TIZEN™ DEVELOPER CONFERENCE
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Power On Tizen with Web API Test Toolkit

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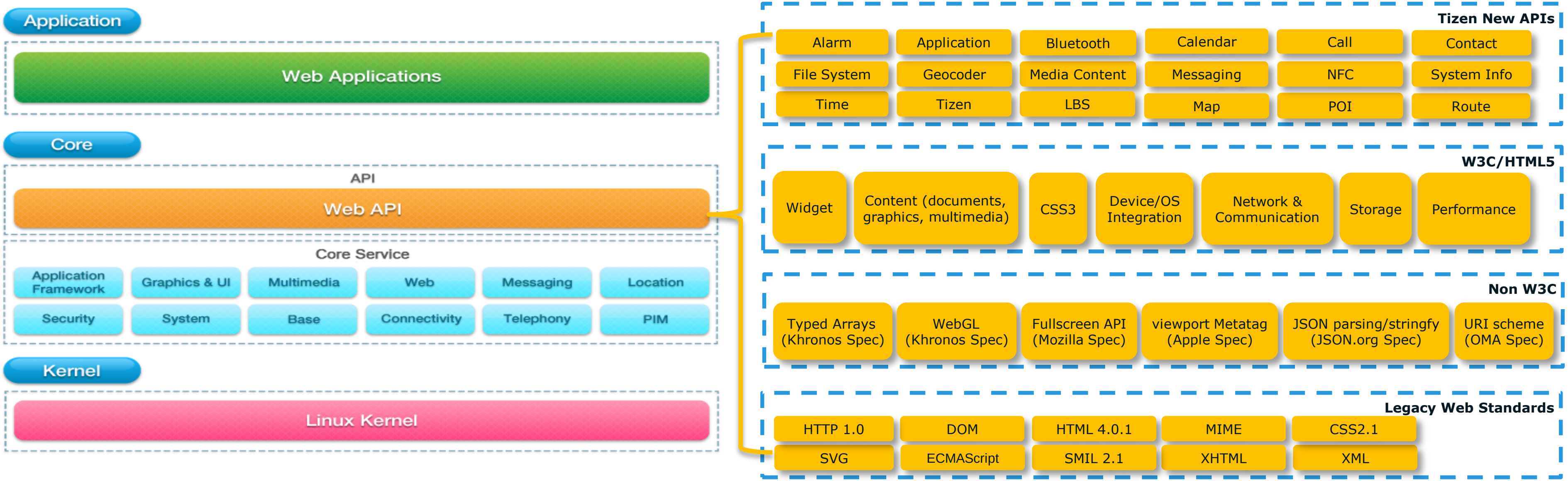
Agenda

- Tizen & Tizen Web API
- Objective
- Bill of Materials
- Architecture
- Test Suite
- How to Use
- Summary
- Q&A

Tizen & Tizen Web API

- Tizen: a standards-based software platform for multiple device categories, supports web applications
- Tizen Web API: a collection of W3C* (HTML5 and more), Khronos WebGL*, and newly-defined device APIs



Application

Web Applications

Core

API

Web API

Core Service

Application Framework, Graphics & UI, Multimedia, Web, Messaging, Location

Security, System, Base, Connectivity, Telephony, PIM

Kernel

Linux Kernel

Tizen New APIs

Alarm, Application, Bluetooth, Calendar, Call, Contact

File System, Geocoder, Media Content, Messaging, NFC, System Info

Time, Tizen, LBS, Map, POI, Route

W3C/HTML5

Widget, Content (documents, graphics, multimedia), CSS3, Device/OS Integration, Network & Communication, Storage, Performance

Non W3C

Typed Arrays (Khronos Spec), WebGL (Khronos Spec), Fullscreen API (Mozilla Spec), viewport Metatag (Apple Spec), JSON parsing/stringfy (JSON.org Spec), URI scheme (OMA Spec)

Legacy Web Standards

HTTP 1.0, DOM, HTML 4.0.1, MIME, CSS2.1

SVG, ECMAScript, SMIL 2.1, XHTML, XML

* Other names and brands may be claimed as the property of others.

