



# INTERACTIVE HPC WITH JUPYTERLAB

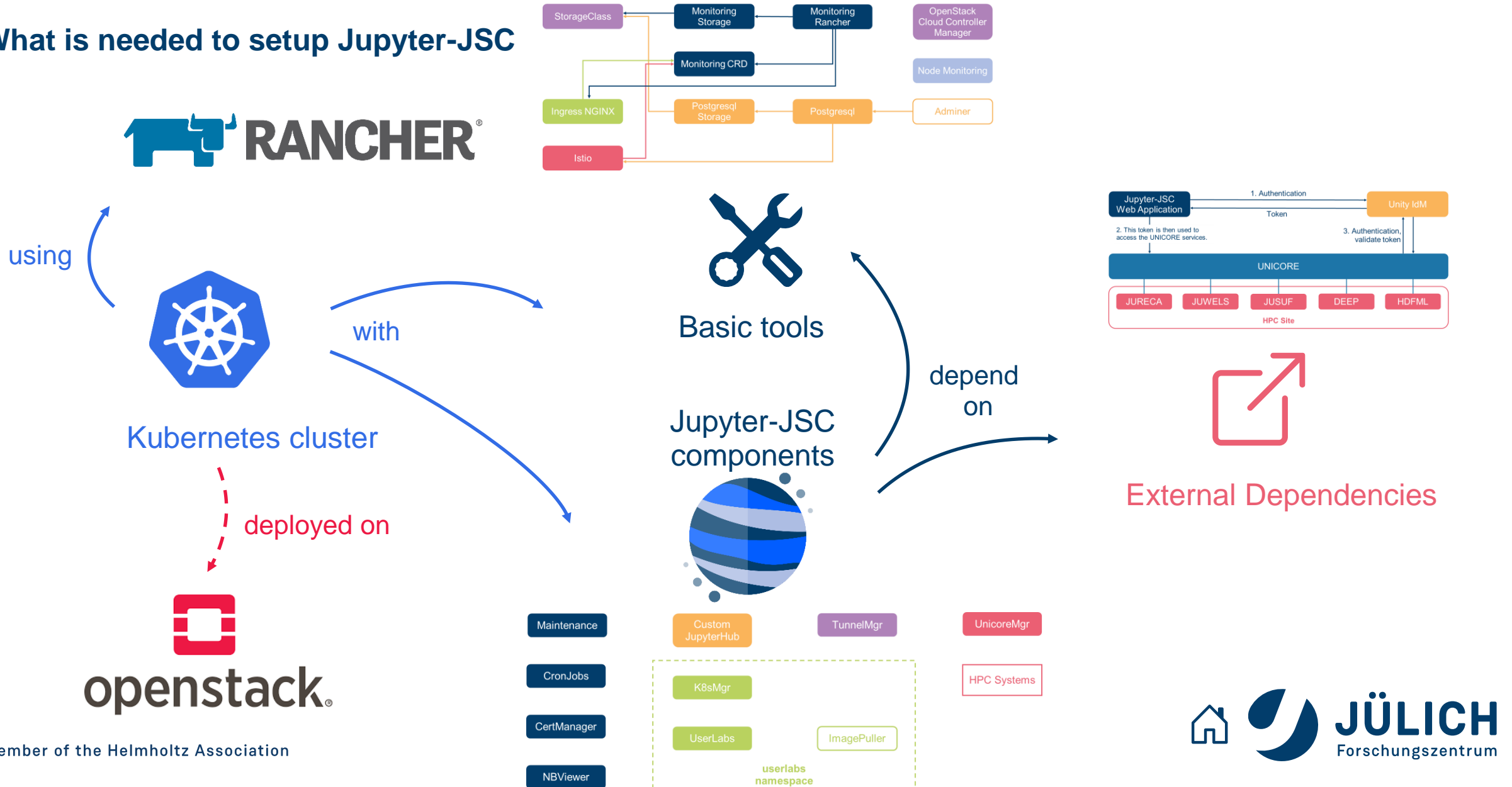
Training Course – Jupyter4hpc – under the hood

2024-04-22..23 | JENS HENRIK GÖBBERT  
HERWIG ZILKEN

(J.GOEBBERT@FZ-JUELICH.DE)  
(H.ZILKEN@FZ-JUELICH.DE)

# OVERVIEW

## What is needed to setup Jupyter-JSC



# CUSTOM JUPYTERHUB COMPONENTS

## Jupyter-JSC JupyterHub

### Authenticator



Authorizes users to use the Hub and single user notebook servers. Saves HPC access related information in the user's auth state. Keeps the Hub's configuration up to date.



### HTML Templates

Custom templates provide complete control over JupyterHub's appearance.



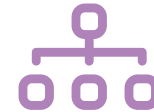
### Endpoints

- Enables 2FA
- Spawn progress updates

### Configuration



Contains information about DRF services, Unity, UNICORE, HPC systems, allowed JupyterLab configurations per user group (VO), etc. Synchronized via git outside of JupyterHub.



### Spawner

Starts each single-user notebook server. Needs to be able to start, poll and stop the servers.



### Patches

Adapt “standard” JupyterHub components to handle customizations.

# JUPYTER-JSC

## Login and Authentication

**JÜLICH** Forschungszentrum | JÜLICH SUPERCOMPUTING CENTRE

Start Links Documentation

**JSC account**

User name

JSC account password

Sign in

**Helmholtz AAI**

Sign in with Helmholtz

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**HELMHOLTZ**  
RESEARCH FOR GRAND CHALLENGES

## Authentication and Authorization via OAuth.

- **JSC account**

Login via unity IdM with Web LDAP user credentials.

- **Helmholtz AAI**

Login via user's home institution credentials.

- **Other identity providers possible**

# JUPYTER-JSC

## JupyterLab Server Configuration

Configuration

Service !

Options !

Resources

Reservation

Kernels and Extensions !

