25 Transaction Whiteboard: User Interface and Procedures

This section describes the Transaction Whiteboard user interface and the procedures for editing an application, including:

- Creating Transaction Whiteboard Model Files
- Tier Operations
- Connection Operations
- Subtask Operations
- Message Operations
- Message Group Operations
- User Interface

For information about logic scripting, see Modeling Complex Application Behavior with Logic Scripts.

Creating Transaction Whiteboard Model Files

To create a new Transaction Whiteboard model file, choose File > Open Model > Transaction Whiteboard. The Transaction Whiteboard Startup Wizard has options for creating an empty Transaction Whiteboard model file or importing a Transaction Analyzer model file.

Note—When you import a Transaction Analyzer model, Transaction Whiteboard creates a new file with a ".aed.m" extension; the original Transaction Analyzer model file (with a ".atc.m" extension) is not changed. For more information about the differences between Transaction Analyzer and Transaction Whiteboard, see Transaction Analyzer vs. Transaction Whiteboard.

Related Topics

- *Transaction Whiteboard: User Interface and Procedures*

Tier Operations

The following table lists the tier operations available in Transaction Whiteboard.

Table 25-1 Tier Operations in Transaction Whiteboard

Operation	Procedure/Comments
Create new tier	1) Choose “Insert > Tier”. 2) Enter a tier name.
Rename one or more tiers	1) Choose “Edit > Rename Tiers”.
Delete a tier pair and all messages for that tier pair	1) Go to the Tree View or Tier Pair Circle page. 2) Select the tier pair to delete. 3) Press the Delete key or choose Edit > Delete Selected Items.

Related Topics

- *Transaction Whiteboard: User Interface and Procedures*

Connection Operations

The following table lists the connection operations available in Transaction Whiteboard. For general information about connections, see Components of a Transaction Whiteboard Model.

Table 25-2 Connection Operations in Transaction Whiteboard

Operation	Procedure / Comments
Create a new connection	1) Choose “Insert > Connection”. 2) Specify the tier pair for the connection.
Set the default connection for a tier pair	1) Choose “Edit > Set Default Connection”. 2) Specify the default connection for the tier pair.
Move a message or message group to a different connection	1) Select messages/groups. 2) In the Message Editor table, change the “Connection” attribute. Whenever you create a new message or message group, its “Connection” attribute is set to the default connection. If desired, you can change this attribute later. For more information, see Message Attribute Descriptions.
Delete a connection and all messages for that connection	1) Go to the Tree View tabbed page. 2) Select the “View by” menu to “Tier Pairs”. 3) In the left pane, select the connection to delete. 4) Press the Delete key or choose Edit > Delete Selected Items.

Related Topics

- *Transaction Whiteboard: User Interface and Procedures*

Subtask Operations

The following table lists the subtask operations available in Transaction Whiteboard. For general information about subtasks, see Components of a Transaction Whiteboard Model.

Table 25-3 Subtask Operations in Transaction Whiteboard

Operation	Procedure / Comments
Create a new subtask	1) Choose “Insert > Subtask”. 2) Enter a subtask name.
Set the default subtask	1) Choose “Edit > Set Default Subtask”. 2) In the Set Default Subtasks dialog box, select a new subtask. Whenever you create a new message or message group, its “Subtask” attribute is set to the default subtask. If desired, you can change this attribute later. For more information, see Message Attribute Descriptions.
Move messages/ message groups to a new subtask	1) Select messages/groups. 2) In the Message Editor table, change the “Subtask” attribute. For more information, see Message Attribute Descriptions.
Move a subtask to a new parent subtask	1) Go to the Tree View tabbed page. 2) Set the “View by” menu to “Subtasks”. 3) In the treeview (left) pane, right-click on a subtask and choose Edit Subtask. 4) Specify a new parent subtask from the pull-down menu.
Delete a subtask and all messages for that subtask	1) Go to the Tree View tabbed page. 2) Select the “View by” menu to “Subtasks”. 3) In the treeview (left) pane, select the subtask to delete. 4) Press the Delete key or choose Edit > Delete Selected Items.

