Job3: Hello_mpi_grape

interactive

a) 1 node, 4 procs total

```
[-bash-4.1$ qsub -q newest -l nodes=1:ppn=4 -I
qsub: waiting for job 8945.grape.soe.ucsc.edu to start
qsub: job 8945.grape.soe.ucsc.edu ready

[-bash-4.1$ cd $PBS_O_WORKDIR
[-bash-4.1$ mpirun -np 4 ./hello_mpi_grape
 Hello world from processor          2  out of          4
 Hello world from processor          3  out of          4
 Hello world from processor          0  out of          4
 Hello world from processor          1  out of          4
[-bash-4.1$
[-bash-4.1$
[-bash-4.1$ exit
 logout

qsub: job 8945.grape.soe.ucsc.edu completed
```

Job4: hello_mpi_grape

interactive

(b) 2 nodes, 8 procs tota

```
[-bash-4.1$ qsub -q newest -l nodes=2:ppn=4 -I
qsub: waiting for job 8946.grape.soe.ucsc.edu to start
qsub: job 8946.grape.soe.ucsc.edu ready

[-bash-4.1$ cd $PBS_O_WORKDIR
[-bash-4.1$ mpirun -np 8 ./hello_mpi_grape
 Hello world from processor            2  out of            8
 Hello world from processor            3  out of            8
 Hello world from processor            4  out of            8
 Hello world from processor            5  out of            8
 Hello world from processor            6  out of            8
 Hello world from processor            7  out of            8
 Hello world from processor            0  out of            8
 Hello world from processor            1  out of            8
[-bash-4.1$
[-bash-4.1$
[-bash-4.1$ exit
 logout

qsub: job 8946.grape.soe.ucsc.edu completed
```

Job9: hello_omp_grape
interactive
(c)) 1 node, 4 threads

```
[-bash-4.1$ qsub -q newest -l nodes=1:ppn=4 -I
qsub: waiting for job 8949.grape.soe.ucsc.edu to start
qsub: job 8949.grape.soe.ucsc.edu ready

[-bash-4.1$ cd $PBS_O_WORKDIR
[-bash-4.1$ export OMP_NUM_THREADS=4
[-bash-4.1$ ./hello_omp_grape
 Hello World from thread =              0
 Number of threads =             4
 Hello World from thread =              2
 Hello World from thread =              1
 Hello World from thread =              3
[-bash-4.1$
[-bash-4.1$
[-bash-4.1$ exit
 logout

qsub: job 8949.grape.soe.ucsc.edu completed
```

Job10: hello_omp_grape
interactive
(d)) 1 node, 8 threads

```
-bash-4.1$ qsub -q newest -l nodes=1:ppn=8 -I
qsub: waiting for job 8950.grape.soe.ucsc.edu to start
qsub: job 8950.grape.soe.ucsc.edu ready

-bash-4.1$ cd $PBS_O_WORKDIR
-bash-4.1$ export OMP_NUM_THREADS=8
-bash-4.1$ ./hello_omp_grape
 Hello World from thread =                7
 Hello World from thread =                3
 Hello World from thread =                1
 Hello World from thread =                2
 Hello World from thread =                6
 Hello World from thread =                5
 Hello World from thread =                0
 Number of threads =                8
 Hello World from thread =                4
-bash-4.1$
-bash-4.1$
-bash-4.1$ exit
logout

qsub: job 8950.grape.soe.ucsc.edu completed
```