UEFI Self-Certification Test (SCT)

*UEFI Summer Plugfest – July 6-9, 2011*

Presented by

Dong Wei (HP) & Harry Hsiung (Intel)
Agenda

- UTWG & UEFI SCT
- UEFI SCT Details
- UEFI SCT Demo
The UEFI Forum & UTWG

Each work group approves/delivers different content to the public.

Publications/Decisions ratified by the board

UEFI Test Workgroup (UTWG) owns UEFI SCT
UEFI SCT Objectives

- UEFI SCT is to provide the computing industry with a test suite to verify the implementations in accordance with the UEFI Specification
  - UEFI Specification Requirements are specified in Section 2.6
  - Compliance is part of the UEFI logo usage guideline [http://www.uefi.org/about/logo/]
UEFI SCT

- **NOT** a debug environment for a UEFI implementation
- **NOT** a code coverage or performance analysis tool
- **NOT** a functional test tool
- SCT tests for existence of protocols and the input and output parameters
UEFI SCT Status

• UEFI SCT 2.3 was released in Jan 2011
  – See release notes for interfaces not tested
    (e.g., ARM binding, User Identification)
UEFI SCT Plan

• UEFI SCT 2.3 Patch
  — Include ARM Binding Tests
  — Target: UEFI Plugfest in Oct., 2011

• UEFI SCT 2.3.1 Release
  — Target: 12 months after the spec release (4/2012)
  — Pre-alpha package: available at this plugfest
    • Focus: Secure Boot Interfaces
Materials

- [www.uefi.org/specs/](http://www.uefi.org/specs/) including
  - Documents for the UEFI SCT
    - SCT2_3_ver1_1.pdf
    - UEFI_SCT2_3 User Guide_ver1_1.pdf
    - UEFI_2_3_SCT_Getting_Started_ver1_1.pdf
  - Source Code of the UEFI SCT
  - Executable images on IA32, X64\Intel® 64, and IA-64 platforms
Getting started

• Get download @ UEFI.org/specs
• Unzip to USB storage device
• Pick correct architecture (ie X64/EM64T)
• Boot to shell
• Run X64install.nsh  install to usb device
• SCT  –u to run in user mode and select the tests you want to run
• Generate report (.csv for MS Excel) or look at raw log files for failures
SCT Test Suite – Native Mode

UEFI-based Target Machine
Running SCT in usual mode

In native mode SCTs run on the system under test in the shell

User interface for local SCT validation

SCT -u
## Native - Test Case selection

### EFI Self Certification Test (v 0.1)

<table>
<thead>
<tr>
<th>Test Case Management</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[x] Boot Services Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Runtime Services Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Loaded Image Protocol Test</td>
<td></td>
</tr>
<tr>
<td>[x] Device Path Protocol Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Driver Model Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Console Support Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Bootable Image Support Test</td>
<td></td>
</tr>
<tr>
<td>[ ] PCI Bus Support Test</td>
<td></td>
</tr>
<tr>
<td>[ ] SCSI Bus Support Test</td>
<td></td>
</tr>
<tr>
<td>[ ] USB Support Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Network Support Test</td>
<td></td>
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<tr>
<td>[ ] Debugger Support Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Compression Test</td>
<td></td>
</tr>
<tr>
<td>[ ] Device IO Protocol Test</td>
<td></td>
</tr>
<tr>
<td>[ ] EFI Byte Code Test</td>
<td>Order: 0</td>
</tr>
<tr>
<td></td>
<td>Passes: 1</td>
</tr>
<tr>
<td></td>
<td>Failures: 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Up/Dn</th>
<th>Select Item</th>
<th>Enter</th>
<th>Select SubMenu</th>
<th>F9</th>
<th>Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space</td>
<td>Change Status</td>
<td>ESC</td>
<td>Exit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## EFI Self Certification Test (v 0.1)

