

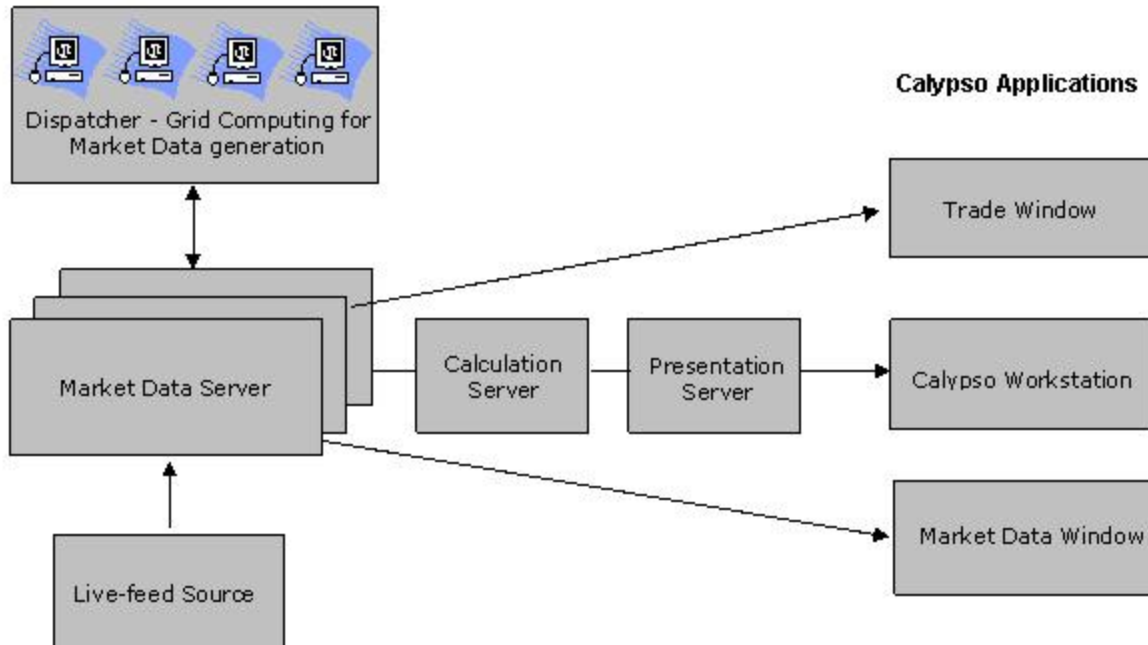
## 1. MARKET DATA SERVER OVERVIEW

The Market Data Server manages real-time market data flowing into the system from live-feed providers, and distributes them in real-time throughout the system, for pricing and intraday risk calculations.

You may run multiple instances of the Market Data Server to handle various types of market data, various update frequencies, or various policies.

When the Market Data Server is running, you can turn on and off real-time updates on-the-fly.

The following picture illustrates the architecture of the Market Data Server.



Market Data Server Architecture

### Contents

- [Installing the Market Data Server](#)
- [Reference - Market Data Server Access Permissions](#)
- [Configuring a Live-Feed Source](#)
- [Configuring the Market Data Server](#)
- [Starting the Market Data Server](#)
- [Activating Market Data Server Subscriptions](#)
- [Using the Market Data Server in Trade Windows](#)
- [Using the Market Data Server for Intraday Risk](#)
- [Monitoring the Market Data Server](#)

## 2. INSTALLING THE MARKET DATA SERVER

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The Market Data Server is part of the Calypso JAR.

Make sure that you have `mktdataserverrel.jar` in your CLASSPATH.

### ***What's Next?***

- You can [define access permissions](#) as needed.
- You can [configure a live-feed source](#).

### 3. MARKET DATA SERVER ACCESS PERMISSIONS

The access permissions may be set using [Main Entry > Configuration > User Access Control > Access Permissions](#). Refer to *Calypso Security Documentation* for details.

The following table shows the access permissions for the Market Data Server.

Application	Access Permissions
<b>Market Data Server Configuration</b>	<p>Access permissions for market data server configurations (host name and port number) are twofold:</p> <ul style="list-style-type: none"> <li>- The user must be granted the functions described below as applicable.</li> <li>- The user must be granted read-only or read-write access to individual market data server configurations under Access &gt; MktData Server Config as applicable.</li> </ul> <p><b>CreateMktDataServerConfig</b></p> <p>Permission to create new market data server configurations.</p> <p><b>ModifyMktDataServerConfig</b></p> <p>Permission to modify market data server configurations.</p> <p><b>RemoveMktDataServerConfig</b></p> <p>Permission to delete market data server configurations.</p> <p><b>MktDataServerAllowForceGenerate</b></p> <p>Permission to allow force generating market data on-the-fly. In the trade worksheet in the Market Data panel, click ▼ and choose "Force generate".</p> <p><b>MktDataServerAllowMultiSelection</b></p> <p>Permission to allow selecting multiple market data servers on-the-fly. In the trade worksheet in the Market Data panel, click ▼ and choose "Select Market Data Server" to choose to a different Market Data Server.</p>

#### What's Next?

 You can [configure a live-feed source](#).

