IHPC National Competence Center for HPC & AI in Iceland

EuroHPC Joint Undertaking

UNIVERSITY OF ICELAND

RAISE Center of Excellence

EURO²

An Overview of the European HPC Strategy and Highlights from the Icelandic HPC Communities

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Head of Quantum Simulation and Data Science Lab, NCC Iceland

@ Fagradalsfjall volcano (2021) Iceland!

Summer school on "High Performance and Disruptive Computing in Remote Sensing",
29 May - 1 June, 2023, Reykjavik, Iceland
Talk: May 29, 2023

Outline

- The Icelandic National Competence Center (NCC) for HPC and AI
- Access to HPC Infrastructure: Iceland and EuroHPC JU
- Icelandic HPC activities: workshops and training
- International Partnerships and Collaborations
- Some applications from Simulation and Data Labs:
  - HPC/AI for remote sensing
  - HPC/AI for NLP
- Selected References
- Acknowledgments

EU National Competence Centers (NCC's)

Single point of contact at national level for technology transfer in High Performance Computing (HPC), High Performance Data Analysis (HPDA), and Artificial Intelligence (AI).

To assist and provide service to the national needs of SMEs, industry, academia, and public administration (EuroCC,EuroCC2).

NCC Iceland lead by
Prof. Dr. – Ing. Morris Riedel, University of Iceland

https://www.eurocc-access.eu/

Icelandic National Competence Center

- Established 12 Simulation & Data Labs
  - different areas of science & engineering
  - with industry use cases & participation
  - EU colloborations (JSC, BSC, ...)
  - support industries, government bodies

1. Simulation and Data Lab Neuroscience
2. Simulation and Data Lab Computational Chemistry
3. Simulation and Data Lab Computational Fluid Dynamics
4. Simulation and Data Lab Remote Sensing
5. Simulation and Data Lab Electron, optical and transport properties of nanoscale systems – Computational Physics
6. Natural Language Processing Lab
7. Simulation and Data Lab Acoustic and Tactile Engineering
8. Simulation and Data Lab Health and Medicine
9. Algorithmic Mathematics Lab
10. Simulation and Data Lab Software Engineering
11. Statistical Weather Lab
12. Quantum Simulation and Data Science Lab

- Promote competencies:
  - HPC
  - AI
  - *Digital* transformation through EDIH-IS

Competence category	Level of HPC readiness of users				
	Digitalization needed	Digitally ready	HPC ready	HPC users	HPC champions
Awareness creation					
Expert technical consultancy			Experience in teaching technical topics like HPC & HPDA systems (1)	Experience in Modular Supercomputing Architecture Technologies (2)	Experience in parallel & distributed training of HPDA / AI models (3)
Services and products				Application Experience in HPDA & Remote Sensing (#6 in the world) (4)	
Business & project consultancy					
Technological assessment and PoCs					Experience in Quantum Computing (i.e., quantum annealing) (5)
Mastering the EU HPC ecosystem				Experience in forming Simulation & Data Labs (science & industry partners) (6)	

[2] M. Riedel et al., 'Practice and Experience using High Performance Computing and Quantum Computing to Speed-up Data Science Methods in Scientific Applications', IEEE MIPRO, 2022

[3] Reza et al., 'The Capability of Recurrent Neural Networks to Predict Turbulence Flow via Spatiotemporal Features', IEEE ICCC, 2022

[4] M. Riedel et al., 'Practice and Experience in using Parallel and Scalable Machine Learning with Heterogenous Modular Supercomputing Architectures', IEEE IPDPSW, 2021

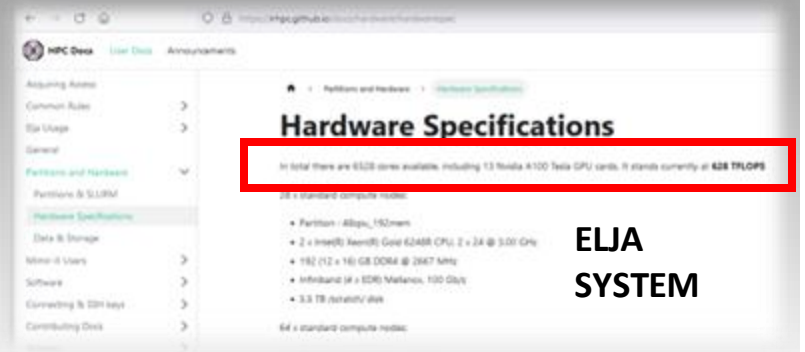
[5] C. Barakat et al., 'Lessons learned on using High-Performance Computing and Data Science Methods towards understanding the Acute Respiratory Distress Syndrome (ARDS)', IEEE MIPRO, 2022

Access to High-Performance Computing (HPC)

- ✓ Different HPC Systems available with CPUs & GPUs
- ✓ Complementary Data Infrastructure available

HPC Beginner/Moderate Users: ELJA & DEEP Systems

- ELJA System in Iceland
  - Small Size HPC System
  - Deployed at University of Iceland (UTS)
- DEEP System in Germany
  - Moderate Size HPC System
  - Deployed at the Juelich Supercomputing Centre (JSC)
  - Access through close cooperation between Germany and Iceland



JÜLICH Forschungszentrum | JÜLICH SUPERCOMPUTING CENTRE

DEEP system	Cluster Module	Booster Module	Data Analytics Module
Usage and design target	Applications and code parts requiring high single-thread performance and a modest amount of memory, which typically show moderate scalability.	Compute intensive applications and code parts with regular control and data structures, showing high parallel scalability.	Data-intensive analytics and machine learning applications and code parts requiring large memory capacity, data streaming, bit- or small datatype processing.
Node count	50	75	16
Socket count	2	1	2
CPU type	Intel Xeon 6146	Intel Xeon 4215	Intel Xeon 8260M
CPU codename	Skylake	Cascade Lake	Cascade Lake
Cores @frequency	12 @3.2 GHz	8 @2.5 GHz	24 @2.4 GHz
Accelerators per node	n.a.	1× NVIDIA V100 GPU	1× NVIDIA V100 GPU 1× Intel Stratix10 FGPA
DDR4 capacity	192 GB	48 GB	384GB+32GB(FPGA)
HBM capacity	n.a.	32 GB (GPU)	32 GB (GPU)
NVMe	n.a.	n.a.	3 TB Intel Optane
Node max. mem BW	256 GB/s	900 GB/s (GPU)	900 GB/s (GPU)
Storage	1x 512 GB NVMe SSD	1x 512 GB NVMe SSD	2x 1.5 TB NVMe SSD
Network technology	EDR-IB (100 Gb/s)	EDR-IB (100 Gb/s)	EDR-IB (100 Gb/s) Ethernet (40 Gb/s)
Network Topology	Fat-tree	Tree	Tree
Power /node	500 W	500 W	1600 W
Cooling	warm-water	warm-water	air
Integration	1× Rack MEGWARE SlideSX-LC ColdCon	3× Rack MEGWARE SlideSX-LC ColdCon	1× Rack MEGWARE

- **Access to HPC systems DEEP & ELJA is free of charge for academic & government users, including storage of datasets in the realm of MBs & GBs**
- **Access to HPC systems DEEP & ELJA is free of charge for industrial / SME users for prototyping, research & development before business licensing**
- **Users requiring significantly more storage in the realm of TBs & PBs can be negotiated also free of charge for a specific period during HPC system runs**
- **A sustainable long-term data storage & sharing infrastructure for Iceland is in development by the EDIH-IS & NCC HPC/AI & will be available 2024 (expected)**

HPC Expert Users: JUELICH & EuroHPC JU Systems

- JUELICH Systems in Germany
  - Large HPC Systems
  - JUWELS → https://www.fz-juelich.de/en/ias/jsc/systems/supercomputers/juwels
  - JURECA → https://www.fz-juelich.de/en/ias/jsc/systems/supercomputers/jureca
- LUMI System in Finland
  - Iceland's System Share → https://lumi-supercomputer.eu/

- EuroHPC Systems in Europe
  - Apply jointly via EuroHPC JU Calls – Open for academics, government & industry/SME
  - https://eurohpc-ju.europa.eu/participate/access-our-supercomputers_en

- **Access to HPC systems JUWELS, JURECA & LUMI is free of charge for academic & government users, including storage of datasets in the realm of MBs & GBs**
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IHPC Workshops and training

bi-monthly IHPC Community Workshops
with public participation and is open to everyone interested.

