
<td>''</td>
<td>Symbol name of the underlying contract. This is a mandatory parameter – it must be set. Note: Multiple symbols are <strong>NOT</strong> supported.</td>
</tr>
</tbody>
</table>
| **DataType**   | string    | 'options' | One of:  
  - 'options' (default) – on index/equity  
  - 'future'  
  - 'spread' – future calendar spreads  
  - 'foptions' – options on future |
| **Side**       | string    | 'cp' (meaning both calls and puts) | One of:  
  - 'cp' (default) – both calls and puts  
  - 'c' – calls only  
  - 'p' – puts only  
Only relevant if **DataType**='options'/foptions' |
| **WhatToShow** | string    | 'symbols' | One of:  
  - 'symbols' (default)– list of symbols in chain  
  - 'quotes' – return the latest quotes data  
  - 'fundamental' – return fundamental data |
| **Months**     | various   | [] meaning all | One of:  
  - Numeric month value(s) between 1-12 (e.g.: 4, 2:5, [1,4,7])  
  - English month name (e.g. 'August', 'Apr')  
  - English month names in cell array (e.g. {'Apr', 'July', 'September', 'Dec'})  
  - Financial month codes from the list FGHJKNQUVXZ (e.g. 'JKMN')  
  Cannot be specified together with **NearMonths** |
| **NearMonths** | integer   | []      | Number of nearby contract months to report.¹³⁴ Cannot be specified together with **Months**. |
| **Years**      | integer   | [] meaning current year | 1+ years e.g. 2013:2019, default: current year. Only relevant when **DataType** ≠ 'options'. |
| **IncludeBinary** | logical | false or 0 | If true, binary/weekly options¹³⁵ are reported, otherwise (default) they are not. This parameter is only relevant when **DataType**='options'. |
| **MinStrike**  | number    | []      | Only report options having a higher strike price; only relevant when **DataType**='options'. |
| **MaxStrike**  | number    | []      | Only report options having a lower strike price; only relevant when **DataType**='options'. |
| **NumInMoney** | integer   | []      | Only report this number of options in the money; only relevant if **DataType**=options'. |
| **NumOutOfMoney** | integer | []      | Only report this number of options out of money; only relevant if **DataType**=options'. |
| **UseParallel** | logical (true/false) | false | If set to true or 1, then querying chain quotes will be done in parallel if possible (see §3.6). |

Note: Options/futures chain lookup is only available in the Professional *IQML* license.

¹³⁴ IQFeed officially supports only 0-4, but in practice higher values are accepted, reporting contracts that expire farther out in the future (for example, 2.5 years for SPX). Note: this is undocumented IQFeed behavior, so specifying a value of 5 or higher may possibly not work properly (or at all) in certain cases. See [http://forums.iqfeed.net/index.cfm?page=topic&topicID=5508](http://forums.iqfeed.net/index.cfm?page=topic&topicID=5508)

¹³⁵ Weekly options are only excluded with IQFeed client 6.1 or newer; binary options are excluded with all clients.
8.3 Markets lookup

To retrieve a list of markets (exchanges), set the action to 'lookup' and DataTypes to 'markets':

```matlab
>> data = IQML('lookup', 'DataType','markets')
data = 474×1 struct array with fields:
  id
  name
  description
  groupId
  groupName

>> data(1)
ans =
  id: 1
  name: 'NGM'
  description: 'Nasdaq Global Market'
  groupId: 5
  groupName: 'NASDAQ'

>> data(2)
ans =
  id: 2
  name: 'NCM'
  description: 'National Capital Market'
  groupId: 5
  groupName: 'NASDAQ'
```

You can convert the data into a [perhaps] more readable form using Matlab’s built-in `struct2cell()` and `struct2table()` functions:

```matlab
>> struct2cell(data)
ans =
  9×5 cell array
  [8] 'CHX'           'Chicago Stock Exchange'                [0] 'NONE'
  [9] 'PHLX'          'Philadelphia Stock Exchange'           [0] 'NONE'
...
```

```matlab
>> struct2table(data)
ans =
  9×5 table
       id | name                  | description                          | groupId | groupName
    ___ | _______________      | _________________________________    | __     | _____________
   1   | 'NGM'                | 'Nasdaq Global Market'               | 5       | 'NASDAQ'
   2   | 'NCM'                | 'National Capital Market'            | 5       | 'NASDAQ'
   3   | 'OTC'                | 'Nasdaq other OTC'                   | 5       | 'NASDAQ'
   4   | 'OTCBB'              | 'Nasdaq OTC Bulletin Board'          | 5       | 'NASDAQ'
   5   | 'NASDAQ'             | 'Nasdaq'                             | 5       | 'NASDAQ'
   6   | 'NYSE_AMERICAN'      | 'NYSE American (Equities and Bonds)'| 6       | 'NYSE_AMERICAN'
   7   | 'NYSE'               | 'New York Stock Exchange'            | 7       | 'NYSE'
   8   | 'CHX'                | 'Chicago Stock Exchange'             | 0       | 'NONE'
   9   | 'PHLX'               | 'Philadelphia Stock Exchange'         | 0       | 'NONE'
...
You can narrow-down the results by specifying the **Name** and/or the **Description** filtering parameters. For example, let’s display only the markets that contain ‘Nasdaq’ in their **Description**:

```matlab
>> data = IQML('lookup', 'DataType','markets', 'Description','Nasdaq')
data =
10x1 struct array with fields:
id
name
description
groupId
groupName
```

```matlab
>> disp(struct2cell(data))
[105] 'PK_NASDAQ' 'Pink Sheets - NASDAQ Listed'       [ 90] 'PK_SHEETS'
[134] 'N2EX'     'NASDAQ OMX-Nord Pool'               [134] 'N2EX'
[139] 'NFX'      'NASDAQ OMX Futures'                [139] 'NFX'
```

Naturally, it is quite possible that no markets exist that match the requested criteria. In such a case, the result will be empty (and cannot be displayed using Matlab’s `struct2table()` or `struct2cell()` functions):

```matlab
>> data = IQML('lookup', 'DataType','markets', 'Name','xyz')
data =
[]
>> struct2cell(data)
Undefined function 'struct2cell' for input arguments of type 'double'.
```

Here is a summary of the **IQML** parameters that affect markets lookup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>string</td>
<td>&quot;&quot;</td>
<td>(empty string) Limits the query to markets that contain the specified string in their name or groupName (case insensitive, <em>anywhere</em> within the name)</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>string</td>
<td>&quot;&quot;</td>
<td>(empty string) Limits the query to markets that contain the specified string in their description (case insensitive, <em>anywhere</em> within the description)</td>
</tr>
</tbody>
</table>
8.4 Security types lookup

To retrieve a list of security types, set action to 'lookup' and **DataType** to 'sectypes':

```matlab
>> data = IQML('lookup', 'DataType', 'sectypes')
data = 38×1 struct array with fields:
    id    name              description
>> data(1)
an =
    id: 1
    name: 'EQUITY'
    description: 'Equity'
>> data(2)
an =
    id: 2
    name: 'IEOPTION'
    description: 'Index/Equity Option'
```

You can convert the data into a [perhaps] more readable form using Matlab’s builtin `struct2cell()` and `struct2table()` functions:

```matlab
>> disp(struct2cell(data))
[ 1]  'EQUITY'            'Equity'
[ 2]  'IEOPTION'          'Index/Equity Option'
[ 3]  'MUTUAL'            'Mutual Fund'
[ 4]  'MONEY'             'Money Market Fund'
[ 5]  'BONDS'             'Bond'
[ 6]  'INDEX'             'Index'
[ 7]  'MARKETSTATS'      'Market Statistic'
[ 8]  'FUTURE'            'Future'
[ 9]  'OPTION'            'Future Option'
[10] 'SPREAD'            'Future Spread'
[11] 'SPOT'              'Spot'
[12] 'FORWARD'           'Forward'
[13] 'CALC'              'DTN Calculated Statistic'
[14] 'STRIP'             'Calculated Future Strip'
[15] 'FOREX'             'Foreign Monetary Exchange'
[16] 'ARGUS'             'Argus Energy'
[17] 'PRECMTL'           'Precious Metals'
[18] 'RACKS'             'Racks Energy'
[19] 'RFSPOT'            'Refined Fuel Spot'
[20] 'ICSPREAD'          'Inter-Commodity Future Spread'
[21] 'STRAITSPREAD'      'Strategy Spread'
[22] 'TREASURIES'        'Treasuries'
[23] 'SWAPS'             'Interest Rate Swap'
[24] 'MRTRPT'            'Market Reports'
[25] 'SNL NG'            'SNL Natural Gas'
[26] 'SNL ELEC'          'SNL Electricity'
[27] 'NP_CAPACITY'       'Nord Pool-N2EX Capacity'
[28] 'NP_FLOW'           'Nord Pool-N2EX Flow'
[29] 'NP POWER'          'Nord Pool-N2EX Power Prices'
[30] 'COMMOD'            'Commodity 3'
[31] 'JACOBSEN'          'The Jacobsen'
[32] 'ISO'               'Independent Systems Operator Data (Genscape)'
[33] 'FAST RACKS'        'Fast Racks (Racks On Wheels)'
[34] 'COMBINED_FUTURE'   'Combined Future Volume OI'
[35] 'COMBINED_FOPTION'  'Combined FOption Volume OI'
[36] 'ARGUSFC'           'Argus Forward Curve'
[37] 'PETROCHEMWIRE'     'PetroChemWire'
[38] 'FOPTION_IV'        'FOption Implied Volatility'
```
You can narrow-down the results by specifying the **Name** and/or the **Description** filtering parameters. For example, let’s display only security types that have ‘Option’ in their **Description**:

```plaintext
>> struct2table(IQML('lookup', 'DataType','sectypes', 'Description','option'))
ans =
4×3 table
    id    name                  description
       2    'IEOPTION'           'Index/Equity Option'
       9    'FOPTION'            'Future Option'
      36    'COMBINED_FOPTION'  'Combined FOption Volume OI'
      39    'FOPTION_IV'         'FOption Implied Volatility'
```

Naturally, it is quite possible that no security types exist that match the requested criteria. In such a case, the result will be empty (and cannot be displayed using Matlab’s `struct2table()` or `struct2cell()` functions):

```plaintext
>> data = IQML('lookup', 'DataType','sectypes', 'Name','xyz')
data =
[]
>> struct2cell(data)
    Undefined function 'struct2cell' for input arguments of type 'double'.
```

Here is a summary of the **IQML** parameters that affect security types lookup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>string</td>
<td>&quot; (empty string)</td>
<td>Limits the query to secTypes that contain the specified string in their name (case insensitive, anywhere within the name)</td>
</tr>
<tr>
<td>Description</td>
<td>string</td>
<td>&quot; (empty string)</td>
<td>Limits the query to secTypes that contain the specified string in their description (case insensitive, anywhere within the description)</td>
</tr>
</tbody>
</table>
8.5 SIC codes lookup

To retrieve a list of SIC sectors/industries, set action to 'lookup' and **DataType** to 'SIC':

```matlab
>> data = IQML('lookup', 'DataType','SIC')
data =
     1009×1 struct array with fields:
          id   description
    _____    _______________________________________________________
     111   'WHEAT'
     112   'RICE'
     115   'CORN'
     116   'SOYBEANS'
     119   'CASH GRAINS, NOT ELSEWHERE CLASSIFIED'
     131   'COTTON'
     132   'TOBACCO'
     133   'SUGAR CANE AND SUGAR BEETS'
     134   'IRISH POTATOES'
     139   'FIELD CROPS, EXCEPT CASH GRAINS, NOT ELSEWHERE CLASSIFIED'
     161   'VEGETABLES AND MELONS'
     171   'BERRY CROPS'
     172   'GRAPEFRUITS'
     173   'TREE NUTS'
     174   'CITRUS FRUITS'
     175   'DECIDUOUS TREE FRUITS'
     179   'FRUITS AND TREE NUTS, NOT ELSEWHERE CLASSIFIED'
...```

You can convert the data into a [perhaps] more readable form using Matlab’s builtin `struct2cell()` and `struct2table()` functions:

```matlab
>> disp(struct2cell(data))
    [111] 'WHEAT'
    [112] 'RICE'
    [115] 'CORN'
    [116] 'SOYBEANS'
    [119] 'CASH GRAINS, NOT ELSEWHERE CLASSIFIED'
    [131] 'COTTON'
    [132] 'TOBACCO'
    [133] 'SUGAR CANE AND SUGAR BEETS'
    [134] 'IRISH POTATOES'
    [139] 'FIELD CROPS, EXCEPT CASH GRAINS, NOT ELSEWHERE CLASSIFIED'
    [161] 'VEGETABLES AND MELONS'
    [171] 'BERRY CROPS'
    [172] 'GRAPEFRUITS'
    [173] 'TREE NUTS'
    [174] 'CITRUS FRUITS'
    [175] 'DECIDUOUS TREE FRUITS'
    [179] 'FRUITS AND TREE NUTS, NOT ELSEWHERE CLASSIFIED'
...```

```matlab
>> disp(struct2table(data))

<table>
<thead>
<tr>
<th>id</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>111</td>
<td>'WHEAT'</td>
</tr>
<tr>
<td>112</td>
<td>'RICE'</td>
</tr>
<tr>
<td>115</td>
<td>'CORN'</td>
</tr>
<tr>
<td>116</td>
<td>'SOYBEANS'</td>
</tr>
<tr>
<td>119</td>
<td>'CASH GRAINS, NOT ELSEWHERE CLASSIFIED'</td>
</tr>
<tr>
<td>131</td>
<td>'COTTON'</td>
</tr>
<tr>
<td>132</td>
<td>'TOBACCO'</td>
</tr>
<tr>
<td>133</td>
<td>'SUGAR CANE AND SUGAR BEETS'</td>
</tr>
<tr>
<td>134</td>
<td>'IRISH POTATOES'</td>
</tr>
<tr>
<td>139</td>
<td>'FIELD CROPS, EXCEPT CASH GRAINS, NOT ELSEWHERE CLASSIFIED'</td>
</tr>
<tr>
<td>161</td>
<td>'VEGETABLES AND MELONS'</td>
</tr>
<tr>
<td>171</td>
<td>'BERRY CROPS'</td>
</tr>
<tr>
<td>172</td>
<td>'GRAPEFRUITS'</td>
</tr>
<tr>
<td>173</td>
<td>'TREE NUTS'</td>
</tr>
<tr>
<td>174</td>
<td>'CITRUS FRUITS'</td>
</tr>
<tr>
<td>175</td>
<td>'DECIDUOUS TREE FRUITS'</td>
</tr>
<tr>
<td>179</td>
<td>'FRUITS AND TREE NUTS, NOT ELSEWHERE CLASSIFIED'</td>
</tr>
</tbody>
</table>
...```
You can narrow-down the results by specifying the **Description** filtering parameter. For example, let’s display only security types that have ‘Oil’ in their **Description**:

```matlab
>> struct2table(IQML('lookup', 'DataType','SIC', 'Description','oil'))
ans =
22×2 table
   id                                description
   ________________________________
       251  'BROILER, FRYER, AND ROASTER CHICKENS'
       711  'SOIL PREPARATION SERVICES'
      1381  'DRILLING OIL AND GAS WELLS'
      1382  'OIL AND GAS FIELD EXPLORATION SERVICES'
      1389  'OIL AND GAS FIELD SERVICES, NOT ELSEWHERE CLASSIFIED'
      2074  'COTTONSEED OIL MILLS'
      2075  'SOYBEAN OIL MILLS'
      2076  'VEGETABLE OIL MILLS, EXCEPT CORN, COTTONSEED, AND SOYBEAN'
      2077  'ANIMAL AND MARINE FATS AND OILS'
      2079  'SHORTENING, TABLE OILS, MARGARINE, AND OTHER EDIBLE FATS AND OILS'
      2673  'PLASTICS, FOIL, AND COATED PAPER BAGS'
      2843  'SURFACE ACTIVE AGENTS, FINISHING AGENTS, SULFONATED OILS, AND ASS'
      2844  'PERFUMES, COSMETICS, AND OTHER TOILET PREPARATIONS'
      2992  'LUBRICATING OILS AND GREASES'
      3353  'ALUMINUM SHEET, PLATE, AND FOIL'
      3443  'FABRICATED PLATE WORK (BOILER SHOPS)'
      3497  'METAL FOIL AND LEAF'
      3532  'MINING MACHINERY AND EQUIPMENT, EXCEPT OIL AND GAS FIELD MACHINER'
      3533  'OIL AND GAS FIELD MACHINERY AND EQUIPMENT'
      3677  'ELECTRONIC COILS, TRANSFORMERS, AND OTHER INDUCTORS'
      5983  'FUEL OIL DEALERS'
      6792  'OIL ROYALTY TRADERS'
```

Naturally, it is quite possible that no security types exist that match the requested criteria. In such a case, the result will be empty (and cannot be displayed using Matlab’s `struct2table()` or `struct2cell()` functions):

```matlab
>> data = IQML('lookup', 'DataType','SIC', 'Description','xyz')
data =
[]
>> struct2cell(data)
Undefined function 'struct2cell' for input arguments of type 'double'.
```

Here is a summary of the **IQML** parameters that affect SIC codes lookup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>string</td>
<td>&quot; &quot; (empty string)</td>
<td>Limits the query to SIC entries that contain the specified string in their description (case insensitive, anywhere within the description)</td>
</tr>
</tbody>
</table>

Note: IQFeed has a confirmed internal bug as of October 2019: some ~150 SIC codes are not reported, although they have corresponding symbols and are reported by the symbols lookup query (§8.1). Symbols having such SIC codes will have an empty `SIC_Description` field in the fundamental data query (§4.2) and empty `SIC_Desc` field in the symbols lookup query (§8.1).

---

136 http://forums.iqfeed.net/index.cfm?page=topic&topicID=5653
8.6 NAICS codes lookup

To retrieve a list of NAICS sectors/industries, set the action to 'lookup' and **DataType** to 'NAICS':

```matlab
data = IQML('lookup', 'DataType','NAICS')
data = 1175×1 struct array with fields:
    id
description
>> data(1)
an =
    id: 111110
description: 'Soybean Farming'
>> data(2)
an =
    id: 111120
description: 'Oilseed (except Soybean) Farming'
```

You can convert the data into a [perhaps] more readable form using Matlab’s builtin `struct2cell()` and `struct2table()` functions:

```matlab
>> disp(struct2cell(data))
[111110]  'Soybean Farming'
[111120]  'Oilseed (except Soybean) Farming'
[111130]  'Dry Pea and Bean Farming'
[111140]  'Wheat Farming'
[111150]  'Corn Farming'
[111160]  'Rice Farming'
[111191]  'Oilseed and Grain Combination Farming'
[111199]  'All Other Grain Farming'
[111211]  'Potato Farming'
[111219]  'Other Vegetable (except Potato) and Melon Farming'
[111310]  'Orange Groves'
[111320]  'Citrus (except Orange) Groves'
[111331]  'Apple Orchards'
[111332]  'Grape Vineyards'
[111333]  'Strawberry Farming'
[111334]  'Berry (except Strawberry) Farming'
[111335]  'Tree Nut Farming'
...
>> disp(struct2table(data))
   id                          description
    ______    ___________________________________________________
    111110    'Soybean Farming'
    111120    'Oilseed (except Soybean) Farming'
    111130    'Dry Pea and Bean Farming'
    111140    'Wheat Farming'
    111150    'Corn Farming'
    111160    'Rice Farming'
    111191    'Oilseed and Grain Combination Farming'
    111199    'All Other Grain Farming'
    111211    'Potato Farming'
    111219    'Other Vegetable (except Potato) and Melon Farming'
    111310    'Orange Groves'
    111320    'Citrus (except Orange) Groves'
    111331    'Apple Orchards'
    111332    'Grape Vineyards'
    111333    'Strawberry Farming'
    111334    'Berry (except Strawberry) Farming'
    111335    'Tree Nut Farming'
...
You can narrow-down the results by specifying the **Description** filtering parameter. For example, let’s display only security types that have ‘Oil’ in their **Description**:

```matlab
>> struct2table(IQML('lookup', 'DataType', 'NAICS', 'Description', 'oil'))
ans =
20×2 table
    id                         description
    _____  ________________________________________________________
      111120  'Oilseed (except Soybean) Farming'
      111191  'Oilseed and Grain Combination Farming'
      112320  'Broilers and Other Meat Type Chicken Production'
      115112  'Soil Preparation, Planting, and Cultivating'
      213111  'Drilling Oil and Gas Wells'
      213112  'Support Activities for Oil and Gas Operations'
      237120  'Oil and Gas Pipeline and Related Structures Construction'
      311223  'Other Oilseed Processing'
      311225  'Fats and Oils Refining and Blending'
      322225  'Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses'
      324191  'Petroleum Lubricating Oil and Grease Manufacturing'
      325620  'Toilet Preparation Manufacturing'
      331315  'Aluminum Sheet, Plate, and Foil Manufacturing'
      332410  'Power Boiler and Heat Exchanger Manufacturing'
      333132  'Oil and Gas Field Machinery and Equipment Manufacturing'
      334416  'Electronic Coil, Transformer, and Other Inductor Manufacturing'
      423810  'Construction and Mining (except Oil Well) Machinery and Equipment…'
      454311  'Heating Oil Dealers'
      486110  'Pipeline Transportation of Crude Oil'
      811191  'Automotive Oil Change and Lubrication Shops'
```

Naturally, it is quite possible that no security types exist that match the requested criteria. In such a case, the result will be empty (and cannot be displayed using Matlab’s **struct2table()** or **struct2cell()** functions):

```matlab
>> data = IQML('lookup', 'DataType', 'NAICS', 'Description', 'xyz')
data =
[]
>> struct2cell(data)
Undefined function 'struct2cell' for input arguments of type 'double'.
```

Here is a summary of the **IQML** parameters that affect NAICS codes lookup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>string</td>
<td>&quot;</td>
<td>Limits the query to NAICS entries that contain the specified string in their description (case insensitive, <em>anywhere</em> within the description)</td>
</tr>
</tbody>
</table>

Note: IQFeed has a confirmed internal bug as of October 2019: some ~150 SIC codes are not reported, although they have corresponding symbols and are reported by the symbols lookup query (**§8.1**).\(^{138}\) A similar bug also applies to NAICS.

\(^{137}\) The extra space at the beginning of the description here is a typo in IQFeed’s data

8.7 Trade condition codes lookup

To retrieve a list of trade condition codes, set the action to 'lookup' and **DataType** to 'conditions':

```matlab
>> data = IQML('lookup', 'DataType', 'conditions')
data = 
   155×1 struct array with fields:
      id    name    description
>> data(1)
an = 
     id: 1
     name: 'REGULAR'
     description: 'Normal Trade'
>> data(2)
an = 
     id: 2
     name: 'ACQ'
     description: 'Acquisition'
```

You can convert the data into a [perhaps] more readable form using Matlab’s builtin `struct2cell()` and `struct2table()` functions:

```matlab
>> disp(struct2cell(data))
  [ 1] 'REGULAR'       'Normal Trade'
  [ 2] 'ACQ'           'Acquisition'
  [ 3] 'CASHM'         'Cash Only Market'
  [ 4] 'BUNCHED'       'Bunched Trade'
  [ 5] 'AVGPRI'        'Average Price Trade'
  [ 6] 'CASH'          'Cash Trade (same day clearing)'
  [ 7] 'DIST'          'Distribution'
  [ 8] 'NEXTDAY'       'Next Day Market'
  [ 9] 'BURSTBSKT'     'Burst Basket Execution'
 [10] 'BUNCHEDSOLD'    'Bunched Sold Trade'
 [11] 'ORDETAIL'      'Opening/Reopening Trade Detail'
 [12] 'INTERDAY'      'Intraday Trade Detail'
 [13] 'BSKTONCLOSE'   'Basket Index on Close'
 [14] 'RULE127'       'Rule - 127 Trade NYSE'
 [15] 'RULE155'       'Rule - 155 Trade AMEX'
 [16] 'SOLDLAST'      'Sold Last (late reporting)'
...