System ! JUWELS

Account ! grosch1

Project ! ccstvs

Partition ! LoginNode

Cancel Start

▼	jusuf	JUSUF	LoginNode	cjsc	i	▶ Start
▼	deep ml-gpu	DEEP	ml-gpu	deepext	i	▶ Start

Jupyter-JSC JUWELS JURECA JUSUF DEEP HDFML HDF-Cloud

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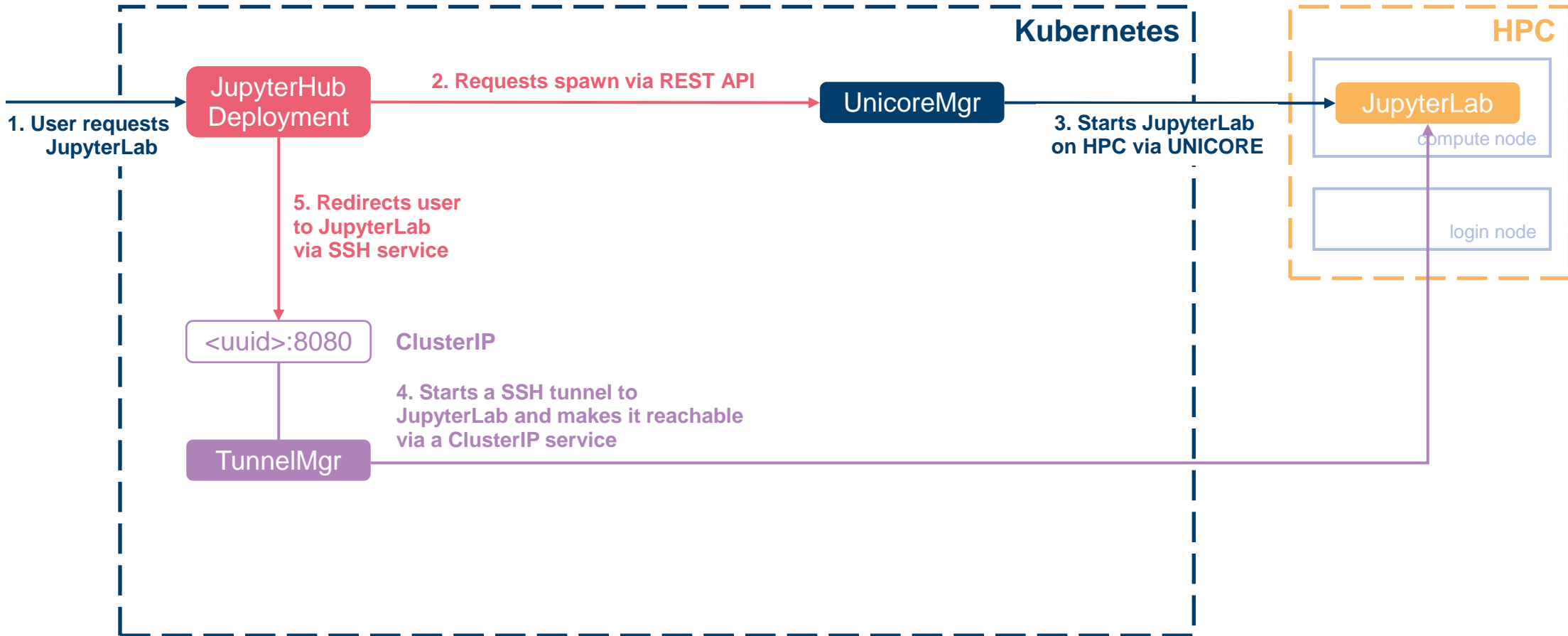
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Users can configure JupyterLab servers before start.

- JupyterLab service **version**
- **System** and **partition**
- **Account** and **project**
- **Compute resources** and **reservation** if available
- **Software** which should be loaded

