



**Transaction Timing
Performance Tool
User Guide
Version 1.1**

Disclaimer

Copyright © 2011 Chicago Board Options Exchange. All rights reserved.

The information contained in this document constitutes confidential and/or trade secret information belonging to CBOE. This document is made available to CBOE members and member firms for use with CBOE*direct*™. This document is provided "As Is" with all faults and without warranty of any kind, either expressed or implied.

Change Notices

The following change notices are provided to assist users of the Transaction Timing (TT) Performance tool in determining the impact of changes to their processing.

If you have any questions or review comments about this document, please contact Odalys Castro at (312) 786-8817.

Date	Version	Description of Change
06/01/11	1.1	New screen capture
05/10/10	1.0	New document

Table of Contents

Table of Contents	iii
Introduction	iv
Purpose.....	iv
Intended Audience	iv
Conventions Used in this Guide	iv
Transaction Timing Performance Tool.....	5
Getting Started	6
Transaction Timing (TT) Reporting.....	7
General Search	8
TT Search	8
Perform TT Search by Class	12
Order/ Quote	17
TIDs Reporter.....	18
TID Detail	22
General TTE Reporter.....	24
Exit the System	27
Exit the System	27
Customizing TT Windows.....	28
Sizing Windows.....	28

Introduction

Purpose This user guide was written to assist users in measuring the performance and dependability conditions of the CBOE *direct* screen-based trading system.

Intended Audience This user guide is intended for systems management, developers or any person interested in the performance state of the CBOE *direct* screen-based trading system.

Conventions Used in this Guide The Transaction Timing (TT) Performance tool was designed so that you can perform all of your activities from a web page.

There are several conventions used throughout this guide to help trigger important information:

Bolding Used to highlight menu selections (e.g., **Login**) and button names (e.g., **Update**)

↪ **Note:** This notation is used to indicate important information you should note when performing the associated function.



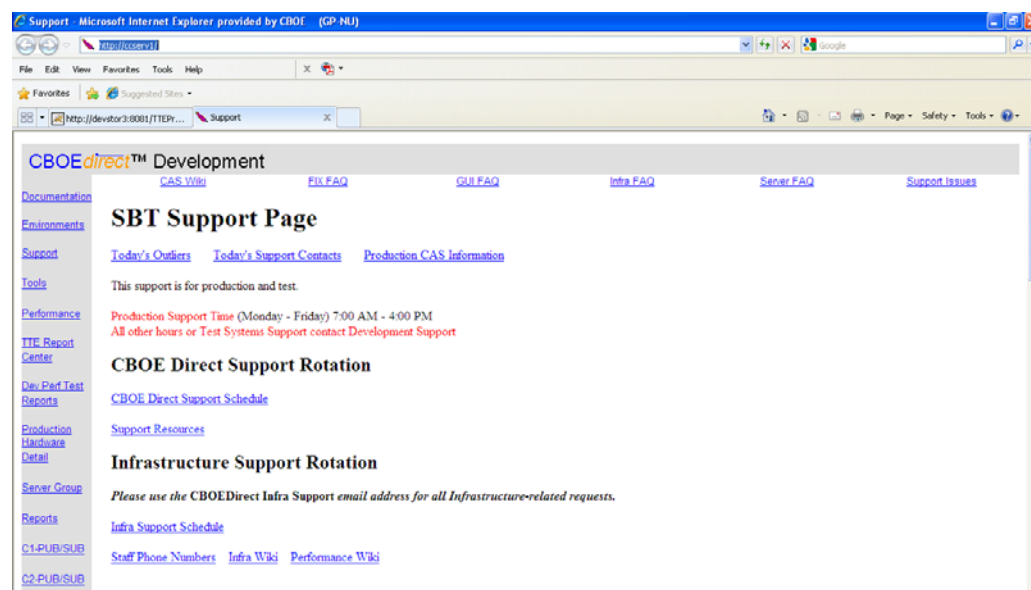
Transaction Timing Performance Tool

This section of the user guide will direct you through all functions of the Transaction Timing Performance tool for CBOE*direct*.

Getting Started

The Transaction Timing (TT) Performance tool is a CBOE internal web-based application. It is accessed through the CBOE *direct* Development website.

To launch the application, open an Internet browser window and enter **URL:** <http://ccserv1>. The CBOE *direct* Development website will display.



From the menu banner located to the left of the window, click **TTE Report Center**. The TT Performance application will display.

TTE Production Reports

Please Enter All Mandatory Fields (in red)

Search

Order/Quote

TID Reporter

TID Detail

General TTE Reporter

TID Reporter:

Date: 05/20/11
(mm/dd/yy)

Start Time: (HH24:MM:SS.FF)
End Time: (HH24:MM:SS.FF)

Low Duration: (µs)
High Duration: (µs)

Class ID:
CAS ID:
User ID:

Date Type: ALL
Session: W_MAN

DC Num: 0 0 0 0
Trade Server: ALL

Max Records: 10
Filter on Direction: ALL

☐ Get Record Count

Submit

Reset

Show Raw Data

TID

Resp (µs)

UID

Classid

Type

Time

CASID

TradeServer

BC

You are now ready to perform TT reporting functions.

Transaction Timing (TT) Reporting

Transaction Timing (TT) is a measurement-based tool and technique for system performance and dependability. The technique involves intercepting system method calls and logging the enter and exit times of the method. It is used to provide insight into processing times of various logical pieces in a call originating from the customer into CBOE*direct*. The TT reporting application allows you to query for events and method timing information based on the filters you provide. It also provides detailed investigation into specific Transaction ID (TID) metrics.

The TT reporting application is setup to query by general search, order/quote, TIDs reporter, TID detail and general TTE reporter.

General Search The search feature in the TT Performance tool allows you to execute general TT queries or queries based on a specific class. Click on the **Search** tab to define your filters.

TT Search

In the **Search** tab, all fields in red font are required. To perform a general TT query:

- Select **TTE Search** from the **Please Select Query** drop down list.
- In the **Date** field, enter the date you want to capture in your query. The date format is mm:dd:yy.
- Type in the start time of your data request in the **Start Time** field. The time format is HH24:MM:SS.FFF. For example, 10:35:00.000 represents 10:35a.m.
- From the **Type** drop down list, choose the category of your search (i.e. quote, order, etc.). Quote is the default value.
- Provide the user's acronym in the **User's ID** field.
- Enter the class name in the **Class** field.
- The **Max Records** field allows you to select the number of records you want to display in your query. The default is 10.
- For a TT search, the following fields are predefined and cannot be changed.
 - Class Lock Hold field defaults to 0-1000, GoBack Interval defaults to 01-00, RT Range defaults to 100-200, Session defaults to W_MAIN, GLB Coll. Type defaults to "ALL", Class Lock Wait defaults to 0-10000.
- If you do not want to display garbage collection, select **No GCs** from the Filters GC drop down checkbox.
- To clear your entries and begin a new query, click **Reset**.
- To enter your search request, click **Submit**. The result of your query will display in the TTE Search Report section of the window.

