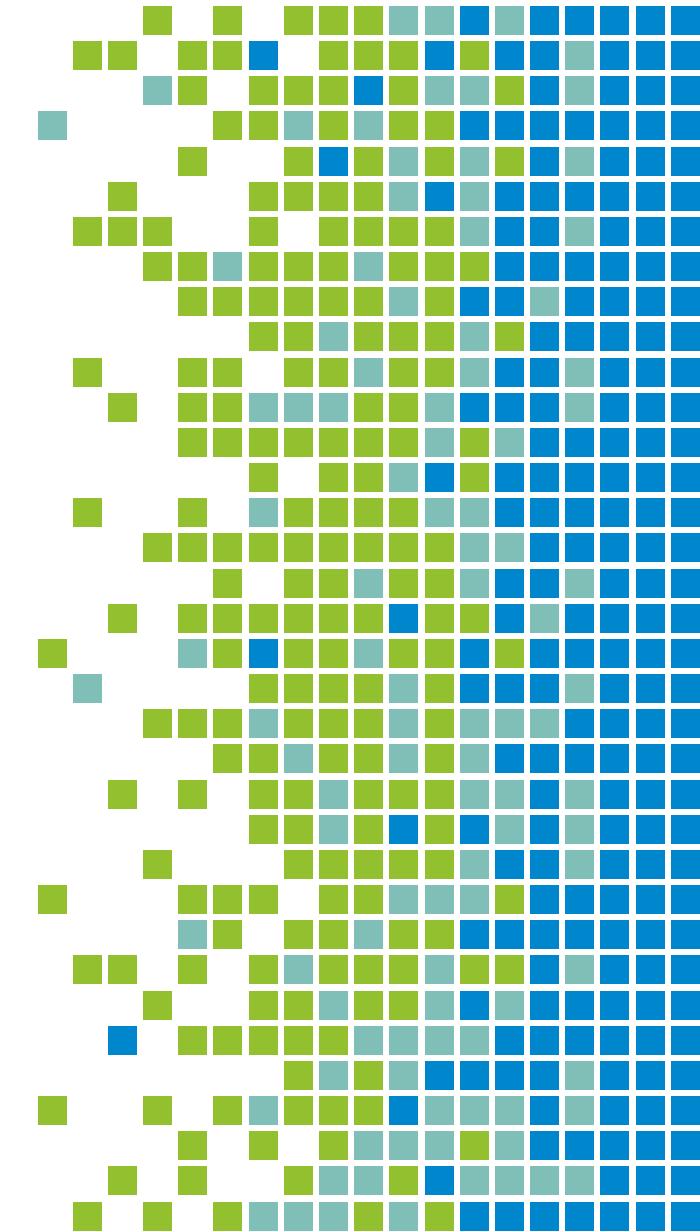


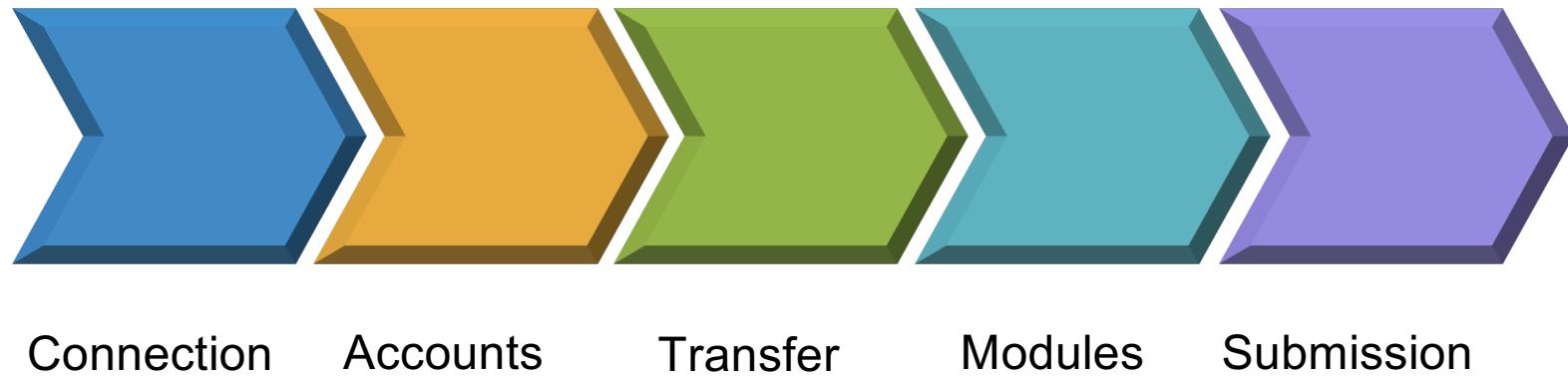


Introduction to HPC

Instructors: Goar Sanchez & Adam Ralph



Roadmap today



Roadmap today



Connection

Accounts

Transfer

Modules

Submission



- How to ssh
- SSH-Keys
- Login & Compute nodes

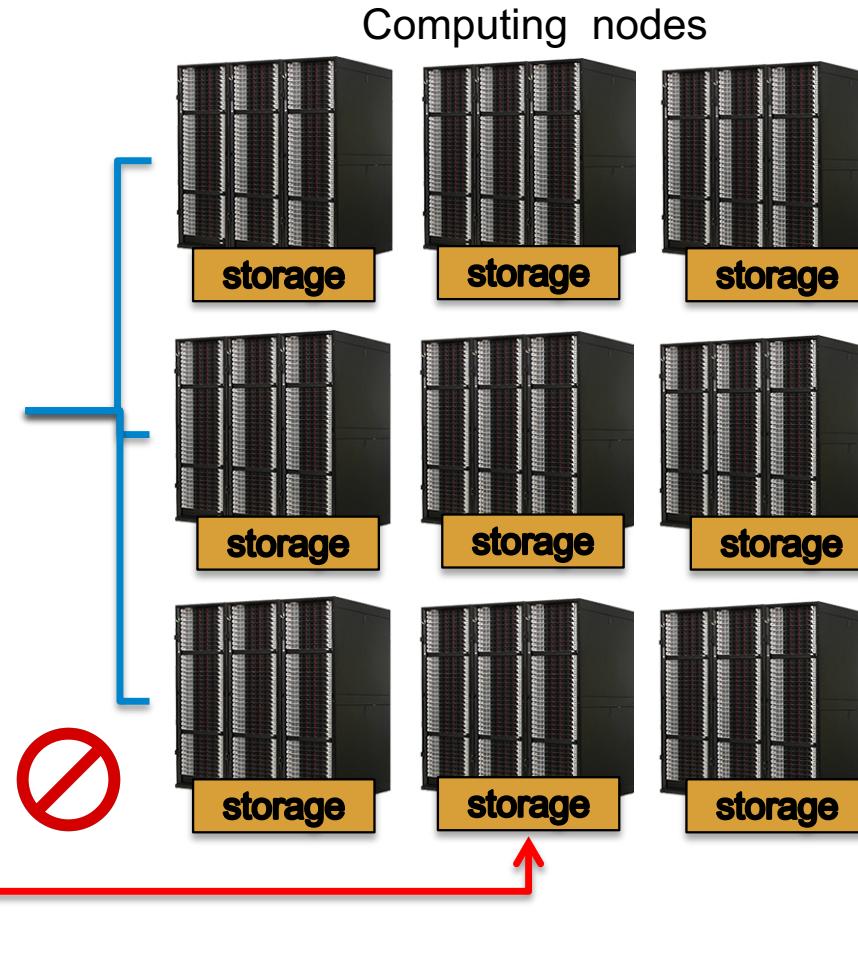
Kay: Login & Compute Nodes