# STARTING A JUPYTERLAB – HIGH LEVEL VIEW HPC

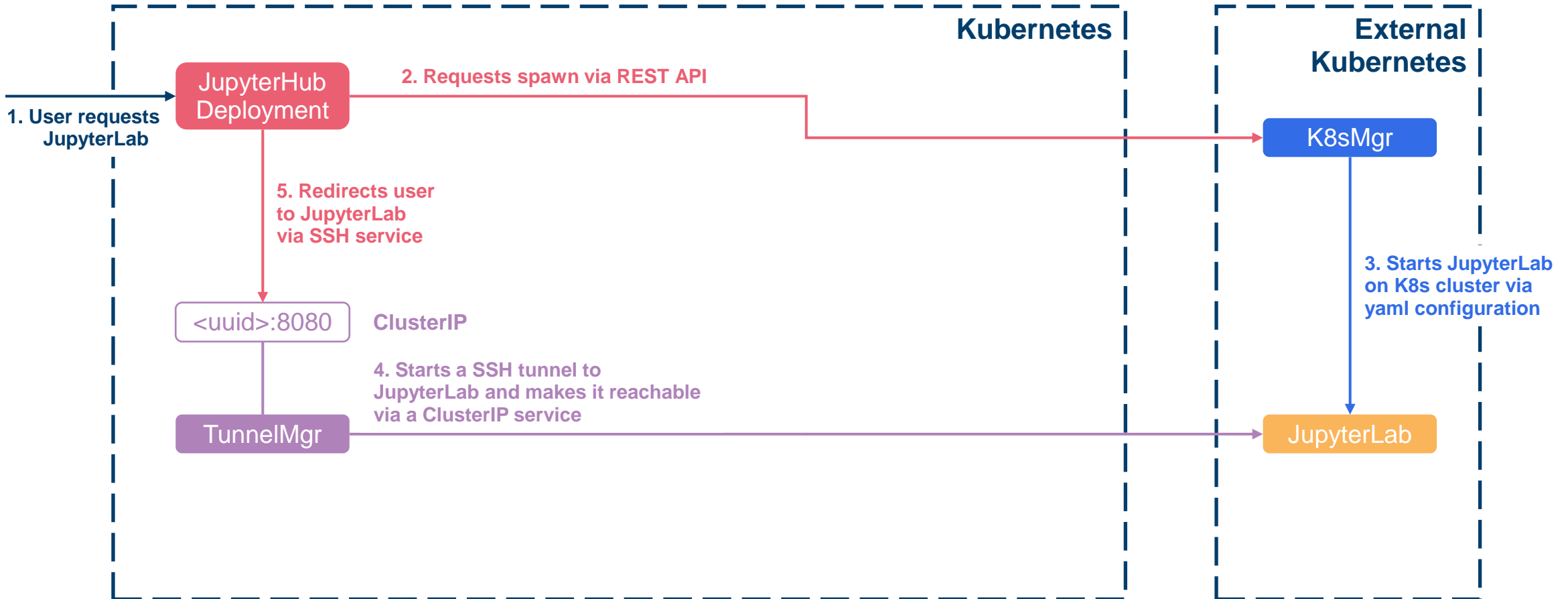
## Jupyter-JSC





# STARTING A JUPYTERLAB – HIGH LEVEL VIEW K8S

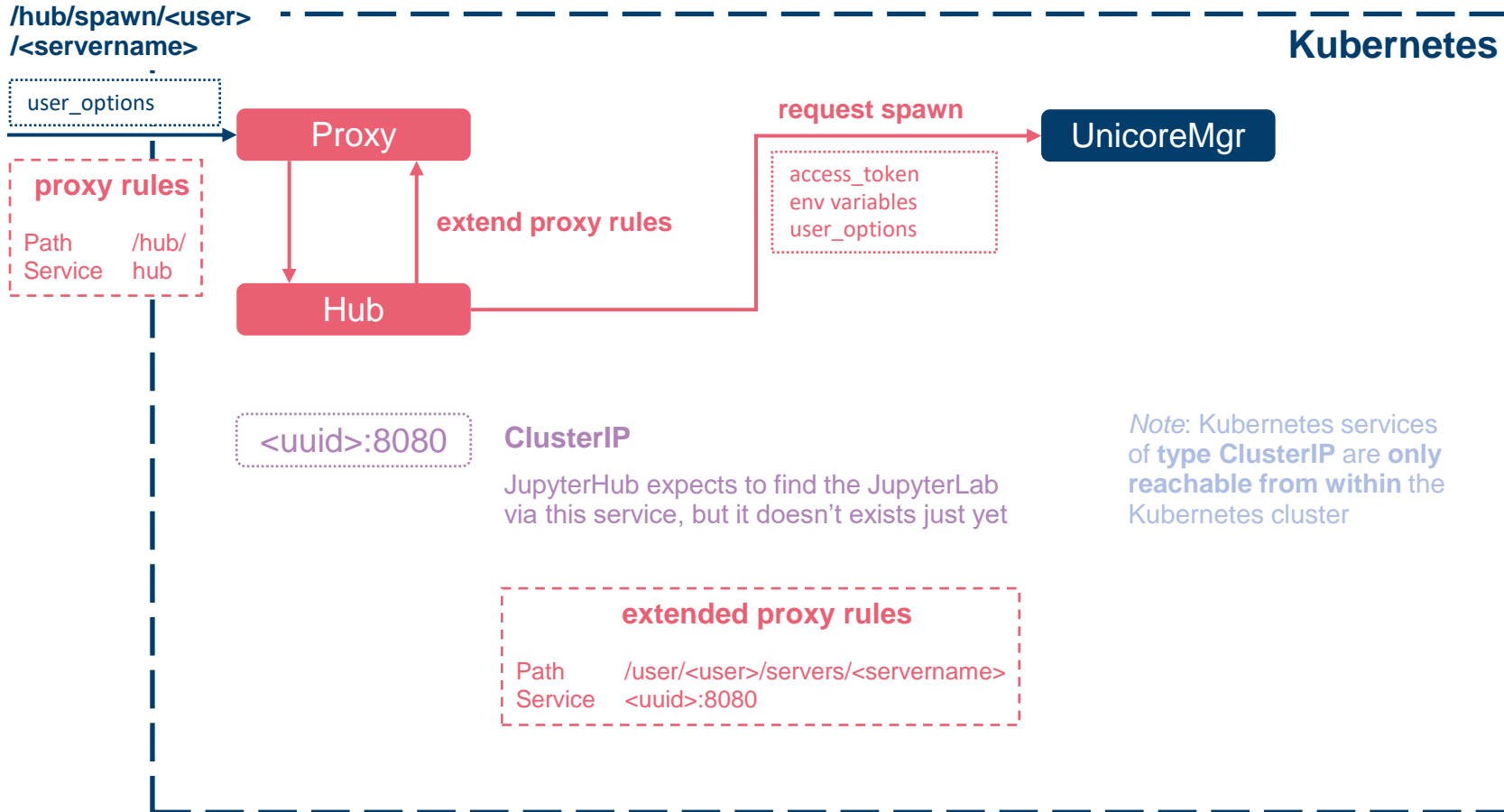
## Jupyter-JSC



# STARTING A JUPYTERLAB (HPC)

Jupyter-JSC - /hub/spawn/<user>/<servername>

—— POST request  
- - - - other communication

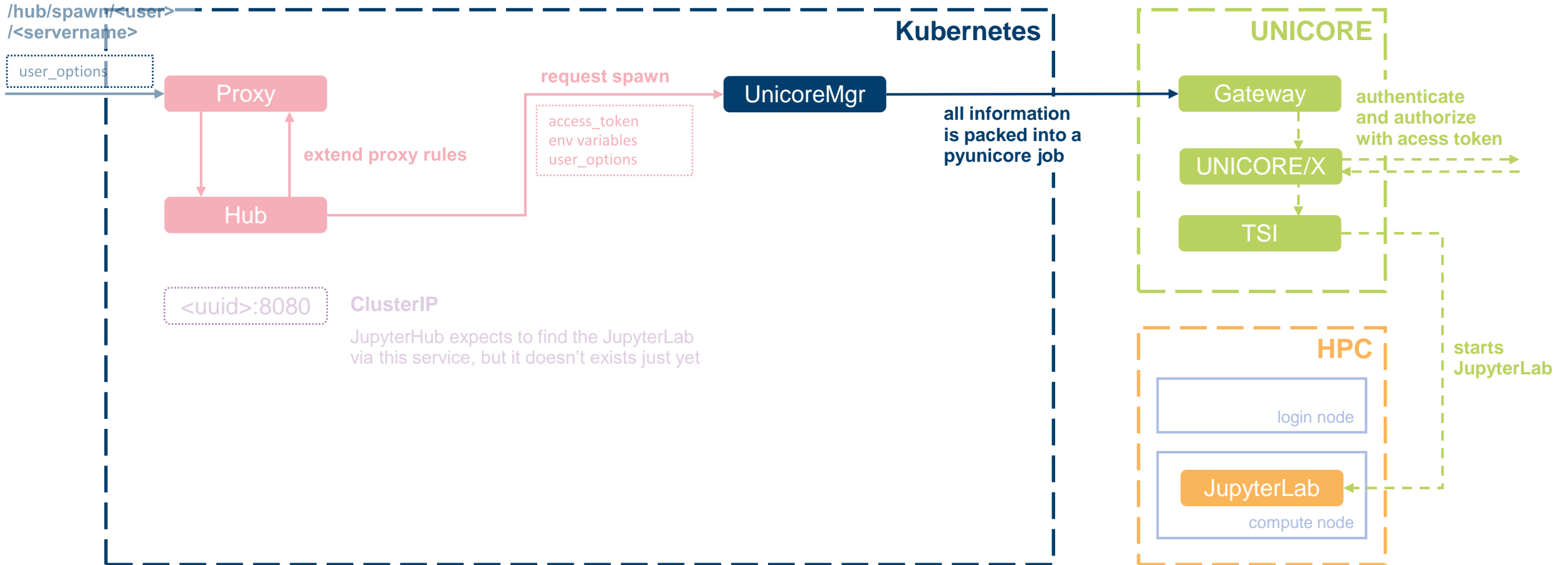




