# Secure Cloud-Native Infrastructure for AI-Based Tumor Tissue Analysis: A Collaborative Approach


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# Outline

## Context

- Scientific purpose: MCVAL use case
- Scientific collaboration

## Infrastructure and architecture

- Secure cloud
- Kubernetes cluster
- NFS Storage
- Authentication and logging
- Automation

## Software involved

- Data elaboration and visualization
- Authentication

## Conclusion

- Summary, issues and future prospects

# Context

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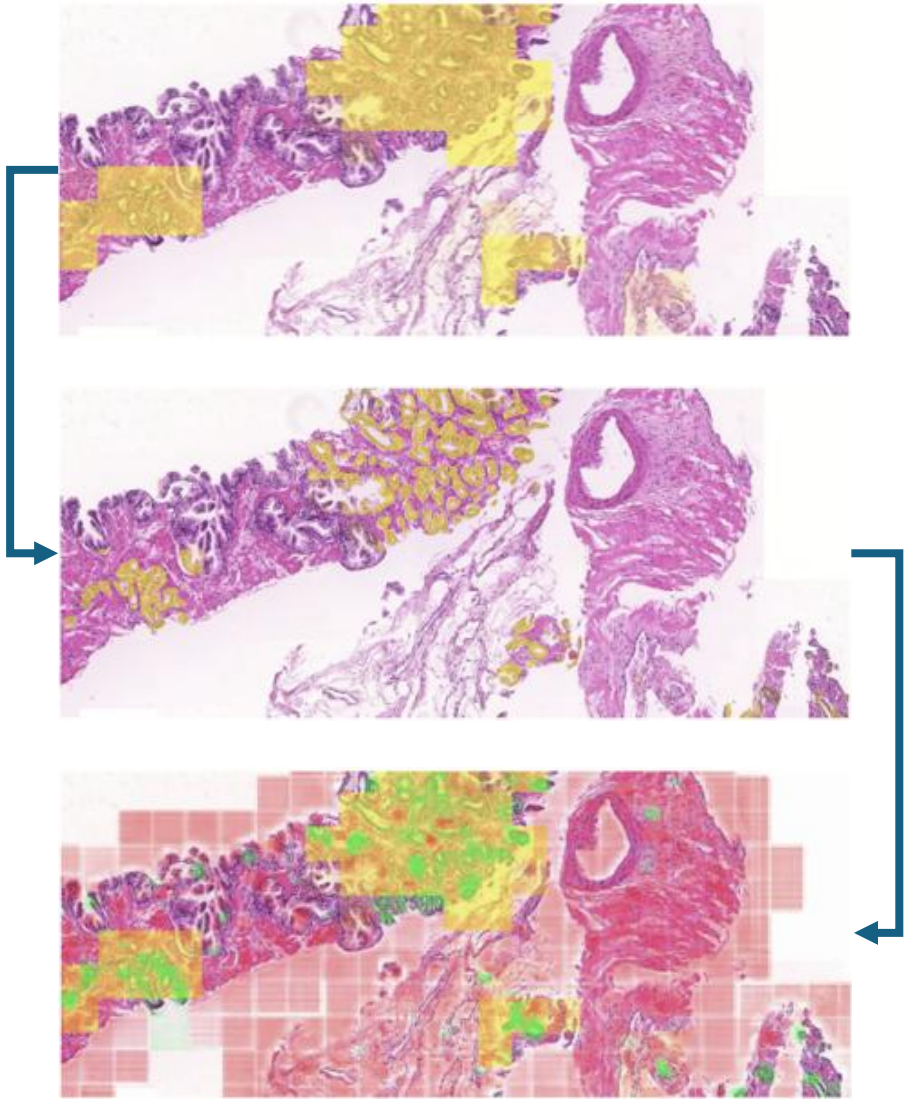
# Scientific purpose: MCVAL use case

**Problem**

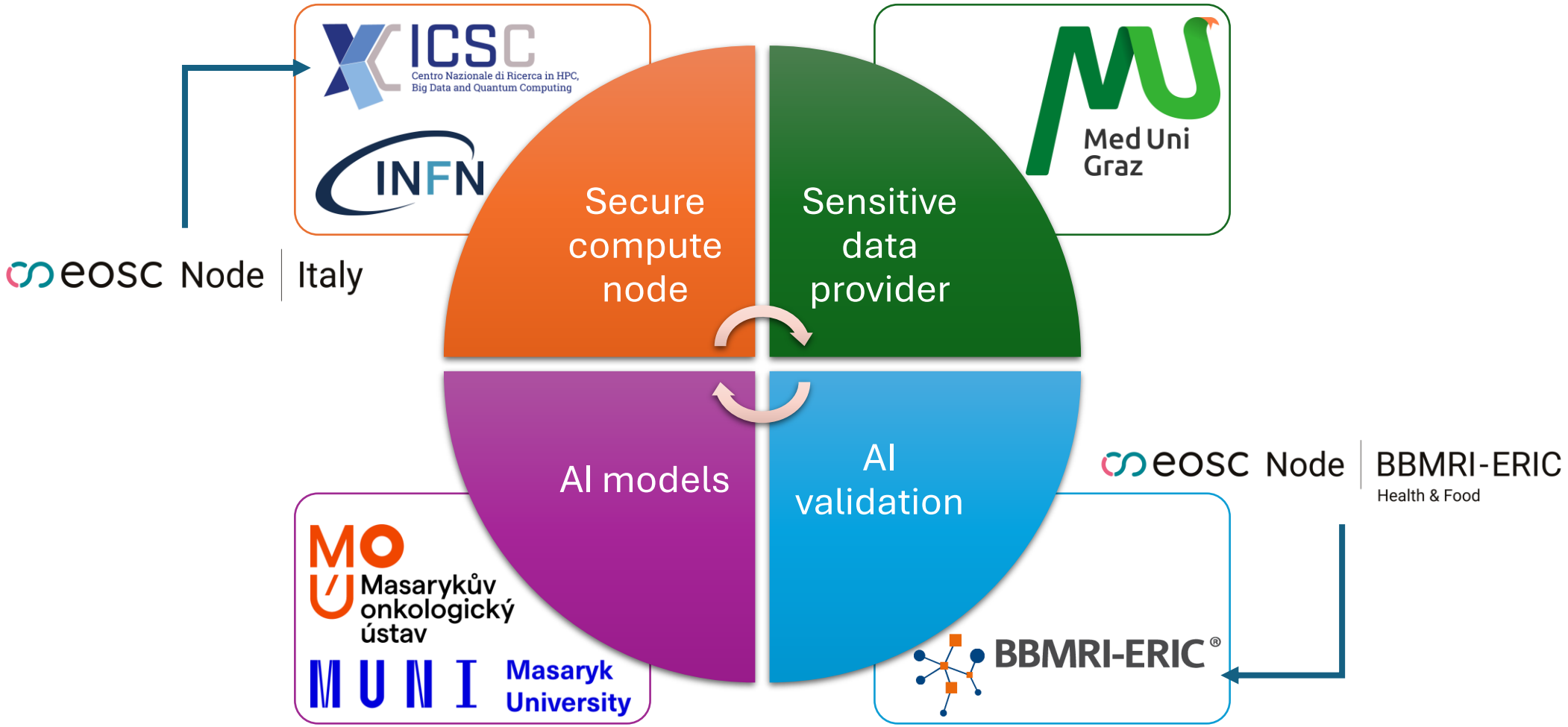
- AI models are often trained using data from a single healthcare institution, so they are not easily transferable
- Define Legal and Ethical frameworks

