Ben-Gurion University of the Negev
The Software Engineering Program

Access Layers 

Automatic Software Testing Tool for Computer Networks

User Manual

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1. Introduction

The AST software is a tool that allows performing different actions from one central computer over the remote machines in the network, such as changing the IP address, switching users, turning off the computer and changing the network settings.

In addition to the basic actions that come with the software, you can also add new actions and scripts that you wrote, and to execute them over the remote machines you've selected.

The software also enables you to build more complex scenarios that are composed of several actions, to select the order and the parameters of the actions you selected and to select the end-stations (the remote machines) for each action.
In addition, the software enables to build a test plans that are composed of several scenarios, and to execute them over the selected end-stations.

During the execution you can view the status of each end-station and after each execution of an action, a scenario or a plan - you will get a full report of the execution results.

With this software you can perform tests that you could have not performed before, such as simultaneously executing actions over a group of end-stations.

2. Training

In this section we will go over on how to use the AST software.

We will start with the installation procedure and then move to detailed guide on how to use the software.

2.1. Installation

2.1.1. Database Installation

1. Download and install 'Microsoft SQL Server Management Studio Express' (Link to the download page).
2. Open 'Microsoft SQL Server Management Studio Express' and press 'Connect'.
3. Select 'New Query'.
4. In the 'New Query' screen write: CREATE DATABASE ASTDB;
5. Select 'Parse' and then 'Execute'.
6. Load the attached *'InitDatabase.sql'* file, select 'Parse' and then 'Execute'.
7. The AST database installation is done.

2.1.2. Setting the Configurations File

The system uses an XML configurations file that located under the same main folder as the executable *AST.exe*.
If the system doesn't find the configuration file, the system will use the next default values:

1. **Database Connection String:**
   Server= [*HOST_NAME*]\SQLEXPRESS; Database=ASTDB; Integrated Security=True;
2. **Max Thread Pool Size:** 10
3. **PsTools Path:** (Parent folder).
4. **Reports Path:** (Parent folder).
5. **Report Option:** XML.

The configurations file XML Format:

```
<Configuration>
        <DatabaseConnectionString>String</DatabaseConnectionString>
        <MaxThreadPoolSize>Number</MaxThreadPoolSize>
        <PSToolsPath>Full Path</PSToolsPath>
         <ReportsPath>Full Path</ReportsPath>
         <ReportOption>XML / TXT</ReportOption>
 </Configuration>
```

In order to change the settings of the configuration file - you can double click the *'config.xml*' file and change the configuration manually or to change the settings via the AST software (you can learn how to do it in section 2.2.12).

Note:

1. You can try starting the program if the SQL Server name is your HOST_NAME (like in the default value).
2. In order to display XML report, the attached *'Report.xsl'* and *'collapse.js'* files should be under the reports path.

2.1.3. PsTools Constraints

In order to use *PsTools suite*, please make sure that your computers meets the following constraints:

In the local machine (the machine where the software runs):
PsTools works on Windows Server 2008, Vista, NT 4.0, Win2K, Windows XP and Server 2003 including x64 versions of Windows.

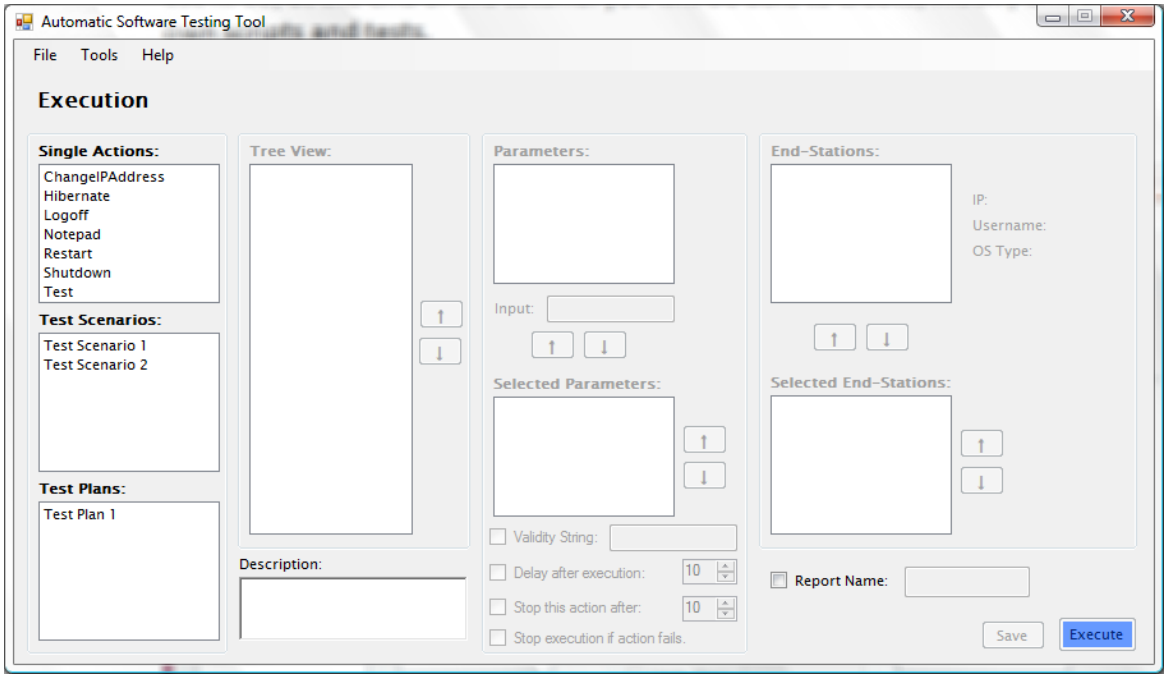
In the target machines (the end-stations):