Related Topics

- *Transaction Whiteboard: User Interface and Procedures*

Message Operations

The following table lists the message operations available in Transaction Whiteboard. For general information about subtasks, see Components of a Transaction Whiteboard Model.

Table 25-4 Message Operations in the Transaction Whiteboard

Operation	Procedure / Comments
Create a new message	Method 1—See Creating Messages Using the Mouse. Method 2—See Creating Messages with Keystrokes.
View and set attributes for one or more messages	1) Select messages/groups. 2) In the Message Editor table, set the attributes of interest. For more information, see Message Attribute Descriptions.
Edit multiple messages in one operation	See Multi-Message Editing.
Change the parent dependency of a message	See Changing the Parent Dependency of a Message.

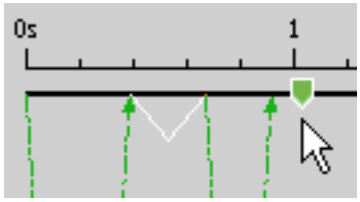
Creating Messages Using the Mouse

The following procedure describes how to create messages using the mouse.

Procedure 25-1 Creating Messages Using the Mouse

1. Click the Data Exchange Chart tab.
2. Choose Insert > Message.

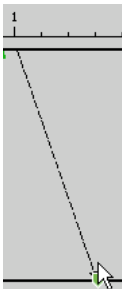
   ➥ The DEC cursor changes color to indicate that you are now in Message Creation mode.
3. To create a message:
   - **3.1** Move the mouse pointer near the source tier for the message.
   - **3.2** Move the mouse pointer so that the cursor is located horizontally at the time when you want the message to be sent (based on the time line at the top of the chart).



cursor located at 1 second on time line ==> “message is sent 1 second after application start”

3.3 Click the left mouse button and move the mouse pointer near the destination tier for the message.

➥ The DEC cursor jumps to the destination tier, and an arrow appears between the source and destination tiers.



3.4 Click on the destination tier to create the message.

Note—The network delay in a Transaction Analyzer model is determined by the Simple Network Estimation settings in the Data Exchange Chart, so the arrival time of a message is always “fixed” at <*message_transmission_time*> + <*estimated_network_delay*>.

4 Repeat steps step 3.1 through step 3.4 for every message you want to create. Right-click to exit Message Creation mode.

End of Procedure 25-1

Creating Messages with Keystrokes

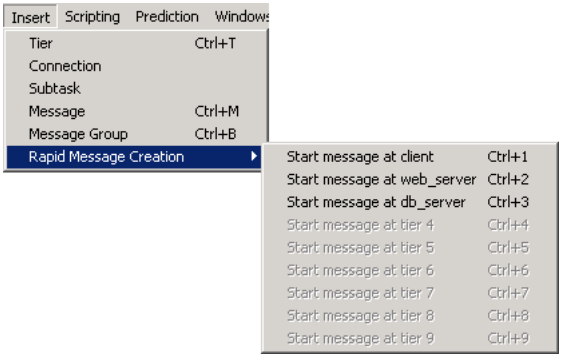
Rapid Message Creation mode is an alternative method for creating messages. This method is useful when you want to create a sequence of messages that meets both these conditions:

- Each message is dependent on the previous message, and
- The messages have uniform tier delays between them.

Procedure 25-2 Rapid Message Creation

1 On the Rapid Message Creation submenu (Insert > Rapid Message Creation), determine the keyboard shortcuts for the source and destination tiers of the messages you want to create.

Figure 25-1 Insert > Rapid Message Creation Submenu (Example)



2 The DEC cursor specifies the start time of the new message. If desired, click at a new horizontal location to specify a new start time for the start time of the message sequence.

➥ The cursor moves to the tier and time where you clicked.

3 For each message you want to create:

3.1 Press Ctrl + <*shortcut_number_for_source_tier*>

3.2 Press Ctrl + <*shortcut_number_for_destination_tier*>

➥ A message is created between the source and destination tier.

➥ The DEC cursor moves to the arrowhead of the message that was just created.

