Steps to connect to clusters(Telluride/Turretarch) and run the program on the cluster

Ssh to connect to any cluster from your computer

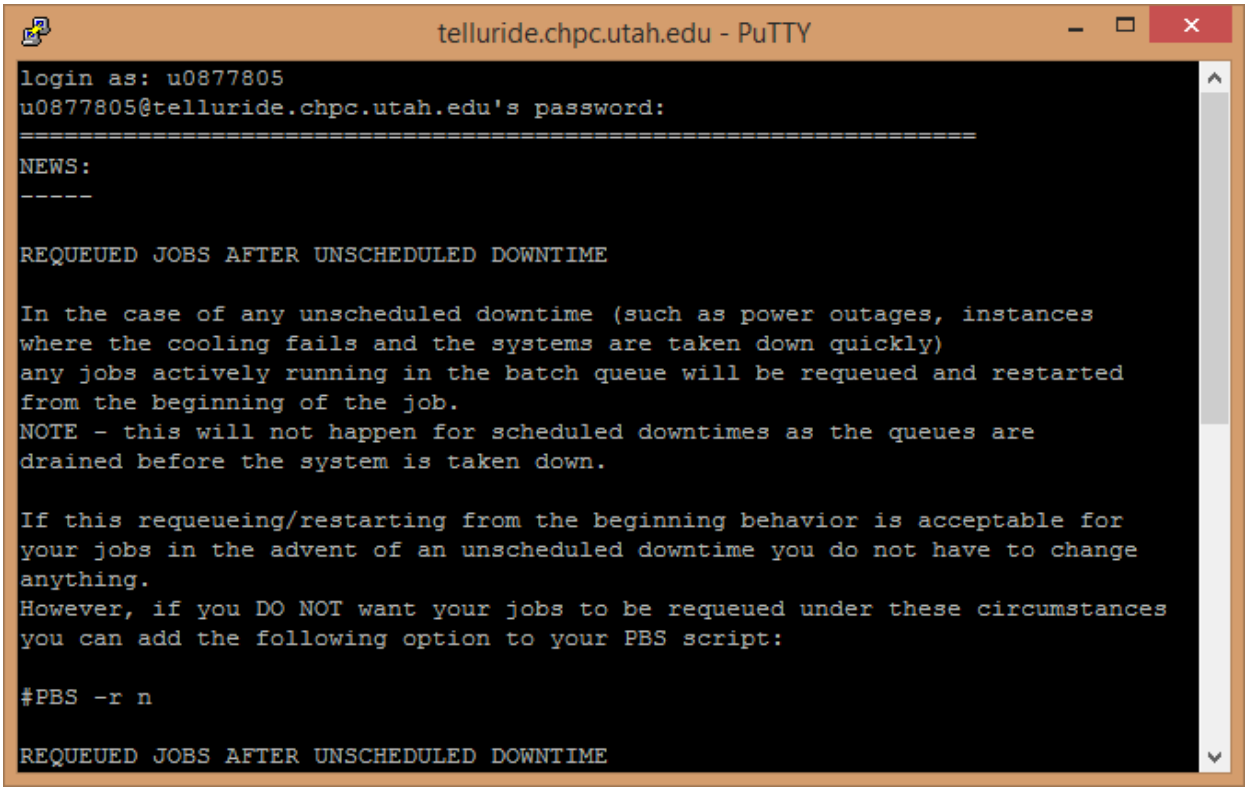
A. <u>Turretarch</u>

1. ssh –X turretarch10.chpc.utah.edu
2. Give your username and id to connect to the cluster

