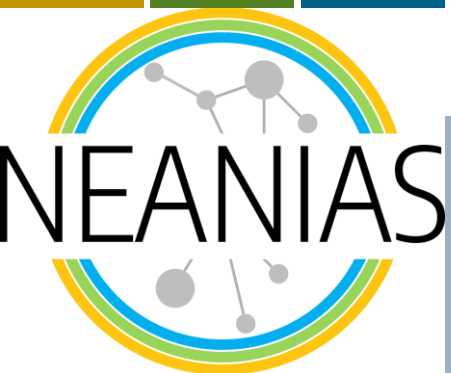


C3.3 Distributed Deep Learning – Horovod

Krisztián Póra, SZTAKI
pora.krisztian@sztaki.hu



www.neanias.eu

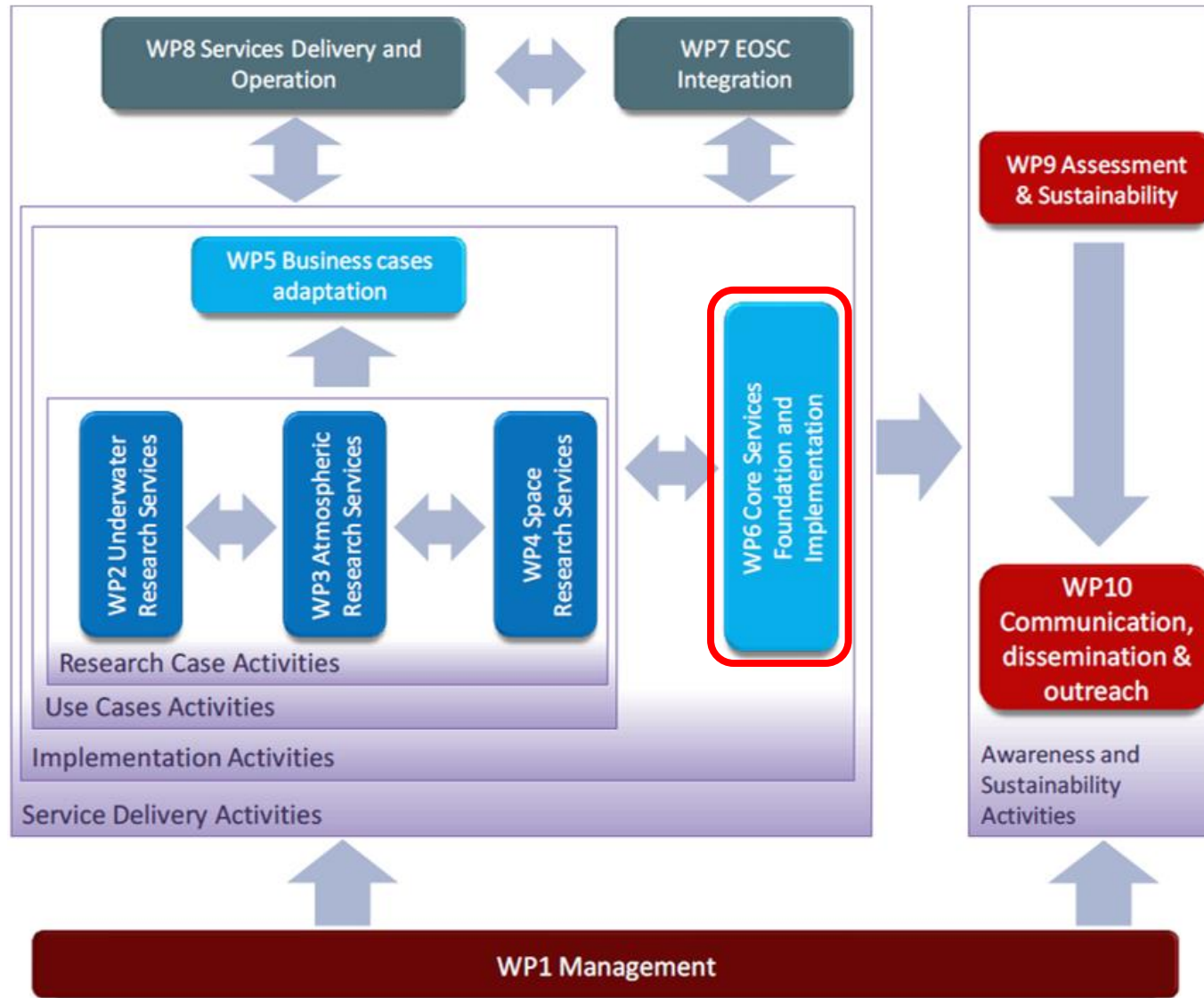


Novel EOSC Services for
Emerging Atmosphere,
Underwater & Space
Challenges

NEANIAS receives funding from
European Union under Horizon 2020
Research and Innovation
Programme under grant agreement
No. 863448

