The bridge to possible

Building your Certification Test Suites using pyATS

Dave Wapstra
Software Engineering Technical Leader

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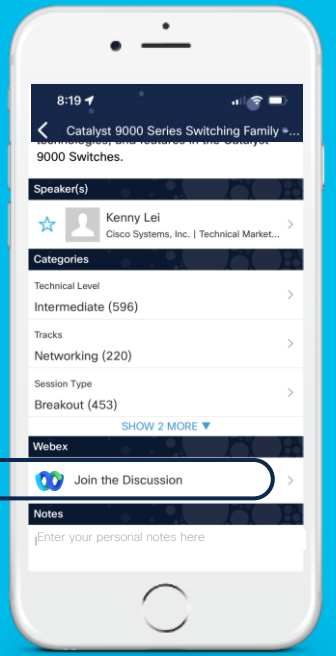


Agenda

- Introduction
- Test Suite Creation
- Test Suite Execution
- CI/CD pipeline integration
- Conclusion

Introduction

Introduction

Create a set of automated test cases ('test suites') using pyATS

- Different types of test cases:
  - pyATS Python Testcases
  - pyATS Genie Triggers
  - pyATS Blitz Triggers
- Execution and control
  - Filter tests
  - Execute on failure
  - Pause execution on log message
- Verifications and Health

Introduction

- Prepare your test plan in Word/Excel/Wiki/etc.
- Identify TestCases, TestSections, Steps

- Create CSV file for use with pyats create project command

```
Testcase;Testsection;Testsection Description;Step
TC1;section1;This is the first section;first step
TC1;section1;This is the first section;second step
TC2;section1;This is the first section;first step
TC2;section1;This is the first section;second step
```

Test Suite Creation

Create Test Suite using pyats create project CLI

- You can use the pyats create project CLI command* with the CSV input file to create the initial code from a template project

```
$ pyats create project --csv-file data1.csv --name testPyATS

$ pyats create project --csv-file data1.csv --name testGenie \
--project-type genie

$ pyats create project --csv-file data1.csv --name testBlitz \
--project-type blitz
```

* the pyats create project CLI enhancements will be released soon

PyATS Test Suite

```
testPyATS                          <- Project Name
├── testPyATS.py                   <- Testcase module
├── testPyATS_data.yaml            <- Datafile
├── testPyATS_job.py               <- Job file
├── testPyATS_job.tem              <- Manifest file
└── testbed.yaml                   <- Testbed file
```

PyATS Test Suite

```
class CommonSetup(aetest.CommonSetup):
..
class TC1(aetest.Testcase):

    @aetest.setup
..
    @aetest.test
    def section1(self, steps):
        with steps.start('first step') as step:
            step.passed()
        with steps.start('second step') as step:
            step.passed()

    @aetest.cleanup
..
class CommonCleanup(aetest.CommonCleanup):
```

Genie Test Suite

```
testGenie                          <- Project Name
├── data
│   ├── subsection-data.yaml       Subsection datafile
│   └── trigger-data.yaml          Trigger datafile
├── etc
│   └── testbed.yaml               Testbed file
├── local_libs
│   ├── __init__.py
│   └── commons.py                 Local library
├── testGenie_job.py               Job file
├── testGenie_job.tem              Manifest file
└── testcases
    └── testGenie.py               Testcase module
```

Genie Test Suite

```
# testcases/testGenie.py
class TC1(Trigger):

    @aetest.setup
..
    @aetest.test
    def section1(self, steps, uut):
        with steps.start('first step') as step:
            step.passed()
        with steps.start('second step') as step:
            step.passed()

    @aetest.cleanup
..
```

Genie Test Suite

```
# data/trigger-data.yaml
TC1:
    source:
        pkg: testcases.testGenie
        class: TC1
    devices: [uut]
..

order:
    - TC1
    - TC2
```

Genie Test Suite

```
# data/subsection-data.yaml
setup:
    sections:
        connect:
            method: local_libs.commons.connect
    order: ['connect']


cleanup:
    sections:
        disconnect:
            method: local_libs.commons.disconnect
    order: ['disconnect']
```

