Bootable Cluster CD
Intro Parallel 2011

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Sponsors

- Intel Corporation
- Supercomputing Conference
- Earlham College
- Shodor Foundation
- Contra Costa College
What is the BCCD?

- A software tool for domain educators for teaching CSE
- A stable platform for the writing of curricula for CSE
- A live CD with pre-configured clustering software
- One part of a larger CSE community
  - Shodor Foundation
  - National Computational Sciences Institute (NCSI)
  - CSE Reference Desk (CSERD)
- “Teaching Parallelism Made Easy”
  - Just keep pushing “Enter”
Short history

- First versions developed by Paul Gray and Students at University of Northern Iowa
- Current version (BCCDv3) collaboratively developed by a number of educational institutions
- BCCDv3 much easier to maintain and able to respond to new needs
- BCCDv3 has the same user experience as BCCDv2, so curricula written for v2 will still work with v3
What is the problem?

- STEM education is more important than ever [1]
- Computers have become a large part of any science curriculum
- BUT ... it’s hard to find suitable resources for teaching computational science and parallel programming at scale
- Many schools do not have the resources or expertise to provide the hardware or software
- Those that do tend to provide the resources primarily for research and not for education
- Even with a dedicated educational resource, it tends not to be “hands-on”, and is difficult to see how it works.
Almost every school will have a computer lab. BCCD is designed to be used on existing systems non-disruptively.

Many laptops are now dual-core. Virtualization software can be used to setup a cluster right in front of you.

Regardless of how it’s used, BCCD provides an environment that facilitates education.
Live Demo!

- Double click on VMware player
- Go to File -> New
- Click on “Install OS Later”
- Select “Linux”, then make sure “Ubuntu” is selected
- Set the name to “BCCD”
- Take the defaults for the storage
- Click Customize
- Set Procs -> 4 (if your system says QUAD) or 2
- Set the Network Adapter -> Bridged
- Don’t boot yet!
Just keep pressing Enter.
GalaxSee - Single node

- In the black terminal window, run `top`

- In the blue terminal window -
  
  ```
  $ cd $HOME/GalaxSee
  $ hostname > machines
  $ make
  ```
Still in the blue terminal window -

```
$ time mpirun -np 1 ./GalaxSee 500 400 5000
$ time mpirun -np 2 ./GalaxSee 500 400 5000
```

Notice the number of GalaxSee processes running in the top window.

You might not see speedup in VMware, because of virtualization overhead.
GalaxSee - Multi-node

- $ module purge && module load modules mpich2
- $ make clean && make
- $ bccd-snarfhosts
- $ bccd-syncdir --ni $HOME/GalaxSee /
  $HOME/machines
- $ time mpirun -np 8 /
  /tmp/$(hostname -s)-$(whoami)/GalaxSee /
  500 400 5000

- Notice that not all your processes are shown in the local top window.
- Once again, speedup is limited by virtualization.
**Miscellaneous information**

Where to find documentation? [http://bccd.net](http://bccd.net)

What software is available? `module avail`

How to load new software? `module load name`

How to unload software? `module unload name`

How to reset networking? `sudo /bin/bccd-reset-network`, use the password you set when you booted

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