1. Make sure that the target machines are not running Windows XP Home. Windows XP Home is lacking some of the network functionality required by (most) PsTools commands.
2. The Workstation service is running (check using services.msc).
3. The Server service is running (check using services.msc).
4. The Admin$ share is available (check using computer management).
5. The Windows Network is running and Printer and File Sharing are activated (no need to actually share anything).
6. Incoming network users authenticate as themselves. To achieve this:
    - Turn off **simple file sharing** and thus turn on **classical file sharing** like on Win2K.
    - Turn of **network users identify as guests** and thus turn on **network users identify as themselves** like on Win2K.
7. **Note**: Classical Network Authentication requires a **non-empty password**. If you have not already done so, assign the user who will logon to \\target a strong password (This is recommended for security reasons anyway).
8. Make sure that the user who will execute the command on the target machine has got **admin privileges**.
9. Check your WinXP firewall settings. By default on WinXP Sp2 the firewall will block any incoming traffic. So it may be necessary to open port 445 on your target machine for incoming traffic from your local machine.
10. Allow remote assistance:
    My Computer -> Properties -> Remote -> Allow remote assistance.

2.2. Guide

We will take you step by step over the functionality of our software, teaching you how to use it. So, at the end of the tutorial you will be able to create, modify and execute your own scripts and tests.

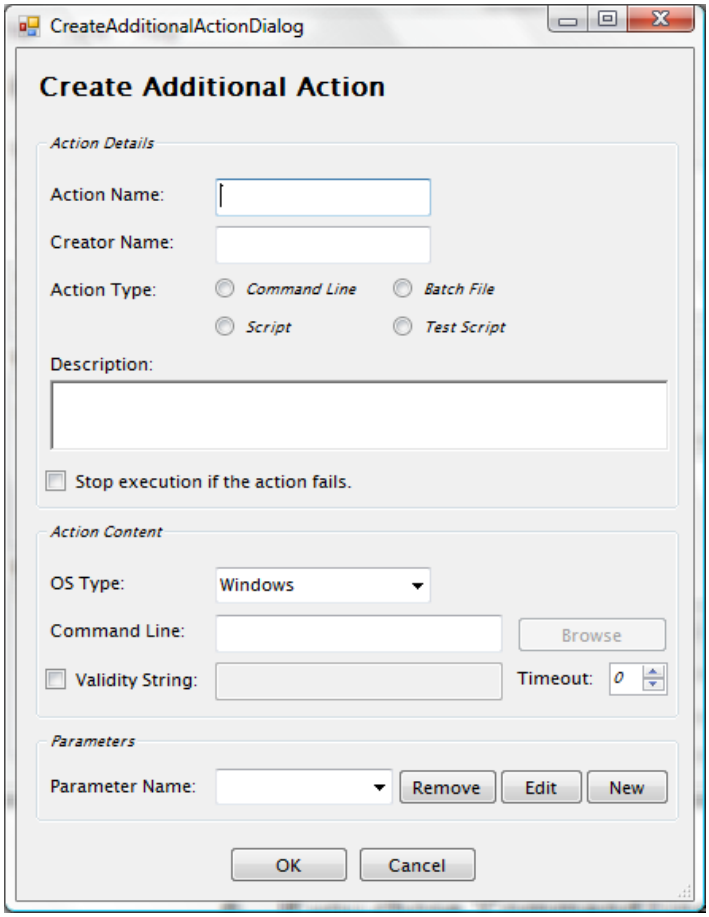
2.2.1. The Main Screen



The main screen of the software is the execution screen.
We will learn to use it in section 2.2.11.

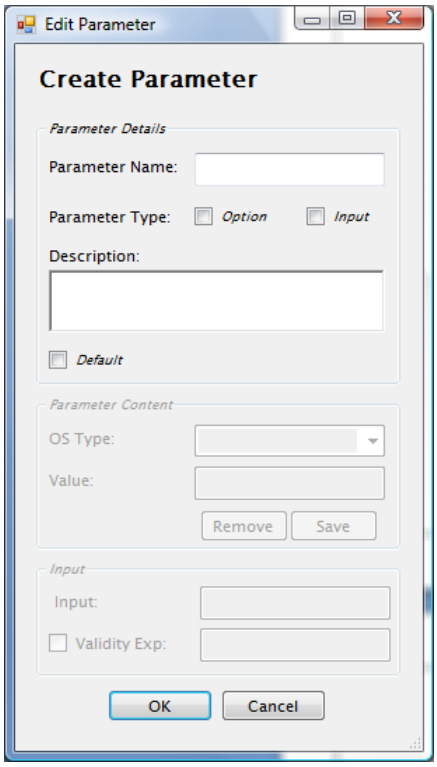
2.2.2. Creating Additional Action

1. Open the software by running the *AST.exe* file.
2. Click 'File', then 'New' and then choose 'Additional Action'
   or right-click in the 'Single Action' list-box and choose 'New'.
3. The next screen will appear:



4. Enter the action name, your name, description of the action and choose the type of the action.
5. If you want the execution will stop if this action fails - check the 'Stop execution if the action fails' check-box.
6. Select an OS Type.
7. If you chose 'Command Line' type, write the desirable command line.
8. If you chose 'Script' type, 'Batch File' type or 'Test Script' type, click 'Browse' and locate the desirable script in your computer.
9. The validity string enables to recognize the success of properly execute, meaning the output of the execution of this additional action must contain this string to be considered as properly executed. If such string exists in your action, check the check-box near the validity string and write this string.
10. Select the timeout for this action. The timeout indicates the time (in seconds) the system waits for a connection to the end-station.
11. To add command line/script for another OS type, return to step 5.

