

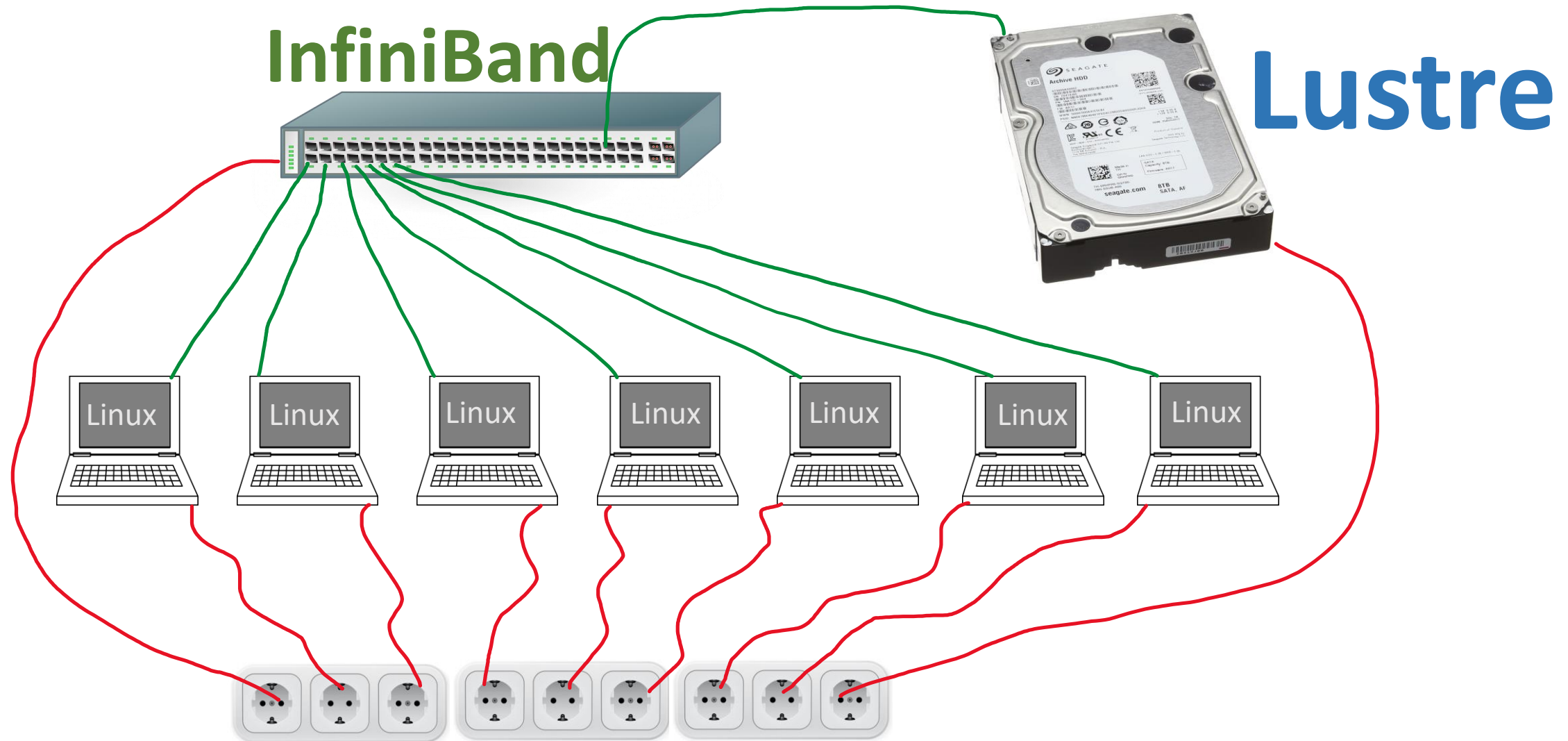
IDUN

IDUN Research Infrastructure

IDUN – Shared Resource Infrastructure

- A joint effort between NTNU IT department and faculties, institutes and research groups
- Partners buy into the machine, according to HPC group specifications, guaranteed share+optional available resources, plus support for either 3 or 5 years.
- IT department provides personell and infrastructure (network, storage, queueing system)