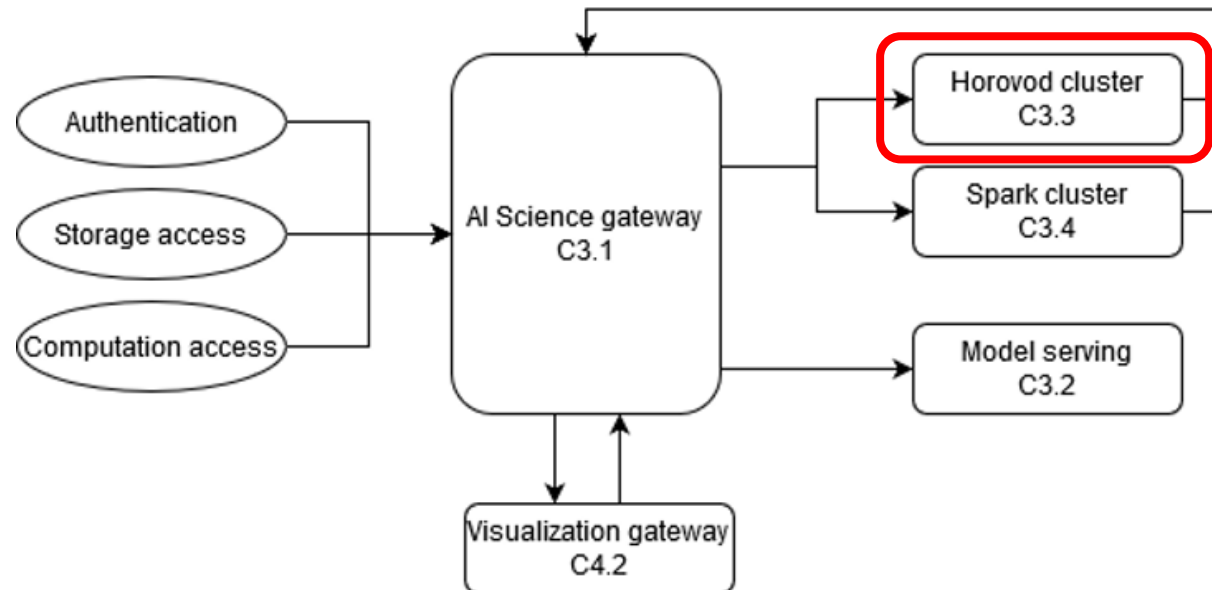


C3.3 Distributed Deep Learning – Horovod



C3.3 Distributed Deep Learning – Horovod

- › Expand C3.1 AI Science Gateway with distributed deep learning
- › Increase efficiency for training large ML models
- › Seamless integration into the workflow