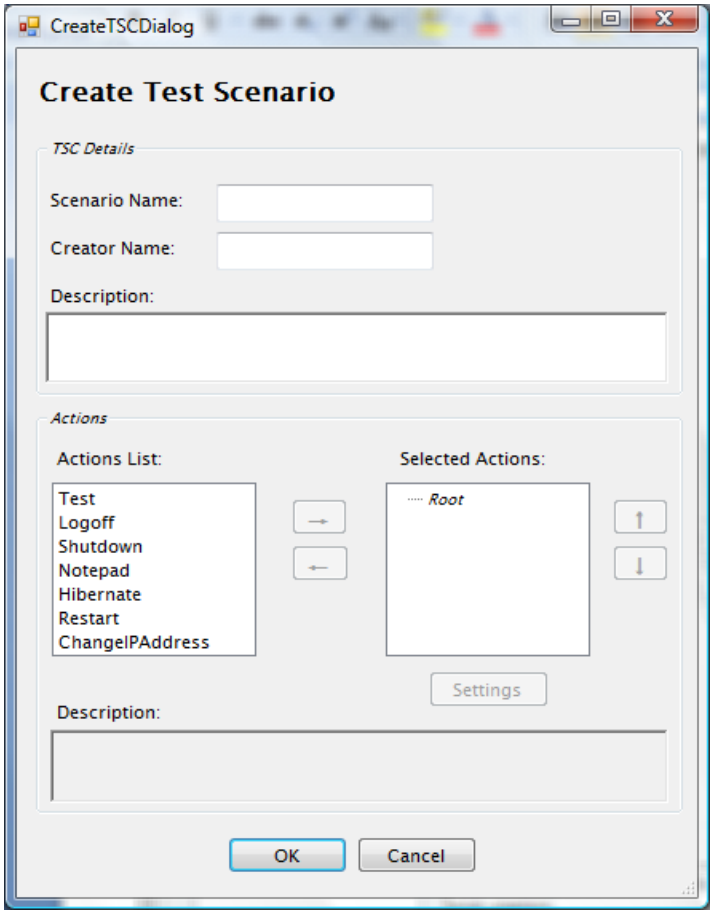
12. After filling the content of the action, you can add/remove parameters to the action.
13. To add parameters, press the 'New' button.



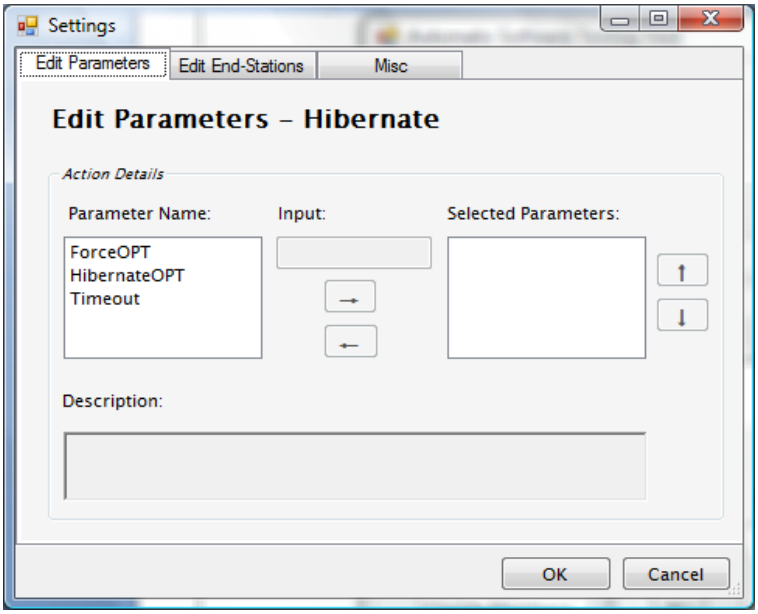
14. Choose a name for the parameter.
15. If the parameter is an input parameter, (for example: username), check the 'Input' check-box and fill its value.
16. If the parameter is an option parameter (for example: -t) check the 'Option' check-box and add values according to the OS type.
17. The 'Default' check-box means that this parameter is default and will be added automatically to the action each time you select the action. Check this check-box if you want the parameter to be default.
18. Press the 'OK' button to save the parameter.
19. To add more parameters, return to step 13.
20. Press the 'OK' button to save the action, or the 'Cancel' button to exit without saving the action.