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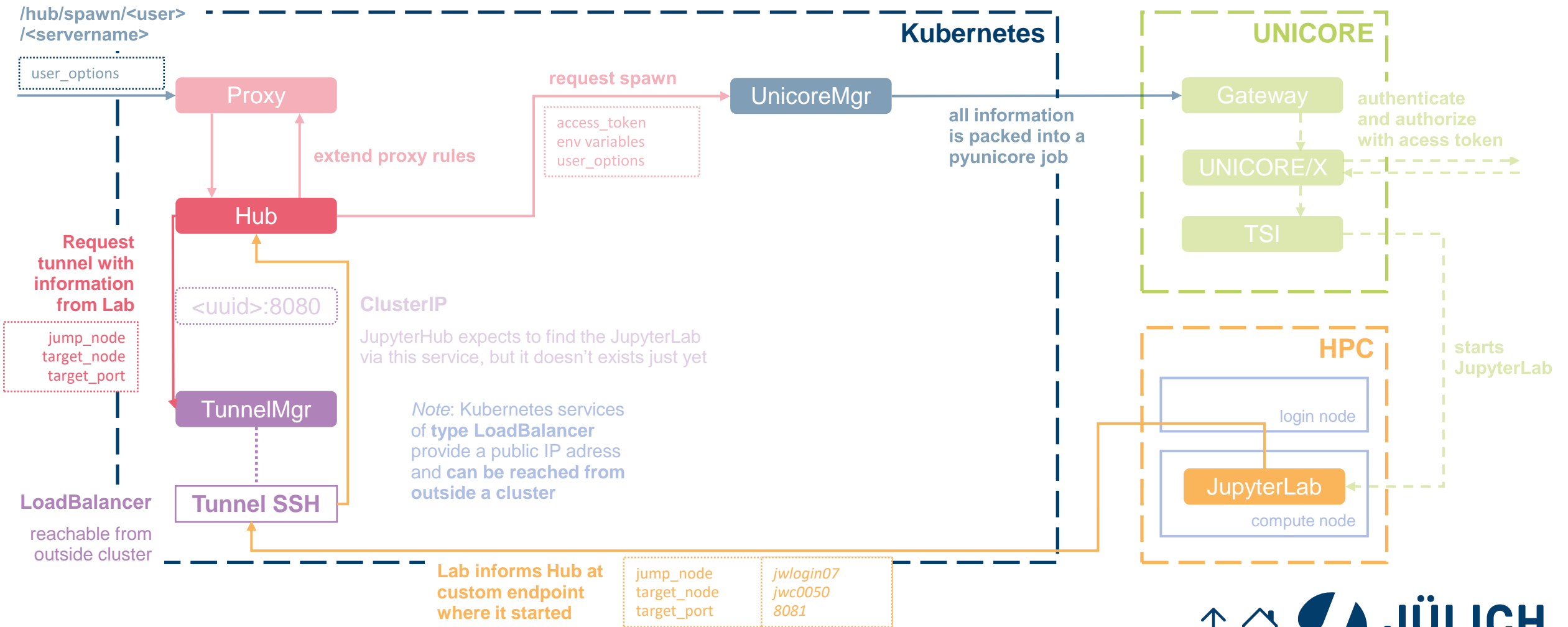
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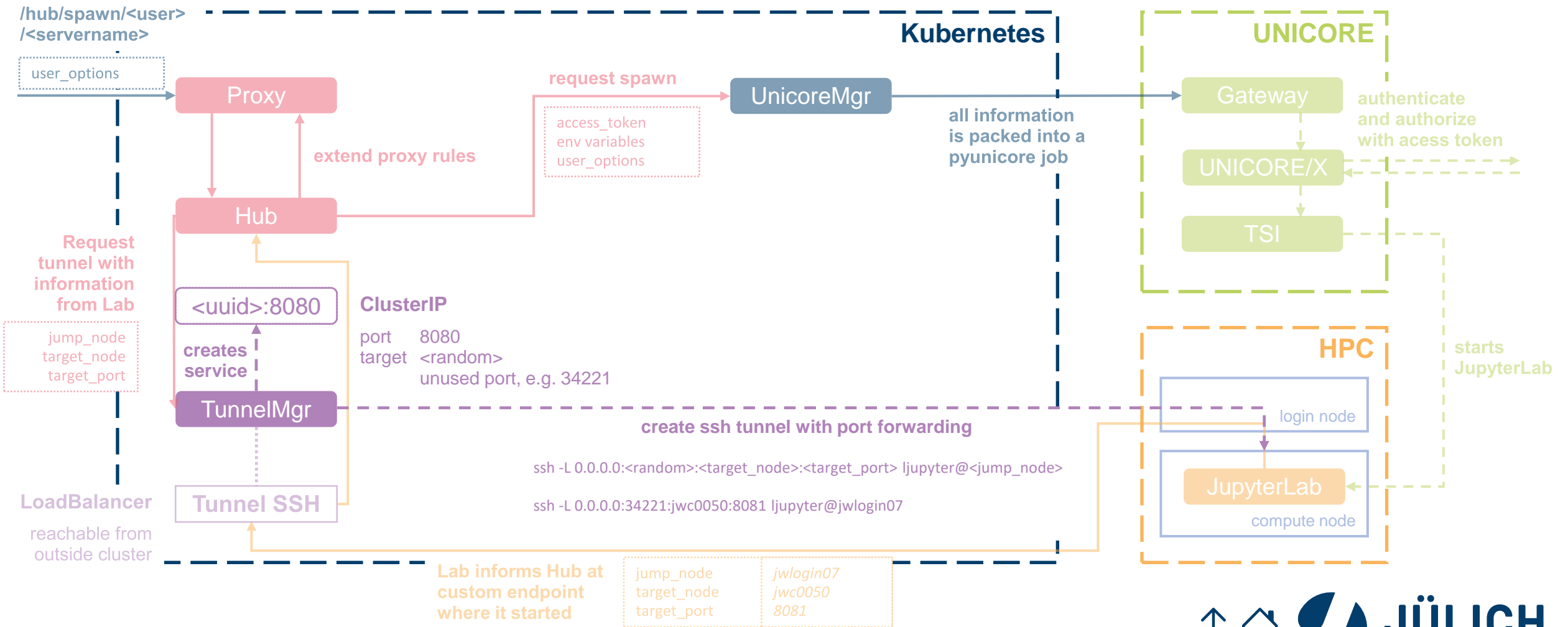
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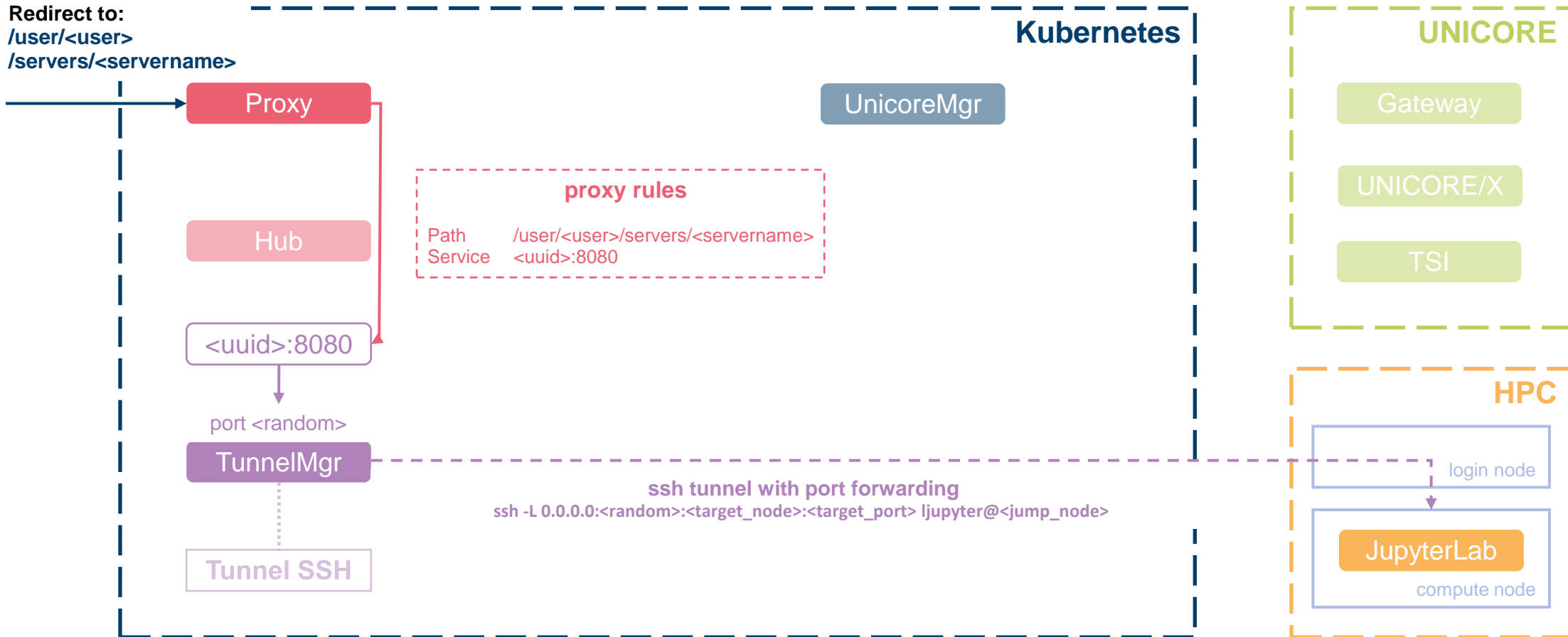
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# STARTING A JUPYTERLAB (HPC)