Blitz Test Suite

```
testBlitz                          <- Project Name
├── testBlitz_job.py               Job file (for manifest)
├── testBlitz_job.tem              Manifest file
├── testbed.yaml                   Testbed file
└── trigger-data.yaml              Trigger datafile
```

Blitz Test Suite

```
TC1:
    source:
        pkg: genie.libs.sdk
        class: triggers.blitz.blitz.Blitz

    test_sections:
        - section1: {}  # Sections contain ”actions”
            # Example action "execute":
            # - execute:
            #     device: PE1
            #     command: show version
```

https://pubhub.devnetcloud.com/media/genie-docs/docs/blitz/design/actions/actions.html

Test suite development

https://pubhub.devnetcloud.com/media/genie-feature-browser/docs/#/apis

https://pubhub.devnetcloud.com/media/genie-feature-browser/docs/#/parsers

https://pubhub.devnetcloud.com/media/genie-feature-browser/docs/#/models

Test Execution

Test Execution using pyats run command

- You can use the pyats run CLI command to execute test suites

```
# pyATS job
$ pyats run job example_job.py --testbed-file testbed.yaml

# Genie and Blitz jobs
$ pyats run genie --testbed-file testbed.yaml --trigger-
datafile trigger-data.yaml --trigger-uids "Or('TC1|TC2')"

# All jobs with manifest file
$ pyats run manifest example_job.tem
```

PyATS Test Suite Execution Summary

```
%EASYPY-INFO: Task-1: testPyATS
%EASYPY-INFO: |-- common_setup                          PASSED
%EASYPY-INFO: |   `-- connect                           PASSED
%EASYPY-INFO: |-- TC1                                   PASSED
%EASYPY-INFO: |   |-- setup                            PASSED
%EASYPY-INFO: |   |-- section1                         PASSED
%EASYPY-INFO: |   |   |-- STEP 1: first step           PASSED
%EASYPY-INFO: |   |   `-- STEP 2: second step          PASSED
%EASYPY-INFO: |   `-- cleanup                          PASSED
%EASYPY-INFO: |-- TC2                                   PASSED
%EASYPY-INFO: |   |-- setup                            PASSED
%EASYPY-INFO: |   |-- section1                         PASSED
%EASYPY-INFO: |   |   |-- STEP 1: first step           PASSED
%EASYPY-INFO: |   |   `-- STEP 2: second step          PASSED
%EASYPY-INFO: |   `-- cleanup                          PASSED
%EASYPY-INFO: `-- common_cleanup                       PASSED
%EASYPY-INFO:     `-- disconnect                       PASSED
```

Genie Test Suite Execution Summary

```
%EASYPY-INFO: Task-1: genie_testscript
%EASYPY-INFO: |-- common_setup                          PASSED
%EASYPY-INFO: |   `-- connect                           PASSED
%EASYPY-INFO: |-- TC1.uut                               PASSED
%EASYPY-INFO: |   |-- setup                             PASSED
%EASYPY-INFO: |   |-- section1                          PASSED
%EASYPY-INFO: |   |   |-- STEP 1: first step            PASSED
%EASYPY-INFO: |   |   `-- STEP 2: second step           PASSED
%EASYPY-INFO: |   `-- cleanup                           PASSED
%EASYPY-INFO: |-- TC2.uut                               PASSED
%EASYPY-INFO: |   |-- setup                             PASSED
%EASYPY-INFO: |   |-- section1                          PASSED
%EASYPY-INFO: |   |   |-- STEP 1: first step            PASSED
%EASYPY-INFO: |   |   `-- STEP 2: second step           PASSED
%EASYPY-INFO: |   `-- cleanup                           PASSED
%EASYPY-INFO: `-- common_cleanup                        PASSED
%EASYPY-INFO:     `-- disconnect                        PASSED
```