Funded by the EuroCC project

Latest:
10th Icelandic HPC Community Workshop (2023-04-26)

1st Icelandic HPC Community Workshop (2021-08-11)
https://ihpc.is/events/1st-icelandic-hpc-community-workshop
2nd Icelandic HPC Community Workshop (2021-10-28)
https://ihpc.is/events/2nd-icelandic-hpc-community-workshop/
3rd Icelandic HPC Community Workshop (2021-12-15)
https://ihpc.is/events/3rd-icelandic-hpc-community-workshop/
4th Icelandic HPC Community Workshop (2022-02-23)
https://ihpc.is/4th-icelandic-hpc-community-workshop/
5th Icelandic HPC Community Workshop (2022-04-25)
https://ihpc.is/events/5th-icelandic-hpc-community-workshop/
6th Icelandic HPC Community Workshop (2022-08-30)
https://ihpc.is/events/6th-icelandic-hpc-community-workshop/
7th Icelandic HPC Community Workshop (2022-10-27)
https://ihpc.is/events/7th-icelandic-hpc-community-workshop/
8th Icelandic HPC Community Workshop (2022-12-7)
https://ihpc.is/8th-icelandic-hpc-community-workshop/

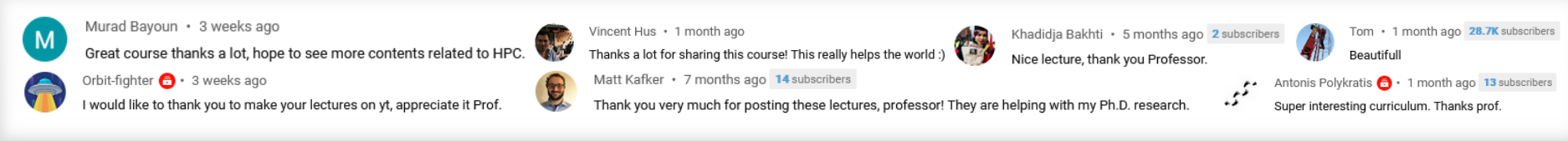
The IHPC workshop series of NCC Iceland

[7] EuroCC NCC Iceland Icelandic HPC (IHPC) Community Workshop Events

Training material from Prof Dr - Ing Morris Riedel
YouTube channel: @profdr-ingmorrisriedel5563

Training: Publicly Accessible Lectures

[8] YouTube Channel with HPC & Cloud Computing Courses



Collaboration Highlights

- NCC DE (‘big brother to learn from‘)
  - Juelich Supercomputing Centre (JSC) with joint Simulation & Data Labs Members
  - Centre of Excellence RAISE for HPC/AI
- CASTIEL Quantum Computing WG
  - NCC DE, NCC IT, NCC DK, NCC IE, NCC NL
  - Mentoring Path – First Workshop & Report
- Joint Workshops (e.g., Prague 11/2022)
  - NCC CY, NCC CZ, NCC DE, NCC LV & SMEs
- EDIH-IS of Iceland (‘on-boarding HPC/AI‘)
  - Joining forces to work with SMEs on EU level
  - Working with Audna Tech Transfer Office

Why using High-Performance Computing (HPC)?

- ✓ Benefit #1: Faster Training of AI Models → Speed-up!
- ✓ Benefit #2: Train Better AI Models → Higher Accuracy!

Needs of using Artificial Intelligence (AI) with HPC

- Goal Faster AI Model Training using HPC
  - Challenge: Complexity in AI stacks on HPC
  - CoE RAISE offers a Unique AI Framework

[1] CoE Research on AI- & Simulation-Based Engineering at Exascale

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[2] CoE RAISE YouTube Channel for joint Trainings

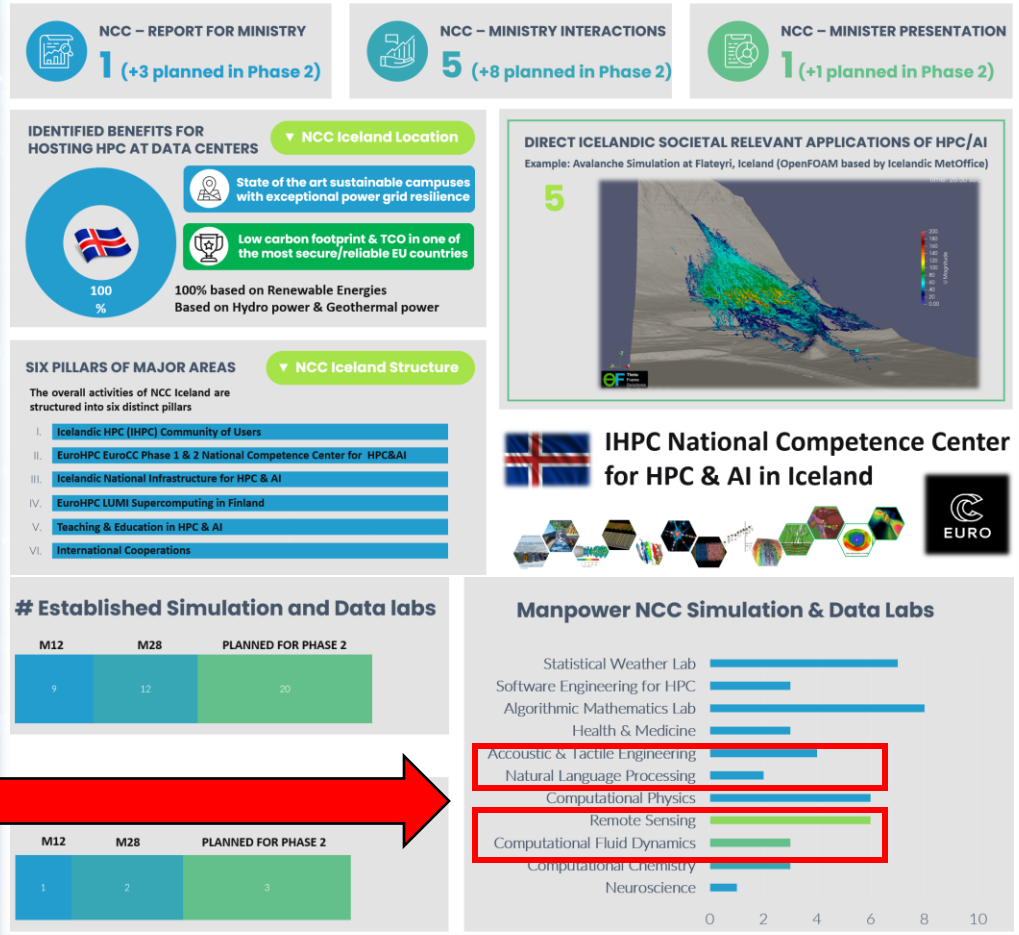
YouTube

- Simulation & Data Labs use AI
  - Accoustic & Tactile Engineering (SME Treble)
  - Natural Language Processing (SME Mideind)
  - Computational Fluid Dynamics (SME Icewind)