TTE Search Report (Order)													
Time	TID	CAS	Acronym	Branch	Class	Class Key	CAS Time (ms)	Server Time (ms)	Seq. Num	Firm	Sess.	Orig.	Product Name
11:35:59.926	6019929521827938304	fix50_03	ABC	WAB	IBM	69213922	1073663175	300283324765569534	501	3			C

The example above displays the TT order data for user ABC and class IBM on June 03, 2011, starting at 10:35a.m. The report generates the following information:

- **Time:** the time the transaction occurred.
- **TID:** the transaction ID for the order.
- **CAS:** name of the CAS engine.
- **Acronym:** refers to the user's acronym.
- **Branch:** the Firm's branch ID.
- **Class:** the name of the class.
- **Class Key:** class identifier.
- **CAS Time (ms):** the transaction time for the CAS in milliseconds.
- **Server Time (ms):** the transaction time for the server in milliseconds.
- **Seq. Num:** the order sequence number
- **Firm:** the Firm's number
- **Sess.:** the trading session where the order was entered.
- **Orig.:** the order originator
- **Product Name:**

Use your scroll bar to view additional data fields to the right of the window.

To display your search results in raw data, click **Show Raw Data**. The results will display as follows.

```

http://devtest3:9001/TTEProcReports/faces/Print1.jsp
/sbt test infra/TransTimeReports/2011/06/03/data/CAS/OrderTimes TIME,TID,CAS,Acronym,Branch,Class,ClassKey,ProductKey,CASTime,ServerTime,Seq#,Firm,Session,Originator 11:35:59.926
6019929521827938304 fix50_03 ABC WAB IBM 69213922 1073663175 3002833 2476556 9534 501 3 C
  
```

To display detailed information for a TID, click on the TID data row. A new window will open detailing the method entry and exit timings for that TID.

The report has three tabs with each tab providing a different perspective of the selected TID. The three tabs are: QueryTID Report, QueryTID Time Report and Query CLL Report.

QueryTID Report

Transaction Timing for TID 601992952102792004 (91850934744699) Friday 06/03/11

#Direction	Time	CAS	Acronym	ClassName	ClassKey	ProductKey	CASTime	ServerTime	Branch	Sequence	Firm	Session	Originator	Type
Enter	11:35:59.926	fix50_03	ABC	IBM	69213922	1073663175	3002833	2476556	NAB	9934	801	M_NAIII	C	Order
Exit	11:35:59.929	fix50_03	ABC	IBM	69213922	1073663175	3002833	2476556	NAB	9934	801	M_NAIII	C	Order

fix50 fixcas03v2fix50

#Direction	Time	nanoTime	duration(ms)	threadID	callDelta(ms)	totalDelta(ms)	serverField	methodID	methodName
1.Enter	11:35:59.926	18907960365976065	0	470966022	N/A	N/A	0	1323186	FixAppAdapter
1.Exit	11:35:59.926	18987960366000907	0.024	470966032	0.024	0.024	0	1323186	FixAppAdapter
2.Enter	11:35:59.926	18907960366150932	0	767497192	0.155	0.179	0	1323188	FixOrderDispatcher
3.Enter	11:35:59.926	18987960366217197	0	767497182	0.061	0.24	0	1323188	FixGetProductByDate

Red color above indicates method duration over threshold of 5.0 milliseconds

QC Filter: No GCs [Cancel] [ShowRawData]

The QueryTID Report tab provides a detailed view of the time the TID has spent within a method and between methods. It also presents the applicable method ids and method names.

This output shows entry and exit into a method and the durations inside these methods. To allow a user to line-up the related entries and exits, by default the entry to the methods are numbered, indented and colorized to match their peer exit.

To turn off these decorations and see a linear list of all exits and entries, select the checkbox. **Show Results in Plain Text**.

Click **Cancel** to return to the main reporting page.

QueryTID Time Report

TTE Production Reports

Details for TID: 6019929521827938304 Date: 06/03/11

☐ Show Results in Plain Text

QueryTID Report QueryTID Time Report Query CLL Report

Transaction Timing for TID 6019929521827938304(9165634744488) Friday 06/03/11

Session(V_MAR, Type=Order, Class=BM, User=ABC, Branch=UAB, Sequence=9534, Firm=501 Originator Type=C

Call First in Last Out Duration [serverTime]
 fx50_02 1 11:35:59.926 11:35:59.929 3002833 2478666
 Network time CAG to QHG: 552556
 fxCA902v2fx50 2 11:35:59.929 11:35:59.929 2.053
 BC30x1OnServerMyntprobc30a 3 11:35:59.927 11:36:37.079 1.624
 Total GC Time 7
 GC Event 11:36:15.053 11:36:15.060 7
 BC30x1OnServerMyntprobc30a 1 11:36:00.008 11:36:00.009 0.103
 BC30x1HybridTradeServerZaribc30a 5 11:35:59.927 11:36:36.898 0.984
 BC30x1HybridTradeServerprobc30a 1 11:35:59.944 11:35:59.944 0.047

----- Method Statistics -----

Call Total Time Exclusive Time Name

fxCA902v2fx50
 1 2.451 2.451 Order_RoutingProxy
 1 0.197 0.197 fxOrderPublishView
 1 2.828 0.089 fxOrderDispatcher
 1 0.000 0.000 Order

GC Filter: No GCs Cancel ShowRawData

The QueryTID Time Report is a summary of the methods visited by this TID for each Trade Server involved.

Click **Cancel** to return to the main reporting page.

Query CLL Report

TTE Production Reports

Details for TID: 6019929521827938304 Date: 06/03/11

☐ Show Results in Plain Text

QueryTID Report QueryTID Time Report Query CLL Report

Class Lock	Acquire Time	TID	Class Lock	Hold Time (ms)	Traded (ms)	Gbg. Coll. (ms)	Type (QPB, Cancelcount, OrderOrigin)	UserID	InCAS Time (ms)	InCAS Interval
11:35:59.914	4503654066402689024	0.000	0.188	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.914	4503654066402623488	0.243	0.174	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.914	4503654067058049024	0.760	0.226	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.914	4503654066402557952	0.981	0.256	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.913	4503654067713409024	1.424	0.257	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.913	4503654067057983488	1.375	0.287	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.912	4503654066402492416	1.254	0.251	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.912	4503654067713343488	0.609	0.243	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.911	4503654067057917952	1.351	0.257	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.911	4503654066402426880	1.365	0.278	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.911	4503654067713277952	1.324	0.315	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.910	4503654067057852416	0.639	0.300	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.909	4503654066402361344	1.217	0.270	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.909	4503654067713212416	1.227	0.292	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.909	4503654067057786880	1.683	0.295	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.908	4503654066402295808	1.032	0.301	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.907	4503654067713146880	0.926	0.314	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.907	4503654067057721344	0.589	0.181	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.907	4503654066402230272	0.564	0.216	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	
11:35:59.907	4503654067713081344	0.534	0.277	NoTrade	NoGC	ServerTransaction	N/A	N/A	N/A	

GC Filter: No GCs Cancel ShowData

The Query CLL (Class Level Lock) Report is a list of the TIDs associated with the main TID of the report. Clicking on these associated TIDs allows investigation into the

different layers of connected TIDs for this TID.

