

An Introduction to GTT

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1. GTT Main Window

There are five areas in the main window (see Figure 1) of GTT when starting successfully: Test Sequence Editing, The Events or Tests, Error Message, Description of selected node, and Abstract information of component. The Test Sequence Editing area on the left side of the main window is the most important part of our system. A test flow is executed step by step for every node of the test script from top to bottom. By using different nodes, a test flow can verify execution results, send events to AUT or reset the application. A test script consists of four kinds of nodes: *composite node*, *event node*, *test node* and *reset node* (see Table 1).

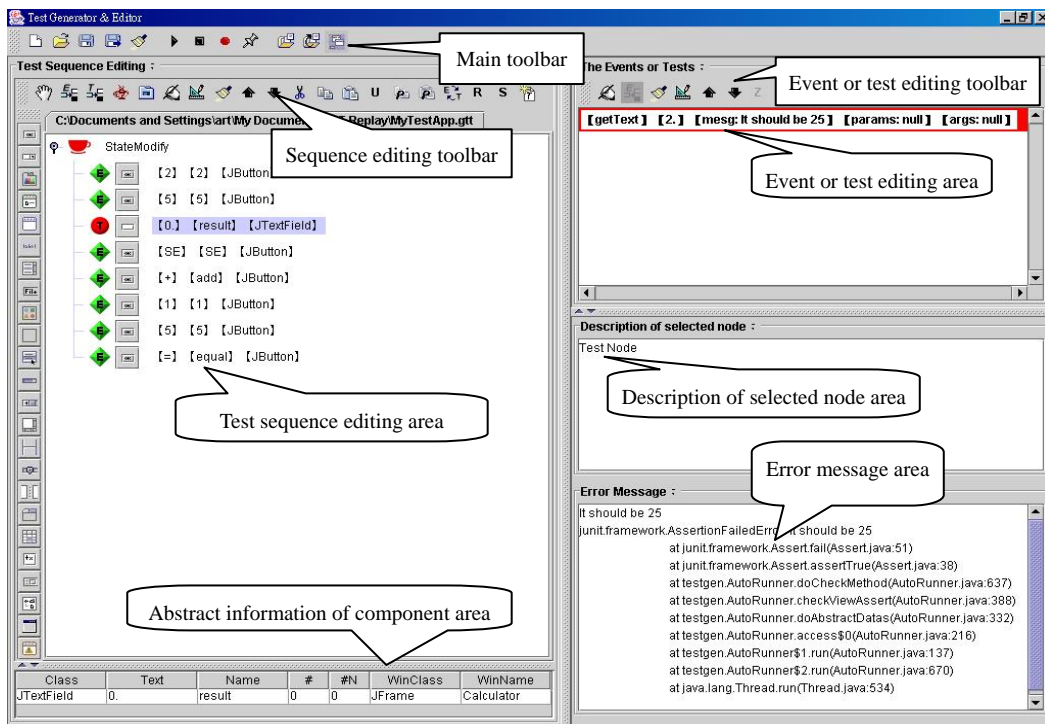





Figure 1 The GTT main window

Table 1 Description of nodes

Icon	Name	Ver.	Function
	A folder (or composite node)	GTT	Parent node of event and test nodes to simplify complicated test sequence.
	Event node	GTT	Save events from user's operation to replay user's operation when playing.
	Test node	GTT	Check point saving wanted result to validate the really execution result.

R	Reset node	GTT	Reset program under test to the initial state.
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The event node **E** and test node **T** usually contain component information. A component information starts with a node icon (see Figure 2) and a component icon (corresponding to the component's class). Next to the component icon is a list of bracketed descriptions. The first bracketed description is the text displayed on the component. The second one is the name of the component. The third one is the class of the component.

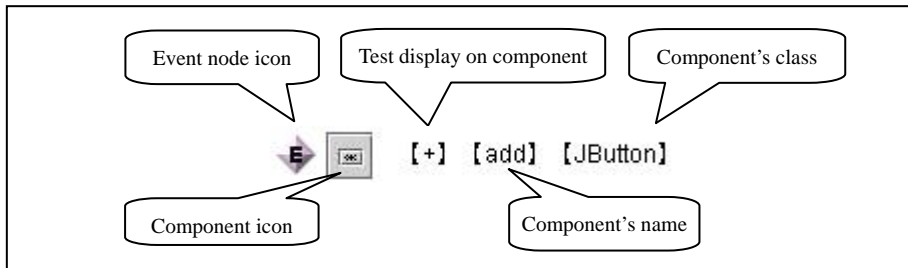


Figure 2 Information of event nodes

When using an external test node to verify an execution result, the test node does not contain the component's information (see Figure 3). Following the test node icon is an icon indicating an external test point (external test program). The next bracketed description is the class name of the external test program.