treble

MIÐEIND

ICEWIND EXTREME ENERGY SOLUTIONS



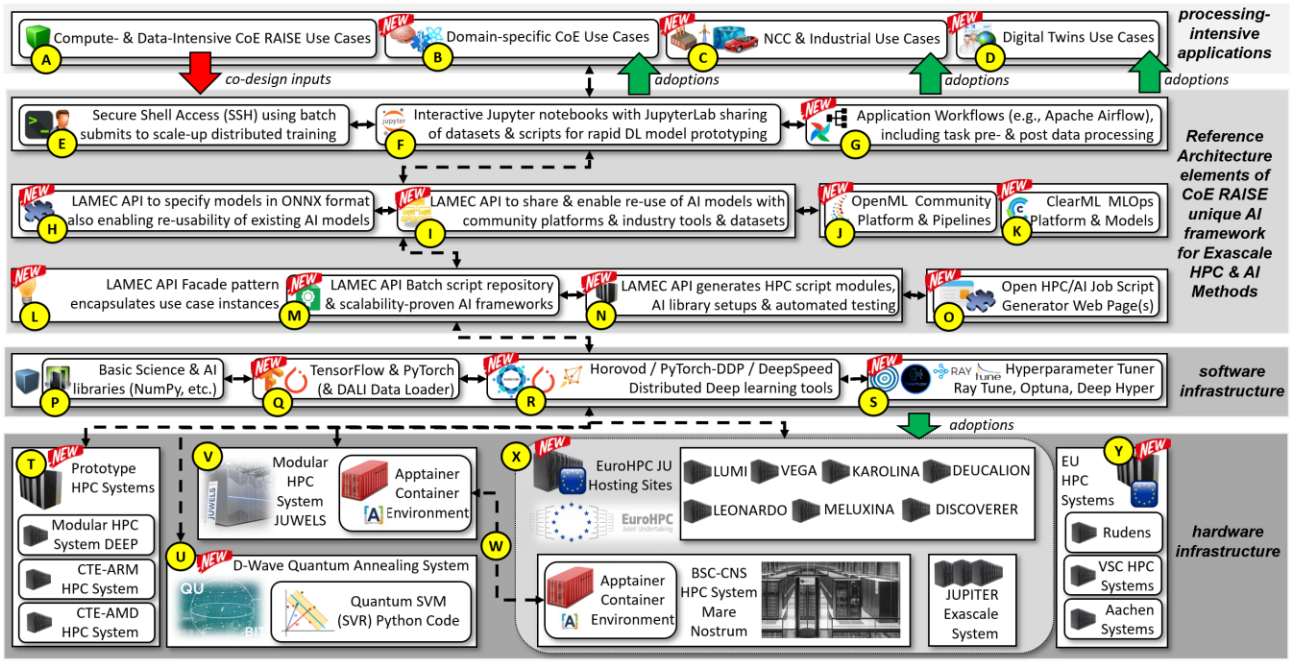
[3] NCC Iceland IHPC Community & Simulation and Data Labs

CoE RAISE – Unique AI Framework (UAIF) – LAMEC – API

```
#!/usr/bin/env bash

# Slurm job configuration
#SBATCH --nodes=1
#SBATCH --ntasks-per-node=4
#SBATCH --cpus-per-gpu=20
#SBATCH --account=hai_so2sat
#SBATCH --output=output.out
#SBATCH --error=error.er
#SBATCH --time=6:00:00
#SBATCH --job-name=BENTF2
#SBATCH --gres=gpu:1 --partition=booster

#load modules
ml Stages/2020  GCC/9.3.0  OpenMPI/4.1.0rc1
ml Horovod/0.20.3-Python-3.8.5
ml TensorFlow/2.3.1-Python-3.8.5
#activate my virtualenv
#source /p/project/joaiml/remote_sensing/rocco_sedona/ben_TF2/scripts/env_tf2_juwels_booster/bin/activate

#export relevant env variables
#export CUDA_VISIBLE_DEVICES="0,1,2,3"

#run Python program
srun --cpu-bind=none python -u train_hvd_keras_aug.py
```

The challenge of finding the right versions of modules That work together (ca. 2-3 days/month)

- Solution: Use LAMEC – API of the UAIF framework of CoE RAISE
- Simplify HPC access using AI libraries with the LAMEC – API
- LAMEC = Load AI Modules, Environments, & Containers
- Support of many HPC systems in Europe already



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[1] CoE Research on AI- & Simulation-Based Engineering at Exascale

Benefit #1: Faster Training of AI Models – Examples

remote sensing

MDPI

Article

Remote Sensing Big Data Classification with High Performance Distributed Deep Learning

Rocco Sedona [1,2,3,4,*,†], Gabriele Cavallaro [2,3,4,†], Jenia Jitsev [3,4,†], Alexandre Strube [3], Morris Riedel [1,2,3,4] and Jón Atli Benediktsson [1]

[1] School of Engineering and Natural Sciences, University of Iceland, Dunhagi 5, 107 Reykjavik, Iceland; morris@hi.is (M.R.); benedikt@hi.is (J.A.B.)
[2] Jülich Supercomputing Centre (JSC), Forschungszentrum Jülich (FZJ), Wilhelm-Johnen-Strasse 1, 52425 Jülich, Germany; g.cavallaro@fz-juelich.de (G.C.); j.jitsev@fz-juelich.de (J.J.); a.strube@fz-juelich.de (A.S.)
[3] High Productivity Data Processing Research Group, JSC, 52425 Jülich, Germany
[4] Cross-Sectional Team Deep Learning (CST-DL), JSC, 52425 Jülich, Germany
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† These authors contributed equally to this work.

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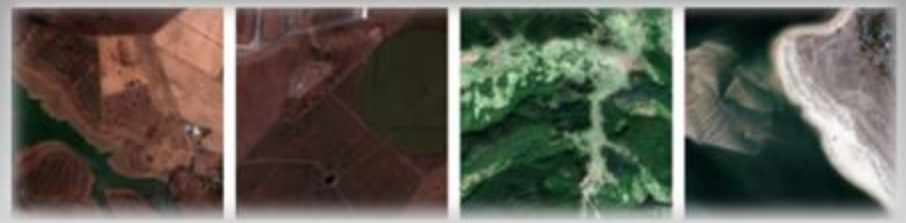
Abstract: High-Performance Computing (HPC) has recently been attracting more attention in remote sensing applications due to the challenges posed by the increased amount of open data that are produced daily by Earth Observation (EO) programs. The unique parallel computing environments and programming techniques that are integrated in High-Performance Computing (HPC) systems are able to solve large-scale problems such as the training of classification algorithms with large amounts of Remote Sensing (RS) data. This paper shows that the training of state-of-the-art deep Convolutional Neural Networks (CNNs) can be efficiently performed in distributed fashion using parallel implementation techniques on HPC machines containing a large number of Graphics Processing Units (GPUs). The experimental results confirm that distributed training can drastically reduce the amount of time needed to perform full training, resulting in near linear scaling without loss of test accuracy.

Keywords: distributed deep learning; high performance computing; residual neural network; convolutional neural network; classification; sentinel-2



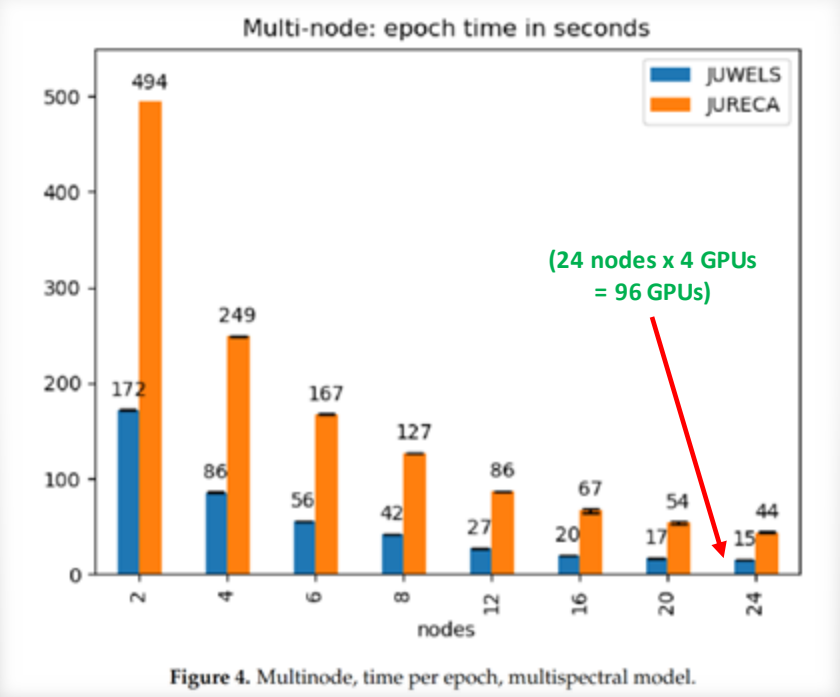


Figure 4. Multinode, time per epoch, multispectral model.