**Purpose**

- Develop a tool for validating AI models used in prostate cancer screening (**M**ulti-**C**entric **VAL**idation)



# Scientific collaboration



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# Infrastructure and architecture

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# Secure Cloud

## Cloud

- Vertical and orizontal scaling
- Backups and volumes management
- Network segregation
- VM migration

## EPIC

- ISO certifications
- Access granted only to authorized personnel
- System administrator certification
- VPN and 2FA
- Reliable software

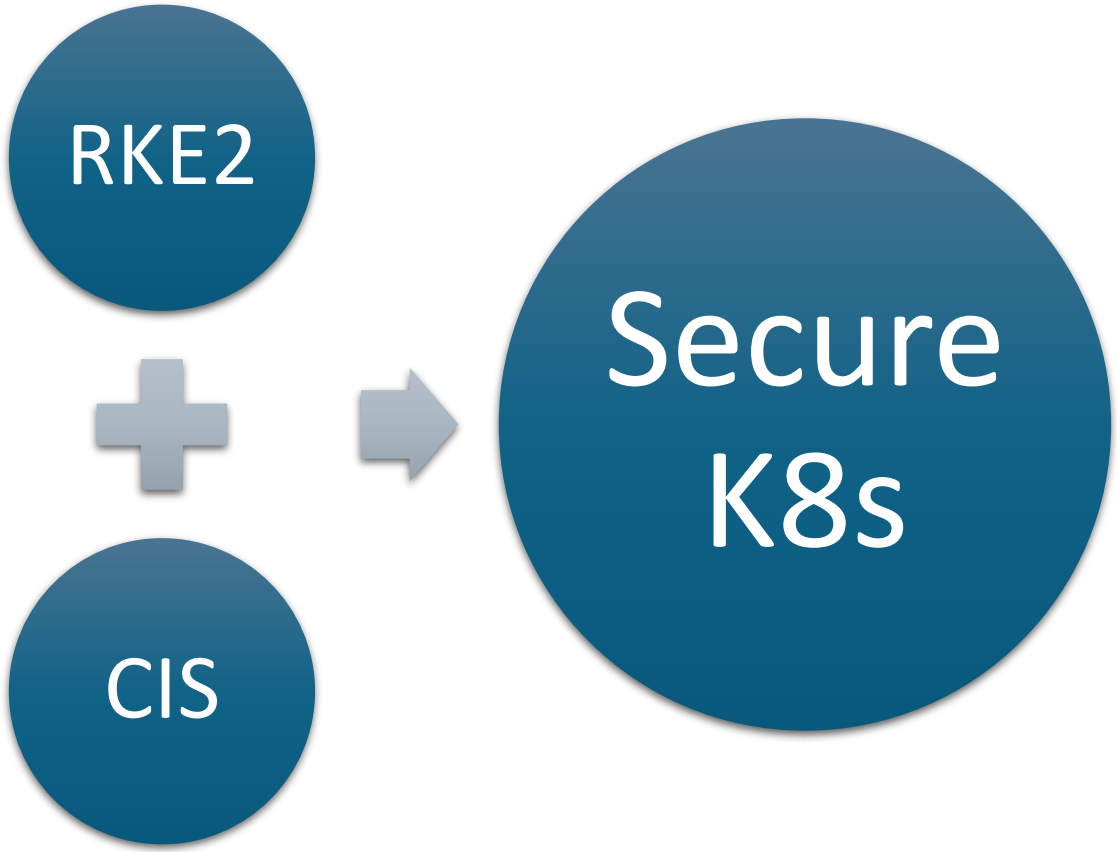
# Kubernetes cluster

## RKE2

- Enterprise-ready Kubernetes distribution
- Large community (sponsored by SUSE)
- CIS benchmark

## CIS

- Recommended secure configurations
- Disabling of risky features
- Several best practices