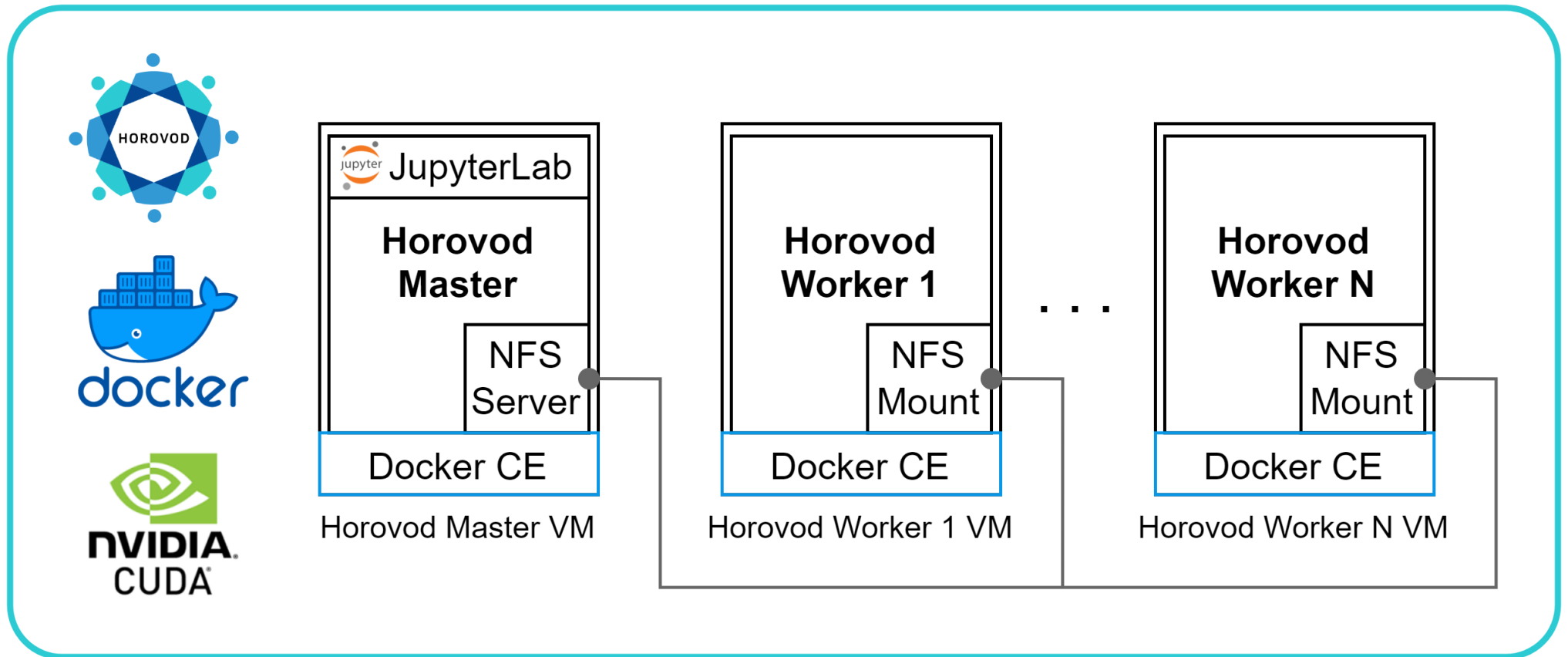


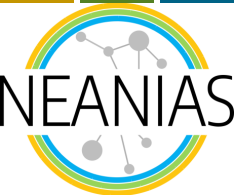
Horovod

- › Open-source distributed deep learning framework from Uber
- › Supports TensorFlow, Keras, PyTorch, Apache MXNet and Spark
- › Provide an easy-to-use framework for distributed training
 - Execute on hundreds of GPUs with just a few lines of additional code
- › Data parallel execution
- › Ring-Allreduce strategy
 - Each node communicates with two of its peers $2*(N-1)$ times
 - NVIDIA NCCL 2.0 for intra-node communication