>> disp(struct2table(data))
   id        name                     description
   __________    ________________    ________________________________
     1    'REGULAR'        'Normal Trade'
     2    'ACQ'           'Acquisition'
     3    'CASHM'         'Cash Only Market'
     4    'BUNCHED'       'Bunched Trade'
     5    'AVGPRI'        'Average Price Trade'
     6    'CASH'          'Cash Trade (same day clearing)'
     7    'DIST'          'Distribution'
     8    'NEXTDAY'       'Next Day Market'
     9    'BURSTBSKT'     'Burst Basket Execution'
    10    'BUNCHEDSOLD'    'Bunched Sold Trade'
    11    'ORDETAIL'      'Opening/Reopening Trade Detail'
    12    'INTERDAY'      'Intraday Trade Detail'
    13    'BSKTONCLOSE'   'Basket Index on Close'
    14    'RULE127'       'Rule - 127 Trade NYSE'
    15    'RULE155'       'Rule - 155 Trade AMEX'
    16    'SOLDLAST'      'Sold Last (late reporting)'
...
You can narrow-down the results by specifying the Name and/or the Description filtering parameters. For example, let’s display only security types that have ‘Option’ in their Description:

```matlab
>> struct2table(IQML('lookup', 'DataType','conditions', 'Description','option'))
ans =
7×3 table
   id       name                   description
     ___ _______ __________________________
   __________ __________________________
 39   'SPRD'   'Spread - Trade in Two Options in the Same Class (a buy and a sell in the same class)'
 40   'STDL'   'Straddle - Trade in Two Options in the Same Class (a buy and a sell in a put and a call)'
 43   'BWRT'   'Option Portion of a Buy/Write'
 44   'CMBO'   'Combo - Trade in Two Options in the Same Options Class (a buy and a sell in the same class)'
 68   'STKOPT_TRADE' 'Stock-Option Trade'
 82   'OPTION_EX' 'Option Exercise'
 96   'OPT_ADDON' 'Short Option Add-On'
```

Naturally, it is quite possible that no security types exist that match the requested criteria. In such a case, the result will be empty (and cannot be displayed using Matlab’s struct2table() or struct2cell() functions):

```matlab
>> data = IQML('lookup', 'DataType','conditions', 'Name','xyz')
data =
[]
>> struct2cell(data)
Undefined function 'struct2cell' for input arguments of type 'double'.
```

Note that the trade condition codes are typically reported by IQFeed as a string of one or more 2-digit hexadecimal values.\(^\text{139}\) For example (see §4.1):

```matlab
>> data = IQML('quotes', 'Symbol','GOOG')
    ... data =
      Most_Recent_Trade_Conditions: '3D87'
      Trade_Conditions_Description: 'Intramaket Sweep; Odd lot trade'
```

In this example, the reported last trade had 2 trade conditions: hexadecimal 3D (=61, meaning 'Intramaket Sweep')\(^\text{140}\) and hexadecimal 87 (=135, meaning 'Odd lot trade').

Here is a summary of the IQML parameters that affect trade conditions lookup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>string</td>
<td>(empty string)</td>
<td>Limits the query to trade conditions that contain the specified string in their name (case insensitive, anywhere within the name)</td>
</tr>
<tr>
<td>Description</td>
<td>string</td>
<td>(empty string)</td>
<td>Limits the query to trade conditions that contain the specified string in their description (case insensitive, anywhere in the description)</td>
</tr>
</tbody>
</table>

\(^\text{139}\) Trade condition codes 15 or lower are reported with a leading 0, e.g. 05 or 0E. The availability of the codes’ translation in the Trade_Conditions_Description field depends on MsgParsingLevel=2 (which is the default value; see §3.2).

\(^\text{140}\) The missing ‘r’ in “Intramarket” is a typo in IQFeed’s data
9 Connection, administration and other special commands

9.1 Connecting & disconnecting from IQFeed

When using IQML, there is no need to worry about connecting or disconnecting from IQFeed – IQML handles these activities automatically, without requiring user intervention. The user only needs to ensure that IQFeed is active and logged-in when the IQML command is invoked in Matlab.

IQML does not require any special configuration when connecting to IQFeed. It uses whatever setting was previously set in the DTN IQConnect client application. You might be prompted to enter a username/password, if IQConnect was not set up to automatically connect using saved login/password information:

```
>> IQML('time', 'Username','123456-1', 'Password','OpenSesame')
```

In addition to entering the login credentials in the client window, you can also specify them programmatically. This could be useful when you have several IQFeed accounts and wish to switch between them programmatically, or if you use IQFeed’s non-Windows client installer on MacOs (which prevents user-entry in the login window):

```
>> IQML('time', 'Username','123456-1', 'Password','OpenSesame')
```

Note that the Username and Password parameters must be specified together, and that they are only meaningful in the first IQML command that starts the connection. If the Username and Password parameters are specified after a connection to IQFeed has been established, they will be ignored for the current connection, but stored in IQFeed’s registry for subsequent connections (see §9.5).

If you enter an invalid set of Username/Password, an error message will be thrown. A different error will be thrown if IQML fails to connect to IQFeed within 10 seconds.
IQML can connect to a running IQFeed client, that was already started by another process on the current computer (e.g. charting app or another Matlab process that runs IQML), even without Username and Password in the initial IQML connection. IQML will bypass login, connecting directly to the client process.

IQML typically uses the latest API features supported by your installed IQFeed client (IQConnect). For example, if you use client version 6.0.1.1, IQML will use IQFeed communication protocol 6.0, and you will not have access to features of protocol 6.1. Once you install a newer IQFeed client, IQML will automatically detect this and use a newer protocol number, as determined by the new client version. For debugging purposes, you can override Protocol to a version older than your installed client. For example, with a 6.0.1.1 client, you can set Protocol to 5.2, but not to 6.1 or newer:

```matlab
>> IQML(..., 'Protocol', 6.2)
Warning: Your IQFeed client (version 6.0.1.1) does not support Protocol 6.1 - using Protocol 6.0 instead
(Type "warning off IQML:UnsupportedProtocol" to suppress this warning.)
```

You will be able to retrieve information in Matlab as soon as IQML connects to the IQFeed client and [if necessary] the client finishes the login process and synchronizes with the IQFeed servers. This process typically takes a few short seconds.

The following parameters affect the initial connection to IQFeed:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Username</td>
<td>string</td>
<td>(none)</td>
<td>Used to launch and login into IQConnect</td>
</tr>
<tr>
<td>Password</td>
<td>string</td>
<td>(none)</td>
<td>Used to launch and login into IQConnect</td>
</tr>
<tr>
<td>Protocol</td>
<td>number</td>
<td>installed client’s version</td>
<td>IQFeed API protocol that should be used. You can set any protocol value supported by your IQConnect client version. For example, client 6.0.1.1 supports protocols 5.2 and 6.0 (this client’s default), but not 6.1.</td>
</tr>
</tbody>
</table>

By default, IQML uses the following TCP ports to connect to IQFeed’s client:

- 5009 – Level1Port – used for Level 1 queries(msgs) (quotes, fundamentals)
- 9100 – LookupPort – used for historical, news and lookup queries/messages
- 9200 – Level2Port – used for Level II (market-depth) queries/messages
- 9300 – AdminPort – used for administrative queries/messages (stats etc.)
- 9400 – DerivativePort – used for interval-bars queries/messages
- 60020 – LoginPort – used for login authentication

If any of these ports are already used by any other process at the time that IQFeed’s client application (IQConnect) starts, it will not be able to communicate with IQML via these ports. IQML automatically tries to detect and report such cases, for example:

```matlab
>> data = IQML('history', 'Symbol', 'IBM')
Error using IQML
Port #9100 is already used by process #12345 (SomeProcess.exe) and cannot be used by IQFeed. Run IQML('registry') to set a different value for LookupPort.
```

You can solve such port conflicts using any of the following methods:

---

141 For example, historic market summary data and scanning (§5.6)
1. Stop/uninstall the other process (`SomeProcess.exe` in the example above)
2. Modify the other process’s settings to use different ports, so that they will not conflict with IQFeed (this is rarely possible)
3. Modify IQFeed’s registry settings to use a different port, which is not used by any other process (see §9.5). If you choose this option, you will need to fix the port again whenever you re-install the IQFeed client (for example, whenever you update the client to a newer version), because the client’s installation process resets the port values back to their default values.

After you resolve the problem using one of these alternatives, restart IQFeed’s IQConnect client and then retry the IQML command. An IQConnect restart is necessary since IQConnect reads the registry values and sets the ports only when it starts.

In some cases, users may wish to disrupt a live connection. You can disconnect from IQFeed using IQML’s 'disconnect' action, which has no settable parameters:

```matlab
>> IQML('disconnect')
```

This command disconnects IQML from the IQFeed client. If IQML was the only application that was connected to the client, then the client will silently exit after several seconds, unless a new IQFeed connection is established during this time.

There is no need for a corresponding connect action, because connection is automatically (re-)established whenever this is required by a new IQML command.

IQML and IQConnect automatically try to recover from connection losses during normal operation. You may see in the Matlab console one or more IQConnect error messages such as the following, which indicate such a connection loss:

- 20180410 20:03:06.371 Level1 server disconnected!
- 20180410 20:03:57.934 Unable to connect to L2IP server. Error Code: 10051
  Error Msg: A socket operation was attempted to an unreachable network.
- 20180410 20:03:57.934 Unable to connect to L2IP server. Error Code: 10065
  Error Msg: A socket operation was attempted to an unreachable host.
- 20180410 20:03:57.934 Unable to connect to L2IP server. Error Code: 10053
  Error Msg: An established connection was aborted by the software in your host machine.
- 20180410 20:03:57.934 Unable to connect to L2IP server. Error Code: 10060
  Error Msg: A connection attempt failed because the connected party did not properly respond after a period of time

You can safely ignore such messages in most cases, since IQConnect will automatically re-establish connection with IQFeed’s servers as soon as they become accessible again, and show an appropriate informational message in Matlab’s console:

- 20180410 20:04:16.497 Level1 server is connected

In some cases, users may wish to actively re-connect (disconnect and then connect) to IQFeed. This can be done with the 'reconnect' action (no settable parameters):

```matlab
>> IQML('reconnect')
```

Note that after reconnecting to IQFeed, you will need to request any and all streaming data again (see §6), since IQFeed resets data streaming after a client disconnect.
9.2 Server time

You can request the latest IQFeed server time using the 'time' action:

```matlab
>> data = IQML('time')
data =
    latestEventDatenum: 737114.660205451
    latestEventTimeStamp: '20180223 15:50:41'
    latestServerDatenum: 737114.368518519
    latestServerTimestamp: '20180223 08:50:40'
```

The returned data struct includes the following data fields:

- `latestEventDatenum` — a Matlab numeric datenum value that corresponds to the local time in which the very latest message has arrived from IQFeed.
- `latestEventTimeStamp` — a human-readable format of `latestEventDatenum`
- `latestServerDatenum` — a Matlab numeric datenum value that corresponds to the latest server time that was received from IQFeed.
- `latestServerTimestamp` — a human-readable format of `latestServerDatenum`

Note that the server time may be off by up to a full second from the current time, depending on when the last timestamp message was received from IQFeed. IQFeed sends server time messages once every second, so `latestServerDatenum` lags by 0.5 secs behind the current time on average.

Similarly, `latestEventDatenum` reports the time at which the last message was received from IQFeed. This message could be a timestamp message, or any other data message. For this reason, the lag here is typically much lower than the lag of `latestServerDatenum`.

The 'time' action has no settable properties.
9.3 Client stats

You can retrieve the updated IQFeed connection traffic stats using the 'stats' action:

```python
>> data = IQML('stats')
data =
    ServerIP: '66.112.148.226'
    ServerPort: 60002
    MaxSymbols: 1300
    NumOfStreamingSymbols: 0
    NumOfClientsConnected: 3
    SecondsSinceLastUpdate: 1
    NumOfReconnections: 0
    NumOfAttemptedReconnections: 0
    StartTime: 'Mar 07 11:03AM'
    MarketTime: 'Mar 07 04:34AM'
    ConnectionStatus: 'Connected'
    IQFeedVersion: '5.2.7.0'
    LoginID: '123456-1'
    TotalKBsRecv: 42.98
    KBsRecvLastSecond: 0.02
    AvgKBsPerSecRecv: 0.02
    TotalKBsSent: 361.62
    KBsSentLastSecond: 0.22
    AvgKBsPerSecSent: 0.19
    Exchanges: {1×16 cell}
    ServerVersion: '6.0.0.5'
    ServiceType: 'real_time'
```

The returned data struct includes the following data fields:\footnote{\url{http://iqfeed.net/dev/api/docs/AdminSystemMessages.cfm}}

- **ServerIP** – IP address of the least loaded IQFeed Quote Server
- **ServerPort** – Port number for least loaded IQFeed Quote Server
- **MaxSymbols** – The maximum # of symbols that can be streamed simultaneously
- **NumOfStreamingSymbols** – # of symbols that are currently being streamed
- **NumOfClientsConnected** – # of clients that are currently connected
- **SecondsSinceLastUpdate** – # of seconds since last update from the Quote Server
- **NumOfReconnections** – # of times that IQFeed successfully reconnected
- **NumOfAttemptedReconnections** – # of times IQFeed failed to reconnect
- **StartTime** – Time of latest connection/reconnection to IQFeed (local timezone)
- **MarketTime** – Current time of the market (market’s time-zone)
- **ConnectionStatus** – Represents whether IQFeed is connected or not
- **IQFeedVersion** – Represents the version of IQFeed that is running
- **LoginID** – The Login ID that is currently logged into IQFeed
- **TotalKBsRecv** – Total # of Kilobytes received by IQFeed from *IQML* (i.e., *IQML* commands/requests to IQFeed). Found in the “Internet Bandwidth” section of the IQConnection Manager. Formula: total bytes received / 1024
- **KBsRecvLastSecond** – Found in the “Internet Bandwidth” section of the IQConnection Manager. Formula: bytes received in the past second / 1024
• AvgKBsPerSecRecv – Found in the “Internet Bandwidth” section of the IQConnection Manager. Formula: total KB’s received / total seconds

• TotalKBsSent – Total # of Kilobytes sent from IQFeed to IQML (i.e., IQFeed messages to IQML). Found in the “Local Bandwidth” section of the IQConnection Manager. Formula: total bytes sent / 1024

• KBsSentLastSecond – Found in the “Local Bandwidth” section of the IQConnection Manager. Formula: bytes sent in the past second / 1024

• AvgKBsPerSecSent – Found in the “Local Bandwidth” section of the IQConnection Manager. Formula: total KB’s sent / total seconds.

• Exchanges – The list of exchanges for which this IQFeed account is subscribed

• ServerVersion – The current version of IQFeed that the server supports. This is always the same or higher than your locally-installed IQFeedVersion.

• ServiceType – Type of data provided for this account (delayed or real-time)

The 'stats' action has a single settable property: AddPortStats (default=0). If you set this property to 1 or true, then additional stats will be returned, with extra information on the connected data channels/ports (see the highlighted fields below):

```matlab
>> data = IQML('stats', 'AddPortStats',1)
```
```plaintext
data =
    ServerIP: '66.112.148.224'
    ServerPort: 60005
    MaxSymbols: 1300
    NumOfStreamingSymbols: 0
    NumOfClientsConnected: 4
    SecondsSinceLastUpdate: 0
    NumOfReconnections: 0
    NumOfAttemptedReconnections: 0
    StartTime: 'Apr 01 8:21PM'
    MarketTime: 'Apr 01 02:12PM'
    ConnectionStatus: 'Connected'
    IQFeedVersion: '5.2.7.0'
    LoginID: '464720-1'
    TotalKBsRecv: 69.44
    KBsRecvLastSecond: 0.04
    AvgKBsPerSecRecv: 0.02
    TotalKBsSent: 1470.32
    KBsSentLastSecond: 0.47
    AvgKBsPerSecSent: 0.48
    Exchanges: {1×16 cell}
    ServerVersion: '6.0.0.5'
    ServiceType: 'real time'
    Level2: [1×1 struct]
      Level2SymbolsWatched: 2
      Lookup: [1×1 struct]
      RegionalSymbolsWatched: 2
      Admin: [1×1 struct]
    Level1: [1×1 struct]
      Level1SymbolsWatched: 0

>> data.Level1
ans =
    ConnectTime: '20180401 202111'
    KBsReceived: 0.74
    KBsSent: 70.58
    KBsQueued: 0
Note that it might take a few seconds for the additional port stats to arrive after the initial command. If you don’t see the expected results immediately, simply re-query them after 1-2 secs.

The returned data structs include the following data fields, separately for each data channel (port):\(^{143}\)

- **ConnectTime** – Timestamp when this channel to IQFeed was first opened
- **KBsReceived** – Total # of Kilobytes sent from IQML to IQFeed via this channel (requests for data queries etc.).
- **KBsSent** – Total # of Kilobytes sent from IQFeed to IQML via this channel. This data transfer is typically much larger than KBsReceived – this is normal and does not indicate a problem.
- **KBsQueued** – Total # of Kilobytes waiting in IQConnect to be sent to IQML via this channel for processing. This value should typically be 0 (zero) – a consistent non-zero value indicates that the Matlab program is unable to keep up with the inflow of data from IQFeed, perhaps due to a high load on the computer, or some heavy processing of the incoming data. If the value increases over time, Matlab and your computer will eventually freeze and become non-responsive, requiring a hard reset. See §3.6 for ways to speed-up the processing time, in order to get KBsQueued back to 0.

Corresponding information can also be seen in IQConnect’s Diagnostics Utility, which is installed as part of IQFeed’s client installation:

\(^{143}\) See §9.1 for a description of IQFeed’s data channels (ports)
9.4 Sending a custom command to IQFeed

You can send any custom command to IQFeed’s API, using the 'command' action. For example, to send the 'S,TIMESTAMPOFF' command,\(^\text{144}\) which stops IQFeed from sending server timestamp messages every second:

\[
\text{>> IQML('command', 'String','S,TIMESTAMPOFF')}
\]

IQFeed expects that users send commands to its API via specific channels (“ports”). Each command is typically accepted only by the port for which it is defined. For example, the 'S,TIMESTAMPOFF' command is defined for the Level1 port,\(^\text{145}\) whereas the 'S,CLIENTSTATS OFF' command (which stops the IQFeed server from streaming client stats messages) is defined for the Admin port.\(^\text{146}\) When you use IQML’s standard actions you do not need to worry about which port handles which command – this is automatically handled by IQML. But when you send a custom command to IQFeed, you need to specify the port, if it is different from the default (‘Level1’). In this specific example:

\[
\text{>> IQML('command', 'String','S,CLIENTSTATS OFF', 'PortName','Admin')}
\]

IQFeed is very picky about the spelling of the commands, including spaces and casing. If the spelling is not exactly right, the command will be rejected by IQFeed, possibly even without an error message. Unfortunately, IQFeed are not entirely consistent in the format of the various commands. For example, the 'S,TIMESTAMPOFF' command has no space, whereas the 'S,CLIENTSTATS OFF' command (which stops the IQFeed server from streaming client stats messages) is all-uppercase, yet the 'S,SET AUTOCONNECT,On' Admin command spells On/Off with lowercase letters (and uses a comma instead of a second space).

In some cases, the command that is sent to IQFeed may result in data messages that will be sent back from IQFeed, which should be received and processed. To do this, you can set the **ProcessFunc** property to a custom callback function that will handle these messages (see §10).

The following properties can be specified in IQML with the 'command' action:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>string or cell-</td>
<td>(none)</td>
<td>The IQFeed command string(s).</td>
</tr>
<tr>
<td></td>
<td>array of strings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PortName</td>
<td>string</td>
<td>'Level1'</td>
<td>The IQFeed port that will process the command(s). Must be one of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'Level1' (default)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'Level2'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'Lookup'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'Admin'</td>
</tr>
<tr>
<td>ProcessFunc</td>
<td>function handle</td>
<td>[]</td>
<td>Custom user callback function to process incoming IQFeed data messages (see §10).</td>
</tr>
</tbody>
</table>

\(^\text{144}\) http://iqfeed.net/dev/api/docs/Level1viaTCPIP.cfm
\(^\text{145}\) http://iqfeed.net/dev/api/docs/Level1viaTCPIP.cfm
\(^\text{146}\) http://iqfeed.net/dev/api/docs/AdminviaTCPIP.cfm
9.5 Modifying IQFeed’s registry settings

IQFeed stores its settings as keys in the HKEY_CURRENT_USER\Software\DTN\path of the Windows registry. Most of the important setting keys that a user might want to modify are located within HKEY_CURRENT_USER\Software\DTN\IQFeed\Startup\. These registry keys can be reviewed and modified using Window’s built-in Registry Editor (regedit.exe) utility. As a convenient method to open the Registry Editor at the correct path, use the IQML 'registry' action, which has no settable parameters:  