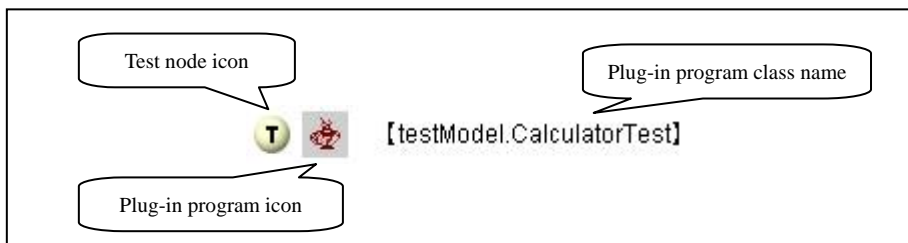



Figure 3 Information of test nodes in plug-in method

Abstract information of selected node area is on the left hand bottom corner of the main window. The information of selected node is displayed in the order (see Figure 4): class, text, name, component index (#), component index name (#N), WinClass and WinName.

Class	Text	Name	#	#N	WinClass	WinName
JButton	SetDefault	setDefault	0	0	JDialog	ToolBar property

Figure 1 Abstract information of selected node

The Events or Test area is on the top right corner of the main window. It is used to display the data and editable methods associated with the event or test node selected in the test script on the left side. If an event node  is selected, its *action type*, *sleep time* and *event information* are shown successively (see Figure 5).

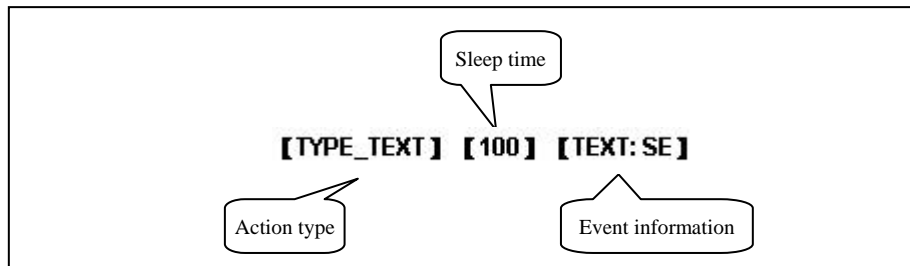



Figure 5 Information of an input event

Not all components support all the same set of events. Neither do they have the same information. If a test node  is selected, its *test method*, *expected return value*, *error message*, *parameter type* and *parameter value* which are shown (see Figure 6). If an external test program node selected, the information shown are *test class*, *test method* and *parameter type* (see Figure 7).

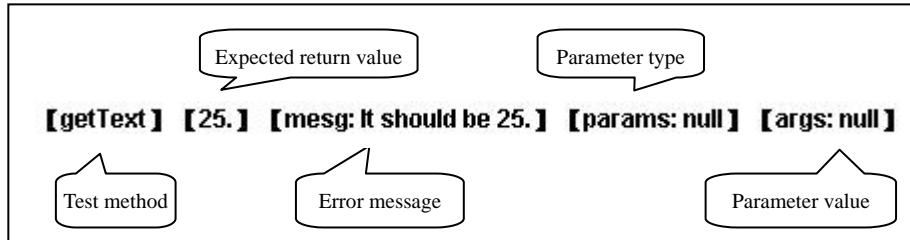


Figure 6 Information of Internal test point

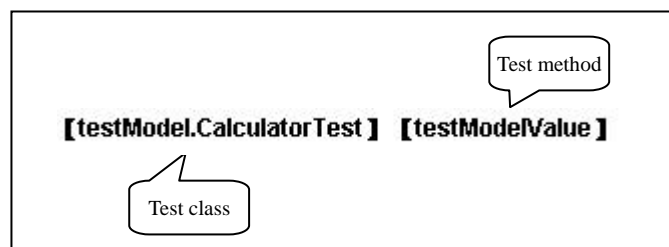








Figure 7 Information of External test point

Description of selected node, on the right side of the main window, is used to describe each node's information in the test script. Test designer can select a node and then key in the description wanted. Error Message, below the

Description of selected node, is a field to display error at run time. When a test script fails to execute, error messages are generated. Test designer may observe the error messages by clicking the node with errors. GTT uses color to indicate the correctness of the execution result. Green icons    indicate that the execution is correct and red icons    indicate failure.














2. Toolbar

Each area has its own toolbar. The main toolbar (Figure 8) provides many functions: New File, Open File, Save File, Save File As, Close File, Run, Stop, Record, Break, Open Application, Reopen Application and Configuration from left to right successive. The usages of these functions are shown in Table 2.