Username is UID and Password is CIS password

login as: u0877805

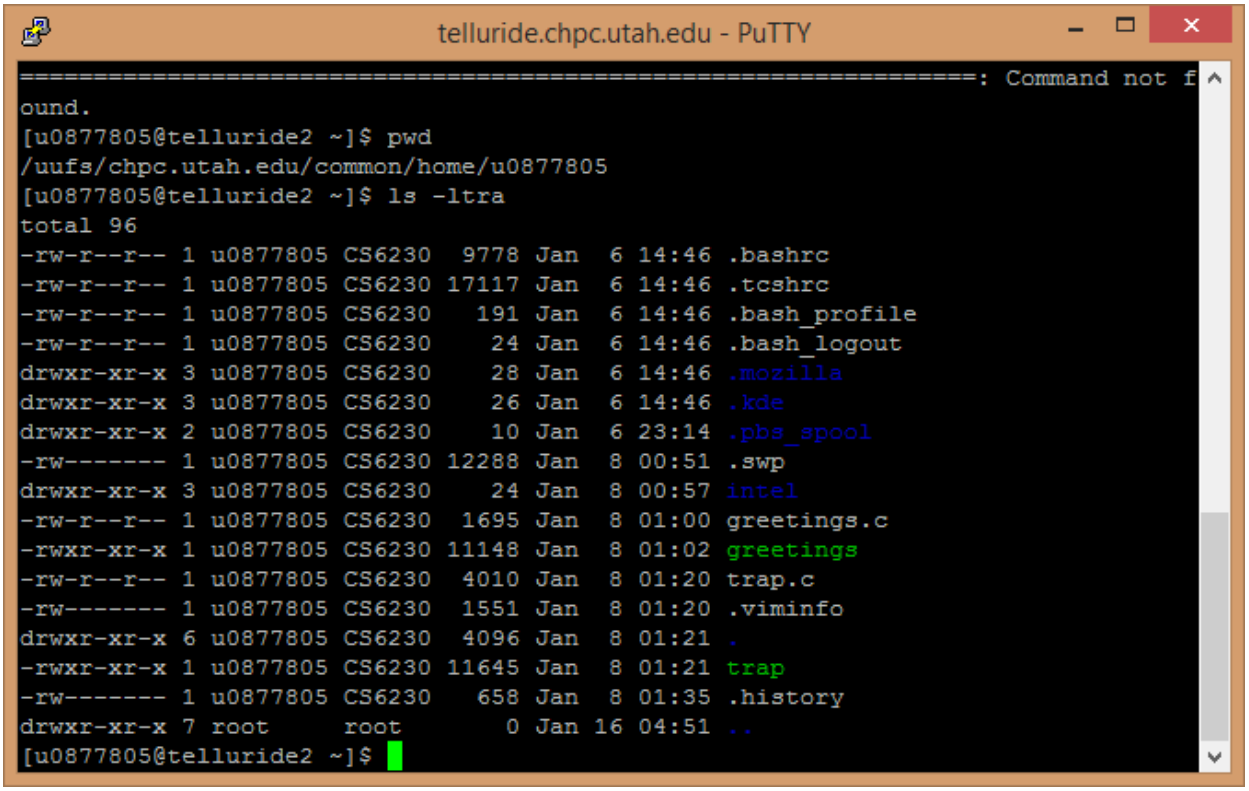
u0877805@telluride.chpc.utah.edu's password:



3. Touch filename to create the file on the cluster

Example:

Touch greetings.c



And then opened greetings.c using vi editor to write the program and saved it (use :wq! To save in vi editor)

Sample Program code for greetings.c

[u0877805@telluride2 ~]$ vi greetings.c

```
    /* Find out number of processes */
    MPI_Comm_size(MPI_COMM_WORLD, &p);


    if (my_rank != 0) {
        /* Create message */
        sprintf(message, "Greetings from process %d!",
            my_rank);
        dest = 0;
        /* Use strlen+1 so that '\0' gets transmitted */
        MPI_Send(message, strlen(message)+1, MPI_CHAR,
            dest, tag, MPI_COMM_WORLD);
    } else { /* my_rank == 0 */
```

```
            for (source = 1; source < p; source++) {
                MPI_Recv(message, 100, MPI_CHAR, source, tag,
                    MPI_COMM_WORLD, &status);
                printf("%s\n", message);
            }
        }

        /* Shut down MPI */
        MPI_Finalize();
} /* main */
```

4. FOR TURRETARCH edit the .bashrc

```
elif [[ "$UUFSCELL" = "turretarch.arches" ]] ; then
    source /uufs/chpc.utah.edu/sys/pkg/mpich2/std/etc/mpich2.sh
  # export SSIHLM=/uufs/turretarch.arches/sys/pkg/hlm/std
    export SSIHLM=/uufs/chpc.utah.edu/sys/pkg/mpich2/std
```