Click **Cancel** to return to the main reporting page.

Perform TT Search by Class

The TT tool allows you to perform a search based on a specific class.

The screenshot displays the 'TTE Production Reports' interface. On the left is the 'Search' tab with various input fields. On the right is the 'TTE Search By Class Report' table.

Search Tab Fields:

- Please Enter All Mandatory Fields (in red):**
 - Please Select Query:** SearchByClass (dropdown)
 - Date:** 06/03/11 (mm/dd/yyyy)
 - User ID:** (text field)
 - Type:** ALL (dropdown)
 - Start Time:** 10:35:00.000 (HH:MM:SS.FFF)
 - Class:** GLB (dropdown)
 - CAS Name:** (text field)
 - End Time:** (text field)
 - Class Lock Hold:** 0-10000 (ms)
 - RT Range:** 100-200 (min-max)
 - GoBack Interval:** 01:00 (HH:MM)
 - Gbg Coll. Type:** ALL (dropdown)
 - Session:** W_MAIN (dropdown)
 - Filter GCs:** No GCs (dropdown)
 - Class Lock Wait:** 0-10000 (ms)
 - Graph Results:** (button)
 - Max Records:** 500 (dropdown)
 - Filter on Direction:** ALL (dropdown)
 - Get Record Count:** (button)
 - Submit, Reset, Show Raw Data:** (buttons)

TTE Search By Class Report Table:

Class	Class Lock	Class Lock	Class Lock	Type	Order	Cancelcount	OrderOrigin	UserID	Int
Acquire	Wait	Hold	Time	GBg	Coll.	Optional Data			
Time	TID	Time (ms)	Time (ms)	Traded (ms)	Coll. (ms)				

In the **Search** tab, all fields in red font are required. To perform a TT query based on a specific class:

- Select **SearchByClass** from the **Please Select Query** drop down list.
- In the **Date** field, enter the date you want to capture in your query. The date format is mm:dd:yy.
- Type in the start time of your data request in the **Start Time** field. The time format is HH24:MM:SS.FFF. For example, 10:35:00.000 represents 10:35a.m.
- From the **Type** drop down list, choose the category of your search (i.e. quote, order, etc.). Quote is the default value.
- Provide the user's acronym in the **User's ID** field.
- Enter the class name in the **Class** field.
- The **Max Records** field allows you to select the number of records you want to display in your query. The default is 500.
- For a search by class, the following fields are predefined and cannot be changed.
 - RT Range defaults to 100-200
 - GLB Coll. Type defaults to "ALL"
- The following fields can be changed at your discretion but are predefined as follows:
 - Class Lock Hold field defaults to 0-10000
 - GoBack Interval defaults to 01:00
 - Session defaults to W_MAIN

- Class Lock Wait defaults to 0-10000
- If you do not want to display garbage collection, select the **No GCs** from the **Filter GCs** drop down list.
- To clear your entries and begin a new query, click **Reset**.
- To enter your search request, click **Submit**. The result of your query will display in the TTE Search by Class Report section of the window.

Class Lock Acquire Time	TID	Class Lock Wait Time (ms)	Class Lock Hold Time (ms)	Traded (ms)	Gbg. Coll. (ms)	Optional Data	Type (QPB, Cancelcount OrderOrigin)	UserID	InCAS Time
10:34:59.912	106701126208389120	0.003	0.232	NoTrade	NoGC	0	Quote(3)	SMM06	10:34:5
10:34:59.659	131470980561567744	0.000	0.067	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5
10:34:59.639	131470980103995392	0.000	0.066	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5
10:34:59.639	131470980169400320	0.000	0.094	NoTrade	NoGC	0	Quote(2)	MLF1	10:34:5
10:34:59.621	107827011503652864	0.002	0.274	NoTrade	NoGC	0	Quote(7)	RCQ	10:34:5
10:34:59.604	131189376026083328	0.000	0.359	NoTrade	NoGC	0	Quote(33)	MSA12	10:34:5
10:34:59.926	131470980626776064	0.003	0.141	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5
10:34:58.897	139915108477501440	0.003	0.362	NoTrade	NoGC	0	Quote(9)	TZV8	10:34:5
10:34:58.877	139915108870455296	0.002	0.320	NoTrade	NoGC	0	Quote(10)	TZV8	10:34:5
10:34:58.859	106701125423267840	0.002	0.142	NoTrade	NoGC	0	Quote(2)	SMM06	10:34:5
10:34:58.813	111486165017755648	0.002	0.121	NoTrade	NoGC	0	Quote(1)	WYI	10:34:5
10:34:58.786	131470981870845952	0.003	0.107	NoTrade	NoGC	0	Quote(3)	MLF1	10:34:5
10:34:58.694	111486162857754624	0.002	0.110	NoTrade	NoGC	0	Quote(1)	WYI	10:34:5
10:34:58.666	99664385672806400	0.002	0.176	NoTrade	NoGC	0	Quote(2)	LB19	10:34:5
10:34:58.658	139915107363848192	0.002	0.554	NoTrade	NoGC	0	Quote(13)	TZV8	10:34:5
10:34:58.653	92908838913638400	0.002	0.118	NoTrade	NoGC	0	Quote(1)	HZ10	10:34:5
10:34:58.649	139915108215619584	0.002	0.337	NoTrade	NoGC	0	Quote(9)	TZV8	10:34:5
10:34:58.595	131470981870714880	0.002	0.062	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5
10:34:58.588	131470981477957632	0.000	0.072	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5
10:34:58.568	92908840354119680	0.003	0.197	NoTrade	NoGC	0	Quote(2)	HZ10	10:34:5
10:34:58.567	131470979906797568	0.003	0.116	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5
10:34:58.550	92908837669240832	0.002	0.101	NoTrade	NoGC	0	Quote(2)	HZ10	10:34:5
10:34:58.539	139915108477370368	0.002	0.382	NoTrade	NoGC	0	Quote(10)	TZV8	10:34:5
10:34:58.516	92908839895760896	0.003	0.133	NoTrade	NoGC	0	Quote(1)	HZ10	10:34:5
10:34:58.516	131470979645964288	0.000	0.099	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5
10:34:58.511	131470981149949952	0.002	0.126	NoTrade	NoGC	0	Quote(1)	MLF1	10:34:5

The example above displays the TT order data for class IBM on June 03, 2011, starting at 10:35a.m. The report generates the following information:

- **Class Lock Acquire Time:** the time the class lock occurred.
- **TID:** the transaction ID for the order.
- **Class Lock Wait Time:** the class lock waiting period in milliseconds.
- **Class Lock Hold Time:** the class lock holding period in milliseconds.
- **Traded:** the time the trade occurred in milliseconds.
- **Gbg Col:** refers to the garbage collection times in milliseconds.
- **Type:** the count of actions that took place (i.e., number of quotes per block).
- **User ID:** the user's acronym.
- **InCAS Time (ms):** the time the transaction reached the CAS in milliseconds.
- **InCAS Interval (ns):** the CAS interval times for the transaction in nanoseconds.

