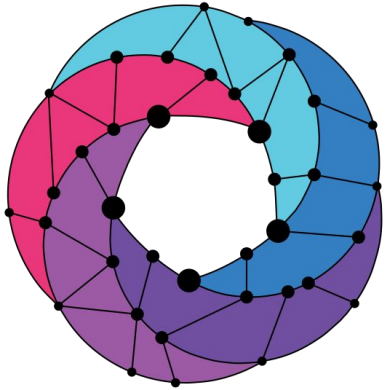

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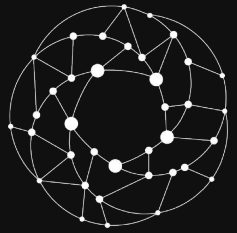
OSM Hackfest – Session 7a
Adding day-1/day-2 configuration to your VNF
Creating your first proxy charm

Adam Israel (Canonical) and Eduardo Sousa (Whitestack)

ETSI



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Preparing your development environment

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Install the charm tools

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Install charm tools via snap:

```
$ sudo snap install charm
charm 2.4.5+git-1-gd62c072 from 'charms' installed

$ charm version

charmstore-client 2.3.0+snap-298+git-47-g44bc628
charm-tools 2.4.5+snap-298+git-1-gd62c072
```

Setup your Charming environment

Create the directories we'll use for our charm:

```
mkdir -p ~/charms/layers
```

Tell the charm command where our workspace is (for best results, add this to ~/.bashrc):

```
export JUJU_REPOSITORY=~/charms
```

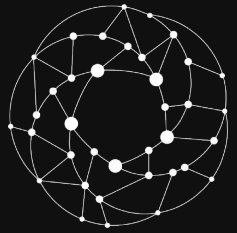
Speed up local deployments

We'll make a few changes to your installed Juju that will speed up the deployment of charms.

```
# Disable automatic OS update and upgrade of every new container
$ juju model-config enable-os-refresh-update=false enable-os-upgrade=false

# Get a copy of my hackfest tools and examples
$ git clone https://github.com/AdamIsrael/osm-hackfest.git

# Cache the LXD image used by Juju for new containers
$ osm-hackfest/bin/update-juju-lxc-images
```



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Understanding charms

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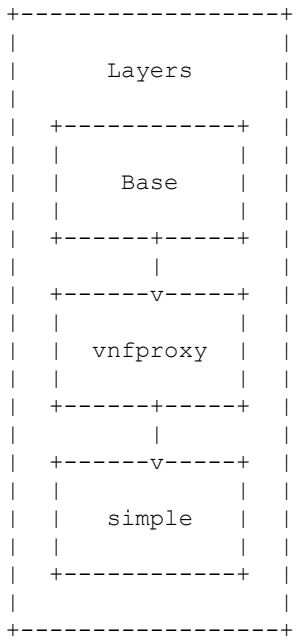
Reactive Framework

- The *Reactive* programming pattern that allows a charm to respond to flags that represent a change in state, including lifecycle events, in an asynchronous way.
- Lifecycle events may tell the charm to install, start, or stop an application, to perform leadership election, to collect metrics, or to upgrade the charm itself.

Layers

- Layers are encapsulations of charm code that lend themselves to being reused across charms.
- The Base layer contains the core code needed for other layers to function.
- Vnfproxy is a runtime layer providing common functionality to interoperate with a VNF.
- Simple is the charm layer containing code to manage *your* vnf.



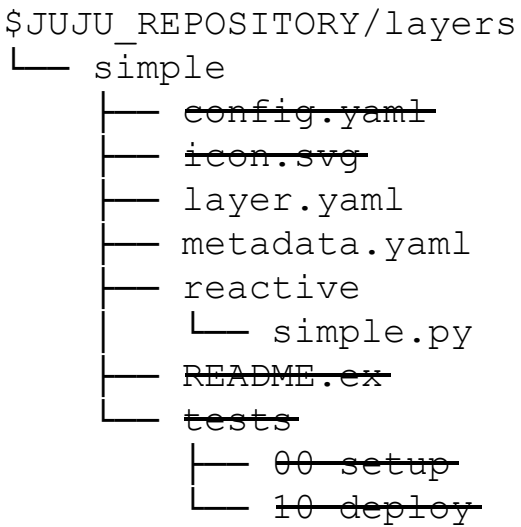
Creating a VNF Proxy charm

```
# Change into the layers folder

$ cd $JUJU_REPOSITORY/layers

# Invoke the charm command to create a charm layer
called ‘simple’

$ charm create simple

$ cd simple
```

Anatomy of a charm layer

To the right is the contents of your simple charm.

For the purposes of this example, we will ignore the struck-through files.



Anatomy of a layer

`layer.yaml` defines which base and runtime layers your charm depends on.