2.2.3. Creating Test Scenario

1. Click 'File', then 'New' and then choose 'Test Scenario'
   or right-click in the 'Test Scenario' list-box and choose 'New'.
2. The next screen will appear:



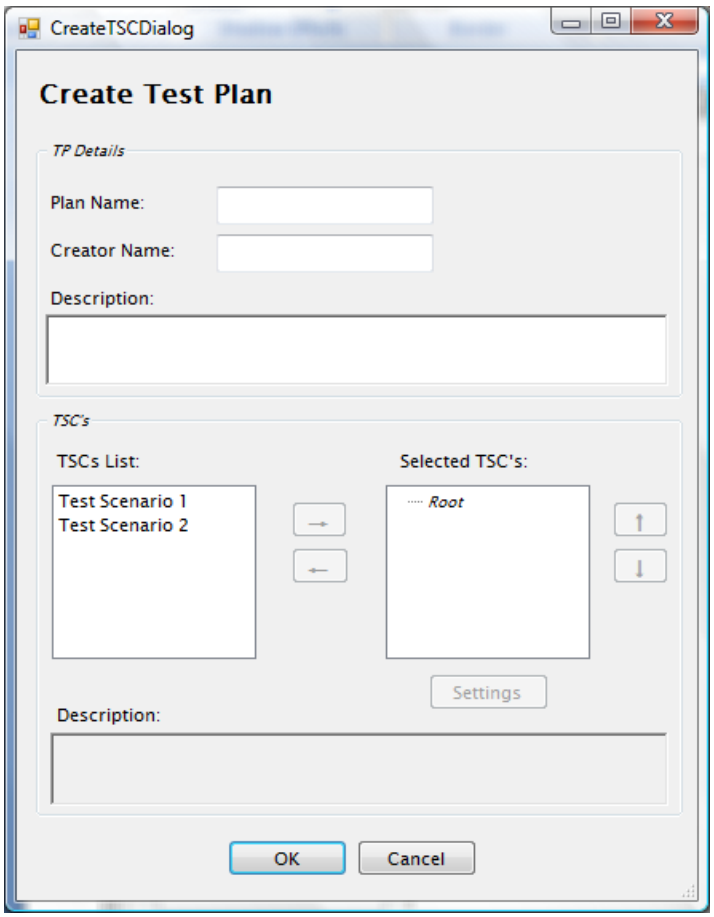
3. Enter the scenario name, your name and description of the test scenario.
4. Select/unselect the actions for the scenario by pressing the 'left' and 'right' arrow buttons and moving the actions from one side to another.
5. By standing on each action you can see its description.
6. Change the order of the actions by pressing the 'up' and 'down' arrow buttons.
7. To change setting of a selected action, select the action and press the 'Settings' button.



8. To add/edit parameters, go to 'Edit Parameters' tab.
    a. Select/unselect parameters by clicking the 'right' and 'left' arrow buttons.
    b. Change the parameters order by pressing the 'up' and 'down' arrow buttons.
9. To add/edit end-stations, go to 'Edit End-Stations tab.
    a. Select/unselect end-stations by pressing the 'right' and 'left' arrow buttons and moving the end-stations from one side to another.
    b. Change the end-stations order by pressing the 'up' and 'down' arrow buttons.
10. To set a delay after the execution of the action and the duration of the action, go to 'Misc' tab.
11. Press the 'OK' button to save the settings.
12. Press the 'OK' button to save the test scenario, or the 'Cancel' button to exit without saving the test scenario.

2.2.4. Creating Test Plan

1. Click 'File', then 'New' and then choose Test Plan
   or right-click in the 'Test Plan' list-box and choose 'New'
2. The next screen will appear:



3. Enter the plan name, your name and description of the test plan.
4. Select/unselect the test scenarios for the plan by pressing the 'left' and 'right' arrow buttons and moving the test scenarios from one side to another.
5. By standing on each action and scenario you can see its description.
6. Change the order of the test scenarios by pressing the 'up' and 'down' arrow buttons.
7. To change setting of a selected action or scenario, select the action and press the 'Settings' button.
8. After the setting is done, press the 'OK' button to save the settings.
9. Press the 'OK' button to save the test plan, or the 'Cancel' button to exit without saving the test plan.

2.2.5. Modifying Additional Action

1. Click 'File', then 'Open' and then choose 'Additional Action'
   or right-click on the selected addition action in the 'Single Action' list-box and choose 'Edit'.
2. In case you selected the first option, a browse dialog will be opened. Select the action you want to modify. The description of the action will appear in the description box. After selecting the action, press the 'OK' button.
3. The same screen as 'New Additional Action' will appear, with filled data.
4. Modify the attributes you would like to change.
5. Press the 'OK' button to save the changes, or the 'Cancel' button to exit without saving the changes.

2.2.6. Modifying Test Scenario

1. Click 'File', then 'Open' and then choose 'Test Scenario'
   or right-click on the selected test scenario in the 'Test Scenario' list-box and choose 'Edit'.
2. In case you selected the first option, a browse dialog will be opened. Select the test scenario you want to modify. The description of the test scenario will appear in the description box. After selecting the test scenario, press the 'OK' button.
3. The same screen as 'New Test Scenario' will appear, with filled data.
4. Modify the attributes you would like to change.
5. Press the 'OK' button to save the changes, or the 'Cancel' button to exit without saving the changes.