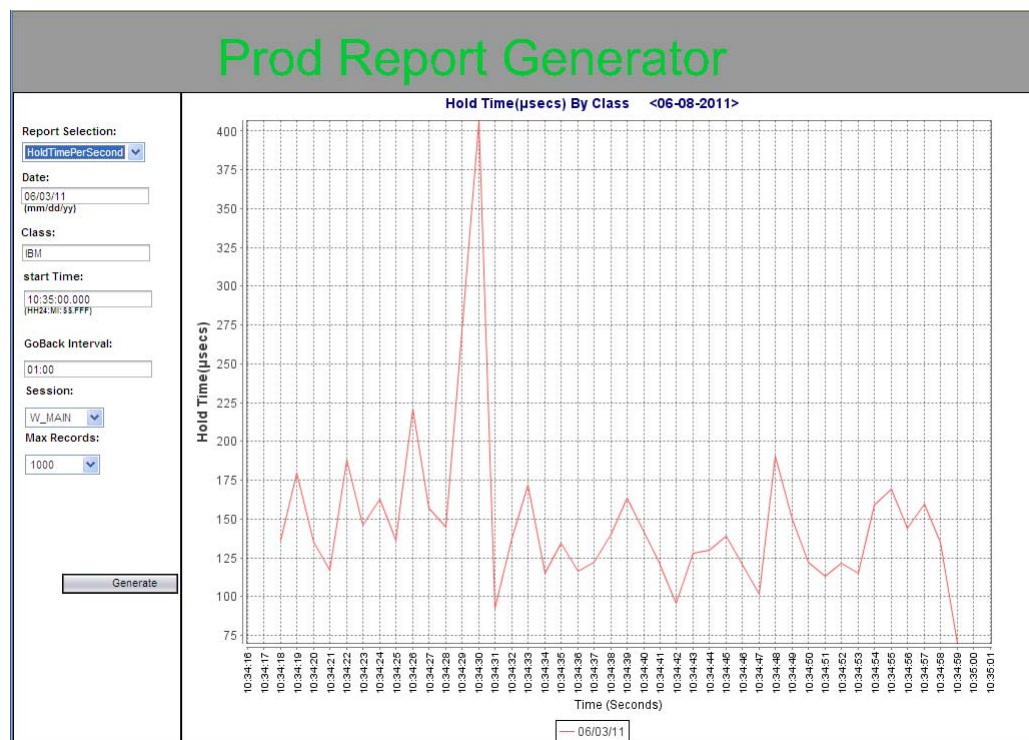
Use your scroll bar to view additional data fields to the right of the window.

To display your search results in raw data, click **Show Raw Data**. The results will display as follows.

http://devstor3:8081/TTProdReports/faces/Page1.jsp

10:34:59.912 106701126206389120 0.003 0.232 NoTrade NoGC 0 Quote(3) SMM06 10:34:59.915 797151 10:34:59.659 131470980561567744 0.000 0.067 NoTrade NoGC 0 Quote(1) MLF1 10:34:59.662 353779 10:34:59.639 131470980103995392 0.000 0.066 NoTrade NoGC 0 Quote(1) MLF1 10:34:59.642 385151 10:34:59.639 131470980169400320 0.000 0.094 NoTrade NoGC 0 Quote(2) MLF1 10:34:59.642 456662 10:34:59.621 107827011503652864 0.002 0.274 NoTrade NoGC 0 Quote(7) RCQ 10:34:59.625 800512 10:34:59.604 131189376026083328 0.000 0.359 NoTrade NoGC 0 Quote(33) MSA12 10:34:59.607 989752 10:34:58.926 131470980626776064 0.003 0.141 NoTrade NoGC 0 Quote(1) MLF1 10:34:58.926 544391 10:34:58.897

To display your search results in graph format, click **Graph Results**.



To display detailed information for a transaction ID, click on the TID data row. A new window will open detailing the method entry and exit timings for that TID.

The report has three tabs with each tab providing a different perspective of the selected TID. The three tabs are: QueryTID Report, QueryTID Time Report and Query CLL Report.

QueryTID Report

TTE Production Reports

Details for TID: 106701126208389120 Date: 06/03/11

☐ Show Results in Plain Text

QueryTID Report QueryTID Time Report Query CLL Report

Transaction Timing for TID 106701126208389120 (1628129977545) Friday 06/03/11

#Direction	Time	CAS	Acronym	ClassName	ClassKey	CASTime	ServerTime	ClassWait	ClassHold	CacheWait	CacheHold	BlockSize	Session	Type
Enter	10:34:59.915	cas0379	S0006	IBM	69213922	797151	749030	3155	762971	355	22317	3	W_MAIN	Quote
Exit	10:34:59.915	cas0379	S0006	IBM	69213922	797151	749030	3155	762971	355	22317	3	W_MAIN	Quote

cas0379 cas0379cas0379

#Direction	Time	nanotime	duration(ms)	threadID	callDelta(ms)	totalDelta(ms)	serverField	methodID	methodName
1.Enter	10:34:59.915	958646972485450	0	2343287	N/A	N/A	0	1306259	Quote
2.Enter	10:34:59.915	9586469724897910	0	2343287	0.012	0.012	0	1379738	Quote_RoutingProxy
3.Exit	10:34:59.915	9586469725643969	0.746	2343287	0.746	0.759	0	1379738	Quote_RoutingProxy
1.Exit	10:34:59.915	9586469725673613	0.708	2343287	0.03	0.708	0	1306259	Quote

prdoc308 BC30X1HybridTradeServerprdoc308

*Red color above indicates method duration over threshold of 5.5 milliseconds

GC Filter: No GCs Cancel ShowRawData

The QueryTID Report tab provides a detailed view of the time the TID has spent within a method and between methods. It also presents the applicable method ids and method names.

This output shows entry and exit into a method and the durations inside these methods. To allow a user to line-up the related entries and exits, by default the entry to the methods are numbered, indented and colorized to match their peer exit.

To turn off these decorations and see a linear list of all exits and entries, select the checkbox. **Show Results in Plain Text**.

Click **Cancel** to return to the main reporting page.

