

Lab1: CPU Cluster

TAIWANIA 3 (台灣杉三號)

- 900 Nodes
- CPU: Intel Xeon 8280L (28 cores) * 2
- Memory: DDR4 384 GB
- Intranet: 100Gbps Infiniband
- Operated by: 國家高速網路與計算中心,
National Center for High-Performance Computing (NCHC)

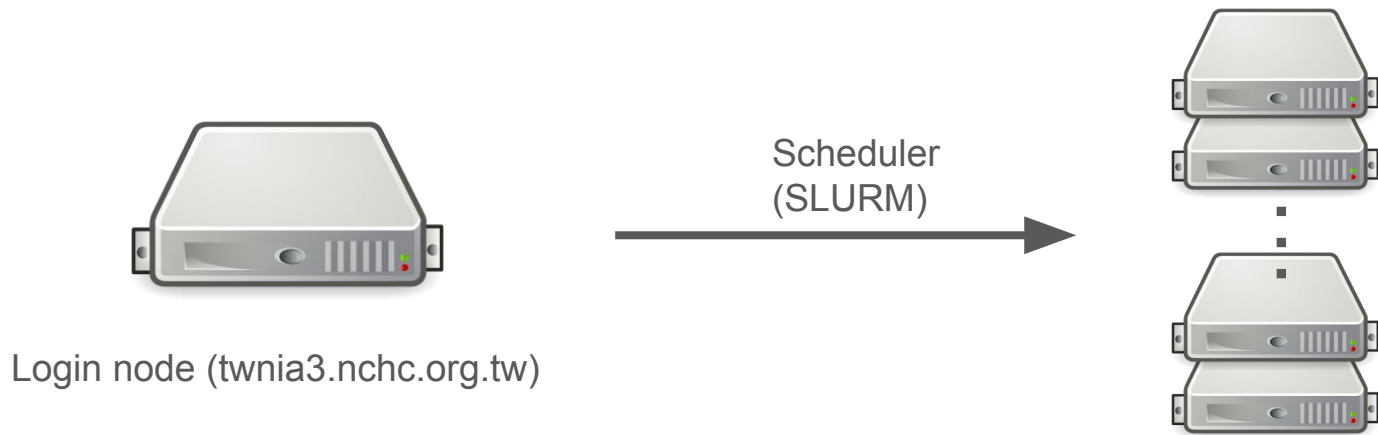
項目	描述	數量
CPU	Intel® Xeon® Platinum 8280L 28 Cores 2.7GHz	2
記憶體	ECC DDR4 2933 Mhz	384GB/768GB (注)
高速網路	Mellanox InfiniBand HDR100	1

Software

- OS: CentOS x86_64 7.8
- Compilers: GCC, Intel Compiler...
 - The libraries and compilers are managed by [Module](#), which is a tool that allows loading and unloading specific binary.
- Scheduler: **SLURM**

Available resources

- 1 login node (twnia3.nchc.org.tw)
- Hundreds of compute nodes (we will not use that much)
- Use **squeue** to view SLURM usage



Login to TAIWANIA3

- Address: **twnia3.nchc.org.tw**
- Username: The username the one you registered in **iService**

SSH

- `ssh <username>@twnia3.nchc.org.tw`
- TAIWANIA 3 requires 2FA
- Please refer to this [link](#) to set it up
- Your account is disabled until we add you into our course project

```
[kappa7077@BookMac ~ % ssh kappa7077@twnia3.nchc.org.tw
(kappa7077@twnia3.nchc.org.tw) Please select the 2FA login method.
1. Mobile APP OTP
2. Mobile APP PUSH
3. Email OTP
Login method: 1
(kappa7077@twnia3.nchc.org.tw) Password:
(kappa7077@twnia3.nchc.org.tw) OTP: 292384
[PASS] The OTP verification succeeded.
```

```
-----
Welcome to NCHC Taiwania III
```

VScode remote tunnel

- If you do not want to enter password and OTP code once the window is reloaded, you can refer to <https://code.visualstudio.com/docs/remote/tunnels>

Job submission

SLURM workload scheduler: On a cluster system, there are multiple users and multiple nodes. SLURM schedules jobs submitted by users across different nodes, so that the same resource is not used by two jobs at the same time (to ensure accuracy of performance-critical experiments), and also ensure the utilization of the cluster.

SLURM prefer the following jobs:

- short jobs (you can set time limit)
- less resource demanding jobs
- jobs queued for a long time
- users that haven't run a lot of jobs recently

Job submission using srun

- `srun [options] ./executable [args]`
- Options:
 - `-N NODES`: the number of nodes to run the job
 - `-n PROCESSES`: the number of **total processes** to launch
 - `-c CPUS`: CPUS is the number of cpus available to each process
 - `-t TIME`: The time limit in "minutes" or "minutes:seconds"
 - `-J NAME`: The name of the job. Will be displayed on queue
 - `-A PROJECT_ID`: The ID of the project. In this course, the project ID is **ACD114118**

srun - submit jobs

```
srun -A ACD114118 ./a.out
```

→ run a.out via Slurm

```
srun -A ACD114118 -c4 ./a.out
```

→ Give 4 CPU resources to a.out

```
srun -A ACD114118 -n3 ./a.out
```

→ Execute 3 a.out processes

```
srun -A ACD114118 -n4 -c2 ./a.out
```

→ Execute 4 a.out processes, with 2 CPUs allocated to each process.

Total: 8 CPUs

srun - submit jobs

```
srun -A ACD114118 -N 2 -n 2 hostname
```

→ run 2 processes on 2 nodes (1 process per node)

```
[kappa7077@lgn303 lab1]$ srun -A ACD114118 -N 2 -n 2 hostname  
srun: No partition specified, setting to default partition 'ctest'  
srun: User kappa7077 Account ACD114118 wallet has 3997.8277 remaining.  
srun: job 16535307 queued and waiting for resources  
srun: job 16535307 has been allocated resources  
cpn3850  
cpn3849
```

```
srun -A ACD114118 -N 1 -n 2 hostname
```

→ run 2 processes on 1 node

```
[kappa7077@lgn303 lab1]$ srun --quiet -A ACD114118 -N 1 -n 2 hostname  
cpn3050  
cpn3050  
[kappa7077@lgn303 lab1]$ |
```

Job submission using sbatch

- Using sbatch command to submit jobs in the background
- You can write a simple script to do that

```
#!/bin/bash  
#SBATCH -n 4  
#SBATCH -N 2  
#SBATCH -A ACD114118  
srun ./hello
```

- `$ sbatch script.sh`

Job control

- `sinfo`: view status of nodes
- `squeue`: view submitted jobs in queue
- `scancel JOBID`: cancel a job with its JOBID

Lab Spec

- `cp -r /work/kappa7077/pp25/lab1 ~/`
- `cd lab1 && source env.sh`
- Fill in this [Google form](#)
- Due 2025/09/19 23:59

Useful Information

- 服務概觀: <https://man.twcc.ai/@TWCC-III-manual/H1bEXeGcu>
- Module Tutorial: <https://man.twcc.ai/@TWCC-III-manual/ryDQk2yKO>