

# Our HPC Cluster



## Compute nodes (12x)

- 2x INTEL Xeon Gold 6248, 2.5GHz, 20C/40T
- 192/768GB RDIMM, 2933MT/s
- 480GB SSD
- Broadcom 10Gbit/s Base-T
- INTEL Omni-Path Host Fabric Adapter

## Login node

- 2x INTEL Xeon Gold 5217, 3.0GHz, 8C/16T
- 128GB RDIMM, 2666MT/s
- 24X 2TB SAS
- PERC H730P+ RAID Controller
- Broadcom 10Gbit/s Base-T
- INTEL Omni-Path Host Fabric Adapter

## Network switches

- S4148T-ON 48x 10GBase-T, 10Gbit/s
- H1024-OPF 24x Omni-Path, 100Gbit/s

# HPC Cluster Access: Login

- You will receive your access credentials via email: username (nssc\_lastname) and password
- Every user is linked to the TISS user: You are identifiable.
- To access the cluster:
  1. Establish a TU Wien VPN connection (also when already on TU Wien network)
  2. Use ssh and your credentials to access the cluster's login node

```
$ ssh nssc_doe@tcad30.iue.tuwien.ac.at
```

  - Enter your initial password
  - You will be asked to change your password upon first login →
    - Provide again your initial password → afterwards the new password → needs to be repeated.

# HPC Cluster Access: File Transfer

## File transfer via scp

- Transfer file (`some_file`) to your home directory on the cluster:

```
$ scp some_file nssc_doe@tcad30.iue.tuwien.ac.at:
```

- Transfer folder (`some_folder`) to your home directory on the cluster:

```
$ scp -r some_folder nssc_doe@tcad30.iue.tuwien.ac.at:
```

- Transfer file (`some_file`) from your home directory on the cluster to a specific directory (`/path/`) on your machine:

```
$ scp nssc_doe@tcad30.iue.tuwien.ac.at:some_file /path/
```

- Transfer folder (`some_folder`) from your home directory on the cluster to a specific directory (`/path/`) on your machine:

```
$ scp -r nssc_doe@tcad30.iue.tuwien.ac.at:some_folder /path/
```

# HPC Cluster Access: Job Submission

- The login server is used for compilation, job submission, and data exchange platform.
  - Shared file system with compute nodes
  - Same software environment as compute nodes
- **The login server must not be used for job execution: Every exercise submission must include a functioning SLURM script**
- To schedule the execution of your program:
  1. Compile as usual (preferably with a build tool, e.g., Makefile).
  2. Setup a job submission script (which tells the job submission manager which executable is to be executed and how).
  3. Submit the job submission script and wait for completion.

# HPC Cluster Access: Job Submission Script

- Submit the job with:

```
$ sbatch submit_script.sh
```

Note that terminal output will be written continuously into the file `slurm-JOBID.out` file. Read it with, e.g., `less`, `vim`. For realtime file update read access use:

```
$ tail -f slurm-JOBID.out
```

- Show current job queue for your user:

```
$ squeue -u nssc_username
```

- Cancel a specific job from your queue (JOBID number from squeue output):

```
$ scancel JOBID
```

- Cancel of your jobs

```
$ scancel -u nssc_username
```

# HPC Cluster Access: Job Submission Script

## Hints:

- You can submit several jobs at once – one script and submission per job. For instance, submit 4 jobs to execute 4 different benchmarks (e.g. different thread numbers).
- Alternatively, you can also execute several programs (one after the other) in a single job submission script (.e.g. two executions where you provide different resolutions as input parameters) – see example `submit_script.sh` in handouts.
- If your job takes longer than specified (see `-time` parameter), then the job is being automatically aborted: Make sure you estimate reasonably!

# HPC Cluster Development

## Best practices

- **Develop code on your local machine**
- **Test with small thread sizes on your local machine**
- **When ready, move to cluster:**
  - **Transfer source code and build file to cluster**
  - **Compile on the cluster (g++ 8.2.1 is the default compiler)**
  - **Setup job submission script**
  - **Submit job (aka execute application on cluster)**
  - **Collect data (e.g. output files) and transfer to your local machine for analysis**

# Topology

## Login Node

User: **tcad30.iue.tuwien.ac.at**

*ssh / scp*

*Slurm Workload Manager  
requires active TUV-VPN*



**Shared Filesystem**

## Compute Nodes



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