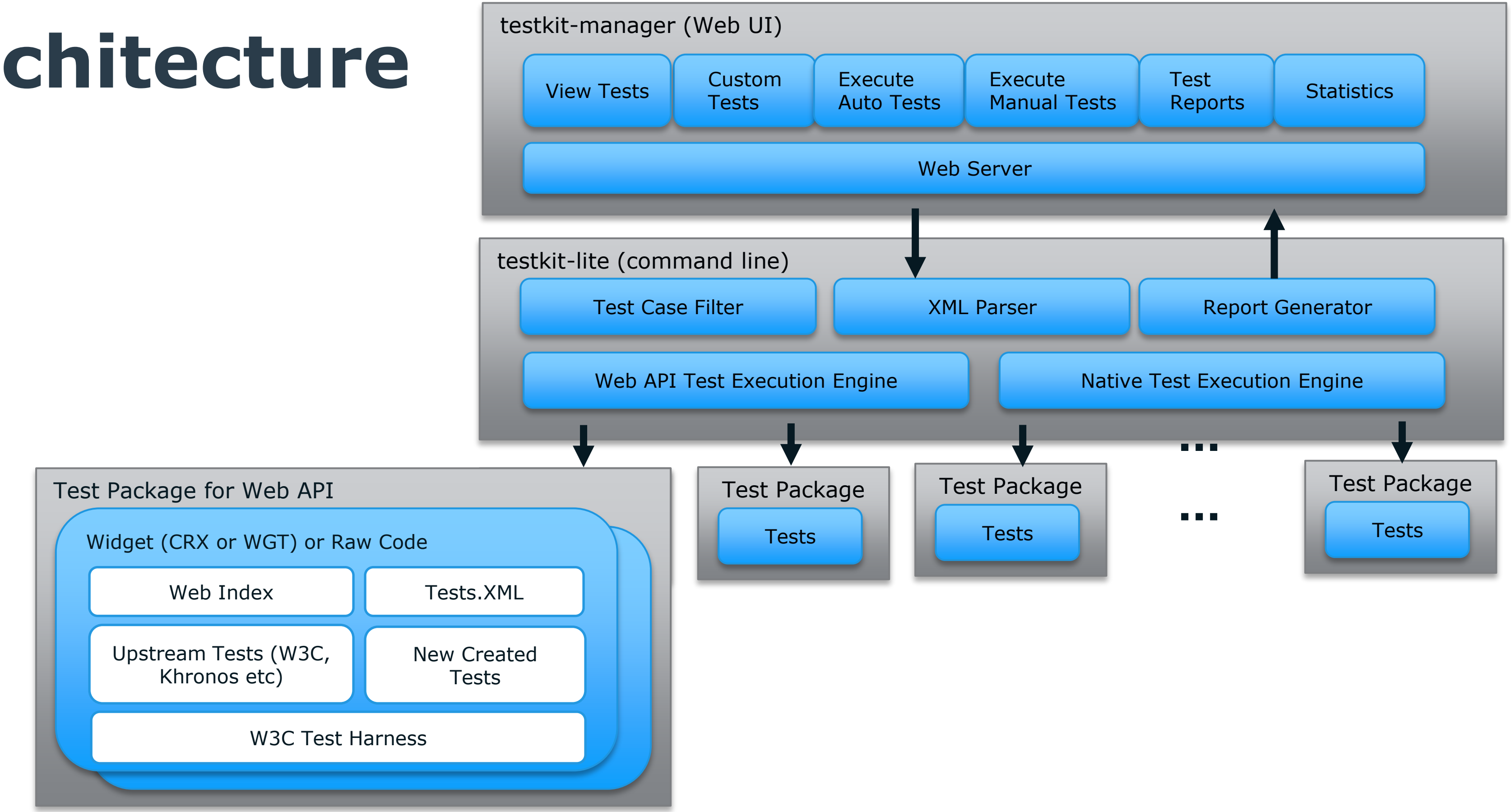
Objective

- Establish a set of standard, independent Web API test suites that enable a high quality Tizen Web runtime, and help Tizen 3rd party developers and the ecosystem.
- The Web API test toolkit provides:
  - comprehensive, independent, and extremely automated test cases
  - User-friendly execution and results statistics, in a variety of forms, for gap analysis and Web API specification coverage.

Bill of Materials

- Tizen Web API Test Toolkit
  - Test Execution Framework – Testkit
    - Common test execution framework for Linux
    - Composed of: testkit-manager as the GUI front-end, and testkit-lite as the command-line backend test runner.
  - Test Suite (Test Packages)
    - Integrated existing test cases created by standards organizations (W3C and Khronos)
    - Newly created tests to fill gaps in upstream tests
    - Newly created tests for Tizen’s new APIs
    - Using the W3C test harness as an API test framework

Architecture



Test Suite

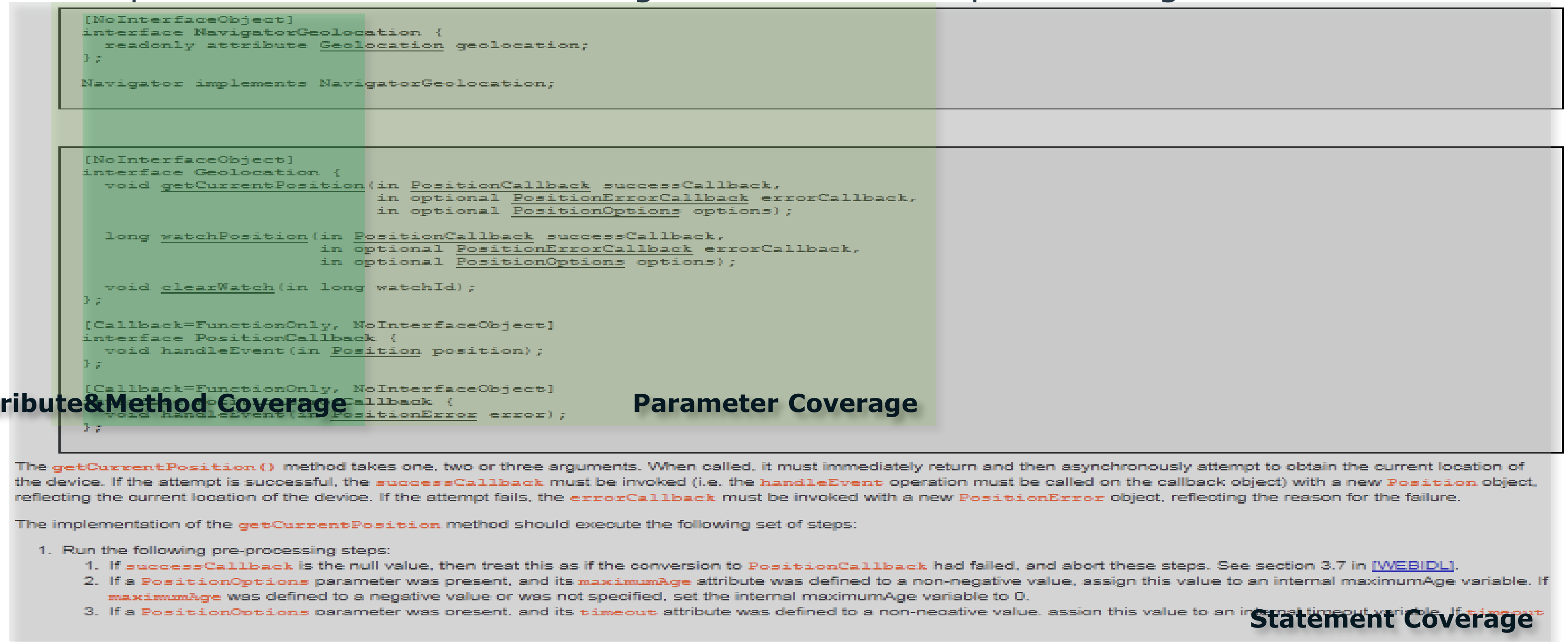
- Test Approach
  - Spec-based API Test
  - API Usage Test

Test Suite

- Test Approach
  - Spec-based API Tests are designed for different spec coverage levels
    - Attribute & Method Coverage
    - Parameter Coverage
    - Statement Coverage

Test Suite

- Test Approach
  - Spec-based API Tests are designed for different spec coverage levels



```
[NoInterfaceObject]
interface NavigatorGeolocation {
  readonly attribute Geolocation geolocation;
};

Navigator implements NavigatorGeolocation;
```

```
[NoInterfaceObject]
interface Geolocation {
  void getCurrentPosition(in PositionCallback successCallback,
                          in optional PositionErrorCallback errorCallback,
                          in optional PositionOptions options);

  long watchPosition(in PositionCallback successCallback,
                     in optional PositionErrorCallback errorCallback,
                     in optional PositionOptions options);

  void clearWatch(in long watchId);
};

[Callback=FunctionOnly, NoInterfaceObject]
interface PositionCallback {
  void handleEvent(in Position position);
};

[Callback=FunctionOnly, NoInterfaceObject]
interface PositionErrorCallback {
  void handleEvent(in PositionError error);
};
```

The getCurrentPosition() method takes one, two or three arguments. When called, it must immediately return and then asynchronously attempt to obtain the current location of the device. If the attempt is successful, the successCallback must be invoked (i.e. the handleEvent operation must be called on the callback object) with a new Position object, reflecting the current location of the device. If the attempt fails, the errorCallback must be invoked with a new PositionError object, reflecting the reason for the failure.