2.2.7. Modifying Test Plan

1. Click 'File', then 'Open' and then choose 'Test Plan'
   or right-click on the selected addition action in the 'Test Plan' list-box and choose 'Edit'.
2. In case you selected the first option, a browse dialog will be opened. Select the test plan you want to modify. The description of the test plan will appear in the description box. After selecting the test scenario, press the 'OK' button.
3. The same screen as 'New Test Plan' will appear, with filled data.
4. Modify the attributes you would like to change.
5. Press the 'OK' button to save the changes, or the 'Cancel' button to exit without saving the changes.

2.2.8. Removing Additional Action

1. Click 'File', then 'Delete' and then choose 'Additional Action'
   or right-click on the selected addition action in the 'Single Action' list-box and choose 'Delete'.
2. In case you selected the first option, a browse dialog will be opened. Select the action you want to remove and press the 'OK' button.
3. If the action isn't used in any test scenario, the action will be removed.

2.2.9. Removing Test Scenario

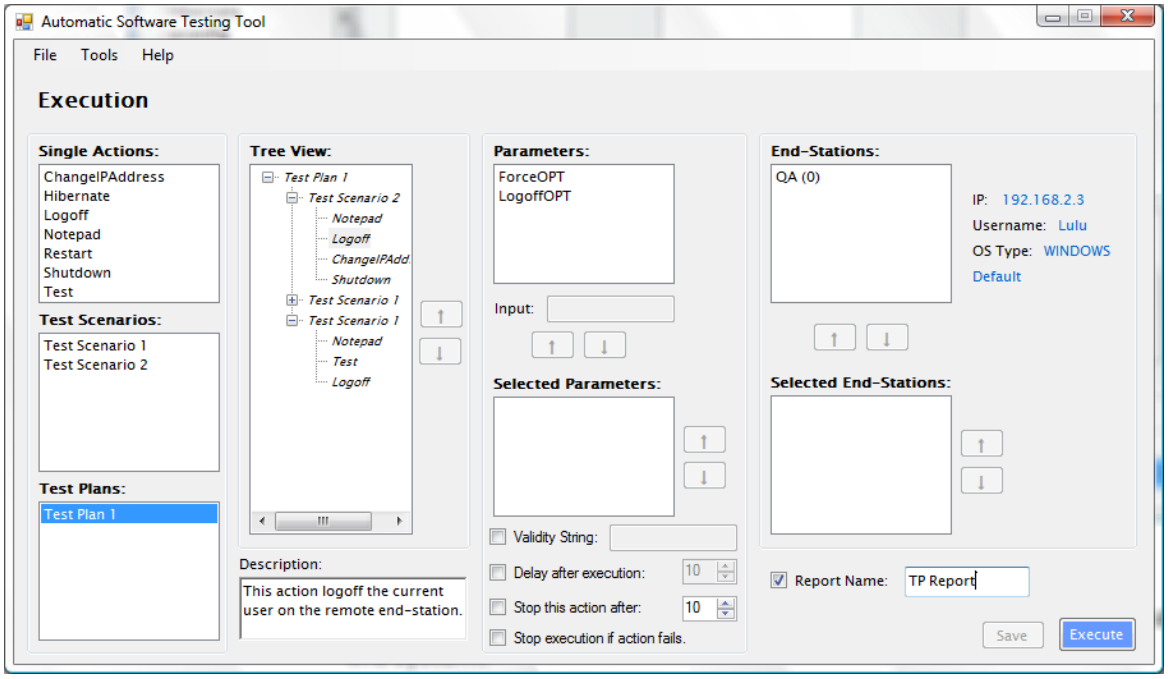
1. Click 'File', then 'Delete' and then choose 'Test Scenario'
   or right-click on the selected addition action in the 'Test Scenario' list-box and choose 'Delete'.
2. In case you selected the first option, a browse dialog will be opened. Select the test scenario you want to remove and press the 'OK' button.
3. If the test scenario isn't used in any test plan, the test scenario will be removed.

2.2.10. Removing Test Plan

1. Click 'File', then 'Delete' and then choose 'Test Plan'
   or right-click on the selected addition action in the 'Test Plan' list-box and choose 'Delete'.
2. In case you selected the first option, a browse dialog will be opened. Select the test plan you want to remove and press the 'OK' button.