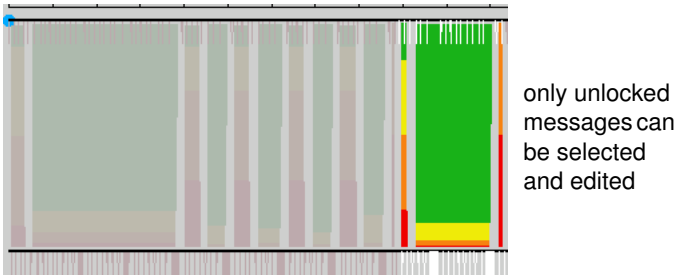
4 Repeat step 3 for each message you want to create.

End of Procedure 25-2

Locking Messages Before an Editing Operation

When viewing or editing messages in the Data Exchange Chart, you might find it useful to “lock out” irrelevant messages. Locked messages appear dimmed in the Data Exchange Chart window, and cannot be selected or edited. This means that only messages in the connection, tier, or subtask of interest will appear in the Message Editor. You can lock and unlock messages based on tier pair, subtask, and connection using operations in the View > Lock and View > Unlock submenus.

Figure 25-2 Locked Messages in the Data Exchange Chart



Editing Messages

The following procedure describes how to view and change information about individual messages. To edit multiple messages in one operation, see Procedure 25-4. For information about specific message attributes, see Message Attribute Descriptions.

Procedure 25-3 Editing One or More Messages

1. Optionally, lock out messages from irrelevant tier pairs, connections, or subtasks using the View > Lock submenu (for more information, see Locking Messages Before an Editing Operation).

2. In the Tree View, Data Exchange Chart, or Tier Pair Circle page, select one or more messages to edit.

   ➥ The selected messages appear in the Message Editor table.

3. For each attribute you want to change, enter a new value and press Enter.

   For more information, see Message Attribute Descriptions.

End of Procedure 25-3

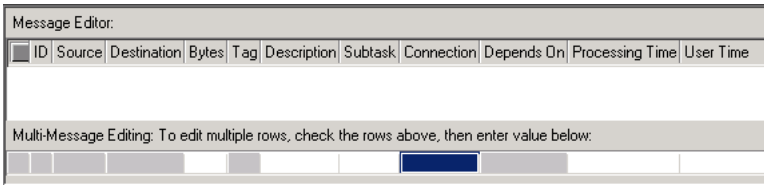
Multi-Message Editing

Multi-Message Editing mode enables you to specify attributes on multiple messages in one operation. For information about specific message attributes, see Message Attribute Descriptions.

Procedure 25-4 Editing Messages Using Multi-Message Editing Mode

1 If the Edit > Enable Multi-Message Editing Mode menu item does not have a checkbox next to it, choose this menu item.

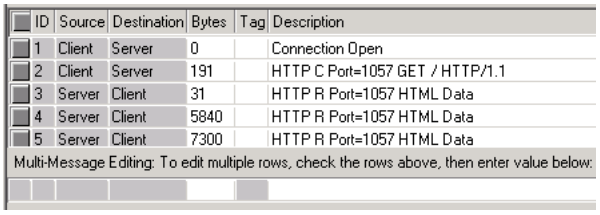
➥ The Multi-Message Editing window appears at the bottom of the Message Editor. Some fields appear dimmed because these attributes cannot be edited using Multi-Message Editing.



2 Optionally, lock out messages from irrelevant tier pairs, connections, or subtasks using the View > Lock submenu (for more information, see Locking Messages Before an Editing Operation).

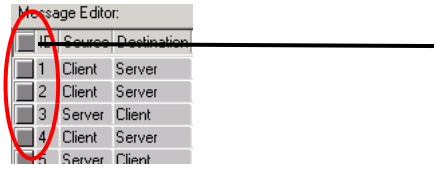
3 Select one or more tier pairs, connections, subtasks, messages, or message groups in the Tree View, Data Exchange Chart, or Tier Pair Circle.

➥ The selected messages appear in the Message Editor table.

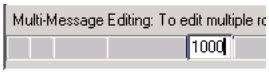


4 Click in the left-most column for each message whose attribute you want to change. To check/uncheck all messages, click in the top checkbox.

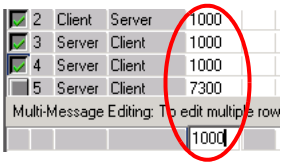
➥ Checkmarks indicate the messages to be set during Multi-Message Editing.