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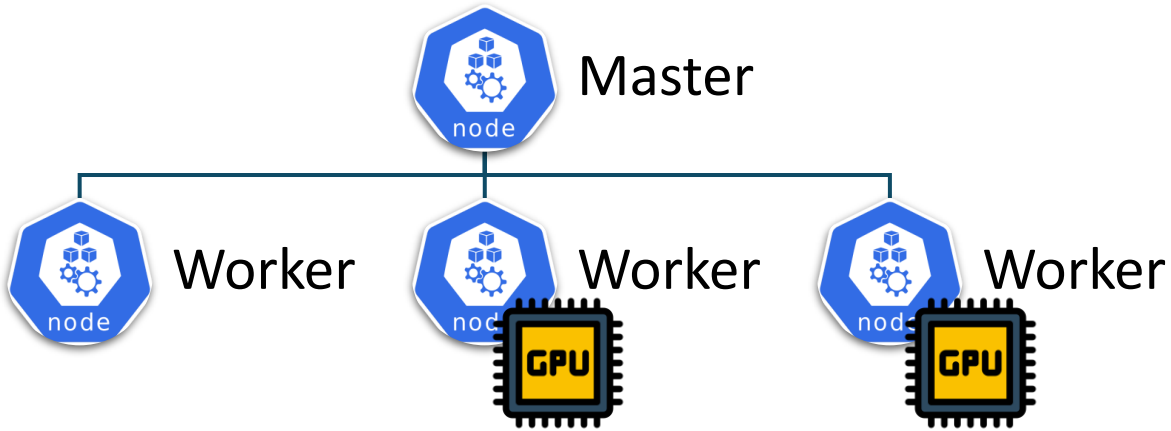




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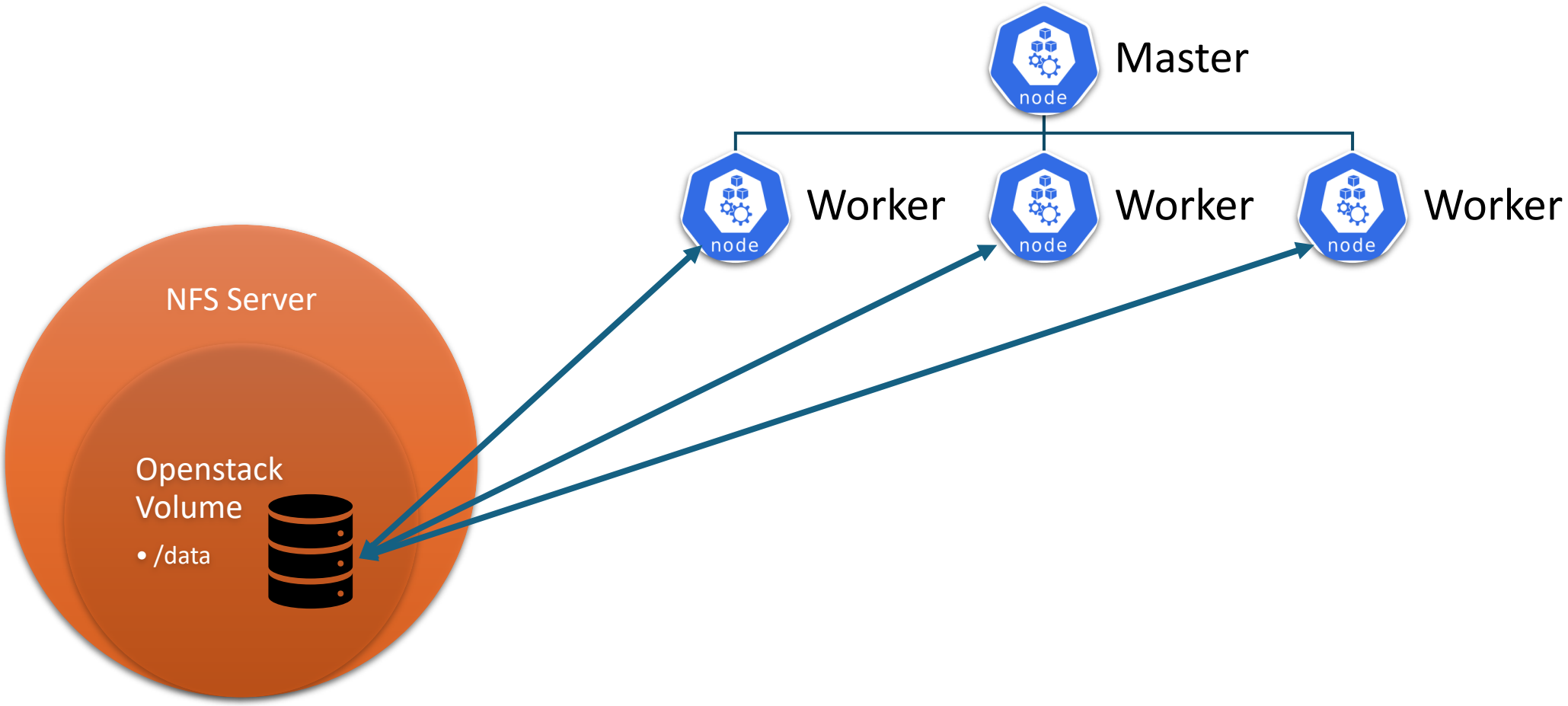
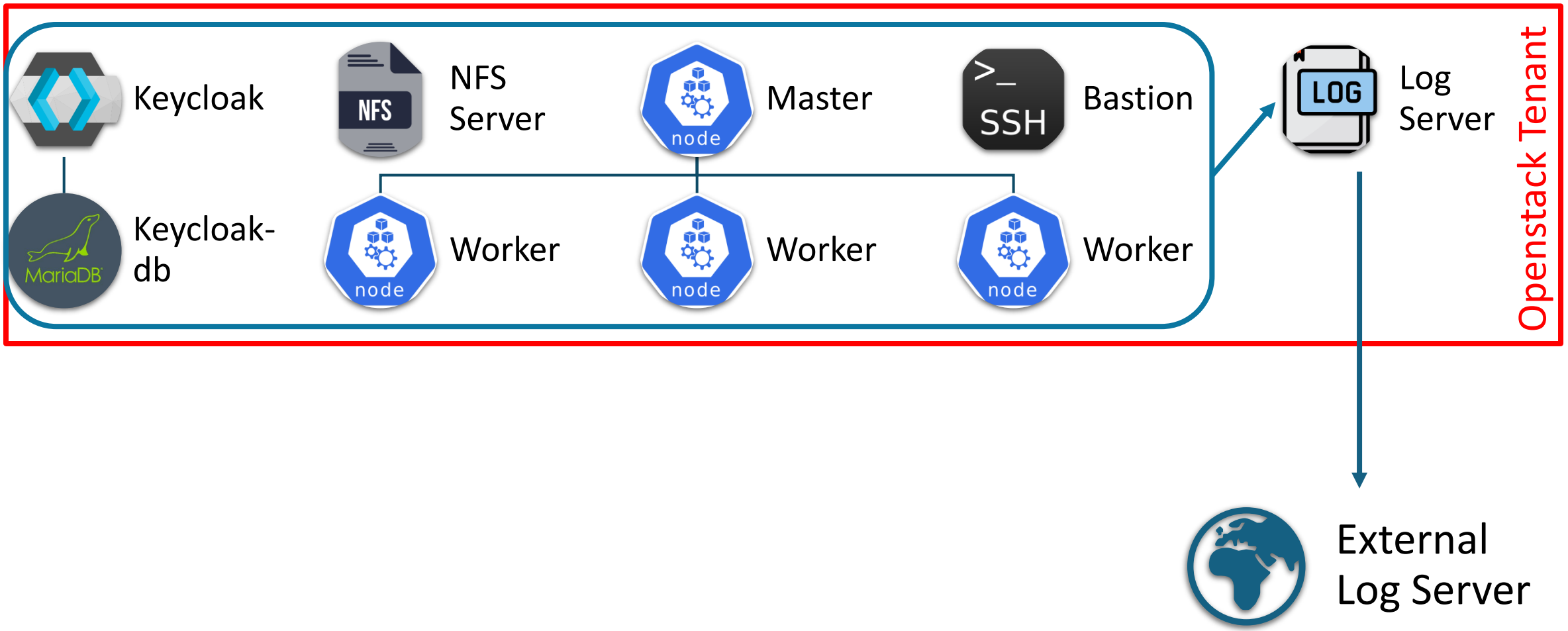
# NFS Storage