Faster AI Model training through parallel computing on many GPUs at the same time

Benefit #2: Train Better AI Models – Examples

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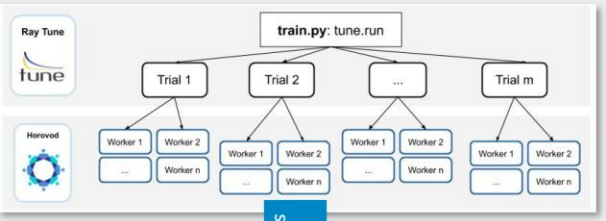
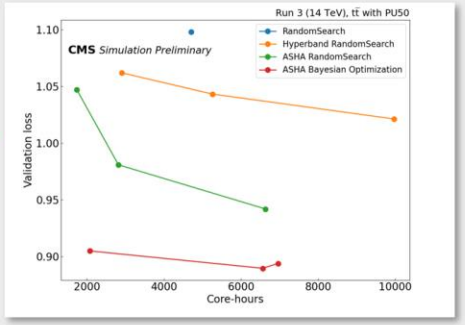
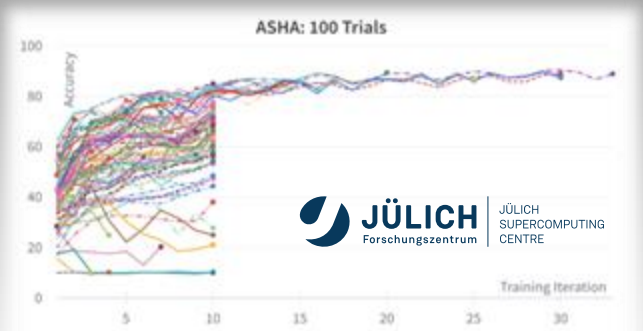
Distributed hypertuning



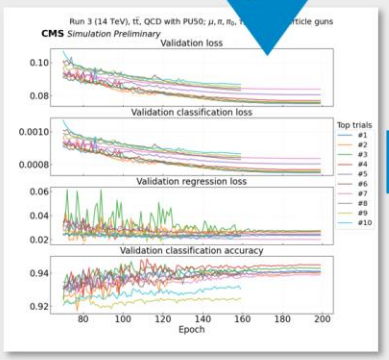
Hypertuning evaluation



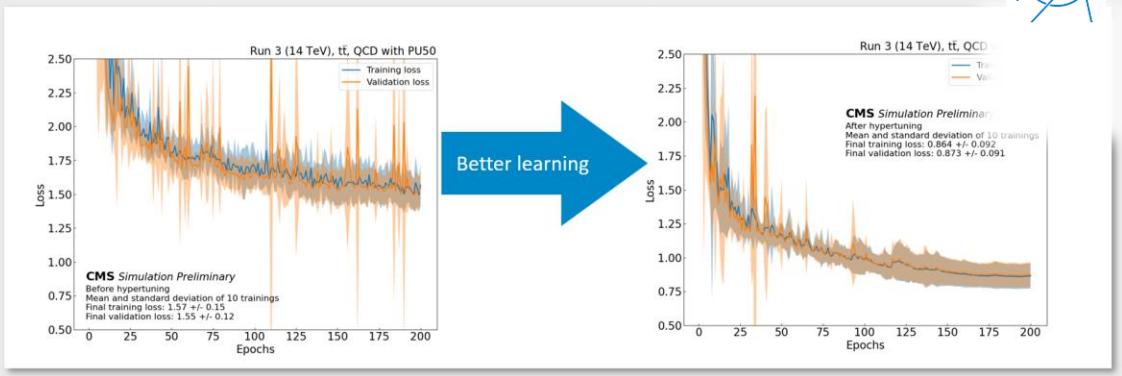
- Mean validation loss decreased by **~44%** giving a significant performance improvement



Model selection

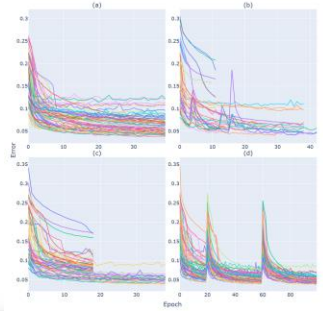


Assess learning variability

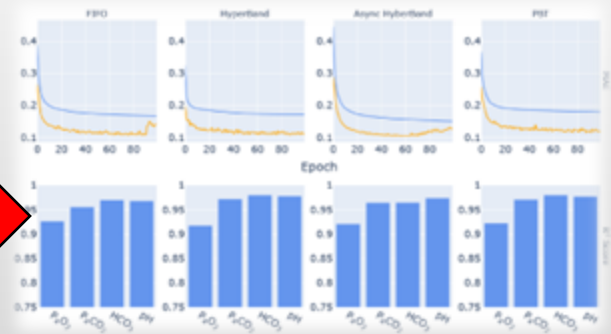


Better learning

Hyperparameter Optimization



Train Better AI Models

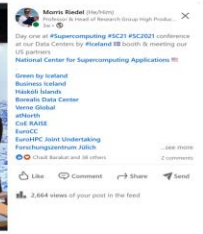


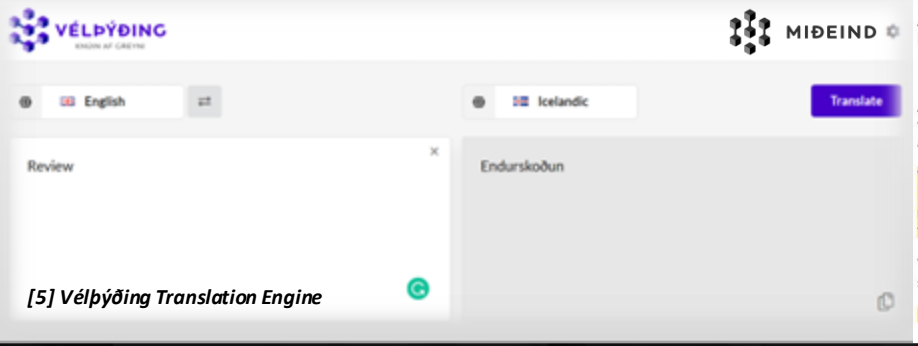
Better AI models with higher accuracy or lower error rates through hyperparameter optimization

“AI at Scale Applications“ Example Large Language Models

- Large Language Model & OpenAI / GPT-4
  - Example: SME Mideind ehf
  - Natural Language Processing (NLP) SME & NCC Iceland Simulation & Data Lab NLP
  - Develop ‘google translate‘ that works
  - Submitted joint EU proposal using AI on HPC
- CoE RAISE Unique AI Framework (UAIF)
  - Selected Building Blocks used for AI on HPC

[4] mideind ehf





[5] Vélþýðing Translation Engine

Miðeind develops Natural Language Processing and Artificial Intelligence applications for the Icelandic language (mideind.is)

12 employees, based in Reykjavík, Iceland

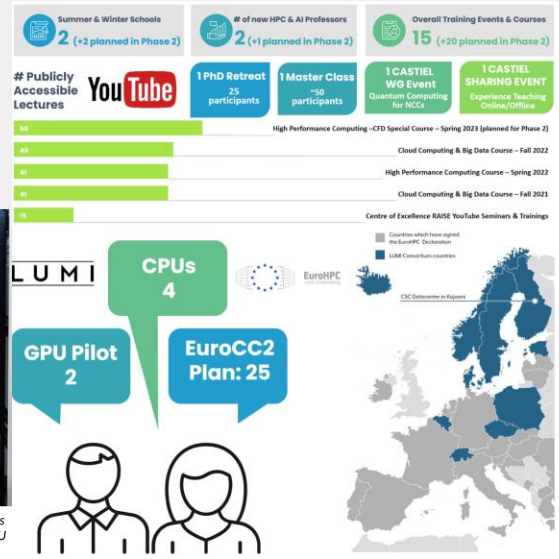
Applications include spelling and grammar correction, a voice assistant, machine translation, question answering, summarization, chatbots & more

