# SETTING UP SSH FOR YOUR PARALLELLA: A TUTORIAL FOR STUDENTS

Written by Dr. Suzanne J. Matthews, CDT Zachary Ramirez, and Mr. James Beck, USMA

## ABOUT THIS TUTORIAL:

This tutorial teaches you to access your Parallella board from your laptop using an SSH connection. If you don't have an HDMI monitor, this is the principle way to run programs, and transfer files between the Parallella board and your computer in the Barracks. Before you get started, you will need to ensure you have a few things.

## THINGS YOU WILL NEED BEFORE-HAND:

- A Parallella board with the latest image already installed (see other tutorial if this is not the case)
- Crossover Ethernet cable
- Putty on your laptop: cadet software link: \\usmasvddeecs\EECS\Cadet\Software\Putty.

#### **CONFIGURING THE PARRALLELA BOARD:**

In order to SSH into our Parallella board, we need to configure it with a static IP address. Boot up the Parallella board using the HDMI display and keyboard input, and pull up LXTerminal. Ensure that /etc/network/interfaces has the following lines:

```
auto eth0
iface eth0 inet static
    address 10.0.0.3/8
    up route add 10.0.0.2 dev eth0
```

Next, edit /etc/hostname and give your board a hostname. linx47691 is an example.

Next, edit /etc/hosts and add the following line (assumes the IP address and hostname 10.0.0.3 linx47691

Reboot the board using sudo reboot to allow the OS to process the changes you've made. At this point, your Parallella board is configured. Next, we will configure our laptop for use.

## **CONFIGURING YOUR PERSONAL COMPUTER:**

Under Control Panel select -> Network and Sharing -> "Change adapter settings" -> "Local Area Connection"-> "Properties" -> "Internet Protocol Version 4 (TCP/IPv4 -> Properties.

		×	ų.	Local Area Connection Sta	atus	23
🚱 🗢 👯 « Network and Inte	ernet > Network and Sharing Center - 4	P				
<u>File Edit View Tools H</u> elp	2			General		
Control Panel Home Manage wireless networks Change adapter settings Change advanced sharing settings	View your basic network information and set up connections       See full         USMANBUXATEDI       Image: Connection of the set of	@ nap ect		Connection IPv4 Connectivity: IPv6 Connectivity: Media State: Duration: Speed: Details	No Inten	Internet net access Enabled 05:23:56 1.0 Gbps
See also HomeGroup Internet Options Windows Firewall	<ul> <li>Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or acc point.</li> <li>Connect to a network</li> <li>Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.</li> <li>Choose homegroup and sharing options         Access files and printers located on other network computers, or change sharing settings.</li> <li>Troubleshoot problems         Diagnose and repair network problems, or get troubleshooting information.</li> </ul>	55		Activity Sent Bytes: 113,46:		Received
						Close

Click on "Alternative Configuration". Indicate that the IP address should be User Configured, and enter 10.0.0.2 as your IP address.

📮 Local Area Connection Properties		
Networking Sharing		
Connect using:	Internet Protocol Version 4 (TCP/IF	Pv4) Properties
Intel(R) 82577LM Gigabit Network Connection	General Alternate Configuration	
	If this computer is used on more the settings below.	han one network, enter the alternate IP
This connection uses the following items:	O Automatic private IP address	s
Synchron Eyes network Driver	I User configured	
✓ ■ File and Printer Sharing for Microsoft Networks	IP address:	10 . 0 . 0 . 2
Internet Protocol Version 6 (TCP/IPv6)	Subnet mask:	255.0.0.0
✓ Internet Protocol Version 4 (TCP/IPv4)     ✓ Ink-Layer Topology Discovery Mapper I/O Driver	Default gateway:	
Link-Layer Topology Discovery Responder	Preferred DNS server:	
Install Uninstall Properties	<u>A</u> lternate DNS server:	
Description	Preferred <u>W</u> INS server:	
Iransmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication	Alternate WI <u>N</u> S server:	
across diverse interconnected networks.	alidate settings, if changed	d, upon exit
OK Cancel		OK Cancel