QueryTID Time Report

TTE Production Reports

Details for TID: 106701126200389120 Date: 06/03/11

☐ Show Results in Plain Text

QueryTID Report QueryTID Time Report Query CLL Report

Transaction Timing for TID: 106701126200389120(1628126877648) Friday 06/03/11

Session: MY_MARL Type=Quote, Class=BM, User=GM006, BlockSize=3

Host Calls Rt OUT Duration [serverTime classValuing cacheValuing]
 cas0378 1 10:34:59.915 10:34:59.915 797161 749030 3165 265
 Network time CAS to TS: 432030
 cas01v2cas0279 1 10:34:59.915 10:34:59.915 0.700
 BC30v2cas0279 1 10:34:59.912 10:34:59.913 0.317

***** Method Statistics *****

Calls Total Time Exclusive Time Name

cas01v2cas0378
 1 0.746 0.746 Quote_RoutingProxy
 1 0.700 0.042 Quote
 BC30v2cas0279 1 0.317 0.002 com.cboe.businessServices.marketDataService.MarketDataServiceLocalImpl:acceptQuotesForClassV3(Lcom.cboe.idl.cmiQuote.QuoteStructV3(Lcom.cboe.idl.cmiQuote.ClassQuoteResultStructV3;
 4 0.028 0.028 BOMession_Command
 1 0.024 0.024 com.cboe.businessServices.marketDataService.MarketUpdate.MarketUpdateCollector:TT_DB_HandCoded_COMMIT
 2 0.016 0.016 com.cboe.server.marketDataBuffer.MarketDataBufferCollectorImpl:TT_DB_HandCoded_COMMIT
 1 0.002 0.002 AccountClassLevelLock
 3 0.002 0.002 com.cboe.businessServices.marketDataService.QuoteImpl:TT_DB_HandCoded_COMMIT

GC Filter: No GCs

The QueryTID Time Report is a summary of the methods visited by this TID for each Trade Server involved.

Click **Cancel** to return to the main reporting page.

Query CLL Report

TTE Production Reports

Details for TID: 106701126200389120 Date: 06/03/11

☐ Show Results in Plain Text

QueryTID Report QueryTID Time Report Query CLL Report

Class Lock	Acquire Time	TID	Class Lock Wait Time (ms)	Class Lock Hold Time (ms)	Trade (ns)	Cbg. Coll. (ms)	Type (QPB, Cancelcount, OrderOrigin)	UserID	InCAS (ms)	InCAS Interval
	10:34:59.639	131470990103995392	0.000	0.066	NoTrade	NoGC	Quote (1)	MLF1	10:34:59.642	0
	10:34:59.639	131470980169400320	0.000	0.094	NoTrade	NoGC	Quote (2)	MLF1	10:34:59.642	0
	10:34:59.621	107027011503652864	0.002	0.274	NoTrade	NoGC	Quote (7)	RQ2	10:34:59.625	0
	10:34:59.604	101109376026083320	0.000	0.359	NoTrade	NoGC	Quote (33)	MSA12	10:34:59.607	0
	10:34:58.926	131470980626776064	0.003	0.141	NoTrade	NoGC	Quote (1)	MLF1	10:34:58.928	0
	10:34:58.897	139915108477501440	0.009	0.362	NoTrade	NoGC	Quote (9)	TZV8	10:34:58.900	0
	10:34:58.877	139915108870455296	0.002	0.320	NoTrade	NoGC	Quote (10)	TZV8	10:34:58.880	0
	10:34:58.859	106701125423267940	0.002	0.142	NoTrade	NoGC	Quote (2)	MM006	10:34:58.861	0
	10:34:58.813	111486165017795640	0.002	0.121	NoTrade	NoGC	Quote (1)	WT1	10:34:58.816	0
	10:34:58.786	131470981870845952	0.003	0.107	NoTrade	NoGC	Quote (3)	MLF1	10:34:58.789	0
	10:34:58.727	139915107495051264	0.000	0.217	NoTrade	NoGC	Quote (8)	TZV8	10:34:58.730	0
	10:34:58.710	139915110572490752	0.000	0.217	NoTrade	NoGC	Quote (7)	TZV8	10:34:58.713	0
	10:34:58.694	111486162057754624	0.002	0.110	NoTrade	NoGC	Quote (1)	WT1	10:34:58.696	0
	10:34:58.666	99604385672806400	0.002	0.176	NoTrade	NoGC	Quote (2)	LB19	10:34:58.669	0
	10:34:58.658	139915107363848192	0.002	0.554	NoTrade	NoGC	Quote (13)	TZV8	10:34:58.660	1
	10:34:58.653	92908838913638400	0.002	0.118	NoTrade	NoGC	Quote (1)	ML10	10:34:58.656	0
	10:34:58.649	139915108215619088	0.002	0.337	NoTrade	NoGC	Quote (9)	TZV8	10:34:58.652	0
	10:34:58.595	131470981870714880	0.002	0.062	NoTrade	NoGC	Quote (1)	MLF1	10:34:58.598	0
	10:34:58.590	131470981477957632	0.000	0.072	NoTrade	NoGC	Quote (1)	MLF1	10:34:58.590	0
	10:34:58.568	92908840354119680	0.003	0.197	NoTrade	NoGC	Quote (2)	ML10	10:34:58.571	0

GC Filter: No GCs

The Query CLL (Class Level Lock) Report is a list of the TIDs associated with the main TID of the report. Clicking on these associated TIDs allows investigation into the different layers of connected TIDs for this TID. Click **Cancel** to return to the main reporting page.

Order/Quote Click on the **Order/Quote** tab to query TT data by order/quote count per class.

In the **Order/Quote** tab, all fields in red font are required.

- Enter the date of your query in the **Date** field. The date format is mm/dd/yy.
- Although the fields are not in red font, you are required to enter a **User ID** or **CAS Name** or both.
- From the **Type** field, choose the category of data you want to display. Quote is the default value.
- The **Max Records** field allows you to select the number of records you want to display in your query. The default is 10.
- **Filter on Direction** is predefined to "All" and cannot be changed.
- To clear your data and start a new query, click **Reset**. The values you entered in the fields will be removed.
- If you are satisfied with your query request, click **Submit**. The results will display to the right of your window.

TTE Production Reports

Please Enter All Mandatory Fields (in red)

Order/Quote Counts By Class

Date: 06/03/11

UserId: ABC

CAS Name:

Type: Order

Max Records: 5 Filter on Direction: ALL

Get Record Count Submit Reset Show Raw Data

```

06/03/11 ABC fix50_03
Orders Class
181 SPXW
109 GPOR
102 SPX
84 POWI
81 UKB

```

[Send Feedback](#)

The example above shows that on June 03, 2011, user ABC on FIX50 engine 03 had 181 orders for class SPXW, 109 orders for class GPOR, etc.

TIDs Reporter

The **TIDs Reporter** tab provides a general mechanism for investigating transaction IDs.