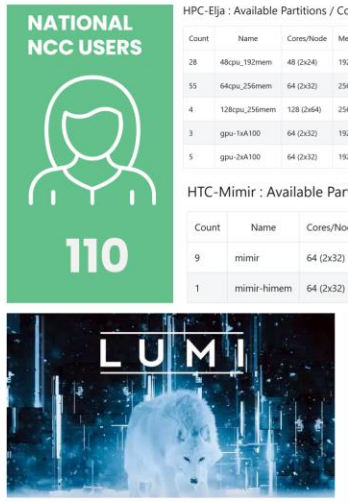
We have received great support from Forschungszentrum Jülich and University of Iceland* regarding access to GPU clusters for training and fine-tuning of large language models

We are looking to contribute to European projects to support smaller languages in NLP and AI

** Many thanks to Prof. Dr. - Ing. Morris Riedel & hisNCC team!*

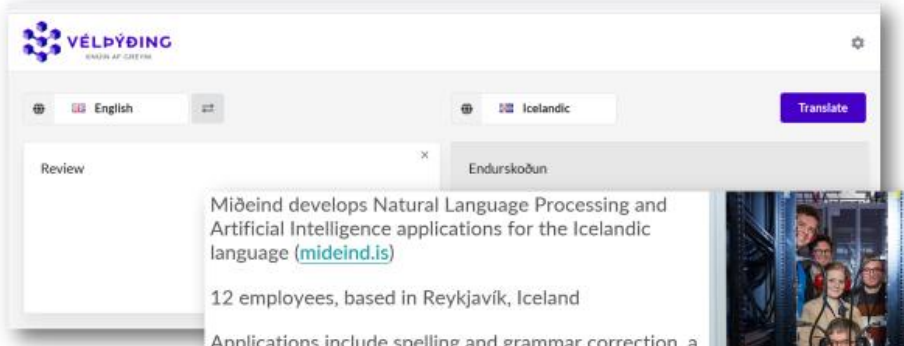
A few members of Miðeind's team with our 8 x A100 GPU server





SME Mideind ehf & OpenAI / GPT - 4

- Simulation & Data Lab Natural Language Processing (NLP) activities
- Addressing societal challenge: Preserving ‘small country‘ languages



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[2] mideind ehf

[3] OpenAI

Quantum Simulation and Data Science Lab

Exploiting cutting-edge technologies to advance materials modelling and simulations.

Selected References

- [1] EuroCC NCC Iceland IHPC Community, Online: https://ihpc.is/community/
- [2] CoE RAISE YouTube Channel for joint Trainings, Online: https://www.youtube.com/@coeraise6339
- [3] CoE RAISE, Online: https://www.coe-raise.eu/
- [4] Mideind ehf, Iceland Natural Language Processing (NLP) Company, Online: https://miðeind.is/
- [5] Vélþýðing Translate English – Iceland, Online: https://velthyding.is/
- [6] AI and Simulation Based Engineering Workshop, Praque, 01.12.2022, Online: https://www.it4i.cz/en/welcome-to-the-national-competence-centre-in-hpc/ai-and-simulation-based-engineering-workshop
- [7] EuroCC NCC Iceland & Borealis Data Centers Jointly Organized Event „Responsible HPC Workshop“, 18th – 19th May 2022, Reykjavik, Iceland Online: https://www.bdc.is/conference
- [8] YouTube Channel with publicly accessible training material on HPC/Cloud Co Online: https://www.youtube.com/channel/UCWC4VKHmL4NZgFfKoHtANKg

[6] CoE RAISE & NCCs – Joint Workshop, Praque, Czech Republic

[7] Responsible HPC Workshop (with many industry partners), Reykjavik, Iceland

Selected References – HPC Success Stories & Training

Revolutionising recycling with AI

Plastic Bottles (Credit: Getty Images / Anna Kim)

The challenge

Recycling waste is one of the easiest ways to reduce the use of limited resources and curb climate change, but often the materials that end up on the conveyors of the materials recovery facilities (MRFs) are not what re-cyclers want and many contaminants such as containers soiled with food waste have to be removed by hand. It's estimated that the world generates three billion tonnes of domestic waste each year, but less than 10 per cent of it is recycled.

The solution

Danu Robotics, an Edinburgh-based start-up specialising in AI solutions that protect the environment, has come up with a solution based on machine learning software that can visually identify recyclable and non-recyclable material and remove any items that should not be there.

Before deploying the robot picking hardware, the company had to build up a waste image database to help the system identify contaminants. Now that the initial system training is complete, Danu Robotics is working on the software which will direct the robotic sorting system to remove contaminants from a moving conveyor belt as efficiently and effectively as possible. For this part of the programme, the company called in EPCC for support. EPCC initially worked with DanuRobotics to outline the system's architecture and this led to further work to train the AI part of the system to identify recyclable and contaminant items. EPCC's Cirrus super-computer was employed to help process the data and train the software.

Impact of this EuroCC project

In mid 2022 the project began two months of lab tests to integrate the software with the robotic hardware, and then a three-month trial of the prototype system at Glasgow City Council's recycling centre. Several large European recycling companies are interested in the company's product.

The system is designed to be sustainable, flexible, affordable, scalable and future proof, and the technology can help recycling companies recoup their investment within two years, and double their profit within three or four years' time.

https://www.eurocc-access.eu/

Thanks – www.ihpc.is/community

EuroHPC
Joint Undertaking

This project has received funding from the European High-Performance Computing Joint Undertaking (JU) under grant agreement No 101101903. The JU receives support from the Digital Europe Programme and Germany, Bulgaria, Austria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Lithuania, Latvia, Poland, Portugal, Romania, Slovenia, Spain, Sweden, France, Netherlands, Belgium, Luxembourg, Slovakia, Norway, Türkiye, Republic of North Macedonia, Iceland, Montenegro, Serbia

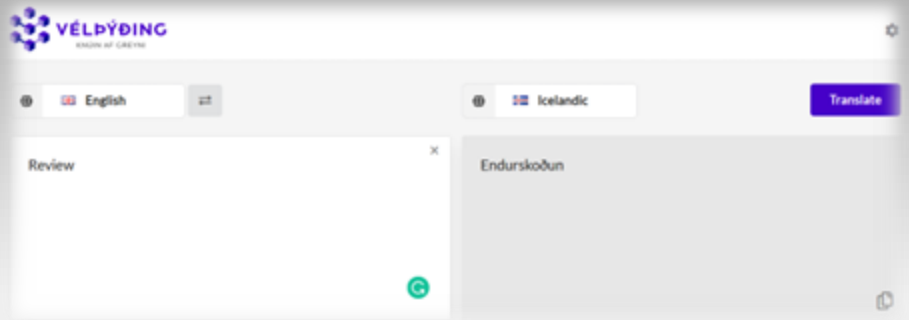
Why using High-Performance Computing (HPC)?

✓ Benefit #1: Faster Training of AI Models → Speed-up!

