

# Introduction to PDC

Centre for high performance computing

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# What is PDC?

- A supercomputing centre founded in 1990
  - SNIC centre(SNIC > Swedish National Infrastructure for Computing)
  - Under administration of School of Electrical Engineering and Computer Science (EECS) at KTH
- Providing high performance computing (HPC) services for academic and business/industrial research.
  - Services include HPC systems for performing computations and simulations (as well as pre- and post-processing of data), short- and long-term data storage, and assistance from application and systems experts

# HPC Systems

- Beskow:
  - Cray XC40 system
  - Intel Haswell and Broadwell processors
  - Designed for running large parallel jobs
- Tegner
  - Pre and post processing system for Beskow
  - Intel CPUs + NVIDIA Tesla GPUs
  - 24 cores per node
  - Has large memory nodes: 0.5-1-2 TB
  - Will be used for OpenFOAM training
- Dardel
  - New system of PDC arrived a few months ago!
  - Dual AMD EPYC™ 2.25 GHz 64 core processor
  - AMD Instinct™ MI200 GPUs



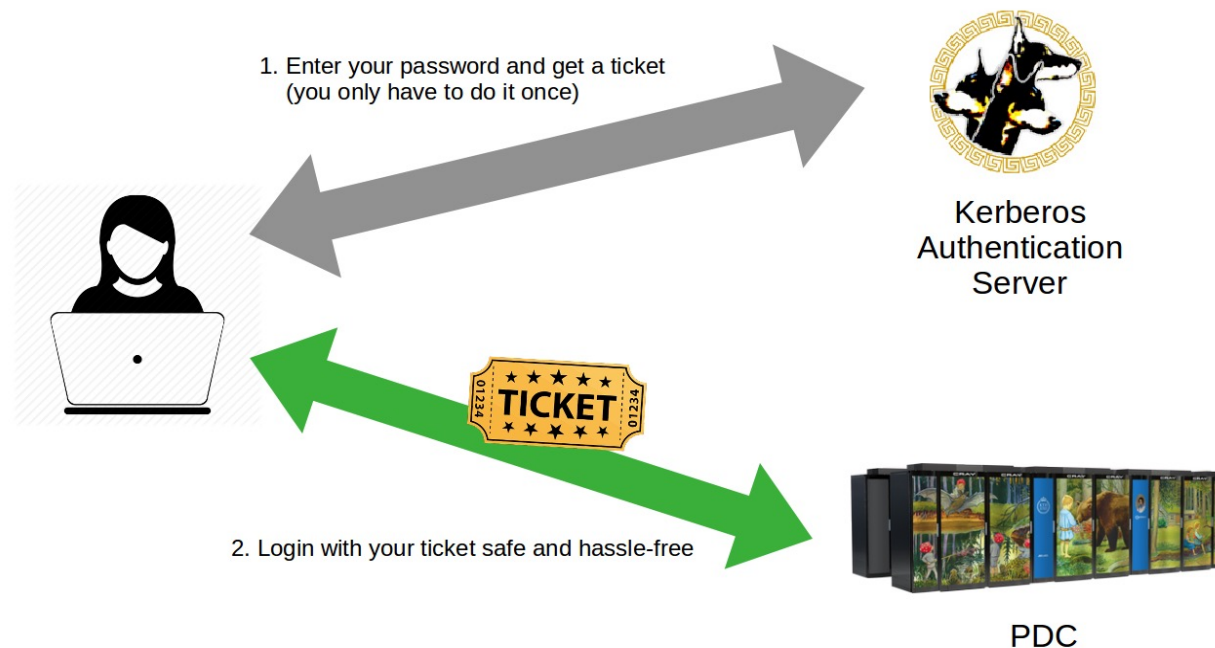


# Dardel Compute nodes

Number of nodes	RAM (GB)	Name
488	256	Thin
20	512	Large
8	1024	Huge
2	2048	Giant
36	256	Business

# Getting started with Tegner

How to login: two step login using Kerberos ticket



```
Kinit -f <username>@NADA.KTH.SE  
ssh -X <username>@tegner.pdc.kth.se
```