The implementation of the getCurrentPosition method should execute the following set of steps:

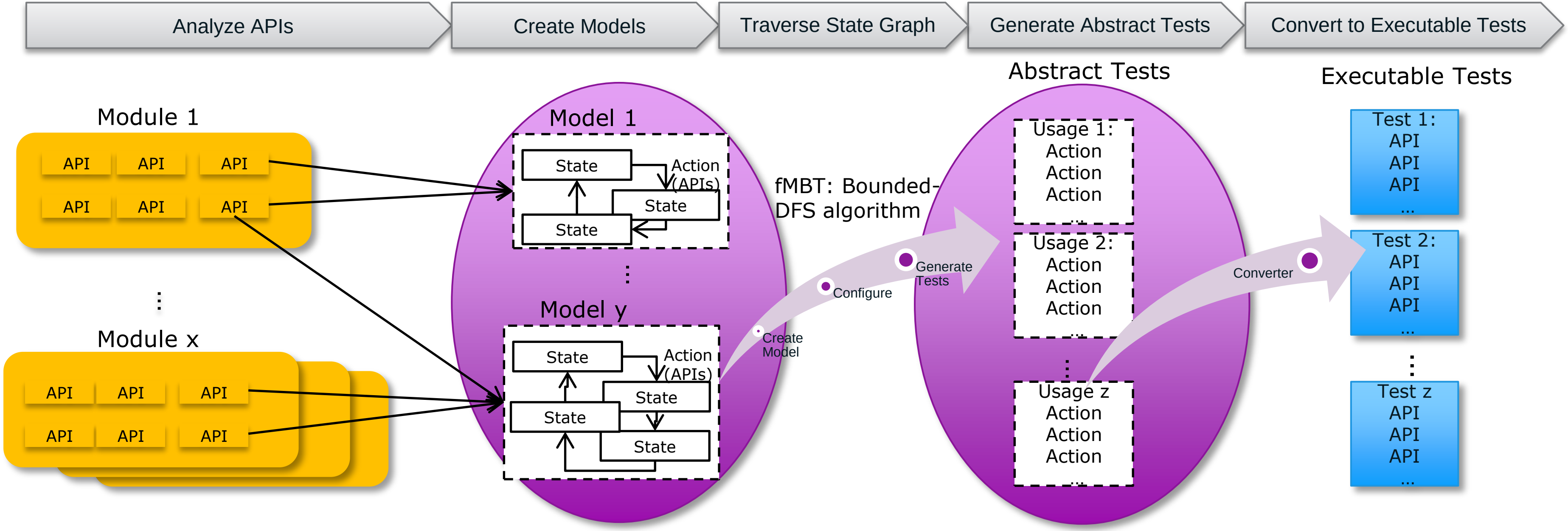
1. Run the following pre-processing steps:
   1. If successCallback is the null value, then treat this as if the conversion to PositionCallback had failed, and abort these steps. See section 3.7 in [WEBIDL].
   2. If a PositionOptions parameter was present, and its maximumAge attribute was defined to a non-negative value, assign this value to an internal maximumAge variable. If maximumAge was defined to a negative value or was not specified, set the internal maximumAge variable to 0.
   3. If a PositionOptions parameter was present, and its timeout attribute was defined to a non-negative value, assign this value to an internal timeout variable. If timeout

Test Suite

- Test Approach
  - API Usage Tests are designed for API scenarios in one or more modules
    - Adopt a Model Based Test design method, which is the application of Model Based Design for software testing
    - Models can represent both the desired behavior of the SUT(System Under Test) and testing strategy
    - Leverage fMBT as a facility for Model Based Test design

Test Suite

- Test Approach
  - API Usage Tests are designed for API scenarios in one or more modules



Analyze APIs → Create Models → Traverse State Graph → Generate Abstract Tests → Convert to Executable Tests

Module 1

API API API

API API API

⋮

Module x

API API API

API API API

Model 1

State

Action (APIs)

State

State

⋮

Model y

State

Action (APIs)

State

State

State

fMBT: Bounded-DFS algorithm

Create Model

Configure

Generate Tests

Abstract Tests

Usage 1: Action Action Action …

Usage 2: Action Action Action …

⋮

Usage z Action Action Action …

Converter

Executable Tests

Test 1: API API API …

Test 2: API API API …

⋮

Test z API API API …

Test Suite

- Total ~10,500 test cases with ~80% automation

WebAPI/Tizen/Alarm	WebAPI/W3C_Networking/Webmessaging
WebAPI/Tizen/Bluetooth	WebAPI/W3C_Networking/Websocket
WebAPI/Tizen/Geocoder	WebAPI/W3C_Networking/XMLHttpRequest
WebAPI/Tizen/Messaging	WebAPI/W3C_Perf/PageVisibility
WebAPI/Tizen/SystemInfo	WebAPI/W3C_Perf/WebWorker
WebAPI/Tizen/Time	WebAPI/W3C_Storage/AppCache
WebAPI/Tizen/Tizen	WebAPI/W3C_Storage/FileReader
WebAPI/W3C_Content/Audio	WebAPI/W3C_Storage/FileSystem
WebAPI/W3C_Content/Canvas	WebAPI/W3C_Storage/FileWriter
WebAPI/W3C_Content/Forms	WebAPI/W3C_Storage/IndexDB
WebAPI/W3C_Content/IframeSandbox	WebAPI/W3C_Storage/WebSQLDatabase
WebAPI/W3C_Content/SessionHistory	WebAPI/W3C_Storage/WebStorage
WebAPI/W3C_Content/Video	WebAPI/W3C_Widget/WidgetInterface
WebAPI/W3C_Device/Geolocation	WebAPI/NONW3C/ViewPort
WebAPI/W3C_Device/NetworkInfo	WebAPI/NONW3C/WebGL
WebAPI/W3C_Device/OnlineState	WebAPI/LegacyWeb/CSSFixedPositioning
WebAPI/W3C_Device/TouchEvent	WebAPI/LegacyWeb/Legacy
WebAPI/W3C_Device/WebAudio	…

Test Suite

- Next Steps
  - Monthly major releases, and biweekly snapshot releases
  - Goal of next major release (end of May): attribute & method coverage for Tizen’s new APIs, and HTML5/W3C specs
  - Publish test design and coding guidelines

