

Cloud Resources for PUNCH4NFDI

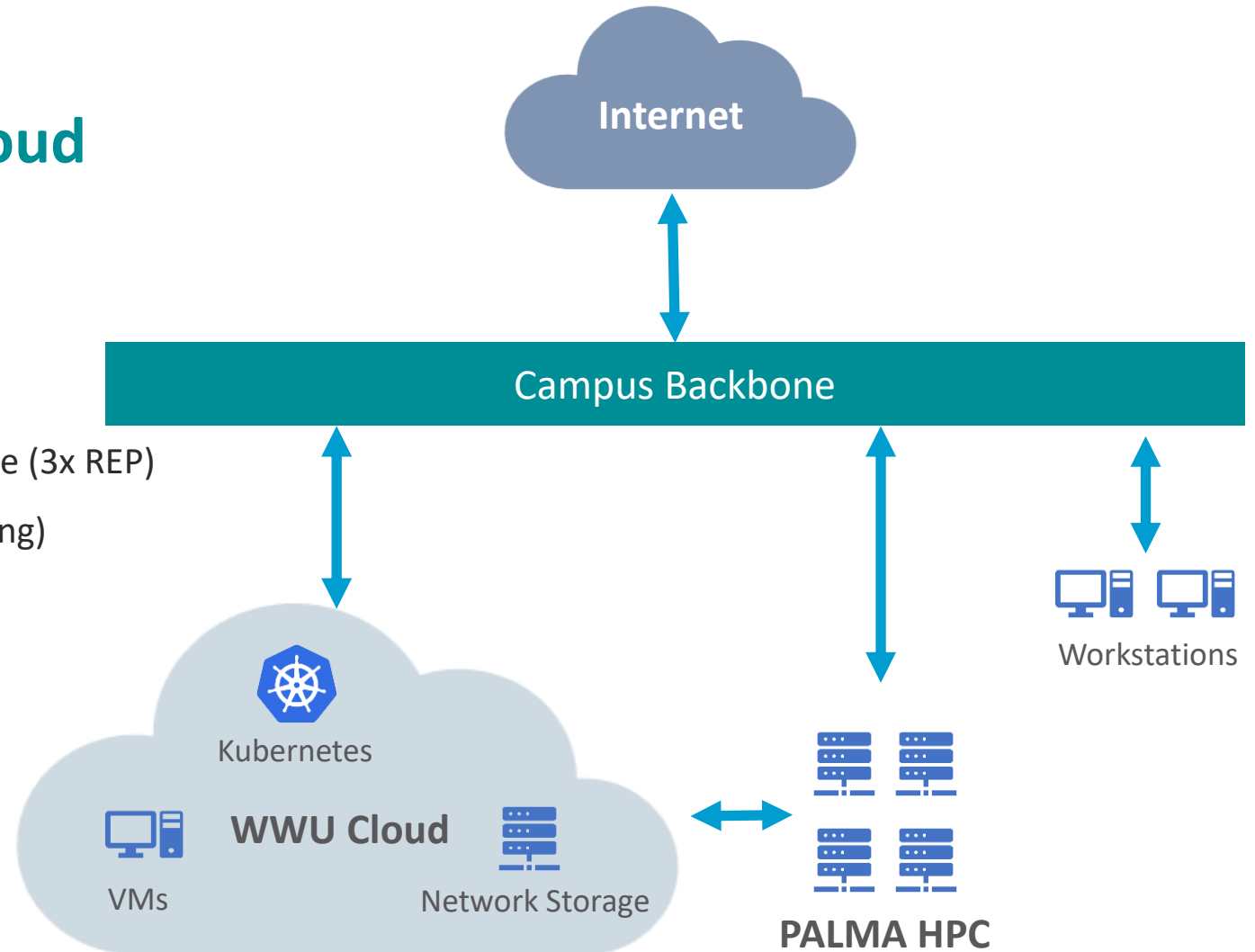
OpenStack and Kubernetes

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WWU Cloud – OpenStack IaaS Cloud

- Cloud for hosting **services and network storage**
- Services can be hosted in VMs or Kubernetes Cluster
- Storage: S3, NFS or CephFS shares (8+3 EC), block storage (3x REP)
- Two regions in two separate datacenters (third in planning)
- Login via DFN AAI: Readily available for PUNCH services
 - Integrated in COMPUTE4PUNCH
 - TODO: STORAGE4PUNCH
- Current hardware (changing frequently):
4k Cores, 78TB RAM
35PB HDD, 5PB NVMe, 100Gbit Network,
2x NV Tesla M10, 16x NV Tesla T4, 16x NV Tesla A40



