ICS Infrastructure Deployment Overview at ESS

ICALEPCS 2019 - WEAPP04

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Outline

EUROPEAN SPALLATION SOURCE

- Introduction
- Ansible
- AWX
- CSEntry

Introduction

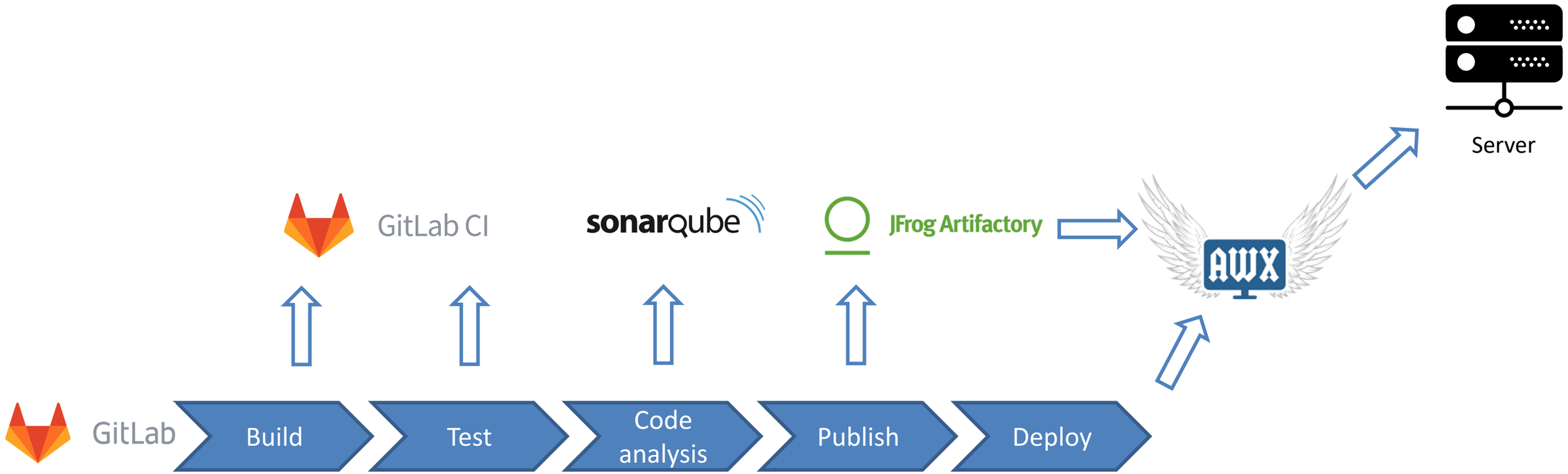
Control System Infrastructure

The **Integrated Control System Division** (ICS) is an organisational unit responsible for the control systems within the European Spallation Source (ESS) facility, including control systems for accelerator, target, neutron scattering systems and conventional facilities

Within ICS, the Control System Infrastructure group is in charge to design, implement and operate the IT infrastructure needed to reliably run the EPICS eco-system

- Local & Main Control room
- Data Centre
- Control System Networks
- Software Infrastructure

Continuous Integration & Delivery Pipeline



Deployment

Build → Test → Code analysis → Publish → **Deploy**

- Repeatable
- Reproducible
- Reliable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ANSIBLE

Ansible

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```yaml
- name: install docker
  yum:
    name:
      - "docker-ce-{{ docker_version }}"
      - "docker-ce-cli-{{ docker_cli_version }}"
      - "containerd.io-{{ docker_containerd_io_version }}"
    state: present

- name: create docker daemon configuration directory
  file:
    path: /etc/docker
    state: directory
    mode: 0700

- name: create docker daemon configuration
  template:
    src: daemon.j2
    dest: /etc/docker/daemon.json
    mode: 0600
  notify:
    - restart docker daemon

- name: start docker daemon
  systemd:
    name: docker
    enabled: true
    state: started
```

- YAML format
- Readable
- Idempotent

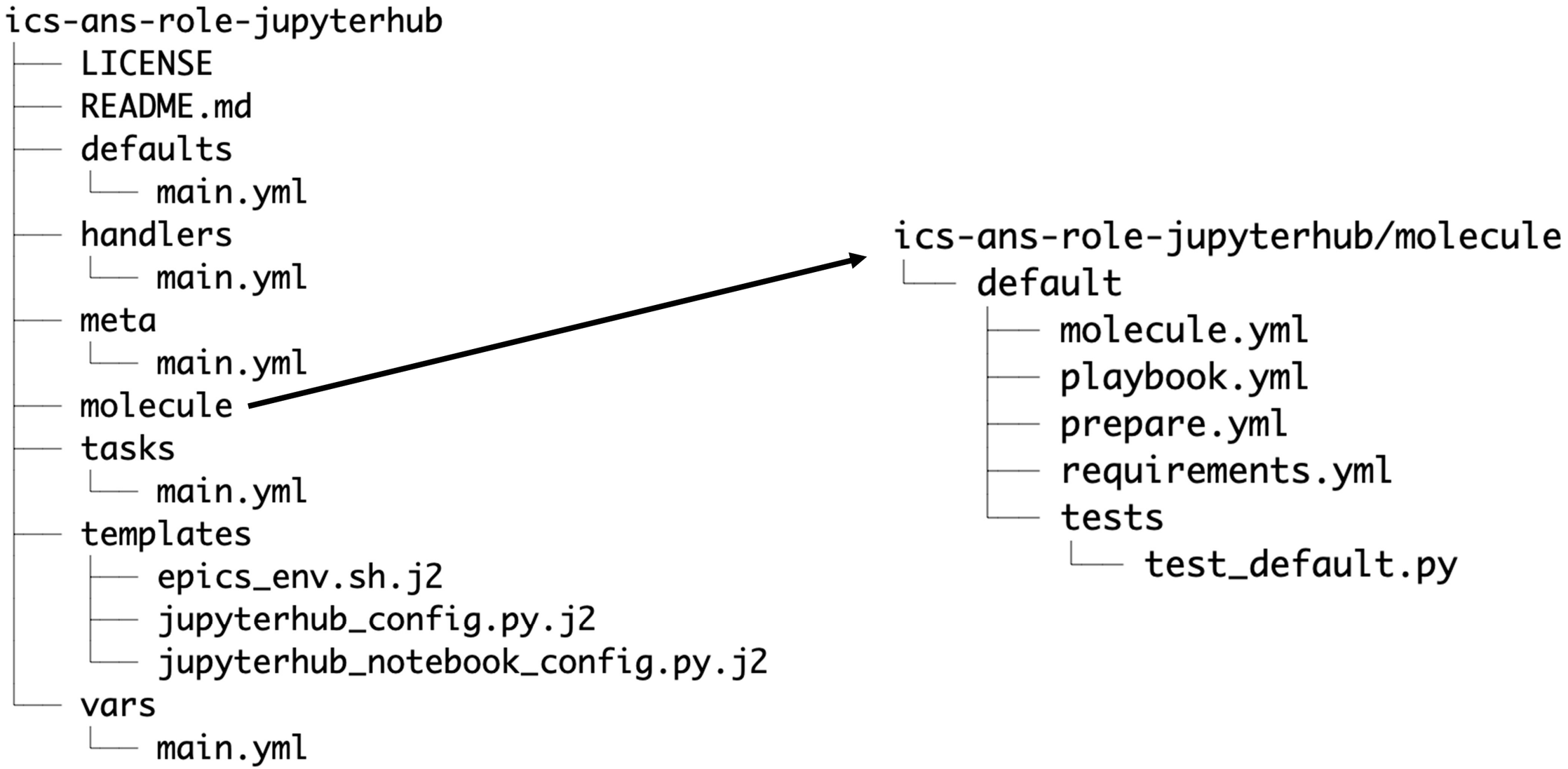
Ansible at ESS: playbook

```
ics-ans-jupyterhub/
├── LICENSE
├── README.md
├── group_vars
│   └── jupyterhub
├── molecule
├── playbook.yml
├── roles
│   └── requirements.yml
```

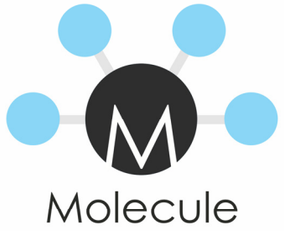
```yaml
---
- hosts: jupyterhub
  become: true
  roles:
    - role: ics-ans-role-jupyterhub
```