Open up a command prompt (SHIFT->Right Click->Open Command Window Here) and ensure that you have an IP address of 10.0.2

C:\Windows\system32\cmd.exe	3
Windows IP Configuration	^
Ethernet adapter Bluetooth Network Connection 2:	
Media State Media disconnected Connection-specific DNS Suffix . :	
Ethernet adapter Local Area Connection:	
Connection-specific DNS Suffix .: Link-local IPv6 Address : fe80::18a7:3284:51fa:5b20x11 IPv4 Address : 10.0.0.2 Subnet Mask : 255.0.0.0 Default Gateway :	
Ethernet adapter VirtualBox Host-Only Network:	
Connection-specific DNS Suffix .: Link-local IPv6 Address : fe80::e997:c63c:c35b:4acd%29 IPv4 Address : 192.168.56.1 Subnet Mask : : : 255.255.255.0 Default Gateway :	
C:\Users\Suzanne.Matthews\Desktop>	-

Next, ensure you have connectivity to the board by entering ping 10.0.0.3



#### TROUBLESHOOTING:

- If Parallella IP is not 10.0.0.3
  - Ensure all the files match what is specified above. In particular, /etc/hosts and /etc/hostname should have the same hostname! (lin<your x Number>!)
  - Run if config -a to ensure that the address is 10.0.0.3
  - Reboot the board to ensure all changes are propagated: type sudo reboot.
- If Windows IP address is not 10.0.0.2
  - Are you connected to wireless? This may be interfering with your ability to get a static IP address. Try disconnecting or turning off wireless.

Open up putty.exe in Windows and create	a new profile that lo	ooks like the following:
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🕵 PuTTY Configuration		? 💌		
Category:				
Session	Basic options for your PuTTY session			
···· Logging ···· Terminal ···· Keyboard	Specify the destination you want to conne	ct to		
	Host <u>N</u> ame (or IP address)	Port		
Bell	10.0.0.3	22		
Features ⊡ Window	Connection type: ◎ Ra <u>w</u> ◎ <u>T</u> elnet ◎ Rlogin ◎ <u>S</u> SH	l 🔘 Serjal		
Appearance Behaviour Translation Selection Colours Connection Data Proxy Telnet Rlogin SSH Serial	Load, save or delete a stored session Sav <u>e</u> d Sessions			
	Default Settings Parallela SSH	Load Sa <u>v</u> e Delete		
	Close window on e <u>x</u> it: Always   Never   Only on clean exit			
<u>A</u> bout <u>H</u> elp	<u>O</u> pen	<u>C</u> ancel		

Save it as Parallella-SSH. Clicking "open" should give you a login prompt. Log in using the regular username and password. You should now be connected!

#### **TRANSFERRING FILES:**

We will be using the PSFTP (Putty Secure FTP) client to transfer files between your laptop and the Parallella board via SSH. PSFTP will acts as an interactive FTP session that allows you to list directory contents, browse the file systems, etc. The program PSFTP.EXE is located in the same directory as the Putty.exe executable. Double click on PSFTP.EXE to open the prompt. Ensure that you can ssh into your board prior to doing this! If you cannot ssh, this certainly will not work.

First we need to logon. Type open linaro@10.0.0.3 to establish a connection:



This psftp prompt acts like a linux terminal. You can ls, cd, etc. In the following set of examples, we will be transferring files from the parallella-files/para-para/src directory and the directory that your Putty install resides in.