5 Enter a value in one of the fields of the Multi-Message Editing window and press Enter.



➥ The specified attribute setting is applied to all checked messages.



6 Optionally, choose Edit > Enable Multi-Message Editing Mode again to turn off this mode.

End of Procedure 25-4

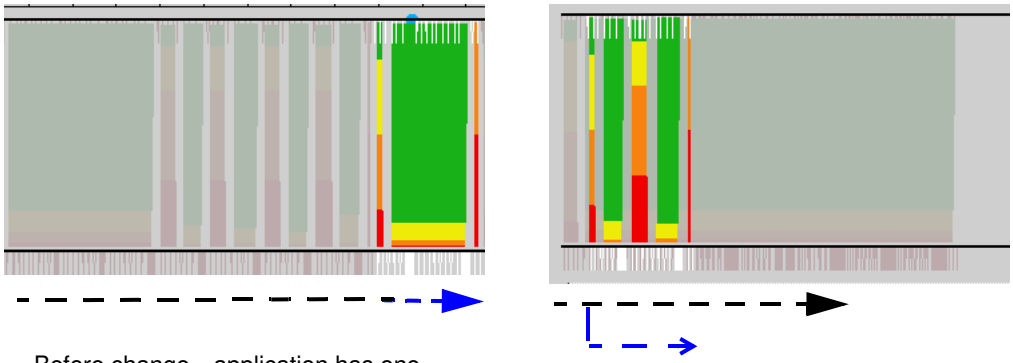
Changing the Parent Dependency of a Message

Every message in an application task (except the first message) depends on the arrival of a previous message; the first message is called the *parent dependency* of the second. Changing the parent dependency of a message has two important effects:

1) The new parent dependency occurs earlier or later than the original dependency. This means that the start time of the edited message, and of all messages that depend on that message, are also earlier or later.

2) Changing the parent dependency of a message can affect the overall behavior of the application, because the chain of parent/child message dependencies has changed as a result.

Figure 25-3 Changing the Parent Dependency of a Message: Example



Before change—application has one dependency chain in which every message (except the first) depends on the previous message.

After change—two messages now depend on the same parent message. This causes two parallel dependency chains.

You can change the parent dependency of a message using one of the following methods:

- Edit the message attributes in the Message Editor (see Procedure 25-3 and Message Attribute Descriptions)
- Drag the message dependency to a new parent in the Data Exchange Chart, as described in Procedure 25-5.

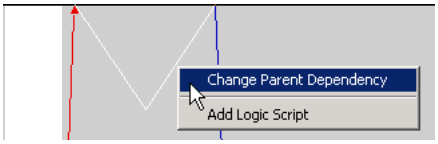
Procedure 25-5 Changing a Parent Dependency Using the Mouse

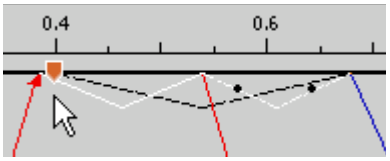
1 Click the Data Exchange Chart tab if this page is not visible.

2 Zoom in on the dependency of the message you want to change (that is, the line that connects the child message with the parent message at the source tier).

3 Right-click on the dependency and choose Change Parent Dependency.

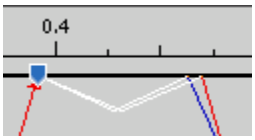
➥ A “Select Parent Dependency” cursor appears at the source tier, and a dashed line connects the cursor to the child message.





4 Click on the message that you want to specify as the new parent dependency.

➥ The parent dependency of the child message is adjusted. The edited message and all its dependent messages are moved to reflect the change.



End of Procedure 25-5

Message Attribute Descriptions

Use the Message Editor to view and change the attributes of selected messages.

The following table lists the available message attributes.