```yaml
---
- src: git+https://gitlab.esss.lu.se/ics-ansible-galaxy/ics-ans-role-repository.git
  version: v0.11.0
- src: git+https://gitlab.esss.lu.se/ics-ansible-galaxy/ics-ans-role-docker.git
  version: v1.2.1
- src: git+https://gitlab.esss.lu.se/ics-ansible-galaxy/ics-ans-role-traefik.git
  version: v0.8.1
- src: git+https://gitlab.esss.lu.se/ics-ansible-galaxy/ics-ans-role-jupyterhub.git
  version: v1.1.0
- src: git+https://gitlab.esss.lu.se/ics-ansible-galaxy/ics-ans-role-certificate.git
  version: v0.1.4
```

Ansible at ESS: role



Molecule



Designed to aid in the development and testing of Ansible roles

- Make it easy to run a playbook in Docker container or Vagrant box for local testing
- Verify role syntax
- Check idempotence
- Run ansible-lint (best practices checker for Ansible)
- Run tests with Testinfra

https://molecule.readthedocs.io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SOURCE


AWX

AWX

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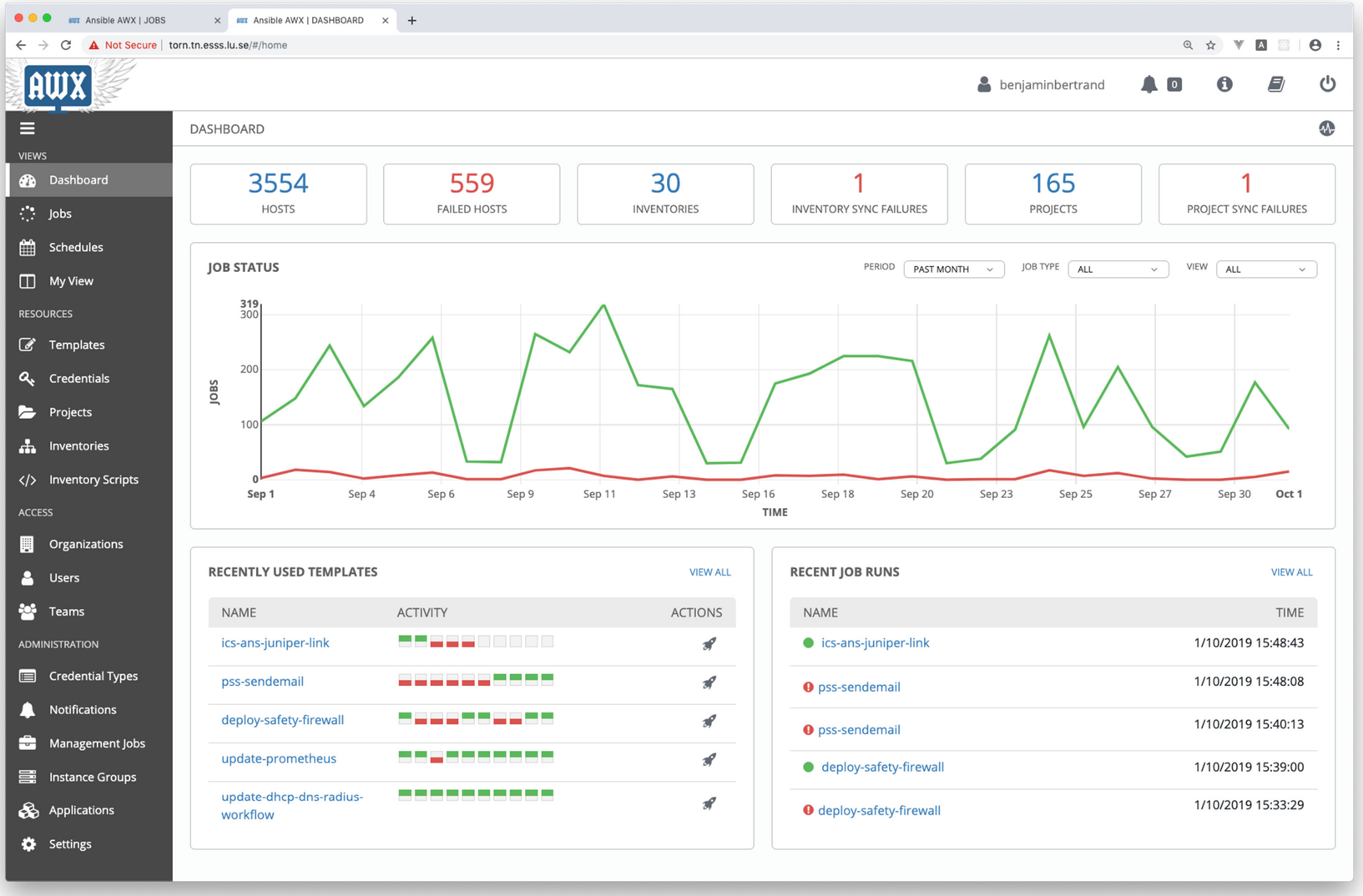
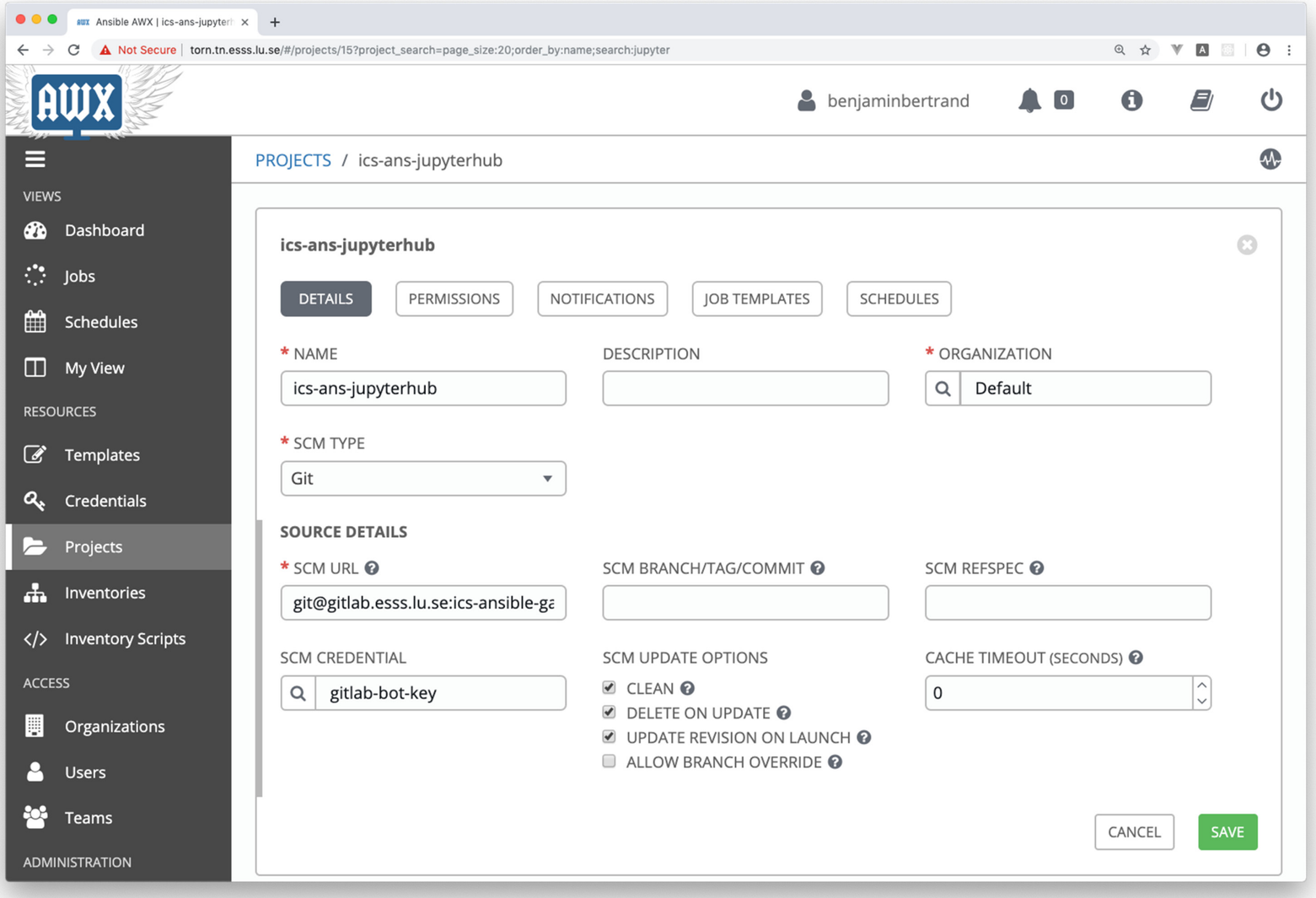
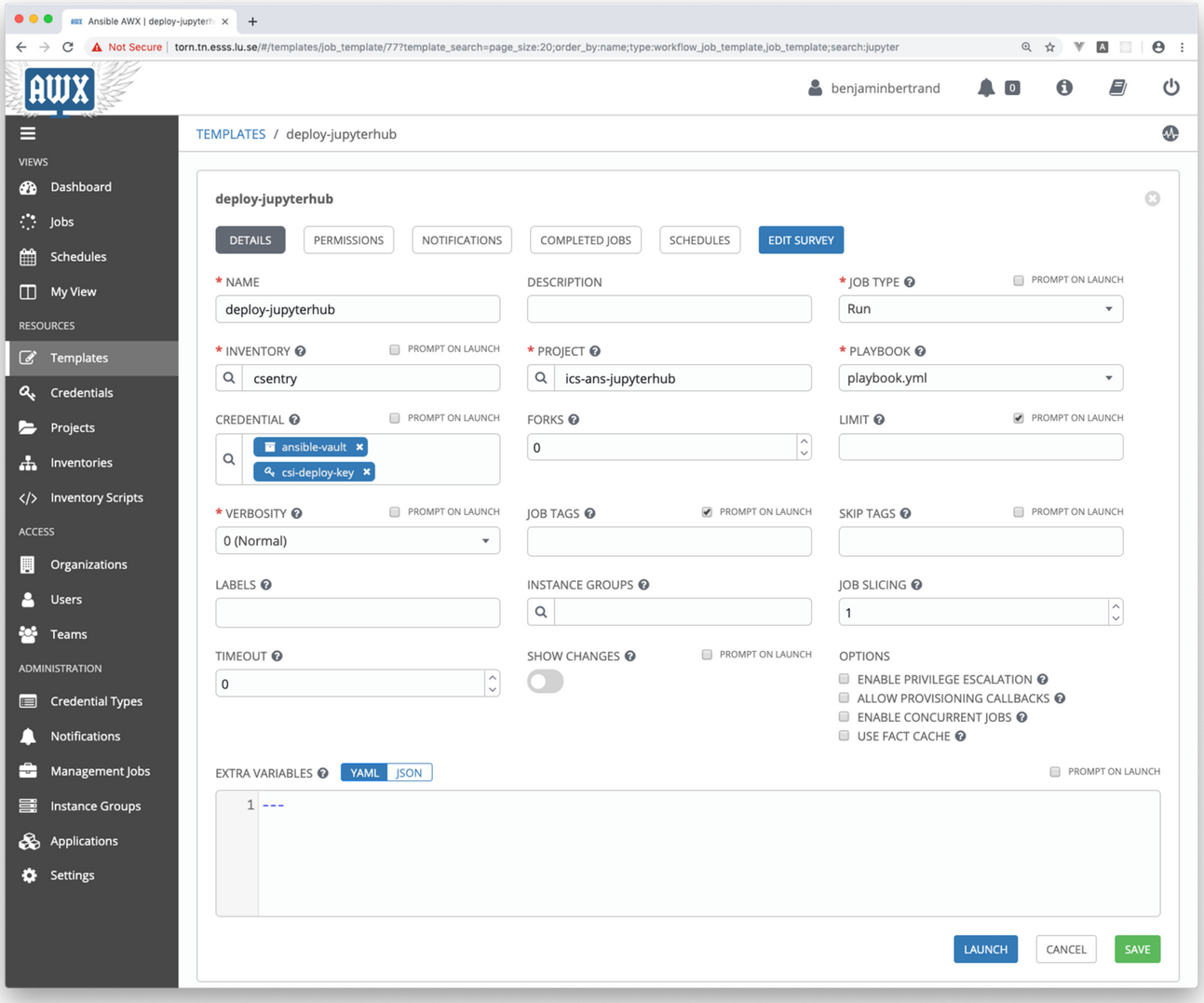


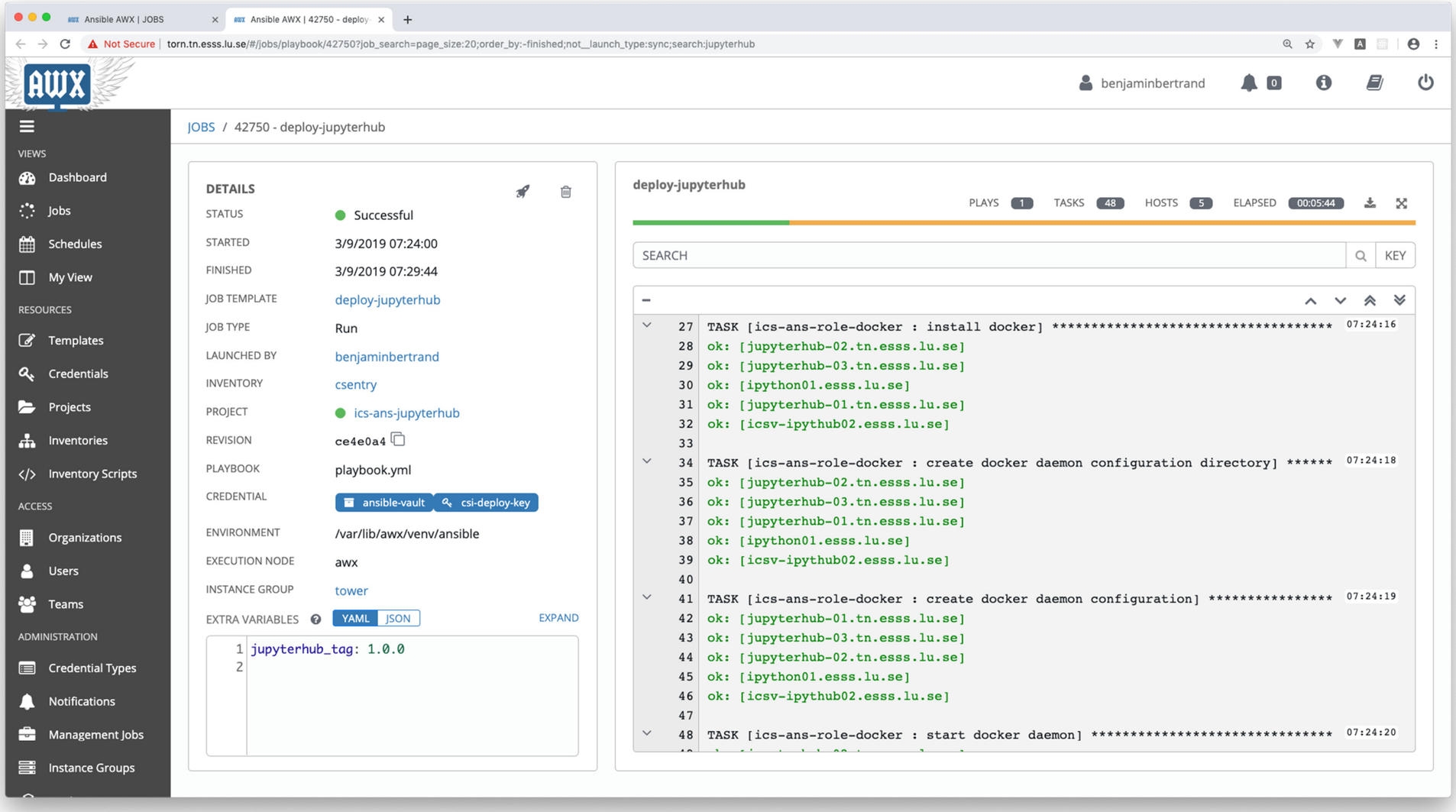
AWX project