TTE Production Reports

Please Enter All Mandatory Fields (in red)

TID Reporter:

Date: 06/03/11
(mm/dd/yyyy)

Start Time: Low Duration:
(HH24:MI:SS.YYYY) (µs)

End Time: High Duration:
(HH24:MI:SS.YYYY) (µs)

Class ID: Data Type: ALL

CAS ID: ALL Session: VV_MAIN

User ID: ALL

BC Num: 0 0 0 a Trade Server: ALL

Max Records: 10 Filter on Direction: ALL

Get Record Count Submit Reset Show Raw Data

TID	Resp (µs)	UID	ClassId	Type	Time	CASID	TradeServer	BC
-----	-----------	-----	---------	------	------	-------	-------------	----

[Send Feedback](#)

In the **TIDs Reporter** tab, all fields in red font are required. To perform a TT query:

- In the **Date** field, enter the date you want to capture in your query. The date format is mm:dd:yy.
- Optional fields include: Start Time, End Time, Low Duration, High Duration, Class ID, Data type, CAS ID, Session and User ID.
 - ↳ **Note:** Although the fields above are optional, you must enter a Class ID, CAS ID or User ID to run the query.
- The **Max Records** field allows you to select the number of records you want to display in your query. The default is 10.

- To clear your entries and begin a new query, click **Reset**.
- To enter your search request, click **Submit**. The result of your query will display in the TTE Search Report section of the window.

TTE Production Reports

Please Enter All Mandatory Fields (in red)

Search
Order/Quote
TIDs Reporter
TID Detail
General TTE Reporter

TID Reporter:
Date: 06/03/11
(mm/dd/yyyy)

Start Time: (HH24:MM:SS.FFF)
End Time: (HH24:MM:SS.FFF)

Low Duration: (ps)
High Duration: (ps)

Class ID: ()
CAS ID: ALL
User ID: ALL

Data Type: ALL
Session: VW_MAIN

BC Num: 0 0 0 0 0 0 0 0
Trade Server: ALL

Max Records: 10
☐ Get Record Count

Filter on Direction: ALL
Submit
Reset
Show Raw Data

TID	Resp (µs)	UID	Classid	Type	Time	CASID	TradeServer	BC
126967211861147648	161.473	JJC	SOMU	QuoteCancel	09:26:25.258	cas0451	TradeServer3	prdb094a
126967210029433408	162.110	JJC	SOMU	QuoteCancel	09:26:30.279	cas0451	TradeServer3	prdb094a
126967230171250688	160.974	JJC	SOMU	QuoteCancel	10:41:26.512	cas0451	TradeServer3	prdb094a
126967268015013888	157.254	JJC	CYOU	QuoteCancel	15:00:02.884	cas0451	TradeServer4	prdb094a
126967267294511104	169.195	JJC	ALV	QuoteCancel	15:00:03.451	cas0451	TradeServer4	prdb030b
126967266443264000	161.078	JJC	ALV	QuoteCancel	15:00:03.451	cas0451	TradeServer4	prdb030b
126967267427549184	161.753	JJC	GEQV	QuoteCancel	15:00:05.397	cas0451	TradeServer4	prdb081b
126967266830052864	160.557	JJC	EFAY	QuoteCancel	15:00:05.636	cas0451	TradeServer4	prdb030b
126967269393039360	156.390	JJC	HLF	QuoteCancel	15:00:05.639	cas0451	TradeServer4	prdb081b

The example above shows the list of TIDs on June 03, 2011, for All users. The report generates the following information.

- **TID:** the transaction ID for the data type (i.e., order, quote, etc.)
- **Resp:** response time for the TID.
- **UID:** the user's acronym.
- **ClassID:** the class acronym.
- **Type:** the data type (i.e., order, quote, etc.)
- **Time:** the time the transaction occurred.
- **CASID:** the CAS engine identifier.
- **FE:** the Front-end identifier.
- **BC:** the Business Cluster identifier.
- **Session:** the trading session where the order was entered.

Use your scroll bar to view additional data fields to the right of the window.

To display your search results in raw data, click **Show Raw Data**.

To display detailed information for a transaction ID, click on the TID data row. A new window will open detailing the method entry and exit timings for that TID.

The report has three tabs with each tab providing a different perspective of the selected TID. The three tabs are: QueryTID Report, QueryTID Time Report and Query CLL Report.

QueryTID Report

Details for TID: 126967211861147648 Date: 06/03/11

☐ Show Results in Plain Text

QueryTID Report QueryTID Time Report Query CLL Report

Transaction Timing for TID 126967211861147648(1937365903643) Friday 06/03/11

#Direction	Time	CAS	Acronym	ClassDate	ClassDay	CASTime	ServerTime	ClassWait	ClassHold	CacheWait	CacheHold	BlockSize	Session	Type
Enter	09:26:25.258	cas0451	JJC	SCHU	88080395	161478	153652	566	155968	0	0	1	W_MAIN	QuoteCancel
Exit	09:26:25.258	cas0451	JJC	SCHU	88080395	161473	153652	566	155968	0	0	1	W_MAIN	QuoteCancel

cas0451 cas01v2cas0451

#Direction	Time	nanoTime	duration(ms)	threadID	callDelta(ms)	totalDelta(ms)	serverField	methodID	methodName
1.Enter	09:26:25.259	11386619031788820	0	1602915269	N/A	N/A	0	1306260	CancelQuote
2.Enter	09:26:25.259	11306619031795035	0	1602915269	0.007	0.007	0	1379739	CancelQuote_RoutingProxy
2.Exit	09:26:25.259	11386619031947377	0.152	1602915269	0.152	0.159	0	1379739	CancelQuote_RoutingProxy
1.Exit	09:26:25.259	11306619031948069	0.16	1602915269	0.001	0.16	0	1306260	CancelQuote

