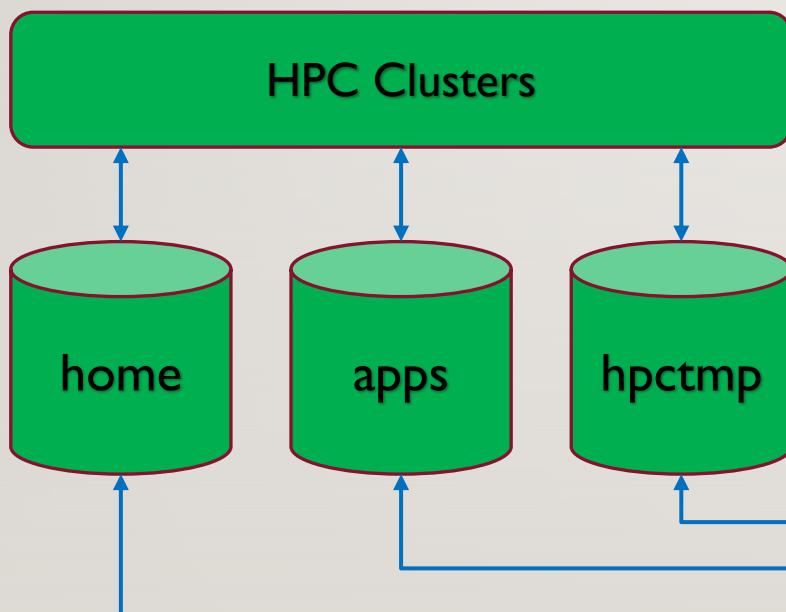


HPC CLOUD

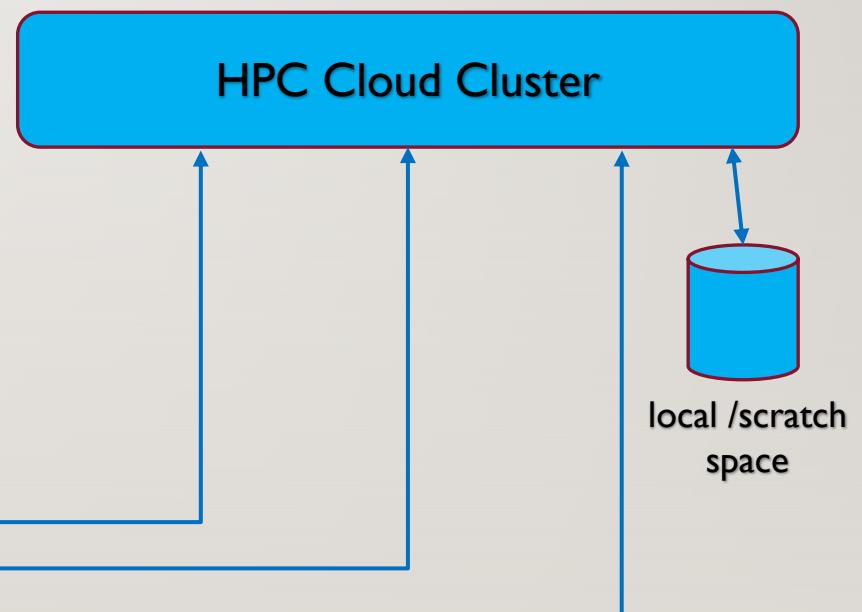
BRIEFING FOR NEW USERS

OVERVIEW OF HPC CLOUD

On Campus



In the Cloud

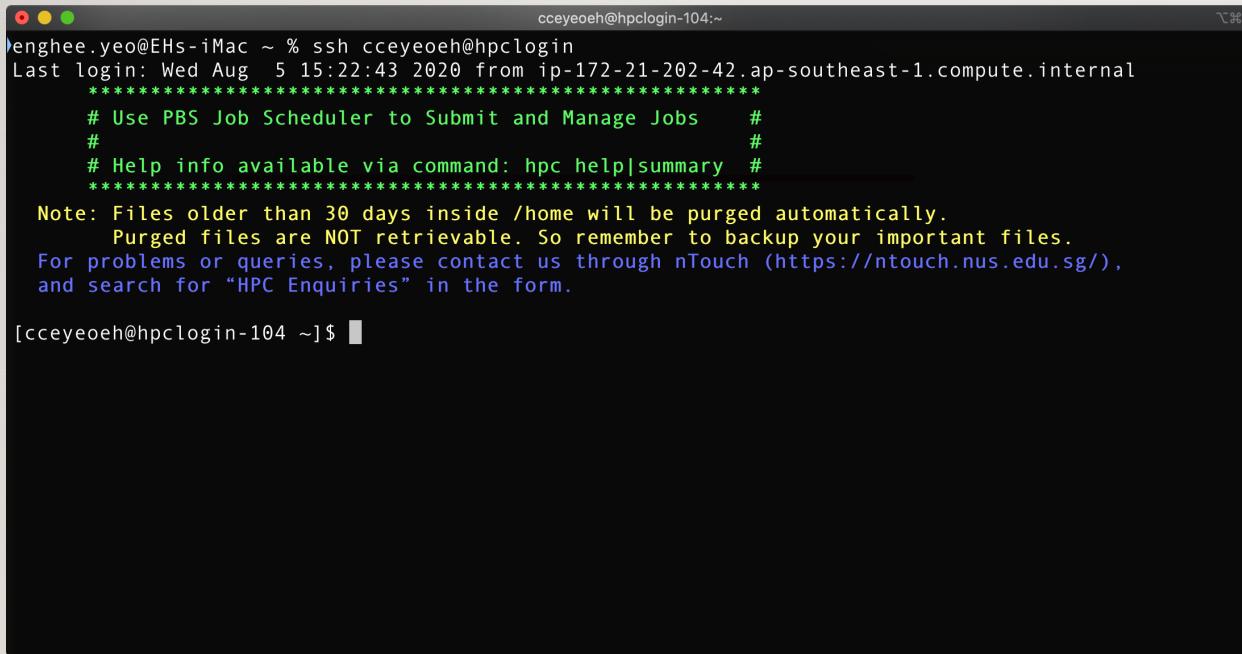


THE CLOUD ADVANTAGE

- Scalability
- Flexibility
- Access to the latest hardware
- Better HPC experience for all users