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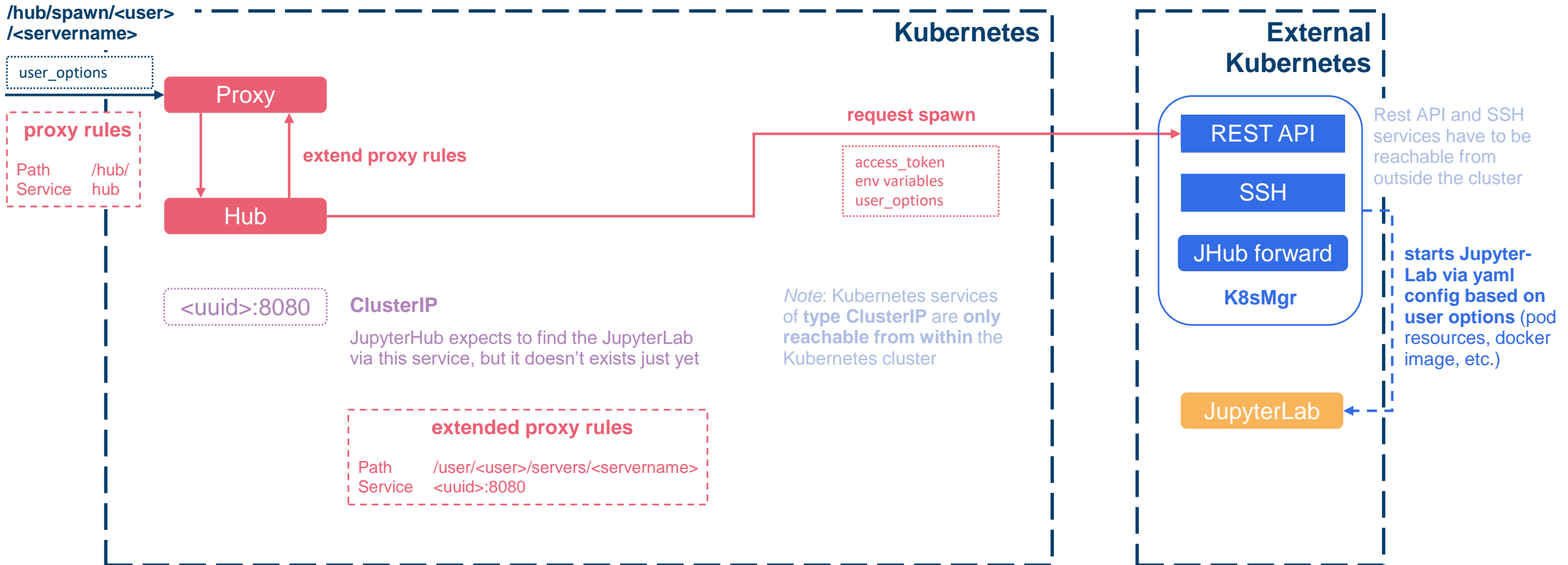
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---- other communication