# Authentication and logging



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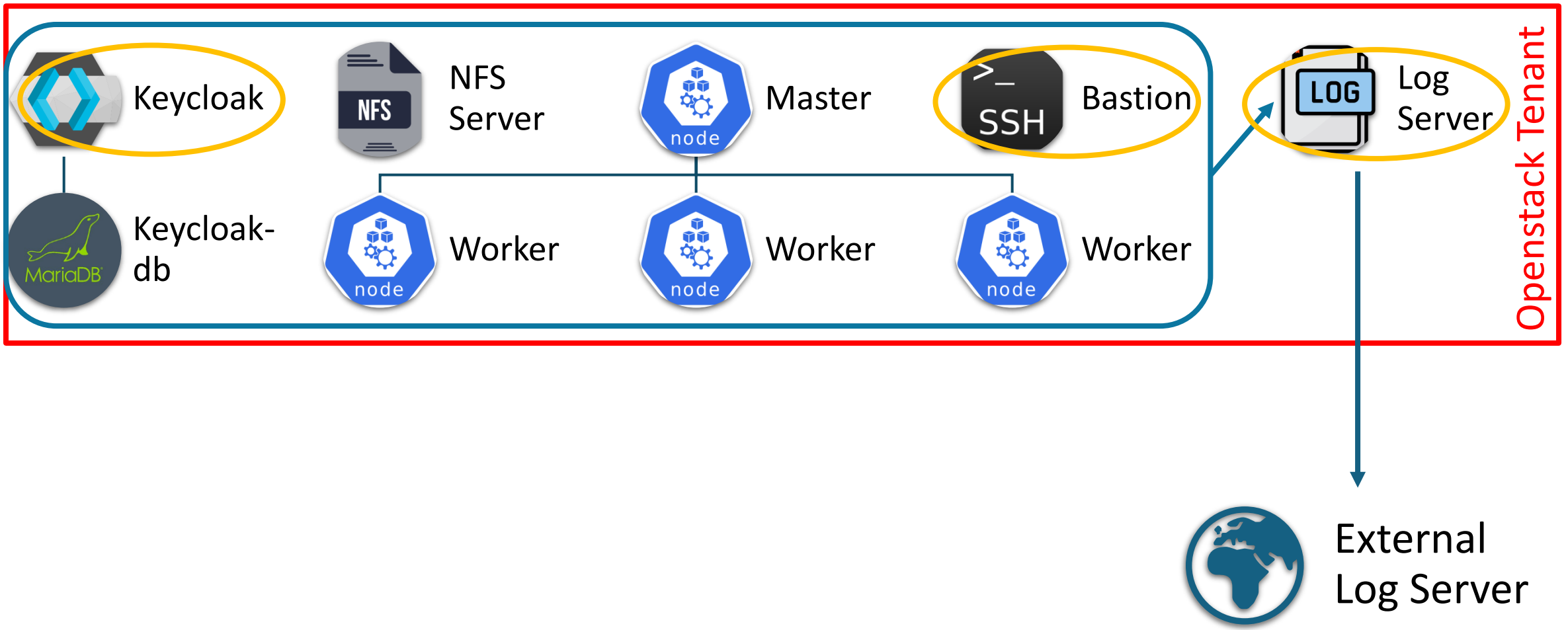
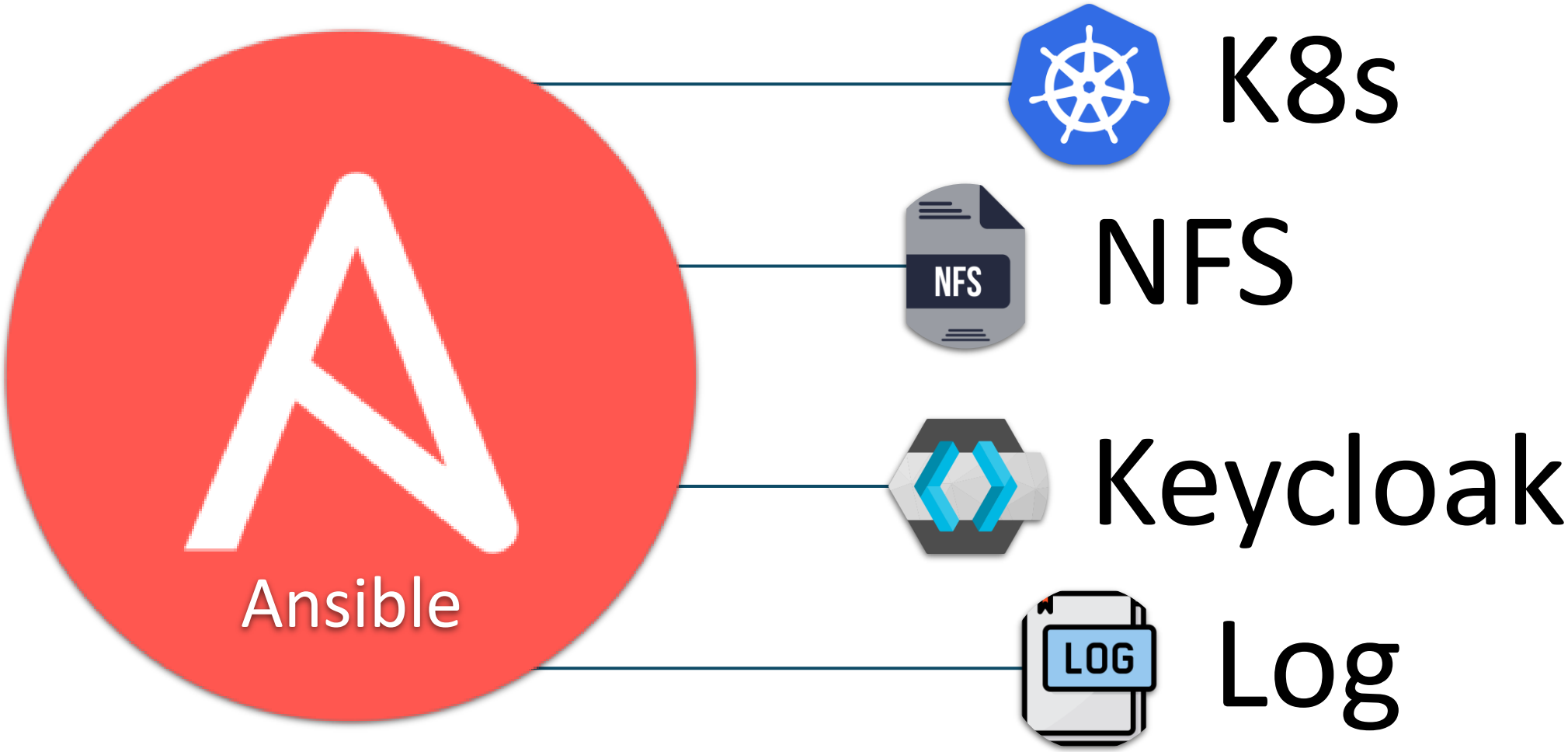