2.2.11. Execution

1. The main screen of the program is the execution screen:

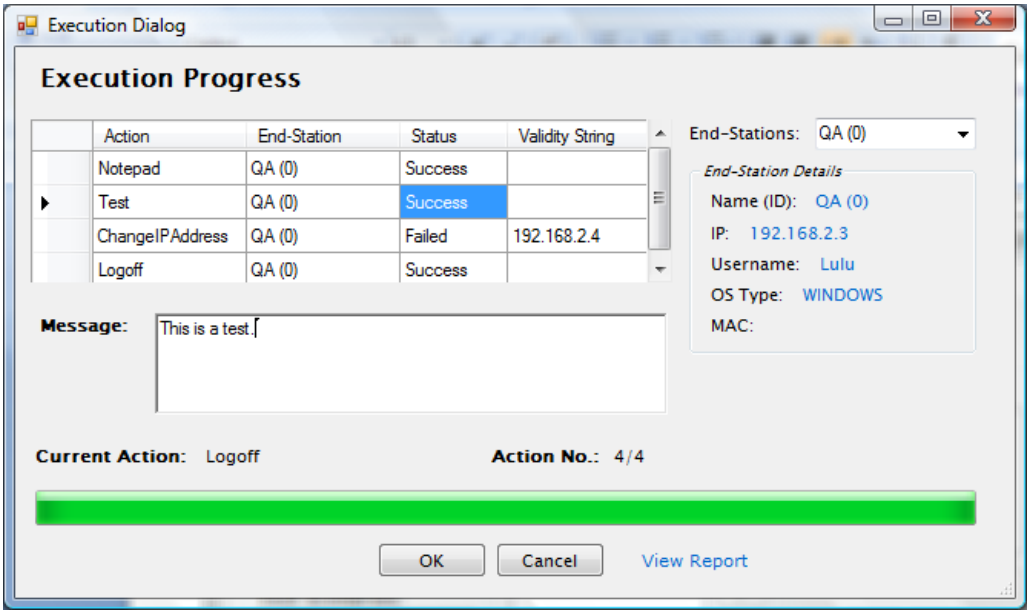


The screen is divided to 4 columns:

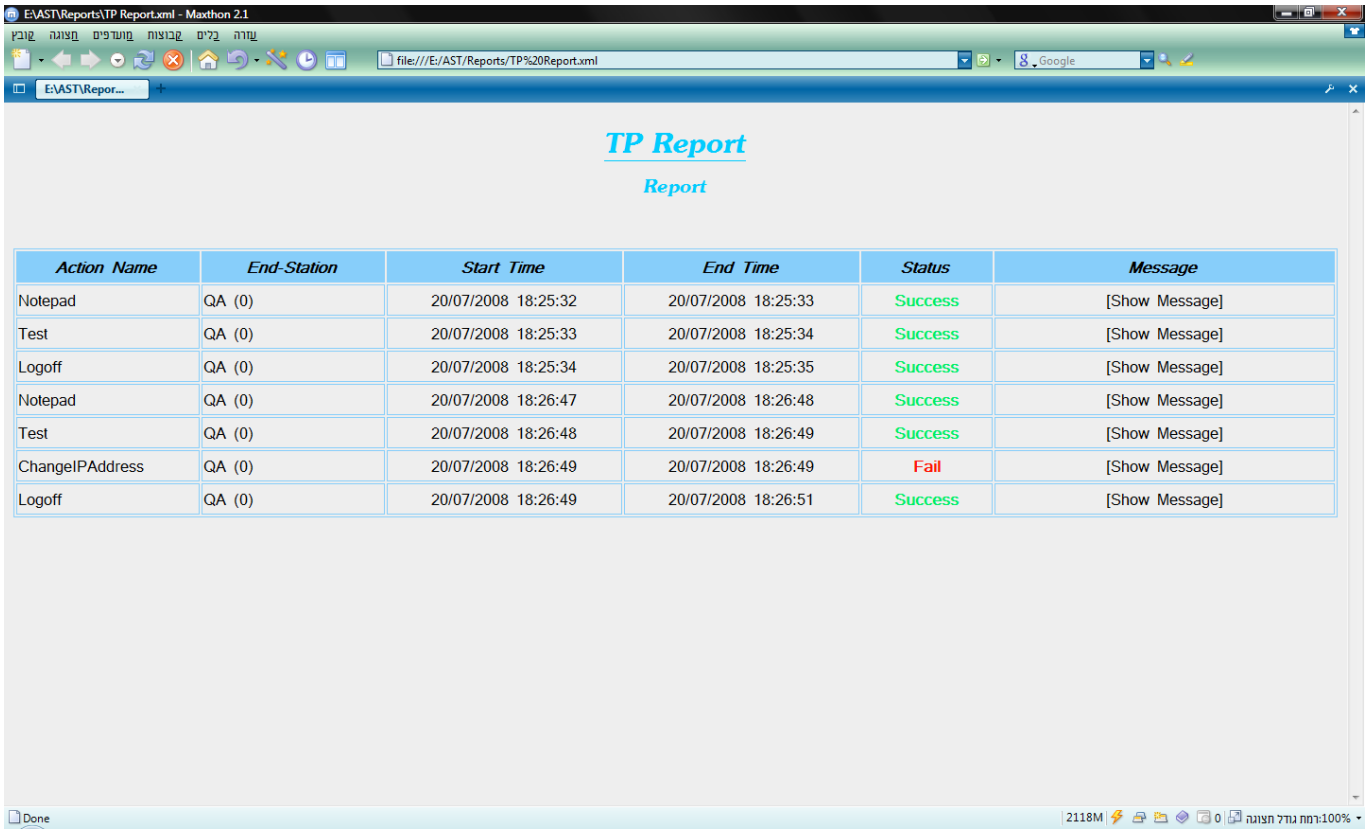
- The first column is all the actions, test scenarios and test plans that are in the system.
- The second column is the tree-view of the selected action / test scenario / test plan.
- The third column is the parameters of the selected action.
- The fourth column is the end-stations of the selected action.

2. Before the execution, go to the settings page to make sure that all of the settings are correct (you can learn how to change the settings in section 2.2.12) and then return to the execution page.
3. Select an action / test scenario / test plan from the left list-boxes.
4. After selecting the desirable action / test scenario / test plan - it will appear in the tree-view with all of the actions / test scenarios that it holds.
5. To edit the parameters, the delay and the duration of each action - select the action from the tree-view.
6. The parameters of the selected action will appear in the 'Parameters' list-box, and the selected parameters will appear in the 'Selected Parameters' list-box.
7. Select/unselect parameters by pressing the 'up' and 'down' arrow buttons between the list-boxes and moving the parameters from one list-box to another.
8. Change the order of the selected parameters by pressing the 'up' and 'down' arrow buttons near the 'Selected Parameters' list-box.
9. To select/unselect end-stations for each action / test scenario / test plan - select it from the tree-view.