Ansible AWX | ics-ans-jupyter
Not Secure | torn.tn.esss.lu.se/#/projects/15?project_search=page_size:20;order_by:name;search:jupyter
AWX
benjaminbertrand
0
VIEWS
Dashboard
Jobs
Schedules
My View
RESOURCES
Templates
Credentials
Projects
Inventories
Inventory Scripts
ACCESS
Organizations
Users
Teams
ADMINISTRATION
PROJECTS / ics-ans-jupyterhub
ics-ans-jupyterhub
DETAILS
PERMISSIONS
NOTIFICATIONS
JOB TEMPLATES
SCHEDULES
* NAME
ics-ans-jupyterhub
DESCRIPTION
* ORGANIZATION
Default
* SCM TYPE
Git
SOURCE DETAILS
* SCM URL
git@gitlab.esss.lu.se:ics-ansible-ga
SCM BRANCH/TAG/COMMIT
SCM REFSPEC
SCM CREDENTIAL
gitlab-bot-key
SCM UPDATE OPTIONS
CLEAN
DELETE ON UPDATE
UPDATE REVISION ON LAUNCH
ALLOW BRANCH OVERRIDE
CACHE TIMEOUT (SECONDS)
0
CANCEL
SAVE

AWX job template



AWX job


Ansible AWX | JOBS
Ansible AWX | 42750 - deploy
Not Secure | torn.tn.esss.lu.se/#/jobs/playbook/42750?job_search=page_size:20;order_by:-finished;not__launch_type:sync;search:jupyterhub
AWX
benjaminbertrand
0
VIEWS
Dashboard
Jobs
Schedules
My View
RESOURCES
Templates
Credentials
Projects
Inventories
Inventory Scripts
ACCESS
Organizations
Users
Teams
ADMINISTRATION
Credential Types