Figure 8 Main toolbar

Table 2 Detail of main toolbar's function










Icons	Name	Function	Remark
	New File	Create an empty test script	
	Open File	Open an existing test script	
	Save File	Save the current test script	If it is unnamed, a file management dialog will be opened.
	Save File As	Save the current test script to a new file.	A file management dialog will be opened.
	Close File	Close current test script	
	Run	Execute the test script	The AUT will be reset and executed.
	Stop	Stop recording	Test designer needs to select the position (before, within, or after) of the recorded event flow.
	Record	Start recording	It will record the interaction between test designer and AUT until test designer stops recording.
	Break	Set a break point	A break point causes the test script to stop execution temporarily.
	Open Application	Open an AUT	Choose (or change) the AUT associated with the current test script.
	Reopen Application	Reopen an AUT	Reset and restart the AUT.
	Configuration	Open configuration dialog	Change the configuration of GTT and AUT.
	About	Version information	












The testTreeToolBar (Figure 9), in the Test Sequence Editing area, provides functions to edit test scripts. These functions are Stop Action, Insert Event, Insert Test, Java, Add State Node, Manual Add Node, Edit, Remove, Move Up, Move Down, Cut, Copy, Paste, UnProxy, Proxy Copy, Proxy Paste, Convert, Reset Application, Reset Test Script, and Synchronize. See Table 3 for the usages of these functions.



Figure 9 Test tree toolbar

Table 3 Detail of Test Tree toolbar's function

Icon	Name	Function	Remark
	Stop Action	Stop intercepting events.	Stop the interception of event without saving.
	Insert Event	Start to intercept events and open the Test Generator Select Component For Insert Component Event dialog (Fig. 17).	Test designer interacts with AUT, GTT will identify the selected component and open Test Generator Select Component For Insert Component Event dialog that helps test designer to insert an event node.
	Insert Test	Start to intercept events and then open the Test Generator Select Component For Insert Component Event dialog (Fig. 17).	Test designer interacts with AUT, GTT will identify the selected component and open Test Generator Select Component For Insert Component Event dialog that helps test designer to insert a test node.
	Java	Open Test Generator Modify Test Class dialog (Fig. 19)	Select a plug-in test program and test method to insert test node.
	Add State Node	Insert a folder.	Use folder to manage the test or event nodes.
	Manual Add Node	Open Test Generator Modify ComponentData dialog (Fig. 13)	Fill abstract information of component manually.
	Edit	Open JComponent Event Modify dialog (Fig. 14)	
	Remove	Remove the selected node	Confirmation dialog will be opened when a folder node is to be removed.
	Move Up	Move the node up	


	Move Down	Move the node down	
	Cut	Cut the selected node	
	Copy	Copy the selected node	
	Paste	Paste the copied node.	
	UnProxy	Release the sharing relationship	Release the sharing relationship of selected node with other node.
	Proxy Copy	Copy sharing relationship	Let the copied nodes to have sharing relationship with their original nodes.
	Proxy Paste	Paste the copied sharing relationship	Paste the copied sharing relationship.
	Convert	Convert the test node to event node, vice versa.	This action will remove all inner events or tests.
	Reset Application	Add a reset application node	Reopen or reset the status of AUT.
	Reset Test Script	Reset the test script	Reset the status of script execution or clear the execution results.
	Synchronize	Update the information	Synchronize the status of AUT and test script when the AUT have changed

The icons enabled in the Test Generator Edit Event ToolBar vary with the selected node. When an event node is selected, the functions are Manual Add Data, Add Based Event, Remove, Edit, Move Up, Move Down and Sleep (see Figure 10). See Table 4 for the usages of these functions. While selecting a test node, the functions are Manual Add Test, Remove, Edit, Move Up and Move Down (see Figure 11). The usages of Remove, Move Up and Move Down are the same no matter which kinds of nodes are selected. Table 5 shows the usages of the icons for test nodes (without showing Remove, Move Up, and Move Down).



Figure 10 Test Generator Edit Event toolbar – editing event node

Table 4 Detail of Test Generator Edit Event toolbar’s function – in editing event node

Icon	Name	Function	Occasion
	Manual Add Data	Open Test Generator Modify ComponentData dialog (Fig. 13).	Add abstract information of component manually.










	Add Based Event	Open Test Generator Select Component For Insert Component Event dialog (Fig 17).	Add new component events using dialogs.
	Remove	Remove the selected element	
	Edit	Open JComponent Event Modify dialog (Fig. 14, 15, or 16).	Edit the selected event using dialogs according to the kind of the component.
	Move Up	Move the node up.	
	Move Down	Move the node down.	
	Insert Sleep Time	Open dialog to set sleep time.	Add a sleep time between events.