Status of the NCC Iceland

Prof. Dr. – Ing. Morris Riedel, The University of Iceland

- Interactions with Industry work well
  - Example: SME Mideind ehf
  - Natural Language Processing (NLP) SME & NCC Iceland Simulation & Data Lab NLP
  - Develop ‘google translate‘ that works
  - Joining forces in EU Horizon & DEP proposals



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MIÐEIND

A few members of Miðeind's team with our 8 x A100 GPU server

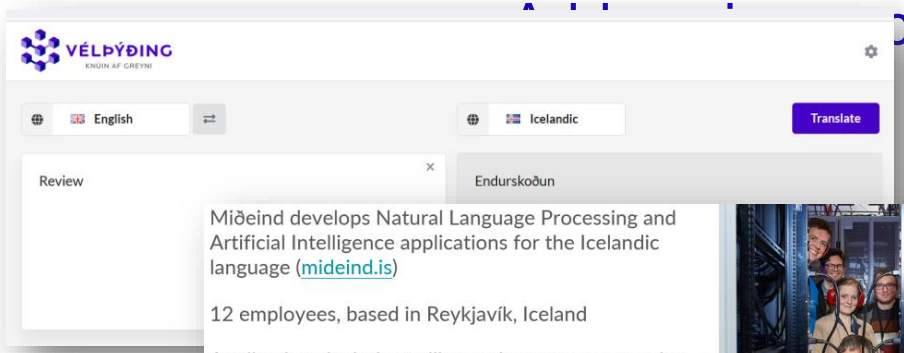
[6] mideind ehf


[1] EuroCC NCC Iceland Simulation & DataLabs

SME Mideind ehf & OpenAI / GPT - 4

- Activities of the Simulation & Data Lab Natural Language Processing (NLP)

- Addressing societal challenge: Preserving ‘small country‘ languages



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[2] mideind ehf

SME Mideind CEO Vilhjálmur Þorsteinsson

OpenAI Representatives

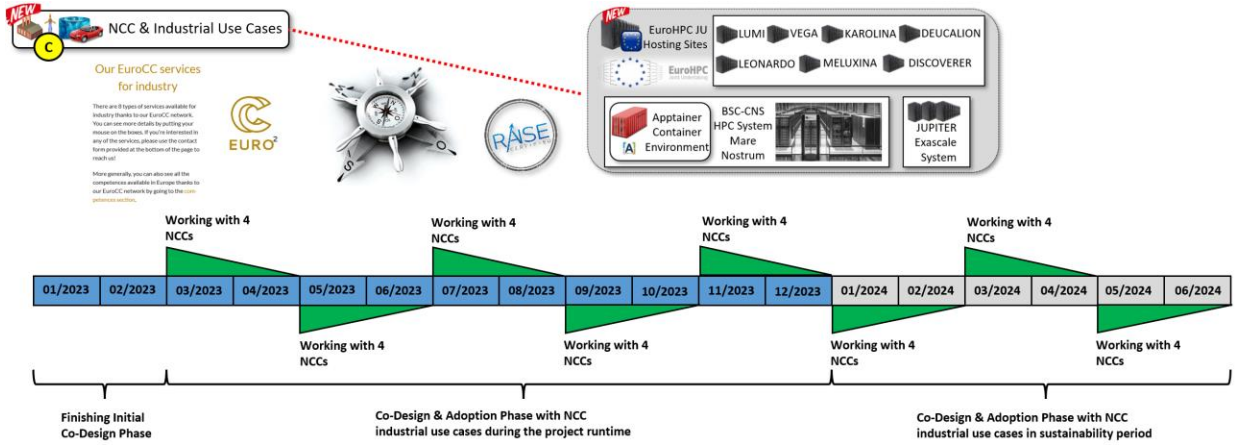
Lilja Alfreðsdóttir, Minister of Culture & Business Affairs

[3] OpenAI

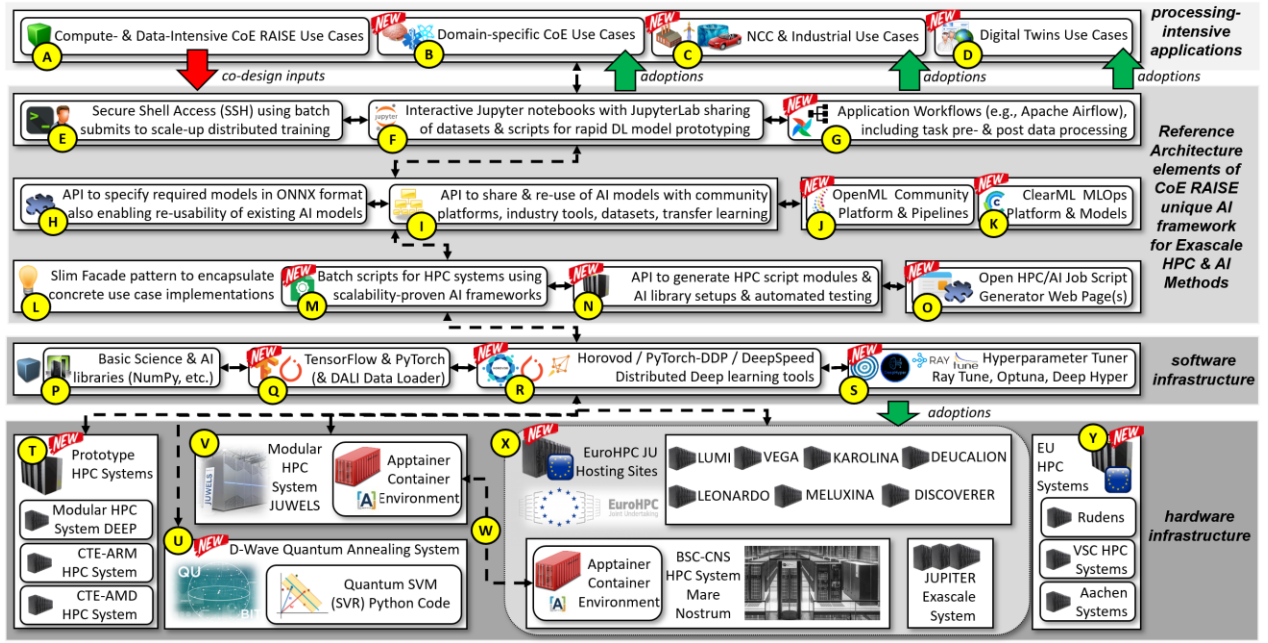
[1] EuroCC NCC Iceland Simulation & DataLabs

CoE RAISE & Unique AI Framework

- Activities of the Simulation & Data Lab Remote Sensing & CFD
- Addressing technical challenge: Solving complexity of AI/HPC software tools