Notifications
Management Jobs
Instance Groups
JOBS / 42750 - deploy-jupyterhub
DETAILS
STATUS Successful
STARTED 3/9/2019 07:24:00
FINISHED 3/9/2019 07:29:44
JOB TEMPLATE deploy-jupyterhub
JOB TYPE Run
LAUNCHED BY benjaminbertrand
INVENTORY csentry
PROJECT ics-ans-jupyterhub
REVISION ce4e0a4
PLAYBOOK playbook.yml
CREDENTIAL ansible-vault csi-deploy-key
ENVIRONMENT /var/lib/awx/venv/ansible
EXECUTION NODE awx
INSTANCE GROUP tower
EXTRA VARIABLES YAML JSON EXPAND
1 jupyterhub_tag: 1.0.0
2
deploy-jupyterhub
PLAYS 1 TASKS 48 HOSTS 5 ELAPSED 00:05:44
SEARCH KEY
27 TASK [ics-ans-role-docker : install docker] ********** 07:24:16
28 ok: [jupyterhub-02.tn.esss.lu.se]
29 ok: [jupyterhub-03.tn.esss.lu.se]
30 ok: [ipython01.esss.lu.se]
31 ok: [jupyterhub-01.tn.esss.lu.se]
32 ok: [icsv-ipythub02.esss.lu.se]
33
34 TASK [ics-ans-role-docker : create docker daemon configuration directory] ****** 07:24:18
35 ok: [jupyterhub-02.tn.esss.lu.se]
36 ok: [jupyterhub-03.tn.esss.lu.se]
37 ok: [jupyterhub-01.tn.esss.lu.se]
38 ok: [ipython01.esss.lu.se]
39 ok: [icsv-ipythub02.esss.lu.se]
40
41 TASK [ics-ans-role-docker : create docker daemon configuration] ********** 07:24:19