What is HPC cluster? – (High Performance Computing)



Idun documentation

- <https://www.hpc.ntnu.no>

The screenshot shows the website for the NTNU High Performance Computing Group. At the top left is the NTNU logo and the text "High Performance Computing Group". At the top right are navigation links for "System Status & News" and "Documentation". The main heading is "Support". Below this is a table with two columns: "System" and "Email/Topdesk". The table lists contact information for "Vilje/Fram/Saga/Betzy/NIRD" and "Idun". To the right of the table is a search bar. Below the search bar is a "SHORTCUTS" section with a list of links, including "Idun", "How to get access to Idun", "Become a shareholder and partner in Idun", "Getting started on Idun", "Hardware", "Acknowledgment", "Vilje", "Support", "Training", and "Mimes Brønn". Below this is a "RECENT POSTS" section with a list of recent articles. At the bottom right is a "META" section with links for "Log in", "Entries feed", "Comments feed", and "WordPress.org".

NTNU
High Performance Computing Group

System Status & News ▾ Documentation ▾

Support

System	Email/Topdesk
Vilje/Fram/Saga/Betzy/NIRD	support@metacenter.no
Idun	help@hpc.ntnu.no Operatørgruppe: IT Utvikling Forskningsstøtte

• [Twitter](#)
• [Facebook](#)
• [Innsida channel](#)

Physical meetup

Sluppen:
[Sluppenveien 12, 3th floor, IT-drift.](#)

Gløshaugen:
[Mimes Brønn](#)

[2-105A \(2.etasje\) Materialtekniske laboratorier, Trondheim.](#)

Search ... 🔍

SHORTCUTS

- [Idun](#)
 - [How to get access to Idun](#)
 - [Become a shareholder and partner in Idun](#)
 - [Getting started on Idun](#)
 - [Hardware](#)
 - [Acknowledgment](#)
- [Vilje](#)
- [Support](#)
- [Training](#)
- [Mimes Brønn](#)

RECENT POSTS

- [Master thesis on detecting offensive and hateful language](#)
- [PROXMOX \(Debian 10, KVM\) enabling SR-IOV for Mellanox Infiniband cards](#)
- [References and Acknowledgements](#)
- [Unplanned Idun Downtime](#)
- [Idun Upgrades and Changes](#)

META

- [Log in](#)
- [Entries feed](#)
- [Comments feed](#)
- [WordPress.org](#)