```matlab
>> IQML('registry')
```

IQFeed’s key names are generally self-explanatory. In most cases you should leave the settings unchanged. Some circumstances where you might want to modify certain keys are discussed in §9.1 and §12.2. Key values can be modified by right-clicking the key name and selecting “Modify…”:

Be EXTREMELY careful when editing the Windows registry: if you make a mistake it could disable not only a specific program, but possibly even Windows itself, rendering the computer useless. Never delete or rename keys, only modify their value. If you are unsure which registry key to modify and how, ask DTN’s technical support.

---

147 Note: running Windows Registry Editor requires local computer Administrator priviledges (or elevation). In Mac/Linux, IQML('registry') will naturally work only when Matlab runs under Parallels/Wine, not in native mode.
10 Attaching user callbacks to IQFeed messages

10.1 Processing IQFeed messages in IQML

IQFeed uses an asynchronous event-based mechanism for sending information to clients. This means that we do not simply send a request to IQFeed and wait for the answer. Instead, we send a request, and when IQFeed is ready it will send us one or more (or zero) messages in response. Each of these messages evoke an event that carry data (the message content and the originating IQFeed channel/port-name). By analyzing the event data we (hopefully) receive the answer that we were waiting for.

Matlab has built-in support for asynchronous events, called `callbacks` in Matlab jargon. Whereas Matlab callbacks are normally used in conjunction with Graphical User Interfaces (GUI), they are also used with IQML, which automatically converts all the IQFeed events into a Matlab callback invocation.

The callback that processes incoming IQFeed messages is constantly being “fired” (i.e., invoked) by asynchronous messages from IQFeed, ranging from client stats and time messages (once per second, for each of IQFeed’s 3 channels/ports), to system messages (e.g. connection losses and reconnections), to error messages and responses to market queries. Some of the events are triggered by user actions (market or portfolio queries, for example), while others are triggered by IQFeed (e.g., client stats once a second).

In addition to the regular IQML callback that processes all incoming IQFeed message events, you can assign your own custom Matlab function that will be triggered whenever a certain IQFeed message arrives. In all cases, the parameter controlling this callback in IQML is called `ProcessFunc`.

There are two types of callbacks that you can use in IQML:

- **Generic callback** – this is a catch-all callback function that is triggered upon any IQFeed message event. Within this callback, you would need to write some code to distinguish between the different event types in order to process the events’ data. A skeleton for this is given below.

- **Specific callback** – this is a callback function that is only triggered when the specific event type is received from IQFeed. Since the event type is known, you can process its event data more easily than in the generic callback case. You can specify a different specific callback for each of the event types that you wish to process, as well as a default callback that will be used for any other event that was not assigned a specific callback.

When you specify any callback function to IQML, the command/action does not need to be related to the callback. For example:

```
data = IQML('time', 'ProcessFunc', @IQML_Callback);
```

where `IQML_Callback()` is a Matlab function created by you that accepts two input arguments, which are automatically populated in run-time:

---

• `iqObject` – this is currently an empty array. Future versions of IQML may place an actual object in this argument.

• `eventData` – a Matlab struct that contains the event’s data in separate fields. This struct includes the following fields:
  o `Timestamp` – local time in Matlab numeric datenum format.
  o `MessagePort` – the name of the IQFeed port that sent the message: 'Level1', 'Level2', 'Lookup' or 'Admin'.
  o `MessageType` – the event type, which corresponds to the custom fields that can be set in the `ProcessFunc` parameter for specific callbacks.
  o `MessageHeader` – the first part of the message text string, that identified the message type. This is typically used to set the `MessageType` field.
  o `MessageString` – the message text string as received from IQFeed.
  o `MessageParts` – processed parts of `MessageString`, as a cell-array.

An example of defining a Matlab callback function is:
```matlab
function IQML_Callback(iqObject, eventData)
  % do callback processing here using the info in eventData
end
```

You can pass external data to your callback functions using the callback cell-array format. For example, to pass two extra data values:
```matlab
callbackDefinition = {{@IQML_Callback, 123, 'abc'}; 
IQML('time', 'ProcessFunc',callbackDefinition);
function IQML_Callback(iqObject,eventData,extra1,extra2)
  % do callback processing here using the info in eventData, extra1, extra2
end
```

Here are examples of the `eventData` for two different IQFeed messages – a timestamp message (sent from IQFeed once every second on the Level1 and Level2 ports), and a connection stats message (sent from IQFeed once a second on the Admin port). IQFeed messages always begin with a single character indicating the message type:

```
Timestamp: 737128.675475417
MessagePort: 'Level1'
MessageType: 'Time'
MessageHeader: 'T'
MessageString: 'T,20180309 09:12:39'
MessageParts: {'T' '20180309 09:12:39'}
```

```
Timestamp: 737128.675479248
MessagePort: 'Admin'
MessageType: 'System'
MessageHeader: 'S'
MessageString: 'S,STATS,66.112.148.225,60002,1300,0,4,0,0,0,Mar 09
3:10PM,Mar 09 09:12AM,Connected,5.2.7.0,464720-
1,86.43,0.04,0.02,759.37,0.20,0.20'
MessageParts: {1×20 cell}
```

All IQFeed messages typically begin with a single character indicating the message type: ‘T’, which we call the `MessageHeader`, and which identify the `MessageType`. For example, `MessageHeader` of 'T' identifies a Time message, and 'S' identifies a System message. An exception to this rule may happen if you send custom commands to IQFeed using the mechanism in §7.4. In such case, it is possible that `MessageHeader` will not be a recognized or even a single character. It will have a `MessageType` of 'Other'.

149 http://www.mathworks.com/help/matlab/creating_guis/writing-code-for-callbacks.html#brqow8p

150 An exception to this rule may happen if you send custom commands to IQFeed using the mechanism in §7.4. In such case, it is possible that `MessageHeader` will not be a recognized or even a single character. It will have a `MessageType` of 'Other'.
All the callbacks examples so far have set a generic callback that is used for all incoming IQFeed messages. As noted above, you can also set specific callbacks for specific messages. For example:

```matlab
% Alternative #1: using the struct() function:
>> callbacks = struct('Time','disp TIME!','System',@(h,e)disp(e.MessageString));

% Alternative #2: using direct field assignments:
>> callbacks.Time = 'disp TIME!';
>> callbacks.System = @(h,e)disp(e.MessageString);

>> IQML('time','processFunc',callbacks);
```

In this example, we have set two separate custom callbacks for two different IQFeed messages: the periodic timestamp messages and the periodic system update messages.

In addition to specific callbacks for specific message types, you can also set a “Default” callback that will be invoked for each incoming IQFeed message that does not have a specific callback assigned to it.

The following message types can be trapped, corresponding to the eventData’s MessageType field (e.MessageType):

<table>
<thead>
<tr>
<th>MessageType</th>
<th>Message Header</th>
<th>Description</th>
<th>See section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental</td>
<td>F</td>
<td>Fundamental asset data</td>
<td>§4.2</td>
</tr>
<tr>
<td>Quote_summary</td>
<td>P</td>
<td>Quote summary message</td>
<td>§4.1</td>
</tr>
<tr>
<td>Quote_update</td>
<td>Q</td>
<td>Quote update (tick) message</td>
<td>§6.1</td>
</tr>
<tr>
<td>Market_depth</td>
<td>Z</td>
<td>Level2 market-depth update message</td>
<td>§4.4, §6.4</td>
</tr>
<tr>
<td>Market_maker</td>
<td>M</td>
<td>Market maker information</td>
<td>§4.4, §6.4</td>
</tr>
<tr>
<td>History</td>
<td>H</td>
<td>Historical data (one msg per bar/tick)</td>
<td>§5</td>
</tr>
<tr>
<td>Regional</td>
<td>R</td>
<td>Regional update message</td>
<td>§6.2</td>
</tr>
<tr>
<td>News</td>
<td>N</td>
<td>News data (one message per item)</td>
<td>§7</td>
</tr>
<tr>
<td>End_of_data</td>
<td>!ENDMSG!</td>
<td>Indicates end of the data with multiple data items (e.g., history or news)</td>
<td>§5, §7</td>
</tr>
<tr>
<td>Lookup</td>
<td>s</td>
<td>Lookup information message</td>
<td>§8.1</td>
</tr>
<tr>
<td>Chain</td>
<td>:</td>
<td>Options/Futures chain</td>
<td>§8.2</td>
</tr>
<tr>
<td>Time</td>
<td>T</td>
<td>Timestamp message (once a second)</td>
<td>§9.2</td>
</tr>
<tr>
<td>System</td>
<td>S</td>
<td>System message (stats, once a sec)</td>
<td>§9.3</td>
</tr>
<tr>
<td>Symbol_not_found_error</td>
<td>n</td>
<td>Indicates a symbol-not-found error</td>
<td>§3.4</td>
</tr>
<tr>
<td>General_error</td>
<td>E</td>
<td>All other IQFeed-generated errors</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>All other IQFeed messages</td>
<td></td>
</tr>
<tr>
<td>Default</td>
<td></td>
<td>Any IQFeed message that does not have a specific callback assigned to it</td>
<td></td>
</tr>
</tbody>
</table>
You can set individual callbacks to any of these MessageType values, by using the MessageType value as a field-name in the ProcessFunc parameter. For example, to process quote-update (tick) messages in a dedicated callback function:

>> callbacks.Quote_update = @IQML_Quote_Update_Callback;
>> IQML('time','ProcessFunc',callbacks);

Here is a more elaborate example, were we set different callbacks for different message types, along with a default callback for all other message types:

% Alternative #1: using the struct() function:
>> callbacks = struct('Time','disp TIME!','...'
                       'System',[],... % ignore System messages
                       'Quote_update',@IQML_Quote_Update_Callback,'...'
                       'Default',@IQML_Default_Callback);

% Alternative #2: using direct field assignments:
>> callbacks.Time = 'disp TIME!';
>> callbacks.System = [];
>> callbacks.Quote_update = @IQML_Quote_Update_Callback;
>> callbacks.Default = @IQML_Default_Callback;

When you specify any callback function to IQML, you only need to set it once, in any IQML command. Unlike most IQML parameters, which are not remembered across IQML commands and need to be re-specified, callbacks do not need to be re-specified. They are remembered from the moment they are first set, until such time as Matlab exits or the callback parameter is changed.

Note that it is not an error to re-specify the callbacks in each IQML command, it is simply useless and makes the code less readable.

If an error occurs during the evaluation of your specified callback function, an error message will be displayed in the Matlab console. In blocking mode (data=IQML(...)) a Matlab exception will then be thrown, which can be trapped in the calling code using a try-catch block (see §3.4 item 1); in non-blocking mode no exception will be thrown:

```
>> IQML('quotes','symbol','IBM','processFunc',struct('Quote_Summary',@myFunc))
% Matlab exception thrown, error message displayed
```

To reset all callbacks (i.e., remove any callback invocation), simply set the ProcessFunc parameter value to [] (empty square brackets):

```
IQML('time', 'ProcessFunc', []);
```

You can also set individual message callbacks to an empty value, in order to ignore just these specific messages but not the other messages:

```
>> callbacks.Time = 'disp TIME!';
>> callbacks.System = [];
>> callbacks.Default = @IQML_Default_Callback;
>> IQML('time', 'ProcessFunc', callbacks);
```

Matlab callbacks are invoked even if you issue a custom IQFeed command (see §9.4). This can be very useful: you can send a request to IQFeed, and then process the results in a Matlab callback function. However, note that in such a case, it is possible that the returned message will contain a MessageHeader that will not be a recognized. Such messages will be assigned a MessageType of 'Other'.

```
10.2 Run-time performance implications

It is very important to ensure that any callback function that you assign in IQML completes in the fastest possible time. This is important for programming in general, but it is especially important for IQML callbacks, which are invoked (executed) every time that a new message arrives from IQFeed, numerous times each second.

As explained in §3.6, IQML’s standard callback processing has an overhead of 1-2 milliseconds per IQFeed message. This means that without any user-specified callbacks, and without any other Matlab or other code running, IQML can process up to 500-1000 IQFeed messages per second.

When you add your own user-defined callbacks, their processing time is added to IQML’s. For example, if your callback takes an average of just 3 msecs to process (which is quite fast), then the total average message processing time will be 4-5 msecs, lowering IQML’s effective maximal processing rate from 500-1000 to just 200-250 messages/second. The more callbacks and alerts that you define, and the longer each of them takes to process, the lower will IQML’s message processing rate be.

The following specific tips may assist you to reduce the callback performance impact:

1. Ensure that you have enough physical memory to avoid memory swapping to disk. This is probably the single most important tip to improve performance
2. Avoid setting user callbacks and alerts, or at least disable them when not needed.
3. Avoid setting a Default callback or a general ProcessFunc, but rather specific callbacks only for the messages that you need (e.g. for News or Regional).
4. Limit the streaming data to just those events and symbols that are of interest to you. For example, if you are only interested in the GOOG symbol, and set a Quote_update callback, this callback will also be processed for streaming quotes for other symbols, so it’s better to stop streaming those other symbols.
5. Minimize disk access: disk I/O is much slower than memory access. Save data to memory and flush it to disk at the end of the trading day, or once in a while (e.g. every 5 minutes), but not in each callback.
6. If you need to access a disk, use SSD (solid-state disk) rather than a spinning hard-disk.
7. If you need to load data from disk, do it once and preserve the data in memory using Matlab persistent or global variables, to be reused in callback calls.
8. Instead of re-computing values that are based on static data in each callback call, compute once and cache results in Matlab persistent or global variables.
9. Use Matlab’s built-in Profiler tool¹⁵¹ to check your callback code for run-time performance hotspots that can be optimized to run faster.
10. Read the textbook “Accelerating MATLAB Performance”,¹⁵² authored by IQML’s creator (see §15.2), for numerous tips on improving Matlab run-time.

¹⁵² https://undocumentedmatlab.com/books/matlab-performance
10.3 Usage example – using callbacks to parse options/futures chains

In this example, we request IQFeed to send the list of symbols in an options/futures chain, then parse the incoming results to retrieve the symbols in the chain (see §8.2).

We first send the relevant command to IQFeed using IQML’s custom command functionality (§9.4), specifying a custom callback function for the 'Chain' MessageType:

% Equity options chain for GOOG:
processFunc.Chain = @IQML_Chain_Callback;
>> IQML('command', 'String', 'CEO,GOOG,p,,1', 'PortName', 'lookup', ...
 'debug',1, 'ProcessFunc',processFunc)
=> 20180405 13:13:00.063 (lookup) CEO,GOOG,p,,1
<= 20180405 13:13:00.574 (lookup) :,GOOG1806P1000,GOOG1806P1002.5,GOOG1806P1005,GOOG1806P1010,GOOG1806P1012.5,GOOG1806P1015,GOOG1806P1017.5,GOOG1806P1020,GOOG1806P1022.5,GOOG1806P1025,GOOG1806P1027.5,GOOG1806P1030,GOOG1806P1032.5,GOOG1806P1035,GOOG1806P1037.5,GOOG1806P1040,GOOG1806P1042.5,GOOG1806P1045,GOOG1806P1047.5,GOOG1806P1050,...,
<= 20180405 13:13:00.578 (lookup) !ENDMSG!

% Future options chain for C:
>> IQML('command', 'String', 'CFO,C,p,,9,1', 'PortName', 'lookup', ...
 'debug',1, 'ProcessFunc',processFunc)
=> 20180405 13:31:48.677 (lookup) CFO,C,p,,9,1
<= 20180405 13:31:49.158 (lookup) !ENDMSG!

The custom callback function may look something like this:

function IQML_Chain_Callback(iqObject, eventData)
symbols = eventData.MessageParts(2:end); %discard the ':' message header
% now do something useful with the reported symbols...
end

153 Note that we have set Debug=1 in this example purely to illustrate the incoming IQFeed message format; it would not be used in a typical run-time program.
10.4 Usage example – using callbacks for realtime quotes GUI updates

In this example, we wish to update a real-time ticker window with the latest streaming quotes data. The idea is to create a minimalistic window and update its title with the symbol name and latest trade price, whenever a new tick arrives.

The code relies on the format of IQFeed’s Quote_update (Q) message, which by default is a 16-element cell array: 
\{Symbol, Most_Recent_Trade, Most_Recent_Trade_Size, Most_Recent_Trade_Time, Most_Recent_Trade_Market_Center, Total_Volume, Bid, Bid_Size, Ask, Ask_Size, Open, High, Low, Close, Message_Contents, Most_Recent_Trade_Conditions\};

```matlab
>> processFunc = struct('Quote_Update', @Quote_Update_Callback);
>> IQML('quotes', 'symbol', '@VX#', 'numofevents', 100,...
       'ProcessFunc', processFunc, 'debug', 1)
```

In our case, we are only interested in the 1st (Symbol) and 2nd (Most_Recent_Trade) elements of the ‘Q’ update messages:

```matlab
eventData =
    Timestamp: 737161.502602859
    MessagePort: 'Level1'
    MessageType: 'Quote_Buffer'
    MessageHeader: 'Q'
    MessageParts: { '@VX#' 20.61  '04:52:29.711000' 32  5668  20.60  50  20.65  86  20.20  20.70  20.15  20.18  'a'  '4D'}
```

The corresponding callback function will be:

```matlab
function Quote_Update_Callback(iqObject, eventData)
    % Symbol is 1st data element of IQFeed 'Q' messages
    symbol = eventData.MessageParts{1};
    % Last trade price is 2nd data element of the IQFeed 'Q' messages
    latestTrade = eventData.MessageParts{2};
    % Get the handle for this symbol's ticker window
    hFig = findall(0, 'Tag', symbol, '-depth', 1);
    if isempty(hFig)
        % Ticker window not found, so create it
        hFig = figure('Tag', symbol, 'Position', [300, 300, 250, 1], ...
                      'Resize', 'off', 'NumberTitle', 'off', ...
                      'Menu', 'none', 'ToolBar', 'none');
    end
    % Update the ticker window's title
    hFig.Name = sprintf('%s: %.2f', symbol, latestTrade);
end
```

And the resulting ticker window will look like this:

![@VX#: 20.61 — □ ×]

As noted in §6.1, tick events may be sent at a very high rate from the IQFeed server. So instead of updating the GUI with each tick, you may want to use a periodic Matlab timer having a Period of 0.5 [secs], that will invoke a timer callback, which will call `IQML(...,'NumOfEvents',-1)` to fetch the latest data and update the GUI.
10.5 Usage example – using callbacks for realtime order-book GUI updates

In this example, we wish to update a real-time GUI display of the order-book (at least the top few rows of the book).

Note: Market Depth (Level 2) data is only available in the Professional IQML license.

As noted in §6.4, market-depth events may be sent at a very high rate from the IQFeed server, and so it is not feasible or useful to update the Matlab GUI for each update. Instead, we update the GUI with the latest data at a steady rate of 2 Hz (twice a second). This can be achieved in two different ways: one alternative is to set-up a periodic timer that will run our GUI-update callback every 0.5 secs, which will call IQML(…,'NumOfEvents',-1) to fetch the latest data and update the GUI.

Another alternative, shown here below (also downloadable\(^{154}\), is to attach a user callback function to Level 2 market-depth messages, updating an internal data struct, but only updating the GUI if 0.5 secs or more have passed since the last GUI update:

```matlab
% IQML_MktDepth - sample Market-Depth usage function
function IQML_MktDepth(symbol)
    % Initialize data
    numRows = 10;
    depthData = cell(numRows,8);
    lastUpdateTime = -1;
    GUI_refresh_period = 0.5 * 1/24/60/60; % =0.5 secs
    % Prepare the GUI
    hFig = figure('Name','IQML market-depth example', ...
    'NumberTitle','off','CloseReq',@figClosedCallback, ...
    'MenuBar','none','ToolBar','none', ...
    'Resize','off','Pos',[100,200,660,260]);
    color = get(hFig,'Color');
    headers = {'Ask valid','Ask time','Ask size','Ask price', ...
    'Bid price','Bid size','Bid time','Bid valid'};
    formats = {'logical','char','numeric','long', ...
    'long','numeric','char','logical'};
    hTable = uitable('Parent',hFig,'Pos',[10,40,635,203], ...
    'Data',depthData,'ColumnName',headers, ...'
    'ColumnFormat',formats, ...'
    'ColumnWidth',{60,100,80,80,80,80,100,60});
    hButton = uicontrol('Parent',hFig,'Pos',[50,10,60,20], ...
    'String','Start','Callback',@buttonCallback);
    hLabel1 = uicontrol('Parent',hFig,'Pos',[120,10,100,17], ...
    'Style','text','String','Last updated:', ...'
    'HorizontalAlignment','right', 'BackgroundColor',color);
    hLabelTime = uicontrol('Parent',hFig,'Pos',[225,10,100,17], ...
    'Style','text','String','(not yet)', ...'
    'HorizontalAlignment','left', 'BackgroundColor',color);
    % Send the market-depth request to IQFeed using IQML
    contractParams = {'symbol',symbol}; % symbol='@ES'
    callbacks = struct('Market_depth',@mktDepthCallbackFcn);
    IQML('marketdepth',contractParams{1}, 'processFunc',callbacks);
```

\(^{154}\) http://IQML.net/files/IQML_MktDepth.m or https://UndocumentedMatlab.com/IQML/files/IQML_MktDepth.m
% Figure close callback function - stop market-depth streaming
function figClosedCallback(hFig, ~)
% Delete figure window and stop any pending data streaming
delete(hFig);
IQML('marketdepth', contractParams{:}, 'numofevents',0);
end % figClosedCallback

% Start/stop button callback function
function buttonCallback(hButton, ~)
currentString = get(hButton, 'String');
if strcmp(currentString, 'Start')
    set(hButton, 'String', 'Stop');
else
    set(hButton, 'String', 'Start');
end
end % buttonCallback

% Callback functions to handle IQFeed Market Depth update events
function mktDepthCallbackFcn(~, eventData)
% Ensure that it's the correct MktDepth event
allMsgParts = strsplit(eventData.MessageString, ', ', ');
allMsgParts(strcmpi(allMsgParts, 'T')) = {true};
allMsgParts(strcmpi(allMsgParts, 'F')) = {false};
if strcmp(eventData.MessagePort, 'Level2') && ...
    strcmp(allMsgParts{2}, symbol)
% These are the field names of the IQFeed messages
inputParams = {'Intro', 'Symbol', 'MMID', '...
    'Bid', 'Ask', 'BidSize', 'AskSize', '...
    'BidTime', 'Date', 'ConditionCode', '...
    'AskTime', 'BidInfoValid', '...
    'AskInfoValid', 'EndOfMsgGroup'};

% Get the updated data row
% Note: Java indices start at 0, Matlab starts at 1
mmid = allMsgParts{strcmpi(inputParams, 'MMID')};
row = sscanf(mmid, '%*c%*c%d');

% Get the size & price data fields from the event's data
bidValid = allMsgParts{strcmpi(inputParams, 'BidInfoValid')};
askValid = allMsgParts{strcmpi(inputParams, 'AskInfoValid')};
bidTime = allMsgParts{strcmpi(inputParams, 'BidTime')};
askTime = allMsgParts{strcmpi(inputParams, 'AskTime')};
bidSize = allMsgParts{strcmpi(inputParams, 'BidSize')};
askSize = allMsgParts{strcmpi(inputParams, 'AskSize')};
bidPrice = allMsgParts{strcmpi(inputParams, 'Bid')};
askPrice = allMsgParts{strcmpi(inputParams, 'Ask')};
thisRowsData = {askValid, askTime, askSize, askPrice,...
    bidPrice, bidSize, bidTime, bidValid};
depthData(row,:) = thisRowsData;

% Update the GUI if more than 0.5 secs have passed and
% the <Stop> button was not pressed
if ~isvalid(hButton), return, end
isStopped = strcmp(get(hButton, 'String'), 'Start');
if now - lastUpdateTime > GUI_refresh_period && ~isStopped
% IQML_MktDepth
    set(hTable, 'Data', depthData);
    set(hLabelTime, 'String', datestr(now, 'HH:MM:SS'));
    lastUpdateTime = now;
end
end % mktDepthCallbackFcn
end % IQML_MktDepth
### IQML market-depth example

<table>
<thead>
<tr>
<th>Ask valid</th>
<th>Ask time</th>
<th>Ask size</th>
<th>Ask price</th>
<th>Bid price</th>
<th>Bid size</th>
<th>Bid time</th>
<th>Bid valid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2704.75</td>
<td>2704.5</td>
<td>193</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2705.25</td>
<td>2704.25</td>
<td>271</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2704.25</td>
<td>2704.5</td>
<td>496</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2705.75</td>
<td>2703.75</td>
<td>399</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2704.5</td>
<td>2703.5</td>
<td>390</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2706.25</td>
<td>2703.25</td>
<td>424</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2707.25</td>
<td>2703.5</td>
<td>430</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2706.25</td>
<td>2702.75</td>
<td>331</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2707.25</td>
<td>2702.5</td>
<td>350</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2707.25</td>
<td>2702.25</td>
<td>349</td>
<td>09:58:49:192176</td>
<td></td>
</tr>
</tbody>
</table>

Last updated: 16:55:53
11 Alerts

11.1 General Usage

In cases where certain events in streaming data are of interest to the user, IQML can generate alerts of these events as they arrive from IQFeed. The user can define the event data type, the trigger condition, and the type of alert to generate when the condition is met. For example, users may configure an alert on quotes, such that when a symbol’s bid price is higher than some threshold, an email will be sent.