<table>
<thead>
<tr>
<th>Test Environment Configuration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Case Max Run Time</td>
<td>Sets the maximum run time for one test case, in seconds (0 means unlimited)</td>
</tr>
<tr>
<td>Enable Screen Output</td>
<td></td>
</tr>
<tr>
<td>Bios Id</td>
<td>[EFI 1.10]</td>
</tr>
<tr>
<td>Platform Number</td>
<td>[0]</td>
</tr>
<tr>
<td>Configuration Number</td>
<td>[0]</td>
</tr>
<tr>
<td>Scenario String</td>
<td></td>
</tr>
</tbody>
</table>

Value Range:
- Max: 400
- Min: 0

**Keyboard Shortcuts**
- Up/Down: Select Item
- F3: Set to Default
- ESC: Save & Exit
Native - Sequence

EFI Self Certification Test (v 0.1)

<table>
<thead>
<tr>
<th>Main Menu</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td></td>
</tr>
<tr>
<td>Test</td>
<td></td>
</tr>
<tr>
<td>Test</td>
<td></td>
</tr>
<tr>
<td>Help</td>
<td></td>
</tr>
</tbody>
</table>

Open File: fs0:SCT\Sequence

2.seq
1.seq

File Name: 2.seq
Files of type: Sequence Files (*.seq)

Up/Dn: Select Item
F4: Reset results
F5: Load Sequence
F6: Save Sequence
Enter: Select SubMenu
ESC: Exit
Native - Report
SCT log file raw test output

GetNextVariableName_Conf
Revision 0x00010000
Test Entry Point GUID: E8014C92-15C4-42A8-8B0D-6080C47D3778
Test Support Library GUIDs:
  1F9C2AE7-F147-4D19-A5E8-255AD005EB3E
  7FD8C38D-7C5C-42FC-B044-3A834A617476

UEFI 2.3
Test Configuration #0

Perform the consistence check of GetNextVariableName() service.

Logfile: "\SCT\Log\Runtime Services Test\Variable Services Test\GetNextVariableName_Conf_0_0_E8014C92-15C4-42A8-8B0D-6080C47D3778.log"
Test Started: 07/01/2011 01:08

RT.GetNextVariableName - With VariableNameSize is NULL -- PASS
5826847A-9067-4F9F-8838-0BF8EC20171C
c:\uefisct\SctPkg\TestCase\UEFI\EFI\RuntimeServices\VariableServices\BlackBoxTest\VariableServicesBBTestConformance.c:1553:Status - Invalid Parameter, Expected - Invalid Parameter

RT.GetNextVariableName - With VariableName is NULL -- PASS
8E8258DC-6634-4DE1-857A-60457EFA7C21
c:\uefisct\SctPkg\TestCase\UEFI\EFI\RuntimeServices\VariableServices\BlackBoxTest\VariableServicesBBTestConformance.c:1632:Status - Invalid Parameter, Expected - Invalid Parameter

RT.GetNextVariableName - With VendorGuid is NULL -- PASS
99A357F0-B6C5-4AEC-9648-34732D2A4950
c:\uefisct\SctPkg\TestCase\UEFI\EFI\RuntimeServices\VariableServices\BlackBoxTest\VariableServicesBBTestConformance.c:1712:Status - Invalid Parameter, Expected - Invalid Parameter
RT.GetNextVariableName - With VariableNameSize is 2 -- PASS
51C19DBA-BAF6-4854-AC09-604547886798
c:\\uefisct\\SctPkg\\TestCase\\UEFI\\EFI\\RuntimeServices\\VariableServices\\BlackBoxTest\\VariableServicesBBTestConformance.c:1833:Status - Buffer Too Small, Expected - Buffer Too Small

RT.GetNextVariableName - After entire variable list returned -- PASS
FE09FF82-B289-449F-B083-981D68D917B1
c:\\uefisct\\SctPkg\\TestCase\\UEFI\\EFI\\RuntimeServices\\VariableServices\\BlackBoxTest\\VariableServicesBBTestConformance.c:2009:Status - Not Found, Expected - Not Found