# STARTING A JUPYTERLAB (KUBERNETES)

—— POST request  
---- other communication

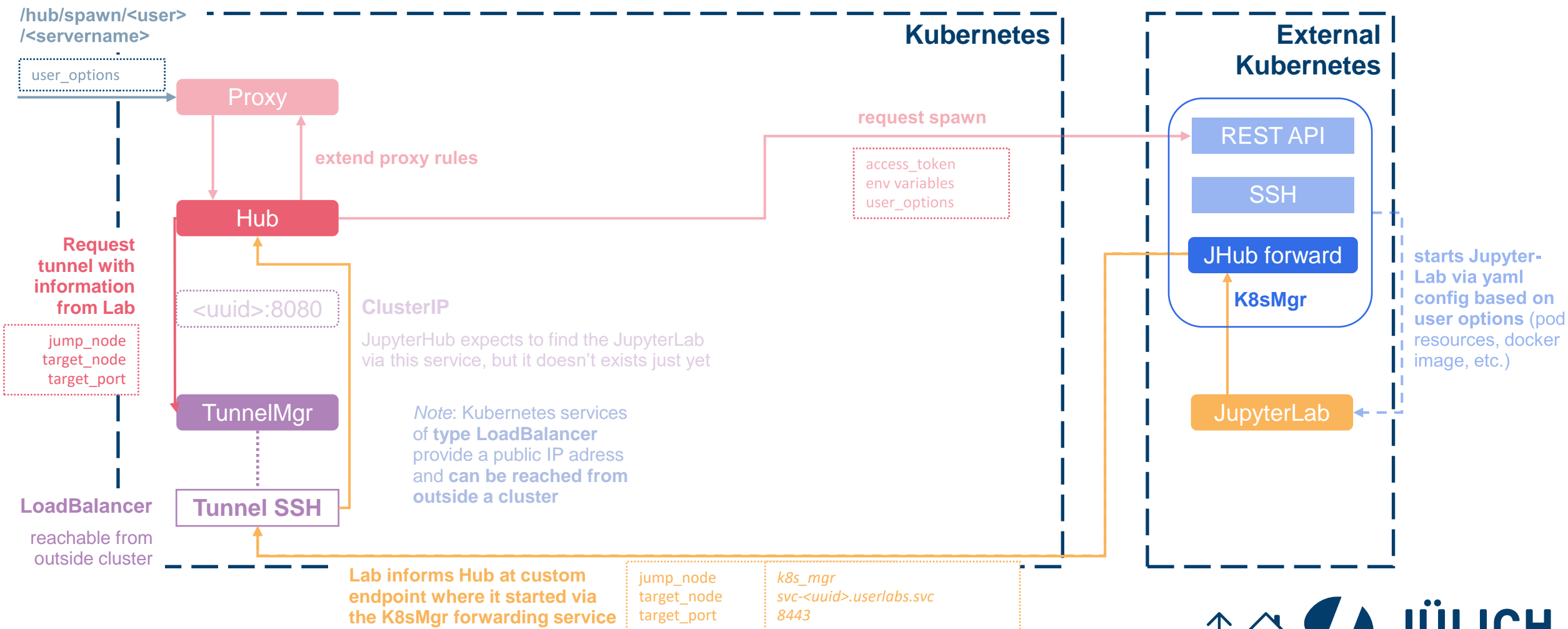
Jupyter-JSC - /hub/**spawn**/**<user>**/**<servername>**