Figure 11 Test Generator Edit Event toolbar – in editing test node

Table 5 Detail of Test Generator Edit Event toolbar's function – in editing test node

Icon	Name	Function	Occasion
	Manual Add Data	Open Test Generator Modify ComponentData dialog (Fig. 13).	Add a view assertion or a model assertion
	Edit	Open JComponent Event Modify dialog (Fig. 14, 15, or 16).	Edit the selected test element.

In GTT, there are two ways to add event nodes. One is using Record method to get abstract information of component automatically. The other is to click the Insert Event button  in the test tree toolbar. In this way the abstract information is obtained from the interception of events and the interaction with dialogs.












3. Dialog



There are several dialogs which assist the design of test scripts. These dialogs are: Configuration, Test Generator Modify Component Data, Event Modify, Test Generator Select Components For Insert Component, Test Generator Modify Check, and Test Generator Modify Test Class. The usages of these dialogs are shown in Table 6. Test designer can send

common events to every Swing component through the settings in the Event Modify Dialog. In GTT, there are individual event information dialogs for each Swing component to process different component events. The design of dialog is based on the information needed by the component events.

Figure 15 and Figure 16 introduce the dialogs supported by GTT. Since most dialogs are similar, we skip the introduction of the following dialogs: *JDialog*, *JInternalFrame*, *JMenuBar*, *JPopupMenu*, *JSlider*, *JSplitPane*.

Table 6 Detail of dialogs

Dialog	Occasion	Function
Configuration (see Figure 12)	Click the button  in toolbar.	Advanced configuration including speed, abstract level and AUT, etc.
Test Generator Modify Component Data (see Figure 13)	1. Double click left key on event or test node. 2. Select an event or test node and click the button  in toolbar.	Modify the abstract information of the selected event or test node.
Event Modify (see Figure 14, 15 and 16)	1. Click the selected element in event or test editing area. 2. Select an event element and click the button  in toolbar. 3. Click the button  in the edit event toolbar. 4. Click the button  in main toolbar.. 5. Click the button  in main toolbar and input the abstract information.	1. Modify the existing abstract information of events consist of ID and sleep time. 2. Create an event according to the information of selected event. There are different dialogs for the different abstract components
Test Generator Select Component For Insert Component (see Figure 17)	Click the  or  button in toolbar any where in the test script and select component of AUT.	1. Get abstract information by selecting the component under test. 2. Support event or test editing while getting abstract information
Test Generator Modify Check (see Figure 18)	1. Click the selected element in event or test editing area. 2. Select an event element and click the button  in toolbar. 3. Click the button  in the event editing toolbar. 4. Click the button  in main toolbar..	Use options in this dialog to set the information needed for validating results (expected status) and error message.

