Jose Lausuch (Ericsson)

OPNFV Summit 2015

jose.lausuch@ericsson.com
Agenda

- What is Functest?
- Test cases
- Repository structure
- CI & Automation
- Brahmaputra Release
OPNFV Projects ecosystem
What is Functest?
What we do…

*Base System Functionality Testing*

- Focus on verifying the OpenStack deployment and the SDN Controllers
- Have a full integration and automation mechanism
- Provide comprehensive testing methodology
WE DON’T:
- Performance tests
- HW tests
- Frameworks
The gang…

Peter Bandzi

Morgan (PTL) Richomme

Jose Lausuch

Viktor Tikkanen

Guy Rodrigue

Qinglong Lan

Valentin Boucher

Juha Kosonen
The project...

Commits per repository

Authors per repository

source: Bitergia (http://projects.bitergia.com/opnfv)
date: November 2015
Functest Testcases

Arno
Functest Testcases

- **vPing test case**
  Create machines and verify connectivity

- **ODL test case**
  Robot framework, ODL functional testing

- **Rally bench tests**
  Benchmark the OpenStack deployment

- **Tempest test**
  OpenStack native tests (100+ smoke-tests)
Functest Testcases

✓ vPing test case

Create machines and verify connectivity

✓ ODL test case

Robot framework, ODL functional testing

✓ Rally bench tests

Benchmark the OpenStack deployment

✓ Tempest test

OpenStack native tests (100+ smoke-tests)

09/11/2015  Functest in Depth, OPNFV Summit 2015
vPing test case

```
u = "#!/bin/sh
while true; do
    ping -c 1 $test_ip 2>&1 >/dev/null
    RES=$?
    if [ '$RES' = '0' ]; then
        echo 'vPing OK'
        break
    else
        echo 'vPing KO'
    fi
    sleep 1
done"
```

```python
vm1 = nova_client.servers.create(
    name=NAME_VM_1,
    flavor=flavor,
    image=image,
    nics=[{"port-id": port_id1}]
)

vm2 = nova_client.servers.create(
    name=NAME_VM_2,
    flavor=flavor,
    image=image,
    nics=[{"port-id": port_id2}],
    userdata=u
)```

provisional Neutron network
Functest Testcases

- vPing test case
  Create machines and verify connectivity

- ODL test case
  Robot framework, ODL functional testing

- Rally bench tests
  Benchmark the OpenStack deployment

- Tempest test
  OpenStack native tests (100+ smoke-tests)
ODL test case
ODL test cases

Borrowed from ODL repository

https://github.com/opendaylight/integration.git

4 basic test cases:

- [x] Check ODL Restconf
- [x] Create/Delete/Check Network
- [x] Create/Delete/Check Subnet
- [x] Create/Delete/Check Port
Functest Testcases

- vPing test case
  Create machines and verify connectivity

- ODL test case
  Robot framework, ODL functional testing

- Rally bench tests
  Benchmark the OpenStack deployment

- Tempest test
  OpenStack native tests (100+ smoke-tests)

09/11/2015  Functest in Depth, OPNFV Summit 2015
Rally

Rally is a benchmarking tool that answers the question:

“How does OpenStack work at scale?”.
**Rally - scenario example**