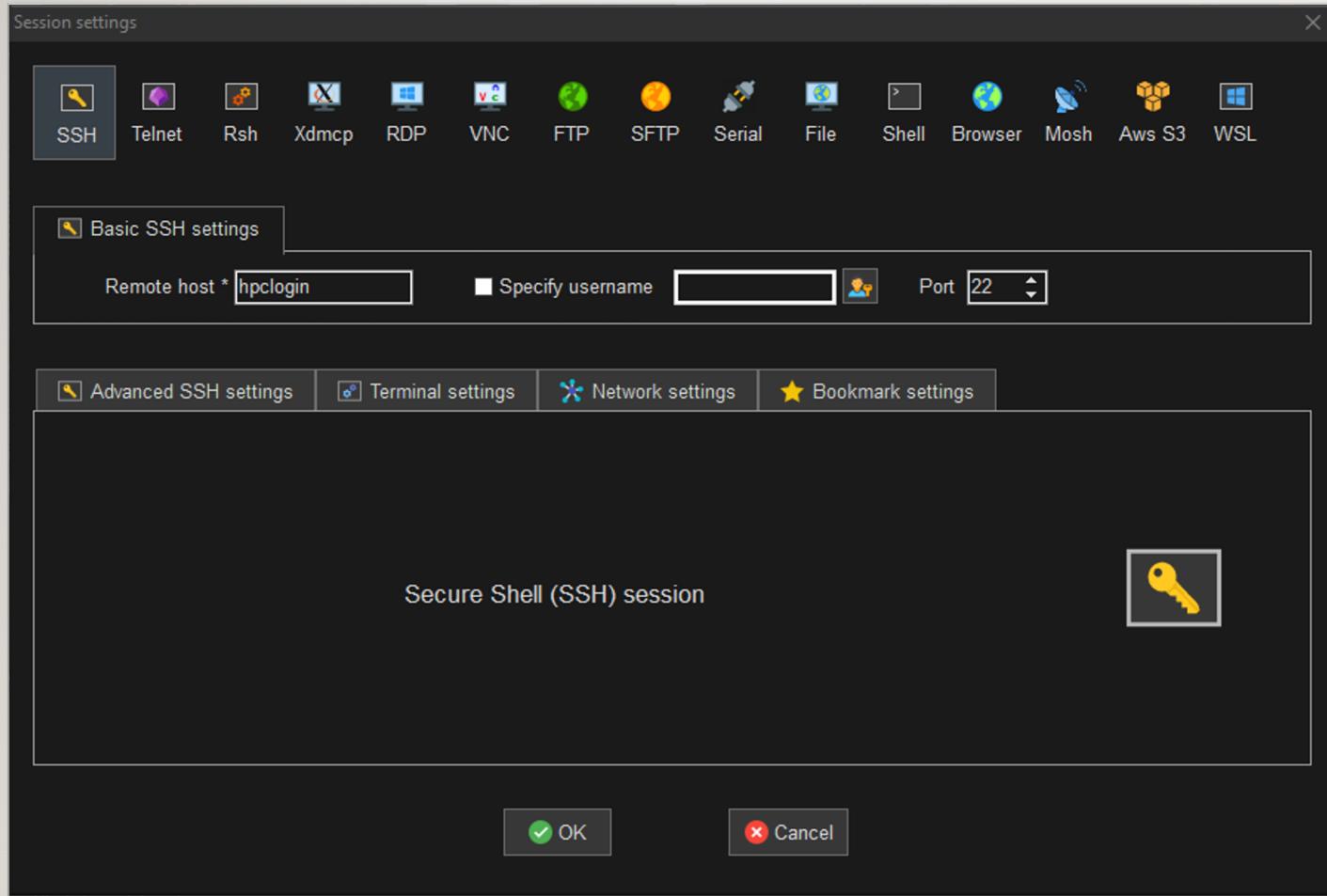
ACCESSING THE CLOUD LOGIN NODES

LOGIN TO HPC CLOUD LOGIN HOST

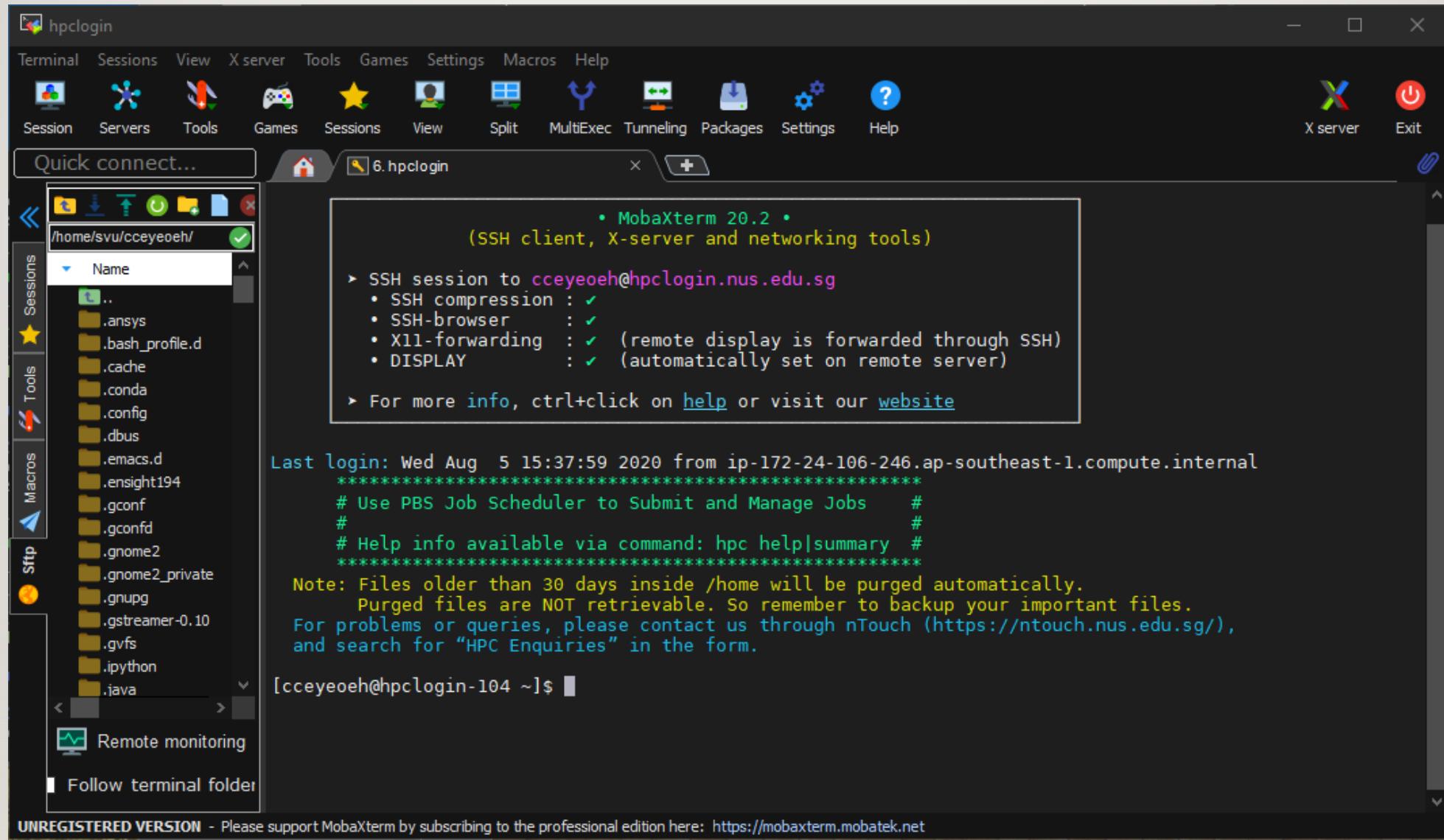


```
cceyeoeh@hpclogin-104:~  
enghee.yeo@EHs-iMac ~ % ssh cceyeoeh@hpclogin  
Last login: Wed Aug  5 15:22:43 2020 from ip-172-21-202-42.ap-southeast-1.compute.internal  
*****  
# Use PBS Job Scheduler to Submit and Manage Jobs  #  
#  
# Help info available via command: hpc help|summary  #  
*****  
Note: Files older than 30 days inside /home will be purged automatically.  
Purged files are NOT retrievable. So remember to backup your important files.  
For problems or queries, please contact us through nTouch (https://ntouch.nus.edu.sg/),  
and search for "HPC Enquiries" in the form.  
[cceyeoeh@hpclogin-104 ~]$
```