# Automation



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# Software involved

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# Data elaboration and visualization

Jupyter

MLflow

Viewer



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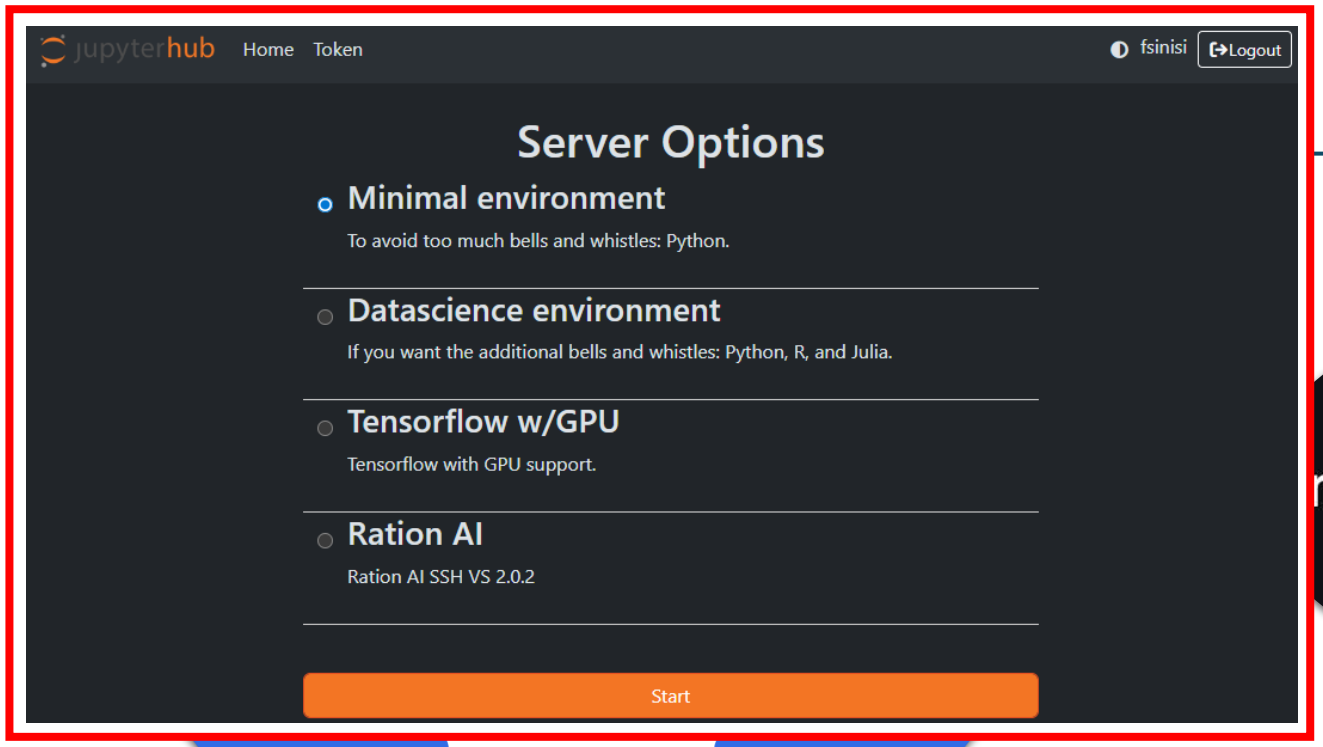