Table 25-5 Message Attribute Descriptions

Attribute	Description
ID	Message ID (not editable)
Source	Source tier of the selected message (not editable)
Destination	Destination tier of the selected message (not editable)
Bytes	Message size, in bytes
Tag	Optional field, provided for extra flexibility when writing logic scripts. For example, you can specify a tag for specific messages; then you can write a logic script that uses these tags to access the messages during QuickPredict or a discrete event simulation.
Subtask	Parent subtask of the message. To move the message to another subtask, change this attribute.
Connection	Parent connection of the message. To move the message to another connection, change this attribute.
Robustness	UDP Robustness mechanism specified for the connection. This attribute is available for UDP connections only. For more information, see Modeling Applications over UDP with Transaction Whiteboard.
Depends On	The parent dependency of the message.
Processing Time	Application processing time (in seconds) at the source tier between the previous (parent) event and the message start.
User Time	User “think time” (in seconds) at the source tier between the previous (parent) event the message start. The total delay between the previous event and the start of the current message is the sum of the Processing Time and the User Time attributes.

Related Topics

- *Transaction Whiteboard: User Interface and Procedures*

Message Group Operations

Message groups are useful when you need to model a well-defined series of requests and responses (for example, a series of chatty database requests).

Table 25-6 Message Group Operations in the Transaction Whiteboard

Operation	Procedure / Comments
Create a new message group	See Creating a Message Group
View and set attributes for one or more message groups	1) Select messages/groups. 2) In the Message Editor table, set the attributes of interest. See Message Attribute Descriptions and Message Group Attribute Descriptions
Edit multiple messages or message groups in one operation	See Multi-Message Editing
Change the parent dependency for a message group	See Changing the Parent Dependency of a Message

Creating a Message Group

Use the Insert Message Group operation (Insert > Message Group) to create a group of sequential messages between two tiers.

Procedure 25-6 Creating a Message Group

1. Click the Data Exchange Chart tab if this page is not shown.
2. Choose Insert > Message Group.
3. The Define Message Group dialog box appears.
4. Set the attributes to characterize the message group you want to create, then click OK. (These attributes are listed in Table 25-7.)

   ➥ The DEC cursor changes color to indicate that you are now in Message Group Creation mode.

5. To create a message group:

   5.1 Move the mouse pointer near the source tier for the message, located horizontally at the time when you want the message group to start (based on the time line at the top of the chart).

cursor located at 3 seconds on time line ==> “message group starts 3 seconds after application start”

5.2 Click the left mouse button and move the mouse pointer near the destination tier for the message.

➥ The DEC cursor jumps to the destination tier.

5.3 Click near the destination tier to create the message group.

End of Procedure 25-6

Editing a Message Group

You can edit the attributes of a message group in the Message Editor, as described in Procedure 25-3.

Message Group Attribute Descriptions

A message group has many of the same attributes as an individual message. You can edit these attributes after you create a message group; for more information, see Table 25-5.

Table 25-7 Message Group Attribute Descriptions

Attribute	Description
Total application turns	The number of times that the flow of messages changes direction. This attribute determines how many messages are used to transfer: If <*number_of_total_app_turns*> is odd, the number of messages is • source —> dest: (<*number_of_total_app_turns*> + 1) / 2 • dest —> source: (<*number_of_total_app_turns*> + 1) / 2 If <*number_of_total_app_turns*> is even, the number of messages is • source —> dest: <*number_of_total_app_turns*> / 2 + 1 • dest —> source: <*number_of_total_app_turns*> / 2
Total application bytes —>	Total number of application bytes from the source to the destination tier.
Total application bytes <—	Total number of application bytes from the destination to the source tier.
Total processing seconds at source tier	Total amount of processing time at the source tier, from the first to the last message.
Total processing seconds at destination tier	Total amount of processing time at the destination tier, from the first to the last message.

How a Message Group Models Individual Messages

A message group models messages based on the following assumptions:

- All messages are transferred between the same two tiers.
- All messages sent from one tier are the same size. The message size is determined by the “Total application turns” and the “Total application bytes” specified for the tier.
- The processing delay between messages at a tier is determined by the “Total application turns” and the “Total processing seconds” specified for the tier.
- The total duration of a message group is determined by the network delay (specified by the Simple Network Estimation options in the Data Exchange Chart), the number of message turns, and the total processing time at each tier.

Related Topics

- *Transaction Whiteboard: User Interface and Procedures*

User Interface

Transaction Whiteboard has three tabbed pages, with interfaces similar to their Transaction Analyzer equivalents:

- Tree View
- Data Exchange Chart
- Tier Pair Circle

Tree View

Use the Tree View page to visualize and edit the way messages are organized by tier pair, connection, or subtask.