## 4. CONFIGURING A LIVE-FEED SOURCE

Configuring a live-feed source is a two-step process:

- You first need to define a feed source
- Then you need to map the Calypso quote names with the quote names of the feed source

### 4.1 DEFINING A FEED SOURCE

Choose [Main Entry > Configuration > Market Data > Feed](#) to define a feed source.

Name	Value
CONFIG_LOCATION	
NAMESPACE	
SESSION_NAME	

#### Feed Source Definition

- » Select the type of feed source you want to use: RFA (Reuters RFA), or Random (random quote generator for test purposes).

A number of attributes are displayed, define the attributes as needed.

For Random, enter the name of the file that contains the random quotes "QuoteGenTest.txt" - A sample file is located under `resources/samples`.

For RFA, refer to the *Calypso Reuters RFA Integration Guide* for details.

- » Enter a name in the Name field. The feed configuration will be identified by its name throughout the system.
- » Click **Save** to save the configuration.

### 4.2 FEED MAPPING

Choose [Main Entry > Configuration > Market Data > Feed Address Mapping](#).

**Feed Address Window**

Feed: ReutersRFA    Quote Address: FX.USD.JPY

Quote Type: Price    Feed Address: IDN\_RDF|JPY= \* 1.0 + 0.0

Names Like:    Bid: BID    Ask: ASK    High: BID\_HIGH\_1    Last:   

Open: OPEN\_BID    Close:    Low: BID\_LOW\_1    Date: ACTIV\_DATE

**CALYPSO QUOTE NAMES**

- Bond.3IINFO 0 03Apr12 Stri
- Bond.3I Gp plc [III] 1.375 01
- Bond.AA 5.375 15Jan13.01
- Bond.AA 5.55 01Feb17.02-
- Bond.AA 5.72 23Feb19.02-
- Bond.AA 6.5 01Jun11.06-01
- Bond.AA 7.375 01Aug10.08

Quote Address	Type	Feed	Feed Address
FX.USD.INR	Price	ReutersRFA	IDN_RDF INR=
FX.USD.INR.INR01.Reuters	Price	ReutersRFA	IDN_RDF INRFIX=RBIA
FX.USD.ISK	Price	ReutersRFA	IDN_RDF ISK=
FX.USD.JPY	Price	ReutersRFA	IDN_RDF JPY=
FX.USD.JPY.1M	Price	ReutersRFA	IDN_RDF JPY1M=
FX.USD.JPY.1W	Price	ReutersRFA	IDN_RDF JPYSW=
FX.USD.JPY.1Y	Price	ReutersRFA	IDN_RDF JPY1Y=

Buttons: Refresh, Load All, Add, Modify Feed Address, Delete, Close

### Feed Source Mapping

- » Select a feed definition from the Feed field, and click **Load All** to load all Calypso quote names. They appear in the Addresses list on the left-hand side.

You can search specific quote names using the Names Like field, and click **Refresh** to update the list of Calypso quote names.

- » Select a Calypso quote name from the Addresses list. The selected address appears in the Quote Address field.

Enter the corresponding address from the feed source in the Feed Address field, and any multiplicative or additive factor.

Enter the instance names from the feed source corresponding to the Calypso instance names (Bid, Ask, High, Last, Open, Close, Low, and Date).

Fast-Track provides out-of-the-box mappings for Reuters RFA.

[**NOTE:** The date that the system saves with the quote defaults to today's date. However, you may want to save a different date with the quote, such as yesterday's date. You can map the date to a date field used by the feed. For example, when using the Reuters feed, you could map ACTIVE\_DATE, VALUE\_DT1, or VALUE\_DT2 to the Calypso Date field]

- » Click **Add** to save the mapping.

### What's Next?

- » You can now [configure a market data server](#).

## 5. CONFIGURING THE MARKET DATA SERVER

Administrators may configure a Market Data Server using [Main Entry > Market Data > Utilities > Market Data Server](#) (marketdata.server.MktDataServerFrame), also available under [Main Entry > Configuration > Market Data > Market Data Server](#).


Check the "Edit Mode" box to create or edit a configuration.