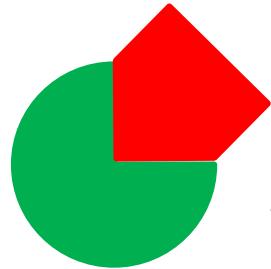
>
_
SSH



Login nodes
kay.ichec.ie



Generate the ssh-key



ssh-keys

Private: id_ed25519

Public: id_ed25519.pub



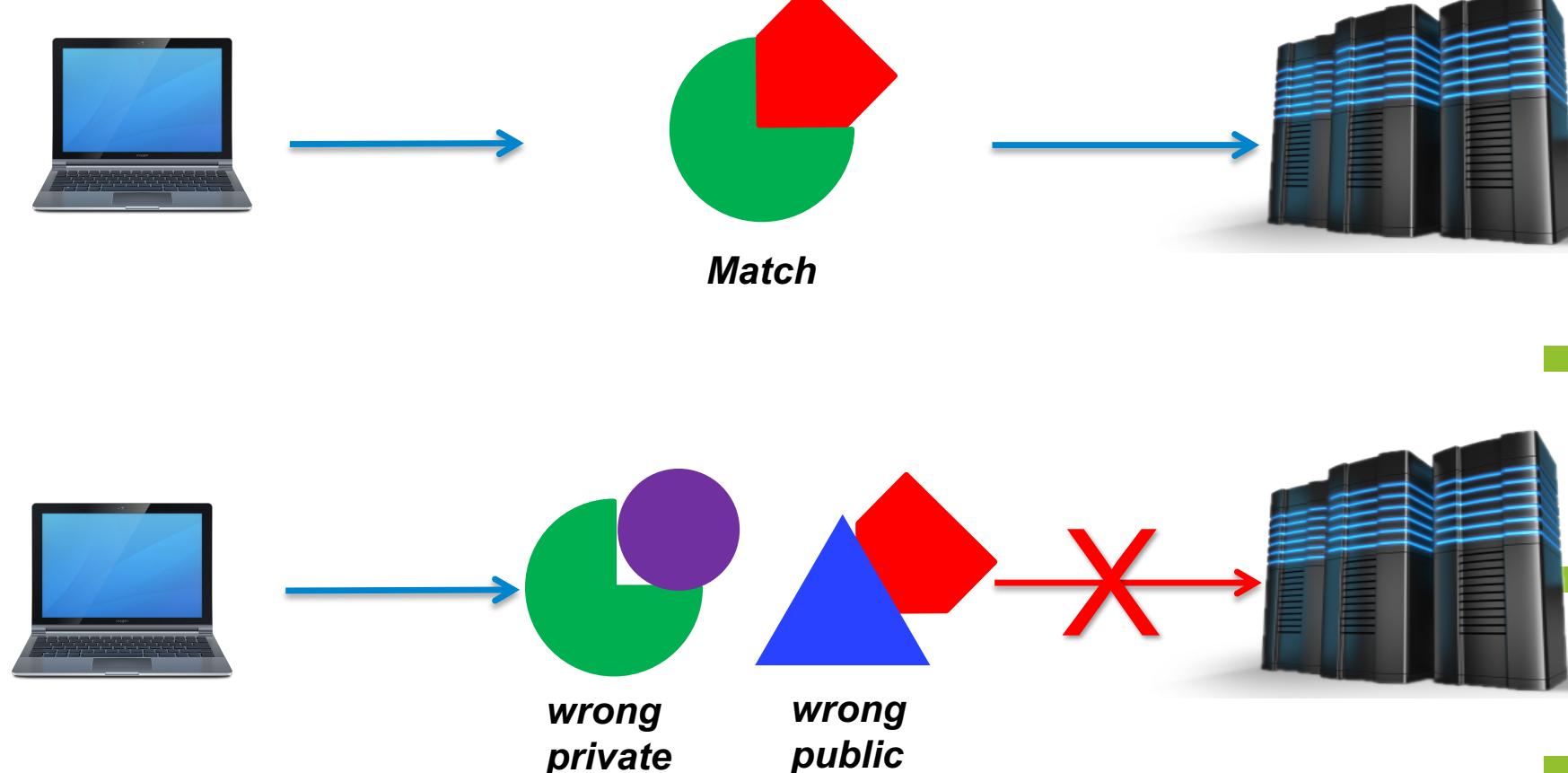
`$USER_PROFILE/.ssh/id_ed25519`

`$HOME/.ssh/authorized_keys`

<https://www.ichec.ie/academic/national-hpc/documentation/tutorials/setting-ssh-keys>