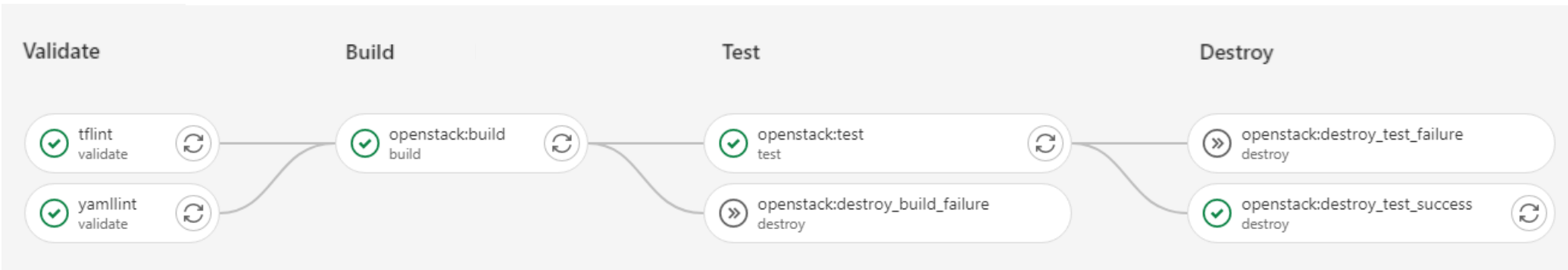
Horovod cluster architecture





Automatic Testing using GitLab CI/CD

Status	Pipeline	Triggerer	Stages
passed 00:10:52 3 days ago	Merge branch 'dev' into 'master' #12802 master -> 69b90b32 Scheduled		✓ ✓ ✓ ✓
passed 00:11:01 1 week ago	Merge branch 'dev' into 'master' #12669 master -> 69b90b32 Scheduled		✓ ✓ ✓ ✓
passed 00:11:03 2 weeks ago	Merge branch 'dev' into 'master' #12511 master -> fb4524a5 Scheduled		✓ ✓ ✓ ✓
passed 00:11:19 3 weeks ago	Merge branch 'dev' into 'master' #12338 master -> 7096578e Scheduled		✓ ✓ ✓ ✓



Monitoring with Prometheus Grafana stack



Integration into NEANIAS AI-Gateway

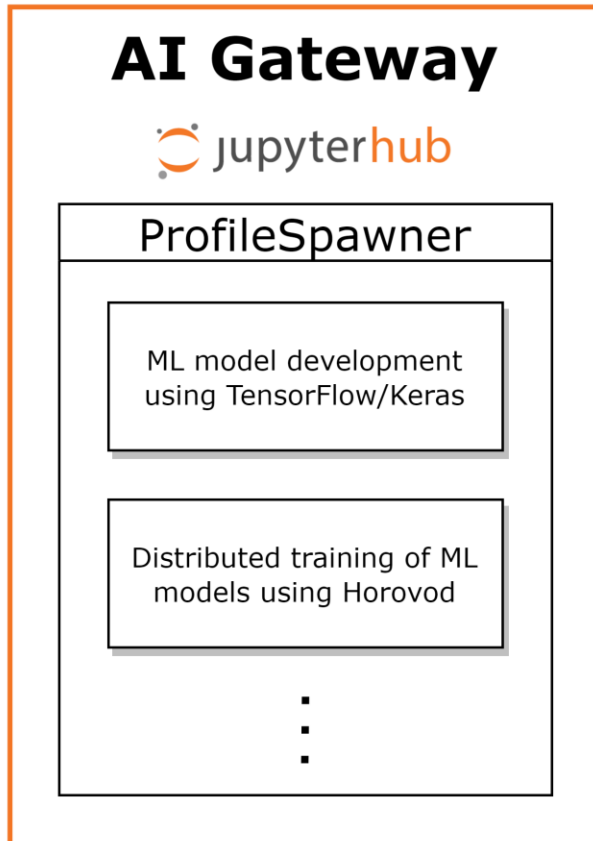
Server Options

- ML model development using Tensorflow/Keras**
Environment for ML model development supported by Tensorflow and Keras Python ML libraries
- Distributed training of ML models using Horovod**
Environment for Distributed Deep Learning by Horovod. IMPORTANT: You need to request a personal cluster before choosing this environment at eosc-horovod@sztaki.hu!
- Serving ML models using BentoML**
Environment for establishing a service by BentoML with a ML model behind
- ADAM API**
Environment for using ADAM API
- ASTRO ML**
Environment for using MRCNN
- TIRAMISU**
Environment for using Tiramisu modeling