5. To compile the greetings.c we use mpicc compiler

   Mpicc -g -o greetings greetings.c

   -g will is used to create information that allows us to use a debugger

   -o <outfile>.Put the executable in the file named outfile

6. To run the program

   Mpiexec -n <number of processes> ./greetings

   or

   mpirun –n <number of processes> ./greetings

7. OUTPUT of greetings.c

```
[u0877805@turretarch10 ~]$ mpirun -n 16 ./greetings
Greetings from process 1!
Greetings from process 2!
Greetings from process 3!
Greetings from process 4!
Greetings from process 5!
Greetings from process 6!
Greetings from process 7!
Greetings from process 8!
Greetings from process 9!
Greetings from process 10!
Greetings from process 11!
Greetings from process 12!
Greetings from process 13!
Greetings from process 14!
Greetings from process 15!
```

B. Telluride

1. ssh –X telluride.chpc.utah.edu
2. compile the .c file

   /uufs/telluride.arches/sys/pkg/openmpi/std_intel/bin/mpicc -o **greetings greetings.c** -I/uufs/telluride.arches/sys/pkg/openmpi/std_intel/include -L/uufs/telluride.arches/sys/pkg/openmpi/std_intel/lib

3. **FOR TELLURIDE edit the .bashrc**

   elif [["$UUFSCELL" = "telluride.arches"]] ; then

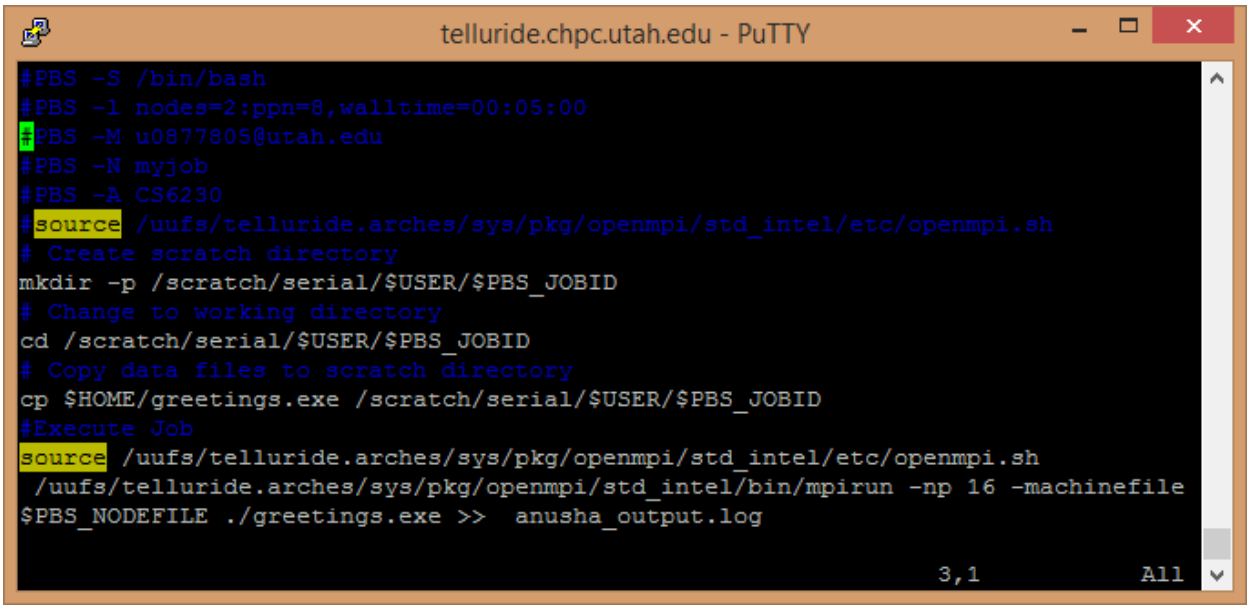
   #source /uufs/telluride.arches/sys/pkg/openmpi/std_intel/etc/openmpi.sh #anusha

   source /uufs/chpc.utah.edu/sys/pkg/mkl/std/tools/environment/mklvarsem64t.sh

   source /uufs/telluride.arches/sys/pkg/openmpi/std_intel/etc/openmpi.sh

   export MPI_SHELL="/usr/bin/rsh"