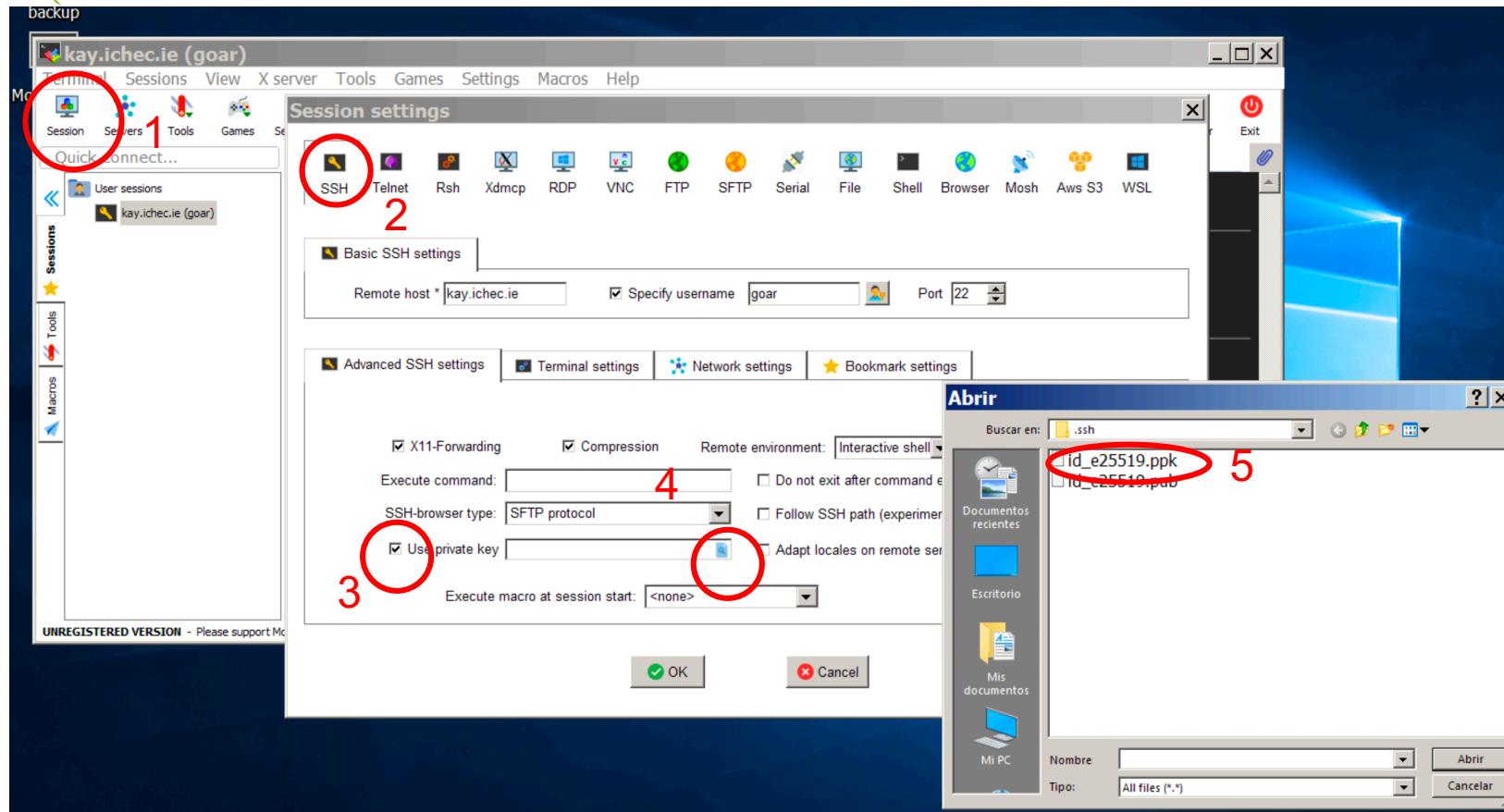


ssh-keys



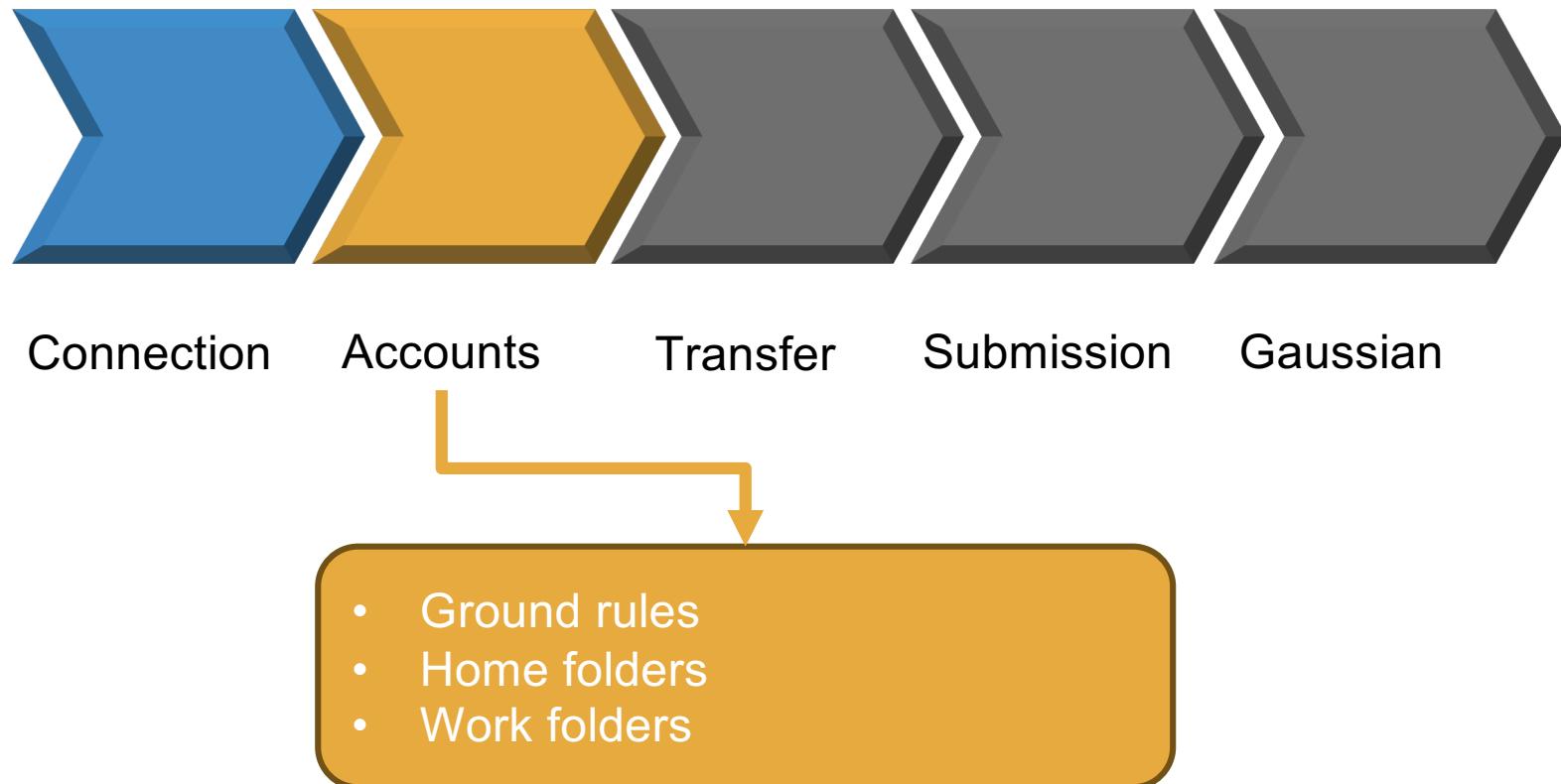
<https://www.ichec.ie/academic/national-hpc/documentation/tutorials/setting-ssh-keys>

Mobaxterm Connection



<https://www.ichec.ie/academic/national-hpc/documentation/tutorials/setting-ssh-keys>

Roadmap today



User and project account



User Account

- Unique: username
- Same across all ICHEC services
- Required to access kay
- **/ichec/home/users/courseXX**
- Storage: 25GB