How to use – 3 Modes

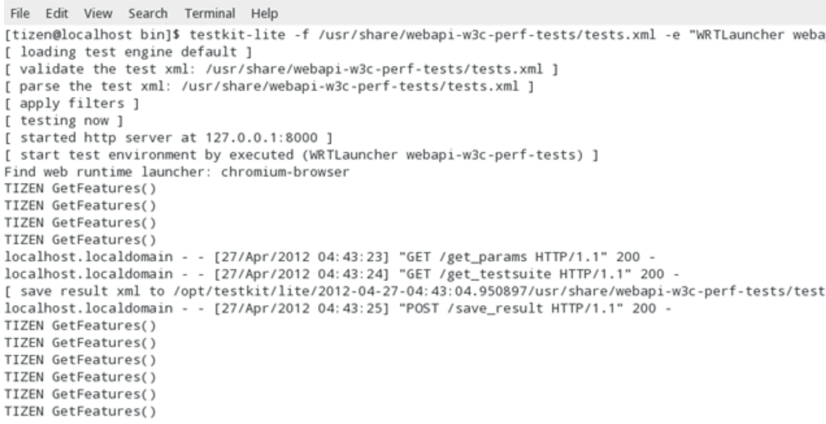
- Standalone Mode – run test package as a widget
- Command-line Mode – use testkit-lite to execute tests from the command line
- Web Mode – use testkit-manager to execute tests from the Web GUI (recommended)

How to use Standalone Mode

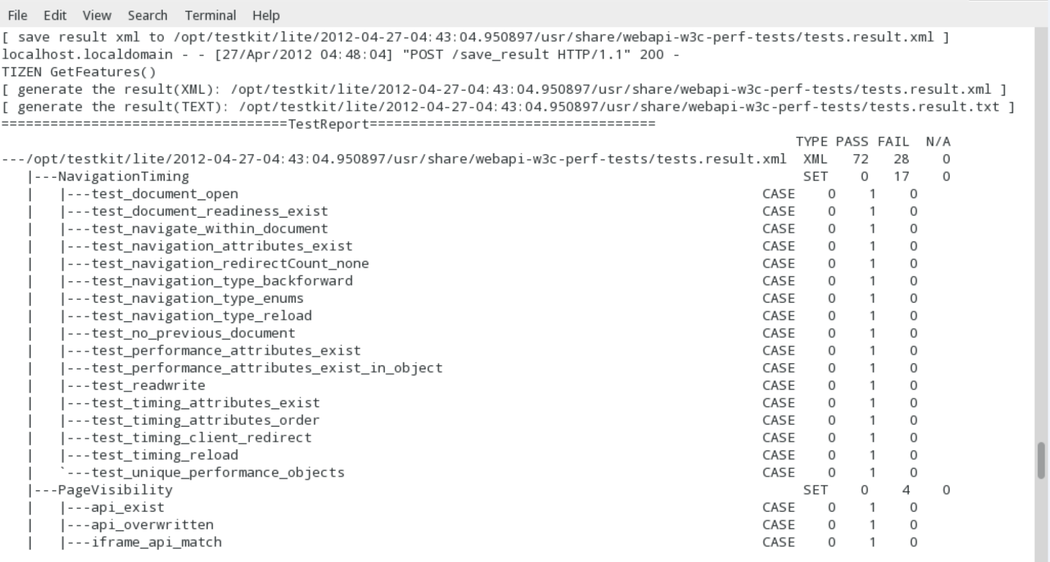
- The test package is a widget that can be executed directly in a browser or with the web runtime
  - Download and install the test package on the target test box
  - Launch the test widget from the home screen or execute “WRTLauncher webapi-xxx-tests” from the command line

How to use Command-Line Mode

- Execute from the command line
  - Download and install the testkit-lite package
  - Download and install test packages
  - Start Testing: testkit-lite -e "WRTLauncher webapi-xxx-tests" -f /usr/share/webapi-xxx-tests/tests.xml -o ~/webapi-xxx-tests.result.xml