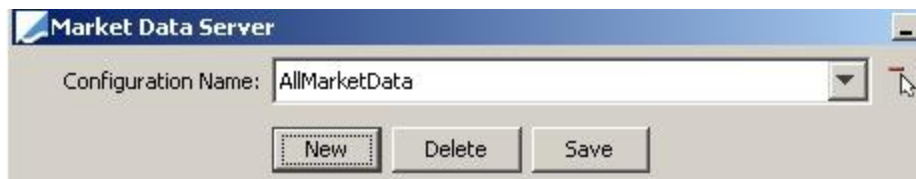


### Market Data Server Configuration - Edit

You can now create the various components of the Market Data Server configuration as described below.

### 5.1 CONFIGURATION NAME

To start a new configuration, click . You can also select an existing configuration and modify as needed.



#### Set Configuration Name

- » Click **New**. You will be prompted to enter a name for the configuration.
- » Then click **Save**.

### 5.2 SERVER CONFIGURATION

Configure the host name and port number for the Market Data Server. Click  to display the server details.


#### Define Server

- » Click **New**. You will be prompted to enter a server configuration name.
- » Enter the host name and port number.  
You can check the Advanced checkbox to configure a Bind Port number and a Client Port number.
- » Click **Save**.

### 5.3 GENERATION POLICY

You then need to configure which market data are distributed in real-time by the market data server, and how.

By default, ALL quotes are distributed in real-time by the market data server, whether they are coming from a live-feed source, or saved manually in the system. For curves and surfaces however, you need to configure a generation policy for each type of data. If you do not specify a generation policy, the corresponding market data will not be regenerated and distributed in real-time, the market data server will load the market data from the database.

Click  to display the configuration policy details.

#### Generation Policy Details

- » Click **New**. You will be prompted to enter a name for the policy configuration.
- » When you right-click the "Market data config" label, you can choose "Set Options" to set the update frequency for the quotes - It defaults to 1 minute. See [Setting Options](#) for details.
- » To add a generation policy for a type of curve or surface, right-click the "Market data config" label, and choose "Add/Update Policy". See [Adding a Generation Policy](#) for details.

### 5.3.1 ADDING A GENERATION POLICY

Right-click the "Market data config" label, and choose "Add/Update Policy". It brings up the "Add/Update policy" dialog.



Add/Update Policy

1

Select the type of market data for which you want to define a generation policy.

By default, the generation policy applies to all curves or surfaces of the selected type, but you can restrict the scope using the selection criteria.

2

Select the generation policy:

- "Something changes" - If anything changes on the market data (definition or quotes), the market data server regenerates and distributes the market data.
- "Quote change only" - The market data server regenerates and distributes the market data only if the underlying quotes change.
- "Underlying change only" - The market data server regenerates and distributes the market data only if the underlying instruments have been modified.

You can also enter a frequency multiplier to override the base frequency for the current market data. For example, if you set the frequency multiplier to 10, and the base frequency is 1 minute, the current market data will be updated every 10 minutes.

3

Click **Add Item** to add the policy to the policy configuration.

[**NOTE**: You can click Replace when you are updating an existing policy]

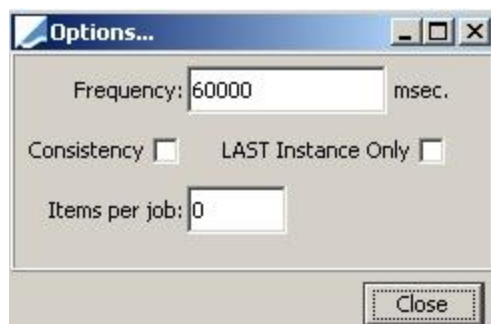
Make sure to click **Save** to save the policy configuration.



### 5.3.2 SETTING OPTIONS

You can set options at the base level of the policy configuration - This applies to quotes.

You can also set options for each generation policy.



#### Set Options

- » Enter the options as needed - They are described below.
- » Make sure to click **Save** to save the policy configuration.

Fields	Description
<b>Frequency</b>	Enter the update frequency in milliseconds.
<b>Consistency</b>	Check "Consistency" to update related market data when the current market data is updated.  For example, on the generation policy for probability curves, you can check "Consistency", so that the probability curve will be updated, if the underlying riskless curve is updated.
<b>LAST Instance Only</b>	If checked, this option will have the effect of ignoring all feed quote updates except the ones used for the "LAST" market data instance (i.e. BID and ASK quotes).  Technical note: This "filtering" only applies to quotes received from a live-feed source and not to quotes saved into the system. If a quote is saved into the system (manually, or through the SAVE_QUOTES scheduled task), or if a curve or surface is modified, the market data server will pick up this change and make it available to all of relevant subscribers regardless of the market data instance being used.  The INSTANCE_TYPE pricing parameter impacts this option. When the instance type is CLOSE and "Last Instance Only" is checked, then there will be no subscription to real-time updates. If "Last Instance Only" is not checked, then real-time updates proceed for any value of INSTANCE_TYPE.
<b>Items per job</b>	If you are using a dispatcher configuration to distribute the load of regenerating the market data to multiple processors, you need to specify the number of items per processor.  The number of items per job is the number of curves and surfaces that will be regenerated by a given processor. Even if the same base curve is needed to regenerate all the curves and surfaces, multiple jobs will be created based on this setting.