Each alert contains 3 components:
- Data type – quote, intervalbar, regional or news
- Trigger – a condition (typically a comparison between a field and a value)
- Action – what IQML should do when the trigger condition is met

Alerts are created using the 'alert' action. Each new alert is assigned a unique numeric ID. Using this ID, users can query, delete or edit the alert after it was created.

The following parameters affect the alerts. Detailed explanations and usage examples are listed in the following sections.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol or Symbols</td>
<td>colon or comma- delimited string or cell-array of strings</td>
<td>(none)</td>
<td>Limits the alert to the specified symbols and meta-tags only. Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM:AAPL:GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'IBM,AAPL,GOOG'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• {'IBM', 'AAPL', 'GOOG'}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Optional parameter for news alerts; mandatory for quote/intervalbar alerts</td>
</tr>
<tr>
<td>Trigger</td>
<td>string describing the alert trigger</td>
<td>(none)</td>
<td>A string composed of the data type, triggering parameter, trigger operator and triggering value, separated by spaces. Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'quote bid &gt;= 102.60'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'intervalbar close &lt; 80'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'news text contains IPO'</td>
</tr>
<tr>
<td>AlertAction</td>
<td>string, function handle, or callback cell array</td>
<td>(none)</td>
<td>Type of alert to generate. Options:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'display'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'popup'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 'email' (requires specifying the EmailRecipients parameter)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• @myCallbackFcn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• {@myFcn, data1, data2, …}</td>
</tr>
</tbody>
</table>

155 In IQML, the Symbol and Symbols parameters are synonymous – you can use either of them, in any capitalization
156 Note the performance implications that are discussed in §3.6 and §10.2
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NumOfEvents</td>
<td>integer</td>
<td>1</td>
<td>Maximal # of times to be alerted of the defined event. <strong>NumOfEvents</strong> = -1 returns a list of all existing alerts.</td>
</tr>
<tr>
<td>StartStream</td>
<td>logical (true/false)</td>
<td>false</td>
<td>If false (default), data streaming needs to be started by the user in a separate command. If true and relevant data streaming is not currently active, <strong>IQML</strong> starts the data streaming automatically (see §11.2).</td>
</tr>
<tr>
<td>AlertID</td>
<td>integer (scalar or array)</td>
<td>[]      (empty array)</td>
<td>Unique ID generated and returned by <strong>IQML</strong> when new alert is defined. <strong>AlertID</strong> is relevant (and mandatory) only for querying, editing or deletion of existing alerts. See §11.3 and §11.4.</td>
</tr>
<tr>
<td>GetStory</td>
<td>logical (true/false)</td>
<td>true</td>
<td>If true (default), the full story text is fetched and reported with each news alert via email/callback; if false, only headline data will be reported. <strong>GetStory</strong> is relevant only for news alerts with <strong>AlertAction</strong>='email' or callback.</td>
</tr>
</tbody>
</table>
| EmailRecipients  | comma-delimited string or cell-array of strings | '' (empty string) | Email addresses to which email alerts will be sent. This parameter is relevant (and mandatory) only for email alerts. Examples:  
  - 'john@doe.com'  
  - 'john@doe.com, jane@doe.com'  
  - {'john@doe.com', 'jane@doe.com'} |
| SmtpEmail        | string                     | 'iqml.alerts@gmail.com' | SMTP e-mail address from which alert emails will be sent. This parameter is relevant only for specifying a non-default email sender. **SmtpEmail** only needs to be set once, and is used by all future **IQML** alert events. |
| SmtpServer       | string                     | (none)  | SMTP server that will send alert emails. This parameter is relevant only for specifying a non-default email sender. **SmtpServer** only needs to be set once, and is used by all future **IQML** alert events. |
| SmtpPassword     | string                     | (confidential) | Password of the sender’s e-mail account. This parameter is relevant only for specifying a non-default email sender. **SmtpPassword** only needs to be set once, and is used by all future **IQML** alert events. |

Note: Alerts are only available in the Professional **IQML** license.
11.2 Alert Configuration

Alerts can be configured by the user using the 'alert' action, using the properties in the table above. Users can configure the data type, event trigger, maximal number of alert reports, and the type of alert to generate (email, pop-up message, etc.). For email alerts, users can also specify the recipients and the sender email account.

The **Trigger** parameter is the most important input, and is unique to the 'alert' action. It is a string describing the alert trigger event, so it is very important that it be composed properly. The **Trigger** string has 4 elements:

1. Data type ('quote', 'intervalbar', 'news' or 'regional')
2. Trigger field: case-insensitive name of a field in the latestData struct of the source data specified by the Data type (see §6.1, §6.3). For example: 'bid', 'ask', 'total_volume', 'Most_Recent_Trade', 'intervalVolume', 'text', etc.
3. Trigger operator ('>', '>=', '<', '<=', '==', or 'contains').
   - '>' and '<=' are only relevant for non-news alerts (but not for news)
   - '==' and 'contains' are relevant for all alert types (including news)
4. Trigger value: either a scalar number (for a '>', '>=', '<', '<=', or '==' operator) or a string (for a '==' or 'contains' operator).

For example:

```plaintext
alertId = IQML('alert', 'Symbol', 'IBM', 'Trigger', 'quote ask < 145.70', ...);
alertId = IQML('alert', 'Symbol', 'IBM', 'Trigger', 'quote Total_Volume >= 10', ...);
alertId = IQML('alert', 'Symbol', 'IBM', 'Trigger', 'news text contains IPO', ...);
```

By default, alerts are only triggered and reported once. This can be changed by setting the **NumOfEvents** parameter to an integer value. For example, the following alert will be reported up to 5 times, and will then be deleted from the list of alerts:

```plaintext
alertId = IQML('alert', 'Symbol', 'IBM', ..., 'NumOfEvents',5);
```

*IQML* does NOT automatically start streaming data when alerts are defined. This enables users to start and stop streaming data at will, and the alerts will only be evaluated when streaming data messages arrive from IQFeed.

Note: if you use a Data type of 'quote', then depending on the setting of the **Fields** parameter in your latest quotes query (§4.1), the requested alert Trigger field might not exist in the streaming quotes, causing the alert to become ineffective. *IQML* does **not** automatically update **Fields** with the requested Trigger field. When such a case is detected, a warning message will be presented:

```
Warning: Field 'VWAP' is not currently included in your quotes Fields parameter, making the requested alert useless
```

It is sometimes convenient to start streaming immediately when the alert is created. This can be done by setting the **StartStream** parameter (default: false). Setting a value of true starts the streaming for the corresponding data type (e.g., streaming quotes for a symbol) automatically, unless the streaming is already active.

---

157 Additional trigger operators may be added in future *IQML* releases.
Note that with `StartStream=true`, the streaming is started automatically, using the default parameters. If you wish to control the streaming parameters (for example, `NumOfEvents` or `DataType`), leave `StartStream` in its default `false` value, and start the streaming in a separate `IQML` command.

The `AlertAction` defines the action to be performed when a triggering event is detected (i.e., when the trigger condition is met). There are 4 possible `AlertAction` values: 'popup', 'display', 'email', and callback (note the performance discussion in §3.6, §10.2):

1. 'Popup' announces the triggered event in a pop-up a message-box:

   ```
   alertId = IQML('alert', 'Symbol', '@VX#', 'Trigger', 'quote bid > 14.75', ...
   'AlertAction','popup');
   ```

   ![IQML alert](image)

   04:50:11.099000 IQML alert: @VX# bid (14.8) > 14.75

2. 'Display' announces the event in Matlab’s console (Command Window):

   ```
   alertId = IQML('alert', 'Symbol', '@VX#', 'Trigger', 'quote bid > 14.75', ...
   'AlertAction','display');
   ```

   04:50:11.099000 IQML alert: @VX# bid (14.8) > 14.75

   Or, as another example of regional update alert:

   ```
   alertId = IQML('alert', 'Symbol', 'IBM', 'AlertAction','display', ...
   'Trigger', 'regional regionalbid > 140');
   ```

   20180524 16:57:13.689 IQML alert: IBM regionalbid (143.75) > 140

3. 'Email' – an email with the alert event’s details will be sent to the specified `EmailRecipients`, a mandatory parameter for email alerts. `EmailRecipients` must be set as a comma/semi-colon/colon delimited string, or a cell array of email addresses; it cannot be left empty.

   For example, the following alert will send an email to two email recipients:

   ```
   alertId = IQML('alert', 'Symbol', '@VX#', 'Trigger', 'quote bid > 14.75', ...
   'AlertAction','email', ...
   'EmailRecipients',{'john@a.com','jane@b.com'});
   ```

   which results in an email similar to this:

   ```
   From: iqml.alerts@gmail.com
   Subject: IQML alert: @VX# bid (14.8) > 14.75
   Body:
   Symbol: '@VX#'
   Most_Recent_Trade: 14.82
   Most_Recent_Trade_Size: 10
   Most_Recent_Trade_Time: '08:40:02.926510'
   Most_Recent_Trade_Market_Center: 32
   Total_Volume: 6890
   ```
or similarly, in the case of a news alert:

```
From: iqml.alerts@gmail.com
Subject: IQML alert: United Technologies Plans To Hire 35,000 People, Make $15 B... (RTB)
Body:
ID: 22017029634
Symbols: {'UTX'}
Text: '09:31 Wednesday, May 23, 2018. (RTN) - United Technologies Plans To Hire 35,000 People, Make $15 Bln Investment In U.S. Over Next 5 Years For comments and feedback: contact editorial@rttnews.com. Copyright(c) 2018 RTN. All Rights Reserved'
```

For news alerts, the full story text is fetched by default. It is possible to skip fetching the full story by setting `GetStory` to `false`. This speeds up processing by skipping the news-fetch query, and reports only the headline information:

```
From: iqml.alerts@gmail.com
Subject: IQML alert: United Technologies Plans To Hire 35,000 People, Make $15 B... (RTB)
Body:
Source: 'RTB'
ID: 22017029634
Symbols: {'UTX'}
Timestamp: '20180523 093143'
Text: 'United Technologies Plans To Hire 35,000 People, Make $15 B...'  
```

As noted, `EmailRecipients` can be specified in various manners. For example, all the following are equivalent:

- `EmailRecipients', 'john@a.com', 'jane@b.com'
- `EmailRecipients', 'john@a.com; jane@b.com'
- `EmailRecipients', {'john@a.com', 'jane@b.com'}

Alert emails are sent from an IQML email address (`iqml.alerts@gmail.com`) by default. To send the alert emails from another sender (for example, a corporate email account), specify the `SmtpEmail`, `SmtpServer` and `SmtpPassword`. These parameters are saved in your local machine’s Matlab settings, and will be used by all future IQML email alerts (even after you restart the computer), so you only need to set them once. For example:

```matlab
alertId = IQML('alert', 'Symbol', 'GOOG', 'Trigger', 'quote ask < 1090', ...
    'AlertAction', 'email', 'Recipients', 'JohnDoe@gmail.com', ...
    'SmtpServer', 'smtp.gmail.com', ...
    'SmtpEmail', 'senderEmail@gmail.com', ...
    'SmtpPassword', 'mypassword123');
```

On modern smartphones, text (SMS) messages have generally been replaced with email push notifications. Still, for some users text alerts may be useful. Some mobile operators enable users to receive text messages by sending them to a specially-formed email address. For example, to send a text message alert to T-Mobile number 123-456-7890 in the USA, simply email the alert to

---

158 The SMTP port is automatically assumed to be 465. If you use Google’s mail server (smtp.gmail.com), the account must allow access from “less secure apps” ([https://myaccount.google.com/lesssecureapps](https://myaccount.google.com/lesssecureapps)). Note that anti-virus or firewall software may possibly block the outgoing emails (in such cases you may see a “PKIX path building” error).

159 [https://en.wikipedia.org/wiki/SMSS_gateway#Email_clients](https://en.wikipedia.org/wiki/SMSS_gateway#Email_clients)
1234567890@tmomail.net. To receive alerts via such text messages, you just need to determine your mobile carrier’s email gateway for SMS messages, and set EmailRecipients accordingly. Note that carrier charges might apply.

4. Callback: a personalized callback function for an event can be specified using a Matlab function handle. For example:

   alertId = IQML('alert', 'Symbol', 'GOOG', 'Trigger', '...', 'AlertAction', @myFunc);

The callback function (myFunc in this example) should accept two or more inputs, as customary for Matlab callbacks:

   function myFunc(alertObject, eventData)
     ...
     alertObject – a struct with the alert’s configuration (see §11.3)
     eventData – a struct with the triggered event’s local time (in Matlab datenum format) and the trigger data.

For example, for quote data alerts, eventData might look like this:

   >> eventData =
       triggerTime: 737202.663148947
       triggerData: [1×1 struct]
   >> eventData.triggerData
   ans =
     Symbol: 'GOOG'
     Most_Recent_Trade: 1083
     Most_Recent_Trade_Size: 30
     Most_Recent_Trade_Time: '08:54:53.159809'
     Most_Recent_Trade_Market_Center: 11
     Total_Volume: 1957
     ...

To specify additional input parameters to your callback function, set AlertAction to a cell array in which the first cell is the function handle and the rest are additional inputs. For example:

   callback = {@myFunc, data1, data2};
   alertId = IQML('alert', 'Symbol', 'GOOG', 'Trigger', '...', 'AlertAction', callback);

   function myFunc(alertObject, eventData, data1, data2)
     ...
     % data processing done here
   end

11.3 Alerts Query

**IQML** can be queried for the list of all existing alerts, or just a single specific alert. Alerts are returned in this case as Matlab structs containing the alerts’ specifications.

Specific alerts may be queried by specifying their unique **AlertID** (which was returned by the command that created the alert), and setting **NumOfEvents** to -1:

```matlab
>> alertID = IQML('alert', 'Symbol', 'IBM', 'Trigger', 'quote bid > 200',...);
>> alert = IQML('alert', 'AlertID', alertID, 'NumOfEvents', -1)
```

```
alert =
    struct with fields:
        AlertID: 22120136109
              isActive: 1
              DataType: 'quote'
              Trigger: 'bid > 200'
              TriggerType: 'bid'
              TriggerOp: '>'
              TriggerValue: '200'
              Symbol: {'IBM'}
              AlertAction: 'popup'
        EmailRecipients: {}
        EventsProcessed: 0
        EventsToProcess: 1
        LatestValue: []
```

The **AlertID** parameter can be an array of alert IDs, resulting in an array of structs.

To retrieve the list of all the existing alerts, simply set **NumOfEvents** to -1, without specifying the **AlertID** parameter:

```matlab
>> allAlerts = IQML('alert', 'NumOfEvents', -1)
```

```
allAlerts =
    3x1 struct array with fields:
        AlertID
              isActive
              DataType
              Trigger
              TriggerType
              TriggerOp
              TriggerValue
              Symbol
              AlertAction
              EmailRecipients
              EventsProcessed
              EventsToProcess
              LatestValue
```

11.4 Alert Editing or Deletion

An existing alert can be edited or deleted by specifying its **AlertID**:

To delete an alert, set **NumOfEvents** to 0 as follows:

```matlab
IQML('alert', 'AlertID', alertID, 'NumOfEvents', 0);
```

To update/edit an alert, specify **AlertID** with one or more of the alert configuration parameters: **Symbols**, **Trigger**, **AlertAction**, **EmailRecipients**, **NumOfEvents** (>1).

```matlab
IQML('alert','AlertID',alertID,'AlertAction','email','EmailRecipients','john@a.com');
```

As above, the **AlertID** input can be an array of IDs, affecting multiple alerts at once.
12 Messages and logging

12.1 IQML messages

To display detailed information on IQML requests and IQFeed messages, set IQML’s Debug parameter to 1 or true (default=0). IQML will then display in the Matlab console (Command Window) additional information that may help diagnose problems.

For example, setting Debug to 1 (or true) displays the outgoing commands from IQML to IQFeed (“=>”), and incoming messages from IQFeed to IQML (“<=”), along with the message’s local timestamp and port channel.\[161\]

```matlab
>> data = IQML('news', 'DataType', 'headlines', 'MaxItems', 4, 'debug', 1)
=> 20180401 15:14:00.010 (Lookup) NHL,,t,5,,
<= 20180401 15:14:01.082 (Lookup) N,CPR,21998204468,,20180401080059,
Following Is a Test Release
<= 20180401 15:14:01.086 (Lookup) N,RTI,10134529069,,20180401080029,
Quarterly Corporate Earnings (04/01/18)
<= 20180401 15:14:01.092 (Lookup) N,CPR,21998201110,,20180401073059,
Following Is a Test Release
<= 20180401 15:14:01.098 (Lookup) N,CPR,21998197500,,20180401070059,
April 1 Alert: Introducing, Duty Not Free: Pay-as-you-go toilet time
<= 20180401 15:14:01.107 (Lookup) !ENDMSG!
>> data = IQML('quotes', 'symbol', 'FB', 'debug', 1)
=> 20180401 17:20:29.189 (Level1) wFB
<= 20180401 17:20:29.450 (Level1)
,159.7900,Cbacv,8801
=> 20180401 17:20:29.462 (Level1)
,159.7900,Cbacv,8801
```

In order to log such messages in a text file, you can use IQFeed’s built-in logging facility, as described below (§12.2).

In certain cases, IQML reports messages as red error messages on the Matlab console. Such messages can be handled by analyzing IQML’s second (optional) output argument, which is typically an empty string, except when an error is reported:

```matlab
>> [data, errorMsg] = IQML('quotes', 'Symbol', 'IBM', 'Timeout', 0.1)
IQML timeout: either IQFeed has no data for this query, or the Timeout parameter should be set to a value larger than 0.1
data = []
errorMsg = 'IQML timeout: either IQFeed has no data for this query, or the Timeout parameter should be set to a value larger than 0.1'
```

Users can control whether such error messages from IQFeed should raise a Matlab error (exception) in blocking (non-streaming) mode, using the RaiseErrorMsgs parameter (default: true).

```matlab
>> [data, errorMsg] = IQML('quotes', 'Symbol', 'IBM', 'RaiseErrorMsgs', false);
```

\[161\] Periodic IQFeed timestamp and client-stats messages (once every second) are not displayed, even when Debug is 1 or true. For a description of the various port channels used by IQFeed, see §9.1
In addition to IQFeed messages, your program must handle cases of IQML errors. In most cases, these are due to invalid IQML input parameters (an invalid action or parameter name, or an invalid parameter value). Errors might also happen due to network problems, or even an internal bug due to an unhandled edge-case situation.

To trap and handle such programmatic exceptions, wrap your calls to IQML within a try-catch block, as follows:

```matlab
try
    data = IQML('action', 'query', ...);
catch
    % process the exception here
end
```

Try-catch blocks have very small performance or memory overhead and are a very effective way to handle programmatic errors. We recommend that you use them in your program, not just to wrap IQML calls but also for other processing tasks. I/O sections in particular (reading/writing files) are prone to errors, so they are prime candidates for such exception handling. The same applies for code that handles user inputs (we can never really be too sure what invalid junk a user might enter in there, can we?).

Very common causes of errors when using IQML are relying on default parameter values, and specifying numeric parameter values within string quotes (e.g., ‘1’ rather than 1). Users of IQML should take extra precaution in their programs to ensure that these common mistakes do not occur. See discussion in §3.4.

Matlab “out of memory” errors might occur when receiving and storing a huge amount of streaming or historic data. They can be fixed by running IQML on a computer having more memory, or by reducing the amount of stored data.\(^{162}\)

Java memory errors are recognized by the message “java.lang.OutOfMemoryError: Java heap space”. They can be solved by running Matlab with more allocated Java heap memory than the default value of 64MB or 128MB (depending on Matlab release). This value can be increased in Matlab’s preferences, or via a *java.opts* file.\(^{163}\)

---


12.2 IQFeed logging

IQFeed requests, messages and events (e.g. connections/disconnections), are logged in IQFeed’s log. This is a text file called “IQConnect.txt” in the DTN\IQFeed subfolder of “My Documents”, e.g. C:\Users<xyz>\Documents\DTN\IQFeed\IQConnectLog.txt (replace <xyz> with the actual user name in your computer).

Using IQFeed’s Diagnostic Utility, which is installed as part of IQFeed’s client installation, you can control the log file’s folder path (but not its IQConnectLog.txt name, which is fixed), as well as the logged details:

Running IQML('log') without any parameters will return a Matlab struct containing the current log settings (the struct fields are explained below).

```
>> data = IQML('log')
data =
    struct with fields:
        logDetails: [1 0 0 0 0]
        logFile: 'C:\Users\Yair\Documents\DTN\IQFeed\IQConnectLog.txt'
```

In addition to interactively using the Diagnostic Utility to modify the log file path and logging details, you can also control them programmatically, via IQML’s 'log' action:

We can modify the log file’s folder path using the Path parameter, for example:

```
IQML('log', 'path', 'C:\My Programs\Logs\')
```

Note: Path sets the log file’s folder – not its name. As mentioned above, IQFeed’s log file name is fixed (IQConnectLog.txt) and cannot be modified, only its folder can be changed. As a safety measure, IQML will complain if the specified Path does not exist:

```
>> IQML('log', 'path', 'C:\NoSuch\Folder')
Error using IQML
Bad log path specified: "C:\NoSuch\Folder" is not an existing folder
```

---

\(^{164}\) Note: the IQML('log') feature uses IQFeed’s Windows registry. In Mac/Linux, IQML('log') will naturally work only when Matlab runs under Parallels/Wine, not in native mode.
When setting the log Path, the IQML command will return a Matlab struct with the log’s old filename (prior folder name and the fixed name IQConnect.txt). You can use this to restore the original log path after temporarily redirecting logging to a different folder:

```matlab
data = IQML('log', 'path', newPath);
oldPath = fileparts(data.logFile); ... % logging in this section is temporarily redirected to newPath
IQML('log', 'path', oldPath); % restore the original log file’s path
```

Note that changing the log file’s Path does not affect a currently-running IQFeed session, only subsequent sessions (IQFeed’s IQConnect client reads the log Path when it launches). If you need to modify the Path while IQFeed is running, you can temporarily reconnect IQFeed (see §9.1) to ensure that it loads the new Path value.