Edit `layer.yaml` to include the vnfproxy layer:

```
includes: ['layer:basic', 'layer:vnfproxy']
options:
    basic:
        use_venv: false
```

```
$JUJU_REPOSITORY/layers
└── simple
    ├── config.yaml
    ├── icon.svg
    ├── layer.yaml
    ├── metadata.yaml
    ├── reactive
    │   └── simple.py
    ├── README.ex
    └── tests
        ├── 00-setup
        └── 10-deploy
```

Anatomy of a layer

Edit `metadata.yaml` with the name and description of your charm:

```
name: simple
summary: A simple VNF proxy charm
maintainer: Name <user@domain.tld>
subordinate: false
series: ['bionic']
```

```
$JUJU_REPOSITORY/layers
└── simple
    ├── ~~config.yaml~~
    ├── ~~icon.svg~~
    ├── layer.yaml
    ├── metadata.yaml
    ├── reactive
    │   └── simple.py
    ├── ~~README.ex~~
    └── ~~tests~~
        ├── ~~00-setup~~
        └── ~~10-deploy~~
```

Building your first charm

```
$ charm build
build: Destination charm directory: ~/charms/builds/simple
build: Please add a `repo` key to your layer.yaml, with a url from which your layer can be
cloned.
build: Processing layer: layer:basic
build: Processing layer: layer:sshproxy
build: Processing layer: layer:vnfproxy
build: Processing layer: simple (from .)
proof: W: Includes template README.ex file
proof: W: README.ex includes boilerplate: Step by step instructions on using the charm:
proof: W: README.ex includes boilerplate: You can then browse to http://ip-address to configure
the service.
proof: W: README.ex includes boilerplate: - Upstream mailing list or contact information
proof: W: README.ex includes boilerplate: - Feel free to add things if it's useful for users
proof: I: all charms should provide at least one thing
```

Examining the compiled charm

The `charm build` command takes all of the layers defined in layer.yaml, combines them into a single charm, and caches the dependencies in the `wheelhouse` directory for faster installation.

```
$ ls $JUJU_REPOSITORY/builds/simple

actions     bin           copyright  hooks      layer.yaml    Makefile
reactive    README.md     simple     tox.ini    actions.yaml  config.yaml
deps        icon.svg      lib        README.ex  metadata.yaml tests
requirements.txt          wheelhouse
```

Action

- Actions are functions that can be called automatically when a VNF is initialized (day-1 configuration) or on-demand by the operator (day-2 configuration).
- In OSM terminology, we know these as config primitives.

Define an action

Let's create `actions.yaml` in the root of the simple charm:

```
touch:
    description: "Touch a file on the VNF."
    params:
        filename:
            description: "The name of the file to touch."
            type: string
            default: ""
    required:
        - filename
```

Create the action helper

$ mkdir actions

Create `actions/touch`, with the contents to the right.

When you're done, mark the script executable:

$ chmod +x actions/touch

This sets the "actions.touch" flag when the primitive is invoked.

```
#!/usr/bin/env python3
import sys
sys.path.append('lib')
from charms.reactive import main, set_flag
from charmhelpers.core.hookenv import action_fail, action_name

set_flag('actions.{}'.format(action_name()))

try:
    main()
except Exception as e:
    action_fail(repr(e))
```

***Note**: The same content has to be used for every action in the charm layer. It is only a helper script to invoke the reactive framework*

Reactive Imports

Edit `reactive/simple.py`.

This is where all reactive states are handled.

```
from charmhelpers.core.hookenv import (
    action_get,
    action_fail,
    action_set,
    status_set,
)

from charms.reactive import (
    clear_flag,
    set_flag,
    when,
    when_not,
)
import charms.sshproxy
```

Your first Reactive function

Edit `reactive/simple.py`.

This is where all reactive states are handled.

```
@when('sshproxy.configured')
@when_not('simple.installed')
def install_simple_proxy_charm():
    """Set the status to active when ssh configured."""

    # This sets the "simple.installed" flag so this function
    # only runs once.
    set_flag('simple.installed')

    # Tell's the VCA that the charm is ready to be used.
    status_set('active', 'Ready!')
```

React to the action

Edit `reactive/simple.py`.

This is where all reactive states are handled.

```
@when('actions.touch')
def touch():
    """Touch a file."""
    err = ''
    try:
        filename = action_get('filename')
        cmd = ['touch {}'.format(filename)]
        result, err = charms.sshproxy._run(cmd)
    except:
        action_fail('command failed:' + err)
    else:
        action_set({'output': result})
    finally:
        clear_flag('actions.touch')
```

***Note**: For every action in the charm layer you need to add a @when decorator and the function to be run*

That’s it!

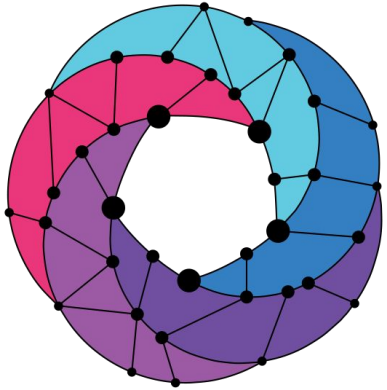
We’re ready to compile the charm with our new action:

$ charm build

Examining the compiled charm again

If you examine the compiled charm now, you should see the `touch` action is now declared in `actions.yaml`, along with the actions provided by the vnfproxy layer.

```
$ ls $JUJU_REPOSITORY/builds/simple

actions     bin           copyright  hooks      layer.yaml    Makefile
reactive    README.md     simple     tox.ini    actions.yaml  config.yaml
deps        icon.svg      lib        README.ex  metadata.yaml tests
requirements.txt          wheelhouse
```



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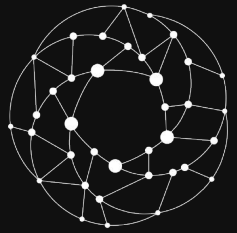

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The End

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