### 5.4 QUOTE SOURCE NAME

Select the live-feed source from the Quote Source Name drop-down menu.

See [Configuring a Live-Feed Source](#) for details on setting up a feed source.

### 5.5 DISPATCHER NAME (OPTIONAL)

Selecting a dispatcher configuration allows distributing the load of regenerating market data to multiple processors. Refer to the *Calypso System Guide* for information on creating a dispatcher configuration.

## 5.6 SAVING THE MARKET DATA SERVER CONFIGURATION

- » Click **Apply** to save the Market Data Server configuration and close the configuration window.

[NOTE: If you modify the configuration, you need to restart the Market Data Server, and re-activate subscriptions]

### *What's Next?*

- You need to [start the Market Data Server](#) in order to distribute real-time updates.
- Each client interested in real-time updates needs to [activate subscriptions](#).

## 6. STARTING THE MARKET DATA SERVER

Once you have a configuration, you can start the Market Data Server at the command line or in GUI mode.

### 6.1 COMMAND LINE

Start the Market Data Server at the command line using

`com.calypso.apps.startup.StartMktDataServer` with the configuration as a parameter.

Example (this is a one-line command):

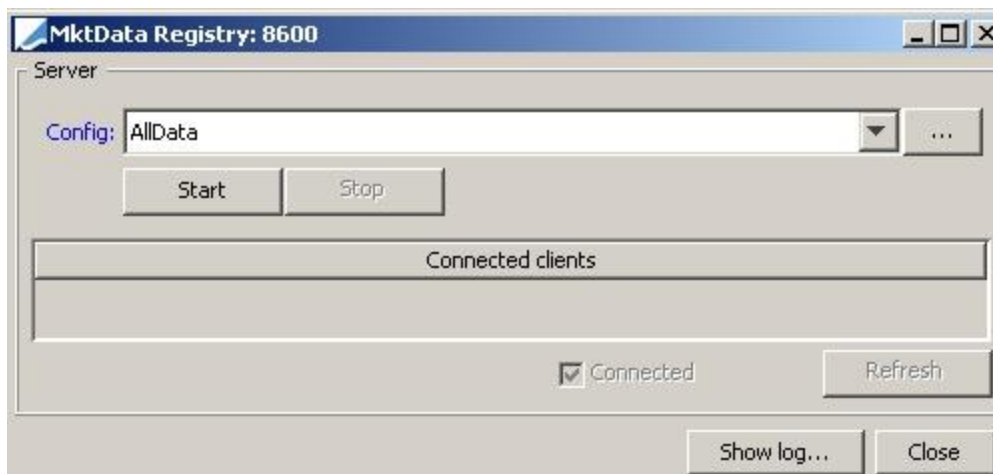
```
%CALYPSO_HOME%\bin\runjava.bat com.calypso.apps.startup.StartMktDataServer -config
AllMarketData -nogui -nologingui -username <user name> -password <password> -env <env>
```

### 6.2 GUI MODE

You can also start the Market Data Server in GUI mode using

`com.calypso.apps.startup.StartMktDataServer`.

The system displays the MktData Registry window.



Start Market Data Server

- » Select a market data server configuration, and click **Start**.

### 6.3 PROCESSING MARKET DATA AT STARTUP

When the market data server first starts, it can now pre-load quotes and market data as specified in a configuration file.

A sample file is located under `resources/samples/RemovePrefix_MktDataServerStartup.txt`.


You need to copy that file to "MktDataServerStartup.txt", in the same folder, and edit it as needed.

```
# File: MktDataServerStartup.txt
# 1st line: Configuration:<Configuration Name>|<PricingEnv name>
# Next lines: <Quote name> or <Market data item id>
# Comment lines start with the symbol #
#
#####
#
## Example:
#
#Configuration:MyConfig|MyPE
#FX.USD.JPY
```

```
#FX.EUR.USD  
#Equity.GM  
#1001  
#1002
```

The environment property MKTDATA\_SERVER\_MAX\_STARTUP\_ITEMS allows limiting the number of items loaded at startup (default is 100).