Be careful when changing log Path. Its default location is set to the user's MyDocs folder because by default, IQConnect.exe launches under the user’s permission group and all users have full access rights to create, modify, and delete files in their user directory. Make sure your user account has appropriate permissions in the directory you choose.

Also keep in mind that there is only one log file for all applications that use IQFeed on the computer. If your program might run alongside other software that uses IQFeed, it is recommended that you do not change the logging location from the default.

We can specify the logging details using the Details parameter, which accepts an array of up to 5 numeric or logical values. These values correspond to Administrative, Level 1, Level 2, Lookup, and Debug. By default, IQFeed logs only Admin requests and messages, which corresponds to Details=[1,0,0,0,0] or simply 1 (extra zeros are assumed, so 1 means the same as [1,0,0] or [1,0,0,0,0]). For example, to also log Level 1 and Lookup messages (but not Level 2 or Debug), set Details to [1,1,0,1]:

```matlab
>> data = IQML('log', 'details',[1 1 0 1])
data =
    struct with fields:
    logDetails: [1 0 0 0 0]
    logFile: 'C:\Users\Yair\Documents\DTN\IQFeed\IQConnectLog.txt'
```

In this example, note how IQML returned the previous Details setting, prior to its change. A subsequent call to IQML('log') will verify that the Details change was indeed made:

```matlab
>> data = IQML('log')
data =
    struct with fields:
    logDetails: [1 1 0 1 0]
    logFile: 'C:\Users\Yair\Documents\DTN\IQFeed\IQConnectLog.txt'
```

Note: IQFeed’s log file can become VERY large VERY fast and potentially reduce system performance if left unattended. It is intended to be used for troubleshooting purposes only and not on a constant basis, and should be used very carefully. This is especially true if you log streaming data, large historic data, and/or Debug data.

Also note that the logging level Details are stored in the computer’s registry and persist across different sessions of Matlab and IQFeed. So after you have set detailed logging and no longer need it, it is good practice to immediately set Details back to [1].

---

165 Admin includes connection/disconnection and other non-data requests and messages
166 Lookup includes history requests/data (§5), news (§7), and symbols/chain lookup (§8)
167 IQFeed’s Debug data provides even more granular logging to aid in troubleshooting issues than the other four log types. This is not related to the Debug parameter that was discussed in §12.4.
Note that unlike **Path** (which does not affect a currently-running IQFeed session), setting the logging **Details** DOES indeed affect the current session; no restart of the IQFeed client is required for the new **Details** setting to take effect.

In addition to setting log **Path** and **Details**, we can also use the 'log' action for several special requests: The **CopyTo** parameter copies the current log file into a specified folder/path. We can also specify the filename, since it is just a copy of the live log file. Note: if the specified target file already exists, it will be overwritten.

```
>> IQML('log', 'copyTo', 'C:\My Programs\Logs\log.txt'); % filename=log.txt
>> IQML('log', 'copyTo', 'C:\My Programs\Logs\'); % filename=IQConnectLog.txt
```

We can use the **DoThis** parameter to reset (empty) the live log file, or to display it in an external editor (the editor displays a log snapshot, it does not automatically refresh):

```
>> IQML('log', 'doThis','reset'); % reset (empty) the live log file
>> IQML('log', 'doThis','display'); % display live log file in external editor
```

Note: Both **CopyTo** and **DoThis** only affect the log file at the time of the request, not continuously. In other words, **CopyTo** copies a snapshot of the live log file as of the time of request; **DoThis** 'reset' (or 'clear' or 'empty') does a one-time reset of the log; and **DoThis** 'display' (or 'show') displays the current log file snapshot (the editor’s refresh of this file is not automatic).

As with other **IQML** actions, we can combine different parameters in a single **IQML** command. For example:

```
IQML('log', 'details',[1 1 0 1], 'path','C:\Programs\Logs\', 'doThis','reset');
```

Here is a summary of the **IQML** parameters that affect IQFeed’s internal logging:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Path</strong></td>
<td>string</td>
<td>(last-used log folder path; initially set to <code>My Documents\DTN\IQFeed</code>)</td>
<td>Path of the folder in which the <strong>IQConnect.txt</strong> log file is to be stored/updated.</td>
</tr>
<tr>
<td><strong>Details</strong></td>
<td>numeric or logical array</td>
<td>(last-used log details setting; initially set to <code>[1,0,0,0,0]</code> meaning only Admin messages are logged)</td>
<td>Array of up to 5 numeric/logical values, corresponding to Admin, Level1, Level2, Lookup, and Debug requests/messages. A value of 1 (or true) indicates that requests/messages belonging to the corresponding group should be logged; a value of 0 (or false) indicates they should not be logged.</td>
</tr>
<tr>
<td><strong>CopyTo</strong></td>
<td>string</td>
<td>'' (empty string)</td>
<td>Path of folder or file in which a snapshot copy of the live log file is to be placed, overwriting existing file if such a file already exists.</td>
</tr>
<tr>
<td><strong>DoThis</strong></td>
<td>string</td>
<td>'' (empty string)</td>
<td>One of the following string values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 'display' or 'show' – display the log file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 'reset' or 'clear' – empty the live log file</td>
<td></td>
</tr>
</tbody>
</table>
13 Frequently-asked questions (FAQ)

1. Can IQML be used with other data-feed providers?

IQML only connects to DTN IQFeed. It can be adapted for other data providers, but some development is obviously required since other providers have different APIs. Email us to see if we can help.

2. Does IQML impose limitations on historical data or streaming quotes?

No – IQML does not impose any limitations. However, IQFeed’s servers do impose limitations on the frequency of the requests and the amount of returned data. These limitations depend on your specific IQFeed subscription. For example, your account might be limited to some maximum number concurrently-streaming (“watched”) symbols. These limitations are imposed by the IQFeed server on your account; IQML supports whatever entitlements your IQFeed account has, it does not limit the information in any manner.

3. Can I see a demo of IQML?

Yes – you are welcome to download a fully-functional trial version of IQML, to try the product at no risk for 30 days.

4. How does IQML compare to alternative products?

We believe that of all the currently available alternatives for connecting Matlab to IQFeed, IQML provides by far the best functionality, value and cost-effectiveness. You are most welcome to test this yourself, using IQML’s free trial. Several traders have reviewed IQML and claim that it is the best Matlab-to-IQFeed connector. 168

5. Does IQML come with an IQFeed or market subscription?

No – IQML connects to an existing IQFeed account. You will need to purchase the IQFeed and market subscriptions separately from DTN.

6. Does IQML send you any information?

No – IQML only communicates with IQFeed. The only communication that is done with IQML’s server is a verification of the license activation (a single hash-code).

7. How can I be sure IQML does not contain bugs that will affect my trades?

The product is rigorously tested, but there is no 100% guarantee. To date, nothing major has been reported. IQML is rock solid - a very stable and robust product.

8. Is IQML being maintained? supported?

Yes, actively. Features and improvements are added on a regular basis, and we support the users personally. You can see the list of ongoing improvements in IQML’s change-log, listed in Appendix B of the IQML User Guide (this document). You can see the very latest updates in the online version of this guide. 169

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168 https://UndocumentedMatlab.com/IQML/reviews
9. I saw a nice new feature in the online User Guide – can I get it?

Once you install IQML, you will be notified in the Matlab console (Command Window) whenever a new version is available. You can always update your installation to the latest version, using a variety of means, as explained in §2.4.

10. What happens when the license term is over?

A short time before your license term is over, you will start to see a notification message in your Matlab console (Command Window) alerting you about this:

*** Your IQML license will expire in 3 days (10-Mar-2018).
*** To extend your license please email info@IQML.net

This message will only appear during the initial connection to IQFeed, so it will not affect your regular trading session. When the license term is over, IQML will stop working. You can always renew or extend your license using the payment links on http://IQML.net or https://UndocumentedMatlab.com/IQML. If you wish to be independent of such annual renewals, you can select a discounted multi-year license.

11. Can I transfer my IQML license to another computer?

Yes, simply email us and we will make the activation switch for you. At any one time, each IQML license will only be activated on a single computer, unless you purchase a site license. You can make up to 3 license activations per year at no extra cost; additional switches will incur a handling fee.

12. I have a laptop and desktop – can I use IQML on both?

Yes, but you will need to purchase two separate IQML licenses. IQML’s license is tied to a specific computer, unless you purchase a site license.

13. Can IQML be compiled and deployed?

Yes, IQML can be compiled using the Matlab Compiler. Each computer running a compiled IQML requires an IQML license (just like a non-compiled IQML that runs in Matlab), unless you get a group license (Site, Deployment, or Development). In other words, for your deployed computers you have a choice of either buying individual licenses (separately for each deployed computer), or a group license which does not require dedicated license activations. If you wish to deploy IQML on a large scale for multiple end-user computers, contact us to discuss alternatives.

14. Is IQML provided in source-code format?

IQML is provided in encrypted binary form, like any other commercial software. A source-code license is available for purchase, subject to signing a separate non-disclosure (NDA) agreement. The source-code version has no license fees and is not tied to any specific computer – you can install it on as many computers as you wish within your organization. Contact us for details. Also see related question #15 below.
15. Do you provide an escrow for IQML’s source-code? Is the source code for sale?
Yes. There are two optional levels of escrow service that you can select:
  1. At safe-keeping with a Wall-Street lawyer
  2. Using NCC Group’s\textsuperscript{170} independent escrow service

Escrow services incur a non-negligible annual usage fee, but you may decide that it may be worth the optional extra cost to ensure business continuity. Alternatively, a source-code license is available for purchase, subject to a separate non-disclosure (NDA) agreement. See related question #14 above. Alternatively, purchasing a multi-year license will ensure independence of renewals, and a site license will avoid external activation checks during the license duration. Contact us for details about any of these optional alternatives.

16. Is feature ABC available in IQML?
IQML supports the entire IQFeed API. This means that all the functionality that IQFeed exposes in its API, is available in IQML using an easy-to-use Matlab wrapper function. In addition to parametric queries, users can send IQFeed custom API commands (see §9.4) and then process the raw incoming IQFeed response (see §10). To check whether a specific feature is available in the IQFeed API (and by extension, in IQML), please refer to IQML’s User Guide (this document), IQFeed’s online reference, or contact IQFeed customer service.

17. Can you add feature ABC in IQML for me?
We will be happy to do so, for a reasonable development fee that will be agreed with you in advance. After the development, this feature will be available to all others who purchase (or update) the latest version of IQML, at no extra cost. Contact us by email if you have such a request, to get a proposed quote.

18. Can you develop a trading strategy for me?
We will be happy to do so, for a reasonable development fee that will be agreed with you in advance. Unlike development of IQML features, strategy development will never be disclosed to others, and will not be integrated in IQML. It will be developed privately for you, and will be kept secret. See §15 for additional details. If you have such a request, contact us by email to get a proposed quote.

19. Does IQML include back-testing/charting/data analysis/algo-trading?
No. IQML is only used for communication with the IQFeed server (retrieving data from IQFeed servers) – it does not include any data analysis, charting or back-testing functionalities. Matlab is great at data analysis and visualization, so you can easily develop your own analysis programs in Matlab, using the data from IQML. We have extensive experience in developing complete backtesting and real-time trading applications - see §15 for additional details. We will be happy to either develop a new application based on your specifications, or to integrate IQML into your existing application, under a separate consulting contract.

\textsuperscript{170} http://nccgroup.com/en/our-services/software-escrow-and-verification/software-escrow
## 14 Troubleshooting

<table>
<thead>
<tr>
<th>Error</th>
<th>Description / solution</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>NullPointerException com.mathworks.jmi.bean MatlabBeanInterface.--addCallback</td>
<td>IQML cannot work properly unless its Java file (IQML.jar) is added to Matlab’s static Java classpath. Contact us to solve the problem.</td>
<td>§2.1</td>
</tr>
<tr>
<td>IQFeed is not properly installed</td>
<td>IQFeed is not installed properly on the local computer so IQML cannot connect to it.</td>
<td>§2.1</td>
</tr>
<tr>
<td>IQFeed cannot be connected or started or: Cannot connect to IQFeed</td>
<td>IQML cannot connect to an active (running) IQFeed client process, nor start one. Try to start IQFeed’s client manually and then retry.</td>
<td>§2.1</td>
</tr>
<tr>
<td>IQML is not activated on this computer</td>
<td>Some component of your activated computer fingerprint has changed. Revert this change, or contact us to modify the activated fingerprint.</td>
<td>§2.2</td>
</tr>
<tr>
<td>Your IQML license will expire in 4 days (1-Mar-2018)</td>
<td>This is an alert on upcoming license expiration. It is not an error, and does not affect IQML’s operation. Contact us to extend your license.</td>
<td>§2.2</td>
</tr>
<tr>
<td>Your IQML license has expired on 1-Jun-2018</td>
<td>IQML’s license is limited in duration. When the license term expires, contact us to renew it.</td>
<td>§2.2</td>
</tr>
<tr>
<td>Cannot connect to IQML.net to validate your IQML license</td>
<td>IQML validates its license on the IQML server. Your internet connection may be down, or the domain (iqml.net, undocumentedmatlab.com) may be blocked by firewall (ask your IT to unblock it).</td>
<td>§2.2</td>
</tr>
<tr>
<td>Action 'xyz' is not [yet] supported</td>
<td>The specified action is not [yet] a valid IQML action, although it is planned for a future version.</td>
<td>§2.4</td>
</tr>
<tr>
<td>Unrecognized IQML action 'xyz'</td>
<td>The specified action is invalid in IQML. Refer to the User Guide for a list of acceptable actions.</td>
<td>§3.1</td>
</tr>
<tr>
<td>Missing parameter value: all parameters must have a value</td>
<td>No value was provided for the specified parameter. IQML parameters must be specified as name-value pairs that have both name and value.</td>
<td>§3.1</td>
</tr>
<tr>
<td>Value for parameter 'abc' should be a &lt;xyz&gt; data type</td>
<td>The specified parameter value provided in your IQML command has an incorrect data type. Refer to the User Guide for a list of acceptable values.</td>
<td>§3.1</td>
</tr>
<tr>
<td>Value for parameter 'abc' should be a scalar number</td>
<td>The specified parameter value must be a single scalar value, not a numeric array. Refer to the User Guide for a list of acceptable values.</td>
<td>§3.1</td>
</tr>
<tr>
<td>Warning: 'abc' is not a valid parameter for the 'xyz' action in IQML</td>
<td>The specified parameter name is not valid for the specified IQML action and is ignored. Refer to the User Guide for a list of acceptable parameters.</td>
<td>§3.1</td>
</tr>
<tr>
<td>The 'news' action is not available in your Standard license of IQML</td>
<td>The specified action is only available in the IQML Professional license and free trial. Contact us to upgrade your license to access this feature.</td>
<td>§3.4</td>
</tr>
<tr>
<td>Symbol 'XYZ' was not found</td>
<td>Either you have no permission to access this Symbol, or this symbol is unknown by IQFeed.</td>
<td>§3.4</td>
</tr>
<tr>
<td>Error</td>
<td>Description / solution</td>
<td>Section</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>(Missing digits in Matlab Command Window)</td>
<td>Matlab’s display format is possibly set to “short” instead of “long”.</td>
<td>§3.4</td>
</tr>
<tr>
<td>Undefined function 'struct2cell' for input arguments of type 'double'</td>
<td>An empty result was returned, and this cannot be converted into a Matlab cell-array.</td>
<td>§3.5</td>
</tr>
<tr>
<td>Error using struct2table (line 26) - S must be a scalar structure, or a structure array ...</td>
<td>An empty result was returned, and this cannot be converted into a Matlab table object.</td>
<td>§3.5</td>
</tr>
<tr>
<td>The Symbol parameter must be specified for an XYZ query when NumOfEvents&gt;0</td>
<td>Queries that have NumOfEvents&gt;0 must be specified with a non-empty Symbol/Symbols.</td>
<td>§4, §6</td>
</tr>
<tr>
<td>Warning: IQML timeout: only partial data is returned. Perhaps the Timeout parameter should be set to a value larger than 5</td>
<td>The query took longer than expected to return all the data; only partial results have arrived from IQFeed before the IQML timed-out. To get all results, set the Timeout parameter to a larger value or the NumOfEvents parameter to a smaller value.</td>
<td>§4.1, §4.3, §5.1, §7.2, §8.1</td>
</tr>
<tr>
<td>IQML timeout: either IQFeed has no data for this query, or the Timeout parameter should be set to a value larger than 5</td>
<td>The query took longer than expected to return any data from IQFeed before IQML timed-out. Try to set the Timeout parameter to a larger value.</td>
<td>§12.1</td>
</tr>
<tr>
<td>Date parameter value must be either a string (YYYYMMDD, YYYY-MM-DD or YYYY/MM/DD) or datenum</td>
<td>The date/time format of one or more of the query parameters is incorrect. Refer to the User Guide for a description of the acceptable formats.</td>
<td>§5</td>
</tr>
<tr>
<td>IQML historic data query error: !NO_DATA!</td>
<td>No data is available for the specified query. Try to modify the query parameters.</td>
<td>§5</td>
</tr>
<tr>
<td>Symbol &quot;XYZ&quot; is not currently streaming</td>
<td>Start data streaming (by sending a query with NumOfEvents&gt;0) before querying streamed data</td>
<td>§6</td>
</tr>
<tr>
<td>(IQML stops receiving IQFeed streaming data)</td>
<td>Try to actively disconnect and reconnect to IQFeed, or to restart the IQConnect application.</td>
<td>§9.1</td>
</tr>
<tr>
<td>Unable to connect to L2IP server. Error Code: 10065</td>
<td>IQConnect lost the connection to IQFeed’s servers. IQConnect will automatically reconnect as soon as possible, and in most cases you can ignore this message. You can also try to actively reconnect to IQFeed, or to check your internet connection.</td>
<td>§9.1</td>
</tr>
<tr>
<td>Out of memory or: Maximum variable size allowed by the program is exceeded or: Requested array exceeds maximum array size preference</td>
<td>This Matlab error might occur when receiving huge amounts of streaming/historic data. Different Matlab releases display different messages having the same basic idea. Run IQML on a computer with more memory, or reduce the amount of stored/processed data.</td>
<td>§12.1</td>
</tr>
<tr>
<td>java.lang.OutOfMemory Error: Java heap space</td>
<td>Set Matlab to use a larger Java heap memory size than the default value. This can be set in Matlab’s preferences, or via a java.opts file.</td>
<td>§12.1</td>
</tr>
</tbody>
</table>
15 Professional services

In addition to IQML being offered as an off-the-shelf software program, advanced Matlab consulting, training, and program development are being offered. With close to 30 years of professional Matlab programming experience, including extensive finance/trading-related development in the past decade, we offer top-of-class Matlab consulting, with a particular emphasis on the financial sector.

We have many years of experience integrating quality production-grade Matlab programs with online brokers (Interactive Brokers (IB), CQG, CFH FIX), data-feed providers (DTN IQFeed, Bloomberg, Reuters, Trading Physics, End-of-Day Historical Data), websites (Finviz, Nasdaq), databases (SQL Server, Oracle, MySQL, SQLite), as well as Excel and raw-format data files. Programs were developed using multiple Matlab releases, on all platforms that Matlab supports: Windows, MacOS and Linux.

We have completed countless life-cycles of software requirements definition, design, development, documentation, integration, testing, deployment, handover, maintenance and support.

Much of our work derives from the financial sector: We developed custom software for a commodities fund in a Geneva bank; a backtesting and analysis program for a large bank in Chicago; a currencies trading program for a hedge-fund in Malta; data-analysis products for financial services firms in New-York; a portfolio risk/exposure analysis program for an Israeli investment advisor; a charting GUI for a San-Francisco hedge fund; and semi- and fully-automated algo-trading programs for multiple clients around the globe.

Development is typically done remotely; onsite consulting/development is also possible upon request, or a combination of remote work and onsite visits.

You can see a small sample of programs that we have developed below. Additional samples can be seen on our consulting webpage.\footnote{171 \url{http://undocumentedmatlab.com/consulting}}

Anything developed under private consulting will be kept confidential and will not be disclosed to others. You will retain full IP ownership of anything developed for you.

Most of our revenue comes from returning or long-time clients. We will be happy to provide references of satisfied clients in US or Europe. With such an impressive track record, you probably already know some of them.

Contact us by email (info@IQML.net or info@UndocumentedMatlab.com) to discuss your needs or to receive a proposal.
15.1 Sample program screenshots
15.2 About the author

With close to 30 years of professional software programming experience, Yair Altman offers top-notch Matlab consulting and training services.

Yair has worked extensively with Matlab and many other programming languages (Java, C#, C, C++ and others). He has developed many programs with SQL and a variety of databases, operating systems and hardware platforms.

Matlab community developers, and even MathWorks themselves, consider Yair a top Matlab expert, as any simple online search will show. His UndocumentedMatlab.com website is by far the largest and most active independent Matlab site. Yair is also well-known from numerous submissions on the Matlab forums and File Exchange; a MathWorks study determined\(^ {172}\) that Yair is the third most influential submitter in the entire Matlab community. He regularly advises MathWorks, and is a member of both its Community Advisory Board (CAB) and MATLAB Advisory Board (MAB).

Yair has a specific experience in the finance sector, developing quality professional Matlab programs that integrate with trading platforms (IB, CQG, CFH FIX); data-feed providers (DTN IQFeed, Bloomberg, Reuters, Trading Physics); websites (Finviz, Nasdaq); databases (SQL Server, Oracle, MySQL, SQLite), as well as Excel and raw-format data files. These programs were developed on multiple Matlab releases and all Matlab-supported platforms: Windows, MacOS and Linux.

Yair published two extensive and highly-acclaimed Matlab textbooks: MATLAB-Java programming\(^ {173}\) (2011) and Accelerating MATLAB Performance\(^ {174}\) (2014). Both books are considered the top references in their field.

Yair provides professional, cost effective consulting and contract development.\(^ {175}\) He can do stuff that few other Matlab programmers know is even possible, delivering great value: top quality code at reasonable cost.

Yair also offers custom Matlab training courses,\(^ {176}\) in a variety of topics and levels.

By combining a proven track-record of quality software programming, decades of professional experience, and Matlab knowledge that few others possess, Yair provides clients with superior value and cost-effectiveness.


\(^ {173}\) [http://undocumentedmatlab.com/books/matlab-java](http://undocumentedmatlab.com/books/matlab-java)


\(^ {175}\) [http://undocumentedmatlab.com/consulting](http://undocumentedmatlab.com/consulting)

\(^ {176}\) [http://undocumentedmatlab.com/training](http://undocumentedmatlab.com/training)
16 Spread the word!

Support IQML development by spreading the word about this product to colleagues. The more people use IQML, the better it becomes over time with improved reliability, functionality and performance. You will directly benefit from this since you get immediate access to each new product version as it is published, as explained in §2.4.

The following professional traders have posted a public online review of IQML:177

“Simply put, IQML just works. Having struggled with Matlab’s data feed toolbox and many frustrated support calls, I found the IQML product. What a night and day experience! Not only does the product allow you to easily access the entire array of IQfeed’s utility as soon as you download it, the documentation and support have been superior to the premium enterprise-level systems that I have worked with in the past. If you use his IB-Matlab product, IQML is the perfect companion. This is absolutely the gold standard for working with market data.”