<p>Test Generator Modify Test Class Dialog (see Figure 18)</p>	<ol style="list-style-type: none"> 1. Click the test node in the event or test editing area. 2. Select a test node (plug-in) and click the button  in event editing toolbar. 3. Click the button  in the event editing toolbar. 	<p>Use file manager to assign a plug-in class to set the model assertion and test method.</p>
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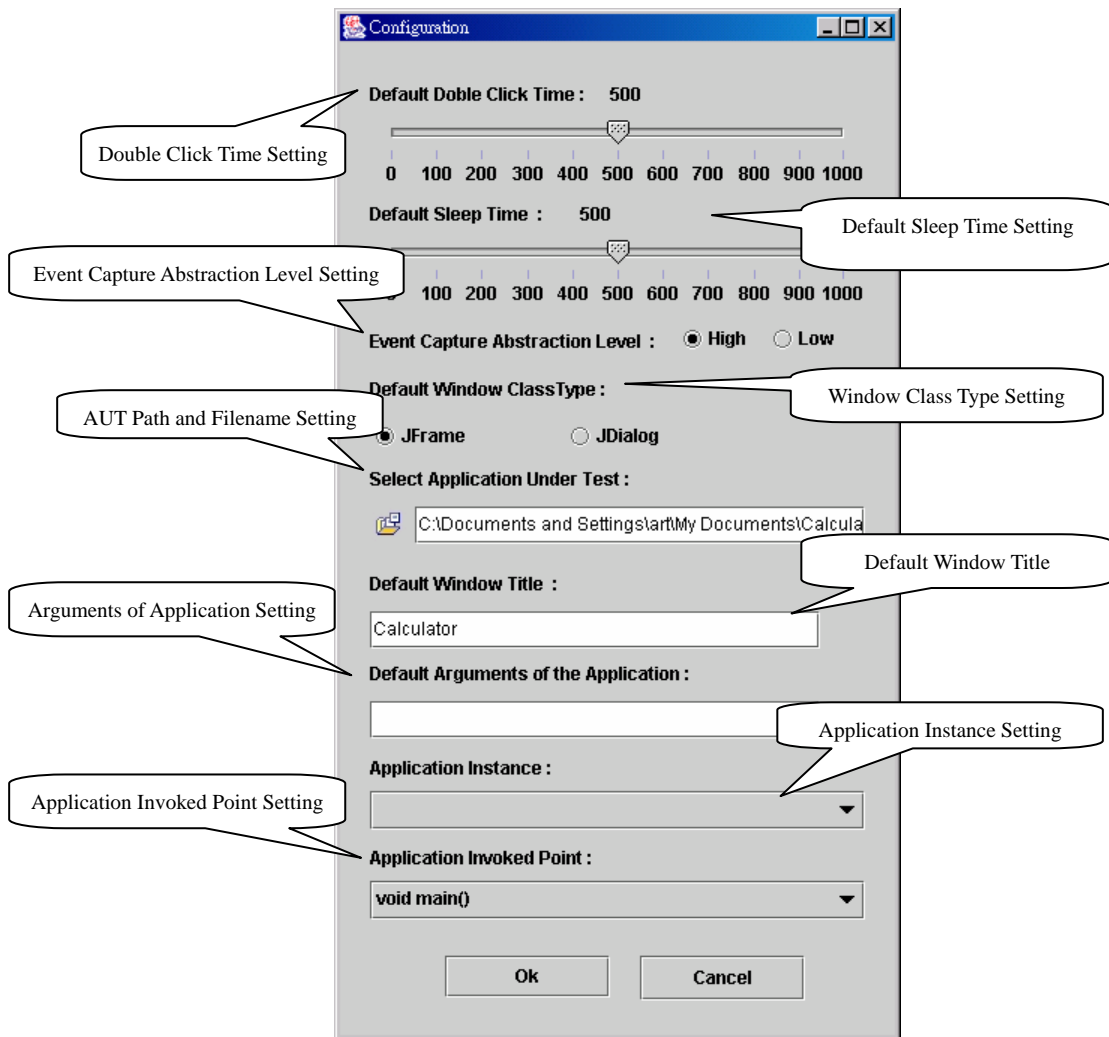


