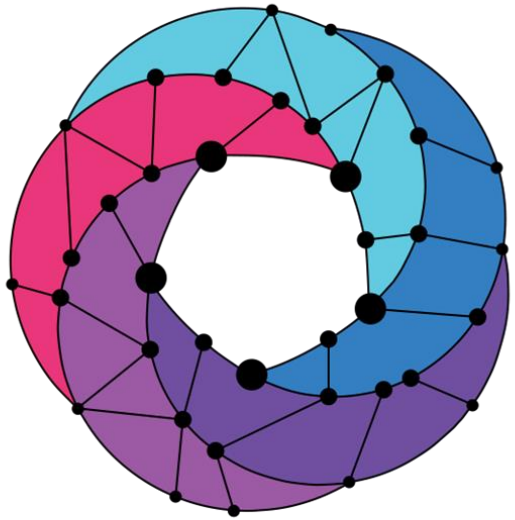

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Dev guidelines for OSM Primitives

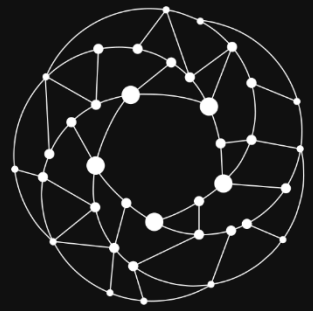
David García and Mark Beierl (Canonical)

ETSI

Recap (yesterday)

- Deploy a kubernetes operator + actions (squid)
- Deploy a machine operator + actions (enodeB + UE)
- Develop a Grafana kubernetes operator
- Develop a Prometheus machine operator
- Integrate Grafana and prometheus

Juju Charms Microk8s LXD



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Charm development guidelines

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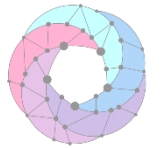

Do one thing well

Steps to onboard a Charm to OSM

1. Make inicial decisions:
   a. Proxy or Native charm
   b. Machine or Kubernetes charm
2. Design:
   a. Configuration parameters
   b. Actions
   c. Integration endpoints
3. Development:
   a. Do it in isolation (only with Juju)
   b. Break down the design into separate tasks
   c. Follow the best practices
4. Onboard it to OSM

Best practices

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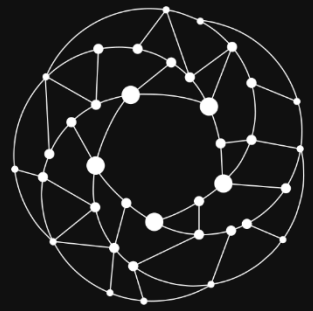
1. Use meaningful names (config, actions, endpoints)
2. Follow Python best practices
    a. Write clean code
        i. Formatting: black, flake8
        ii. Meaningful names for vars and functions
        iii. Functions with few/none parameters
        iv. SRP: Single Responsibility Principle
        v. Reuse code; avoid duplication
    b. Test your code: harness
3. Understanding Juju:
    a. Hooks/events: what is expected in each
4. Make the best operator



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Understanding hooks/events

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Hooks are events generated by the Juju Controller

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Hook → Code script

```
def _on_install(self, _):
        subprocess.run(["snap", "install", "prometheus"])
```

```
def _on_start(self, _):
        subprocess.run(["service", "snap.prometheus.prometheus", "start"])
```

Rules writing hooks

1. Hooks are idempotent
2. Hooks are easy to read and understand
3. Where possible, hooks reuse common code
4. Hooks do not return errors… unless there a good reason

Use the Operator Framework

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Lifecycle hooks

- **install:**
  - When: At the beginning of the life cycle. Once only.
  - Purpose: Install prerequisite software.
- **config-changed:**
  - When: After *install, upgrade-charm*, or after configuration changes. At least once after the agent restarts.
  - Purpose:
    - Cannot assume that SW has started
    - Should not start stopped SW
    - Should restart running SW to update the configuration.
- **start:**
  - When: Immediately after the first *config-changed*.
  - Purpose: Should ensure the charm's software is running
- **stop:**
  - When: Immediately before the end of the unit destruction
  - Purpose:
    - Stop the application
    - Remove any files/configuration created during the application lifecycle
    - Prepare any backup(s)

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Lifecycle hooks

- **upgrade-charm:**
  - When: Runs immediately after any upgrade operation
  - Purpose: used to reconcile local state written by some other version of the charm into whatever form it needs to take to be manipulated by the current version.
- **update_status:**
  - When: Run by Juju at regular intervals (default=5m)
  - Purpose: Provides constant feedback to the user about the status of the application
- **leader-elected:**
  - When: Run at least once to signify that Juju decided this unit is the leader
- **leader-elected-changed:**
  - When: Run when the leader has set values for other units to respond to

- **[name]-relation-joined:**
  - When: Run only when that remote unit is first observed by the unit.
  - Should not depend on any other relation setting more than the name of the joining unit and the remote private-address setting. If more information is needed, should wait for the relation-changed hook.
- **[name]-relation-changed:**
  - When: Always run after *-joined* and after the relation data changes.
  - Take into account:
    - The settings in the relation (relation data) are determined by the interface
    - If data is missing, do not raise errors, just wait until the data will eventually be there.
- **[name]-relation-departed:**
  - When: Run once only, when the remote unit is known to be leaving the relation
  - Purpose: Should be used to remove all references to the remote unit
- **[name]-relation-broken:**
  - When: Run after every necessary -departed hook has been run

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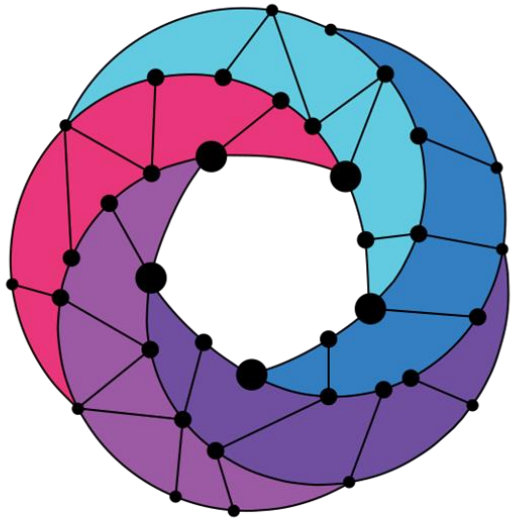
Relation hooks

Documentation

- Juju: https://juju.is/docs
- Charms:
  - Charm hooks/events: https://discourse.charmhub.io/t/charm-hooks
  - Operator framework:
    - Github: https://github.com/canonical/operator
    - Api docs: https://ops.readthedocs.io/en/latest/
    - Talk to us: https://discourse.charmhub.io/
  - Examples:
    - SSHProxy Charm: https://github.com/charmed-osm/sshproxy-operator
    - Machine Charm: https://github.com/charmed-osm/srs-enb-ue-operator
    - Kubernetes Charm:



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