Blitz Test Suite Execution Summary

```
%EASYPY-INFO: Task-1: genie_testscript
%EASYPY-INFO: |-- common_setup                                PASSED
%EASYPY-INFO: |   |-- connect                                 PASSED
%EASYPY-INFO: |   |-- configure                               SKIPPED
%EASYPY-INFO: |   |-- configuration_snapshot                  PASSED
%EASYPY-INFO: |   |-- save_bootvar                            PASSED
%EASYPY-INFO: |   |-- learn_system_defaults                   PASSED
%EASYPY-INFO: |   |-- initialize_traffic                      SKIPPED
%EASYPY-INFO: |   `-- PostProcessor-2                         PASSED
%EASYPY-INFO: |-- TC1.R2                                      PASSED
%EASYPY-INFO: |   `-- section1                                PASSED
%EASYPY-INFO: |-- TC2.R2                                      PASSED
%EASYPY-INFO: |   `-- section1                                PASSED
%EASYPY-INFO: `-- common_cleanup                              PASSED
%EASYPY-INFO:     |-- verify_configuration_snapshot           PASSED
%EASYPY-INFO:     |-- stop_traffic                            SKIPPED
%EASYPY-INFO:     `-- PostProcessor-2                         PASSED
```

Test Execution Control

- You can use the uids / trigger-uids CLI argument to filter testcases

```
# pyATS job
$ pyats run job … --uids "Or('TC1|TC2')"

# Genie and Blitz jobs
$ pyats run genie … --trigger-uids "Or('TC1|TC2')"
```

Test Execution Control – Execute on failure

- You can use the datafile with post processors to execute APIs or commands on failed testcases

```
# pyATS datafile.yaml
processors:
    post: processors.after_test
```

```
# trigger-datafile.yaml
global_processors:
      post:
          post_test:
            method: processors.after_test
```

Test Execution Control – Execute on failure

Processor module with post failure action implementation (pyATS)

```
# processors.py
import logging
from pyats.results import Failed

logger = logging.getLogger(__name__)

def after_test(section):
    if section.result == Failed and \
            section.__context_type__ == 'Testcase':
        logger.warning('Running checks after testcase failure')
```

Test Execution Control – Execute on failure (Genie)

```
# trigger-datafile.yaml
global_processors:
  post:
    collect_show_tech:
      method:
genie.libs.sdk.libs.abstracted_libs.processors.post_execute_command
      parameters:
        valid_section_results:
          - failed
          - passx
          - errored
        devices:
          R1:
            apis:
            - api: get_show_tech
```

Pause on phrase

- You can use the Pause on Phrase feature to pause execution

```
$ pyats run job … --pause-on [regex string|yaml file]

$ pyats run job … --pause-on ".*TC1.*"
```

```
# pause.yaml
timeout: 600          # pause a maximum of 10 minutes
patterns:
    - pattern: '.*pass.*'  # pause on all log messages
                           # with .*pass.* in them
      section: '^common_setup\..*$' # for common_setup
```

Verifications and Health

PyATS Verification and pyATS Health

- Use the Verifications to verify device state in between test cases for specific features

```
$ pyats run job job.py --verification-uids "Or('Verf','Verf2')"
```

- Use pyATS Health to verify generic device status such as CPU, Memory, Error messages, core files

```
$ pyats run job job.py --health-checks core cpu logging memory
```