```json
"GlanceImages.create_and_delete_image": [  
  {  
    "args": {  
      "image_location": "http://download.cirros-cloud.net/0.3.1/cirros-0.3.1-x86_64-disk.img",  
      "container_format": "bare",  
      "disk_format": "qcow2"  
    },  
    "runner": {  
      "type": "constant",  
      "times": 10,  
      "concurrency": 2  
    },  
    "context": {  
      "users": {  
        "tenants": 2,  
        "users_per_tenant": 3  
      }  
    },  
    "sla": {  
      "max_seconds_per_iteration": 10,  
      "failure_rate": {  
        "max": 25  
      }  
    }  
  }
],
```

**Runners:**
- **Serial**: launch scenario N times in one thread
- **Constant**: launch scenario N times in M parallel threads
- **RPS**: generates N threads per second M times

**Context:**
- Contexts needed for this scenario (tenants/users)

**Success criteria (SLA):**
- You can define a maximum time per iteration
- It will skip the test if 1 iteration fails
Rally - output

Charts for the Total durations

Total durations

<table>
<thead>
<tr>
<th>Action</th>
<th>Min (sec)</th>
<th>Median (sec)</th>
<th>90%ile (sec)</th>
<th>95%ile (sec)</th>
<th>Max (sec)</th>
<th>Avg (sec)</th>
<th>Success</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>glance.delete_image</td>
<td>0.873</td>
<td>1.16</td>
<td>1.53</td>
<td>1.56</td>
<td>1.617</td>
<td>1.232</td>
<td>100.0%</td>
<td>10</td>
</tr>
<tr>
<td>glance.create_image</td>
<td>4.166</td>
<td>5.003</td>
<td>9.41</td>
<td>13.059</td>
<td>16.708</td>
<td>7.36</td>
<td>100.0%</td>
<td>10</td>
</tr>
<tr>
<td>total</td>
<td>5.666</td>
<td>7.258</td>
<td>10.605</td>
<td>14.235</td>
<td>17.865</td>
<td>8.592</td>
<td>100.0%</td>
<td>10</td>
</tr>
</tbody>
</table>
Functest Testcases

- vPing test case
  Create machines and verify connectivity

- ODL test case
  Robot framework, ODL functional testing

- Rally bench tests
  Benchmark the OpenStack deployment

- Tempest test
  OpenStack native tests (100+ smoke-tests)
Tempest test

Tempest is a set of integration tests to be run against a live OpenStack cluster.

Rally performs the tempest installation and generation of tempest.conf