10. All of the end-stations that are in the system will appear in the 'End-Stations' list-box, and the selected end-stations will appear in the 'Selected End-Stations' list-box.
11. Select/unselect end-stations by pressing the 'up' and 'down' arrow buttons between the list-boxes and moving the end-stations from one list-box to another.
12. Change the order of the selected end-stations by pressing the 'up' and 'down' arrow buttons near the 'Selected End-Stations' list-box.
13. To select a name for the report file, check the check-box near the 'Report Name' and write the desirable name for the report file (the default report name is a concatenation of the name of the action, the date and the current time).
14. Press the 'Execute' button to start the execution.
15. The next execution dialog will appear:



16. The execution dialog will show the progress of the execution and the state of each end-station during the execution process: the left side will display the status of each action and the right side of the screen will display the details of each end-station. The bottom part of the screen will display the current action and the progress of the entire test scenario / plan.
17. When the execution is done, a link for the report file will appear.
18. By clicking the link, the next screen with all the execution details will appear:

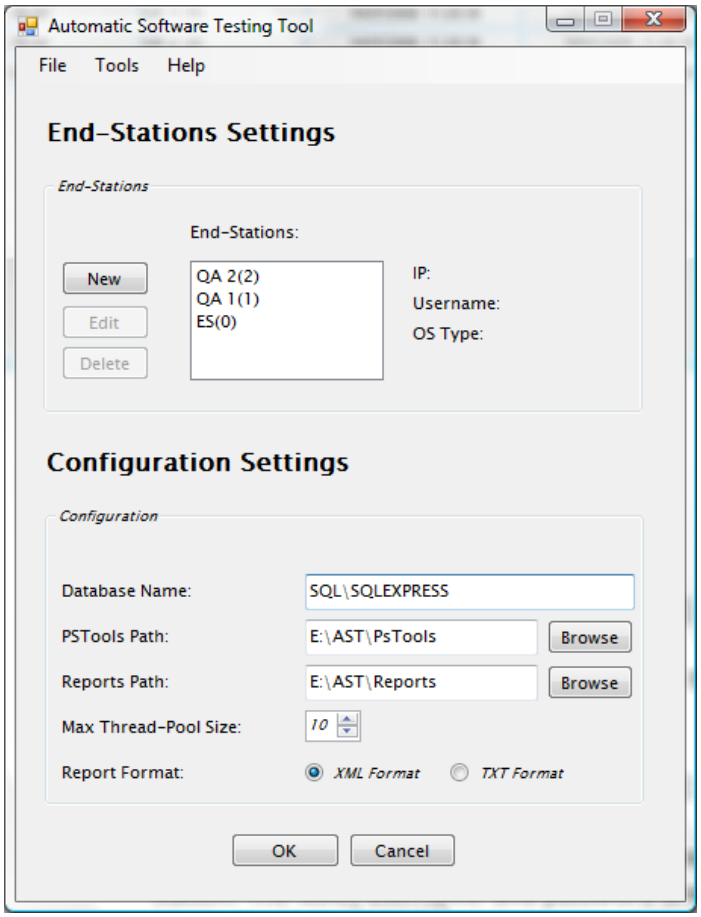


Action Name	End-Station	Start Time	End Time	Status	Message
Notepad	QA (0)	20/07/2008 18:25:32	20/07/2008 18:25:33	Success	[Show Message]
Test	QA (0)	20/07/2008 18:25:33	20/07/2008 18:25:34	Success	[Show Message]
Logoff	QA (0)	20/07/2008 18:25:34	20/07/2008 18:25:35	Success	[Show Message]
Notepad	QA (0)	20/07/2008 18:26:47	20/07/2008 18:26:48	Success	[Show Message]
Test	QA (0)	20/07/2008 18:26:48	20/07/2008 18:26:49	Success	[Show Message]
ChangeIPAddress	QA (0)	20/07/2008 18:26:49	20/07/2008 18:26:49	Fail	[Show Message]
Logoff	QA (0)	20/07/2008 18:26:49	20/07/2008 18:26:51	Success	[Show Message]

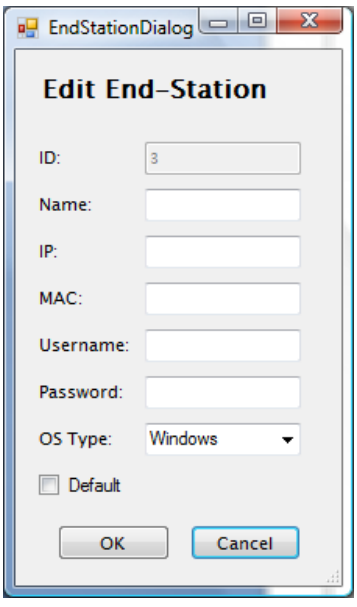
By clicking the '[Show Message]' in the right column, you can view the message that returned from the execution of the action.