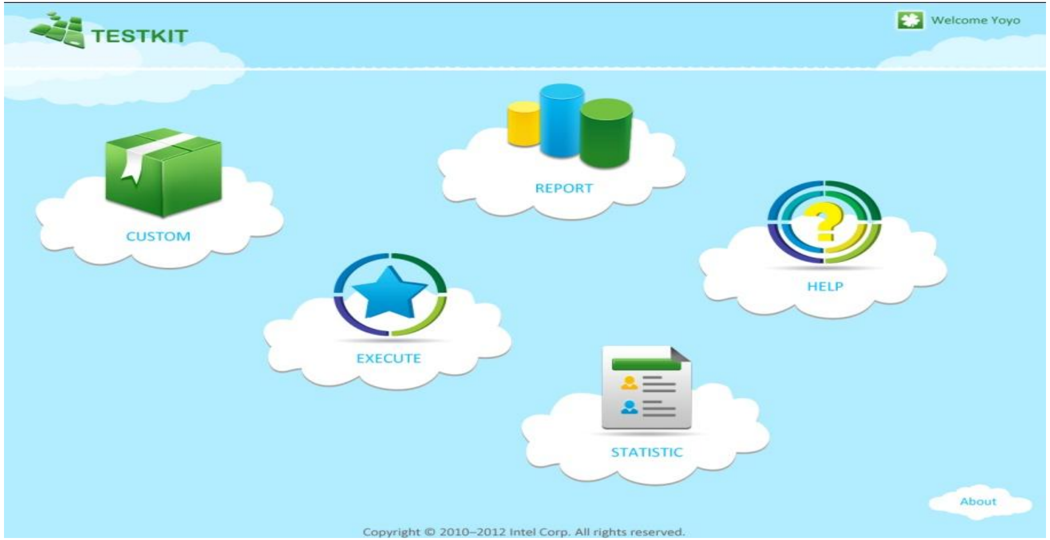
```
[tizen@localhost bin]$ testkit-lite -f /usr/share/webapi-w3c-perf-tests/tests.xml -e "WRTLauncher webapi-w3c-perf-tests"
[ loading test engine default ]
[ validate the test xml: /usr/share/webapi-w3c-perf-tests/tests.xml ]
[ parse the test xml: /usr/share/webapi-w3c-perf-tests/tests.xml ]
[ apply filters ]
[ testing now ]
[ started http server at 127.0.0.1:8000 ]
[ start test environment by executed (WRTLauncher webapi-w3c-perf-tests) ]
Find web runtime launcher: chromium-browser
TIZEN GetFeatures()
TIZEN GetFeatures()
TIZEN GetFeatures()
TIZEN GetFeatures()
localhost.localdomain - - [27/Apr/2012 04:43:23] "GET /get_params HTTP/1.1" 200 -
localhost.localdomain - - [27/Apr/2012 04:43:24] "GET /get_testsuite HTTP/1.1" 200 -
[ save result xml to /opt/testkit/lite/2012-04-27-04:43:04.950897/usr/share/webapi-w3c-perf-tests/test
localhost.localdomain - - [27/Apr/2012 04:43:25] "POST /save_result HTTP/1.1" 200 -
TIZEN GetFeatures()
TIZEN GetFeatures()
TIZEN GetFeatures()
TIZEN GetFeatures()
TIZEN GetFeatures()
TIZEN GetFeatures()
```



```
[ save result xml to /opt/testkit/lite/2012-04-27-04:43:04.950897/usr/share/webapi-w3c-perf-tests/tests.result.xml ]
localhost.localdomain - - [27/Apr/2012 04:48:04] "POST /save_result HTTP/1.1" 200 -
TIZEN GetFeatures()
[ generate the result(XML): /opt/testkit/lite/2012-04-27-04:43:04.950897/usr/share/webapi-w3c-perf-tests/tests.result.xml ]
[ generate the result(TEXT): /opt/testkit/lite/2012-04-27-04:43:04.950897/usr/share/webapi-w3c-perf-tests/tests.result.txt ]
==================================TestReport==================================
                                                                                                  TYPE PASS FAIL  N/A
---/opt/testkit/lite/2012-04-27-04:43:04.950897/usr/share/webapi-w3c-perf-tests/tests.result.xml  XML   72   28    0
   |---NavigationTiming                                                                            SET    0   17    0
   |   |---test_document_open                                                                    CASE    0    1    0
   |   |---test_document_readiness_exist                                                         CASE    0    1    0
   |   |---test_navigate_within_document                                                         CASE    0    1    0
   |   |---test_navigation_attributes_exist                                                      CASE    0    1    0
   |   |---test_navigation_redirectCount_none                                                    CASE    0    1    0
   |   |---test_navigation_type_backforward                                                      CASE    0    1    0
   |   |---test_navigation_type_enums                                                            CASE    0    1    0
   |   |---test_navigation_type_reload                                                           CASE    0    1    0
   |   |---test_no_previous_document                                                             CASE    0    1    0
   |   |---test_performance_attributes_exist                                                     CASE    0    1    0
   |   |---test_performance_attributes_exist_in_object                                           CASE    0    1    0
   |   |---test_readwrite                                                                        CASE    0    1    0
   |   |---test_timing_attributes_exist                                                          CASE    0    1    0
   |   |---test_timing_attributes_order                                                          CASE    0    1    0
   |   |---test_timing_client_redirect                                                           CASE    0    1    0
   |   |---test_timing_reload                                                                    CASE    0    1    0
   |   `---test_unique_performance_objects                                                       CASE    0    1    0
   |---PageVisibility                                                                              SET    0    4    0
   |   |---api_exist                                                                             CASE    0    1    0
   |   |---api_overwritten                                                                       CASE    0    1    0
   |   |---iframe_api_match                                                                      CASE    0    1    0
```

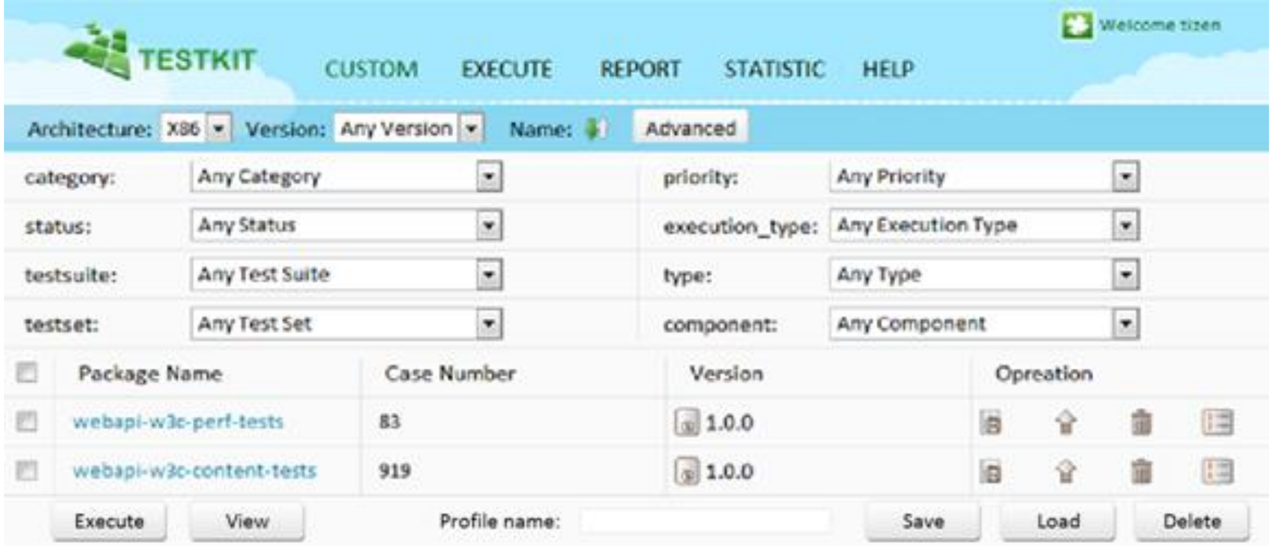
How to use Web Mode

- Execute from the web interface (recommended)
  - Download and install testkit-lite and testkit-manager
  - Download and install test packages
  - Start up web server: /opt/testkit/manager/webapps/bin/testkit_start.pl [port-number]
  - Open the URL “http://<test-machine-name>:[port-number]” in a browser on the target test box, or on a remote host machine



How to use Web Mode

- Custom Tests



Architecture: X86 Version: Any Version Name:

