Single Node MPI Installation Instructions

1. Install Ubuntu Server onto virtual or physical machine

Once the server finishes building and is in Available status, SSH into it and log in using the IP address you recorded earlier. If this is new on OpenStack, it will not need a password but use your ssh-key instead.

```
$ ssh <username>@<Your Server IP>
```

After logging in, execute the following commands. These commands will update your system, install the necessary build tools:

```
$ sudo apt-get update
$ sudo apt-get install build-essential
```

2. Install Open MPI

Install the document extensions for man to use MPI, then finally install the OpenMPI binaries and development tools for mpi so you can run and compile programs.

```
$ sudo apt-get install openmpi-doc
$ sudo apt-get install openmpi-bin
$ sudo apt-get install libopenmpi-dev
```

If this all went well, you can try to run mpirun. If you get something similar to what shows below, you successfully installed OpenMPI.

```
$ mpirun
--------------------------------------------------------------------------
mpirun could not find anything to do.

It is possible that you forgot to specify how many processes to run
via the "-np" argument.
--------------------------------------------------------------------------
```

3. Test OpenMPI – Compile your first program

To verify we have configured everything correctly so far, we will use the hello_c.c from the examples included with Open MPI.

To do this, follow these steps: Make a directory, download the hello world program from one of the systems in the lab, compile the program using mpicc, run the program using mpirun. Steps are below:

```
$ mkdir ~/examples
$ cd examples
$ scp ubuntu@10.3.101.78:/home/ubuntu/hello_c.c hello_c.c
$ mpicc hello_c.c -o hello
$ mpirun ./hello
```

This should output the following:

```
Hello, world, I am 0 of 1
```

Now that it works, get the second example, which we will use it for testing connectivity:

```
$ scp ubuntu@10.3.101.78:/home/ubuntu/connectivity_c.c connectivity_c.c
$ mpicc connectivity _c.c -o connectivity
$ mpirun ./connectivity
```

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You should see the following output:

```
Connectivity test on 1 processes PASSED.
```

Now that we have confirmed that the first node is online and operational, we will finish building your system to run mpi using Python (you can already use C to build mpi, by the way).

4. Install mpi4py

Run the following command to install PIP

```
$ sudo apt-get install python-pip
```

Next, update PIPP: **DO NOT UPGRADE PIP… THIS HAS ISSUES AS INSTALLS WILL NOT WORK.**

```
$ sudo pip install –upgrade pip
```

Install python-dev tools:

```
$ sudo apt-get install python-dev
```

Now install mpi4py:

```
$ sudo pip install mpi4py
```

Congratulations! You can now write and run mpi programs using Python!

5. Install SciPy (if you haven't done this already)

Finally, install SciPy packages. This will take a while:

```
$ sudo apt-get install python-numpy python-scipy python-matplotlib ipython
ipython-notebook python-pandas python-sympy python-nose
```