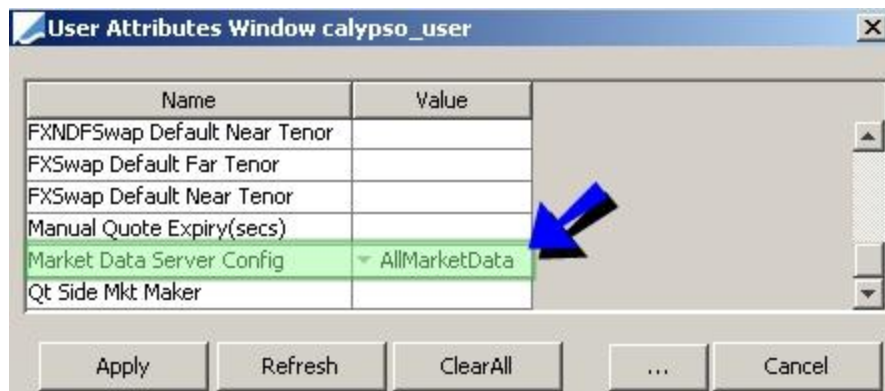
### ***What's Next?***

 Users are now ready to [activate subscriptions to real-time updates](#).

## 7. ACTIVATING MARKET DATA SERVER SUBSCRIPTIONS

On the Client side, each user must activate Market Data Server subscriptions to receive real-time updates from the Market Data Server.

Choose [Main Entry > Configuration > User Access Control > User Defaults](#).



### User Defaults - Select Market Data Server

- » Click **Attributes** to bring up the Attributes window.
- » Select a market data server configuration from the attribute "Market Data Server Config", and click **Apply**.
- » Click **Save** to save the User Defaults.

The activation is a one time operation.

### What's Next?

You are now ready to use real-time updates from the Market Data Server:

- » [In Trade Windows](#)
- » [For Intraday Risk](#)

## 8. USING THE MARKET DATA SERVER - TRADE WINDOW

### 8.1 TOUR OF THE PRICING AREA

When you are using the Market Data Server, the pricing area of the trade window shows the following features, provided the menu item [Pricing Env > Real Time.Change](#) is checked.



Trade Window using Market Data Server

- The green checkmark indicates that everything is running without any issue.  
It turns yellow if there is an issue - In this case, you can click the checkmark to show error details.  
It turns red if the Market Data Server stops running - In this case:
  - Contact your administrator to restart the Market Data Server
  - Click the down arrow and choose "Reconnect"
- The unlocked icon indicates that you want to receive real-time updates.  
You can click the unlocked icon to suspend real-time updates temporarily - The lock icon will appear instead.  
In turn, you can click the lock icon to resume real-time updates.
- The down arrow brings up a popup menu with additional functions - They are described below.



Market Data Server Menu

- The market data appears with a yellow background when it has been updated.

### 8.2 FORCING MARKET DATA UPDATE

At any time, you can click the down arrow and choose "Force Generate" to regenerate the market data with the latest quotes. This can be done in between consecutive real-time updates, or when you have temporarily suspended real-time updates.

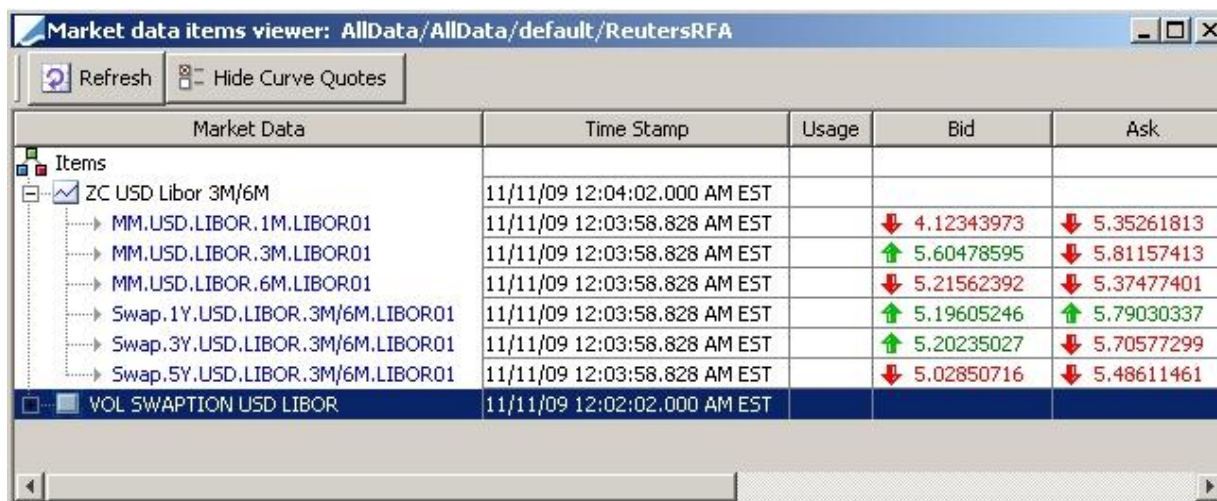
### 8.3 DISPLAYING MARKET DATA DETAILS

You can display details for all market data used in the trade, or for individual market data.