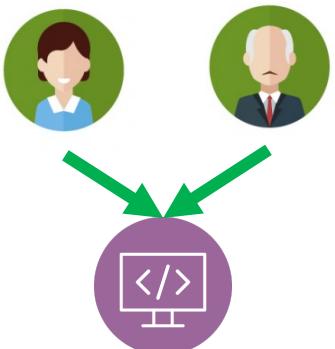
Project Account

- ID name **course**
- PI manage the account
- Required to access kay

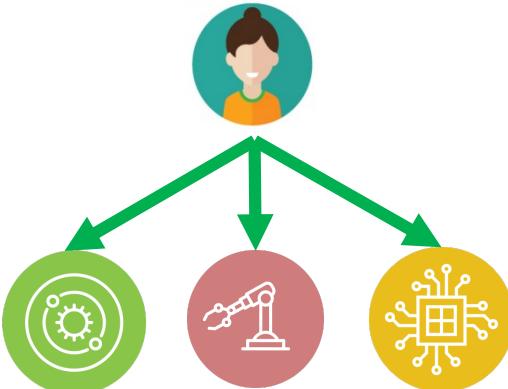


You need an user account + project to connect to kay

Multiple users can share a **project** account



Multiple **projects** can be assigned to a user account



Sharing users accounts is strictly forbidden



User and project account



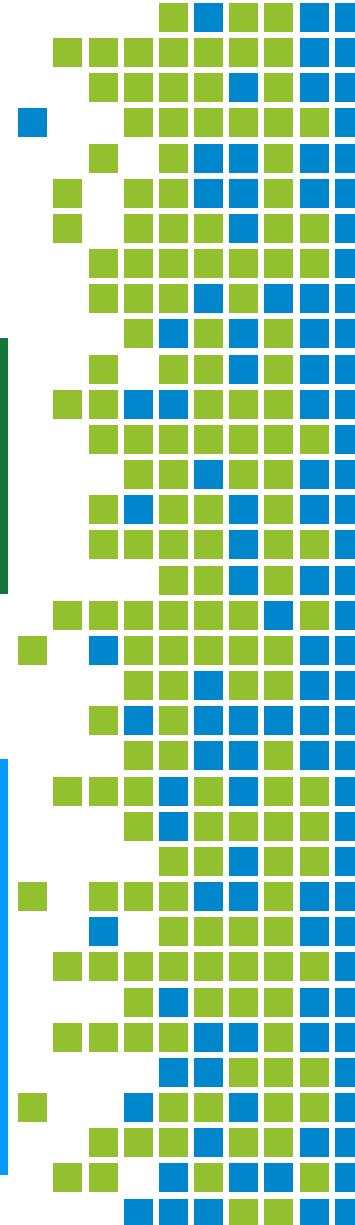
Useful commands

- quota

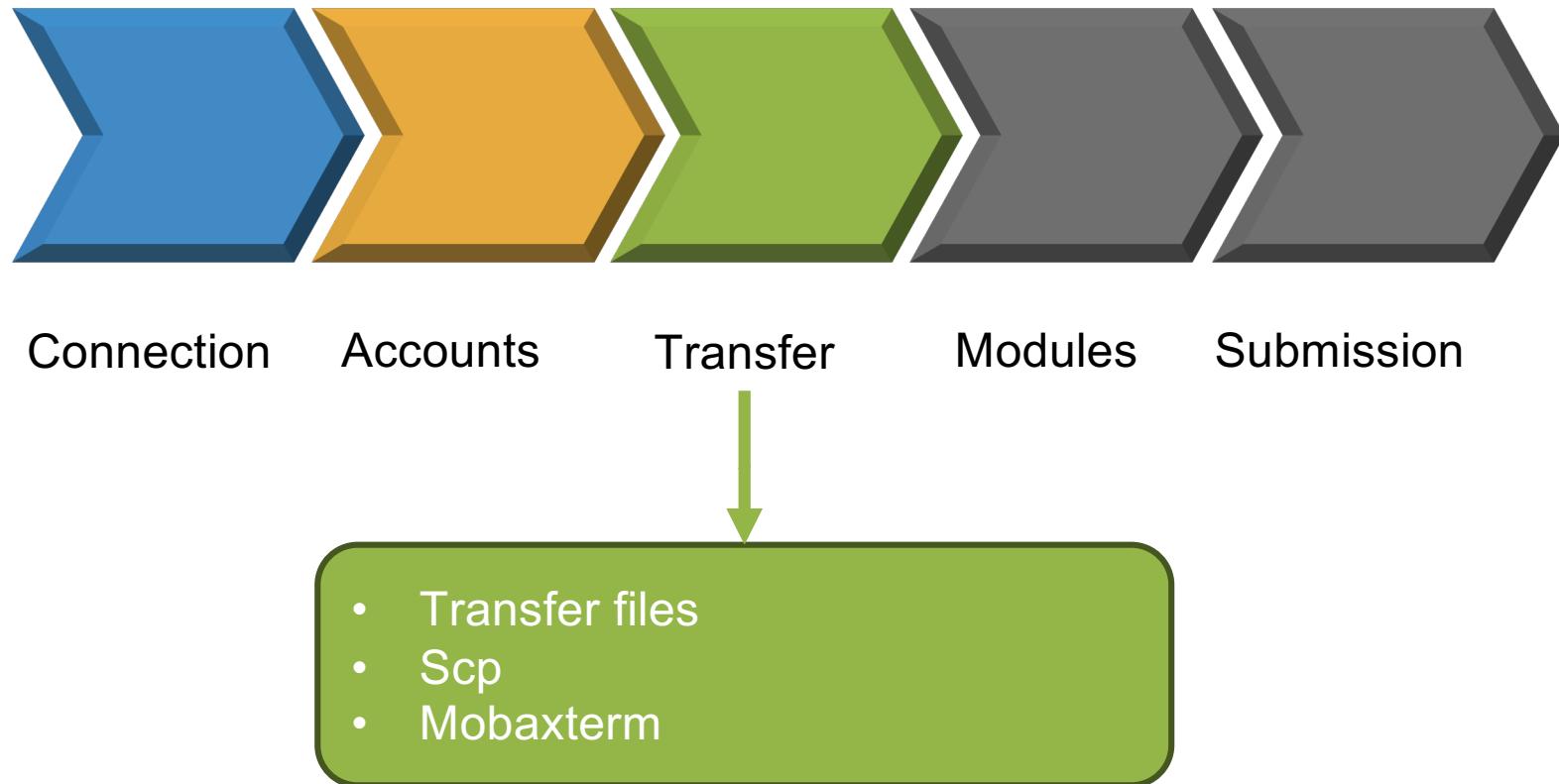
```
[course00@login1 ~]$ quota
Disk quotas for user course00 (/ichec/home/users/course00):
      Used: 0.00 GB    Soft: 25.00 GB  Hard: 27.50 GB
[course00@login1 ~]$
```

- mybalance

```
[course00@login3 ~]$ mybalance
=====
Core Hours Allocation Information for account : course
=====
Allocated Core Hours      :      833333.33
Project Consumed Core Hours : 160791.67
Percentage of Project Consumed : 19.30
=====
[course00@login3 ~]$
```



Roadmap today



Transferring files

Transferring files:

- Putting files from your laptop to Kay

```
scp SOURCE username@kay.ichec.ie:DESTINATION
```



```
goar@815-goar:~$ scp myfiles goar@kay.ichec.ie:/ichec/staff/goar
```

Transferring files

Transferring files:

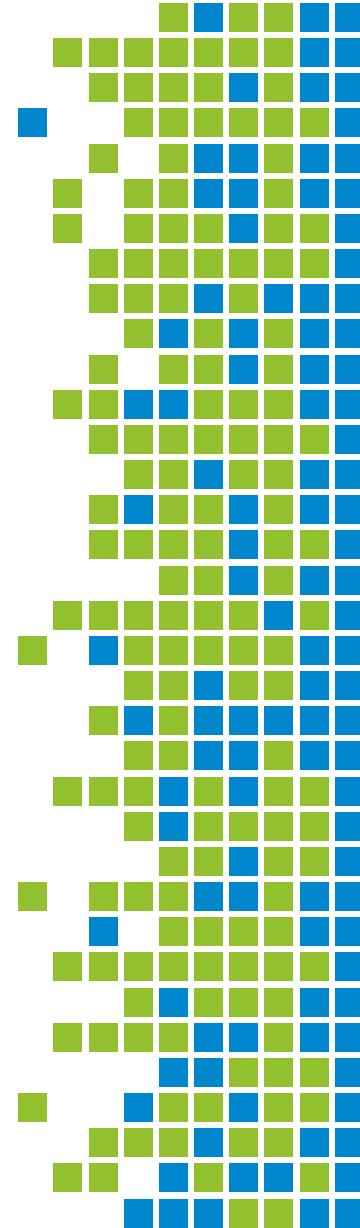
- Bringing files from Kay to your laptop

```
scp goar@kay.ichec.ie:SOURCE DESTINATION
```



```
goar@815-goar:~$ scp goar@kay.ichec.ie:/ichec/staff/goar/myfiles .
```

Transferring Files



OPTIONS

- *-r : recursive, to transfer folders*
- *~ : home directory*

- ***Transfer files from your laptop into fionn***
 - Create a text file
 - Transfer it to Kay

- ***Transfer files from Kay into your laptop***
 - Modify the text file
 - Transfer the new file into your laptop

- ***Transfer folders (recursive)***
 - Create a folder
 - Create n-files into that folder
 - Transfer that folder

Roadmap today



Connection

Accounts

Transfer

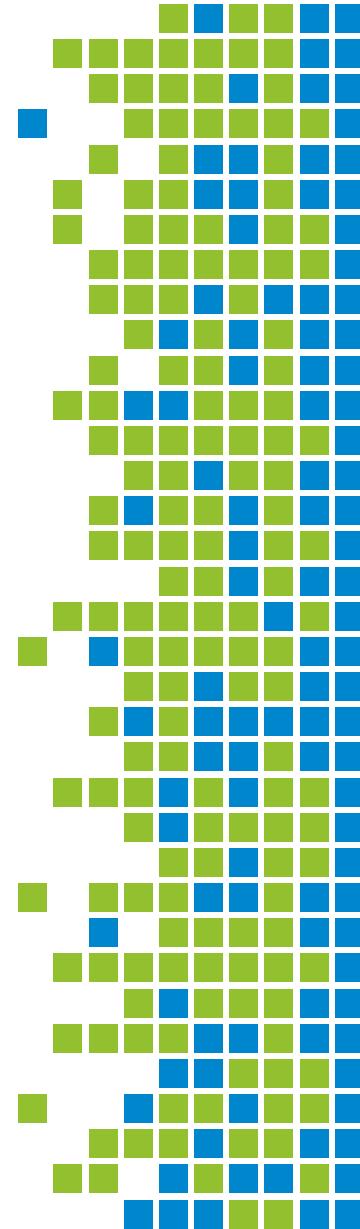
Modules

Submission



- Modules
- Load, list, delete

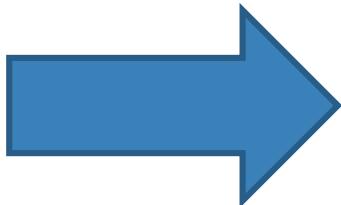
Modules



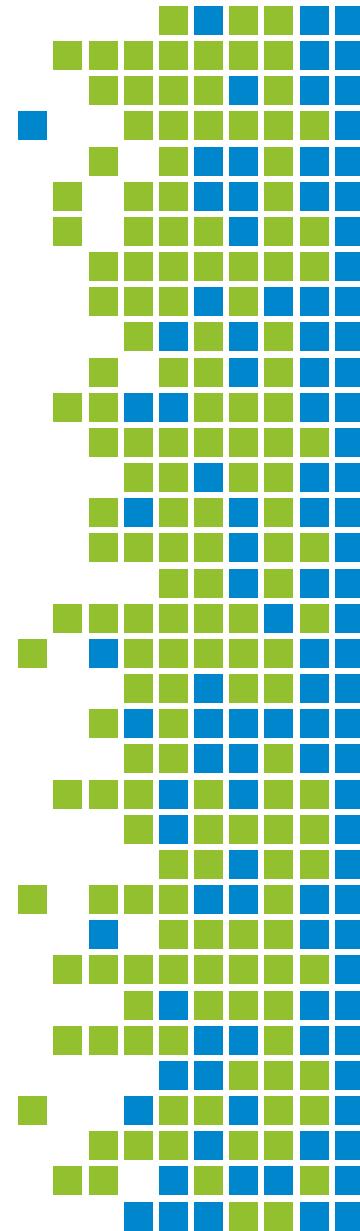
- Modules allow access to certain software, compilers, etc. in Kay
- Prevent mismatch or interference with other libraries
- Allow using different versions of a program/compiler/etc.
- Access to python and conda environments



Module load



Modules

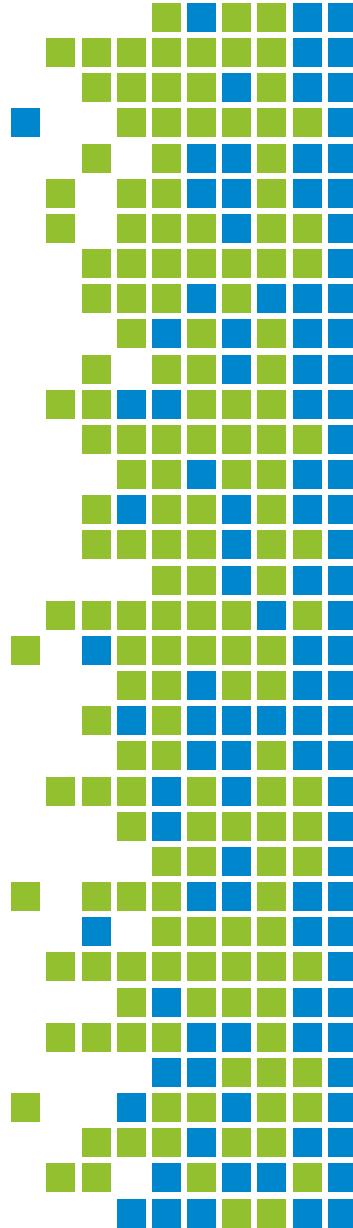


Syntax: `module [command] arguments`

- **module:** shows all options
- **module av/avail:** shows modules available in the system
- **module load *name*:** loads *name*
- **module unload *name* :** unloads *name*
- **module list:** lists all modules currently loaded
- **module purge:** unload all modules

Let's do it live...