42 ok: [jupyterhub-01.tn.esss.lu.se]
43 ok: [jupyterhub-03.tn.esss.lu.se]
44 ok: [jupyterhub-02.tn.esss.lu.se]
45 ok: [ipython01.esss.lu.se]
46 ok: [icsv-ipythub02.esss.lu.se]
47
48 TASK [ics-ans-role-docker : start docker daemon] ********** 07:24:20

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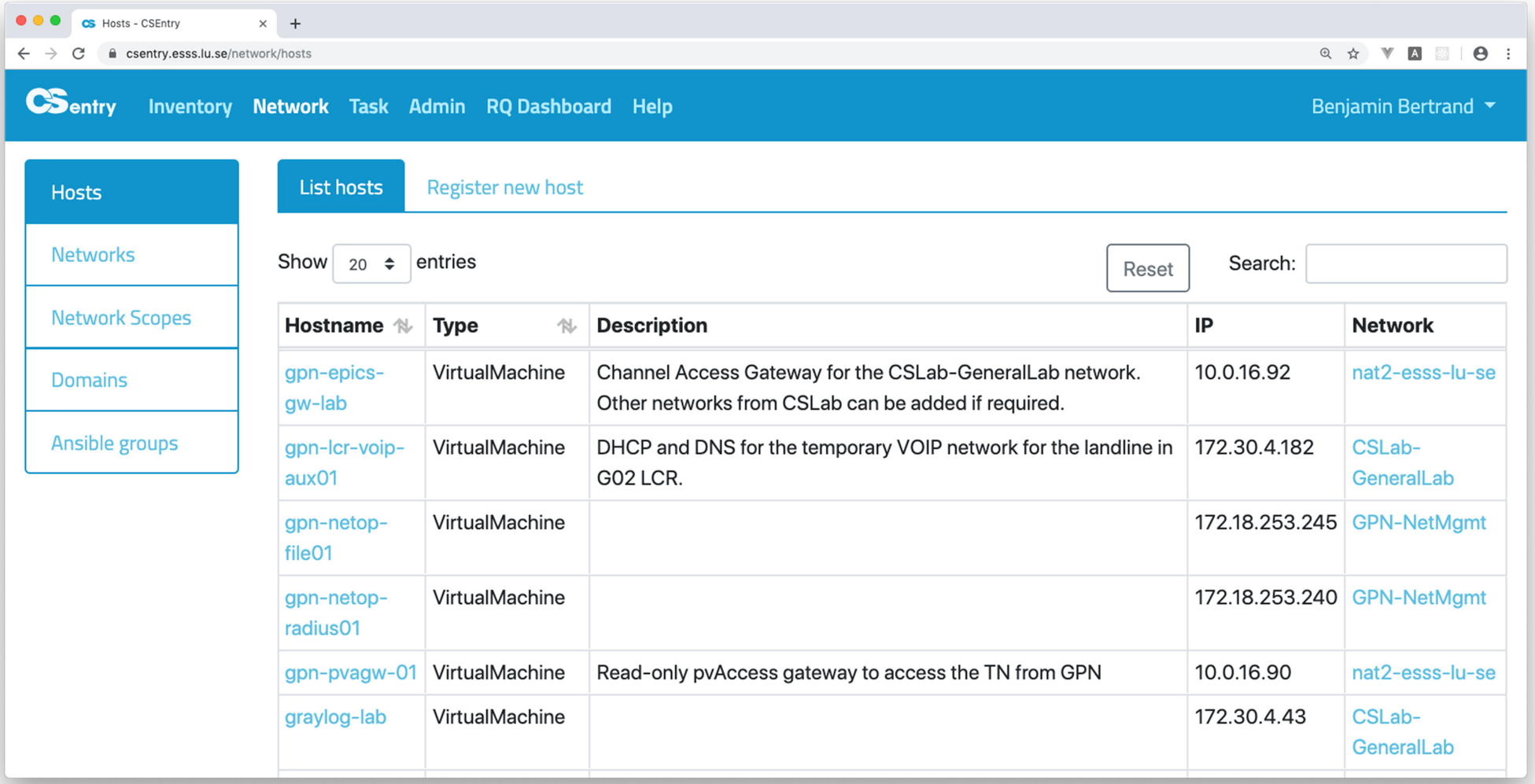
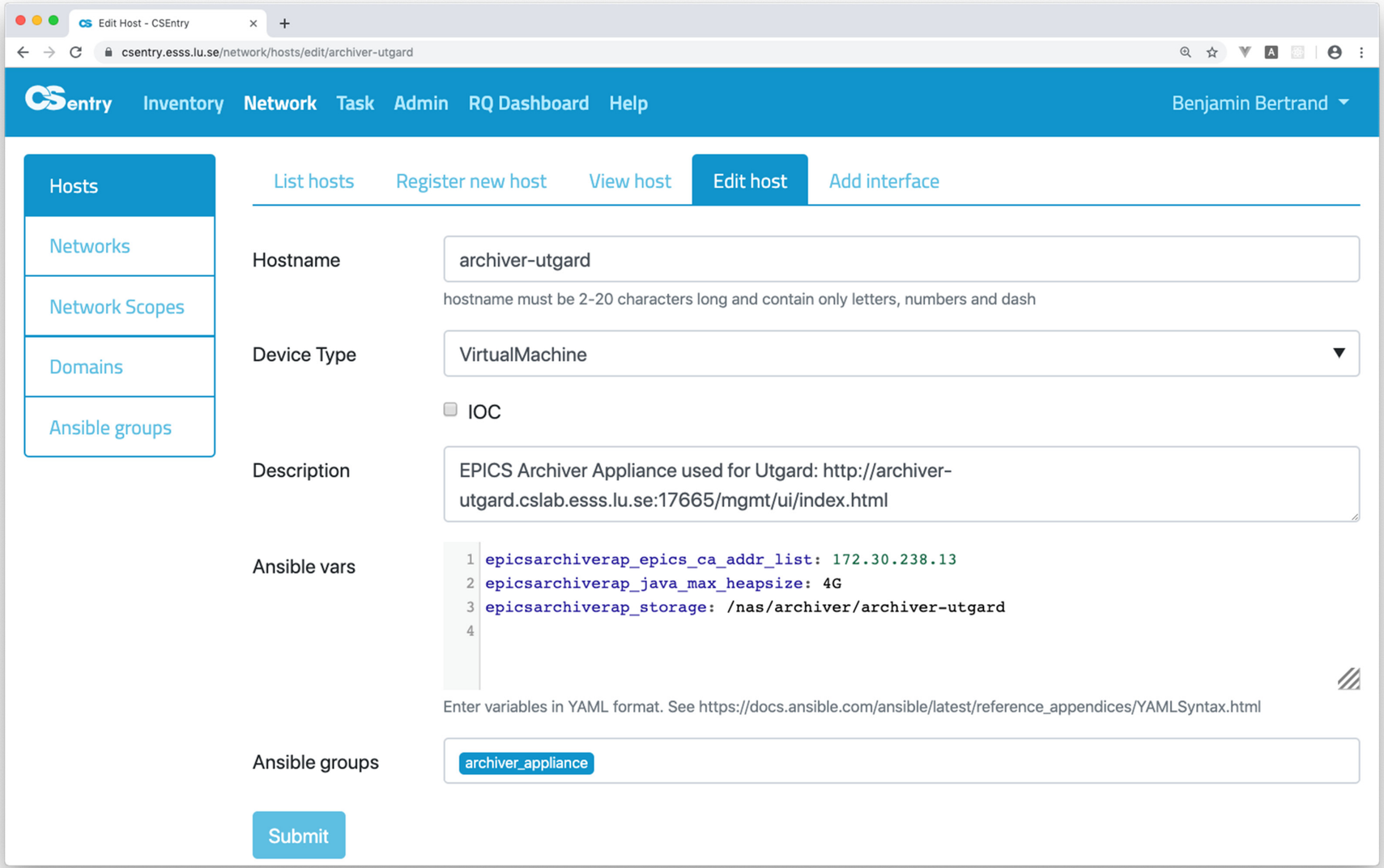
CSentry

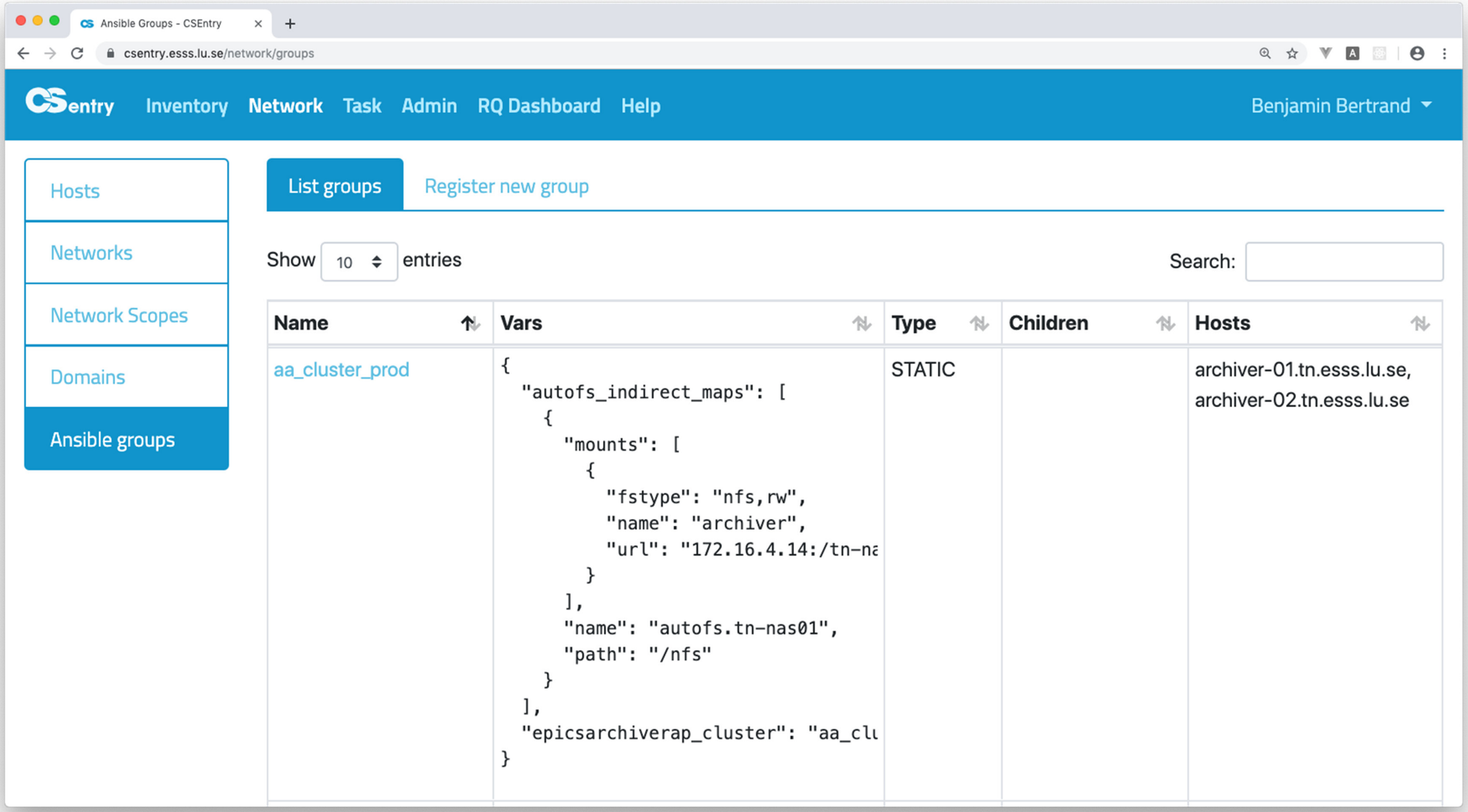
CSEntry
Ansible inventory



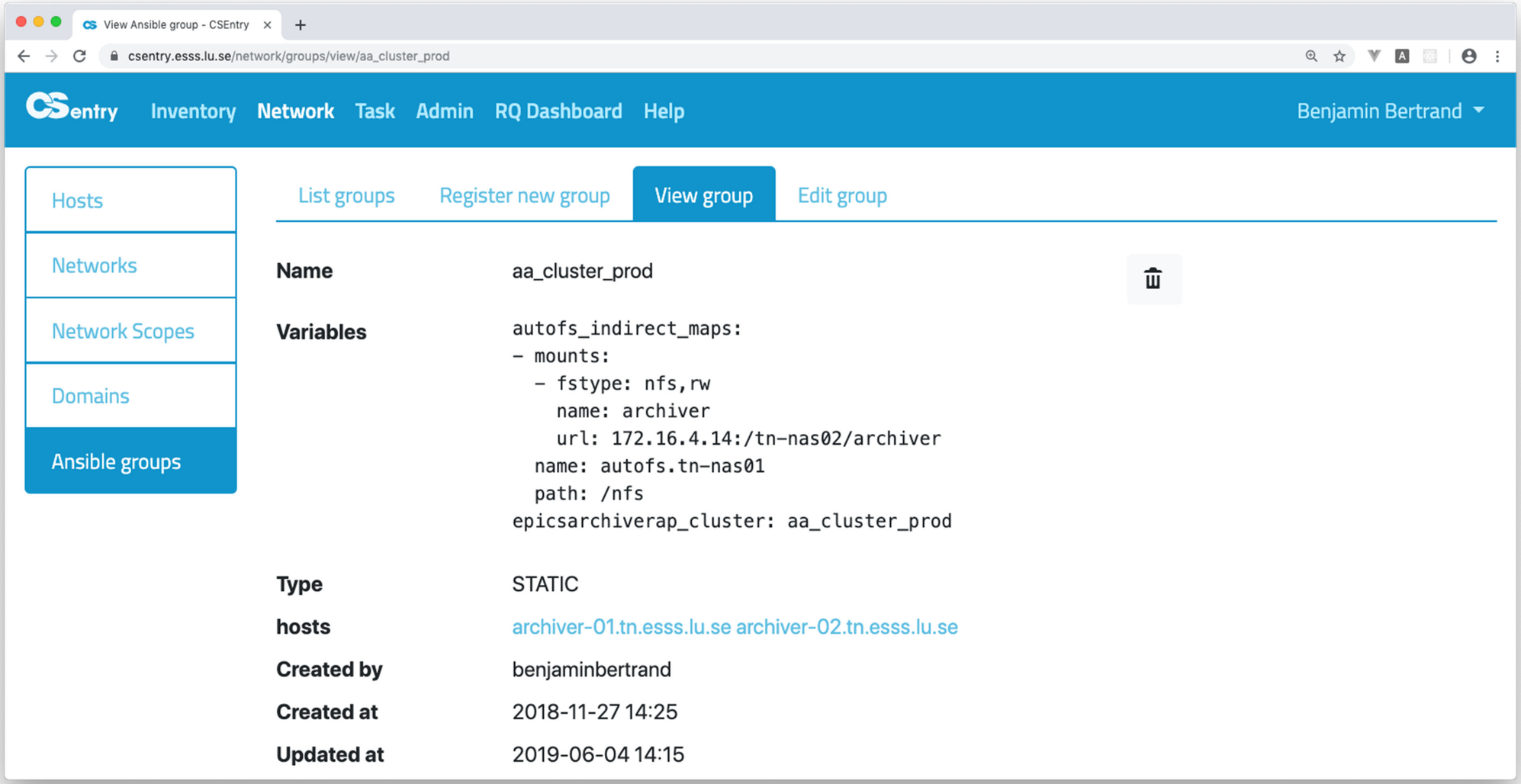
CSEntry
Ansible variables



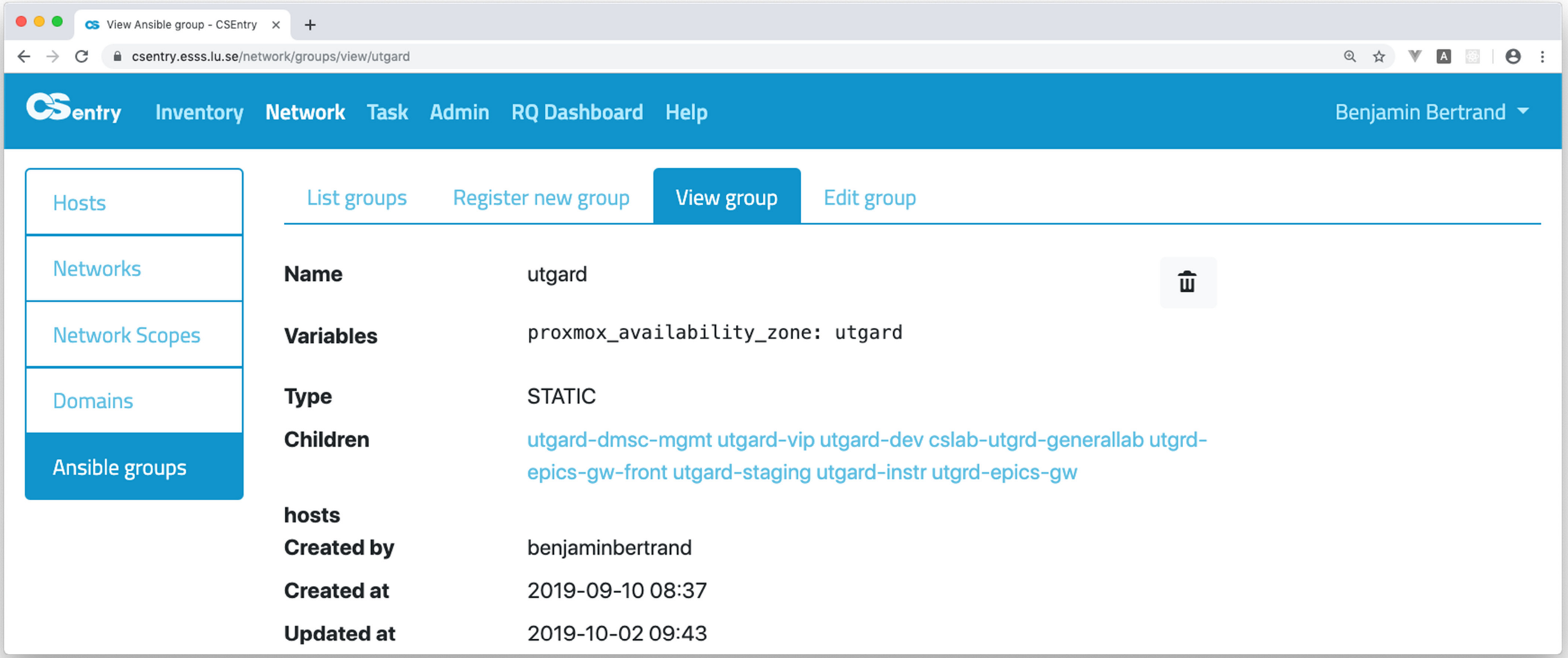
CSEntry
Ansible groups



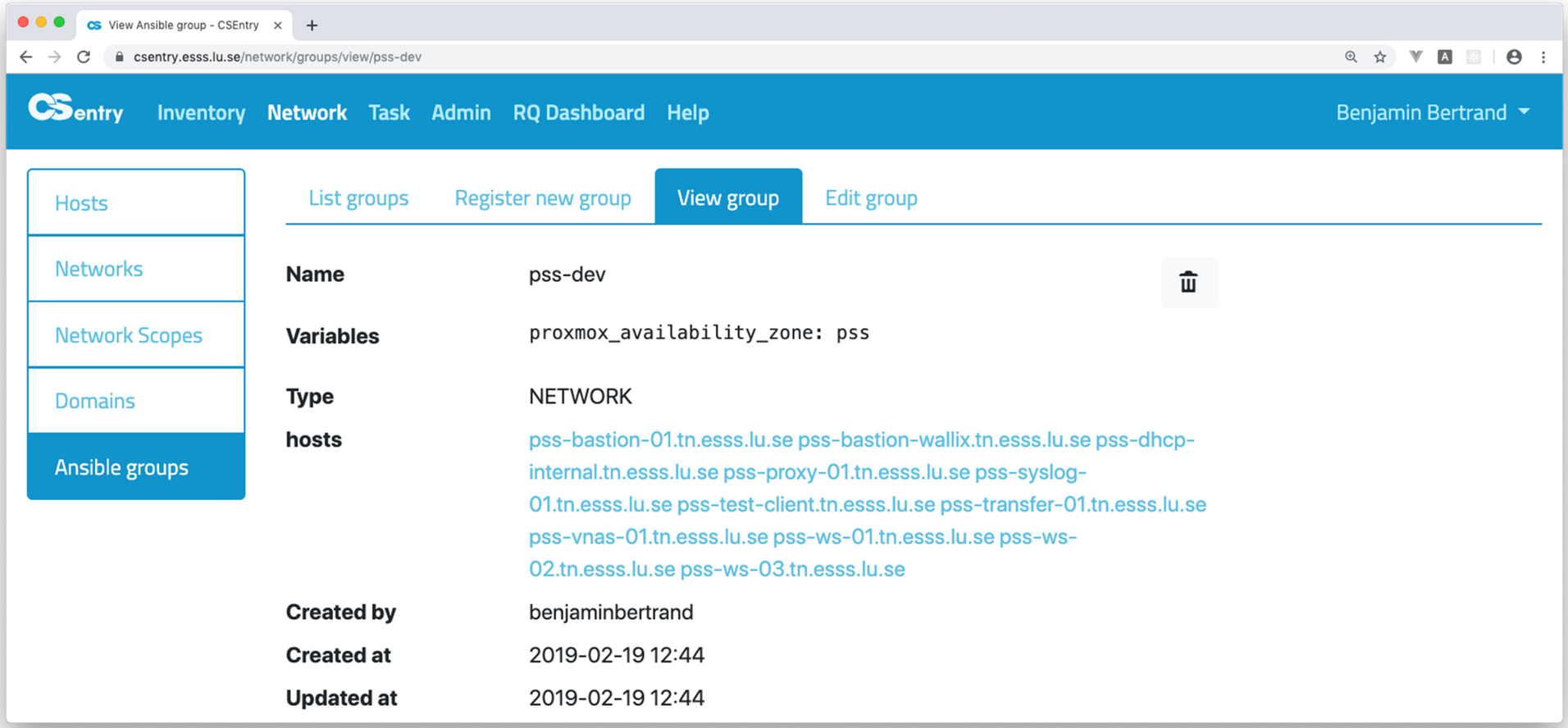
CSEntry
Static Groups



CSEntry
Groups of Groups



CSEntry
Dynamic Groups



Dynamic type: NETWORK / NETWORK_SCOPE / DEVICE_TYPE

The name of the group shall match the name of the <type>

csentry-inventory script

README.rst

csentry-inventory

CSEntry Dynamic Inventory script for Ansible.

Quick start

This Python package installs an entry-point that can be run directly. The variables CSENTRY_URL and CSENTRY_TOKEN shall be set in the environment or can be passed via the --csentry-url and --csentry-token command line options.