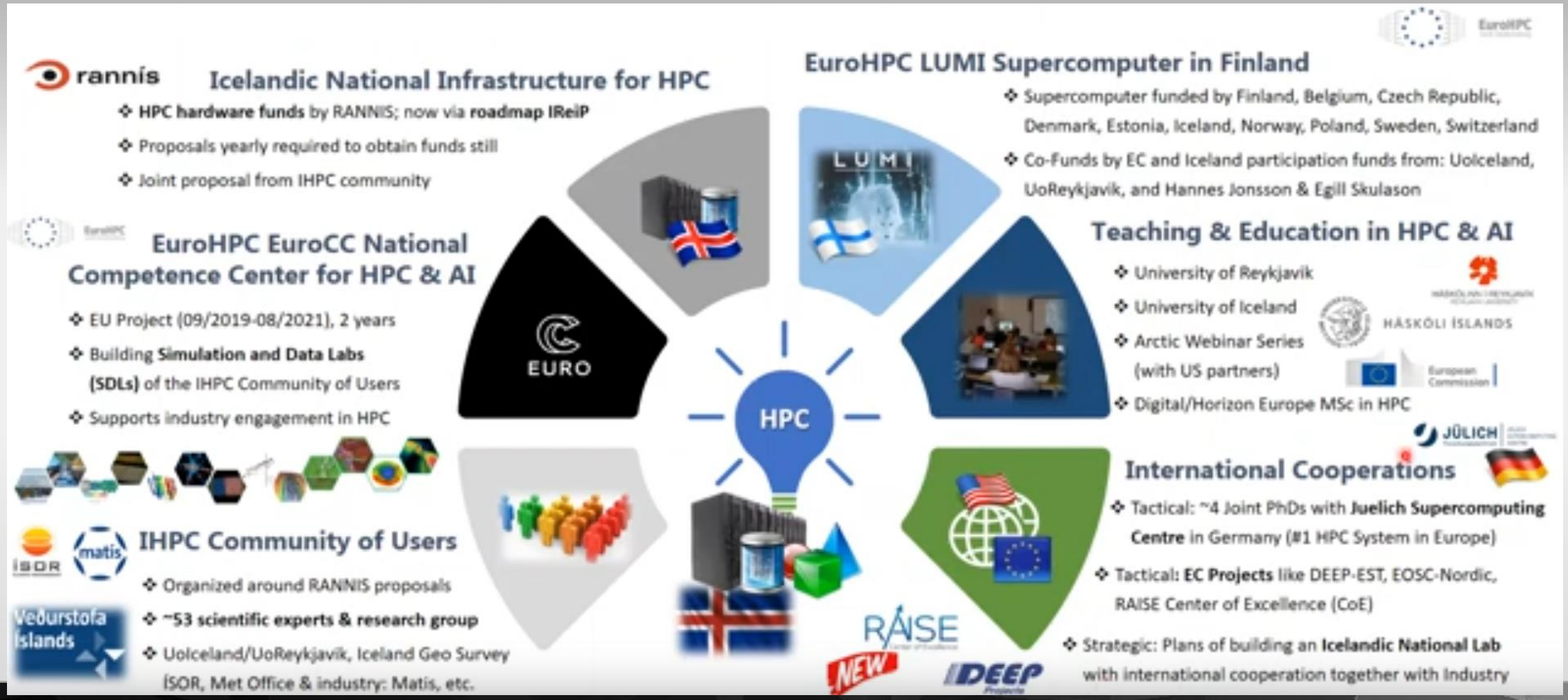
[4] CoE RAISE



Icelandic High-Performance Computing (IHPC) Activities

- IHPC Community Workshop [bi-monthly]
- Activities are increasing in academia and industry that also includes related areas such as Artificial Intelligence (AI), Machine Learning (ML), Data Analytics, and Data Sciences.
- 10 workshops since August 2021
- Center for remote sensing
  - Gabriele, Gro Birkefeldt Moller Pedersen, Rocco,
- CFD
  - A
- Cybersecurity

Icelandic HPC Activities & Long-Term Colloboration Partners



Why Iceland?

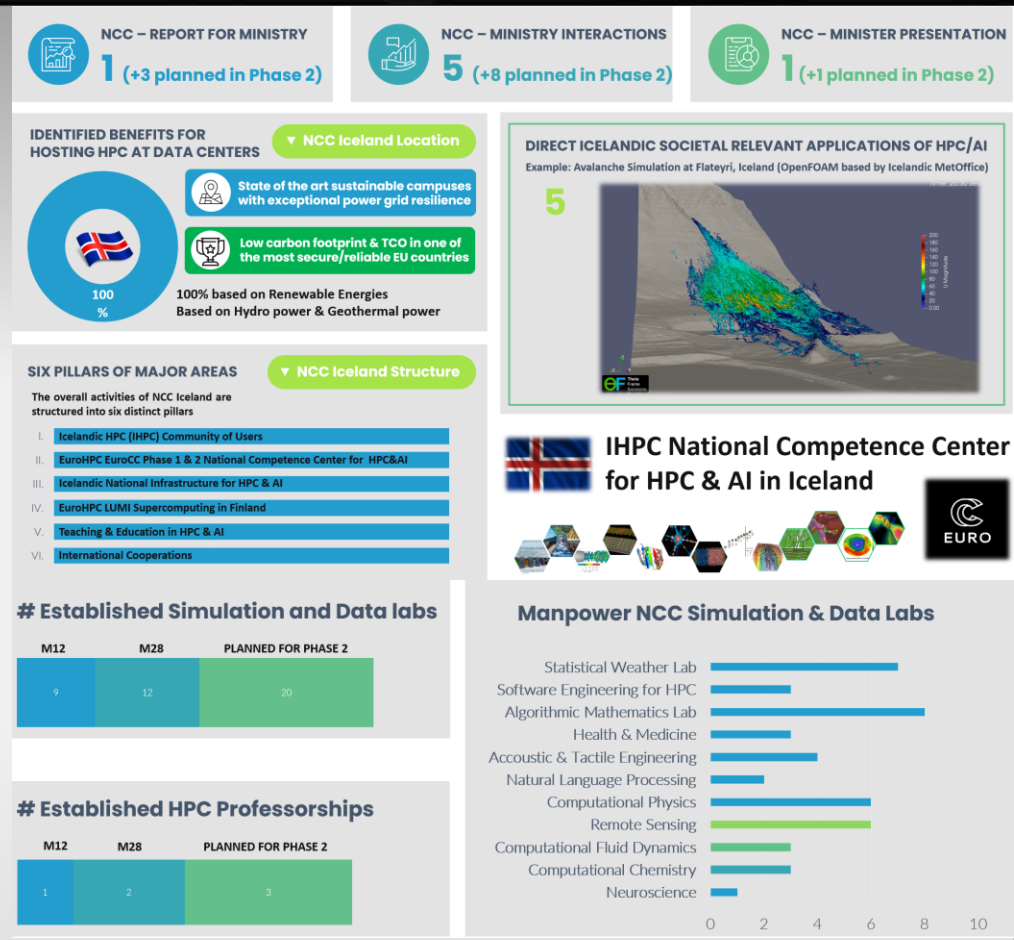
- Clean and data

Main achievements of NCC Iceland

Prof. Dr. – Ing. Morris Riedel, University of Iceland

- Recognized by ministries, SME & Industry
- Established 12 Simulation & Data Labs in key areas of science & engineering
  - With industry use cases & participation
- Identified HPC/AI activities in Iceland
  - Promoted six unique competencies

Competence category	Level of HPC readiness of users				
	Digitalization needed	Digitally ready	HPC ready	HPC users	HPC champions
Awareness creation					
Expert technical consultancy			Experience in teaching technical topics like HPC & HPDA systems (1)	Experience in Modular Supercomputing Architecture Technologies (2)	Experience in parallel & distributed training of HPDA / AI models (3)
Services and products				Application Experience in HPDA & Remote Sensing (#6 in the world) (4)	
Business & project consultancy					
Technological assessment and PoCs					Experience in Quantum Computing (i.e., quantum annealing) (5)
Mastering the EU HPC ecosystem				Experience in forming Simulation & Data Labs (science & industry partners) (6)	



[2] M. Riedel et al., 'Practice and Experience using High Performance Computing and Quantum Computing to Speed-up Data Science Methods in Scientific Applications', IEEE MIPRO, 2022

[3] Reza et al., 'The Capability of Recurrent Neural Networks to Predict Turbulence Flow via Spatiotemporal Features', IEEE ICCC, 2022

[4] M. Riedel et al., 'Practice and Experience in using Parallel and Scalable Machine Learning with Heterogenous Modular Supercomputing Architectures', IEEE IPDPSW, 2021

[5] C. Barakat et al., 'Lessons learned on using High-Performance Computing and Data Science Methods towards understanding the Acute Respiratory Distress Syndrome (ARDS)', IEEE MIPRO, 2022

Current Status of the NCC – KPIs

Prof. Dr. – Ing. Morris Riedel, The University of Iceland

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#	KPI Short Description	Task	Current Value M28	Target Value M24/28
01	Performed training events for HPC, AI, and Big Data users to improve skills	33.2	15	8
02	Performed technology transfer events with specific topics addressed for SMEs	33.3	6	6
03	Number of industrial partners / SMEs interacted with	33.4	30	8
04	Number of companies (incl. SMEs) who ran pilots	33.4	3	2
05	Number of established Simulation and Data Labs	33.5	12	>10
06	Created coordination plans for sharing courses, content & best practices per year	33.2	4	2
07	Number of national HPC, AI, and HPDA infrastructure & NCC competence users	33.6	110	>75
08	Number of LUMI HPC, AI, and HPDA infrastructure & NCC competence users	33.6	6	>25
09	Number of completed surveys of collaborating academic & commercial partners	33.7	20	>10
10	Number of events attended to raise awareness of the NCC Iceland	33.7	11	>10
11	Number of Web page posts & social media posts from the NCC Iceland	33.7	110	>100
12	Number of best practices guides, NCC Iceland testimonials, and success stories	33.6	35	>25