Transferring Files



- ***Load modules***
 - Load any module
 - Load an intel module
 - Load another intel module. What happens?
 - List all modules loaded
- ***Unload modules***
 - Load any module
 - Unload the same module
 - Load several modules and unload them one by one
 - Load several modules and purge them
- ***Additional exercise***
 - Load a compiler
 - Compile a hello_world program (choose your preferred language)

Roadmap today



Connection

Accounts

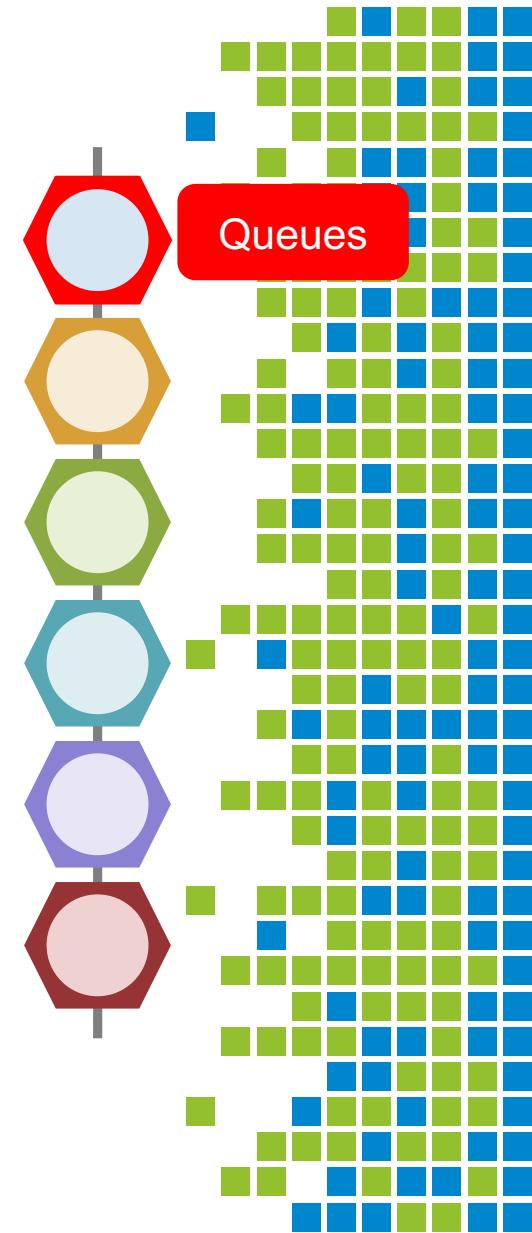
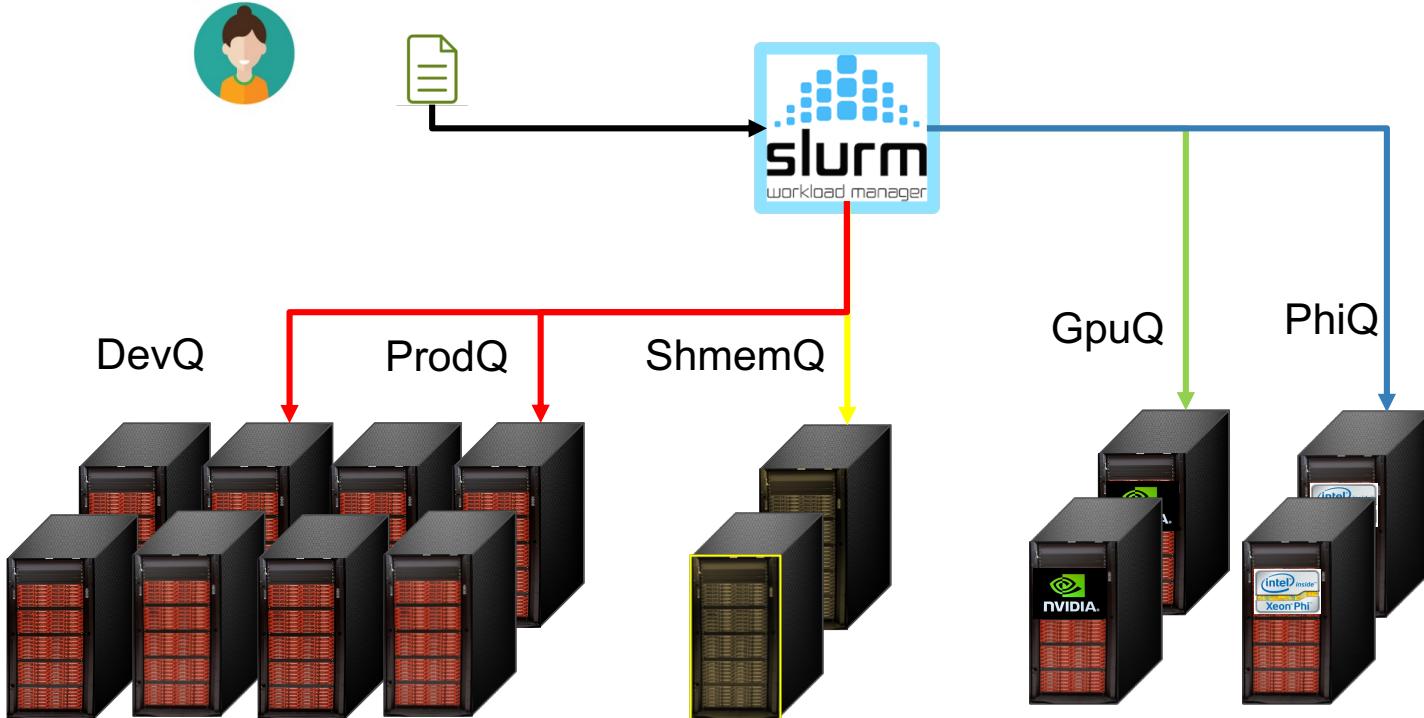
Transfer