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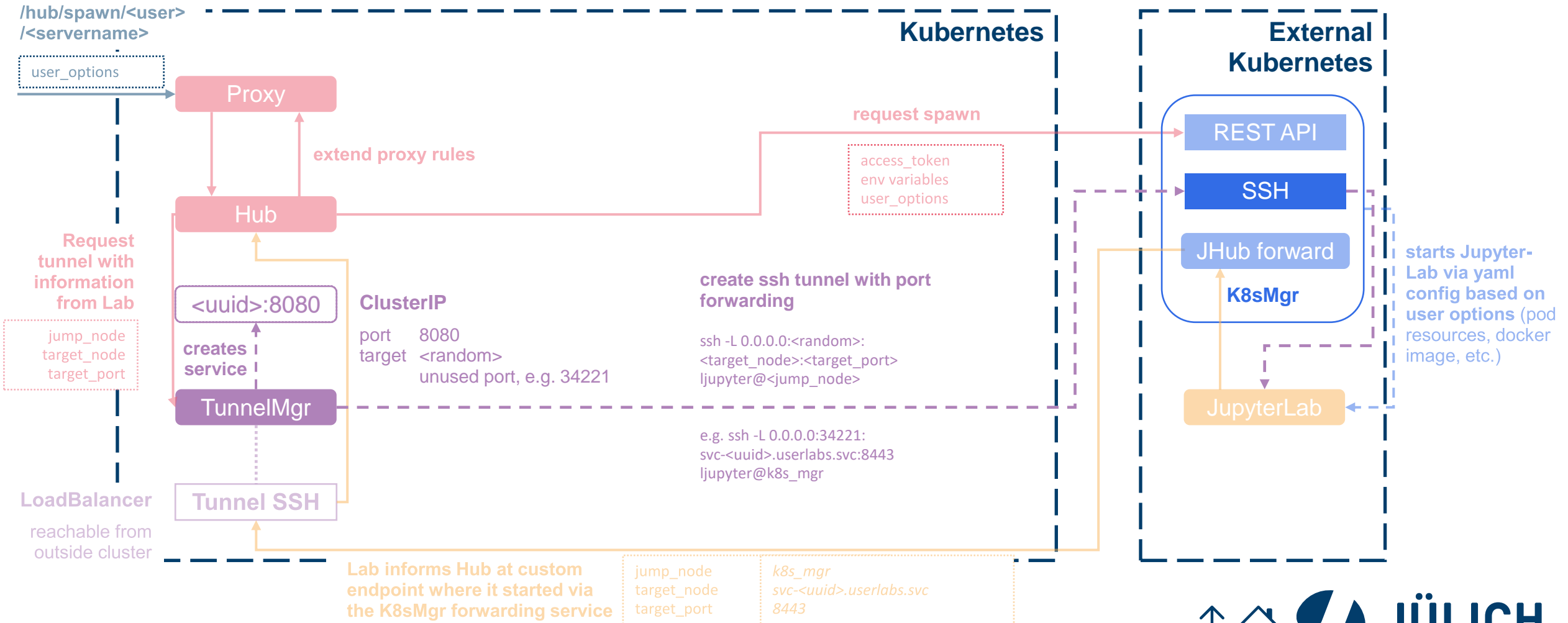
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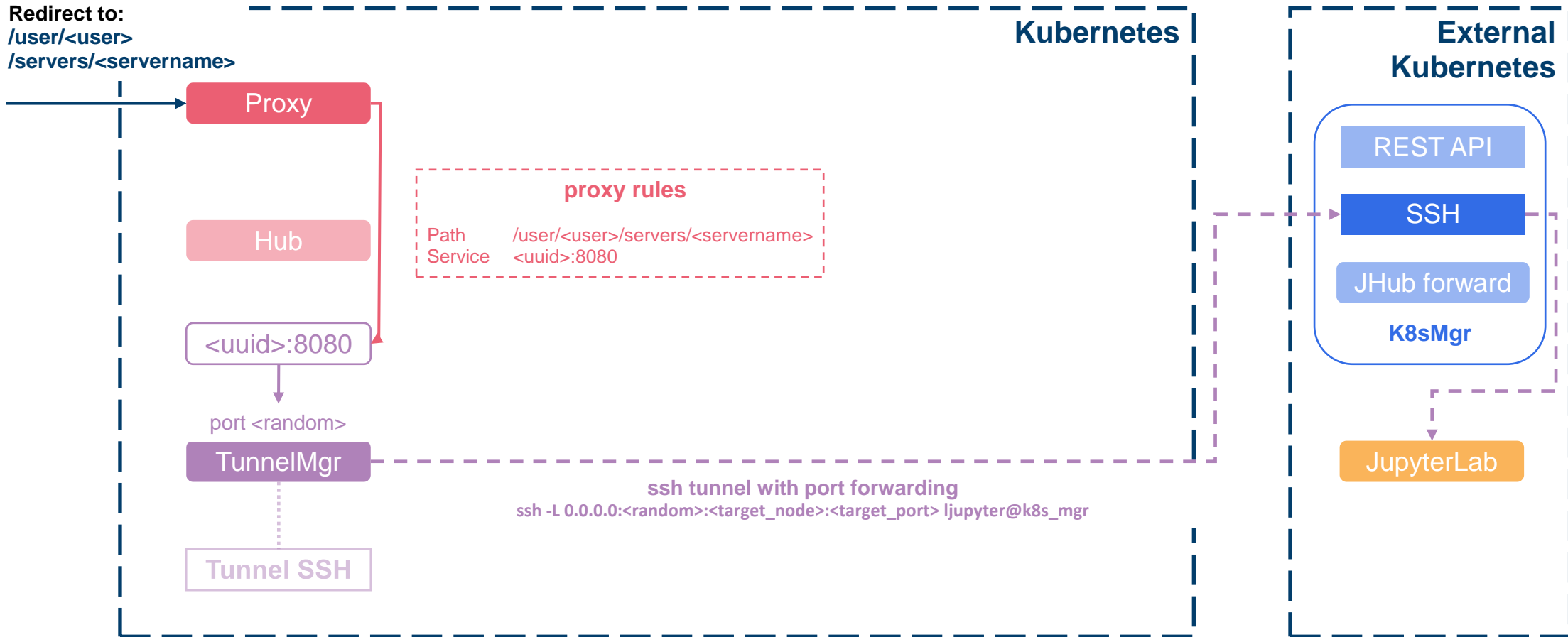