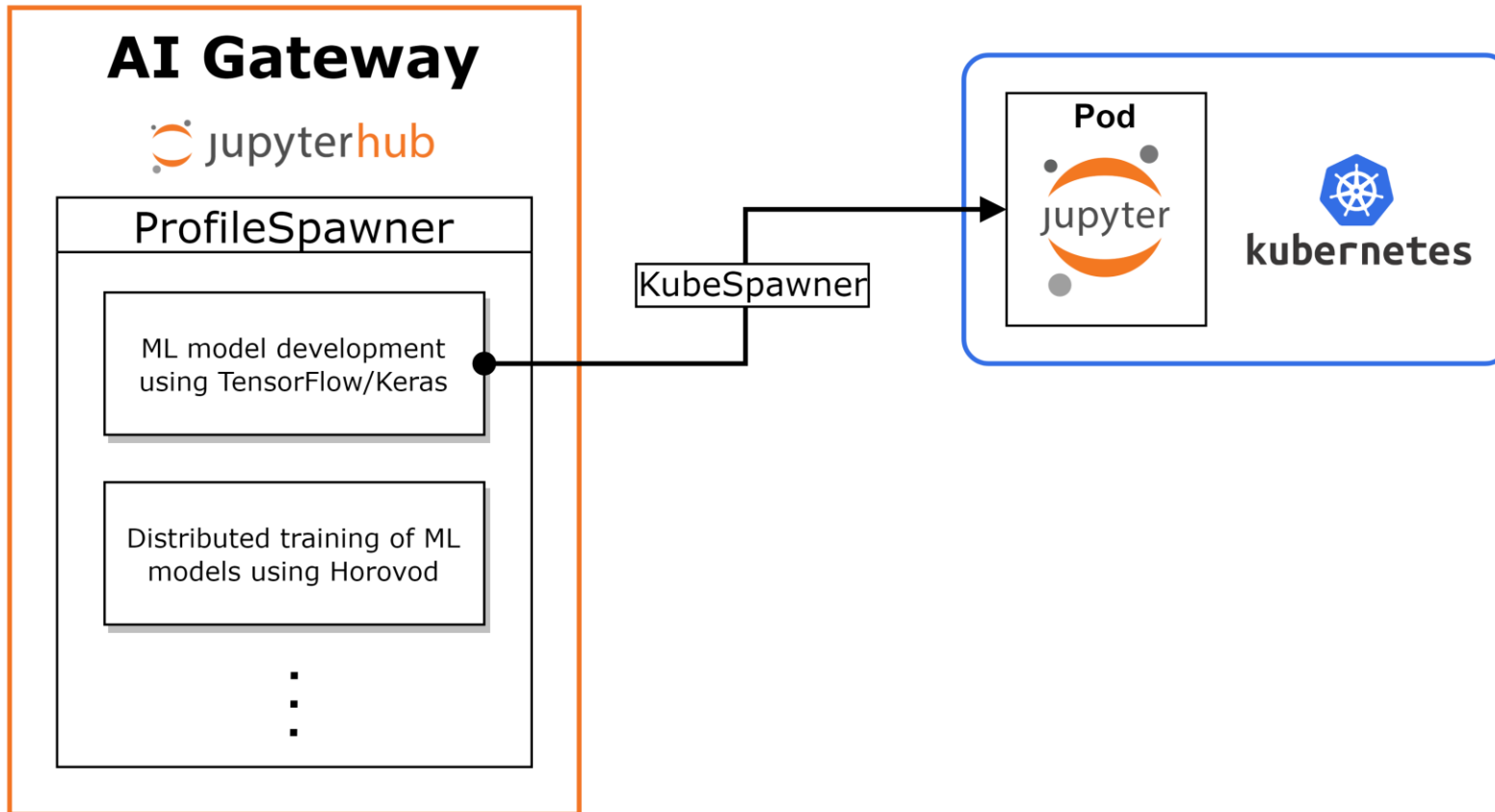
▼ Options for mounting remote storage

Start

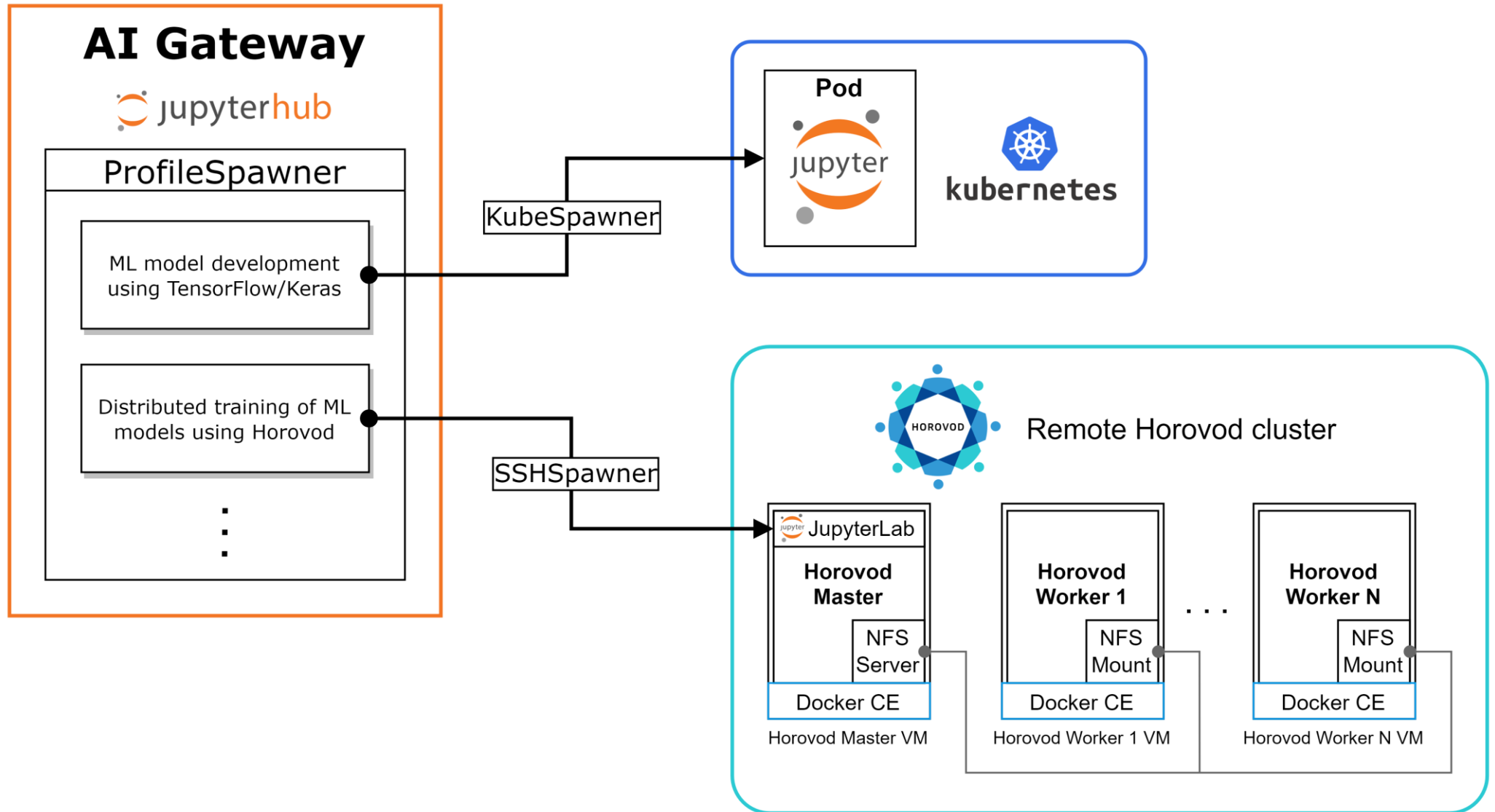
Workflow Overview



Workflow Overview




Workflow Overview



Onboarding to the EOSC Marketplace



[Home](#) > [Resources](#) > [Access physical & infrastructures](#) > [Compute](#) > [Job Execution](#) > [Distributed Deep Learning by Horovod](#)



Distributed Deep Learning by Horovod

DDLbH

deep learning, distributed, horovod

Organisation: **INSTITUTE FOR COMPUTER SCIENCE AND CONTROL**

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ABOUT
DETAILS
REVIEWS (0)

Distributed Deep Learning by Horovod

Providing researchers a reliable platform designed for performing distributed deep learning operations with great scaling efficiency

The Distributed Deep Learning by Horovod service aims to provide the infrastructure, resources and libraries to its users in order to perform effective distributed training of deep neural networks.

Horovod is a distributed training framework with the main goal of enabling the simple and effective distribution of deep learning operations. While requiring just a few lines of additional code (compared to sequential version), Horovod enables training to be performed across possibly hundreds of GPUs, with great efficiency.

SCIENTIFIC CATEGORISATION



- Engineering & Technology
- Electrical, Electronic & Information Engineering

Access modes

Limited-time demo

- Gain short term access to a demo cluster
- Hosted on ELKH Cloud or EGI ACE resources
- 4 GPU enabled nodes



Request deployment on EOSC resources

- Long term access
- Exact period length and node count is up to negotiation

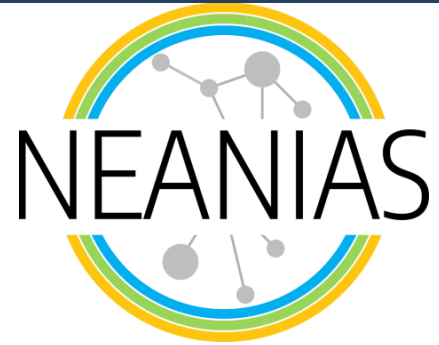


Self-hosted

- User manual
- Technical consultation



DEMO



Novel EOSC
Services for
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Thank you for your attention!

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