Figure 25-4 Tree View in Transaction Whiteboard

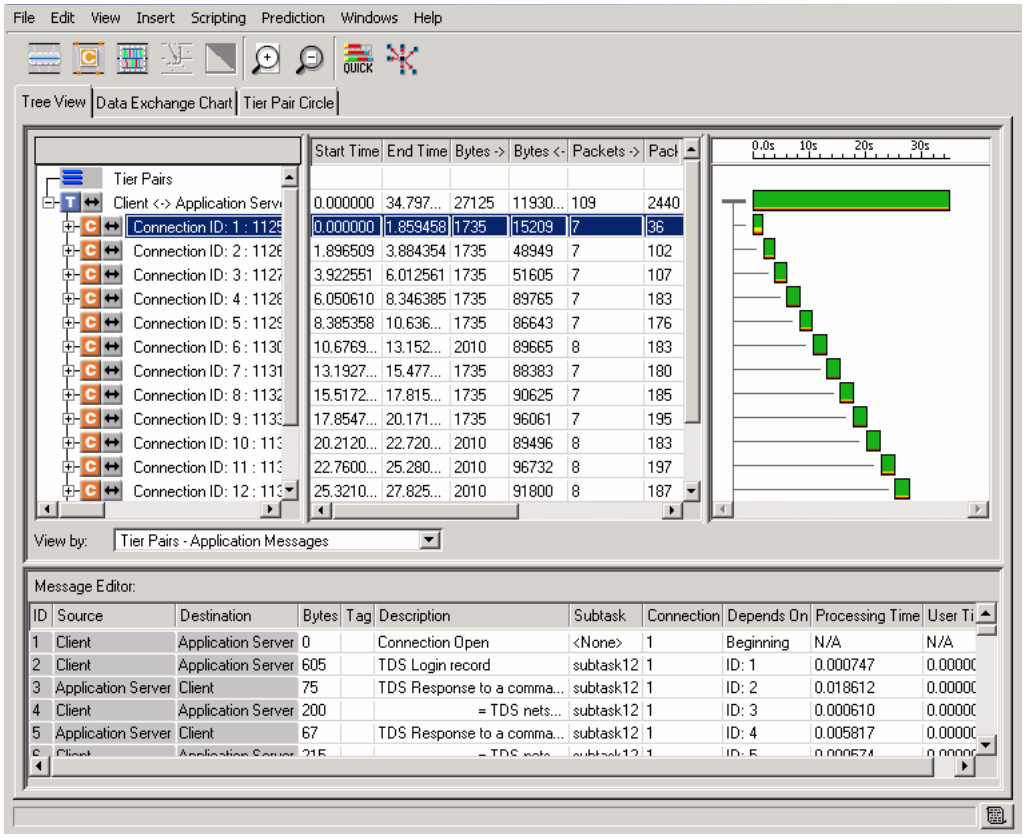


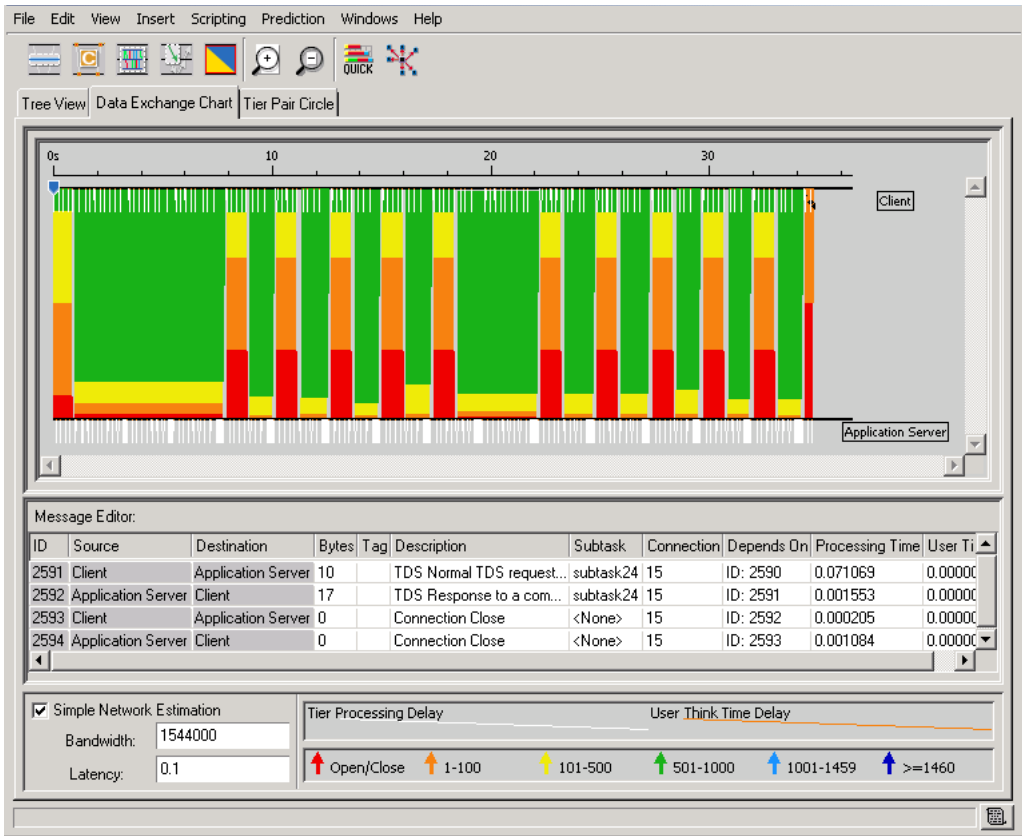
Table 25-8 "Tree View" Page in Transaction Whiteboard—User Interface

Area/Control	Description
Treeview pane (left)	Shows how the individual packets or messages are organized into tier pairs or subtasks (depending on the "View by" menu setting).
Table pane (center)	Shows statistics about individual tier pairs, connections, subtasks, messages, and message groups.
Timeline pane (right)	Shows the traffic patterns and duration of each tier pair or subtask, using the same conventions as the Data Exchange Chart. For more information, see Data Exchange Chart.
Message Editor	To edit one or more messages, select the messages and change the fields of interest in this table. For more information, see Editing Messages.
View by:	Arranges messages in the treeview pane by tier pairs/connections or by subtasks

Data Exchange Chart

Use the Data Exchange Chart to visualize the flow of messages across time. The Data Exchange Chart is the only place where you can create messages and message groups.

Figure 25-5 Data Exchange Chart in Transaction Whiteboard



The Data Exchange Chart uses the following conventions to represent an application task:

- Horizontal lines represent tiers.
- Arrows between tiers represent application messages.
- The horizontal placement of an arrow's tail and head indicate the message transmission and arrival times, respectively, according to the timeline at the top of the chart.
- The network delay shown in the chart (that is, the "slant" of the arrows) is based on the Simple Network Estimation settings at the bottom of the window. If this Simple Network Estimation is turned off, the network delay is 0 and the message arrows have no slant.
- Bars with horizontal bands represent individual messages that are too close together to be seen individually at the current zoom level.