Returned Status Code: Success

GetNextVariableName_Conf: [PASSED]
  Passes.......... 5
  Warnings........ 0
  Errors.......... 0

------------------------------------------------------------
UEFI 2.3
Revision 0x00010000
Test Entry Point GUID: E8014C92-15C4-42A8-8B0D-6080C47D3778
------------------------------------------------------------
Logfile: \\SCT\\Log\\Runtime Services Test\\Variable Services Test\\GetNextVariableName_Conf_0_0_E8014C92-15C4-42A8-8B0D-6080C47D3778.log"
Test Finished: 07/01/2011 01:08
Elapsed Time: 00 Days 00:00:12------------------------------------------

UEFI Plugfest – July 2011 www.uefi.org
Self Certification Test Report

<table>
<thead>
<tr>
<th>Service\Protocol Name</th>
<th>Total</th>
<th>Failed</th>
<th>Passed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>46</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>Total service\Protocol</td>
<td>46</td>
<td>0</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service\Protocol Name</th>
<th>Index</th>
<th>Instance</th>
<th>Iteration</th>
<th>Guid</th>
<th>Result</th>
<th>Title</th>
<th>Runtime Ir</th>
<th>Case Revis Case GUID</th>
<th>Device Pat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.2.1</td>
<td>0</td>
<td>0</td>
<td>5826847A</td>
<td>PASS</td>
<td>RT.GetNextVariableName - GetNextVariableName() returns EFI_INVALID_PARAMETER</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.2.2</td>
<td>0</td>
<td>0</td>
<td>8E8258DC</td>
<td>PASS</td>
<td>RT.GetNextVariableName - GetNextVariableName() returns EFI_INVALID_PARAMETER</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.2.3</td>
<td>0</td>
<td>0</td>
<td>99A357F0</td>
<td>PASS</td>
<td>RT.GetNextVariableName - GetNextVariableName() returns EFI_INVALID_PARAMETER</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.2.4</td>
<td>0</td>
<td>0</td>
<td>51C19DBA</td>
<td>PASS</td>
<td>RT.GetNextVariableName - GetNextVariableName() returns EFI_INVALID_PARAMETER</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.2.5</td>
<td>0</td>
<td>0</td>
<td>FE09FF82</td>
<td>PASS</td>
<td>RT.GetNextVariableName - GetNextVariableName() returns EFI_INVALID_PARAMETER</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.2.6</td>
<td>0</td>
<td>0</td>
<td>12071508</td>
<td>PASS</td>
<td>RT.GetNextVariableName - GetNextVariableName() gets the exist var</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.2.7</td>
<td>0</td>
<td>0</td>
<td>AB5043BC</td>
<td>PASS</td>
<td>RT.GetNextVariableName - GetNextVariableName() gets the exist var</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.1.1</td>
<td>0</td>
<td>0</td>
<td>B0D54FEE</td>
<td>PASS</td>
<td>RT.GetVariable - GetVariable() returns EFI_INVALID_PARAMETER with c:</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.1.2</td>
<td>0</td>
<td>0</td>
<td>390C5E26</td>
<td>PASS</td>
<td>RT.GetVariable - GetVariable() returns EFI_INVALID_PARAMETER with c:</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
<tr>
<td>Runtime Services Test\Variable Services Test</td>
<td>5.2.1.1.3</td>
<td>0</td>
<td>0</td>
<td>176354A6</td>
<td>PASS</td>
<td>RT.GetVariable - GetVariable() returns EFI_INVALID_PARAMETER with c:</td>
<td>0x00010000</td>
<td>D90941AA-B626-4665-BA14-64084396F31D</td>
<td></td>
</tr>
</tbody>
</table>