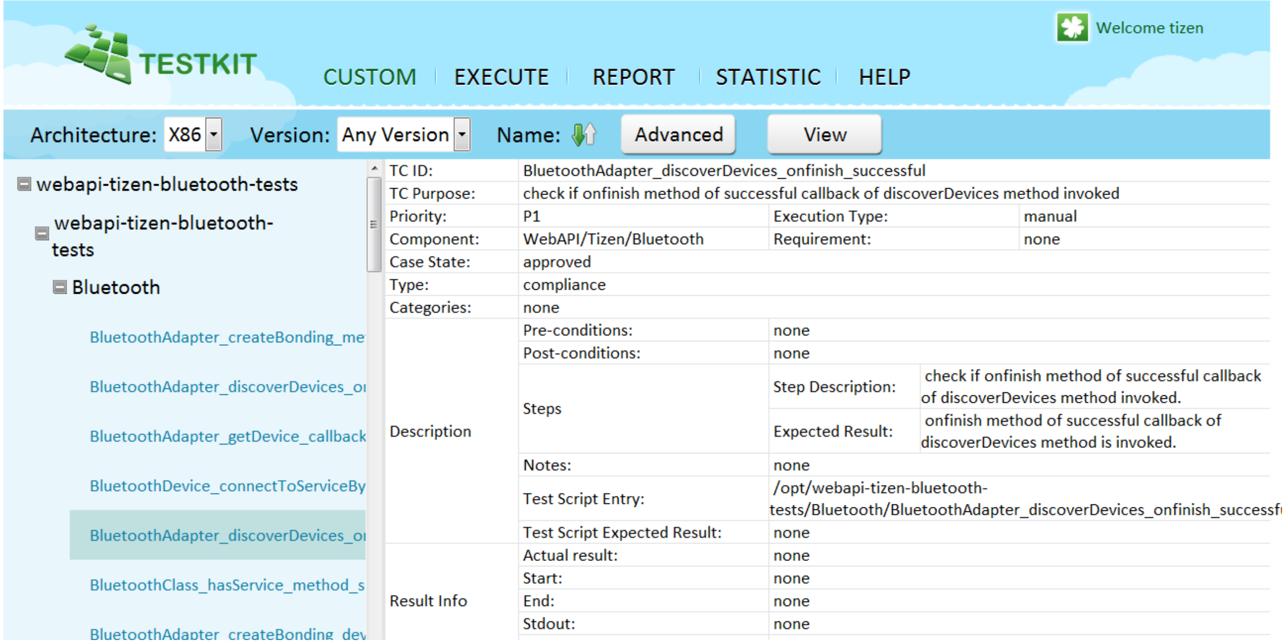
category:	Any Category	priority:	Any Priority
status:	Any Status	execution_type:	Any Execution Type
testsuite:	Any Test Suite	type:	Any Type
testset:	Any Test Set	component:	Any Component

□	Package Name	Case Number	Version	Opreation
□	webapi-w3c-perf-tests	83	1.0.0	
□	webapi-w3c-content-tests	919	1.0.0	

Profile name:

How to use Web Mode

- View Tests



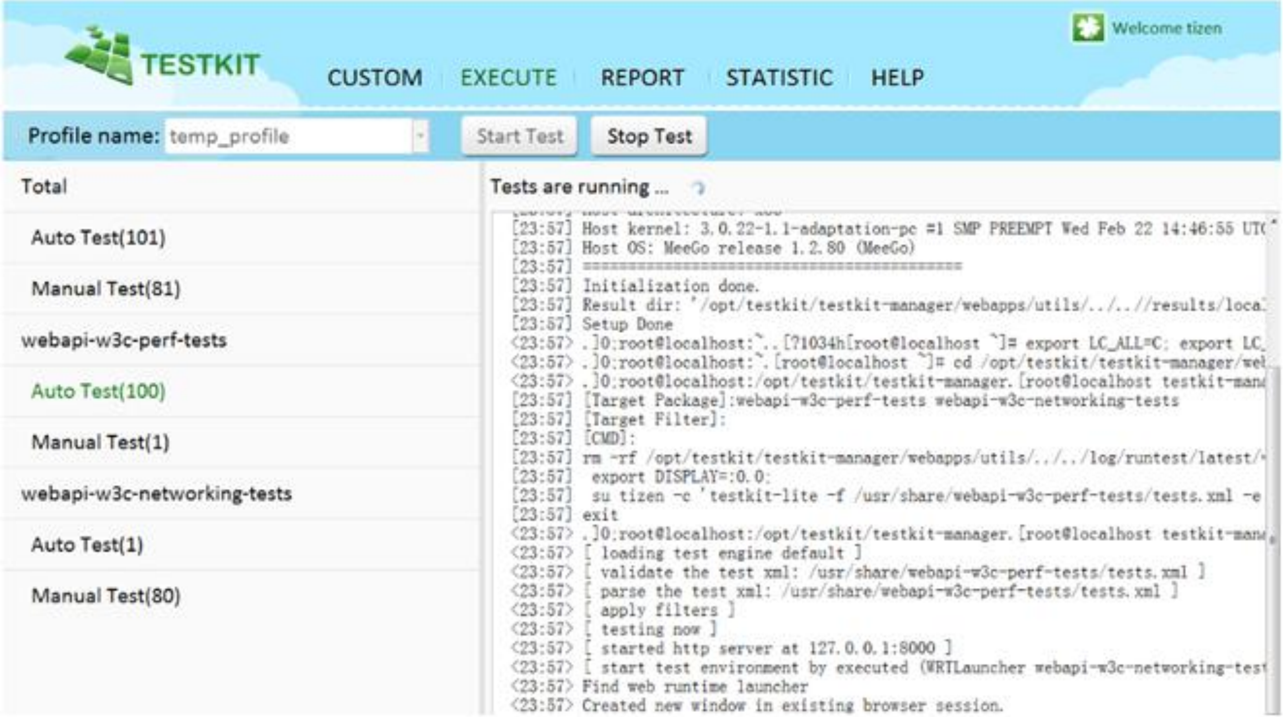
Architecture: X86 Version: Any Version Name:

- webapi-tizen-bluetooth-tests
  - webapi-tizen-bluetooth-tests
    - Bluetooth
      - BluetoothAdapter_createBonding_me
      - BluetoothAdapter_discoverDevices_o
      - BluetoothAdapter_getDevice_callback
      - BluetoothDevice_connectToServiceBy
      - BluetoothAdapter_discoverDevices_o
      - BluetoothClass_hasService_method_s
      - BluetoothAdapter_createBonding_dev

TC ID:	BluetoothAdapter_discoverDevices_onfinish_successful		
TC Purpose:	check if onfinish method of successful callback of discoverDevices method invoked		
Priority:	P1	Execution Type:	manual
Component:	WebAPI/Tizen/Bluetooth	Requirement:	none
Case State:	approved		
Type:	compliance		
Categories:	none		
Description	Pre-conditions:	none	
	Post-conditions:	none	
	Steps	Step Description:	check if onfinish method of successful callback of discoverDevices method invoked.
		Expected Result:	onfinish method of successful callback of discoverDevices method is invoked.
	Notes:	none	
	Test Script Entry:	/opt/webapi-tizen-bluetooth-tests/Bluetooth/BluetoothAdapter_discoverDevices_onfinish_successfu	
	Test Script Expected Result:	none	
Result Info	Actual result:	none	
	Start:	none	
	End:	none	
	Stdout:	none	