Youtube channel

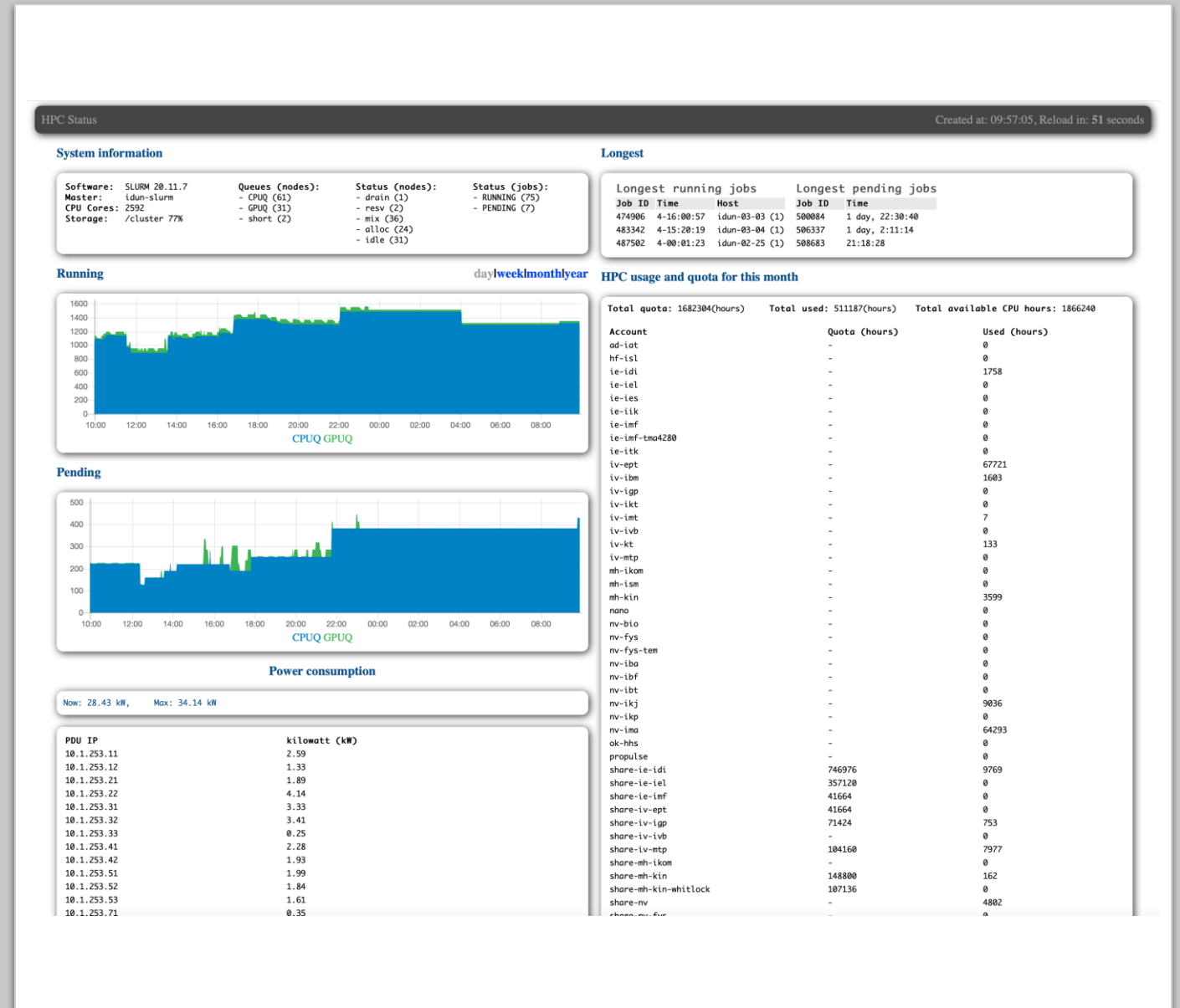
- <https://www.youtube.com/channel/UCA-MnuZtAC-weFBvRjPVCOA/videos>

The screenshot shows the YouTube channel page for 'NTNU High Performance Computing'. The channel has 3 subscribers. The page is organized into a grid of video thumbnails. The left sidebar contains navigation options: Home, Explore, Subscriptions, Library, and History. Below these are options to sign in and a 'BEST OF YOUTUBE' section with categories like Music, Sports, Gaming, Movies, News, Live, and 360° Video. The main content area displays a grid of video thumbnails with titles, view counts, and upload dates. The videos are primarily tutorials on how to use the IDUN HPC cluster from various operating systems and how to run MPI jobs.

Video Title	Views	Upload Date
How to create singularity x86 container on Mac with M1 processor	23 views	3 weeks ago
Environment modules on IDUN HPC cluster	93 views	5 months ago
How to use VNC on IDUN HPC cluster from Linux	32 views	5 months ago
How to use VNC on IDUN HPC cluster from macOS	30 views	5 months ago
How to use VNC on IDUN HPC cluster from Windows	60 views	5 months ago
How to run MPI jobs on IDUN HPC cluster	32 views	5 months ago
Idun HPC cluster How to login from macOS	31 views	5 months ago
How to login IDUN HPC cluster from Windows	87 views	5 months ago
How to login IDUN HPC cluster from Linux	39 views	5 months ago

Idun status

- <http://idun.hpc.ntnu.no>



Hardware on Idun

Processors (2784 cores):

