Dev guidelines for OSM Primitives

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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
Charm development guidelines
Do one thing well
Steps to onboard a Charm to OSM

1. Make initial 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
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
Understanding hooks/events
Hooks are events generated by the Juju Controller
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
- **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)
- **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
• 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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