```
$ export CSENTRY_URL="https://csentry.esss.lu.se"
$ export CSENTRY_TOKEN="xxxxxxxxxxxxxxxxxxxxxxxxx"
$ csentry-inventory --list --pretty

$ csentry-inventory --help
```

Installation

```
$ pip install csentry-inventory -i https://artifactory.esss.lu.se/artifactory/api/pypi/pypi-virtual/simple
```

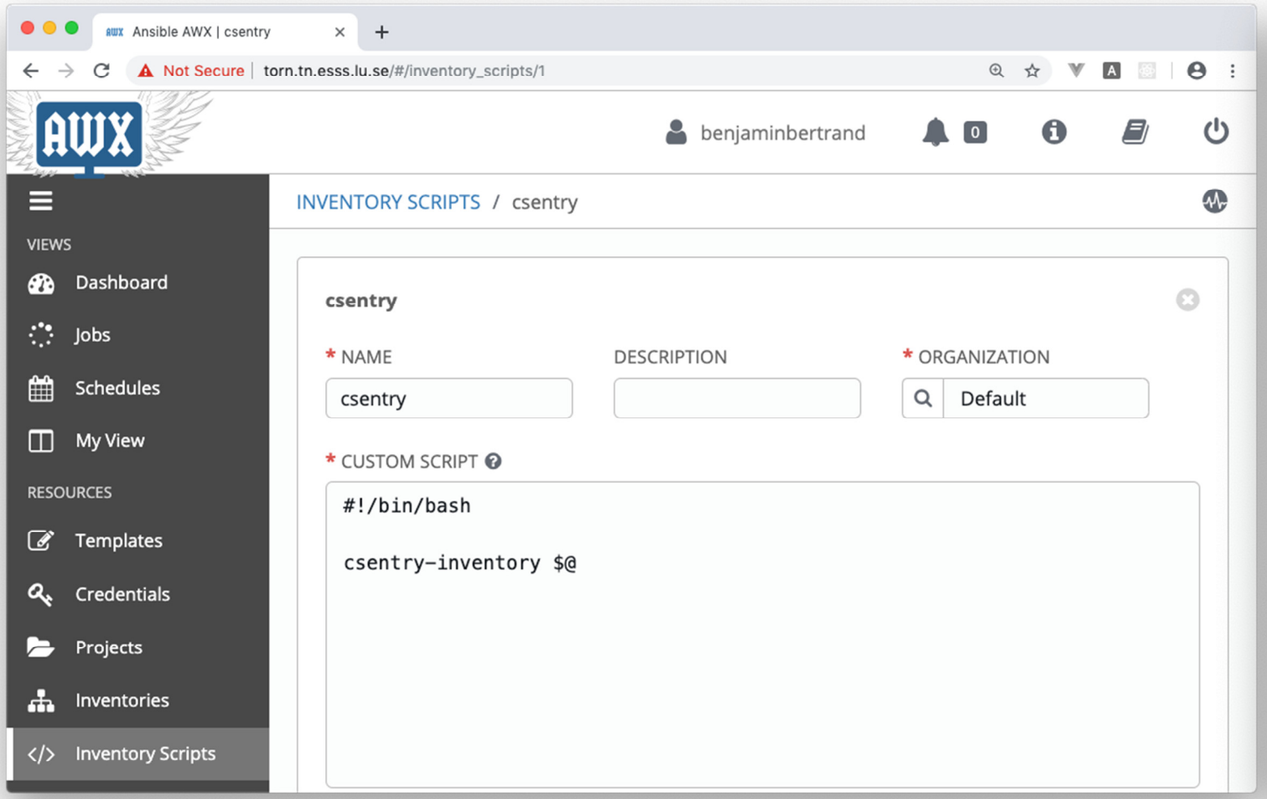
License

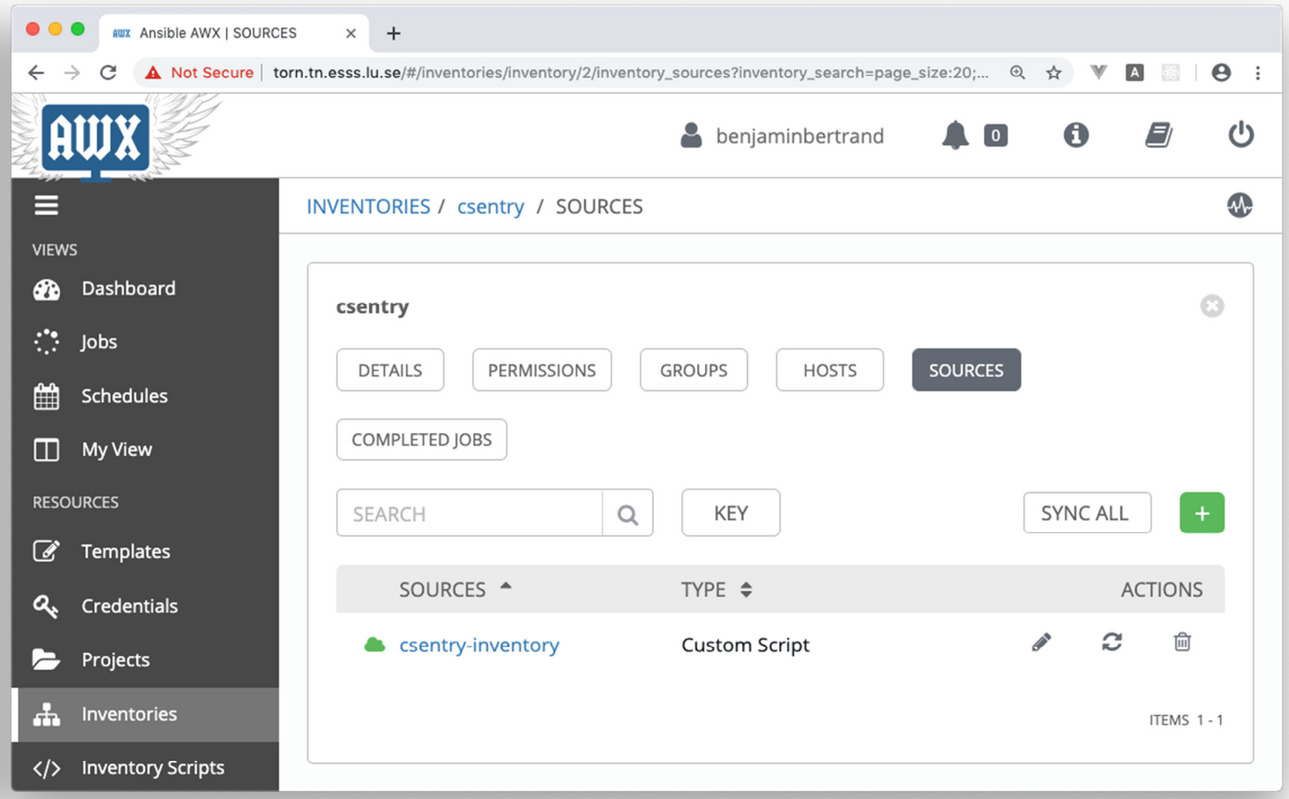
MIT

csentry-inventory extra variables


