Using OpenSCAD on Amazon Web Services Elastic Compute Cloud (AWS EC2)

John E. Nelson

This document describes how to use OpenSCAD on an Amazon EC2 server. This is not a paid or free endorsement of AWS, EC2 nor any of the other applications I mention. This tutorial was produced using Gimp to screen capture and LYX to assemble the document. No warranties are made. Use these directions at your own risk.

Amazon Web Services (AWS) offers a variety of services for cloud computing. I will show you how to use EC2 Elastic Compute Cloud to run openSCAD. Why is this useful? If you have a fairly complex model in openSCAD you may tax your computer or exceed it's memory resulting in swapping of memory to disk with resultant very slow model rendering. AWS allows you to purchase computing time quite cheaply. There is a free version of AWS that allows you to use one CPU (they term it an ECU Elastic Computing Unit or a vCPU virtual CPU). Once comfortable with the process you can move to a paid, faster CPU with more memory. Typically I design my parts at fairly low resolution (few facets) then increase the resolution and run the model on EC2 to produce an STL file for 3-D printing.

Even if you have a fairly powerful CPU, your desktop or notebook has to keep the GUI running along with any other programs you typically use in addition to OpenSCAD. The Amazon EC2 server is only running the base operating system plus a command line call to OpenSCAD without a GUI front end. After producing your STL file you FTP the file to your local machine and view it using a program to view STL files.

This is sort of the 2014 version of connecting to a 1970 era mainframe, sans the phone, acoustic coupler and 300 baud modem.

I use Linux on my desktop and notebook and these directions are based on the programs I typically use. For FTP I use FileZilla, the

connection to Amazon is via the Netscape or Chrome web browser. To view STL files on my Linux machine I use Netgen Mesh Generator. To produce the OpenSCAD script I use OpenSCAD with it's integrated text editor , Geany or Gedit. To SSH to the Amazon server set-up, I use either the Amazon Java Terminal application or a local terminal program Byobu Terminal.