- AMD EPYC 7543 32-Core Processor
- Intel(R) Xeon(R) CPU E5-2630 v4 @ 2.20GHz
- Intel(R) Xeon(R) CPU E5-2650 v4 @ 2.20GHz
- Intel(R) Xeon(R) CPU E5-2695 v4 @ 2.10GHz
- Intel(R) Xeon(R) Gold 6132 CPU @ 2.60GHz
- Intel(R) Xeon(R) Gold 6148 CPU @ 2.40GHz
- Intel(R) Xeon(R) Gold 6226 CPU @ 2.70GHz
- Intel(R) Xeon(R) Gold 6242 CPU @ 2.80GHz
- Intel(R) Xeon(R) Gold 6252 CPU @ 2.10GHz

Memory sizes:

- 55 GB
- 128 GB
- 192 GB
- 385 GB
- 772 GB
- 1031 GB
- 2063 GB

GPUs:

- 50 x P100
- 14 x V100 (16 GB)
- 26 x V100 (32 GB)
- 48 x A100 (40 GB)
- 26 x A100 (80 GB)

- 4 x FPGA (Xilinx)

NTNU VS Sigma2

Idun

Fram

Betzy

Saga

NIRD storage services

NIRD tool kit (<https://apps.sigma2.no>)

Hot to login IDUN HPC cluster

- Connect NTNU network
 - via SSH
 - `ssh -X -l username login.stud.ntnu.no`
 - `ssh -X -l username login.ansatt.ntnu.no`
 - via VPN
 - <https://innsida.ntnu.no/wiki/-/wiki/English/Install+vpn>
- Connect IDUN login server
 - `ssh -X -l username idun-login1.hpc.ntnu.no`
 - `ssh -X -l username idun-login2.hpc.ntnu.no`

Storage

- /cluster/home/Your_Login_Name/ - start directory after login
- /cluster/work/Your_Login_Name/ - recommended directory for files

Important: No Backups for files

Module

list loaded modules:

module list

load foo module:

module load foo

find all modules:

module avail

find foo module:

module avail foo

show description:

module whatis foo

unload all modules:

module purge

Module

```
hpcuser@idun-login1:~
Where:
H: Hidden Module

[hpcuser@idun-login1 ~]$ python -V
Python 2.7.18
[hpcuser@idun-login1 ~]$ module purge
[hpcuser@idun-login1 ~]$ module list
No modules loaded
[hpcuser@idun-login1 ~]$ module load Python/3.8.6-GCCcore-10.2.0
[hpcuser@idun-login1 ~]$ module list

Currently Loaded Modules:
 1) GCCcore/10.2.0
 2) zlib/1.2.11-GCCcore-10.2.0 (H)
 3) binutils/2.35-GCCcore-10.2.0 (H)
 4) bzip2/1.0.8-GCCcore-10.2.0 (H)
 5) ncurses/6.2-GCCcore-10.2.0 (H)
 6) libreadline/8.0-GCCcore-10.2.0 (H)
 7) Tcl/8.6.10-GCCcore-10.2.0
 8) SQLite/3.33.0-GCCcore-10.2.0 (H)
 9) XZ/5.2.5-GCCcore-10.2.0 (H)
10) GMP/6.2.0-GCCcore-10.2.0 (H)
11) libffi/3.3-GCCcore-10.2.0 (H)
12) Python/3.8.6-GCCcore-10.2.0

Where:
H: Hidden Module

[hpcuser@idun-login1 ~]$ python -V
Python 3.8.6
```

Containers and notebooks

- Supported container formats
 - Podman
 - Singularity
 - Docker (convert to singularity)
- Jupyter notebook
 - Tutorial, example setup:
 - <https://www.hpc.ntnu.no/idun/getting-started-on-idun/lessons-from-a-former-masters-student/>

What is Slurm?

- Main application on HPC cluster. It controls where jobs are running.