prdcn94a BC94aHybridTradeServer3prdcn94a

* Red color above indicates method duration over threshold of 5.0 milliseconds

GC Filter: No GCs Cancel ShowRawData

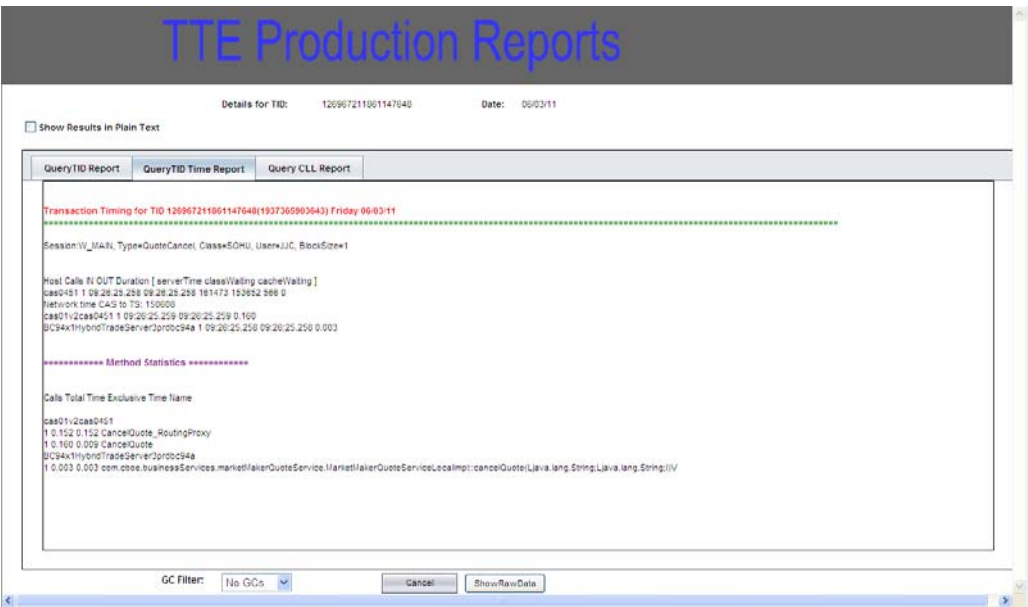
The QueryTID Report tab provides a detailed view of the time the TID has spent within a method and between methods. It also presents the applicable method ids and method names.

This output shows entry and exit into a method and the durations inside these methods. To allow a user to line-up the related entries and exits, by default the entry to the methods are numbered, indented and colorized to match their peer exit.

To turn off these decorations and see a linear list of all exits and entries, select the checkbox. **Show Results in Plain Text**.

Click **Cancel** to return to the main reporting page.

QueryTID Time Report



The QueryTID Time Report is a summary of the methods visited by this TID for each Trade Server involved.

Click **Cancel** to return to the main reporting page.

Query CLL Report



The Query CLL (Class Level Lock) Report is a list of the TIDs associated with the main TID of the report. Clicking on these associated TIDs allows investigation into the different layers of connected TIDs for this TID.

Click **Cancel** to return to the main reporting page.

TID Detail The **TID Detail** tab offers the option of providing a detailed report for any chosen transaction ID.

In the **TID Detail** tab, all fields in red font are required. To perform a TT query:

- Enter the date of the transaction ID in the **Date** field. The date format is mm:dd:yy.
- Enter the transaction ID in the **TID** field.
- The **Max Records** field allows you to select the number of records you want to display in your query. The default is 5.
- To clear your entries and begin a new query, click **Reset**.
- To enter your search request, click **Submit**. The results displays three tabs with each tab providing a different perspective of the selected TID. The three tabs are: QueryTID Report, QueryTID Time Report and Query CLL Report.

QueryTID Report

#Direction	Time	CAS	Acronym	ClassName	ClassKey	CASTime	ServerTime	ClassWait	ClassHold	CacheWait	CacheHold	BlockSize	Session	Type
Enter	15:00:05.639	cas0481	JJC	HLF	320537011	194390	146292	1123	148505	0	0	1	M_MAIN	QuoteCancel
Exit	15:00:05.639	cas0481	JJC	HLF	320537011	194390	146292	1123	148505	0	0	1	M_MAIN	QuoteCancel

#Direction	Time	nanoTime	duration(ms)	threadID	callDelta(ms)	totalDelta(ms)	serverField	methodID	methodName
1.Enter	15:00:05.639	1140663922127914	0	254637766	0	0	0	1306240	CancelQuote
2.Enter	15:00:05.639	11406639221136700	0	254637766	0.009	0.009	0	1379739	CancelQuote_RoutingProxy
2.Exit	15:00:05.639	1140663922120725	0.144	254637766	0.144	0.153	0	1379739	CancelQuote_RoutingProxy
1.Exit	15:00:05.639	11406639221282052	0.194	254637766	0.001	0.194	0	1306240	CancelQuote

The QueryTID Report tab provides a detailed view of the time the TID has spent within a method and between methods. It also presents the applicable method ids and method names.

This output shows entry and exit into a method and the durations inside these methods. To allow a user to line-up the related entries and exits, by default the entry to the methods are numbered, indented and colorized to match their peer exit.

To turn off these decorations and see a linear list of all exits and entries, select the checkbox. **Show Results in Plain Text**.

Click **Cancel** to return to the main reporting page.

QueryTID Time Report

The screenshot displays the 'TTE Production Reports' window. At the top, it shows 'Details for TID: 126967269393030000' and 'Date: 06/03/11'. Below this, there is a checkbox for 'Show Results in Plain Text'. The main content area is divided into three tabs: 'QueryTID Report', 'QueryTID Time Report' (which is selected), and 'Query CLL Report'. The 'QueryTID Time Report' tab displays a detailed transaction timing report for TID 126967269393030000 on Friday 06/03/11. The report includes session information (Session/VJ_UAB), host calls (Host Calls: 0), and a list of methods with their respective durations. The methods listed are: 'cancelQuote_RoutingProxy' (1.0.144.0.010), 'cancelQuote' (1.0.154.0.010), and 'cancelQuote' (1.0.002.0.002). The report also includes a 'Method Statistics' section and a 'Calls Total Time Exclusive Time Name' section. At the bottom, there is a 'GC Filter' dropdown set to 'No GCs', and buttons for 'Cancel' and 'ShowRawData'.

The QueryTID Time Report is a summary of the methods visited by this TID for each Trade Server involved.

Click **Cancel** to return to the main reporting page.