C:\Program Files\Putty\PSFTP.EXE		J
psftp: no hostname specified; use psftp> open linaro@10.0.0.3 Using username "linaro". linaro@10.0.0.3's password: Remote working directory is /home/ psftp> pwd Remote directory is /home/linaro	"open host.name" to connect	
psftp> cd Documents		
Remote directory is now /home/lina	aro/Documents	
psftp> ls Listing dimestany, (home (lippus (Dee	aumonto	
drwxr-xr-x 3 linaro linaro	4096 Jun 2 16:24	
drwxr-xr-x 31 linaro linaro	4096 Oct 19 23:35	
drwxrwxr-x 2 linaro linaro	4096 Jun 2 16:24 Scratch Projects	
psftp> cd		
Remote directory is now /home/lina	aro	
psftp> 1s		17
Listing directory /home/linaro	4096 Act 19 22:25	
dwwxr-xr-x 31 110aru 110aru	4076 VCL 17 23-35 . 4096 May 22 10:48	
-rw $-rw$ $1$ linaro	44 Oct 19 23:35 .Xauthority	
-rw-rw-r 1 linaro linaro	90 Jun 2 11:38 .asoundrc	
-rw 1 linaro linaro	2971 Jun 3 11:32 .bash_history	
-rw-rr 1 linaro linaro	220 May 22 10:48 .bash_logout	
-rw-rr 1 linaro linaro	3828 Jun 3 12:09 .bashrc	1

#### GET: TRANSFERRING FILES FROM PARALLELLA TO WINDOWS

To transfer files from the Parallella board and place it in the putty directory, we can use the get command. In this example, we are transferring the file hello-openmp.c:

C:\Program Files\Putty\PSFTP.EXE
psftp: no hostname specified; use "open host.name" to connect psftp> open linaro@10.0.0.3 Using username "linaro".
linaro210.0.0.3's password:
Remote working directory is /home/linaro
Remote directory is now /home/linaro/parallella-examples/para-para/src
psftp> ls
Listing directory /home/linaro/parallella-examples/para-para/src dwu/www.yr-y 2 linaro linaro 4096 Jun 11 13:36
drwxrwxr-x 3 linaro 1inaro 4096 Jun 11 13:36
-rw-rw-r 1 linaro linaro 425 Jun 11 13:36 hello-mpi.c
-W-W-W-P 1 linaro 111aro 52/2 Jun 11 13:36 hello-openci.c
psftp> get hello-openmp.c
remote:/home/linaro/parallella-examples/para-para/src/hello-openmp.c => local:he
110-openmp.c
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We should now see hello-openmp.c in our putty directory.

#### PUT: TRANSFERRING FILES FROM WINDOWS TO PARALLELLA

To transfer files from the Putty directory and place it on the Parallella board, we can use the put command. In this example, we are transferring a new file called data.txt, which is filled with some random data:

Program Files\Putty\PSFTP.EXE			X	
psftp: no hostname specified; use "open host.name" to connect psftp> open linaro@10.0.0.3 Using username "linaro". linaro@10.0.0.3's password: Remote working directory is /home/linaro psftp> cd parallella-examples/para-para/src Remote directory is now /home/linaro/parallella-examples/para-para/sr psftp> put data.txt local:data.txt => remote:/home/linaro/parallella-examples/para-para/s	°C ∶PC∕0	data.	txt	• III
psftp> ls Listing directory /home/linaro/parallella-examples/para-para/src drwxrwxr-x 2 linaro linaro 4096 Jun 11 13:36 . -rw-rw-r 1 linaro linaro 74 Oct 19 23:49 data.txt -rw-rw-r 1 linaro linaro 425 Jun 11 13:36 hello-mpi.c -rw-rw-r 1 linaro linaro 6272 Jun 11 13:36 hello-opencl. -rw-rw-r 1 linaro linaro 542 Jun 11 13:36 hello-opencl. -rw-rw-r 1 linaro linaro 542 Jun 11 13:36 hello-opencl. psftp>	CC			
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More information can be found in the PSFTP documentation: <u>http://tartarus.org/~simon/putty-snapshots/htmldoc/Chapter6.html</u>