- Bars with diagonal divisions of color represent message groups, which are described in Message Group Operations.

- Each message (except the first message in the task) depends on the departure or arrival of a previous message at the same tier; each message has a “Depends on” attribute that specifies its parent message. The Data Exchange Chart uses dependency lines to connect a message to its parent message at the same tier.

  For information about the different ways that Transaction Whiteboard models message delays, see Tier Delays and Application Message Dependencies.

Table 25-9 “Data Exchange Chart” Page in Transaction Whiteboard—User Interface

Item	Description
Dependency lines	Dependencies are divided into two components: tier processing (shown as a white line) and user time (shown as an orange line).
Message Editor	To edit one or more messages, select the messages and change the fields of interest in this table (see Editing Messages).
Application message arrows	This chart uses colored arrows to represent application messages instead of network packets, and uses the same coloring scheme to indicate the amount of application-layer data in each message
Application message bars	If messages are clustered too closely in time to be represented by individual arrows, the chart uses a solid bar to represent the cluster of messages.
Simple Network Estimation	Specifies a bandwidth and latency to model a simple network delay. (Optional) **Note—**These options are used for visualization purposes only, and have no effect on results from QuickPredict or discrete event simulations (which use their own attributes and settings for modeling network delay).
Legend	Shows colors for visualizing the following quantities: • The relative amount of tier processing delay and user think-time delay between two subsequent messages. • The amount of application-layer data found in individual messages (for arrows) and the relative amount of application data found in the messages of messages bands and message groups.