[NOTE: These windows are for display purposes only - To modify market data, you can access their definition window from the Market Data menu]

### 8.3.1 ALL MARKET DATA

You can click the down arrow and choose "Show Tree View" to display details about all the market data used in the trade.



Market data items viewer: AllData/AllData/default/ReutersRFA

Refresh Hide Curve Quotes

Market Data	Time Stamp	Usage	Bid	Ask
Items				
[-] ZC USD Libor 3M/6M	11/11/09 12:04:02.000 AM EST			
[-] MM.USD.LIBOR.1M.LIBOR01	11/11/09 12:03:58.828 AM EST		↓ 4.12343973	↓ 5.35261813
[-] MM.USD.LIBOR.3M.LIBOR01	11/11/09 12:03:58.828 AM EST		↑ 5.60478595	↓ 5.81157413
[-] MM.USD.LIBOR.6M.LIBOR01	11/11/09 12:03:58.828 AM EST		↓ 5.21562392	↓ 5.37477401
[-] Swap.1Y.USD.LIBOR.3M/6M.LIBOR01	11/11/09 12:03:58.828 AM EST		↑ 5.19605246	↑ 5.79030337
[-] Swap.3Y.USD.LIBOR.3M/6M.LIBOR01	11/11/09 12:03:58.828 AM EST		↑ 5.20235027	↓ 5.70577299
[-] Swap.5Y.USD.LIBOR.3M/6M.LIBOR01	11/11/09 12:03:58.828 AM EST		↓ 5.02850716	↓ 5.48611461
[-] VOL SWAPTION USD LIBOR	11/11/09 12:02:02.000 AM EST			

[View all Market Data](#)

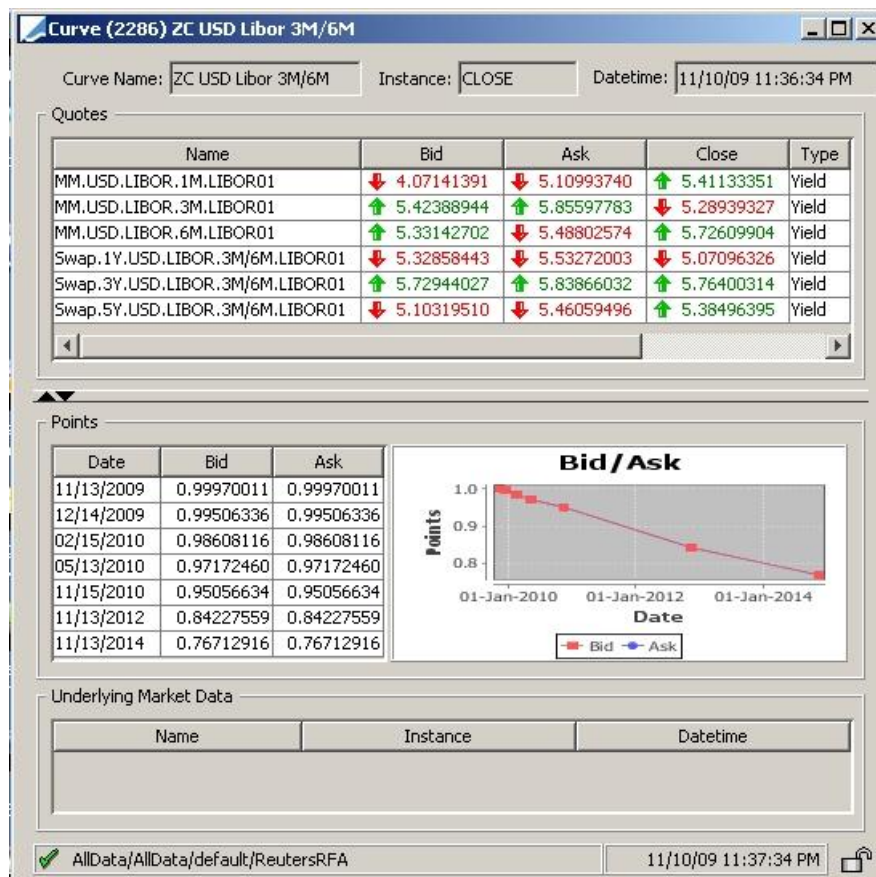
» You can click **Show Curve Quotes** to view details about the real-time quotes.

### 8.3.2 INDIVIDUAL MARKET DATA

You can double-click a market data to view its details.

You can also choose [Market Data > Utilities > Market Data Server Item Selector](#)

(`marketdata.server.MktDataViewerSelector`). You will be prompted to select a market data.