jupyter Jupyter

mlflow MLflow

Viewer



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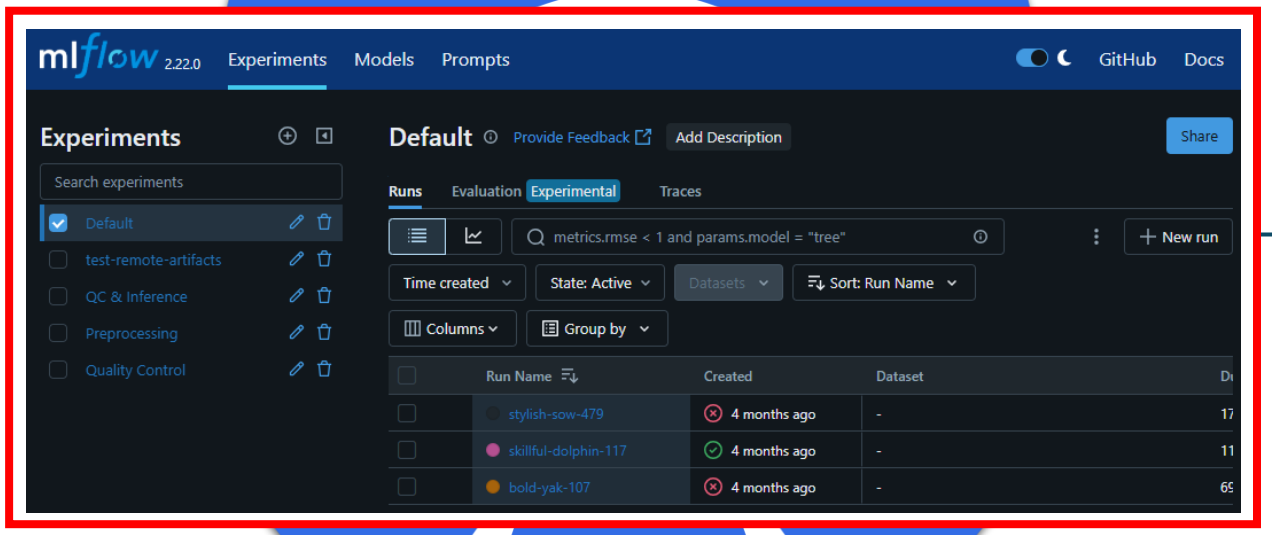


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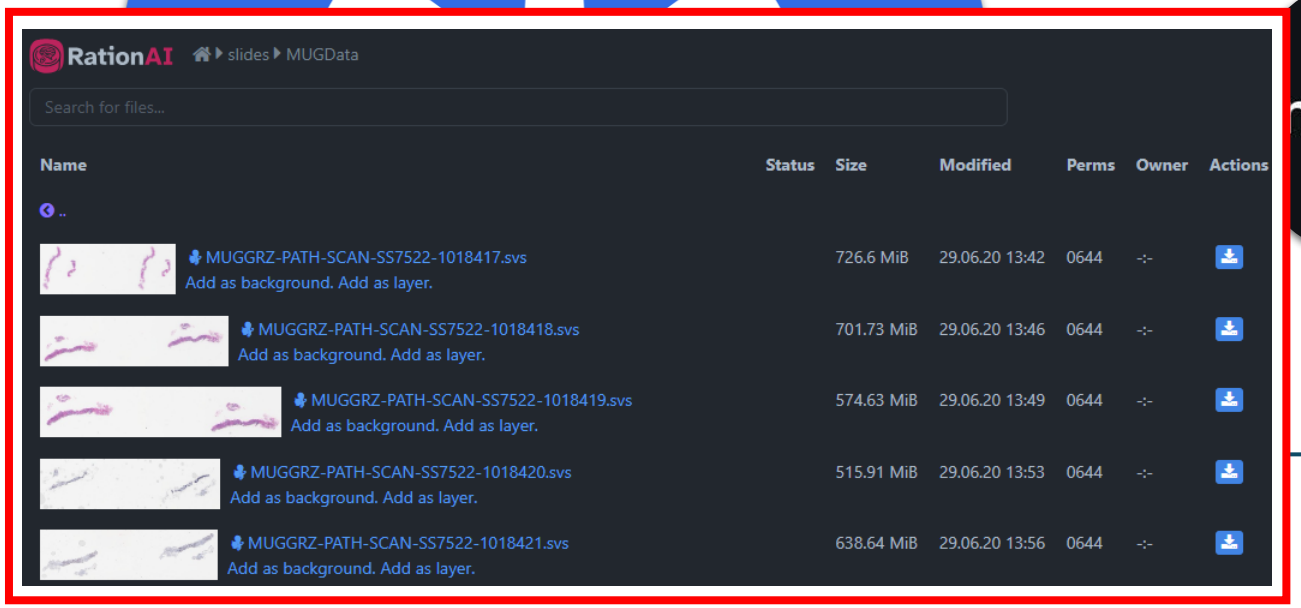




