

# *Getting started on bluefire at NCAR*



# *Secure shell client*

- ⇒ You **MUST** have an ssh client on your machine
- ⇒ See <http://www.cisl.ucar.edu/docs/ssh/>



# How to use a cryptocard

- ⇒ Push the PASSWORD button
- ⇒ Enter your PIN
- ⇒ Push the ENT button
- ⇒ The cryptocard will issue your OTP (One Time Password), see next slide
  
- ⇒ You'll also have an UCAS password, not valid for the supercomputers, but for web pages



# Login

⇒ type:

```
ssh -X your_id@bluefire.ucar.edu
```

⇒ you'll see (if you don't, `your_id` is invalid)

```
Token_Response:
```

⇒ Type the OTP from the cryptocard

⇒ UCAS username is the same as `your_id`

⇒ see also (UCAS password required):

<https://www.cisl.ucar.edu/docs/password/internal/cryptocard/logon.shtml>



# *Shell and Environment*

- ⇒ By default users get the `korn` shell
- ⇒ Disk quota can be checked with the `spquota` command, you'll have:
  - ⇒ 5GB in `~/` (your home, autobackup)
  - ⇒ 400GB in `/ptmp/your_id` (scrubbed)
- ⇒ You might need to familiarize with basic unix commands to deal with files, directories, editing, etc



# *Try a test run - Hello world*

➔ copy the hello\_world directory:

```
cp -r /usr/local/examples/hello_world .
```

➔ edit the file hello\_world.lsf

➔ replace the project number in the #BSUB -P line with yours

➔ Have a look at hello\_world.f too



# *Try a test run - Hello world, cont.*

- ⇒ Run the following command:

```
bsub < hello_world.lsf
```

- ⇒ you'll see something similar to:

```
Job <951703> is submitted to queue <regular>.
```

- ⇒ You can check the status of your job(s) with  
`bjobs`

- ⇒ If something is wrong, cancel the job with

```
bkill 951703
```



# *Try a test run - Hello world, cont.*

➔ Note the following lines in `hello_world.lsf`

➔ `#BSUB -n 1`

Means: use one processor

➔ `#BSUB -R "span[ptile=1]"`

Means: use one processor (again? see later)

➔ `#BSUB -o serial.%J.out`

➔ `#BSUB -e serial.%J.err`

When done, you'll find the output and error files in the same directory (`%J` becomes job number)



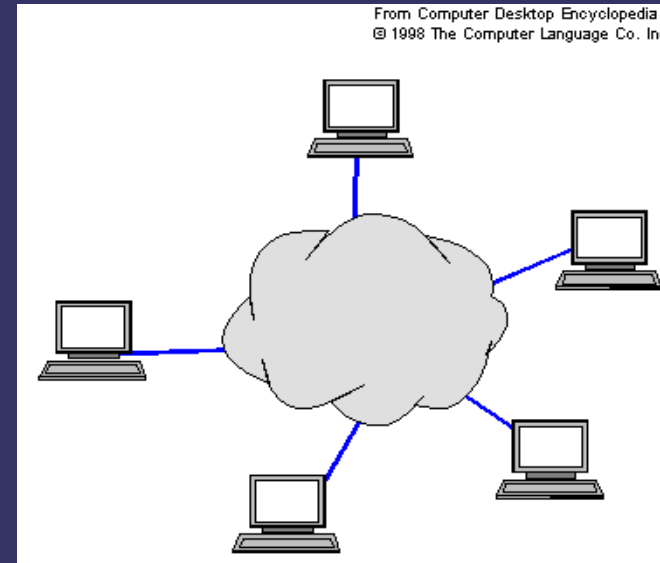
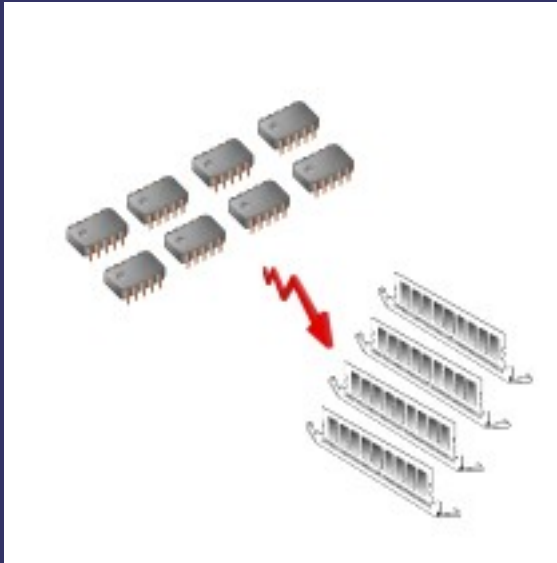


# *Parallel jobs*

- ⇒ The previous example was a serial job
- ⇒ bluefire is a supercomputer, made of 128 nodes - each nodes is “like” your workstation
- ⇒ Every node has: 32 processors (64 with SMP) at 4.7GHz and 64, 128 or 256GB of RAM
- ⇒ You can run a parallel “shared memory” job on a single node – up to 32/64 threads
- ⇒ You can run a parallel “distributed memory” job on many nodes – whatever tasks you'd like



# *Shared vs Private Memory*



# *Parallel jobs*

- ➔ Shared memory jobs usually use the OpenMP programming API
- ➔ Distributed memory usually use the MPI programming API
- ➔ Parallel jobs can use MPI, OpenMP or both (the latter are called hybrid)



# *Parallel wall construction*



# *Running a parallel job*

➔ `#BSUB -n 256`

**Total** number of processors (MPI tasks) to use

➔ `#BSUB -R "span[ptile=32]"`

Number of processors **per node** to use (MPI)

➔ `setenv OMP_NUM_THREADS 32`

Number of OpenMP threads to use

➔ More info:

[http://www.cisl.ucar.edu/docs/bluefire/be\\_quickstart.html](http://www.cisl.ucar.edu/docs/bluefire/be_quickstart.html)







# *Charging*

- ➔ When using the supercomputer your account is charged in General Accounting Units (GAUs)
- ➔ Charging depends on how much computation your job does, and if you are in a hurry (high- mid- or low-priority queues can be used)
- ➔ To track your GAUs usage log on to the CISL portal with OTP (cryptocard)  
<https://cislportal.ucar.edu/portal/>



# Problems?

-  (303) 497 - 1278
-  <https://cislcustomersupport.ucar.edu/>
-  consult1@ucar.edu
-  Hallway 42, Mesa Lab 1B level
- <http://www.cisl.ucar.edu/support/>