Tier Pair Circle

Use the Tier Pair Circle to visualize all tier-pair conversations in the application task, and to see which tiers are conversing and not conversing.

Figure 25-6 Tier Pair Circle in Transaction Whiteboard

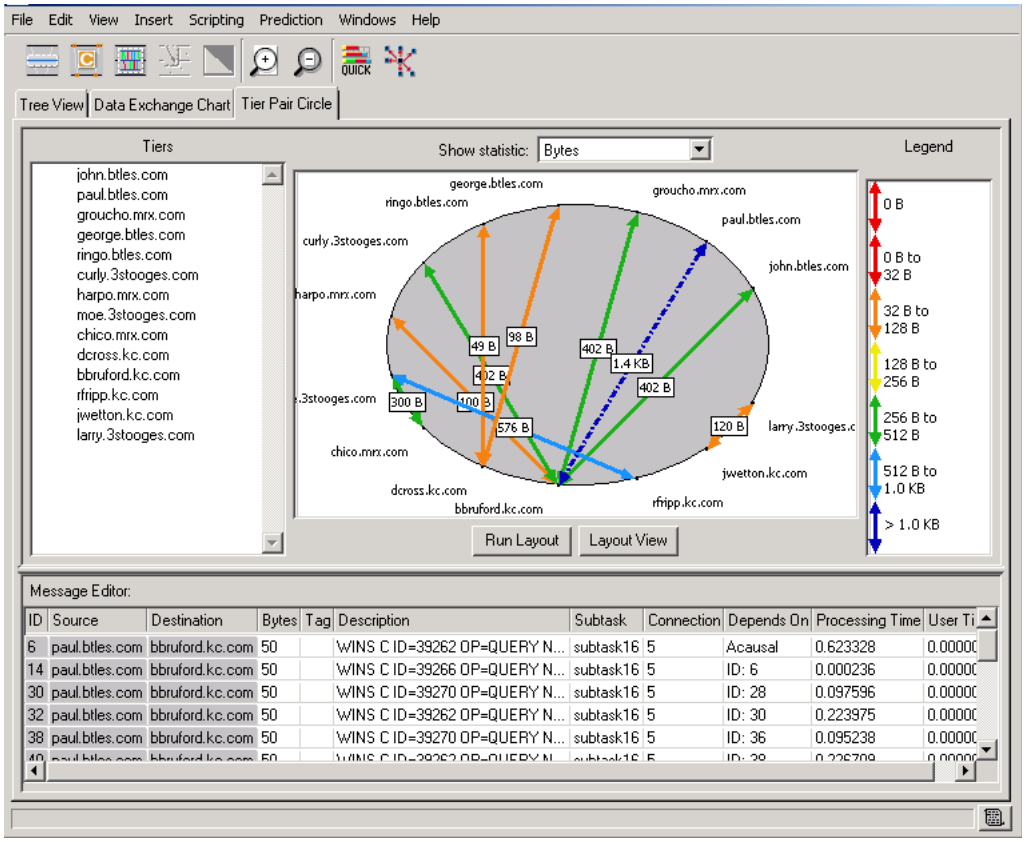


Table 25-10 "Tier Pair Circle" Page in Transaction Whiteboard—User Interface

Item	Description
Tiers pane (left)	Lists all tiers.
Tier pair arrows (center pane)	Each arrow represents a tier-pair conversation; each arrow's color represents a statistic range as indicated by the Legend (right pane).
Legend (right pane)	Shows the color-statistic mapping for the tier-pair arrows.
"Show statistic" menu	Set this menu to view the type of statistic information shown.
Message Editor	To edit one or more messages, select the messages and change the fields of interest in this table. See Editing Messages.

Related Topics

- *Transaction Whiteboard: User Interface and Procedures*