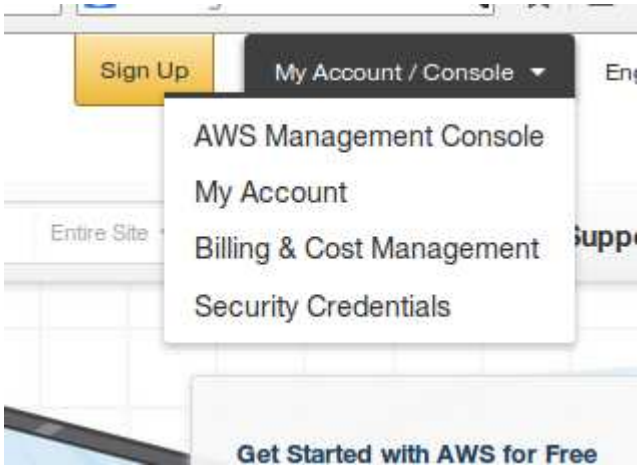
Here goes-

1 Setting up an Amazon EC2 instance

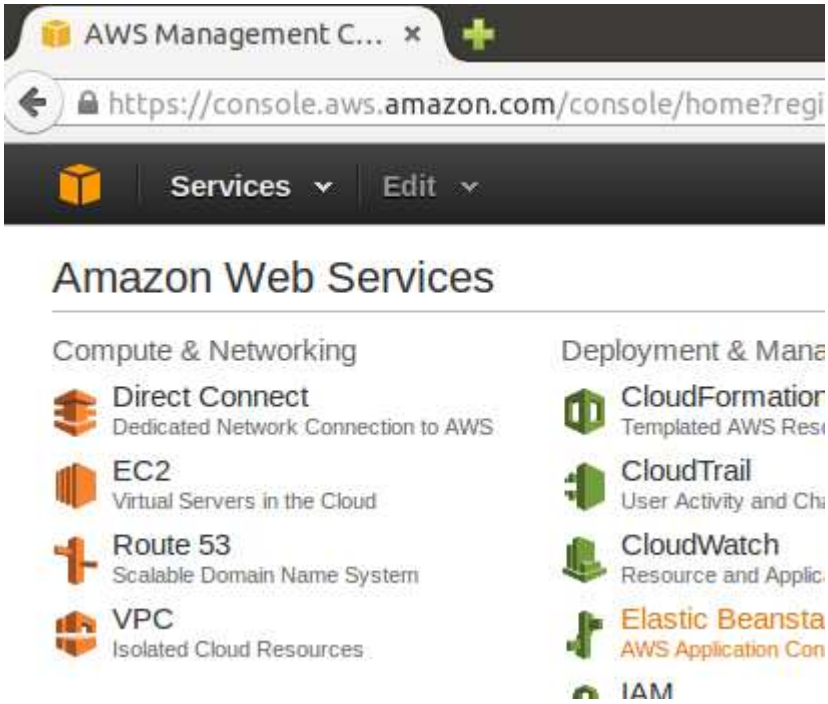
1.1 Open your browser and navigate to Amazon AWS. http://aws.amazon.com

1.2 Sign-up (you will need a credit card and email address).

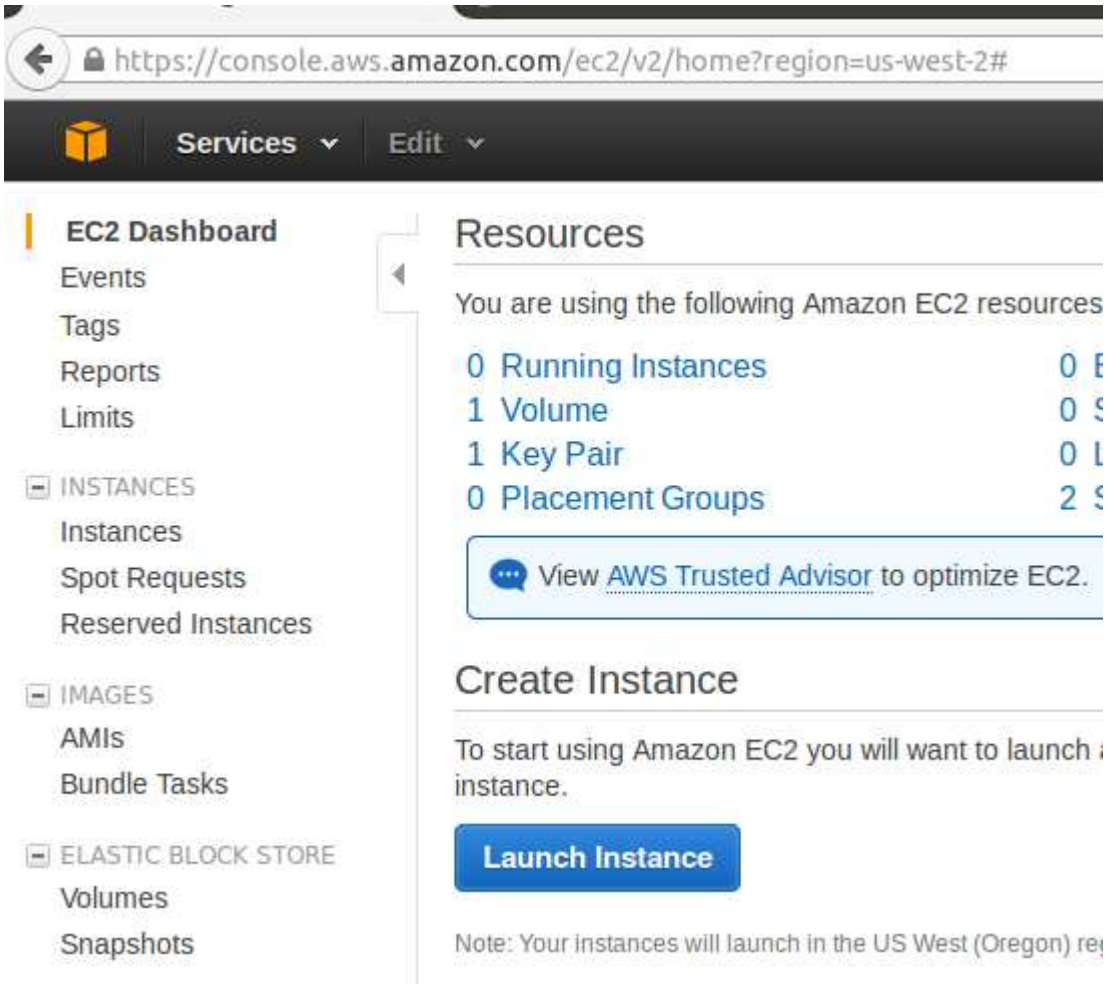
1.3 Sign-in by clicking on MyAccount/Console> AWS Management Console.