```bash
$ rally verify install
$ rally verify genconfig
$ rally verify start smoke
```
Directory structure

- Directory Structure:
  - funtest
    - commons
    - docker
    - docs
    - testcases
      - Controllers
        - ODL
        - ONOS
      - Dashboard
      - VIM
      - OpenStack
      - vIMS
      - vPing
        - __init__.py
        - config_functest.py
        - config_functest.yaml
        - funtest_utils.py
      - INFO
      - LICENSE

- Main configuration script. Installs needed tools (Rally, Robot, ...)
- SDN Controllers test suites
- Openstack related tests (Rally, Tempest)
- vIMS test case
- vPing test case
- Format results to dashboard ready and other utils
- Dockerfile and automation scripts
- Configuration parameters
### Configuration file

#### Configuration yaml file

- ✔️ Predefined tested values
- ✔️ Can be given as an input to Functest
- ✔️ Possible to specify commit IDs of the used repositories
- ⏯ Versioning control
CI & Automation

Functest Jenkins job

- Triggered automatically after a successful deployment
- One macro per test case
- You can execute a single test From Jenkins

<table>
<thead>
<tr>
<th>S</th>
<th>W</th>
<th>Name</th>
<th>Last Success</th>
<th>Last Failure</th>
<th>Last Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>functest-daily-master</td>
<td>5 hr 25 min - #156</td>
<td>N/A</td>
<td>44 sec</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-daily-stable-amo</td>
<td>N/A</td>
<td>4 mo 14 days - #1</td>
<td>4 sec</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-foreman-master</td>
<td>1 mo 6 days - #19</td>
<td>1 mo 6 days - #16</td>
<td>1 hr 24 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-foreman-stable-amo</td>
<td>29 days - #25</td>
<td>N/A</td>
<td>1 hr 7 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-fuel-master</td>
<td>9 hr 31 min - #72</td>
<td>16 hr - #71</td>
<td>45 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-fuel-stable-amo</td>
<td>29 days - #16</td>
<td>1 mo 5 days - #10</td>
<td>1 hr 16 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-merge-master</td>
<td>4 hr 39 min - #56</td>
<td>N/A</td>
<td>45 sec</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-merge-stable-amo</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-poll-test-merge</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-openstack-bench-test-merge-build</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-openstack-tempest-smoke-test-merge-build</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-openstack-memtest</td>
<td>N/A</td>
<td>3 mo 22 days - #17</td>
<td>1 hr 15 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-verify-master</td>
<td>4 hr 44 min - #163</td>
<td>N/A</td>
<td>43 sec</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-verify-stable-amo</td>
<td>29 days - #5</td>
<td>N/A</td>
<td>47 sec</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-vms-foreman-master</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-vms-foreman-stable-amo</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-vms-fuel-master</td>
<td>N/A</td>
<td>4 hr 6 min - #12</td>
<td>1 hr 3 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-vms-fuel-stable-amo</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>functest-vms-ying-test-merge-build</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
CI & Automation

Daily verification of OPNFV platform

New Features

JENKINS

BUILD

DEPLOYMENT

FUNCTEST

YARDSTICK

....
Execution of tests

Don’t worry sir, I’ll do it for you

Jump host

Target POD
Brahmaputra release
Functest in Brahmaputra release

- Dockerization
- Test Result collection
- Dashboard
- Virtual IMS test case
- + SDN Controllers tests
- Feature projects
$docker run -t opnfv/functest $dir/run_test.sh
### Functest Docker

<table>
<thead>
<tr>
<th>Without Docker</th>
<th>With Docker</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Have to install needed libraries in your jumphost</td>
<td>• Needed libraries preinstalled in the docker image</td>
</tr>
<tr>
<td>• Maintain in the documentation the needed libraries and dependencies</td>
<td>• Update image when there is a new software dependency and push to the OPNFV Docker Hub</td>
</tr>
<tr>
<td>• Possible OS dependencies</td>
<td>• No OS dependencies</td>
</tr>
<tr>
<td>• Not portable</td>
<td>• Portable</td>
</tr>
</tbody>
</table>
Execution of tests

Don’t worry sir, I’ll do it for you

Docker Hub

Target POD

Jumphost
vIMS test case
vIMS test case

- Full automation of a core Open Source vIMS solution on OPNFV from Clearwater
- Deployment of an orchestrator (Cloudify) to manage the VNF
- Run suite of signaling tests on vIMS
- Successfully tested from Jenkins on LinuxFoundation POD2
vIMS test case

1) Deploy the orchestrator
2) Create the tenant
3) Create the VNF (10 VMs)
4) Launch test suite (more than 100 signaling tests)
5) Collect results
6) Clean-up
SDN Controllers
SDN Controllers

- Extension of OpenDaylight test cases
- Integration of ONOS test framework
- Open Contrail test
Test results collection
Test results collection

Test projects

- Functest
- Yardstick
- QTIP
- VPerf
- Bottlenecks
- ...

REST API

Mongo DB
Test results collection - API

- Filter per test case
  - http://<DB_Public_IP>/results?case=vPing

- Filter per pod

- Filter per project
  - http://<DB_Public_IP>/results?project=yardstick

- Combination of filters
Dashboard
Dashboard

- Show all the results using simplistic graphs
- Possible to filter per project/test case/…
- Comparison of previous results with recent ones
- …
Beyond Brahmaputra

- New functional test (vCPE, vHGW, vCDN, …)
- Results analytics
- Better Rally usage
- More SDN controllers test integration
- Broaden test coverage (security, O&M, …)
Lessons learned in Arno

- Need for stable labs some weeks before the release
- Need to run the tests on different PODs from CI
- Complex troubleshooting
- Functest cannot solve all problems
Challenges

- Different OpenStack installers
- Different SDN controllers
- Many features

Lots of combinations to be tested!!
Summary

- First test project in OPNFV
- Validate a fresh OPNFV deployment
- Umbrella for testing projects
- Umbrella for feature projects
- We don’t bite, come to us with questions 😊
Thank you!