Bash basics

File bash_script.sh

```
$ cat bash_script.sh
#!/bin/bash
# this line is a comment
##### this line is a comment as well
echo "Hello World"
python3 my_script.py
```

```
$ bash bash_script.sh
```

```
$ chmod +x ./bash_script.sh
```

```
$ ./bash_script.sh
```

Slurm script basics

```
$ cat my_job_script.slurm
#!/bin/bash
#SBATCH --partition=CPUQ
#SBATCH --account=share-nv-fys
#SBATCH --time=00:05:00
#SBATCH --ntasks=1
#SBATCH --mem=12000 # Default units are megabytes.
#SBATCH --job-name="hello_test"
#SBATCH --output=hello_test.out
#SBATCH --mail-user=<your_email@ntnu.no>
#SBATCH --mail-type=ALL
module purge
module load Python/3.8.6-GCCcore-10.2.0
python -V
```


Run slurm script

```
[idun-login1 ~]$ sbatch my_job_script.slurm  
Submitted batch job 1060210
```

```
[idun-login1 ~]$ squeue -u your_login_name
```

JOBID	PARTITION	NAME	USER	ST	TIME	NODES	NODELIST (REASON)
1060210	short	hello_te	pavlokh	PD	0:00	1	(None)

```
[idun-login1 ~]$ scontrol show job 1060210  
JobId=1060210 JobName=hello_test  
  UserId=hpcuser(1313333) GroupId=ntnudefault(1000) MCS_label=N/A  
  Priority=3037918 Nice=0 Account=support QOS=highest  
  JobState=COMPLETED Reason=None Dependency=(null)  
  . . . .  
  . . . .
```

```
[idun-login1 ~]$ cat hello_test.out  
Python 3.8.6
```

MPI USE CASE

```
#!/bin/sh
#SBATCH --partition=CPUQ
#SBATCH --account=<account>
#SBATCH --time=00:15:00
#SBATCH --nodes=2           # 2 compute nodes
#SBATCH --ntasks-per-node=1 # 1 mpi process each node
#SBATCH --mem=12000        # 12 GB
#SBATCH --job-name="hello_test"
#SBATCH --output=test-srun.out
#SBATCH --mail-user=<email>
#SBATCH --mail-type=ALL
module purge
module load intel/2020b
module list
mpirun myprogram
```

GPU USE CASE

```
#!/bin/sh
#SBATCH --partition=GPUQ
#SBATCH --account=<account>
#SBATCH --time=00:30:00
#SBATCH --nodes=2
#SBATCH --ntasks-per-node=2
#SBATCH --gres=gpu:1
#SBATCH --job-name="LBM_CUDA"
#SBATCH --output=lbm_cuda.out
```

```
module purge
module load fosscuda/2018b
mpirun hostname
```

```
mpirun ./my cudacode
```

```
--gres=gpu:P100:2
--gres=gpu:V100:6
--gres=gpu:V10032:1
--gres=gpu:A100:2
```

Interactive Job

```
[idun-login1 ~]$ srun --nodes=1 --partition=CPUQ --time=00:02:00 --pty bash  
[idun-90-01 ~]$ whoami  
hpcuser
```

Cancel job

One job

```
$ scancel 1111111111111111
```

All my jobs

```
$ scancel -u my_login_name
```

Slurm partitions

CPUQ – for jobs to run on CPU

GPUQ – for jobs to run on GPU

short – for test jobs to test job scripts. Has GPU P100

```
[username@idun-login1 ~]$ sinfo
```

PARTITION	AVAIL	TIMELIMIT	NODES	STATE	NODELIST
CPUQ*	up	7-00:00:00	6	resv	idun-02-[23-26],idun-06-[05-06]
CPUQ*	up	7-00:00:00	7	mix	idun-03-[14,16,24,27,29,31-32]
CPUQ*	up	7-00:00:00	48	alloc	idun-02-[01-22,27],idun-03-[01-13,15,17-23,25-26,28,30]
GPUQ	up	7-00:00:00	29	mix	idun-04-[01-17],idun-05-[01-05,08],idun-06-[01-02,04,07-09]
GPUQ	up	7-00:00:00	2	alloc	idun-05-[06-07]
GPUQ	up	7-00:00:00	3	idle	idun-05-[09-10],idun-06-03