Kubernetes



- Kubernetes = container orchestration engine and platform for **containerized services**
 - “systemd” for distributed containerized services
- Declarative service description: REST API with JSON (or typically YAML converted to JSON)
- Independent of and cloud provider => Easy migration between providers, simplifies multi-cloud setups
- Huge landscape of **cloud native** applications
 - <https://landscape.cncf.io/>
 - Many already containerized services can be started with no or little modifications in Kubernetes
- Used by **all** big companies
 - <https://landscape.cncf.io/members>



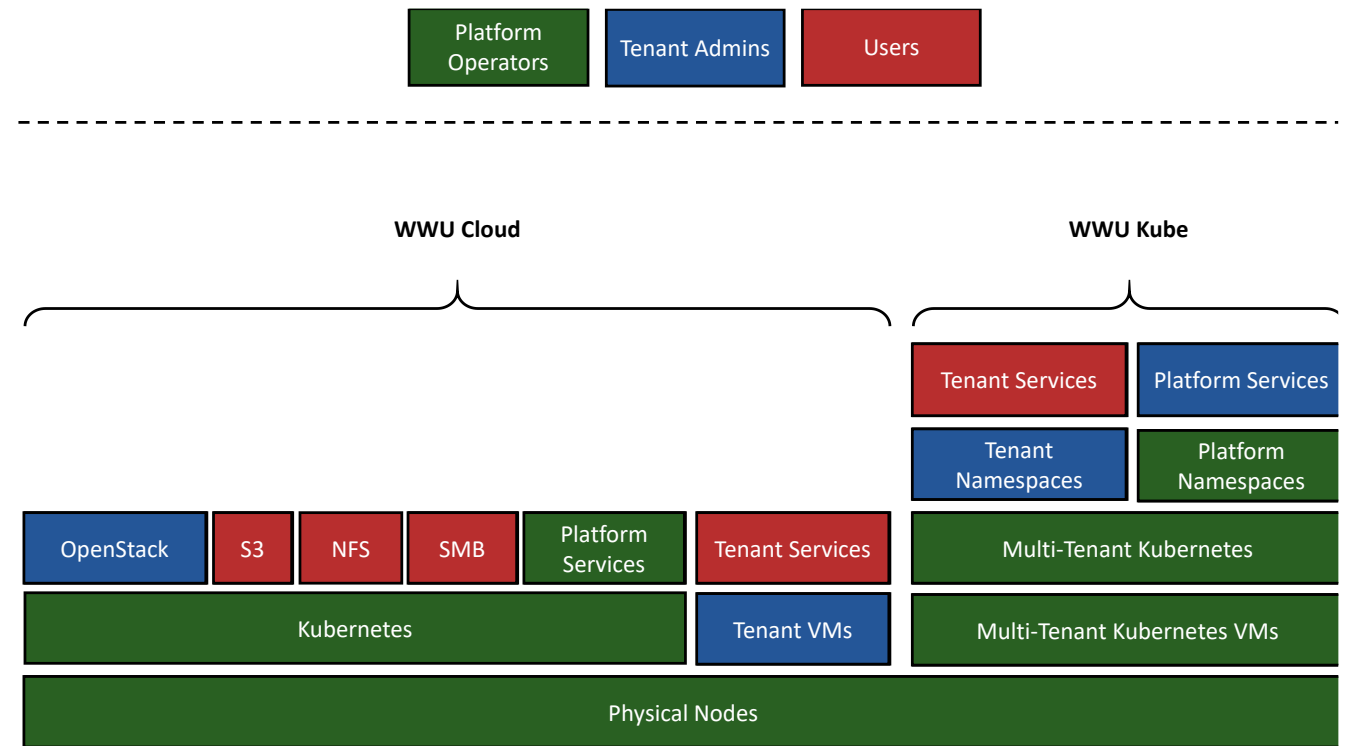
WWU Kube



- Multi tenant kubernetes cluster, running on OpenStack VMs
- DFN AAI for authentication => Readily available for PUNCH services
- Using GitOps and Cluster-API for deployment => Frequent updates
- Automatic scaling of nodes based on workload
- Multi cluster support via Cilium and Istio for increased redundancy of services (currently 2 data centers, expansion planned)
- Monitoring platform included: Grafana, Mimir, Loki, Tempo, Alertmanager
- Strong security and hardening measures in place or in planning (Goal: BSI Standard)

Architecture: WWU Cloud and WWU Kube

- OpenStack/Ceph as base => standardized APIs
- System services deployed on bare metal kubernetes
- Bare metal nodes deployed via Cluster-API (image based)
- Multi tenant kubernetes cluster “WWU Kube” for operating containerized services
- JupyterHub on top of WWU Kube
 - Access for PUNCH in planning
 - Various JupyterHub specific tasks in PUNCH



Thank you for your attention!