#### Market Data Details

This window is currently only available for curves - For other types of market data, the market data definition window is displayed instead.

[NOTE: If real-time updates have been temporarily suspended, the market data definition window is displayed instead. You may make changes to the market data and apply them to the trade as needed]

## 8.4 VIEWING QUOTES THAT ARE NOT UPDATED

You can click the down arrow and choose "Show Unsubscribe Feed Quotes" to display quotes that are not updated in real-time because they are not available from the live-feed source.

## 8.5 SELECTING ANOTHER MARKET DATA SERVER

You can click the down arrow and choose "Select Market Data Server" to select another Market Data Server.



## 9. USING THE MARKET DATA SERVER - INTRADAY RISK

Market Data Server items may be used by the middle-tier to compute risk results in real-time. Choose [Main Entry > Configuration > Reporting & Risk > Calculation Server](#) (`risk.service.RiskOnDemandSetupFrame`).

**Calculation Server Setup**

Calculation S...: CalcServerOfficial Refresh Log

**Analysis Configuration** | Incremental/Grid Configuration

Market Data ...: [MktDataServer] Al... 60 seconds ?

Event processing: ☒ Trade 60 seconds

Dispatcher config: NONE Job priority 100

☐ Stop service if no client connected?

Running	Output id	Analysis	Pricing Env	Trade Filter	Parameters	Val. Date	User
<input type="checkbox"/>		Composite	default	All IRD	IRD		
<input type="checkbox"/>	1011	Composite	default	All IRD	IRD		

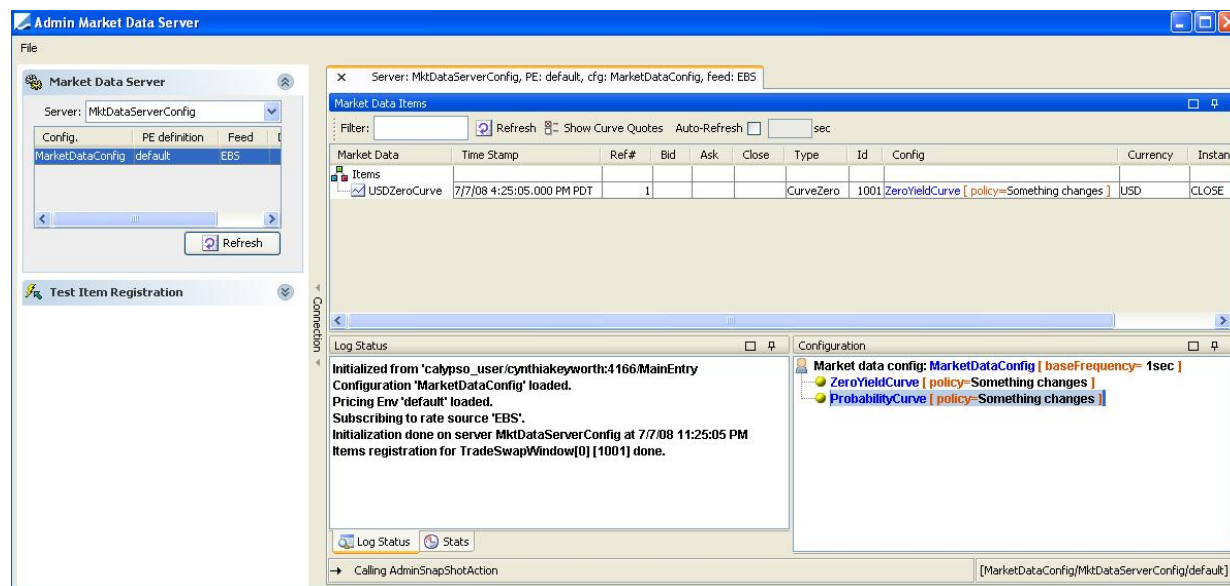
[Calculation Server using Market Data Server](#)

- » Select a Market Data Server configuration from the Market Data field.

Refer to Calypso Workstation documentation for completed details about middle-tier setup.

## 10. MONITORING A MARKET DATA SERVER

Open the Admin Monitor, and choose [Admin > Market Data Server](#) to open the Market Data Server Monitor.



### Admin Market Data Server

In the Market Data Server panel:

- » Select a server configuration from the Server drop-down menu.
- » Double-click a generation policy configuration in the table to display the details in the panels in the right.
- » Click **Refresh** to update the list of configurations.