# Getting started with Tegner

## How to login

- Apply for a PDC account!
  - <https://pdc-web.eecs.kth.se/accounts/>
  - Receive your password by SMS
- Follow steps in:  
<https://www.pdc.kth.se/support/documents/login/login.html#step-by-step-login-tutorial>
- Contact PDC support in case of login issues:  
[support@pdc.kth.se](mailto:support@pdc.kth.se)



# OpenFOAM on Tegner

- Once logged in, you will be on your home directory:  
`/afs/pdc.kth.se/home/<letter>/<username>`

```
[arash2@tegner-login-1 ~]$ pwd  
/afs/pdc.kth.se/home/a/arash2  
[arash2@tegner-login-1 ~]$
```

All the operations will be performed on your home directory

- All the software on Tegner are available through modules
- You need to load a module to your environment to access it





# How to run OpenFOAM on Tegner

- You are already on the 'login node' and do not have access to the compute resources. You need to request a compute node:
- Request a compute node using 'salloc' command

```
$ salloc -N 1 -t 03:00:00 -A edu21.opfm
```

Number of nodes

Time

Account

15 nodes are reserved for this course. Each compute node has 24 cores

- You should see Something like this once you're granted a compute node:

```
salloc: Pending job allocation 63554
salloc: job 63554 queued and waiting for resources
salloc: job 63554 has been allocated resources
salloc: Granted job allocation 63554
```





# How to run OpenFOAM on Tegner

- Try to login to the compute node

```
$ echo $SLURM_NODENAME
```

- Name of compute node will be printed

```
$ ssh -X <username>@<compute node>.pdc.kth.se
```

- Example

```
$ ssh -X arash2@t02n01.pdc.kth.se
```

# OpenFOAM on Tegner

- Run ‘**module avail openfoam**’ to see which versions are available:

```
[arash2@t02n01 ~]$ module avail openfoam

----- /pdc/modules/system/base -----
openfoam/1612+ openfoam/1712 openfoam/1812 openfoam/2.3.1 openfoam/5.0 openfoam/7
openfoam/1706 openfoam/1806 openfoam/1912 openfoam/4.1 openfoam/6
[arash2@t02n01 ~]$
```

- Run ‘**module load openfoam/1912**’
- Run ‘module list’ to see the loaded modules and make sure OpenFOAM is loaded:

```
[arash2@t02n01 ~]$ module list
Currently Loaded Modulefiles:
  1) gcc/7.2.0                2) openmpi/3.0-gcc-7.2      3) openfoam/1912
[arash2@t02n01 ~]$
```



# OpenFOAM on Tegner

- Now you have access to OpenFOAM on Dardel!
- You need to run a script to set some environment variables and paths for OpenFOAM:

```
. $FOAM_BASHRC
```

- Copy OpenFOAM tutorials to your home directory:

Now You're ready for the analysis! You have Necessary files on your home directory

```
$ cp -r $WM_PROJECT_DIR/tutorials .
```

# How to run OpenFOAM on Tegner

- To run your job you use **srun** command:

```
$ mpirun -n 24 icoFoam -parallel
```

Number of cores

OpenFOAM  
binary

OpenFOAM  
option



# How to run OpenFOAM on Tegner

- Jobs can also be submitted through a batch script from the login node:

```
#!/bin/bash
#SBATCH -J mytest
#SBATCH -t 1:00:00
#SBATCH -A edu21.opfm
#SBATCH --nodes=1
module load openfoam/1912
. $FOAM_BASHRC
mpirun -n 24 icoFoam -parallel > my_output_file 2>&1
```

- Submit with 'sbatch' command'

```
$sbatch <name of the script>
```



# How to run OpenFOAM on Tegner

- Use 'squeue' command to see your job status

```
$squeue -u <username>
```

- The output will look like this:

JOBID	PARTITION	NAME	USER	ST	TIME	NODES	NODELIST(REASON)
1059071	main	my_job	arash2	R	0:08	1	t02n01

- Use 'scancel' command to cancel your job

```
$scancel <job-ID>
```



Good luck with the computations!