```
"archiver-utgard.cslab.esss.lu.se": {
    "ansible_host": "172.30.238.75",
    "csentry_device_type": "VirtualMachine",
    "csentry_host_id": 1220,
    "csentry_interfaces": [
        {
            "cnames": [],
            "gateway": "172.30.238.126",
            "ip": "172.30.238.75",
            "is_main": true,
            "mac": "02:42:42:79:b7:db",
            "name": "archiver-utgard",
            "netmask": "255.255.255.192",
            "network": {
                "domain": "cslab.esss.lu.se",
                "name": "Utgrd-EPICS-GW",
                "vlan_id": 3967
            }
        }
    ],
    "csentry_is_ioc": false,
    "csentry_items": [],
    "csentry_model": null,
    "csentry_user": "benjaminbertrand",
    "epicsarchiverap_epics_ca_addr_list": "172.30.238.13",
    "epicsarchiverap_java_max_heapsize": "4G"
```

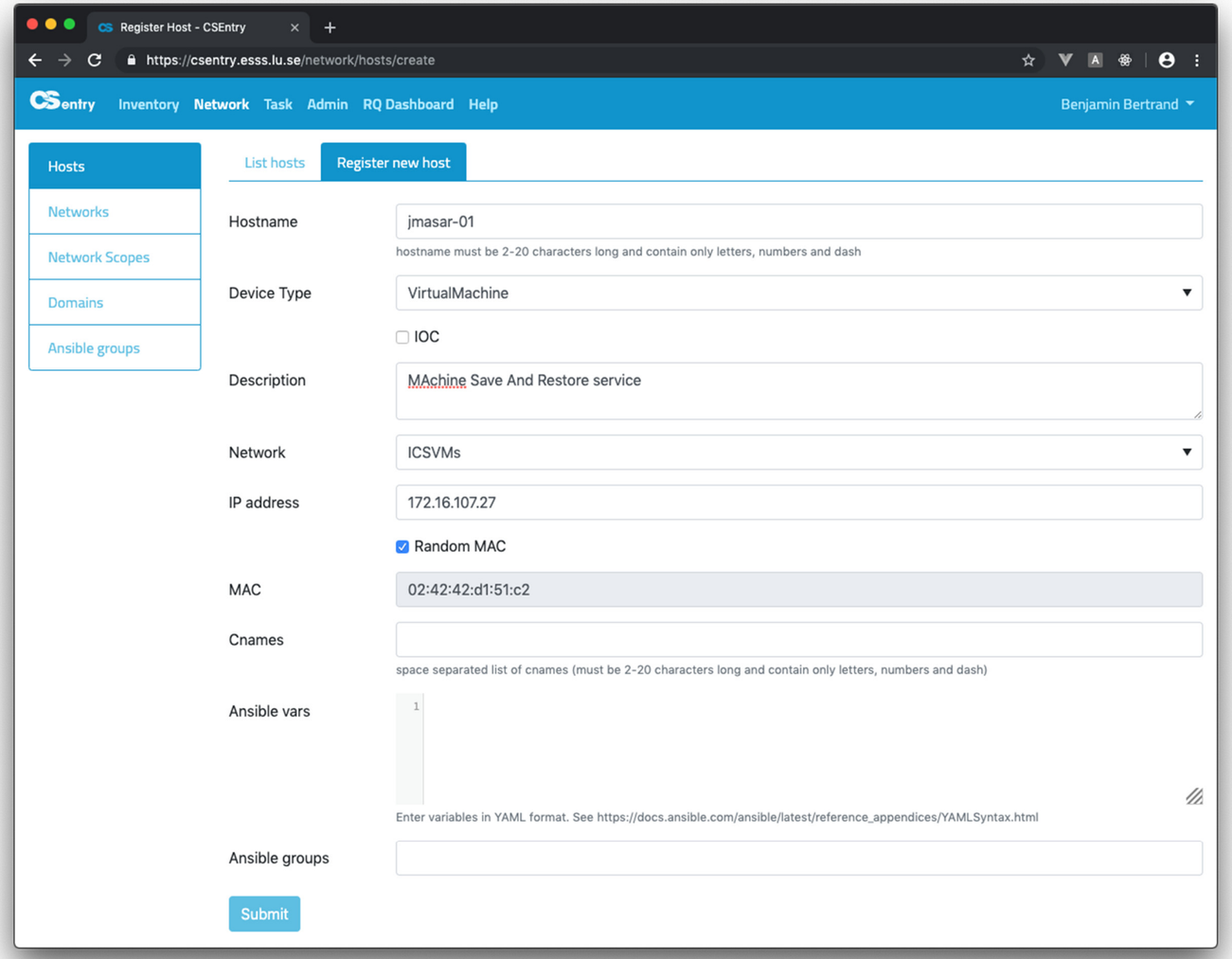
csentry-inventory in AWX





Register new host

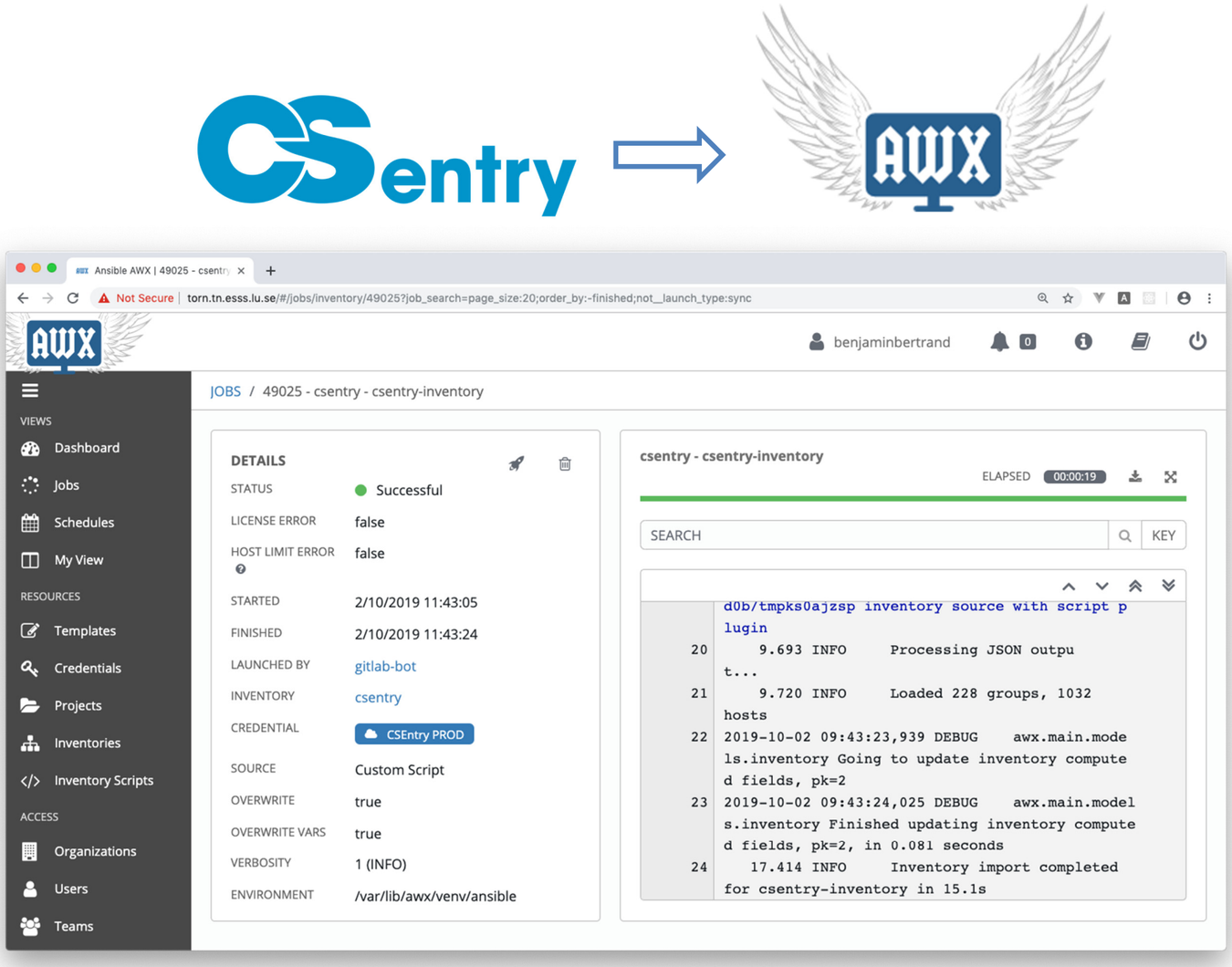
CSEntry



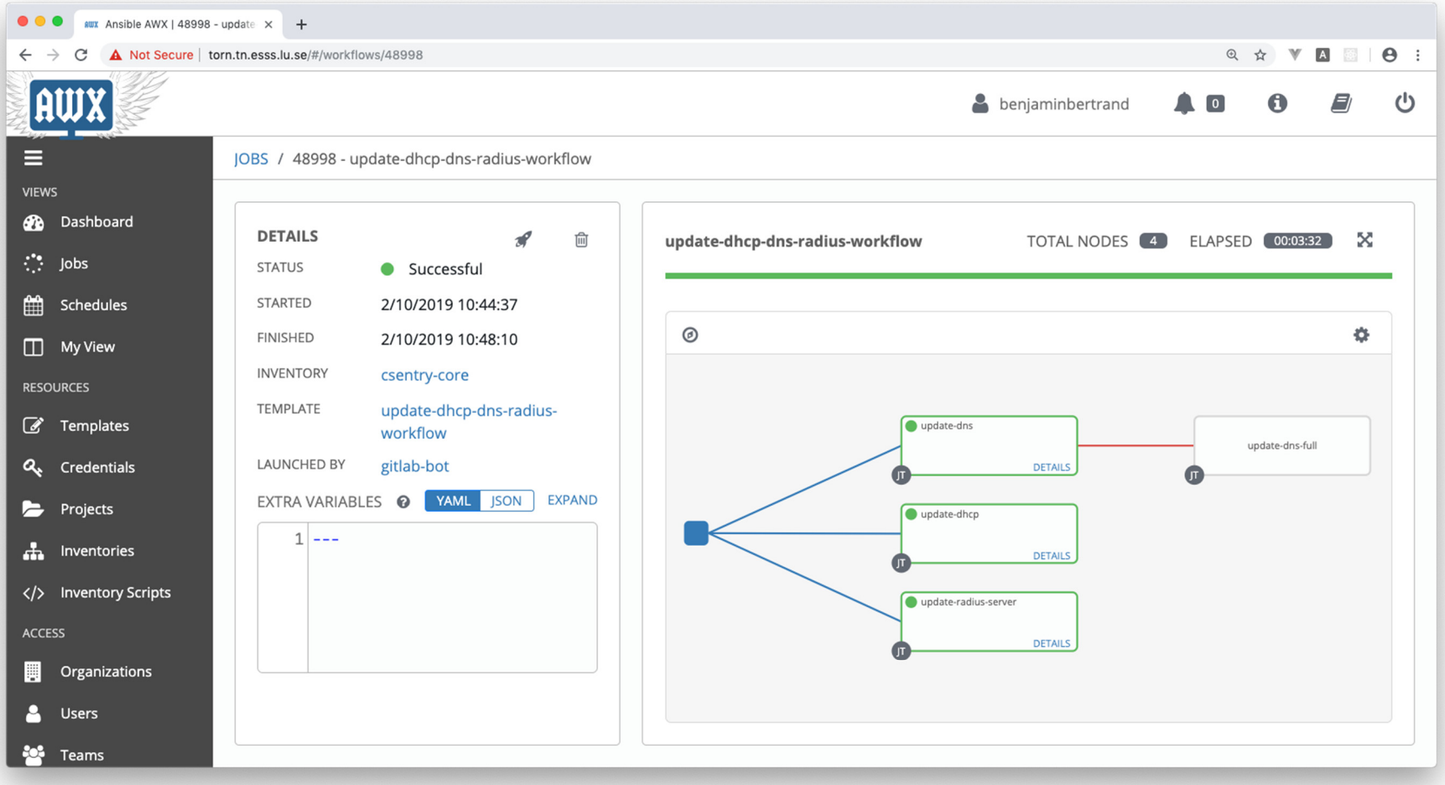
Trigger:

- inventory sync
- core services update

Inventory sync

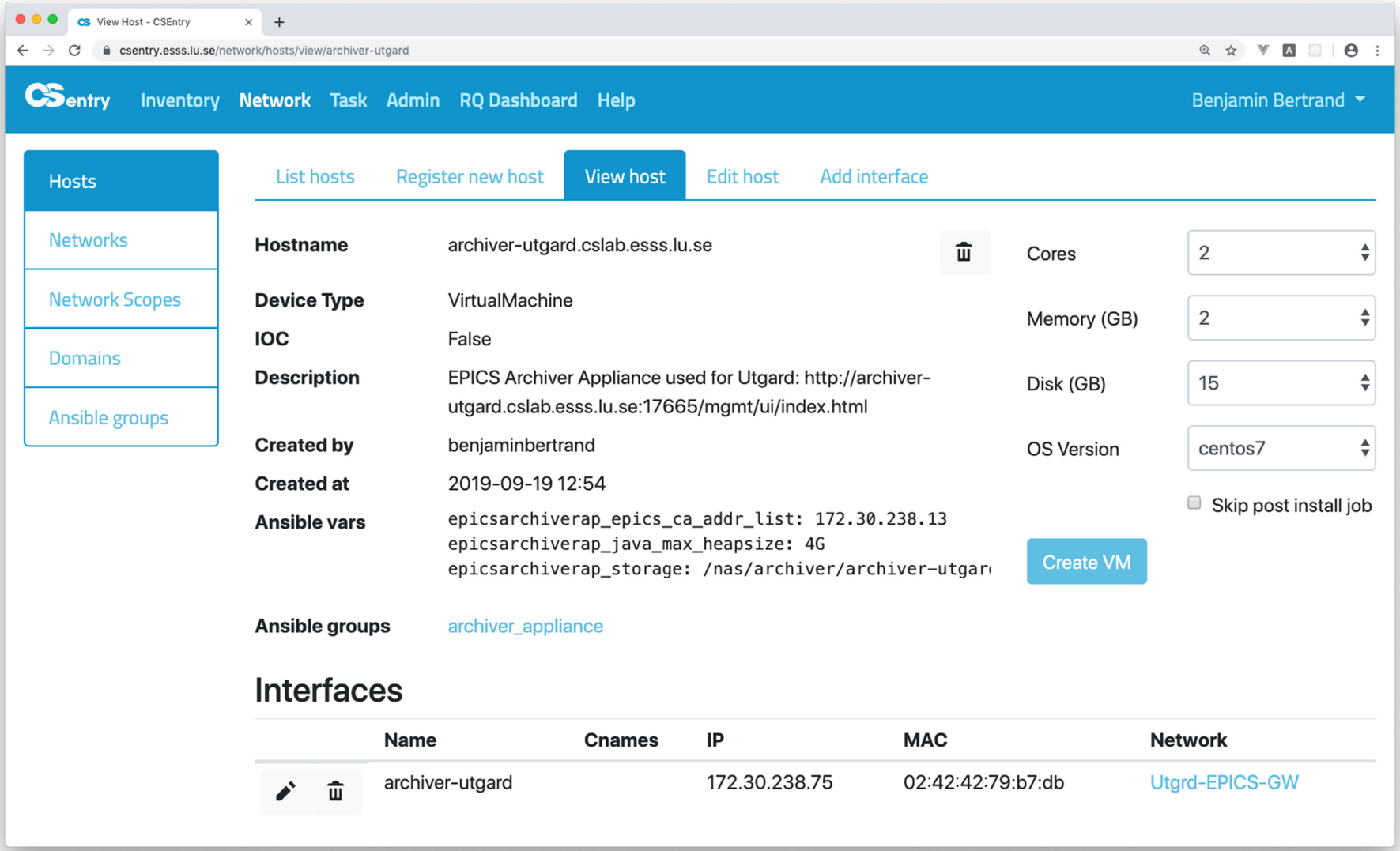


DNS DHCP Radius update



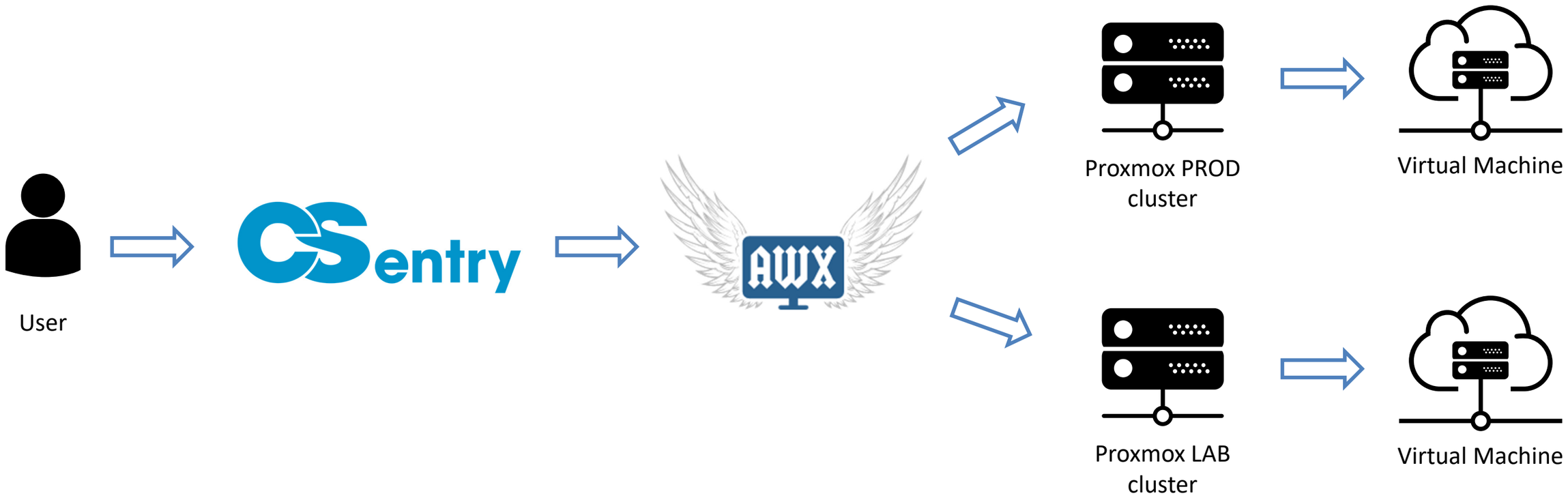
VM Creation

CSEntry

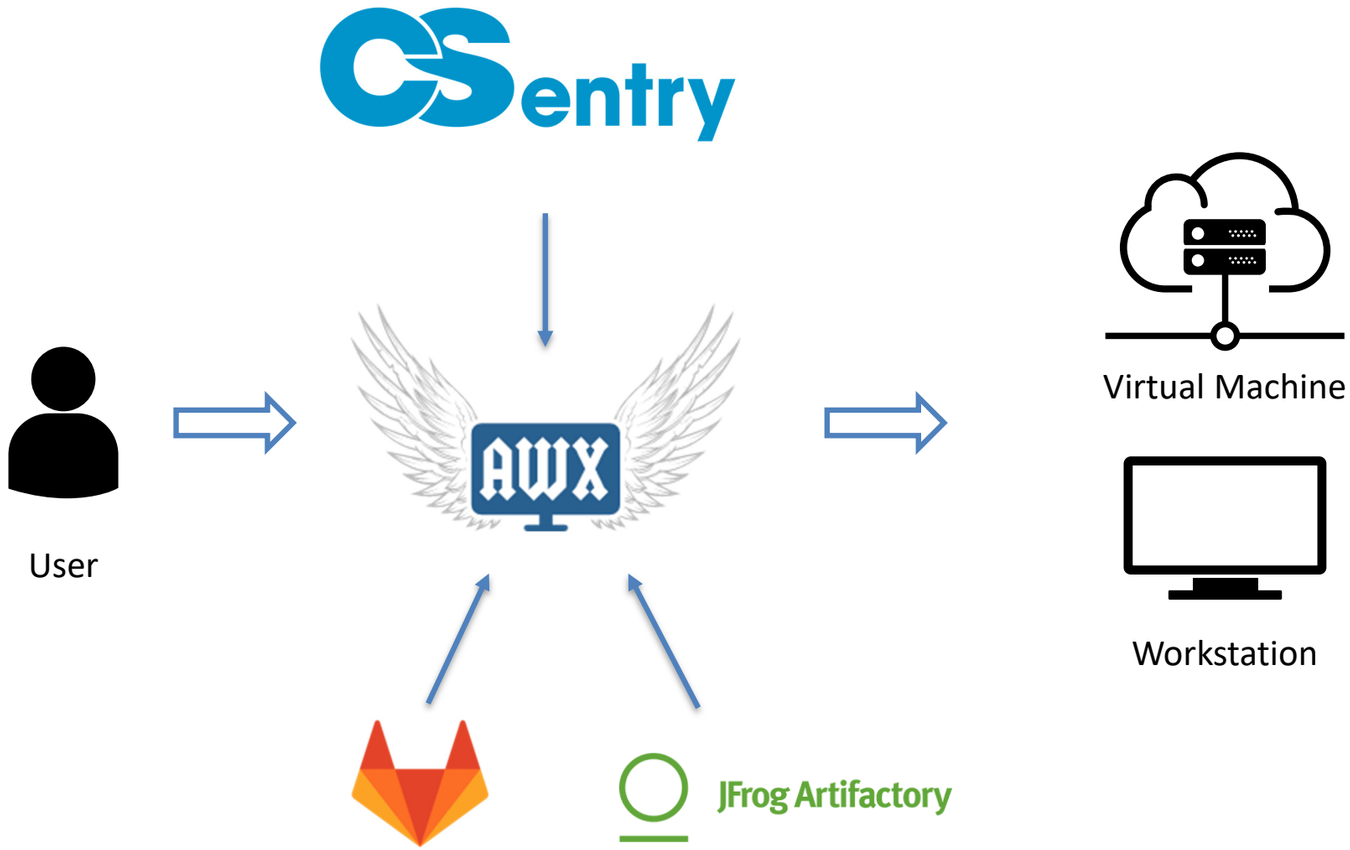


VM Creation
Workflow

Proxmox Clusters



Application Deployment
Workflow



Summary

EUROPEAN SPALLATION SOURCE

- Infrastructure as Code
- Deployment shall be:
  - Repeatable
  - Reproducible
  - Reliable
- CSEntry gives us an easy to use and flexible solution

Thank you!

Thank you for your attention

- Contact: benjamin.bertrand@esss.se