Raspberry Pi Cluster Computer

10/18/16

* Supplies arrive!
* butts
* Parts received:
  + Samsung 32GB Evo Plus UHS-1 microSDHC x 9
  + Sabrent 60W 10-port USB Fast Charger x 1
  + Netgear ProSAFE 16-Port 10/100 Desktop Switch (Model no. FS116) x1
  + Sabrent USB 2.0 A Male to Micro B Cables (6 pack) x 2
  + Raspberry Pi 3, Model B, 1GB RAM x 9
* All microSD cards are formatted in FAT32 file format upon arrival
* We will be loading Raspbarian Jessie Lite onto one, setting up a pi with it and then cloning that image onto the other SD cards

10/19

HEAD NODE

* Reflashed head node
  + Expanded filesystem
  + Changed default password of “pi” user to headnode
  + Set internationalization options
    - Locale: en-US utf-8
    - Time zone: central
    - Keyboard layout: US
    - Wi-Fi country: US
  + Wait for network at boot: no
  + Advanced settings:
    - Hostname: ub00
    - Enabled SSH
* Reboot head node
* Ran sudo apt-get update and sudo apt-get upgrade
* Saved a copy of the default setup image of head node
* Had a TON of trouble getting wifi to work on head node, finally concluded the wifi interfaces on two of the pis do not work. Changed head node to a different pi with working wifi. Pi was not recognizing the wlan0 interface
  + Followed this tutorial to connect to school’s wifi: <https://www.raspberrypi.org/forums/viewtopic.php?f=36&t=111100>
* Allowed wifi to assign IP address with DHCP, did not make any changes to interfaces file
* Used this tutorial to set up head node as DHCP server for cluster pis and NAT <https://www.youtube.com/watch?v=eZ5uX-JJbyY>
* Head node has IP address 192.168.1.1 on LAN, cluster pis have numbers 192.168.1.101-107
* One mistake in video for setting up subnet in /etc/dhcp/dhcpd.conf, line “option router …” should be “option routers”
* Verified I could SSH into head node from my computer, IP address is currently 141.224.204.114
  + Need to request IT to assign static IP to MAC b8:27:eb:0b:30:6d
* Verified I could SSH into each of the cluster nodes from the head node
* Generated an RSA key on the head node by using *ssh-keygen -t rsa -C “pi@ub00”*, pressing enter for the default directory and pressing enter twice for no passphrase
* Then added public key to authorized key list by running *cat /home/pi/.ssh/id\_rsa.pub >> /home/pi/.ssh/authorized\_keys*
* Proceeded to copy the public key of the head node to each worker node by remotely creating a .ssh directory in the home directory by running *ssh pi@192.168.0.10X ‘mkdir .ssh’* and then from the master node running *cat ~/.ssh/id\_rsa.pub | ssh pi@192.168.0.10X “cat >> .ssh/authorized\_keys”*
* Edited /etc/hosts and added all cluster node names to hosts file. Below last line in file I added 192.168.1.011 ub01 etc for each node, each on a new line

CLUSTER NODE

* Reflashed one of the cluster nodes
  + Expanded filesystem
  + Set boot options for auto login to console
  + Wait for network at boot false
  + Set internationalization options
    - Locale: set to ENG-US UTF-8
    - Timezone: central
    - Keyboard layout: US
    - Wi-Fi country: US
  + Set hostname to ub01
  + Changed memory split to allocate 16 memories to GPU
  + Enabled SSH
* Reboot cluster node
* Ran sudo apt-get update and sudo apt-get upgrade
* Saved a copy of the default setup image of cluster node
* Re-imaged all cluster node SD cards
* Configured node ub01 to use dhcp by editing /etc/network/interfaces and adding *auto eth0* and *iface eth0 inet dhcp*
* Changed hostname of ub01 using sudo raspi-config and navigating to advanced options
  + wifi doesn’t work
* Configured node ub02
  + Wifi doesn’t work
* Configured node ub03
* Configured node ub04
* Configured node ub05
* Configured node ub06
* Configured node ub07

10/26/16

* Running speed tests on head node from [www.speedtest.net](http://www.speedtest.net)
  + Hardwired:
    - Trial 1: 19ms latency / 34.21 mbps download / 50.30 mbps upload
    - Trial 2: 19ms latency / 69.85 mbps download / 90.62 mbps upload
    - Trial 3: 3ms latency / 78.36 mbps download / 85.64 mbps upload
  + Wifi:
    - Trial 1: 23ms latency / 30.69 mbps download / 35.36 mbps upload
    - Trial 2: 20ms latency / 30.29 mbps download / 30.48 mbps upload
    - Trial 3: 20ms latency / 30.67 mbps download / 32.22 mbps upload

11/1/16

* Networking setup complete, all cluster nodes are on a subnet, head node has dhcp server running that assigns IP address to cluster nodes, NAT is setup on head node so all cluster nodes can get to internet for updates and package installs
* To SSH into head node:
  + IP: 141.224.204.114
  + User: pi
  + Pw: headnode

11/3/16

* Installed DVTM on all pis to allow us to run commands on all pis
* Beginning to install MPI on pis for parallel processing, we will try MPICH, which supports C, C++ and FORTRAN