Modules

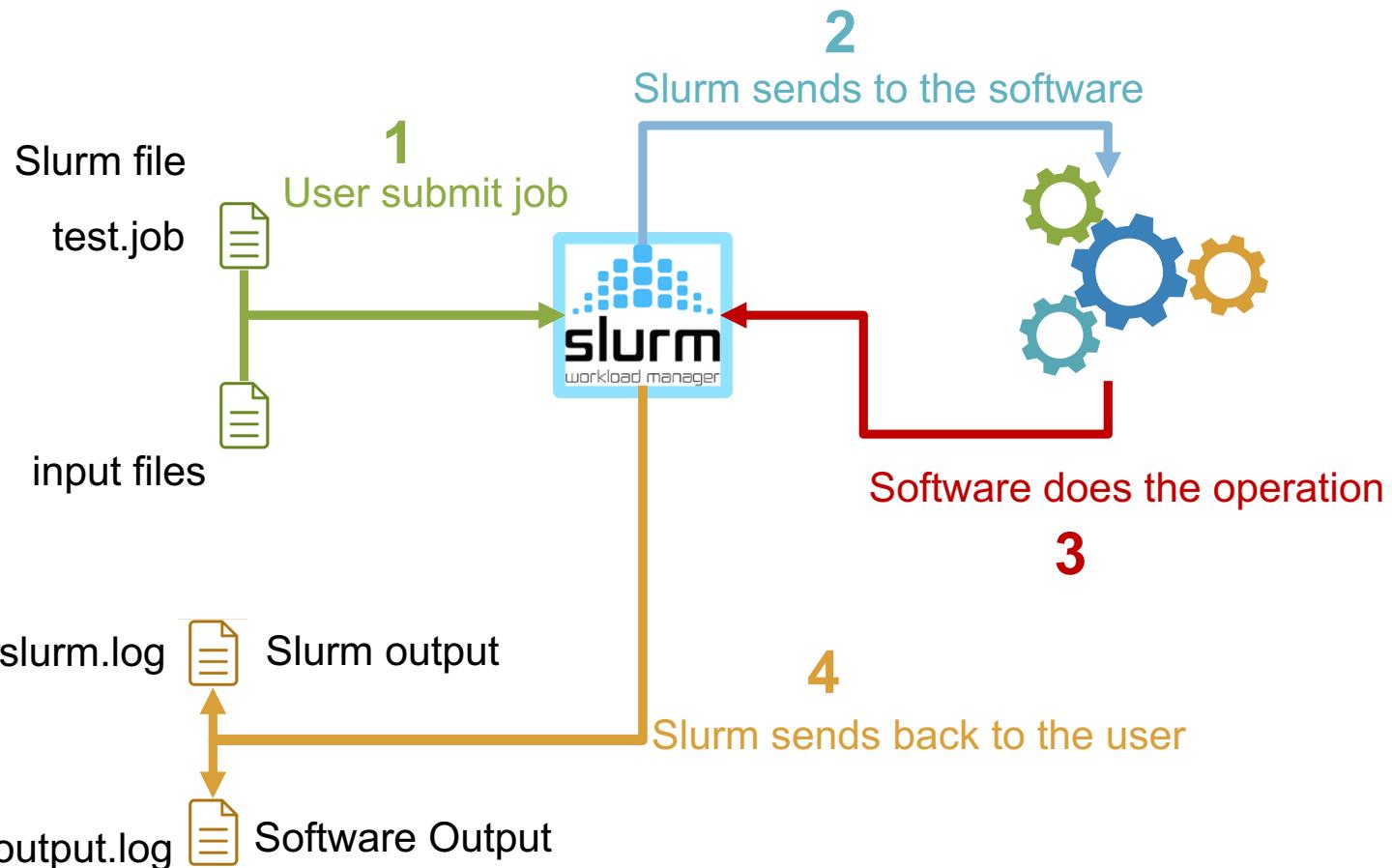
Submission



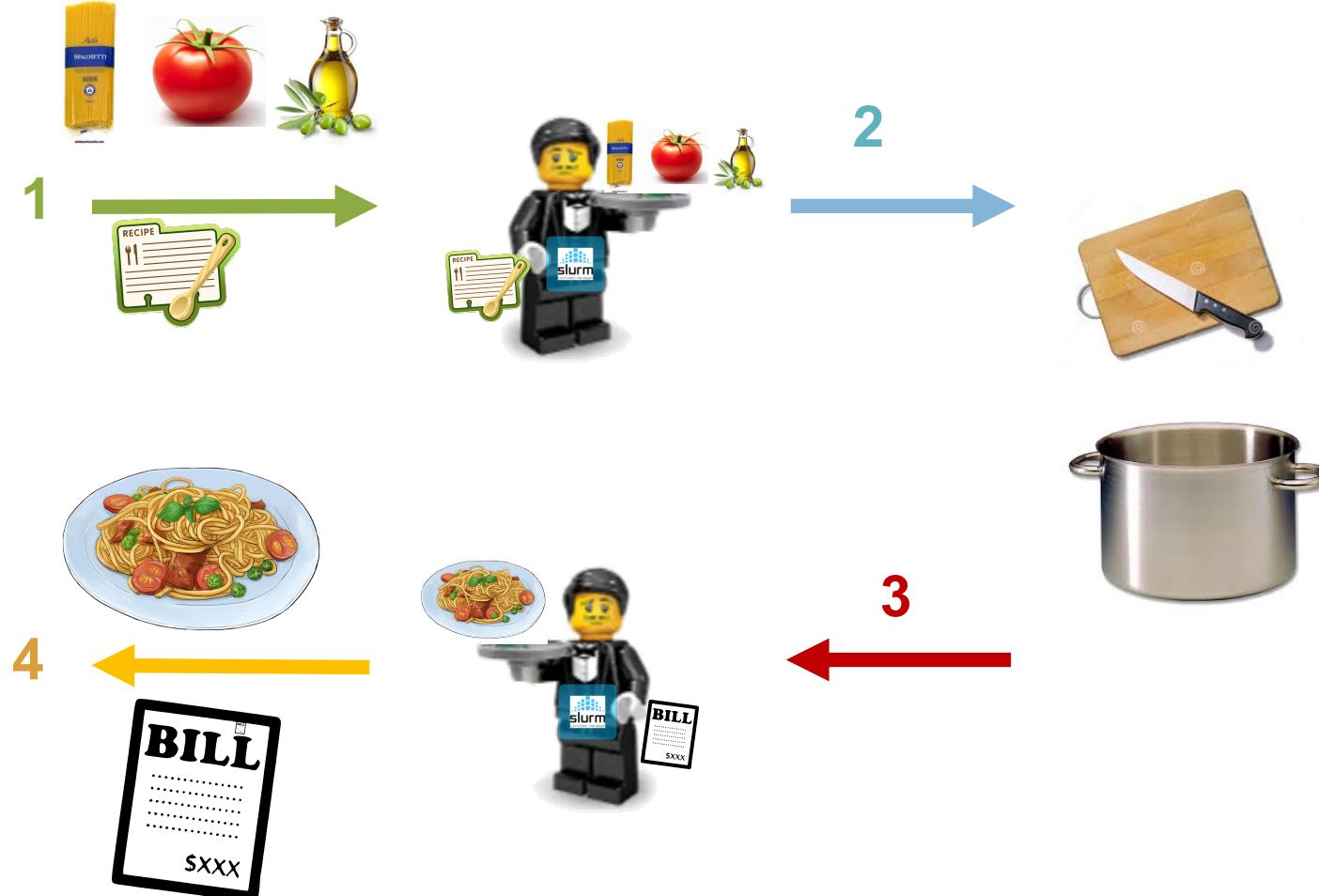
Slurm Manager



Workflow



Workflow





test.job

Slurm Submission file

```
#!/bin/bash

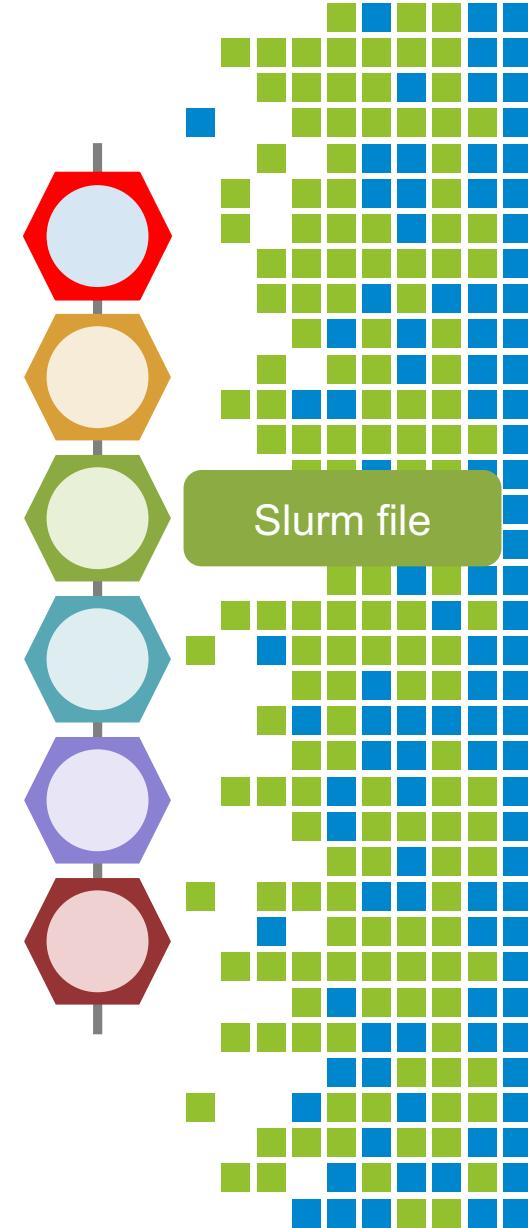
#Slurm flags
#SBATCH --partition=CourseDevQ
#SBATCH --nodes=1
#SBATCH --time=00:30:00
#SBATCH --job-name=test
#SBATCH --account=course
#SBATCH --output=slurm.log
#SBATCH --mail-user=myemailaddress@universityname.ie
#SBATCH --mail-type=BEGIN,END

cd $SLURM_SUBMIT_DIR

#Load module

module load XXXXX

#do something
```





Slurm file



test.job

Slurm Submission file

```
#!/bin/bash

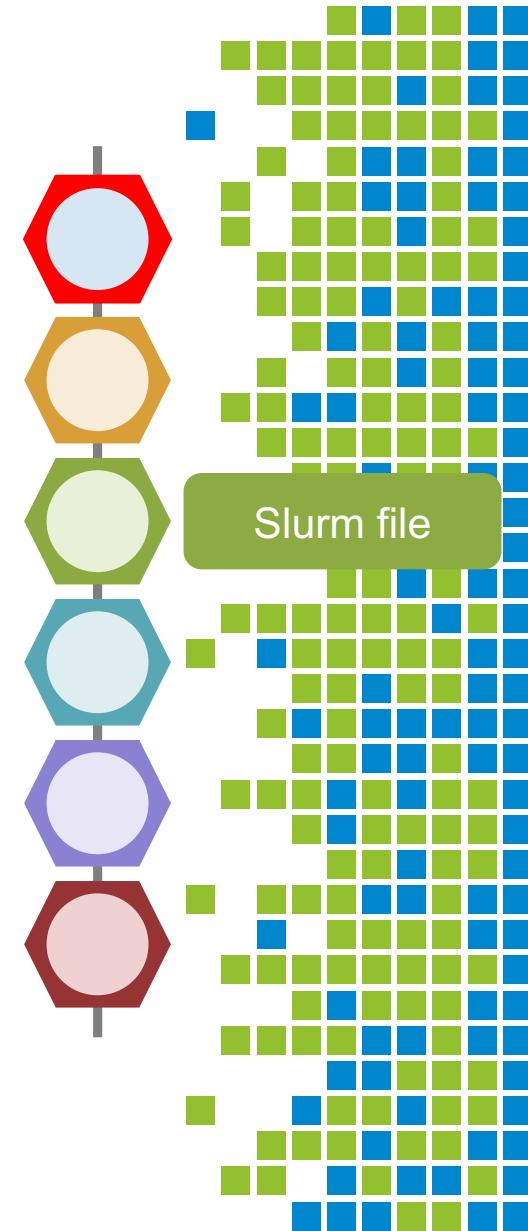
#Slurm flags
#SBATCH --partition=CourseDevQ
#SBATCH --nodes=1
#SBATCH --time=00:30:00
#SBATCH --job-name=myjob
#SBATCH --account=course
#SBATCH --output=slurm.log
#SBATCH --mail-user=goar.sanchez@ichec.ie
#SBATCH --mail-type=BEGIN,END

cd $SLURM_SUBMIT_DIR

#Load compiler's module