Transferring Data

- <https://www.hpc.ntnu.no/idun/getting-started-on-idun/transferring-data>

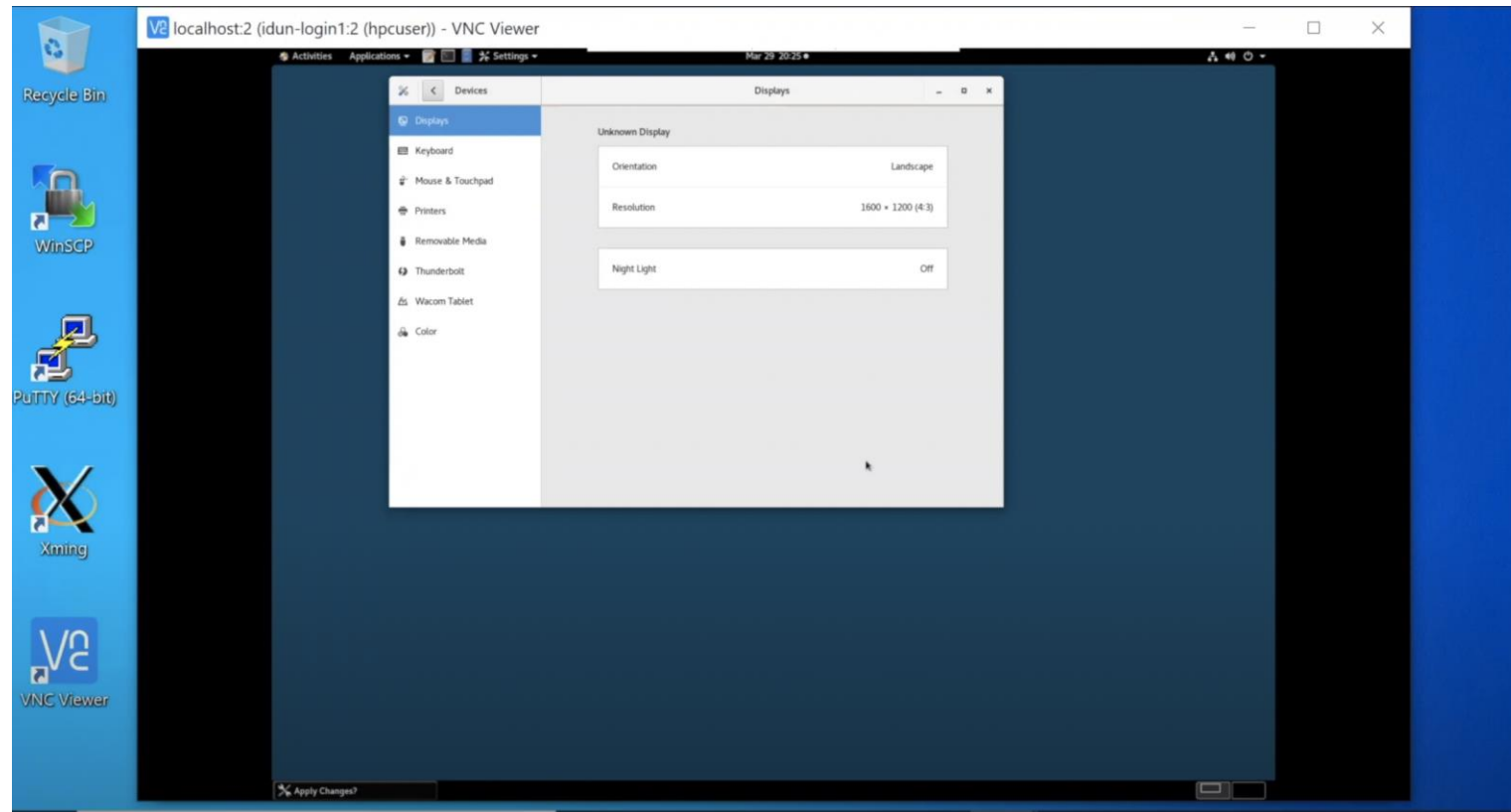
Linux? Mac? Windows?

- Use scp or sftp command
- Use WinSCP or FileZilla
- Use Windows share on server idun-samba1.hpc.ntnu.no

VNC

<https://www.youtube.com/watch?v=aXD1ZRg2Ado>

<https://www.hpc.ntnu.no/idun/getting-started-on-idun/vnc>



Support

help@hpc.ntnu.no

Diskcord:

<https://discord.gg/TWzWKAcu>



Night mode