

Cloud-Native Without the Cloud

Infrastructure Enabled Research Workflows

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Cloud-Native Without the Cloud



Cloud-Native Without the Cloud



RSE in researcher workflows

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RSE in researcher workflows



Technologies for researcher workflows
(workshops, talks, discussions)

Cloud-Native **Without** the Cloud



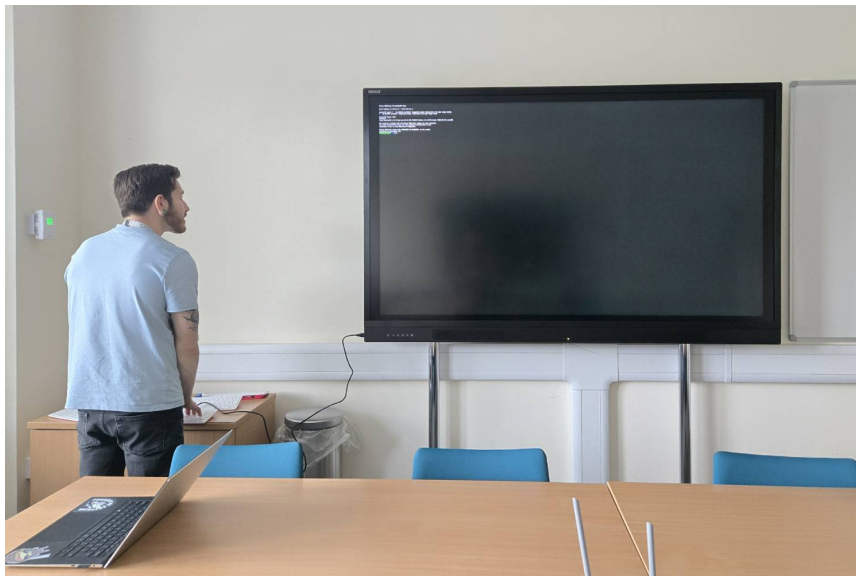
RSE in researcher workflows



**Air-gapped
K3s**

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Cloud-Native **Without** the Cloud



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RSE in researcher workflows



Air-gapped K3s

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Kubernetes: infrastructure freedom + researcher utility



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Kubernetes: infrastructure freedom + researcher utility



OPEN

nDemand

The OpenDemand logo, consisting of a red circular icon with a white stylized 'D' inside, followed by the text "nDemand" in a bold, black, sans-serif font.

Cloud-Native Technologies

How applications are deployed, not *where* (scalable, resilient, automated, portable, API-driven, auditable,...)

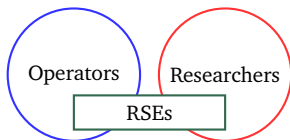
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nDemand





zaphod
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- ◇ Two clusters on OpenStack VMs (STFC Cloud)



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- ◇ Talos OS: Infrastructure as code all the way down





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- ◇ GitOps through GitLab and ArgoCD





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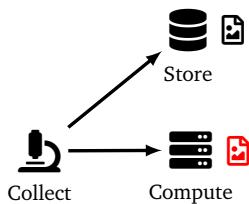


Declarative and auditable—operators own their deployments

RFI Data Movement

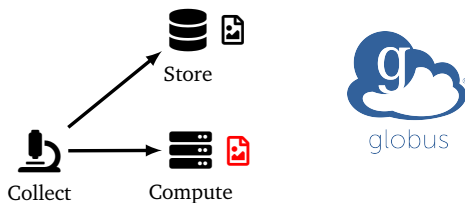


RFI Data Movement



- ◇ daily ~ TB data from instruments to compute/archive

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- ◇ Automated or user-triggered Globus *flows*

RFI Data Movement

```
{
  "StartAt": "Transfer",
  "States": {
    "Transfer": {
      "Type": "Action",
      "ActionUrl": "https://transfer.actions.globus.org/transfer",
      "WaitTime": 900,
      "Parameters": {
        "DATA": [
          {
            "source_path.$": "$.source.path",
            "destination_path.$": "$.destination.path"
          }
        ],
        "source_endpoint.$": "$.source.id",
        "destination_endpoint.$": "$.destination.id"
      },
      "End": true
    }
  }
}
```

RFI Data Movement



- ◇ daily ~ TB data from instruments to compute/archive
- ◇ Globus data management platform (STFC-Cloud)
- ◇ Automated or user-triggered Globus *flows*
- ◇ Metadata capture with SciCat (WIP)

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Generalised Flows



- ◇ Globus: researchers run their own data pipelines

Generalised Flows



argo

- ◇ Globus: researchers run their own data pipelines
- ◇ ArgoCD: Kubernetes workflows and job management

Generalised Flows

```
apiVersion: argoproj.io/v1alpha1
kind: Workflow                                # new type of k8s spec
metadata:
  generateName: hello-world-                # name of the workflow spec
spec:
  entrypoint: hello-world                   # invoke the hello-world template
  templates:
    - name: hello-world                     # name of the template
      container:
        image: busybox
        command: [ echo ]
        args: [ "hello world" ]
        resources: # limit the resources
          limits:
            memory: 32Mi
            cpu: 100m
```

Generalised Flows



argo

- ◇ Globus: researchers run their own data pipelines
- ◇ ArgoCD: Kubernetes workflows and job management
- ◇ Possible extension to researcher workflows—or via Globus compute (‘function as a service’)





- ◇ Special Interest Group under SocRSE
- ◇ STEP-UP: *recognition and skills* for dRTPs
- ◇ Cloud-Native: *infrastructure and tools* for dRTPs

STEP-UP develops dRTPs—Cloud-Native SIG equips them



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Summary



- ◇ Infrastructure agnostic: Self-managed Kubernetes
- ◇ Enabling operators: GitOps, declarative, auditable
- ◇ Enabling researchers: Globus flows and data management

Special Interest Group: cloud-native approaches to DRI



 @pipercycles

Homelab