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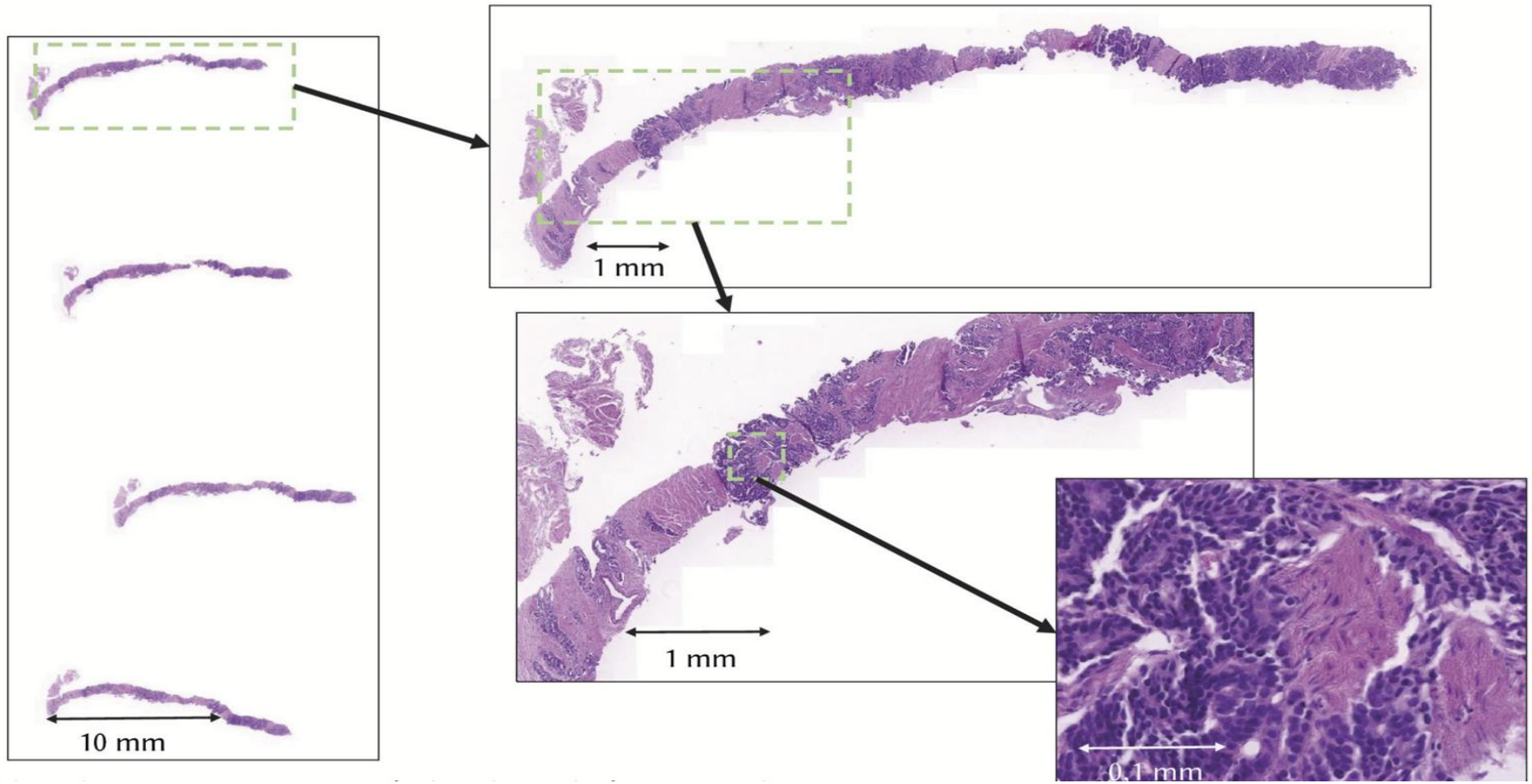


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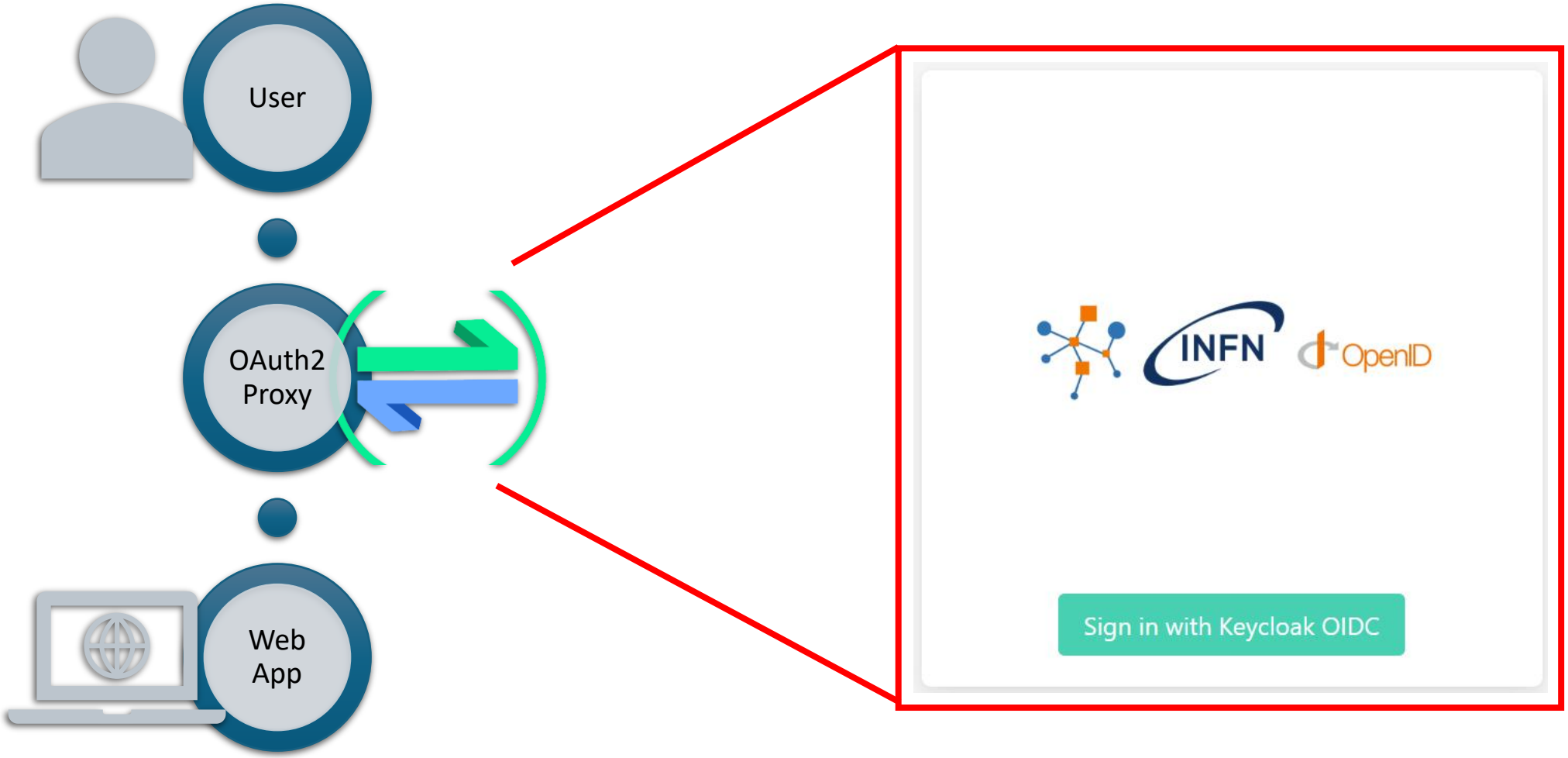