The IHPC workshop series of NCC Iceland was key to success in many of the KPI activities

[7] EuroCC NCC Iceland Icelandic HPC (IHPC) Community Workshop Events

1st Icelandic HPC Community Workshop (2021-08-11)
https://ihpc.is/events/1st-icelandic-hpc-community-workshop

2nd Icelandic HPC Community Workshop (2021-10-28)
https://ihpc.is/events/2nd-icelandic-hpc-community-workshop/

3rd Icelandic HPC Community Workshop (2021-12-15)
https://ihpc.is/events/3rd-icelandic-hpc-community-workshop/

4th Icelandic HPC Community Workshop (2022-02-23)
https://ihpc.is/4th-icelandic-hpc-community-workshop/

5th Icelandic HPC Community Workshop (2022-04-25)
https://ihpc.is/events/5th-icelandic-hpc-community-workshop/

6th Icelandic HPC Community Workshop (2022-08-30)
https://ihpc.is/events/6th-icelandic-hpc-community-workshop/

7th Icelandic HPC Community Workshop (2022-10-27)
https://ihpc.is/events/7th-icelandic-hpc-community-workshop/

8th Icelandic HPC Community Workshop (2022-12-7)
https://ihpc.is/8th-icelandic-hpc-community-workshop/

Training: Publicly Accessible Lectures

YouTube

[8] YouTube Channel with HPC & Cloud Computing Courses

Murad Bayoun • 3 weeks ago
Great course thanks a lot, hope to see more contents related to HPC.

Orbit-fighter • 3 weeks ago
I would like to thank you to make your lectures on yt, appreciate it Prof.

Vincent Hus • 1 month ago
Thanks a lot for sharing this course! This really helps the world :)

Matt Kafker • 7 months ago 14 subscribers
Thank you very much for posting these lectures, professor! They are helping with my Ph.D. research.

Khadidja Bakhti • 5 months ago 2 subscribers
Nice lecture, thank you Professor.

Tom • 1 month ago 28.7K subscribers
Beautifull

Antonis Polykratis • 1 month ago 13 subscribers
Super interesting curriculum. Thanks prof.

Current Status of the NCC

Prof. Dr. – Ing. Morris Riedel, The University of Iceland

- Increased number of HPC/AI users
  - Enabled national/EU access to HPC
- Interactions with Industry work well
  - Example: SME Mideind ehf
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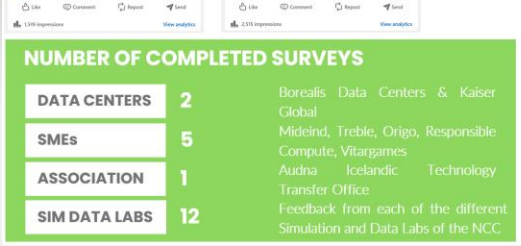
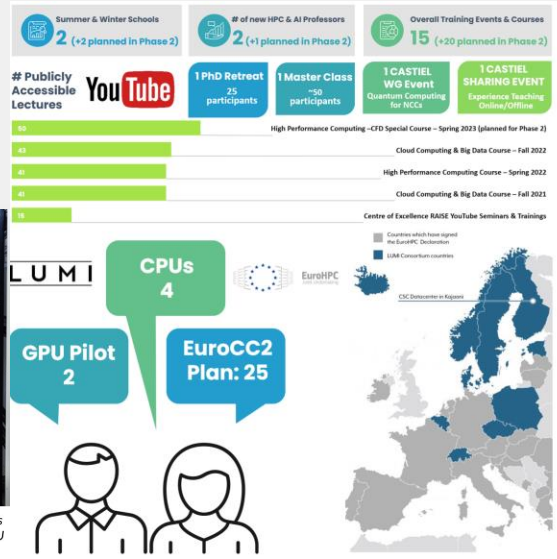


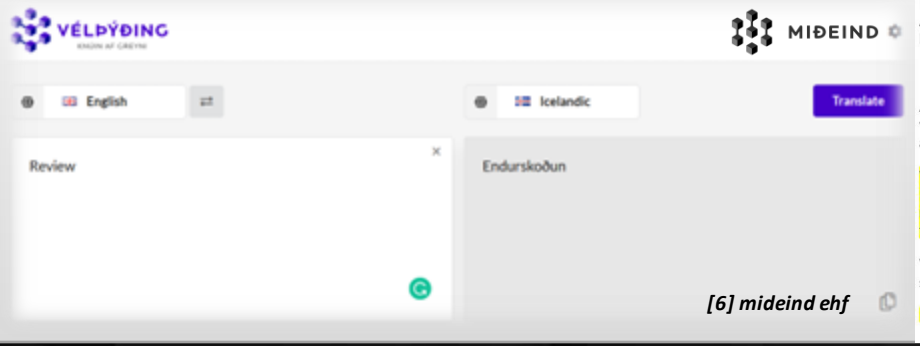


HPC-Elja : Available Partitions / Compute Nodes

Count	Name	Cores/Node	Memory/Node (Gib)	Features
28	48cpu_192mem	48 (2x24)	192 (188)	Intl Gold 6248R
55	64cpu_256mem	64 (2x32)	256 (252)	Intl Platinum 8358
4	128cpu_256mem	128 (2x64)	256 (252)	AMD EPYC 7713
3	gpu-1xA100	64 (2x32)	192 (188)	Nvidia A100 Tesla GPU
5	gpu-2xA100	64 (2x32)	192 (188)	Dual Nvidia A100 Tesla GPU

HTC-Mimir : Available Partitions / Compute Nodes

Count	Name	Cores/Node	Memory/Node (Gib)	Features
9	mimir	64 (2x32)	256 (252)	
1	mimir-himem	64 (2x32)	2048 (2044)	



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Quantum Simulation and Data Science Lab

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An Overview of the European HPC Strategy and Highlights from the Icelandic HPC Communities

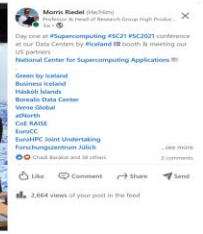
Dr. Hemanadhan Myneni
Research Assistant Professor, Department of Computer Science, University of Iceland
Head of Quantum Simulation and Data Science Lab, Part of NCC Iceland

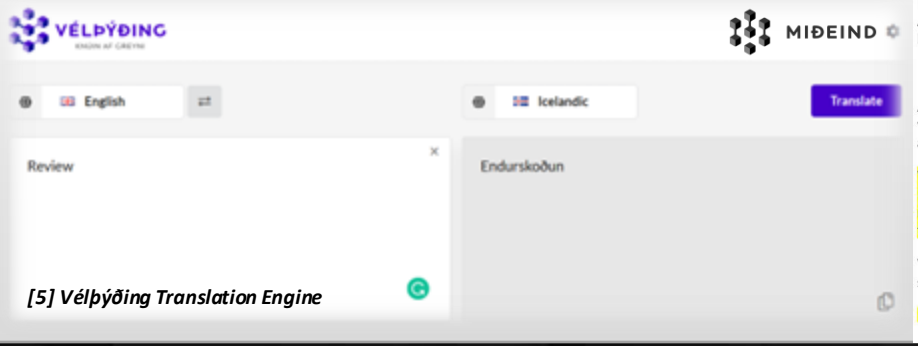
Summer school on "High Performance and Disruptive Computing in Remote Sensing",
29 May - 1 June, 2023, Reykjavik, Iceland
Talk: May 29, 2023

“AI at Scale Applications“ Example Large Language Models

- Large Language Model & OpenAI / GPT-4
  - Example: SME Mideind ehf
  - Natural Language Processing (NLP) SME & NCC Iceland Simulation & Data Lab NLP
  - Develop ‘google translate‘ that works
  - Submitted joint EU proposal using AI on HPC
- CoE RAISE Unique AI Framework (UAIF)
  - Selected Building Blocks used for AI on HPC

[4] mideind ehf





[5] Vélþýðing Translation Engine

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