Figure 12 Configuration dialog

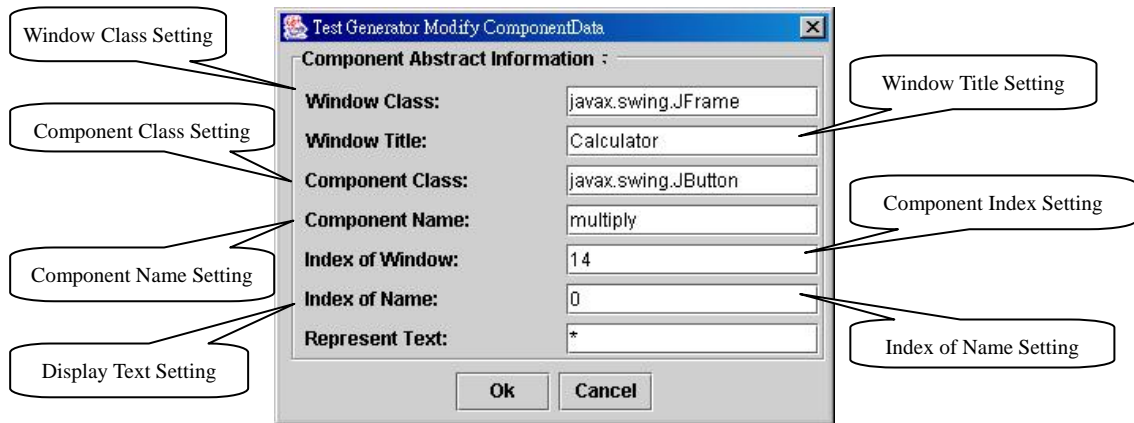


Figure 13 Test Generator Modify ComponentData dialog

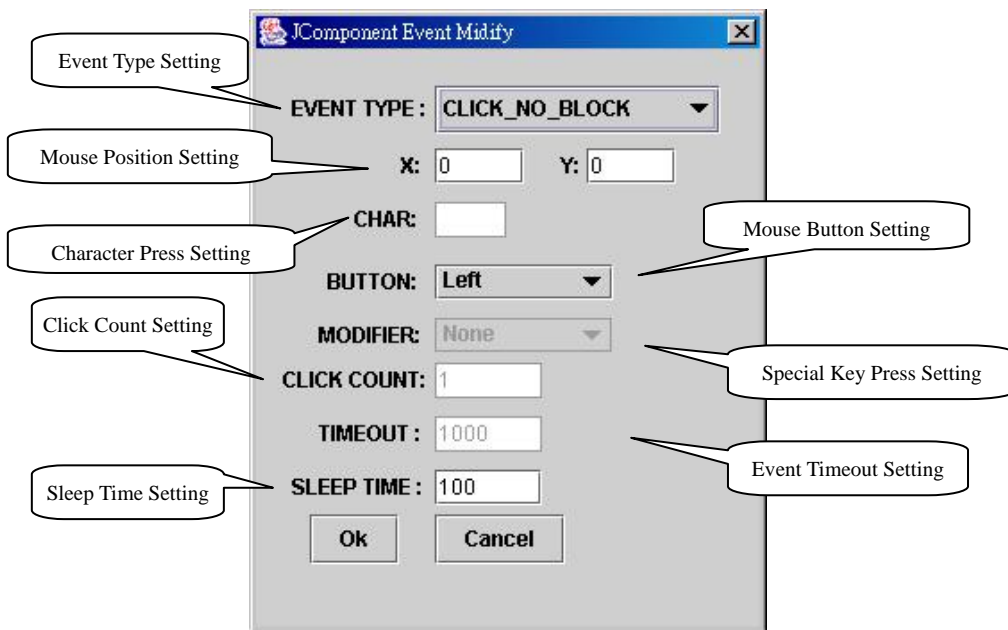


Figure 14 JComponent Event modify dialog