Look up Index for each testcase (i.e. ones that result is FAILED).
Check SCT2_3_ver1_1.pdf for testcase or GUID of test and look to see what the test case is doing.
Look in .log file for specific test case for what failed.
Lookup in source code file to see exactly what UEFI protocol is being called and what parameters are being used.
UefiSctEdkII-Dev.zip under SctPkg\TestCase\UEFI\
SCT for IHV (plugin cards)

• Make sure the plugin card driver is started before SCT testcases are run
• Go to the Test Device Configuration menu to select your driver in the handle database for the test harness to connect it before running the testcases.
SCT for IHV

H  - Print this help information
I <Handle> - Insert one device into the configuration file
L  - List all devices in the configuration file
Q  - Quit
R <Index> - Remove one device from the configuration file
S <Type> - Scan devices in the system
  (Type 0: All, Type 1: With Option ROM)
V <Index> - List one device in the configuration file in verbose mode

For new users, select 'S' first to get the devices with Option ROM, and then use 'I <Handle>' to insert the devices which should be tested into the configuration file. For more information of this handle, please refer to the 'DH' command in Shell environment.

Scan for UEFI IHV driver in handle Database using S command
Use “I” command to select the specific handle of the device for the SCT to run on (i.e. if GOP video device was to be selected the command would be “I 54”)
SCT for IHV

Managed by driver <Console Splitter Driver>
Managed by driver <Platform Console Management Driver>
Managed by driver <UGA Console Driver>
Managed by driver <Windows GOP Driver>

55: VenHw (58C518B1-76F3-11D4-BCEA-0080C73C8881) /VenHw (0C95A93D-A006-11D4-BCFA-0080C73C8881)
Managed by driver <Windows Serial I/O Driver>

56: VenHw (58C518B1-76F3-11D4-BCEA-0080C73C8881) /VenHw (0C95A935-A006-11D4-BCFA-0080C73C8881)
Managed by driver <Windows Simple File System Driver>

57: VenHw (58C518B1-76F3-11D4-BCEA-0080C73C8881) /VenHw (0C95A935-A006-11D4-BCFA-0080C73C8881)
Managed by driver <Windows Simple File System Driver>

Press 'q' to exit, any other key to continue

I 54

Select the device type:
R - SCSI Raid
F - SCSI Fiber
N - NIC
U - USB
V - Video
S - Serial
P - PCI
O - Other
Enter choice:
Tell SCT the what protocol features are enabled in the UEFI driver:
SCT Test Suite – Passive Mode

Communication Channel

UEFI-based Target Side
Running SCT in passive mode

OS-based Management Side
User can easily finish validation job with friendly GUI
Passive mode

• Test UEFI network stack
• Utilizes two UEFI systems where one is the target and one is the host running the agent monitoring software
UEFI 2.3 Compliance Tests
Demo

• DEMO SCT
Call to action

• Run SCTs on your UEFI implementation
• Update SCT to 2.3.1 when it completed
• Looking for any contributions to the UEFI 2.3.1 SCT effort
Thanks for attending the UEFI Summer Plugfest 2011

For more information on the Unified EFI Forum and UEFI Specifications, visit http://www.uefi.org
But wait, there’s more …

**Wed (July 6)**
- UEFI State of the Union (10:30am, Intel)
- Implementing a Secure Boot Path with UEFI 2.3.1 (1:00pm, Insyde)
- UEFI SCT Overview (2:30pm, HP/Intel)

**Thu (July 7)**
- Replacing VGA: GOP Implementation in UEFI (10:30am, AMD)
- UEFI prototyping using a Windows-hosted UEFI environment (1:00pm, Phoenix)
- EFI Shell Lab (2:00-4:00pm, “Thunder”, Intel)
- GOP Enabling & Testing Lab (4:30—5:30pm, “Thunder”, Intel)

**Fri (July 8)**
- Best Practices for UEFI Option ROM Developers (10:30am, AMI)

Download presentations after the plugfest at [www.uefi.org](http://www.uefi.org)