Query CLL Report

TTE Production Reports

Details for TID: 106694537530471040 Date: 04/30/10

☐ Show Results in Plain Text

Class Lock Acquire Time	TID	Class Lock Wait Time (ms)	Class Lock Hold Time (ms)	TRADE (ns)	Gbg. Coll. (ms)	Type (QPB, Cancelcount, OrderOrigin)	UserID	InCAS Time (ms)	InCAS Interval
10:34:59.990	9318369759956400	0	1	NoTrade	NoGC	Quote(1)	HZ01	10:34:59.990	0
10:34:59.876	93183695236104192	0	0	NoTrade	NoGC	Quote(1)	HZ01	10:34:59.876	0
10:34:59.866	100783503750397952	0	1	NoTrade	NoGC	Quote(10)	LS05	10:34:59.867	1
10:34:59.754	106131611328643072	0	0	NoTrade	NoGC	Quote(3)	RQ0	10:34:59.754	1
10:34:59.751	106694537210232032	0	1	NoTrade	NoGC	Quote(1)	SH006	10:34:59.752	0
10:34:59.750	93183698511049184	0	0	NoTrade	NoGC	Quote(1)	HZ01	10:34:59.750	0
10:34:59.626	106694538238244352	0	1	NoTrade	NoGC	Quote(1)	SH006	10:34:59.626	0
10:34:59.563	117109023592415232	0	1	NoTrade	NoGC	Quote(1)	UBF01	10:34:59.562	1
10:34:59.516	132308644137533440	0	0	NoTrade	NoGC	Quote(3)	MSA2	10:34:59.514	1
10:34:59.499	93183697268802688	0	0	NoTrade	NoGC	Quote(1)	HZ01	10:34:59.499	0
10:34:59.375	106694539827412992	0	0	NoTrade	NoGC	Quote(1)	SH006	10:34:59.375	0
10:34:59.374	93183698052579328	0	1	NoTrade	NoGC	Quote(1)	HZ01	10:34:59.375	0
10:34:59.279	106694537210101760	0	0	NoTrade	NoGC	Quote(1)	SH006	10:34:59.279	0
10:34:59.251	106131611891489280	0	1	NoTrade	NoGC	Quote(4)	RQ0	10:34:59.251	1
10:34:59.151	93183697921310720	0	0	NoTrade	NoGC	Quote(1)	HZ01	10:34:59.151	0
10:34:59.032	106694537144893440	0	1	NoTrade	NoGC	Quote(2)	SH006	10:34:59.033	0
10:34:59.030	93183696349626368	0	0	NoTrade	NoGC	Quote(1)	HZ01	10:34:59.030	0
10:34:59.024	112323979494883328	0	0	NoTrade	NoGC	Quote(2)	WVC	10:34:59.023	1
10:34:58.986	112323979429085184	0	1	NoTrade	NoGC	Quote(2)	WVC	10:34:58.986	0
10:34:58.978	116546212564566016	0	0	NoTrade	NoGC	Quote(2)	EYE	10:34:58.978	0

GC Filter: No GCs

The Query CLL (Class Level Lock) Report is a list of the TIDs associated with the main TID of the report. Clicking on these associated TIDs allows investigation into the different layers of connected TIDs for this TID.

Click **Cancel** to return to the main reporting page.

General TTE Reporter

The General TTE Reporter section offers a view into the underlying database tables that isn't available through other means. Most of these allow one to see what is going on in a specific process.

TTE Production Reports

Please Enter All Mandatory Fields (in red)

Search:

Order:

TIDs:

TID:

General TTE Reporter

Date: 06/03/11 (mandatory)

Lock Value: ☐

Select DataType: Event

Select Host: fx50

Select Process: fxcas02v2fx50

Start Time (optional):

End Time (optional):

Max Records: 10 Filter on Direction: ALL

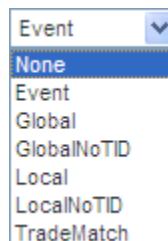
Get Record Count

End Enter Consume Publish Exception

Time TID Duration (ns) Time (ns) Thread Id Direction

In the **General TTE Reporter** tab, all fields in red font are required. To perform a TT query:

- In the **Date** field, enter the date you want to capture in your query. The date format is mm:dd:yy.
- Select the **Data Type** you wish to query. Depending upon the selected DataType, a differing set of outputs is available. The Datatypes and their usage are as follows:



- 'Global' and 'Local' let one see all synchronous events that have a TID for a process and time period.
- 'Event' lets one see all asynchronous events (publish/subscribe events) associated with a process for a time period.
- 'GlobalNoTID' and 'LocalNoTID' let one see events that do not have a TID for a process and time period. There are no other queries in which these show up.
- The 'TradeMatch' query, which shows class, quantity, and session information for trades; as with 'GlobalNoTID' and 'LocalNoTID', there are no other queries that show the 'TradeMatch' data.
- **Start Time** and **End Time** are optional fields.
- From the **Filter on Direction** drop down list, select the path of your query.
- The **Max Records** field allows you to select the number of records you want to display in your query. The default is 10.
- To clear your entries and begin a new query, click **Reset**.
- To enter your search request, click **Submit**. The result of your query will display.

TTE Production Reports

Please Enter All Mandatory Fields (in red)

Search
Order/Quote
TIDE Reporter
TID Detail
General TTE Reporter

Date: 06/03/11
(mm:dd:yy)

☐ Lock Value

Select DataType: Event

Select Host: fx50

Select Process: Rocas03v2fx50

Start Time (optional): mm:ss:PPPP

End Time (optional): mm:ss:PPPP

Max Records: 10

Filter on Direction: ALL

Get Record Count
Submit
Reset
Show Raw Data

Time	TID	Duration (ms)	Time (ms)	Thread Id	Direction
02:22:28.378	12007859478171877376	0.0	18954745393529667	999445351	Consume 1:
02:22:28.384	12007859478171942912	5783560.0	189547453939313207	999445351	Consume 1:
02:22:33.377	12007859478172058448	4.993914993E9	189547533932301187	2015695178	Consume 1:
02:22:33.393	12007859478172073904	1.5309676E7	189547534005539566	2015695178	Consume 1:
02:22:38.328	120078594781722139920	4.898881616E9	18954788344121480	2015695178	Consume 1:
02:22:43.350	12007859478172205058	5.021613612E9	18954763345735093	2015695178	Consume 1:
02:22:48.326	12007859478172270592	4.97619036E9	18954765341925451	2015695178	Consume 1:
02:22:48.349	12007859478172386528	2.2897688E7	18954765344920319	2015695178	Consume 1:
02:22:53.378	12007859478172401664	5.029041304E9	18954773393964623	2015695178	Consume 1:
02:22:53.389	12007859478172467200	1.1021424E7	18954773404986048	2015695178	Consume 1:

Scroll horizontally

Use your scroll bar to view additional data fields to the right of the window.

TTE Production Reports

[illegible]

The example above shows the event data types that occurred on FIX50 for process fixcas03v2fix50 on June 03, 2011. The report generates the following information.

- **Time:** the time of the event.
- **TID:** the transaction ID for the data type (i.e., order, quote, etc.)
- **Duration:** the length of time for the event in nanoseconds.
- **Thread Id:** the thread identification.
- **Direction:** the method path type.
- **Method ID:** the method identification.
- **Method Name:** the method name.

To display your search results in raw data, click **Show Raw Data**.

To display detailed information for a transaction ID, click on the TID data row. A new window will open detailing the method entry and exit timings for that TID.

Exit the System

Exit the System To exit the TT Performance tool, click the right button (X) to close the window. The application will be closed and you will be returned to your system desktop.

Customizing TT Windows

Sizing Windows

Several TT windows are sizable. That is, they can be resized on the screen to make viewing information easier for you.





Place the mouse on any edge of the window until it becomes a two-sided arrow. Hold the left mouse button down and move it to the desired size.

Resizing a window on the corner will expand or contract it in both directions (i.e. up and down and side-to-side). Resizing it on the side or top/bottom will expand or contract the window only in that one direction.

Windows can also be resized using the center glyph in the upper right corner of the window.



Click the left button (_) to minimize the window. Click the right button (X) to close the window. The center button is used for sizing.

If  is displayed, clicking it will increase the window size to a full-screen display.
If  is displayed, clicking it will return the window to its default size.