The Market Data Items panel displays each market data item in the configuration:

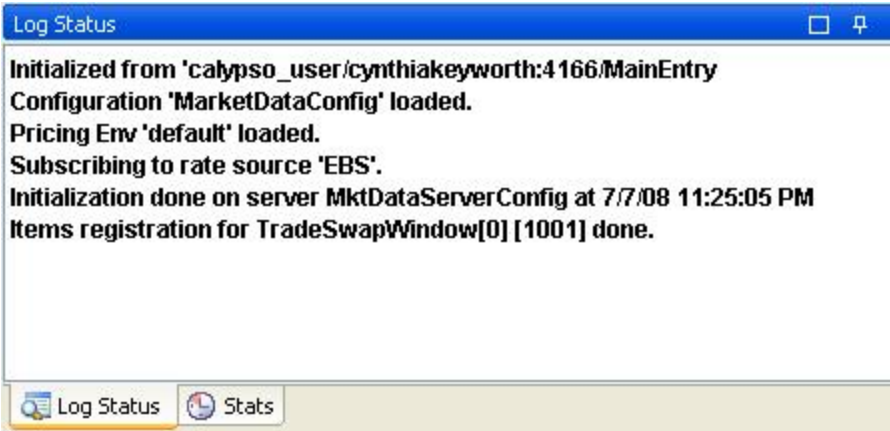
- » The Ref# column displays the number of client applications that are subscribing to that market data item.
- » Select a market data item and click **Show Curve Quotes** to display the quote details.

Market Data	Time Stamp	Ref#	Bid	Ask	Type	Id	Config
Items							
CurveProbMDS	2/21/08 11:57:51.000 AM PST	1			CurveProbability	6520	ProbabilityCurve
USDZeroCurve	2/21/08 11:43:22.000 AM PST	1			CurveZero	1001	ZeroYieldCurve
CDS.USD.CREDILIONPAR.SENIOR_UNSECURED/10Y	2/21/08 11:57:50.562 AM PST	1	0.2030	0.2919	Quotes [Spread]		
CDS.USD.CREDILIONPAR.SENIOR_UNSECURED/1Y	2/21/08 11:57:50.562 AM PST	1	0.3881	0.4678	Quotes [Spread]		
CDS.USD.CREDILIONPAR.SENIOR_UNSECURED/2Y	2/21/08 11:57:50.562 AM PST	1	0.3076	0.4270	Quotes [Spread]		
CDS.USD.CREDILIONPAR.SENIOR_UNSECURED/3Y	2/21/08 11:57:50.562 AM PST	1	0.3740	0.4831	Quotes [Spread]		
CDS.USD.CREDILIONPAR.SENIOR_UNSECURED/50Y	2/21/08 11:57:50.562 AM PST	1	0.0785	0.0892	Quotes [Spread]		
CDS.USD.CREDILIONPAR.SENIOR_UNSECURED/5Y	2/21/08 11:57:50.562 AM PST	1	0.3882	0.4240	Quotes [Spread]		

### Market Data Details

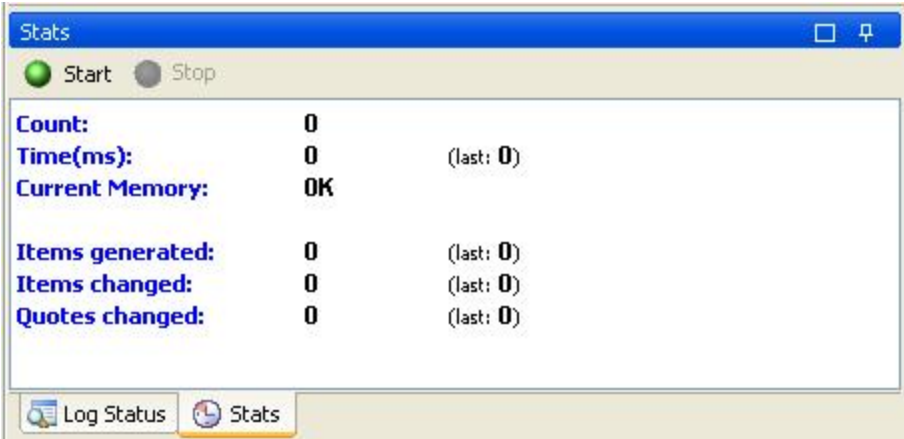
Click **Hide Curve Quotes** to return to the list of market data items.

The Log Status panel displays initialization details and exception details.



Log Status

The Stats panel has diagnostic capabilities.



Statistics

- » Click **Start** to start the statistics.

The left column displays the average to date stats. The right column displays the stats from the last policy generation.

Statistic	Description
Count	Number of generations for the configuration.
Time	Average time in milliseconds to generate an item.
Items generated	Number of market data items generated.
Items changed	Number of market data items that changed.
Quotes changed	Number of quotes that changed.

The Configuration panel displays the details of the market data configuration (for example, the configuration name, update frequency, market data item name, and policy name).



Configuration Details