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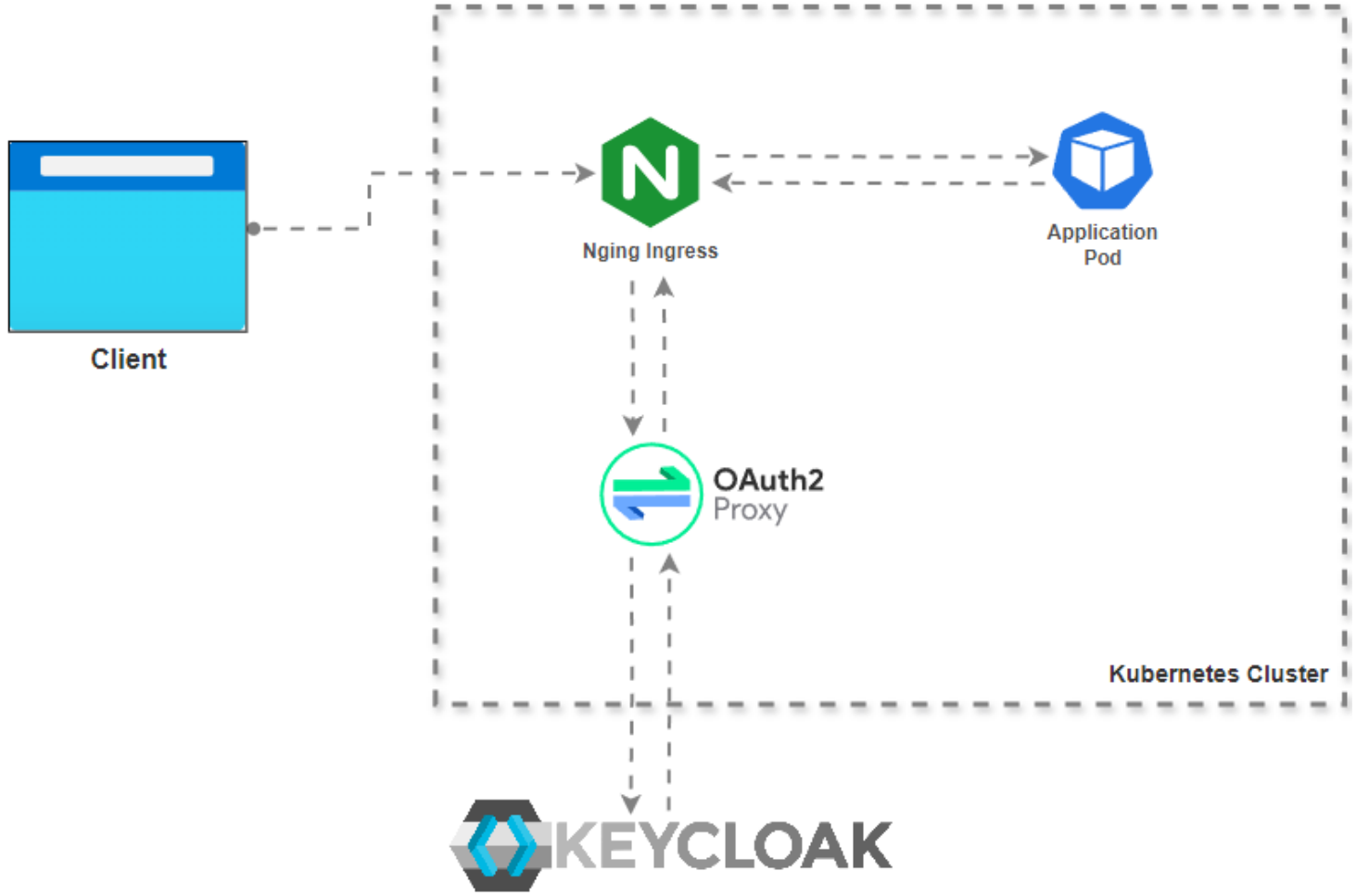

# Conclusion

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# Summary, issues and future prospects

## Summary

- Modern research requires collaboration

## Federation

- To facilitate collaboration, it would be beneficial to have unique authentication system o federation
- There are obvious implementation difficulties

## Improvements

- Use software that natively integrates authentication and authorization
- Best storage solutions
- Automate the infrastructure part

# Thank you

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