– Albert Zhang, professional trader and partner, Auric Investments, USA

“Fantastic product that works flawlessly and has saved me a lot of work, time and money on developing my trading systems! well done Yair!”

– Rodney Ngone, Data Scientist and Quant Trader, UK

“Yair has been doing a fantastic job implementing the IQfeed API for Matlab, a challenging API which needed some thorough testing at the beginning (which I was part of, being one of the first clients). The product has become mature and excellent for algo development for traders who don’t mind to work in details. Many features are making IQML computationally attractive and competitive with regards to other options. Mostly, Yair support is first class and allows to digest the little subtleties of the IQfeed API. With Yair being supportive and flexible in terms of improvements, updating IQML regularly to fix bugs and implement the latest API features, I strongly recommend the use of IQML.”

– Pierre R., trading systems researcher, Australia

“We have been cooperating with Yair for 3 years now and he has always been professional and efficient. Regarding in particular the IQFeed-Matlab interaction, he was able to deeply understand our needs and to quickly consign us perfectly tuned codes, granting us the possibility of exploiting the maximum potential of these two platforms combined.”

– Stefano Peron, Chief Investment Officer, Emergent Quant, Italy

“Before IQML, I spent an inordinate amount of time working on code to consistently retrieve IQFeed data via Matlab, with limited success. IQML works flawlessly, allowing me to focus on strategy development.”

– Jeff Busse, Emory University, USA

“It would surprise you how many systems out there are still legacy-like. They seem to work with a few data-points as advertised, but once you want to scale up the whole thing you hit the wall. And then comes IQML for Matlab: Works out of the box like a charm; uses parallel execution; and with a few wrapper lines of Matlab code I can send the data I need to a database. This enabled me to get my project stockmoneyflows.com up and running in a fraction of the planned time. Yair has been very helpful and responds to requests very fast and what is even more important, he fixes it!”

– Georgios Karas, owner, Stock Money Flows, Netherlands

177 https://UndocumentedMatlab.com/IQML/reviews
“I find IQML intuitive and easy to use. I really love your simple intuitive interface! *** started to build something like this but stopped and left us with nothing (they have a lot more adapters than they have documentation for but these are mostly non-functioning basic connections to the third party softwares). IQML blends perfectly into my MATLAB environment. I am getting 40 quotes per 10 ms using the real time method. The time and careful consideration you spent on IQML’s development show clearly. I will definitely help spread the word about your products!”

– Joe Galbraith, Director, Quantitative Asset Management, USA

“IQML, a robust and seamless interface between Matlab and DTN IQFeed’s realtime financial market data, is the latest automated trading offering from Yair Altman. Yair is a leading authority on Matlab and the author of two books devoted to Matlab’s technical intricacies. His IB-Matlab software, which interfaces Matlab with Interactive Broker’s trading and data platforms, has for many years earned the number one spot among client reviewed third party software on Interactive Broker’s web site.

IQML builds upon the capacities of IB-Matlab by leveraging the more robust data feed of IQ-Feed to meet institutional level trading expectations for financial market data coverage, low latency, and easy reference. Having personally struggled with Matlab’s Datafeed Toolbox and Trading Toolbox to the point I doubted Matlab’s viability as a trading platform, I have been overjoyed to find that IB-Matlab and IQML provide the missing pieces of the puzzle. The interfaces do not require any understanding of the associated API’s and do provide intuitive and easy to understand Matlab commands and references to the Interactive Brokers and IQ-Feed platforms. In addition to rock solid code performance, both products are accompanied by robust documentation and Yair is available to personally tailor their implementation to client needs. Well done, Mr. Altman!”

– David M., proprietary trading firm, USA

“IQML saved us hundreds of hours in “busy work”. It’s so well designed that it works every time with the same simplicity and brilliance of execution. Our systems are fully automated and very sophisticated and to get IQML working so quickly and simply, with such an easy integration, is truly a gift. Yair is very smart and the most responsive engineer I have seen – and I have seen a lot. Big companies should learn from Yair’s approach to design and customer service.”

– Theo Koutras, Chief Investment Officer, OneBrain Technologies, USA

“This year my switch to use your IQML and IB-Matlab connectors was a milestone for my work. It took me just two days to be fully productive with your connectors. No more messing with technical details of IQFEED or IBKR for me, I can focus on the essentials. Thanks!”

– Pietro P., trader, Austria

“With IQML/IQFeed and IB-Matlab/Interactive-Brokers, you will be able to build a complete trading tool from backtesting of the historical data to executing your trading strategies. These connectors are robust and compatible with the Parallel Toolbox of Matlab. The full integrated system will allow you to deal with large amounts of data. On top of that, Yair is always keen to help and provide effective functional and technical support”.

– Jean-Claude H. and Mathieu L., algorithmic trading firm, France

“We first started using Yair’s Matlab-based finance add-ons a number of years ago and it has been a huge benefit to our trading. Added to this, Yair is always quick to respond to queries and provide helpful suggestions to assist us in solving any issues we encounter. I cannot recommend his products and services more highly!”

– Brett Venter, principal, Neural Capital, UK
Appendix A – online resources

A.1 Official DTN IQFeed resources

- IQFeed homepage – http://iqfeed.net
- IQFeed API homepage – http://www.iqfeed.net/dev/api/docs
- IQFeed symbol lookup – http://iqfeed.net/symbolguide/index.cfm?symbolguide=lookup&displayaction=support &section=guide&web=iqfeed
- IQFeed users forum – http://forums.iqfeed.net
- IQFeed live chat – http://iqfeed.net/Fibonacci/index.cfm?displayaction=support&section=chat
- API customer service and technical support – support@iqfeed.net or http://iqfeed.net/Fibonacci/index.cfm?displayaction=support&section=contact
  (please let them know that you are using IQML)

A.2 MathWorks webinars/presentation

  (includes Yair’s webinar “Real-Time Trading System in MATLAB”)
- Creating professional-quality applications with MATLAB –
  (Yair’s keynote presentation in the 2016 Munich MATLAB Expo using IQFeed)
  https://undocumentedmatlab.com/blog/upcoming-public-matlab-presentations

A.3 Additional open-source Matlab resources

- Spatial Econometrics Toolbox for Matlab – http://spatial-econometrics.com
Appendix B – change log

The following table lists changes done to this document and IQML. Depending on the date that you have installed IQML, your version may be missing some features discussed in this document. You can always update to the latest version – see §2.4.

B.1 Complete change log (functional + documentation)

The table below lists both functional changes (in the IQML program) and also documentation changes (in this User Guide). See §B.2 below for a table of only the functional change.

* In this table, the last column indicates the change type: F=functional; D=documentation:

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Section</th>
<th>Description</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.80</td>
<td>2017-10-17</td>
<td>-</td>
<td>Beta integration of IQML in a user trading program</td>
<td>F</td>
</tr>
<tr>
<td>1.00</td>
<td>2018-02-26</td>
<td>-</td>
<td>First commercial release of IQML</td>
<td>F</td>
</tr>
<tr>
<td>1.01</td>
<td>2018-03-11</td>
<td>8.1</td>
<td>Enabled message-specific user callbacks; Added additional information to callback eventData</td>
<td>F</td>
</tr>
<tr>
<td>1.02</td>
<td>2018-03-12</td>
<td>4.3.2</td>
<td>Clarified filtering meta-symbols such as 'BZRatings'</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3.3</td>
<td>Added relevant symbols list in returned news story data</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.1, 11</td>
<td>Clarified automatic connection re-establishment</td>
<td>D</td>
</tr>
<tr>
<td>1.03</td>
<td>2018-03-19</td>
<td>3.2</td>
<td>Enabled Symbol and Symbols as synonymous params</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1, 6.1</td>
<td>Improved ticks request logic &amp; the returned data fields</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Enabled requesting streaming ticks/quotes for multiple symbols at once, in a single IQML command</td>
<td>F</td>
</tr>
<tr>
<td>1.04</td>
<td>2018-04-01</td>
<td>1, 2, 1</td>
<td>Clarified that IQFeed client can run on Linux/Mac via Parallels/Wine, as well as natively on Windows/Mac</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1</td>
<td>Added support for native Mac IQFeed client (untested)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.2</td>
<td>Added new MsgParsingLevel general parameter, for improved callback run-time performance</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td><strong>MaxDataItems</strong> input parameter is renamed <strong>MaxItems</strong></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Some result output fields renamed for consistency; <strong>BufferSize</strong> input parameter is renamed <strong>MaxItems</strong> for consistency; clarified the documentation text</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Added new streaming regional updates functionality</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3→7</td>
<td>Moved the news functionality into a new chapter (§7)</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.3</td>
<td>Added newline characters between separate paragraphs in the reported news-story text, for better readability</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.4</td>
<td>Clarified that default <strong>Date</strong> is today; clarified that story count also includes non-subscribed news sources</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.5</td>
<td>Added new streaming news functionality</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8-13</td>
<td>Renumbered chapters 7-12 as 8-13, to make room for the new chapter (§7) on the news functionality</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Added new section on callback run-time performance</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>Added timestamp and channel info to debug printouts</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A.2</td>
<td>Added an online MathWorks resource</td>
<td>D</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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<td>---------</td>
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<td>------------------------------------------------------------------------------</td>
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<tr>
<td>1.05</td>
<td>2018-04-05</td>
<td>2.1</td>
<td>Added note that in some cases users may need/want to specify the IQFeed connection <strong>Username, Password</strong></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1, 8</td>
<td>Added new symbols and numeric market codes lookup functionality</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.2, 4.1</td>
<td>Modified the default Timeout value from 3 to 5 [secs]</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.7, 2.</td>
<td>Added basic support for options-chain and futures-chain symbol lookup</td>
<td>F</td>
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<tr>
<td></td>
<td></td>
<td>3.5</td>
<td>Added new section on handling returned data format</td>
<td>D</td>
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<tr>
<td></td>
<td></td>
<td>5.5</td>
<td>Clarified that micro-sec time resolution depends on the IQFeed client version, the market, and the security type</td>
<td>D</td>
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<tr>
<td></td>
<td></td>
<td>8.2, 10.3</td>
<td>Added new symbols and numeric market codes lookup (better support is planned for next version)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-14</td>
<td>Renumbered chapters 8-13 as 9-14, to make room for the new chapter (§8) on the lookup functionality</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Enabled specifying IQFeed <strong>Username</strong> and <strong>Password</strong>; Added a 10-sec timeout on IQFeed connection attempts</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.3</td>
<td>Added extra port-specific stats when <strong>AddPortStats=1</strong></td>
<td>F</td>
</tr>
<tr>
<td>1.06</td>
<td>2018-04-08</td>
<td>8.2</td>
<td>Added options/futures chain lookup functionality</td>
<td>F</td>
</tr>
<tr>
<td>1.07</td>
<td>2018-04-10</td>
<td>9.1</td>
<td>Added info msgs on server connections/disconnections</td>
<td>F</td>
</tr>
<tr>
<td>1.08</td>
<td>2018-04-11</td>
<td>4.1, 6.1</td>
<td>Added the Symbol field to returned quotes data struct</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.4</td>
<td>Added usage example of realtime quotes user callback</td>
<td>D</td>
</tr>
<tr>
<td>1.09</td>
<td>2018-04-16</td>
<td>6.3</td>
<td>Added Interval Bars functionality</td>
<td>F</td>
</tr>
<tr>
<td>1.10</td>
<td>2018-05-04</td>
<td>2.4</td>
<td>Added example of update notification on a new version</td>
<td>D</td>
</tr>
<tr>
<td>1.11</td>
<td>2018-05-16</td>
<td>4.3, 6.4, 10.5</td>
<td>Added Market Depth (Level 2) functionality</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3</td>
<td>Indicated that IQFeed server may possibly limit reported interval bars depending on exchange, data subscriptions; Clarified that <strong>IntervalSize</strong> must be &gt;1 for volume/ticks</td>
<td>D</td>
</tr>
<tr>
<td>1.12</td>
<td>2018-05-23</td>
<td>3.4, 4.3, 6.2, 6.4, 7, 8.2, 10.5, 12</td>
<td>Clarified that news, level 2 (market depth), alerts, options/futures chain lookup, and regional updates are only available in the Professional license and free trial</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>Added alerts functionality</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13-15</td>
<td>Renumbered chapters 12-14 as 13-15, to make room for a new chapter on the alerts functionality</td>
<td>D</td>
</tr>
<tr>
<td>1.13</td>
<td>2018-05-25</td>
<td>7.2</td>
<td>Enabled auto-fetch of full news story in news headlines query (streaming/blocking) using <strong>GetStory</strong> parameter</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11-12</td>
<td>Switched between sections 11,12 in the User Guide</td>
<td>D</td>
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<tr>
<td></td>
<td></td>
<td>11.2</td>
<td>Enabled reporting the full news story (in addition to headline) in news alerts using <strong>GetStory</strong> parameter</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.1, 11.2</td>
<td>Added regional updates alert functionality (in addition to news/quote/intervalbar alerts)</td>
<td>F</td>
</tr>
<tr>
<td>1.131</td>
<td>2018-05-28</td>
<td>3.1</td>
<td>Fixed bug in accepting struct-based input parameters</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4</td>
<td>Clarified that <strong>IntervalSize</strong> must be &gt;1 for vol/tick bars</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Fixed typo in regional update action (should be 'regional')</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Fixed bug in the news headlines functionality</td>
<td>F</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
<td>Type</td>
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<tr>
<td>1.14</td>
<td>2018-05-30</td>
<td>4.2</td>
<td>Enabled specifying multiple Symbols in a single Fundamental-data query</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Enabled specifying multiple Symbols in a single streaming Regional updates query</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.3</td>
<td>Enabled specifying multiple news headline ID values in a single news story query</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cover</td>
<td>Updated compatibility notice for Matlab release R2018b</td>
<td>D</td>
</tr>
<tr>
<td>1.15</td>
<td>2018-07-08</td>
<td>4.1, 6.1, 14</td>
<td>Enabled querying snapshot (top of market) &amp; streaming data of multiple symbols at once, in a single IQML query</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Fixed: querying multi-symbol fundamental data sometimes returned empty results</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1-6.3</td>
<td>Fixed: debug data was displayed when streaming queries were requested (now only displayed if Debug=1)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Enabled querying fundamental data of all symbols in an options/futures chain at once, in a single IQML query</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Enabled querying snapshot (top of market) data of entire options/futures chain at once, in a single IQML query</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed: IQML query during IQFeed connection sometimes returned empty/error results</td>
<td>F</td>
</tr>
<tr>
<td>1.16</td>
<td>2018-07-09</td>
<td>3.6</td>
<td>Added new section on general run-time performance</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Improved performance (speed) of historical data queries</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.2</td>
<td>Updated the section on callback-related performance</td>
<td>D</td>
</tr>
<tr>
<td>1.17</td>
<td>2018-07-30</td>
<td>5.4, 5.5</td>
<td>Clarified that IQFeed limits ticks/interval data to 8 days during US trading hours, 180 calendar days outside them</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Clarified that IQFeed allows up to 500 concurrently-streaming symbols, unless you pay DTN formore symbols</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3</td>
<td>Clarified that IntervalSize must be &gt;1 for interval bars that use IntervalType = 'ticks' or 'volume'</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Enabled retrieval and cancellation of streaming data for multiple/all streamed symbols in a single IQML command</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Clarified that option/future chain name might change when corporate actions (such as splits) occur</td>
<td>D</td>
</tr>
<tr>
<td>1.18</td>
<td>2018-08-03</td>
<td>3.1, 3.5</td>
<td>Added optional errorMsg output for IQML commands</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed problem of duplicate fields during initial connection</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved the reliability of a programmatic IQFeed disconnect/reconnect</td>
<td>F</td>
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<tr>
<td>1.19</td>
<td>2018-08-06</td>
<td>3.2, 12</td>
<td>Added the RaiseErrorMsgs parameter to control whether IQFeed errors should raise a Matlab error</td>
<td>F</td>
</tr>
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<td></td>
<td></td>
<td>4.1, 5.1, 7.2, 8.1</td>
<td>Message about partial data received due to Timeout is now a Matlab warning message, not an error message</td>
<td>F</td>
</tr>
<tr>
<td>1.20</td>
<td>2018-08-07</td>
<td>5, 14</td>
<td>Enabled requesting history data for multiple symbols in a single IQML command</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1, 5.4, 5.5</td>
<td>Automatically convert BeginDate⇒BeginDateTime, EndDate⇒EndDateTime (i.e. try to fix usage error)</td>
<td>F</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
<td>*</td>
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<tr>
<td>1.21</td>
<td>2018-08-10</td>
<td>8.1</td>
<td>Enabled looking up symbols by market(s), sec-type(s)</td>
<td>F</td>
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<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Clarified that IQFeed only enables lookup of active (non-expired) options; a list of expired options is available separately as a downloadable text file.</td>
<td>D</td>
</tr>
<tr>
<td>1.22</td>
<td>2018-08-13</td>
<td>8.2</td>
<td>Enabled <strong>NearMonths</strong> values of 0-12, not just 0-4, for options/futures chain. Note: this is based on undocumented IQFeed functionality, so might not work in some cases.</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.2 etc.</td>
<td>Limited the <strong>Timeout</strong> parameter values to 0-3000 [secs]</td>
<td>F</td>
</tr>
<tr>
<td>1.23</td>
<td>2018-08-14</td>
<td>5.4</td>
<td>Clarified regarding historical intervals data limitations; Clarified that IQFeed’s interval data typically exclude irregular “O” trades (see §5.5).</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed a problem of possible bad connection to IQFeed during the initial connection by <strong>IQML</strong></td>
<td>F</td>
</tr>
<tr>
<td>1.24</td>
<td>2018-08-31</td>
<td>3.2 etc.</td>
<td>Limited the <strong>Timeout</strong> parameter values to 0-9000 [secs], with 0 indicating infinite (i.e. no-limit) timeout</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.5</td>
<td>Clarified that while IQFeed typically limits historic tick data to 180 days (outside trading hours), extended (older) tick data can possibly be purchased from DTN</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Enabled <strong>NearMonths</strong> values of 0-99, not just 0-12, for options/futures chain. Note: this is based on undocumented IQFeed functionality, so might not work in some cases.</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Enabled multiple Matlab processes on the same computer to run <strong>IQML</strong> concurrently (Beta)</td>
<td>F</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>2.00</td>
<td>2018-09-05</td>
<td>(all)</td>
<td>This is a major update. Highlights: query parallelization and multiple usability/functionality fixes/improvements</td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td>Enabled parallel processing of IQML commands within parfor/spmd blocks, and parallel internal processing via the UseParallel parameter (Professional license only)</td>
<td></td>
</tr>
<tr>
<td>2.02</td>
<td>2018-09-13</td>
<td>4.3, 5.4, 6.3</td>
<td>Clarified that IntervalSize must be ≥100 for volume bars (a new limitation of IQFeed)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>4.3, 5.4, 6.3, 7.4</td>
<td>Enabled specifying dates and date-times using Matlab datetime objects (in addition to datenums and strings)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>4.3→4.4</td>
<td>Moved the blocking market-depth section to §4.4</td>
<td></td>
</tr>
<tr>
<td>2.03</td>
<td>2018-09-30</td>
<td>9.1</td>
<td>Added Exchanges, ServerVersion, ServiceType fields to the returned client stats data</td>
<td></td>
</tr>
<tr>
<td>2.04</td>
<td>2018-10-02</td>
<td>9.1</td>
<td>Fixed a problem with the license check that caused IQFeed disconnections</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Improved download speed of historical data queries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6, 7.5, 9.2</td>
<td>LatestEventTimestamp is now reported in seconds (not msecs) resolution by default, unless Debug is 1 or true</td>
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</tr>
</tbody>
</table>
## Version History

