

The background of the slide features a complex network diagram. It consists of numerous nodes, represented by circles of varying sizes, connected by thin, light-colored lines. The nodes and lines are primarily in shades of purple and pink, creating a web-like structure that spans the entire background. The overall aesthetic is technical and digital.

uk | SRC

SKAO Regional Centre United Kingdom

ukSRC Node Operations

ukSRC Deployment Methodology

ukSRC uses a tool written by StackHPC and forked and maintained by ukSRC to bootstrap, configure and manage our Kubernetes clusters and all the SRCNet services. The tool is CAPI-Helm-FluxCD and uses as the name suggests.

- Kubernetes CAPI
 - Cluster API is a Kubernetes sub-project focused on providing declarative APIs and tooling to simplify provisioning, upgrading, and operating multiple Kubernetes clusters.
- Helm
 - Helm is a package manager for Kubernetes that uses 'charts' as its package format, which is based on YAML.
- FluxCD
 - FluxCD is a GitOps tool for Kubernetes that automates deployment and management by continuously reconciling cluster state with configurations stored in Git.
- Kind Cluster 'Kubernetes in Docker'.

We can bootstrap an entire cluster and deploy all SRCNet services in around 45 minutes from one command.

ukSRC Clusters

We have the following clusters deployed – running 1.34.8.

- ☐ uksrc-ral-prod
- ☐ uksrc-ral-preprod
- ☐ uksrc-infra
- ☐ uksrc-ral-dev
- ☐ uksrc-ral-dev2
- ☐ uksrc-ral-test
- ☐ uksrc-cam-prod
- ☐ uksrc-cam-preprod
- ☐ uksrc-cam-dev
- ☐ uksrc-slurm
- ☐ uksrc-slurm-stage

Upgrades to the K8s cluster are completely handled by CAPI & Flux, upgrades just involve changing the version of the K8s release and the OpenStack image ID, the upgrade will take place without further intervention.

We're also able to change or add the types of the nodes, and CAPI will replace them for us, and drain the old, seamlessly.

SRCNet & K8s Services

SRCNET Services

- Jupyterhub – Stand Alone *
- Carta - Stand Alone *
- SODA
- Gatekeeper
- PrepareData
- CANFAR

Additional Services

- Software Discovery
- Science MetaData
- Maltopuft

K8s Services

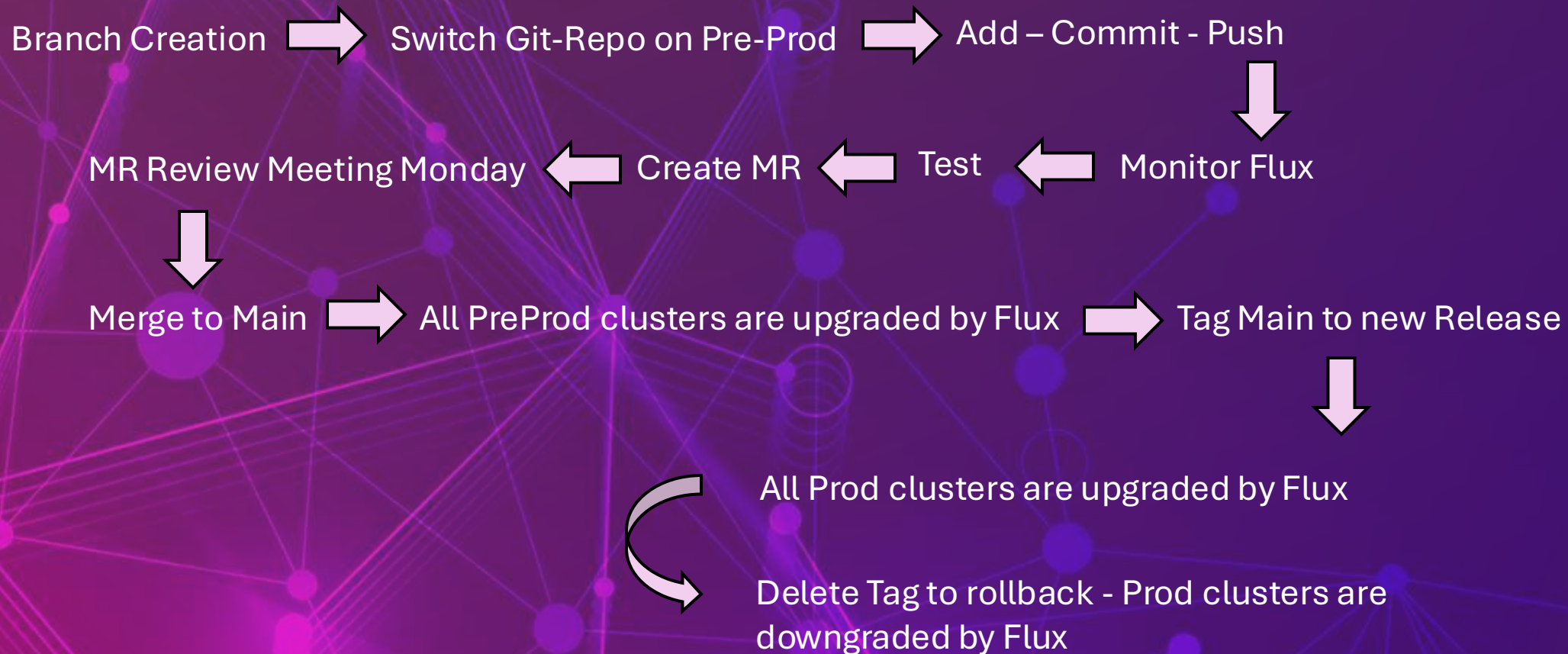
- Harbor (Infra Cluster)
- Headlamp
- Monitoring* – Grafana, Loki, Prometheus
- Kubeseal
- Flux
- Helm
- Envoy Gateway
- LetsEncrypt / Cert Manager
- CAPI
- FluxCD
- Helm
- OpenStack
- CSI-Ceph, Cinder, Manilla *
- Reloader
- Cluster-API : Addon-Provider, Operator, Janitor-OpenStack

*** Some of these are managed as addons.**

Cluster & Service Management

Managing Upgrades

We have a robust method for managing upgrades & releases, this follows the flow as shown below, that uses Semantic Versioning to manage our Production clusters.



Scaling ukSRC Compute

Compute is currently spread between Rutherford Appleton Labs (RAL) & University of Cambridge.

At Cambridge we have recently procured 4 Hi-Mem 1TB new servers and around an additional 4.2 PB of Ceph Storage.

New procurement for hardware is also planned at RAL.

We also are commissioning a new OpenStack cluster at the University of Manchester's Jodrell Bank facility with further procurement planned.

ukSRC are setting up a new UK architecture group to determine how we can meet our pledges and make use of infrastructure in the UK.

Science Delivery Support

ukSRC have hosted DSC's at RAL, from their outset.

- Challenges
 - Staging Data
 - Storage
 - Scratch
 - RSE
 - User Space
 - CPU Pinning
 - Shared Memory

Monitoring Clusters & Services

- Headlamp
- Monitoring
 - Grafana
 - Loki
 - Prometheus
- Helm Exporter