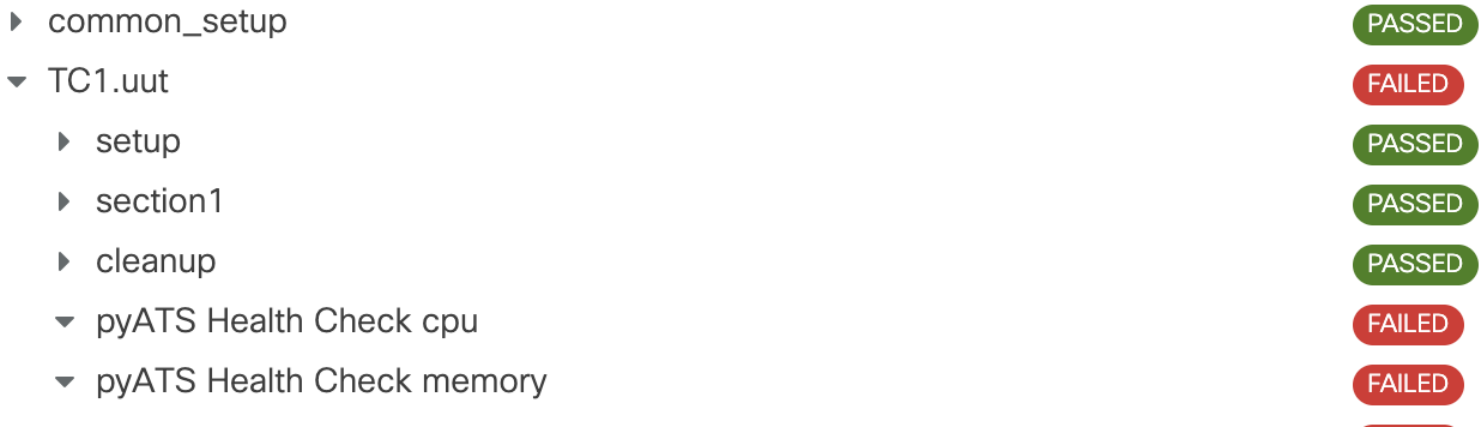
PyATS Verifications

```
$ pyats run job job.py --verification-uids "Or('Verify_Module')"
```

```
%EASYPY-INFO: |-- Verifications.TC1.uut                PASSED
%EASYPY-INFO: |   `-- Verify_Module.uut.1               PASSED
%EASYPY-INFO: |       `-- verify                       PASSED
%EASYPY-INFO: |-- TC1.uut                              PASSED
%EASYPY-INFO: |   |-- setup                            PASSED
%EASYPY-INFO: |   |-- section1                         PASSED
%EASYPY-INFO: |   |   |-- STEP 1: first step           PASSED
%EASYPY-INFO: |   |   `-- STEP 2: second step          PASSED
%EASYPY-INFO: |   `-- cleanup                          PASSED
%EASYPY-INFO: |-- Verifications.TC2.uut                PASSED
%EASYPY-INFO: |   `-- Verify_Module.uut.2              PASSED
%EASYPY-INFO: |       `-- verify                       PASSED
```

PyATS Health checks

```
$ pyats run job job.py --health-checks core cpu logging memory
```



CI/CD pipeline integration

CI/CD pipeline integration

- Exit codes
- XUNIT reports

CI/CD pipeline integration – Exit codes

- pyats run exits with system exit code 0 (Success) if all the following conditions are met:

Condition	Description
Some tests were ran	At least one test script/testcase was run and reported
Test results are available	No exception seen while trying to access test results.
success rate is 100%	Total # of tests with Passed, Passx or Skipped results / total # of tests.
All pre-job plugins ran ok	No exception seen in any pre-job plugin.
All pre-task plugins ran ok	No exception seen in any pre-task plugin for all scripts in the jobfile.
All post-task plugins ran ok	No exception seen in any post-task plugin for all scripts in the jobfile.
All post-job plugins ran ok	No exception seen in any post-job plugin.

CI/CD pipeline integration – Exit codes

pyATS Return Codes

Code	Description
1	Non-100% testcase success rate
2	Incorrect command-line arguments
3	Some errors/exceptions are seen while running plugins
4	All other exceptions unhandled by the infrastructure (unknown)

CI/CD pipeline integration – XUNIT reports

--xunit CLI option Enables the generation of an extra x-unit/j-unit result report XML.

```
# enable generation

$ pyats run job /path/to/job/file.py --xunit

# enable and also copy report to specified location

$ pyats run job /path/to/job/file.py --xunit /path/to/dir
```

Conclusion

Developing pyATS Test Suites

- Understanding of the different test suite types
- Understanding how to create a test suite and develop test cases
- Understanding how to control execution of test suites
- Understanding of additional verification and checks
- Understanding of integration with CI/CD pipelines

https:://developer.cisco.com/pyats

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