How to use Web Mode

- Run Automated Tests



Profile name: temp_profile

Total

Auto Test(101)

Manual Test(81)

webapi-w3c-perf-tests

Auto Test(100)

Manual Test(1)

webapi-w3c-networking-tests

Auto Test(1)

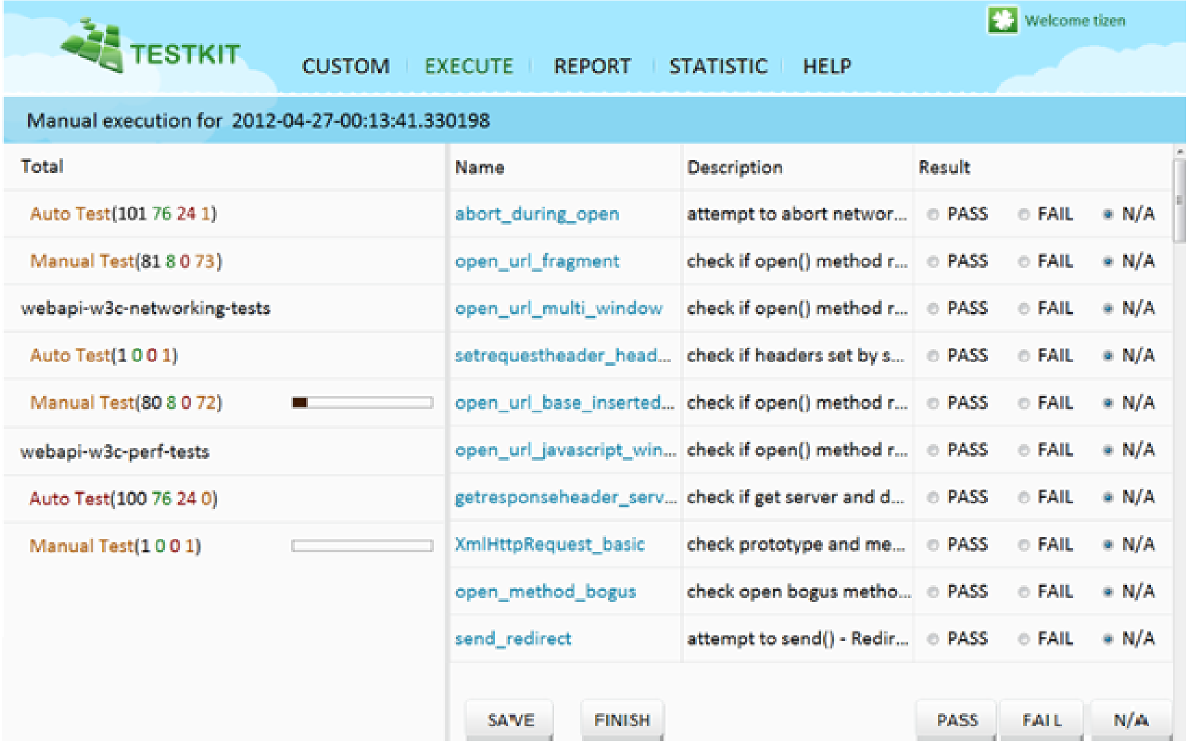
Manual Test(80)

Tests are running ...

```
[23:57] Host kernel: 3.0.22-1.1-adaptation-pc #1 SMP PREEMPT Wed Feb 22 14:46:55 UTC
[23:57] Host OS: MeeGo release 1.2.80 (MeeGo)
[23:57] ============================================
[23:57] Initialization done.
[23:57] Result dir: '/opt/testkit/testkit-manager/webapps/utils/../..//results/loca
[23:57] Setup Done
<23:57> .]0;root@localhost:~..[?1034h[root@localhost ~]# export LC_ALL=C; export LC_
<23:57> .]0;root@localhost:~.[root@localhost ~]# cd /opt/testkit/testkit-manager/wel
<23:57> .]0;root@localhost:/opt/testkit/testkit-manager.[root@localhost testkit-mana
[23:57] [Target Package]:webapi-w3c-perf-tests webapi-w3c-networking-tests
[23:57] [Target Filter]:
[23:57] [CMD]:
[23:57] rm -rf /opt/testkit/testkit-manager/webapps/utils/../../log/runtest/latest/
[23:57]  export DISPLAY=:0.0;
[23:57]  su tizen -c 'testkit-lite -f /usr/share/webapi-w3c-perf-tests/tests.xml -e
[23:57] exit
<23:57> .]0;root@localhost:/opt/testkit/testkit-manager.[root@localhost testkit-mana
<23:57> [ loading test engine default ]
<23:57> [ validate the test xml: /usr/share/webapi-w3c-perf-tests/tests.xml ]
<23:57> [ parse the test xml: /usr/share/webapi-w3c-perf-tests/tests.xml ]
<23:57> [ apply filters ]
<23:57> [ testing now ]
<23:57> [ started http server at 127.0.0.1:8000 ]
<23:57> [ start test environment by executed (WRTLauncher webapi-w3c-networking-test
<23:57> Find web runtime launcher
<23:57> Created new window in existing browser session.
```

How to use Web Mode

- Run Manual Tests



Manual execution for 2012-04-27-00:13:41.330198

Total

Auto Test(101 76 24 1)

Manual Test(81 8 0 73)

webapi-w3c-networking-tests

Auto Test(1 0 0 1)

Manual Test(80 8 0 72)

webapi-w3c-perf-tests

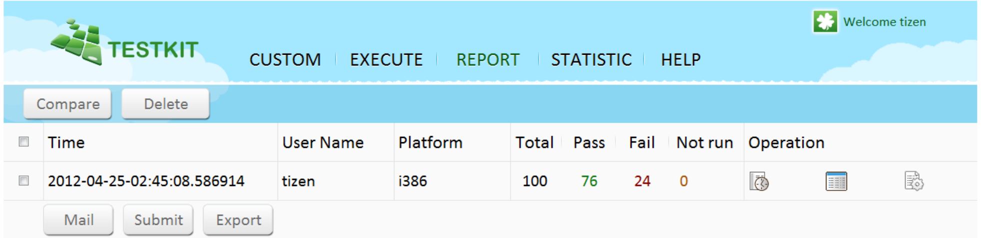
Auto Test(100 76 24 0)

Manual Test(1 0 0 1)