module load gcc/8.3.1

#compile the program
g++ -o helloworld.o hello_world.cpp
```



Slurm file



type: sbatch test.job



Submit a job

Hints:

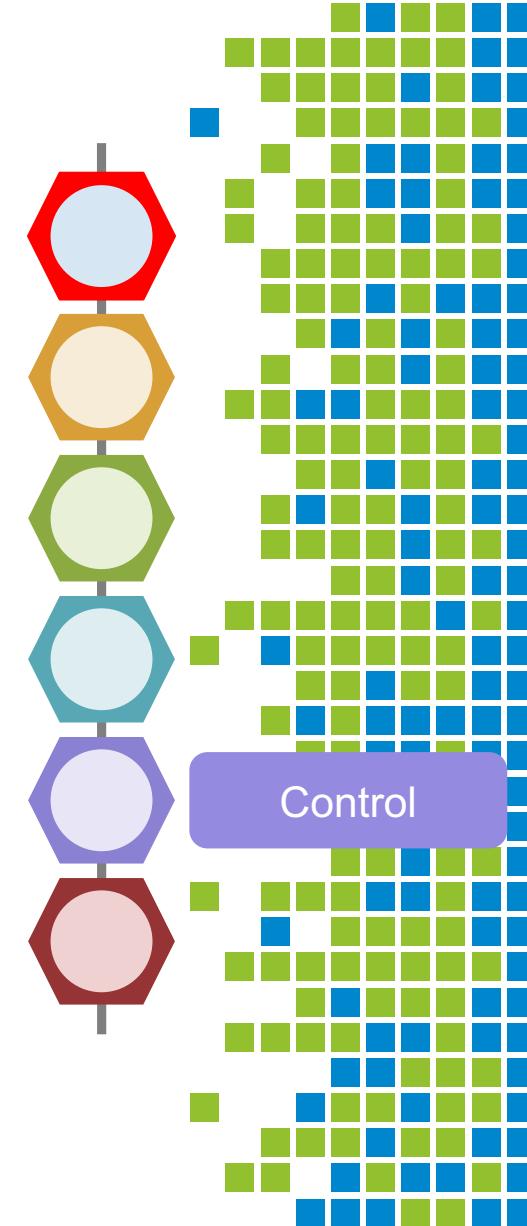
- You need 1 slurm file per job
- You need all the necessary input files



Slurm file

| Description | Command |
|-------------------------------|------------------|
| Queue Status | sinfo |
| Submit Job | sbatch job.sh |
| Check Job Status | squeue -u \$USER |
| Cancel Job | scancel 123213 |
| Check Project Account Balance | mybalance |

Slurm Manager



Exercises

1. **Copy** files from `/ichec/home/users/course00/slurm/example` to your folder
2. **Copy** files from `/ichec/home/users/course00/slurm/exercises` to your folder

Getting Help

Frequently Asked Questions

<https://www.ichec.ie/academic/national-hpc/FAQ>

Documentation

<https://www.ichec.ie/academic/national-hpc/documentation>

Helpdesk

<https://www.ichec.ie/academic/national-hpc/user-support>