4. Create a log file to redirect the console output to log file touch output.log
5. Touch myjob.pbs will create the batch job for telluride cluster which will look like



Give below is the .pbs file and I have comments for each line

[u0877805@telluride2 ~]$ cat myjob.pbs

#PBS -S /bin/bash

#PBS -l nodes=2:ppn=8,walltime=00:05:00 ---specifies the number of processors no of nodes and processors used on each node i.e 2 nodes each 8 processors so total 16

#PBS -M u0877805@utah.edu ---ur email id

#PBS -N myjob --- job name

#PBS -A CS6230 -- to ensure that the job gets prioritized

Create scratch directory

mkdir -p /scratch/serial/$USER/$PBS_JOBID --creating the job_id folder in the scratch directory

Change to working directory

cd /scratch/serial/$USER/$PBS_JOBID --changing to scratch directory

Copy data files to scratch directory

cp $HOME/greetings /scratch/serial/$USER/$PBS_JOBID --copying the file to the scratch directory

#Execute Job

source /uufs/telluride.arches/sys/pkg/openmpi/std_intel/etc/openmpi.sh --sourcing the openmpi

/uufs/telluride.arches/sys/pkg/openmpi/std_intel/bin/mpirun -np 16 -machinefile $PBS_NODEFILE ./greetings>> output.log ---running the file and redirecting the output to log file

Inside the Pbs job we will specify how many total processors you will use for your program i.e 16 in the above case and what is the file name that you would be executing

6. qsub myjob.pbs to submit the pbs job which will be put in the queue on the cluster

[u0877805@telluride2 ~]$ qsub myjob.pbs

47622.trrm.privatearch.arches

Once we submit we will check within the wait time that we have specified in the pbs file to know the job is in which state

7. Command to check whether your job is in blocked,idle,running on telluride

– showq

• -i (idle jobs)

• -r (running)

• -b (blocked)

Example of showq

[u0877805@telluride2 ~]$ showq -i

eligible jobs----------------------

JOBID PRIORITY XFACTOR Q USERNAME GROUP PROCS WCLIMIT CLASS SYSTEMQUEUETIME

47622 281160 1.0 - u0877805 CS6230 16 00:15:00 telluride Thu Jan 16 05:20:28

1 eligible job

Total job: 1

The output will be available in your output.log file which is present in /scratch/serial/$USER/$PBS_JOBID

Greetings from process 1!

Greetings from process 2!

Greetings from process 3!

Greetings from process 4!

Greetings from process 5!

Greetings from process 6!

Greetings from process 7!

Greetings from process 8!

Greetings from process 9!

Greetings from process 10!

Greetings from process 11!

Greetings from process 12!

Greetings from process 13!

Greetings from process 14!

Greetings from process 15!

NOTE :-

Two changes to .bashrc file

FOR TURRETARCH

```
      elif [[ "$UUFSCELL" = "turretarch.arches" ]] ; then
source /uufs/chpc.utah.edu/sys/pkg/mpich2/std/etc/mpich2.sh
         # export SSIHLM=/uufs/turretarch.arches/sys/pkg/hlm/std
  export SSIHLM=/uufs/chpc.utah.edu/sys/pkg/mpich2/std
```

FOR TELLURIDE

```
elif [[ "$UUFSCELL" = "telluride.arches" ]] ; then
#source     /uufs/telluride.arches/sys/pkg/openmpi/std_intel/etc/openmpi.sh #anusha
           source /uufs/chpc.utah.edu/sys/pkg/mkl/std/tools/environment/mklvarsem64t.sh
source     /uufs/telluride.arches/sys/pkg/openmpi/std_intel/etc/openmpi.sh
           export MPI_SHELL="/usr/bin/rsh"
```

First use Turretarch since it is used for benchmarking and then you will know the waittime and then use Telluride.