- SSH from your desktop, after you login to Pulse Secure VPN
- Login using NUS account and password
- SSH to the login host:
 - **ssh [userid]@hpclogin**



USING MOBAXTERM



FILE TRANSFER

TRANSFERRING JOB FILES

- Transfer your files to your home directory or /hpctmp
- Same quotas as HPC Clusters on campus
- Same file aging policies as in /hpctmp on campus

APPLICATION SOFTWARE

APPLICATION SOFTWARE

- Same set of application software as in HPC Cluster on-campus
- Use the same modules commands to access the software, example:
 - `module avail`
 - `module list`
 - `module load/unload`
 - `module purge`
 - `module help`

JOB SUBMISSION VIA PBS PRO

PBS PRO JOB SUBMISSION

- PBS Pro job scheduler
- Same commands as the HPC clusters on campus
- Do not need to specify the queue. Let the PBS Pro job scheduler assign jobs to the appropriate queue based on cpu and/or memory requirements

PBS PRO JOB SUBMISSION

- Sample job script:

```
## HEADER ##

#!/bin/bash

#PBS -P [PROJECT_NAME]
#PBS -j oe
#PBS -N [JOB_NAME]
```

PBS PRO JOB SUBMISSION

- Sample job script:

```
## QUEUE DIRECTIVES ##

#PBS -l select=16:ncpus=1

# opt for -l place=free to run on any idle cpu within the cluster
#PBS -l place=free:shared
# opt for -l place=pack to keep your analysis within the same node
###PBS -l place=pack:shared
```

PBS PRO JOB SUBMISSION

- Default PBS Pro chunk:

```
#PBS -l select=N:ncpus=1:mem=1950mb:mpiprocs=1:ompthreads=1

default_chunk.ncpus = 1
default_chunk.mem = 1950mb
default_chunk.mpiprocs = 1
default_chunk.ompthreads = 1
```

example:

```
#PBS -l select=16:ncpus=1
```

PBS PRO JOB SUBMISSION

- Sample job script:

```
## MISC DIRECTIVES ##

## Automatically calculate the number of processors
cd ${PBS_O_WORKDIR}; ### this line is needed, do not delete.
np=$( cat ${PBS_NODEFILE} | wc -l ); ### get number of CPUs
```

PBS PRO JOB SUBMISSION

- Sample job script: (Note: /scratch versus /hpctmp)

```
## SCRATCH SPACE DIRECTIVES ##

## Make a temporary scratch space (this should be on /scratch/)
scratch=/scratch/${USER}/${PBS_JOBID}
export TMPDIR=${scratch}
mkdir -p ${scratch}
```

PBS PRO JOB SUBMISSION

- Sample job script:

```
## JOB DIRECTIVES ##

##--- Put your exec/application commands below ---
module load Abaqus/cmd
module load Intel/xe_2018
abaqus scratch=${scratch} input=rigmultimech_std job=abaqus_job \
    cpus=${np} double interactive
wait;
## Remove scratch space
rm -rf ${scratch}
exit 0
```

OTHER INFORMATION

REMINDERS

- Request for resources in chunks:
 - `#PBS -l select=1:ncpus=1:mem=1950mb`
 - `#PBS -l select=1:ncpus=1`
- Use home directory (20GB quota) and /hpctmp (500GB quota) for jobs files
- /scratch is a fast local storage for jobs within a single server (not for distributed parallel jobs) or some MPI jobs that can make use of the local fast storage.
- Queue limits:
 - Max CPUs: 48
 - Max Memory: 137GB

THANK YOU