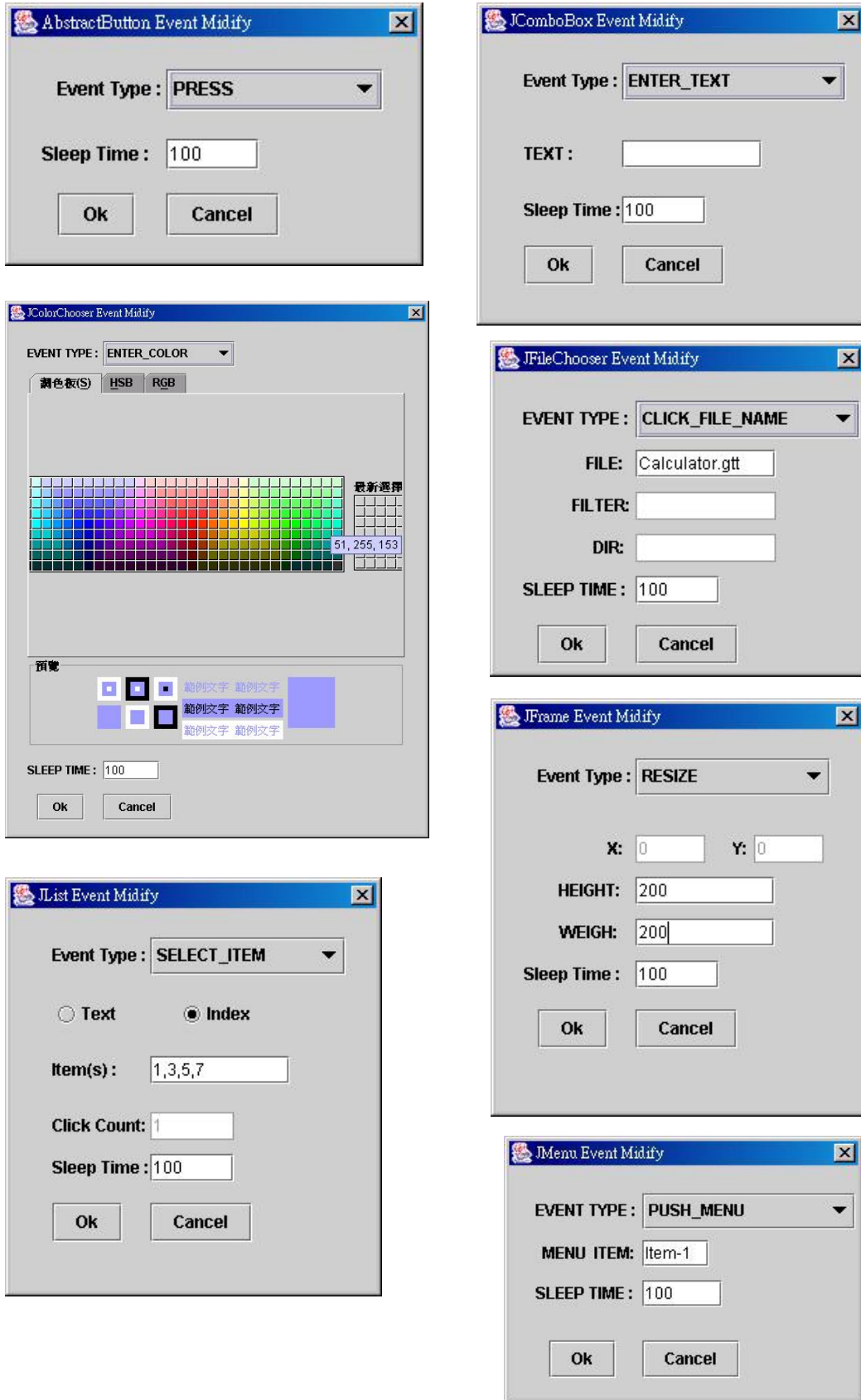


Figure 15 Component event modify dialog

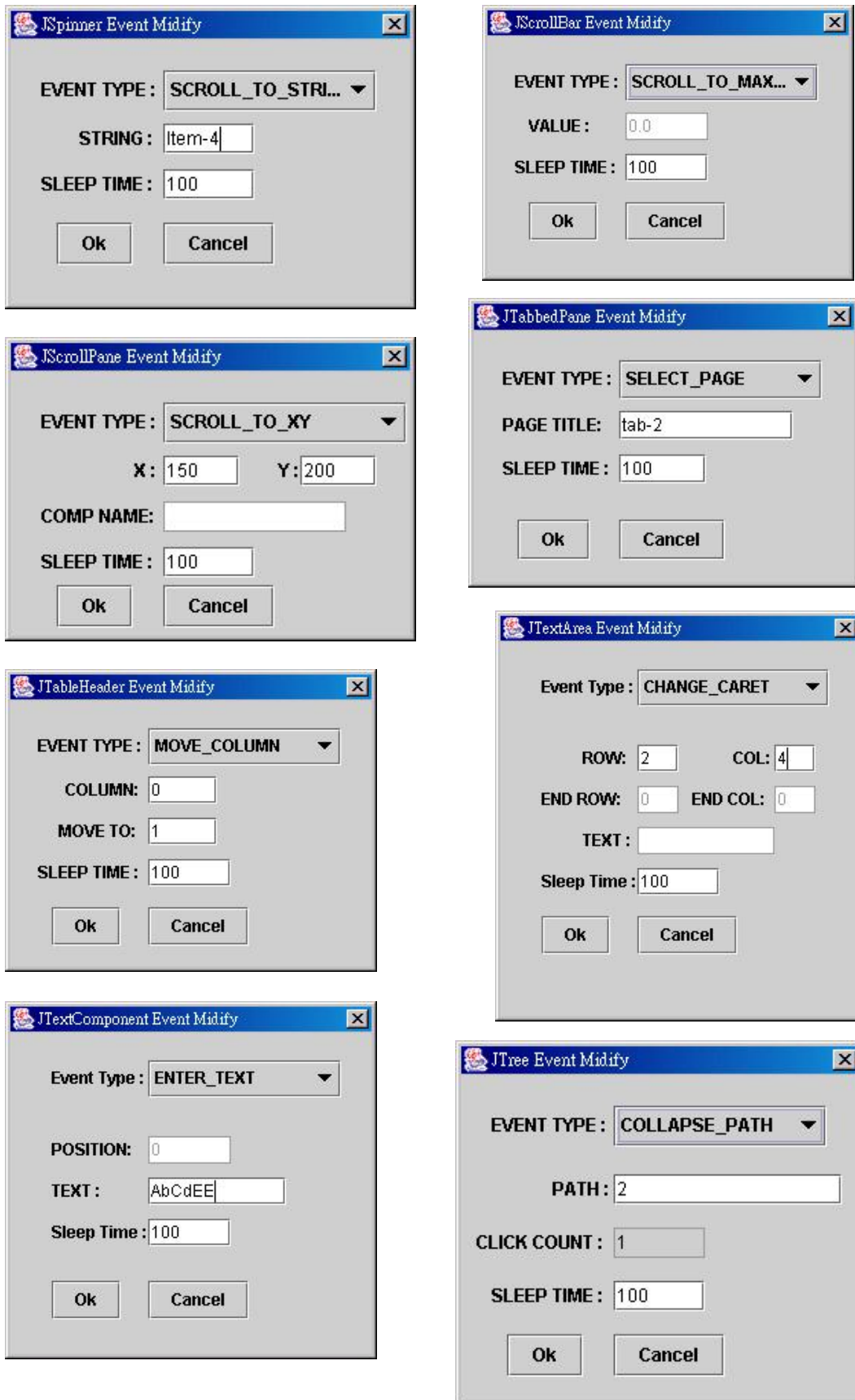


Figure 16 Component event modify dialog (continued)