2.2.12. Changing the Settings

1. Click 'Tools' and then 'Settings'.
2. The next screen will appear:



3. To add new end-station to the system - press the 'New' button.
4. The next screen will appear:



5. Fill the name of the end-station, the IP address and the OS type of the end-station. The MAC, username and password are optional.
6. The 'Default' check-box means that this end-station is default and will be added automatically to each action at execution time. Check this check-box if you want the end-station to be default.
7. Press the 'OK' button to add the end-station to the system.
8. To modify or delete an end-station - select the wanted end-station and press the appropriate button.
9. To change the configuration file - change the attributes in the bottom part of the screen:
    a. The database name is the name of the AST database.
    b. The PSTools path is the directory of the PSTools in the computer.
    c. The reports path is where you would like the reports to be saved.
    d. The max thread-pool size is the maximum size of threads at the execution.
    e. The report format is the format which the reports will be saved. You can select a TXT format or an XML format.
10. Press the 'OK' button to save the changes, or the 'Cancel' button to exit the screen without saving the changes.

3. Reference

3.1. Add End-Station

The user can create a new end-station and to add it to the system.
The end-station contains the following attributes:

- Unique ID (assigned by the system).
- IP address.
- MAC address.
- Operating system type
- Username and password.

3.2. Create Additional Action

The user can create a new action and to add it to the system.
An action can represent one of the following types:

- Command line.
- Batch file.
- Script (.vbs).
- Test script that runs on the local machine.

The action has unique name and contains all the details that are necessary to execute it, such as parameters and end-stations to run this action on.

3.3. Create Test Plan

The user can create a new test plan and to add it to the system.
A test plan has a unique name and contains a list of test scenarios that are predefined in the system, including the end-stations that these test scenarios will run on.

3.4. Create Test Scenario

The user can create a new test scenario and to add it to the system.
A test scenario has a unique name and contains a list of actions that are predefined in the system, including the end-stations that these actions will run on.
A test scenario must include at least one test action (an action that represents a test script).

3.5. Delete Additional Action

The user can remove an additional action.
The additional action and all its content will be removed from the system.

3.6. Delete End-Station

The user can remove an end-station.

The end-station will be removed from the system.

3.7. Delete Test Plan

The user can remove a test plan.
The test plan and all its content will be removed from the system.

3.8. Delete Test Scenario

The user can remove a test scenario.
The test scenario and all its content will be removed from the system.

3.1. Execute Single Action

The user can execute a single action over a group of end-stations.
Before the execution, the user can change the parameters of the action, the selected end-stations and the duration of the action.
The user can select a report name for the execution.
After the execution, the system creates the report that contains all the execution details.

3.2. Execute Test Plan

The user can execute a test plan over a group of end-stations.
Before the execution, the user can change the selected end-stations of each test scenario and the delay between each pair of test scenarios.
The user can select a report name for the execution.
After the execution, the system creates the report that contains all the execution details.

3.3. Execute Test Scenario

The user can execute a test scenario over a group of end-stations.
Before the execution, the user can change the parameters of each action in the test scenario, the duration of each action, the delay between each pair of actions and the selected end-stations of each action in the test scenario.
The user can select a report name for the execution.
After the execution, the system creates the report that contains all the execution details.

3.4. Modify Additional Action

The user can modify the attributes of the additional action, such as the description, type, parameters, end-station, etc.

3.5. Modify End-Station

The user can modify the IP address, MAC address, operating system type, username and password.

3.6. Modify Test Plan

The user can add/remove test scenarios to/from the test plan, change the end-stations for each test scenario, and modify the description of the test plan.

3.7. Modify Test Scenario

The user can add/remove actions to/from the test scenario, change the end-stations for each action, and modify the description of the test scenario.

3.8. Supported Files

The system supports execution of command lines, vb-scripts (.vbs) and batch files (.bat). The system supported a creation of reports in text files (.txt) and XML files (.xml).

4. Limitations

- The system supports the execution of the following scripts only:
  - Vb-scripts (.vbs).
  - Batch files (.bat).

- The system works only in Microsoft Windows platform (but can be extended easily to other platforms).

5. Appendix – Dynamic Change IP

This section will supply information and also developer information about the *'DynamicChangeIP'* basic action.
The tool for this action can be found under *'Scripts'* folder in the filename '*DChangeIP.exe'*, although it has *.exe* extension it configured as BATCH_FILE action in the AST because it is needed to be copied to the end-station before execution (like Batch file).
The usage of this command specified here (or can be viewed by typing "DChangeIP.exe" from the command shell):

Usage: DChangeIP <computer_name> <shared_name> [<username> <password>]
<end-station id>

< computer_name>	The name of the computer holds the shared folder.
< shared_name >	The shared folder name on the computer name this is the path to write the new IP address.
<username>	The username for the computer_name.
<password>	The password for the computer_name.
<end-station id>	The ID of the end-station in the AST database.

The tool release the current IP (using 'ipconfig /release'), renew the IP (using 'ipconfig /renew') and save the new IP in the *<shared_name>* under the txt filename *'<end-station id>.txt'*.
Each end-station gets a unique ID so each one will have a unique filename; also after the AST read the new IP from the file it deletes it.

Important Note:
When executing this action from the AST utility the parameters order must be:

1. Computer Name
2. Shared Folder Path
3. Username
4. Password

Developer Information

- The code for this too found under *'Scripts\DChangeIP\'* folder.
- The Result Handler which handles this action called *'RHDynamicChangeIP'* – this handler decide if the action was successful and deletes the file with the new IP after that.

6. Index