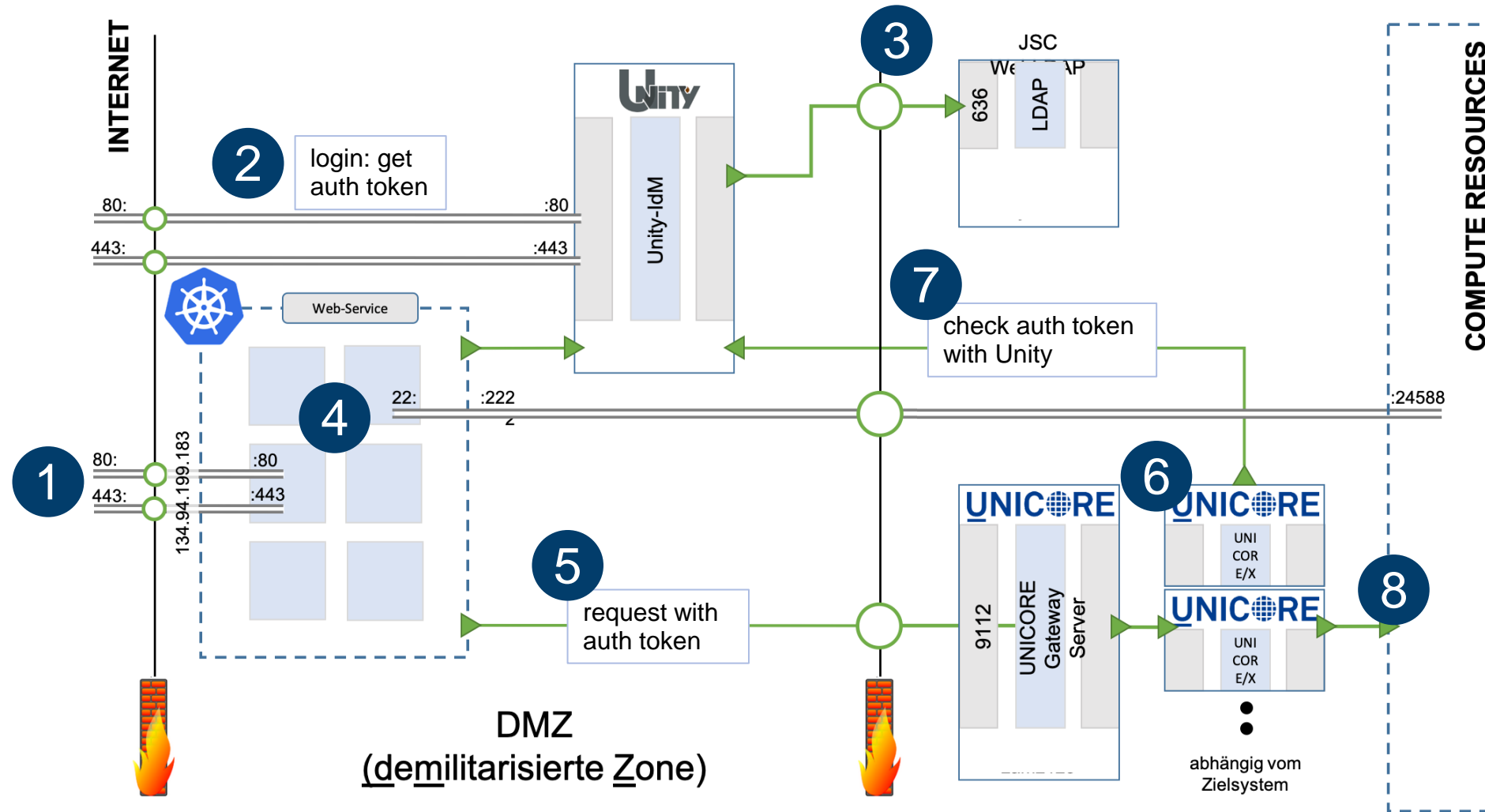
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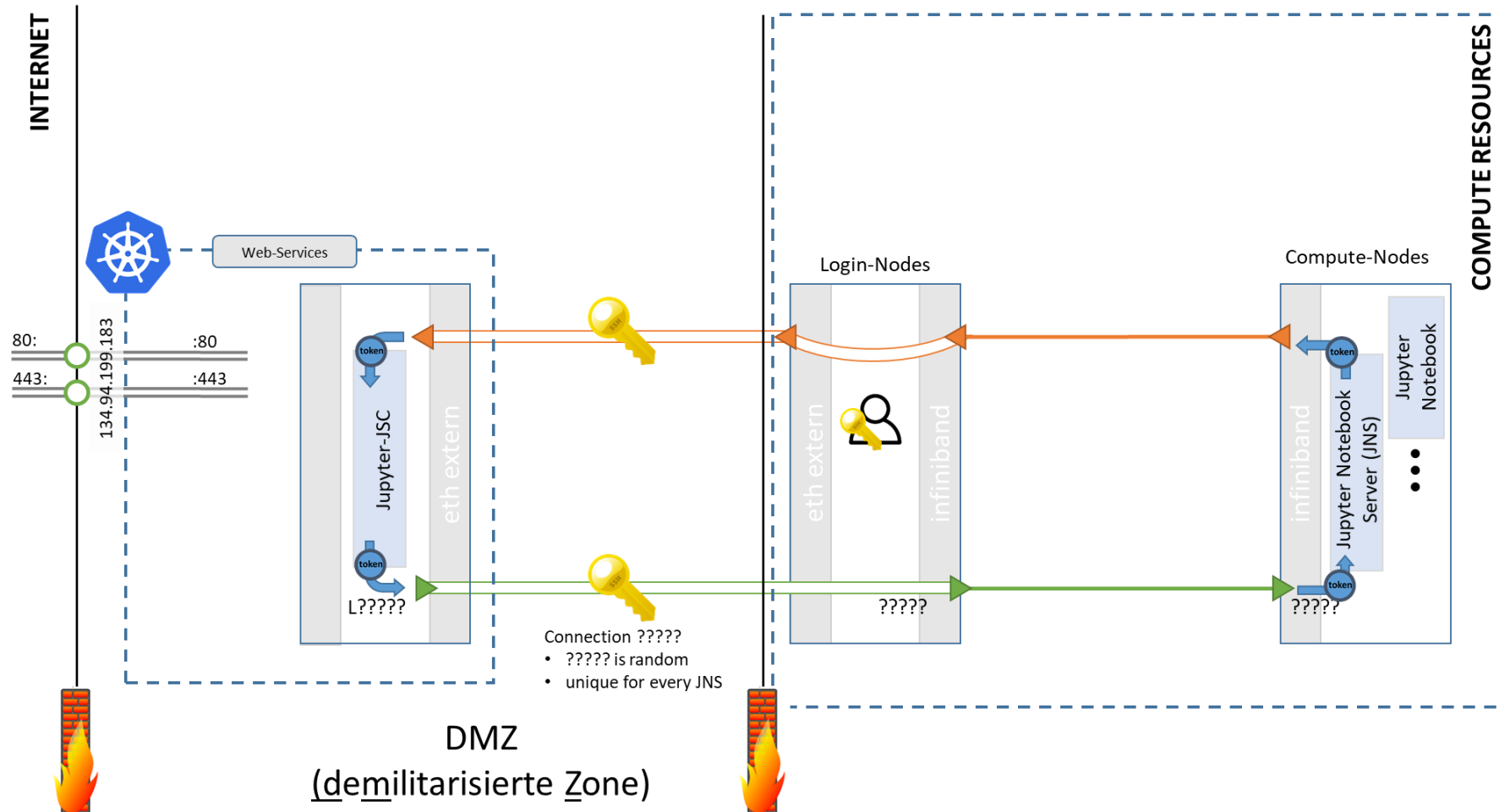
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# JUPYTER-JSC ARCHITECTURE – SECURITY



# JUPYTER-JSC ARCHITECTURE – SECURITY



# JUPYTER HUB WEBSERVICE

On the example of <https://jupyter-jsc.fz-juelich.de>

- Kubernetes Cluster for high availability
- Application & Maintenance as Helm Chart
- Advanced Administration with Ranger
- Better User-Support with enhanced Logging
- Admin dashboard for best system overview