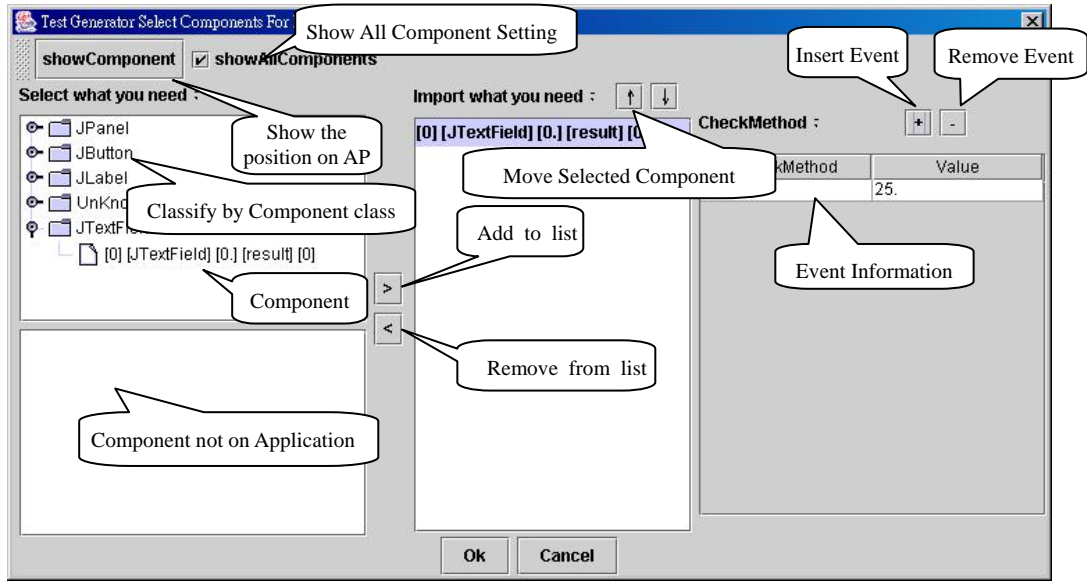


Figure 17 Test Generator Select Component For Insert Component Event dialog

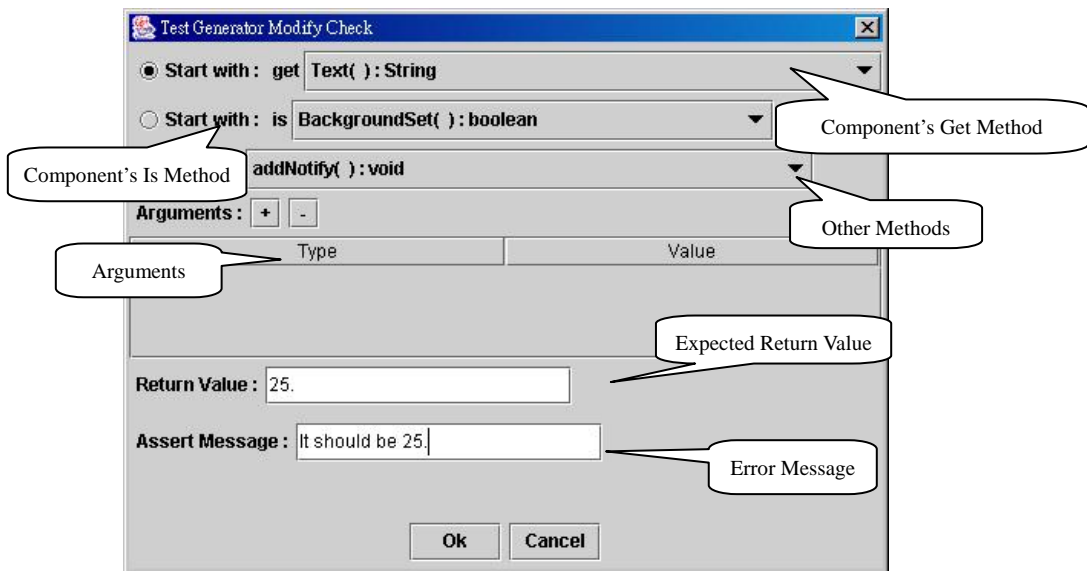


Figure 18 Test Generator Modify Check dialog

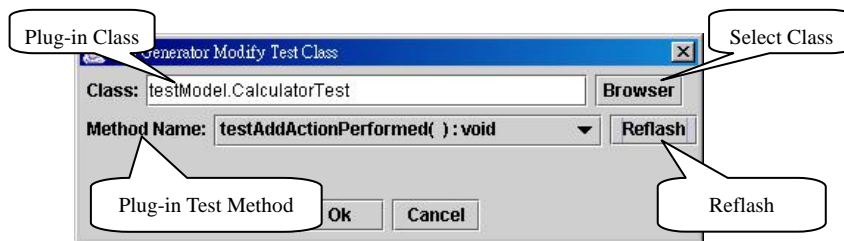


Figure 19 Test Generator Modify Test Class dialog