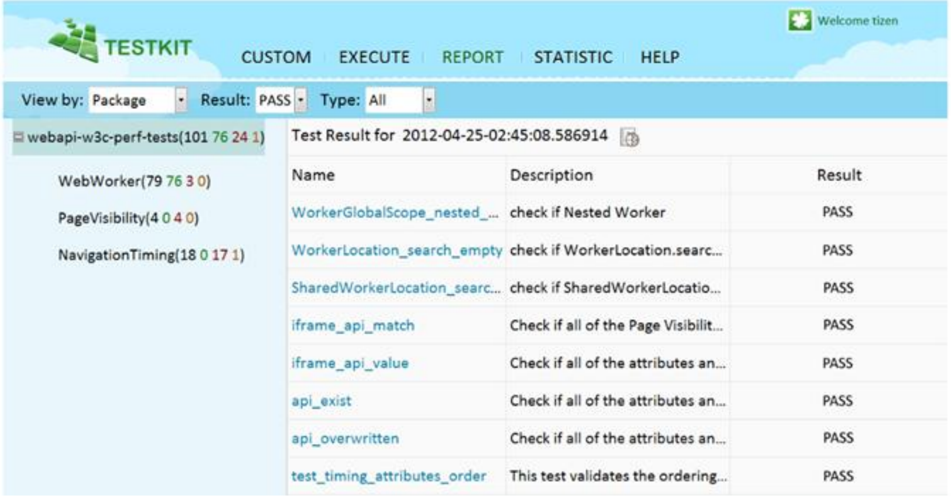
Name	Description	Result
abort_during_open	attempt to abort networ...	○ PASS ○ FAIL ● N/A
open_url_fragment	check if open() method r...	○ PASS ○ FAIL ● N/A
open_url_multi_window	check if open() method r...	○ PASS ○ FAIL ● N/A
setrequestheader_head...	check if headers set by s...	○ PASS ○ FAIL ● N/A
open_url_base_inserted...	check if open() method r...	○ PASS ○ FAIL ● N/A
open_url_javascript_win...	check if open() method r...	○ PASS ○ FAIL ● N/A
getresponseheader_serv...	check if get server and d...	○ PASS ○ FAIL ● N/A
XmlHttpRequest_basic	check prototype and me...	○ PASS ○ FAIL ● N/A
open_method_bogus	check open bogus metho...	○ PASS ○ FAIL ● N/A
send_redirect	attempt to send() - Redir...	○ PASS ○ FAIL ● N/A

How to use Web Mode

- View test results (by test package, by spec coverage)



☐	Time	User Name	Platform	Total	Pass	Fail	Not run	Operation
☐	2012-04-25-02:45:08.586914	tizen	i386	100	76	24	0	

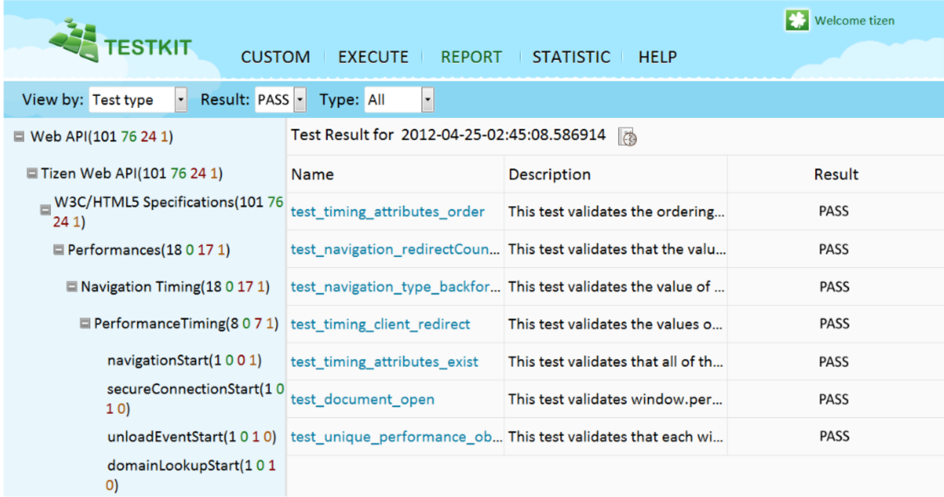


View by: Package Result: PASS Type: All

- ⊟ webapi-w3c-perf-tests(101 76 24 1)
  - WebWorker(79 76 3 0)
  - PageVisibility(4 0 4 0)
  - NavigationTiming(18 0 17 1)

Test Result for 2012-04-25-02:45:08.586914

Name	Description	Result
WorkerGlobalScope_nested_...	check if Nested Worker	PASS
WorkerLocation_search_empty	check if WorkerLocation.searc...	PASS
SharedWorkerLocation_searc...	check if SharedWorkerLocatio...	PASS
iframe_api_match	Check if all of the Page Visibilit...	PASS
iframe_api_value	Check if all of the attributes an...	PASS
api_exist	Check if all of the attributes an...	PASS
api_overwritten	Check if all of the attributes an...	PASS
test_timing_attributes_order	This test validates the ordering...	PASS



View by: Test type Result: PASS Type: All

- ⊟ Web API(101 76 24 1)
  - ⊟ Tizen Web API(101 76 24 1)
    - ⊟ W3C/HTML5 Specifications(101 76 24 1)
      - ⊟ Performances(18 0 17 1)
        - ⊟ Navigation Timing(18 0 17 1)
          - ⊟ PerformanceTiming(8 0 7 1)
            - navigationStart(1 0 0 1)
            - secureConnectionStart(1 0 1 0)
            - unloadEventStart(1 0 1 0)
            - domainLookupStart(1 0 1 0)

Test Result for 2012-04-25-02:45:08.586914

Name	Description	Result
test_timing_attributes_order	This test validates the ordering...	PASS
test_navigation_redirectCoun...	This test validates that the valu...	PASS
test_navigation_type_backfor...	This test validates the value of ...	PASS
test_timing_client_redirect	This test validates the values o...	PASS
test_timing_attributes_exist	This test validates that all of th...	PASS
test_document_open	This test validates window.per...	PASS
test_unique_performance_ob...	This test validates that each wi...	PASS

Summary

- The Tizen Web API test toolkit provides standard, independent, user-friendly, and comprehensive test suite complying to the Web API specifications for Tizen.
- Allows the Tizen community, OSVs, and Tizen developers to test the web runtime on devices running Tizen Web API compliant OSs, with segment-specific implementation, lowering the ecosystem efforts to develop, port, validate, and deploy.

Resources

- Tizen Web API Specification:
  https://developer.tizen.org/documentation
- Testkit Open Source Project:
  https://github.com/testkit/testkit-lite
  https://github.com/testkit/testkit-manager
- Tizen Web API Test Suite Source Code:

  Coming soon …

Q&A

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