<table>
<thead>
<tr>
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<th>Date</th>
<th>Section</th>
<th>Description</th>
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<tr>
<td>2.05</td>
<td>2018-10-13</td>
<td>4.1, 6.1</td>
<td>Added <strong>Fields</strong> parameter to enable dynamic fields-set</td>
<td>F</td>
</tr>
<tr>
<td>2.06</td>
<td>2018-10-15</td>
<td>4.1</td>
<td>Added some clarifications on the new <strong>Fields</strong> parameter</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Minor fixes, performance speedup of streaming quotes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4</td>
<td>Minor text clarifications; added timestamp examples</td>
<td>D</td>
</tr>
<tr>
<td>2.07</td>
<td>2018-10-21</td>
<td>4.3, 5.4, 6.3</td>
<td>Clarified that IQFeed’s limitations on live 'secs' interval bars are stricter than limitations on historical intervals</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4</td>
<td>Enabled using <strong>MaxDays</strong> as synonym for the <strong>Days</strong> parameter in historic interval queries</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed a problem with the license validation that prevented connection in certain cases</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.4</td>
<td>Fixed a few small edge-cases with sending custom commands to IQFeed</td>
<td>F</td>
</tr>
<tr>
<td>2.08</td>
<td>2018-10-28</td>
<td>3.6</td>
<td>Added clarifications on the use of query parallelization</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1, 5.4, 5.5</td>
<td>Enabled parallelized historic data queries (daily/interval/ticks) that have date/time range (Professional license only)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A.1</td>
<td>Added IQFeed’s users forum to list of online resources</td>
<td>D</td>
</tr>
<tr>
<td>2.09</td>
<td>2018-11-07</td>
<td>3.1</td>
<td>Fixed a bug in parsing input parameters in struct format</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.6</td>
<td>Added explanation on how to use a customized <strong>Fields</strong> parameter to improve the query speed of market quotes</td>
<td>D</td>
</tr>
<tr>
<td>2.10</td>
<td>2018-11-14</td>
<td>2.4</td>
<td>Added ability to revert back to the previous IQML version at any time.</td>
<td>F</td>
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<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Added a table listing all the available quote data fields (customizable via the <strong>Fields</strong> parameter)</td>
<td>D</td>
</tr>
<tr>
<td></td>
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<td>4.1</td>
<td>Added description fields for the <strong>Bid_Market_Center</strong>, <strong>Ask_Market_Center</strong> and <strong>Last_Market_Center</strong> fields, when reported in a quotes message from IQFeed.</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Added a new 'Greeks' action, to calculate Greeks, fair value price and implied volatility for options (Professional license only)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1</td>
<td>Clarified that DTN limits historical data retrieval in IQFeed’s trial account. Historical data queries in such accounts may yield fewer data points than requested.</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Clarified that tick (update/quote) messages are streamed whenever any of the requested <strong>Fields</strong> gets updated.</td>
<td>D</td>
</tr>
<tr>
<td>2.11</td>
<td>2018-11-22</td>
<td>4.5</td>
<td><strong>DaysPerYear</strong> parameter was renamed <strong>AnnualFactor</strong>; <strong>Duration</strong> parameter was renamed <strong>DaysToExpiration</strong>; Vega, Rho, Veta, Ultima are no longer divided by 100 (compatibility with Matlab Financial Toolbox, Maple &amp; NAG); minor fix for Veta (negative value); Added new fields in the reported data struct: Omega + Lambda (synonyms), CRho, Color, Annual_Factor_Used. Clarified differences of IQML’s Greek values vs. Matlab’s Trading Toolbox, NAG, and Maple. Added a table explaining all the reported Greek values.</td>
<td>F</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
<td>Type</td>
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<td>---------</td>
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</tr>
<tr>
<td>2.12</td>
<td>2019-01-16</td>
<td>2.1</td>
<td>Added cross-check for <em>IB-Matlab</em> connector</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2</td>
<td>Clarified some license variants; mentioned <em>IB-Matlab</em> bundle</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4</td>
<td>Added a new <code>revert</code> action, to revert back to a previous <em>IQML</em> version</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1</td>
<td>Fixed: display this User Guide using <em>IQML</em>('doc') even when the document is not on the Matlab path</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Clarified that Greek Vomma is sometimes called Volga; minor clarifications regarding the foreign (carry) rate.</td>
<td>D</td>
</tr>
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<td></td>
<td></td>
<td>6.2</td>
<td>Clarified the functionality of streaming regional updates</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2, etc.</td>
<td>Clarified that <a href="https://UndocumentedMatlab.com/IQML">https://UndocumentedMatlab.com/IQML</a> can be used interchangeably with <a href="http://iqml.net">http://iqml.net</a> for any <em>IQML</em> document or file resource</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1</td>
<td>Updated licensing alternatives (short-term, bundle); mentioned option of using the Matlab <code>pathtool</code> command</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2</td>
<td>Updated and clarified the license reactivation process</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4</td>
<td>Clarified that <em>IQML</em>’s timestamp data fields use either local or New York time, not the exchange time</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.6, 4.5</td>
<td>Clarified documentation, improved readability</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1-6.3</td>
<td>Added the <code>ClearBuffer</code> parameter for streaming data; fixed bug with streaming data when <code>NumOfEvents</code>=inf; fixed the documentation of <code>NumOfEvents</code> default value</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.4</td>
<td>Clarified that the streaming market depth mechanism does not store an internal buffer of quote updates</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.15</td>
<td>Clarified FAQ #15 on business continuity alternatives</td>
<td>D</td>
</tr>
<tr>
<td>2.13</td>
<td>2019-02-28</td>
<td>3.1</td>
<td>Fixed a problem specifying parameters via Matlab table</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1</td>
<td>Added ability to specify parameters using Matlab class object properties, similar to struct fields</td>
<td>F</td>
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<tr>
<td></td>
<td></td>
<td>3.1</td>
<td>Removed misleading reference to struct array (only a scalar struct is currently supported, not a struct array)</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1, 14</td>
<td>Invalid parameter names are now ignored (a warning is displayed), rather than raising a Matlab error/exception</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4</td>
<td>Clarified IQFeed’s sensitivity to valid symbol names</td>
<td>D</td>
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<tr>
<td></td>
<td></td>
<td>4.1 etc.</td>
<td>Improved handling of multi-symbol queries</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-7, 11</td>
<td><em>Symbols</em>, <em>Fields</em>, and news <em>Sources</em> can now be separated by <code>:</code> or <code>,</code> (for example, <em>IBM:HP</em> or <em>IBM,HP</em>)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Clarified that the TSTSY symbol can be used to test the streaming data functionality outside trading hours</td>
<td>D</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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<tr>
<td>2.15</td>
<td>2019-03-24</td>
<td>General</td>
<td>Made all the internal cross-references (e.g. “§4.1”) in the User Guide linkable, for easier navigation/referencing</td>
<td></td>
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<td></td>
<td></td>
<td>4.1</td>
<td>Clarified that a reported Bid/Ask Time of 99:99:99 may indicate an invalidated quote after extended trading hours; IQFeed renamed ‘Last Trade Date’ field → ‘Last Date’</td>
<td></td>
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<td></td>
<td></td>
<td>5.1 - 5.5</td>
<td>Clarified that IQFeed limits the historic data provided to its trial accounts vs. regular IQFeed accounts</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Clarified IQFeed only stores news items of past 180 days</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>12</td>
<td>Split chapter 12 into two sections: IQML messages (12.1), IQFeed logging (12.2)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>12.1</td>
<td>Added display of a few types of IQFeed system messages (excluding the periodic stats messages) in Debug mode</td>
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<tr>
<td></td>
<td></td>
<td>12.2</td>
<td>Added programmatic control of IQFeed logging</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>B.2</td>
<td>Added new section listing just functional IQML changes</td>
<td></td>
</tr>
<tr>
<td>2.16</td>
<td>2019-04-17</td>
<td>5.2, 5.3</td>
<td>Added the ability to specify <strong>BeginDate</strong> for historic weekly/monthly data requests, in addition to <strong>MaxItems</strong></td>
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<tr>
<td></td>
<td></td>
<td>3.4, 5.4</td>
<td>Added clarifications on possible causes of run-time error; Display an explanatory message upon an IQFeed account authorization error</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>4.1, 4.3, 5.1, 7.2, 8.1, 14</td>
<td>Clarified warning message in case of partial results returned due to timeout, by including a suggestion to decrease <strong>NumOfEvents</strong> parameter value, when relevant</td>
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<td></td>
<td></td>
<td>4.2</td>
<td>Clarified splits data aspects in Fundamental info reports</td>
<td></td>
</tr>
<tr>
<td>2.17</td>
<td>2019-05-07</td>
<td>4.4, 6.4</td>
<td>Added support for equity Level 2 data (in addition to futures Level 2 which was already supported); Added ID fields to all returned Level 2 data (futures and equities); changed default <strong>NumOfEvents</strong> from inf to 10; IQML now connects to IQFeed L2 servers only as needed, not in startup; Issue error message for each separate failure to access L2 data, not just during initial connection attempt; Added the <strong>IncludeEmptyQuotes</strong> parameter</td>
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<tr>
<td></td>
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<td>5.4</td>
<td>Clarified that daily/weekly/monthly interval data is available for the past 15+ years (except in IQFeed trial)</td>
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<td></td>
<td></td>
<td>5.4, 5.5</td>
<td>Fixed parallelization when only one of <strong>BeginDate/EndDateTime</strong> is specified but not the other</td>
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<td></td>
<td></td>
<td>6.3</td>
<td>Clarified that there is no <strong>EndTime</strong> parameter for streaming interval bars, unlike for historic bars (§5.4)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved behavior for users with multiple IQFeed accounts using the <strong>Username/Password</strong> parameters; Improved startup speed in case of multiple connects/disconnects during the day</td>
<td></td>
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<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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<tr>
<td>2.18</td>
<td>2019-05-14</td>
<td>1.2.1</td>
<td>Clarified that on Mac/Linux, while Matlab and IQML can indeed run in native mode, some features (§9.5 etc.) are only available if Matlab runs under Parallels/Wine.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Added an informative alert when another process is using one of IQFeed’s expected connection ports.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>3.1, 9.5</td>
<td>Added the 'registry' action and functionality, to enable convenient access to IQFeed’s registry settings.</td>
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<td>12.2</td>
<td>Clarified that IQML('log') uses the Windows registry, so will not work if Matlab runs in Mac/Linux native mode.</td>
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<td></td>
<td>Cover</td>
<td></td>
<td>Updated compatibility of supported Matlab releases.</td>
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<td>-</td>
<td>Added an online HTML version of this User Guide (<a href="http://IQML.net/files/IQML_User_Guide">http://IQML.net/files/IQML_User_Guide</a>)</td>
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<tr>
<td></td>
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<td>-</td>
<td>Added functionSignatures.json file for easier IQML usage in Live Editor.</td>
<td></td>
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<td>-</td>
<td>Fixed compatibility issue with Matlab R2008a - R2012b.</td>
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<tr>
<td></td>
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<td>3.1, 5.6</td>
<td>Added 'summary' action and functionality, to fetch historic end-of-day market summary (Professional license).</td>
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<td>4</td>
<td>Improved query responsivity in case of IQFeed error; improved performance of single-symbol queries.</td>
<td></td>
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<td>4.1</td>
<td>Support for IQFeed client 6.1: new optional Fields (Most Recent Trade Aggressor, Most Recent Trade Day Code)</td>
<td></td>
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<tr>
<td></td>
<td>2.19</td>
<td>4.2</td>
<td>Support IQFeed client 6.1: new fundamental data fields (Session_Open_Time, Session_Close_Time, Base_Currency, Contract_Size, Contract_Months, Minimum_Tick_Size, FIGI, First_Delivery_Date, and Security_SubType). Added a table describing all the available data fields.</td>
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<tr>
<td></td>
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<td>5.1-5.3</td>
<td>Included today’s partial daily trading data in day/week/month history queries, in IQFeed client 6.1 or newer.</td>
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<tr>
<td></td>
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<td>5.4</td>
<td>Added LabelAtBeginning parameter for historic interval data queries (requires IQFeed client version 6 or newer).</td>
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<td></td>
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<td>5.4</td>
<td>Clarified that sub-daily data may report data from non-trading days (e.g. Sunday night, when ES starts trading).</td>
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<td>6.1-6.3</td>
<td>Clarified that when using ClearBuffer, some streaming data events may be lost.</td>
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<td></td>
<td></td>
<td>8.2</td>
<td>Default value for IncludeBinary parameter is now false.</td>
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<td></td>
<td></td>
<td>9.1</td>
<td>Added Protocol parameter to customize initial connection.</td>
<td></td>
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<td></td>
<td>2.20</td>
<td>4.2</td>
<td>Added example of new data fields in IQFeed client 6.1.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>5.6</td>
<td>Added the ReportEmptyFields, Filter parameters and functionality (scanning based on multiple filter criteria).</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Fixed the description of the IncludeBinary parameter.</td>
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<td></td>
<td></td>
<td>9.1</td>
<td>Improved IQConnect startup on Linux/Mac via wine.</td>
<td></td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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<tr>
<td>2.21</td>
<td>2019-07-14</td>
<td>4.6</td>
<td>Enabled fetching latest (current) market summary/scanner via a 'summary' query (Professional license)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.2, 5.3</td>
<td>Clarified the latest bar has today’s data only in IQFeed 6.1+</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.6</td>
<td>Moved most of the 'summary' query description to §4.6 and clarified the text; left only the history aspects in §5.6</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.6</td>
<td>Default Date parameter value changed (yesterday → now)</td>
<td>F</td>
</tr>
<tr>
<td>2.22</td>
<td>2019-07-17</td>
<td>4.2</td>
<td>Added Underlying_Contract field for continuous futures</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.6</td>
<td>Fixed bug in change % fields of ‘top’ scanner queries; reordered ‘top’ results volume fields for better readability</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.3</td>
<td>Added information on the client stats port fields and the importance of KbQueued field for runtime performance</td>
<td>D</td>
</tr>
<tr>
<td>2.23</td>
<td>2019-09-18</td>
<td>4.2</td>
<td>Clarified that Common_Shares_Outstanding is in thousands</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3</td>
<td>Added UseParallel parameter feature to IntervalBars</td>
<td>F</td>
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<td></td>
<td></td>
<td>5</td>
<td>Fixed the implementation of MaxItems=-1, due to an IQFeed API behavior change</td>
<td>F</td>
</tr>
<tr>
<td>2.24</td>
<td>2019-10-05</td>
<td>5.5</td>
<td>Fixed duplicate lookup entries after an IQML reconnect</td>
<td>F</td>
</tr>
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<td></td>
<td></td>
<td>8.*</td>
<td>Fixed TradeAggressor, DayOfMonth tick fields (IQFeed 6.1+)</td>
<td>F</td>
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<td></td>
<td></td>
<td>8.1</td>
<td>Indicated that IQFeed has an internal bug that prevents searching for symbols with SIC/NAICS &lt; 10</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.5, 8.6</td>
<td>Indicated that IQFeed has an internal bug that does not report some SIC and NAICS codes</td>
<td>D</td>
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<td></td>
<td>9.4</td>
<td>Enabled multiple custom commands in each IQML query</td>
<td>F</td>
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<td></td>
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<td>12.2</td>
<td>Clarified the usage of redirecting IQFeed log file Path</td>
<td>D</td>
</tr>
<tr>
<td>2.25</td>
<td>2019-10-06</td>
<td>5.*</td>
<td>Fixed bug in historic data introduced in release 2.24</td>
<td>F</td>
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<td></td>
<td></td>
<td>9.1</td>
<td>Improved detection of port conflicts with other programs</td>
<td>F</td>
</tr>
<tr>
<td>2.26</td>
<td>2019-10-26</td>
<td>2.1</td>
<td>Improved reporting of missing program components</td>
<td>F</td>
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<tr>
<td></td>
<td></td>
<td>4.*</td>
<td>Fixed bug when multiple symbols are queried together and some symbols have no data (e.g., bad ticker)</td>
<td>F</td>
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<td></td>
<td></td>
<td>4.*</td>
<td>Fixed bug of not distinguishing between symbols with '.' and '-' (e.g., AGM.A, AGM-A) when both are queried</td>
<td>F</td>
</tr>
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<td></td>
<td></td>
<td>4.2</td>
<td>Improved fundamental data query using caching</td>
<td>F</td>
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<td></td>
<td></td>
<td>4.5</td>
<td>Automatically infer UnderlyingSymbol for future option</td>
<td>F</td>
</tr>
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<td></td>
<td></td>
<td>4.<em>, 5.</em></td>
<td>Small performance speedup of multi-symbol queries</td>
<td>F</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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<tr>
<td>2.27</td>
<td>2019-11-08</td>
<td>Cover</td>
<td>Updated compatibility notice for Matlab release R2020a</td>
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<td></td>
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<td>2.1</td>
<td>Improved reporting of a missing IQFeed installation</td>
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<td></td>
<td>2.4</td>
<td>Added display of extra clarification messages upon successful completion of IQML version update or revert</td>
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<td></td>
<td>4.1</td>
<td>Added <code>Exchange_Description</code> field if <code>Exchange_Id</code> field is reported by IQFeed and <code>MsgParsingLevel=2</code></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>4.1, 4.2</td>
<td>Fixed bug in <code>Exchange_Description</code> of some exchanges</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Improved auto-infer of <code>UnderlyingSymbol</code> for options; added <code>Underlying_Asset_Name</code> field to the returned data</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Added clarifications on filtering parameters limitations; Added warning when trying to use the <code>Years</code> parameter in an index/equity chain query</td>
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<td></td>
<td></td>
<td>9.1</td>
<td>Improved detection of port conflicts with other programs</td>
<td></td>
</tr>
<tr>
<td>2.28</td>
<td>2019-11-09</td>
<td>2.2</td>
<td>Fixed activation issue with compiled IQML on some deployed computers (requires reactivation)</td>
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<td></td>
<td></td>
<td>2.2</td>
<td>Clarified activation error messages in deployed programs; Improved activation resiliency to short network hickups and MacOS-induced hostname changes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4</td>
<td>Skip version update check in deployed (compiled) envs</td>
<td></td>
</tr>
<tr>
<td>2.29</td>
<td>2019-11-21</td>
<td>4.1</td>
<td>Improved processing speed of quotes queries having a <code>Fields</code> parameter</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Added SIC and NAICS sector classification data in fundamental data queries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved detection of port conflicts with other programs</td>
<td></td>
</tr>
<tr>
<td>2.30</td>
<td>2019-12-08</td>
<td>4.2</td>
<td>Improved processing speed of fundamental data queries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Improved resiliency of Greeks query to some data errors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Clarified that Greeks data are subject to the most recent setting of the <code>Fields</code> parameter value; Clarified cases in which IQML cannot auto-infer the <code>UnderlyingSymbol</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.5</td>
<td>Improved processing speed of all historic data queries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.1</td>
<td>Improved processing speed of symbol lookup queries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Clarified that returned chain quotes data is subject to the most recent setting of the <code>Fields</code> parameter value</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.3</td>
<td>Fixed an edge-case problem with some client stats queries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.2</td>
<td>Added support for 'regional' data type in alert <code>Trigger</code>; Added support for 'contains' operator in all alert types; Added warning when user requests a trigger field that is not included in the latest setting of the quotes <code>Fields</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.2</td>
<td>Clarified on setting email alerts from a Google account and on potential clashes with antivirus/firewall</td>
<td></td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
<td>*</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>2.31</td>
<td>2019-12-12</td>
<td><em>.</em></td>
<td>Fixed incompatibility of Matlab releases R2009a or older</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Fixed a bug in parsing of reported date fields</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Added <strong>UseImpliedVolatility</strong> optional Greeks parameter; Added <strong>Volatility_Used_By_Greeks</strong> field to reported data</td>
<td>F</td>
</tr>
<tr>
<td>2.311</td>
<td>2019-12-13</td>
<td>5.*</td>
<td>Fixed bug in parsing of reported history <strong>Datestamp</strong> field</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Fixed bug in parsing of reported news <strong>Timestamp</strong> field</td>
<td>F</td>
</tr>
<tr>
<td>2.32</td>
<td>2019-12-16</td>
<td>2.4</td>
<td>Modified the hyperlinks in the new-version message</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Fixed bug in accumulating multiple quotes when some fields data is missing/empty in some quotes but not others</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.*</td>
<td>Improved processing speed of all historic data queries</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>Clarified a few FAQ sections</td>
<td>D</td>
</tr>
<tr>
<td>2.33</td>
<td>2019-12-31</td>
<td>3.5</td>
<td>Added explanation about <strong>IQML</strong>’s automatic merging of results for queries of multiple symbols (where relevant)</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Displayed warning message when Greeks are requested for expired contracts or with contracts with missing data</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.6</td>
<td>Identified cases of missing summary data from IQFeed</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4, 5.5</td>
<td>Clarified that <strong>BeginDateTime/EndDateTime</strong> have precedence over (override) <strong>Days</strong> parameter; displayed a warning message when trying to use <strong>Days</strong> in such cases</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Clarified the warning message when querying a chain with <strong>DataType</strong>=’options’ and non-default <strong>Years</strong></td>
<td>F</td>
</tr>
<tr>
<td>2.34</td>
<td>2020-01-16</td>
<td>2.2</td>
<td>Minor text clarifications on short and long-term licenses</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3</td>
<td>Fixed bug in parsing the am time in a <strong>BeginDateTime</strong> parameter that is specified in numeric format</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.*</td>
<td>Clarified that a real-time IQFeed data subscription is needed for true live streaming quotes, otherwise IQFeed delays the streamed data by 10+ minutes</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3</td>
<td>Added <strong>MaxUpdateDuration</strong> parameter for streaming intervalbars queries</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
<td>Added new “Spread the word!” section</td>
<td>D</td>
</tr>
<tr>
<td>2.35</td>
<td>2020-02-05</td>
<td>9.1</td>
<td>Fixed connection conflict with IQFeed’s Excel connector</td>
<td>F</td>
</tr>
<tr>
<td>2.36</td>
<td>2020-03-06</td>
<td>7.2</td>
<td>Set <strong>Timeout</strong> to minimum 60 secs for <strong>GetStory</strong> queries; Mentioned that IQFeed has an undocumented limit of returning only up to 4000 news headlines per query.</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.3</td>
<td>Report only unique symbols in a news story query</td>
<td>F</td>
</tr>
<tr>
<td>2.37</td>
<td>2020-03-30</td>
<td>3.1</td>
<td>When an invalid parameter is specified, a list of all valid action parameters is displayed in the warning message</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Improved performance of news headlines query</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.1</td>
<td>Improved reporting of errors in user-specified callback function for an IQFeed message event</td>
<td>F</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
<td>Type</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>2.38</td>
<td>2020-04-14</td>
<td>6.1</td>
<td>Clarified the streaming quotes mechanism explanation</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2</td>
<td>Removed <em>IB-Matlab</em> connector cross-check in deployed programs</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Avoided error when <em>IQFeed</em> sends empty news headlines</td>
<td>F</td>
</tr>
<tr>
<td>2.39</td>
<td>2020-04-16</td>
<td>4.1</td>
<td>Fixed bug when using custom <em>Fields</em> in <em>UseParallel</em> mode for multiple <em>Symbols</em></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.3</td>
<td><em>IQConnect</em>'s Diagnostics utility now displays <em>IQML</em> version and parallel workers in its Client Stats tab</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.6</td>
<td>Explained how using the new <em>Fields</em> parameter in history queries can speed up run-time processing</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Fixed bad results from parallel quotes query of duplicate symbols</td>
<td>F</td>
</tr>
<tr>
<td>2.40</td>
<td>2020-04-20</td>
<td>5.1-5.5</td>
<td>Added <em>Fields</em> parameter to history queries for improved processing speed and memory usage (Pro license)</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1-5.5</td>
<td>Fixed error when parallel historic query of multiple symbols returns non-matching data sizes</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4</td>
<td>Detect &amp; handle case of a missing 'Symbol' parameter, e.g. <em>IQML('quotes','IBM')</em></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Clarified that Bid/Ask fields in returned quotes data are typically NBBO (National Best Bid and Offer) quotes</td>
<td>D</td>
</tr>
<tr>
<td>2.41</td>
<td>2020-05-03</td>
<td>6.1-6.4</td>
<td>Improved speed of <em>IQML</em> commands that start streaming; Added <em>AssignTo</em> parameter to enable assigning stream data to base Matlab workspace variables with live update</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Fixed a bug in fetching streaming Regional quotes</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3</td>
<td>Added <em>BarTypeCode, EventDatenum, EventTimestamp</em> fields to intervalbars data; expanded and clarified documentation</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Faster initial connection to <em>IQFeed</em>; Added extra debug printouts to assist diagnosing <em>IQFeed</em> connection issues</td>
<td>F</td>
</tr>
</tbody>
</table>
### B.2 Functional change log (excluding documentation changes)

The table below is a subset of the table in §B.1, listing just functional IQML changes:

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.80</td>
<td>2017-10-17</td>
<td>-</td>
<td>Beta integration of IQML in a user trading program</td>
</tr>
<tr>
<td>1.00</td>
<td>2018-02-26</td>
<td>-</td>
<td>First commercial release of IQML</td>
</tr>
<tr>
<td>1.01</td>
<td>2018-03-11</td>
<td>8.1</td>
<td>Enabled message-specific user callbacks; Added additional information to callback eventData</td>
</tr>
<tr>
<td>1.02</td>
<td>2018-03-12</td>
<td>4.3.3</td>
<td>Added relevant symbols list in returned news story data</td>
</tr>
<tr>
<td>1.03</td>
<td>2018-03-19</td>
<td>3.2</td>
<td>Enabled Symbol and Symbols as synonymous params</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1, 6.1</td>
<td>Improved ticks request logic &amp; the returned data fields</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Enabled requesting streaming ticks/quotes for multiple symbols at once, in a single IQML command</td>
</tr>
<tr>
<td>1.04</td>
<td>2018-04-01</td>
<td>2.1</td>
<td>Added support for native Mac IQFeed client (untested)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.2</td>
<td>Added new MsgParsingLevel general parameter, for improved callback run-time performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>MaxDataItems input parameter is renamed MaxItems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1</td>
<td>Some result output fields renamed for consistency; BufferSize input parameter is renamed MaxItems for consistency; clarified the documentation text</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Added new streaming regional updates functionality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.3</td>
<td>Added newline characters between separate paragraphs in the reported news-story text, for better readability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.5</td>
<td>Added new streaming news functionality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>Added timestamp and channel info to debug printouts</td>
</tr>
<tr>
<td>1.05</td>
<td>2018-04-05</td>
<td>3.1, 8</td>
<td>Added new symbols and numeric market codes lookup functionality</td>
</tr>
</tbody>
</table>
|         |            | 3.2, 4.1| Modified the default Timeout value from 3 to 5 [secs]
<p>|         |            | 5, 7.2  | |
|         |            | 8.2, 10.3| Added basic support for options-chain and futures-chain symbol lookup (better support is planned for next version) |
|         |            | 9.1     | Enabled specifying IQFeed Username and Password; Added a 10-sec timeout on IQFeed connection attempts |
|         |            | 9.3     | Added extra port-specific stats when AddPortStats=1 |
| 1.06    | 2018-04-08 | 8.2     | Added options/futures chain lookup functionality |
| 1.07    | 2018-04-10 | 9.1     | Added info msgs on server connections/disconnections |
| 1.08    | 2018-04-11 | 4.1, 6.1| Added the Symbol field to returned quotes data struct |
| 1.09    | 2018-04-16 | 6.3     | Added Interval Bars functionality |
| 1.11    | 2018-05-16 | 4.3, 6.4| Added Market Depth (Level 2) functionality |
| 1.12    | 2018-05-23 | 12      | Added alerts functionality |</p>
<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.13</td>
<td>2018-05-25</td>
<td>7.2</td>
<td>Enabled auto-fetch of full news story in news headlines query (streaming/blocking) using <code>GetStory</code> parameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.2</td>
<td>Enabled reporting the full news story (in addition to headline) in news alerts using <code>GetStory</code> parameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.1, 11.2</td>
<td>Added regional updates alert functionality (in addition to news/quote/intervalbar alerts)</td>
</tr>
<tr>
<td>1.131</td>
<td>2018-05-28</td>
<td>3.1</td>
<td>Fixed bug in accepting struct-based input parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Fixed bug in the news headlines functionality</td>
</tr>
<tr>
<td>1.14</td>
<td>2018-05-30</td>
<td>4.2</td>
<td>Enabled specifying multiple <code>Symbols</code> in a single Fundamental-data query</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Enabled specifying multiple <code>Symbols</code> in a single streaming Regional updates query</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.3</td>
<td>Enabled specifying multiple news headline <code>ID</code> values in a single news story query</td>
</tr>
<tr>
<td>1.15</td>
<td>2018-07-08</td>
<td>4.1, 6.1, 14</td>
<td>Enabled querying snapshot (top of market) &amp; streaming data of multiple symbols at once, in a single <code>IQML</code> query</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Fixed: querying multi-symbol fundamental data sometimes returned empty results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1-6.3</td>
<td>Fixed: debug data was displayed when streaming queries were requested (now only displayed if <code>Debug</code>=1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Enabled querying fundamental data of all symbols in an options/futures chain at once, in a single <code>IQML</code> query</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Enabled querying snapshot (top of market) data of entire options/futures chain at once, in a single query</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed: <code>IQML</code> query during IQFeed connection sometimes returned empty/error results</td>
</tr>
<tr>
<td>1.16</td>
<td>2018-07-09</td>
<td>5</td>
<td>Improved performance (speed) of historical data queries</td>
</tr>
<tr>
<td>1.17</td>
<td>2018-07-30</td>
<td>6</td>
<td>Enabled retrieval and cancellation of streaming data for multiple/all streamed symbols in a single <code>IQML</code> command</td>
</tr>
<tr>
<td>1.18</td>
<td>2018-08-03</td>
<td>3.1, 3.5</td>
<td>Added optional <code>errorMsg</code> output for <code>IQML</code> commands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed problem of duplicate fields during initial connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved the reliability of a programmatic IQFeed disconnect/reconnect</td>
</tr>
<tr>
<td>1.19</td>
<td>2018-08-06</td>
<td>3.2, 12</td>
<td>Added the <code>RaiseErrorMsgs</code> parameter to control whether IQFeed errors should raise a Matlab error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1, 5.1, 7.2, 8.1</td>
<td>Message about partial data received due to <code>Timeout</code> is now a Matlab warning message, not an error message</td>
</tr>
<tr>
<td>1.20</td>
<td>2018-08-07</td>
<td>5, 14</td>
<td>Enabled requesting history data for multiple symbols in a single <code>IQML</code> command</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1, 5.4, 5.5</td>
<td>Automatically convert <code>BeginDate</code>⇌<code>BeginDateTime</code>, <code>EndDate</code>⇌<code>EndDateTime</code> (i.e. try to fix usage error)</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
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<td>---------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.21</td>
<td>2018-08-10</td>
<td>8.1</td>
<td>Enabled looking up symbols by market(s), sec-type(s)</td>
</tr>
<tr>
<td>1.22</td>
<td>2018-08-13</td>
<td>8.2</td>
<td>Enabled <strong>NearMonths</strong> values of 0-12, not just 0-4, for options/futures chain. Note: this is based on undocumented IQFeed functionality, so might not work in some cases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.2 etc.</td>
<td>Limited the <strong>Timeout</strong> parameter values to 0-3000 [secs]</td>
</tr>
<tr>
<td>1.23</td>
<td>2018-08-14</td>
<td>9.1</td>
<td>Fixed a problem of possible bad connection to IQFeed during the initial connection by IQML</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.2 etc.</td>
<td>Limited the <strong>Timeout</strong> parameter values to 0-9000 [secs], with 0 indicating infinite (i.e. no-limit) timeout</td>
</tr>
<tr>
<td>1.24</td>
<td>2018-08-31</td>
<td>8.2</td>
<td>Enabled <strong>NearMonths</strong> values of 0-99, not just 0-12, for options/futures chain. Note: this is based on undocumented IQFeed functionality, so might not work in some cases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Enabled multiple Matlab processes on the same computer to run IQML concurrently (Beta)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.00</td>
<td><strong>This is a major update. Highlights:</strong> query parallelization and multiple usability/functionality fixes/improvements (all)</td>
</tr>
<tr>
<td></td>
<td>(major</td>
<td></td>
<td>Enabled parallel processing of IQML commands within parfor/spmd blocks, and parallel internal processing via the <strong>UseParallel</strong> parameter (Professional license only)</td>
</tr>
<tr>
<td></td>
<td>update)</td>
<td></td>
<td>2.03</td>
</tr>
<tr>
<td>2.02</td>
<td>2018-09-13</td>
<td>4.1, 8.2</td>
<td>Issued a warning when requesting more symbol quotes than your IQFeed account limit</td>
</tr>
<tr>
<td>2.03</td>
<td>2018-09-30</td>
<td>9.1</td>
<td>Added detection &amp; report for a case of a non-communicative background IQConnect process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.3</td>
<td>Added Exchanges, ServerVersion, ServiceType fields to the returned client stats data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed a problem with the license check that caused IQFeed disconnections</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>2.04</td>
<td>2018-10-02</td>
<td>5</td>
<td>Improved download speed of historical data queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6, 7, 5, 9.2</td>
<td>LatestEventTimestamp is now reported in seconds (not msecs) resolution by default, unless Debug is 1 or true</td>
</tr>
<tr>
<td>2.05</td>
<td>2018-10-13</td>
<td>4.1, 6.1</td>
<td>Added <strong>Fields</strong> parameter to enable dynamic fields-set</td>
</tr>
<tr>
<td>2.06</td>
<td>2018-10-15</td>
<td>6.1</td>
<td>Minor fixes, performance speedup of streaming quotes</td>
</tr>
<tr>
<td>2.07</td>
<td>2018-10-21</td>
<td>5.4</td>
<td>Enabled using <strong>MaxDays</strong> as synonym for the <strong>Days</strong> parameter in historic interval queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Fixed a problem with the license validation that prevented connection in certain cases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.4</td>
<td>Fixed a few small edge-cases with sending custom commands to IQFeed</td>
</tr>
<tr>
<td>2.08</td>
<td>2018-10-28</td>
<td>5.1, 5.4, 5.5</td>
<td>Enabled parallelized historic data queries (daily/interval/ticks that have date/time range (Professional license only)</td>
</tr>
<tr>
<td>2.09</td>
<td>2018-11-07</td>
<td>3.1</td>
<td>Fixed a bug in parsing input parameters in struct format</td>
</tr>
<tr>
<td>2.10</td>
<td>2018-11-14</td>
<td>2.4</td>
<td>Added ability to revert back to the previous <strong>IQML</strong> version at any time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Added description fields for the <strong>Bid_Market_Center</strong>, <strong>Ask_Market_Center</strong> and <strong>Last_Market_Center</strong> fields, when reported in a quotes message from IQFeed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Added a new 'Greeks' action, to calculate Greeks, fair value price and implied volatility for options (Professional license only)</td>
</tr>
<tr>
<td>2.11</td>
<td>2018-11-22</td>
<td>4.5</td>
<td><strong>DaysPerYear</strong> parameter was renamed <strong>AnnualFactor</strong>; <strong>Duration</strong> parameter was renamed <strong>DaysToExpiration</strong>; Vega, Rho, Veta, Ultima are no longer divided by 100 (compatibility with Matlab Financial Toolbox, Maple &amp; NAG); minor fix for Veta (negative value); Added new fields in the reported data struct: Omega + Lambda (synonyms), CRho, Color, Annual_Factor_Used. Clarified differences of <strong>IQML</strong>'s Greek values vs. Matlab’s Trading Toolbox, NAG, and Maple. Added a table explaining all the reported Greek values.</td>
</tr>
<tr>
<td>2.12</td>
<td>2019-01-16</td>
<td>2.2</td>
<td>Added cross-check for <strong>IB-Matlab</strong> connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4</td>
<td>Added a new 'revert' action, to revert back to a previous <strong>IQML</strong> version</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1</td>
<td>Fixed: display this User Guide using <strong>IQML('doc')</strong> even when the document is not on the Matlab path</td>
</tr>
<tr>
<td>2.13</td>
<td>2019-02-28</td>
<td>6.1-6.3</td>
<td>Added the <strong>ClearBuffer</strong> parameter for streaming data; fixed bug with streaming data when <strong>NumOfEvents</strong>=inf; fixed the documentation of <strong>NumOfEvents</strong> default value</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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</tr>
<tr>
<td>2.14</td>
<td>2019-03-14</td>
<td>3.1</td>
<td>Fixed a problem specifying parameters via Matlab table</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1</td>
<td>Added ability to specify parameters using Matlab class object properties, similar to struct fields</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1, 14</td>
<td>Invalid parameter names are now ignored (a warning is displayed), rather than raising a Matlab error/exception</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1 etc.</td>
<td>Improved handling of multi-symbol queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-7, 11.1</td>
<td>Symbols, Fields, and news Sources can now be separated by '::' or ',', (for example, 'IBM:HP' or 'IBM,HP')</td>
</tr>
<tr>
<td>2.15</td>
<td>2019-03-24</td>
<td>12.1</td>
<td>Added display of a few types of IQFeed system messages (excluding the periodic stats messages) in Debug mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.2</td>
<td>Added programmatic control of IQFeed logging</td>
</tr>
<tr>
<td>2.16</td>
<td>2019-04-17</td>
<td>5.2, 5.3</td>
<td>Added the ability to specify <strong>BeginDate</strong> for historic weekly/monthly data requests, in addition to <strong>MaxItems</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4, 5.4</td>
<td>Display an explanatory message upon an IQFeed account authorization error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1, 4.3, 5.1, 7.2, 8.1, 14</td>
<td>Clarified warning message in case of partial results returned due to timeout, by including a suggestion to decrease the <strong>NumOfEvents</strong> parameter value, where this is relevant</td>
</tr>
<tr>
<td>2.17</td>
<td>2019-05-07</td>
<td>4.4, 6.4</td>
<td>Added support for equity Level 2 data (in addition to futures Level 2, which was already supported); Added ID fields to all returned Level 2 data (futures and equities); changed default <strong>NumOfEvents</strong> from ( \text{inf} ) to 10; IQML now connects to IQFeed L2 servers only as needed, not in startup; Issue an error message for each separate failure to access L2 data, not just during the initial connection attempt; Added the <strong>IncludeEmptyQuotes</strong> parameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4, 5.5</td>
<td>Fixed parallelization when only one of <strong>BeginDateTime</strong> / <strong>EndDateTime</strong> is specified but not the other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved behavior for users with multiple IQFeed accounts using the <strong>Username/Password</strong> parameters; Improved startup speed in case of multiple connects/disconnects during the day</td>
</tr>
<tr>
<td>2.18</td>
<td>2019-05-14</td>
<td>9.1</td>
<td>Added an informative alert when another process is using one of IQFeed’s expected connection ports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.1, 9.5</td>
<td>Added the 'registry' action and functionality, to enable convenient access to IQFeed’s registry settings</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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</tr>
<tr>
<td>2.19</td>
<td>2019-07-07</td>
<td>2</td>
<td>Added functionSignatures.json file for easier IQML usage in Live Editor</td>
</tr>
<tr>
<td></td>
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<td>2</td>
<td>Fixed compatibility problem with old Matlab releases (R2008a - R2012b)</td>
</tr>
<tr>
<td>3.1, 5.6</td>
<td></td>
<td></td>
<td>Added the 'summary' action and functionality, to fetch historic end-of-day market summary (Professional license)</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Improved query responsivity in case of IQFeed error; improved performance of single-symbol queries</td>
</tr>
<tr>
<td>4.1</td>
<td></td>
<td></td>
<td>Support IQFeed client 6.1: new quotes data Fields (Most Recent Trade Aggressor, Most Recent Trade Day Code)</td>
</tr>
<tr>
<td>4.2</td>
<td></td>
<td></td>
<td>Support IQFeed client 6.1: new fundamental data fields (Session Open Time, Session Close Time, Base Currency, Contract Size, Contract Months, Minimum Tick Size, FIGI, First Delivery Date, and Security SubType)</td>
</tr>
<tr>
<td>5.1-5.3</td>
<td></td>
<td></td>
<td>Included today’s partial daily trading data in day/week/month history queries, in IQFeed client 6.1 or newer.</td>
</tr>
<tr>
<td>5.4</td>
<td></td>
<td></td>
<td>Added LabelAtBeginning parameter for historic interval data queries (requires IQFeed client version 6 or newer)</td>
</tr>
<tr>
<td>8.2</td>
<td></td>
<td></td>
<td>Default value for IncludeBinary parameter is now false</td>
</tr>
<tr>
<td>9.1</td>
<td></td>
<td></td>
<td>Added Protocol parameter to customize initial connection</td>
</tr>
<tr>
<td>2.20</td>
<td>2019-07-10</td>
<td>5</td>
<td>Added the ReportEmptyFields, Filter parameters and functionality (scanning based on multiple filter criteria)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved IQConnect startup on Linux/Mac via wine</td>
</tr>
<tr>
<td>2.21</td>
<td>2019-07-14</td>
<td>4</td>
<td>Enabled fetching latest (current) market summary/scanner via a 'summary' query (Professional license)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.6</td>
<td>Default Date parameter value changed (yesterday → now)</td>
</tr>
<tr>
<td>2.22</td>
<td>2019-07-17</td>
<td>4</td>
<td>Fixed a bug that caused a “Duplicate field name Reserved” error for some queries on some Matlab releases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Added Underlying_Contract field for continuous futures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.6</td>
<td>Fixed bug in change % fields of 'top' scanner queries; reordered 'top' results volume fields for improved readability</td>
</tr>
<tr>
<td>2.23</td>
<td>2019-09-18</td>
<td>4</td>
<td>Improved collection of parallelized results, in case some of the results returned an error or empty data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Fixed the implementation of MaxItems=-1, due to an IQFeed API behavior change</td>
</tr>
<tr>
<td>2.24</td>
<td>2019-10-05</td>
<td>5</td>
<td>Improved processing speed and streaming data throughput</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.5</td>
<td>Added TradeAggressor, DayOfMonth fields to reported ticks data (IQFeed client 6.1 or newer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.*</td>
<td>Fixed duplicate lookup entries after an IQML reconnect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.4</td>
<td>Enabled multiple custom commands in single IQML query</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
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</tr>
<tr>
<td>2.25</td>
<td>2019-10-06</td>
<td>-</td>
<td>Clarified a few error messages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.*</td>
<td>Fixed bug in historic data that was introduced in release 2.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved detection of port conflicts with other programs</td>
</tr>
<tr>
<td>2.26</td>
<td>2019-10-25</td>
<td>2.1</td>
<td>Improved reporting of missing program components</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.*</td>
<td>Fixed bug when multiple symbols are queried together and some symbols have no data (e.g., bad ticker)</td>
</tr>
<tr>
<td>2.27</td>
<td>2019-11-08</td>
<td>4.*</td>
<td>Fixed bug of not distinguishing between symbols with ',' and '-' (e.g., AGM.A, AGM-A) when they are both queried</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Added fundamental data caching for improved performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Automatically infer <code>UnderlyingSymbol</code> for future options</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.<em>, 5.</em></td>
<td>Small performance speedup of multi-symbol queries</td>
</tr>
<tr>
<td>2.28</td>
<td>2019-11-09</td>
<td>2.2</td>
<td>Fixed activation issue with compiled IQML on some deployed computers (requires reactivation)</td>
</tr>
<tr>
<td>2.29</td>
<td>2019-11-21</td>
<td>2.2</td>
<td>Clarified activation error messages in deployed programs; Improved activation resiliency to short network hickups and MacOS-induced hostname changes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4</td>
<td>Skip version update check in deployed (compiled) program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Improved processing speed of quotes queries using <code>Fields</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Added SIC and NAICS sector classification data in fundamental data queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Improved resiliency of Greeks query to some data errors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.*</td>
<td>Improved processing speed of all historic data queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.1</td>
<td>Improved processing speed of symbol lookup queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Improved detection of port conflicts with other programs</td>
</tr>
<tr>
<td>2.30</td>
<td>2019-12-08</td>
<td>9.3</td>
<td>Fixed an edge-case problem with some client stats queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.2</td>
<td>Added support for 'regional' data type in the alert <code>Trigger</code>; Added support for 'contains' operator in all alert types; Added warning when user requests a trigger field that is not included in the latest setting of the quotes <code>Fields</code></td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
</tr>
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<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2.31</td>
<td>2019-12-12</td>
<td>2.31</td>
<td><em>.</em> Fixed incompatibility with Matlab releases R2009a or older</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Fixed a bug in parsing of reported date fields</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Added <strong>UseImpliedVolatility</strong> optional Greeks parameter; Added <strong>Volatility_Used_By_Greeks</strong> field to reported data</td>
</tr>
<tr>
<td>2.311</td>
<td>2019-12-13</td>
<td>5.*</td>
<td>Fixed bug in parsing of reported history <strong>Datestamp</strong> field</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Fixed bug in parsing of reported news <strong>Timestamp</strong> field</td>
</tr>
<tr>
<td>2.32</td>
<td>2019-12-16</td>
<td>2.4</td>
<td>Modified the hyperlinks in the new-version message</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Fixed bug in accumulating multiple quotes when some fields data is missing/empty in some quotes but not others</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.*</td>
<td>Improved processing speed of all historic data queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Displayed warning message when Greeks are requested for expired contracts or with contracts with missing data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.6</td>
<td>Identified casses of missing summary data from IQFeed</td>
</tr>
<tr>
<td>2.33</td>
<td>2019-12-31</td>
<td>5.4, 5.5</td>
<td>Clarified that <strong>BeginDateTime/EndDateTime</strong> have precedence over (override) the <strong>Days</strong> parameter; displayed a warning message when trying to use <strong>Days</strong> in such cases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.2</td>
<td>Clarified the warning message when querying a chain with <strong>DataType='options'</strong> and non-default <strong>Years</strong></td>
</tr>
<tr>
<td>2.34</td>
<td>2020-01-16</td>
<td>4.3</td>
<td>Fixed bug in parsing the am time part in a <strong>BeginDateTime</strong> parameter that is specified in numeric format</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3</td>
<td>Added <strong>MaxUpdateDuration</strong> parameter for streaming intervalbars queries</td>
</tr>
<tr>
<td>2.35</td>
<td>2020-02-05</td>
<td>9.1</td>
<td>Fixed a connection conflict with IQFeed’s Excel connector</td>
</tr>
<tr>
<td>2.36</td>
<td>2020-03-06</td>
<td>7.2</td>
<td>Set <strong>Timeout</strong> to minimum 60 secs for <strong>GetStory</strong> queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.3</td>
<td>Report only unique symbols in a news story query</td>
</tr>
<tr>
<td>2.37</td>
<td>2020-03-30</td>
<td>3.1</td>
<td>When an invalid parameter is specified, the list of all valid action parameters is displayed in the warning message</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Improved performance of news headlines query</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.1</td>
<td>Improved reporting of errors in user-specified callback function for an IQFeed message event</td>
</tr>
<tr>
<td>2.38</td>
<td>2020-04-14</td>
<td><em>.</em></td>
<td>Improved <strong>UseParallel</strong> robustness in some scenarios/edge-cases (Professional license)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2</td>
<td>Removed <strong>IB-Matlab</strong> connector cross-check in deployed apps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2</td>
<td>Avoided error when IQFeed sends empty news headlines</td>
</tr>
<tr>
<td>2.39</td>
<td>2020-04-16</td>
<td><em>.</em></td>
<td>Added informative message when the user specifies an invalid <strong>Symbol</strong> format</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1</td>
<td>Fixed bug when using custom <strong>Fields</strong> in <strong>UseParallel</strong> mode for multiple <strong>Symbols</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.3</td>
<td>IQConnect’s Diagnostics utility now displays <strong>IQML</strong> version and parallel workers in its Client Stats tab</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Section</td>
<td>Description</td>
</tr>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2.40</td>
<td>2020-04-20</td>
<td>4.1</td>
<td>Fixed bad data in parallel quotes query of duplicate symbols</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1-5.5</td>
<td>Added <strong>Fields</strong> parameter to history queries for improved processing speed and memory usage (Professional license)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1-5.5</td>
<td>Fixed error when parallel historic query of multiple symbols returns non-matching data sizes</td>
</tr>
<tr>
<td>2.41</td>
<td>2020-05-03</td>
<td>3.4</td>
<td>Detect &amp; handle case of a missing 'Symbol' parameter, e.g. IQML('quotes','IBM')</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1-5.5</td>
<td>Improved performance of history queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1-6.4</td>
<td>Improved speed of <strong>IQML</strong> commands that start streaming; Added <strong>AssignTo</strong> parameter to enable assigning streaming data to base Matlab workspace variables, with live updates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Fixed a bug in fetching streaming Regional quotes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3</td>
<td>Added <strong>BarTypeCode,EventDatenum,EventTimestamp</strong> fields to streaming intervalbars data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.1</td>
<td>Faster initial connection to IQFeed; Added extra debug printouts to assist diagnosing IQFeed connection problems</td>
</tr>
</tbody>
</table>