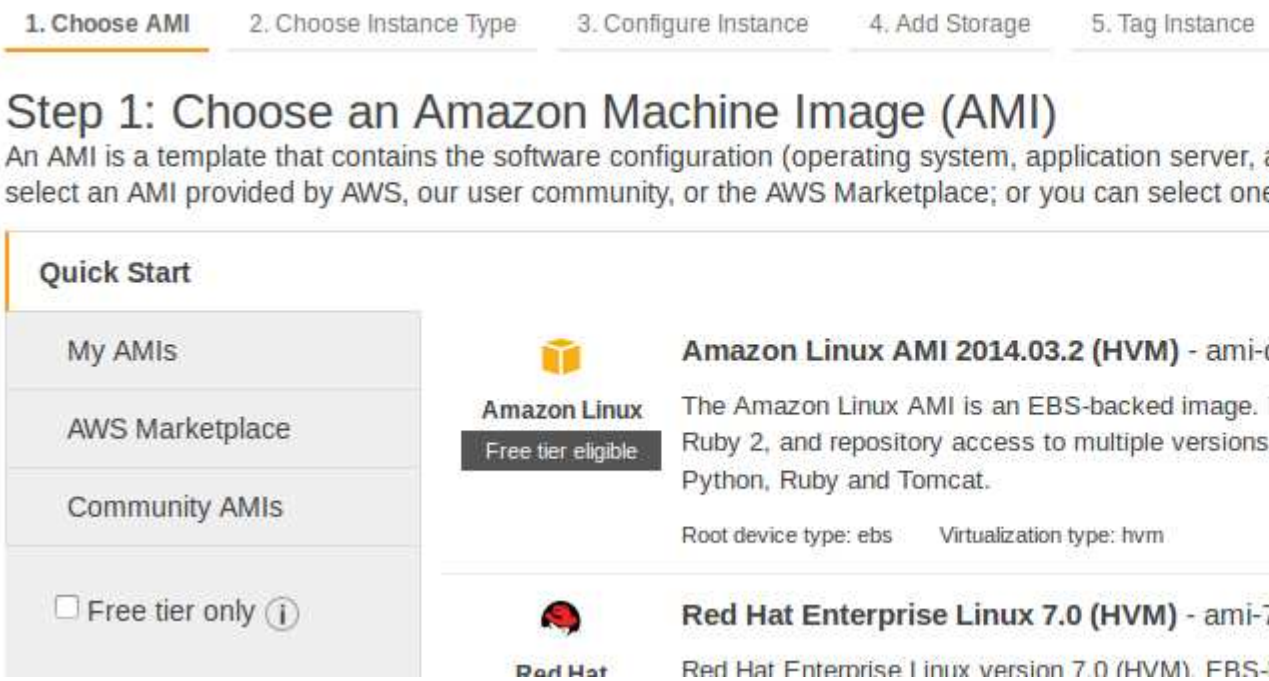
1.4 Navigate to EC2



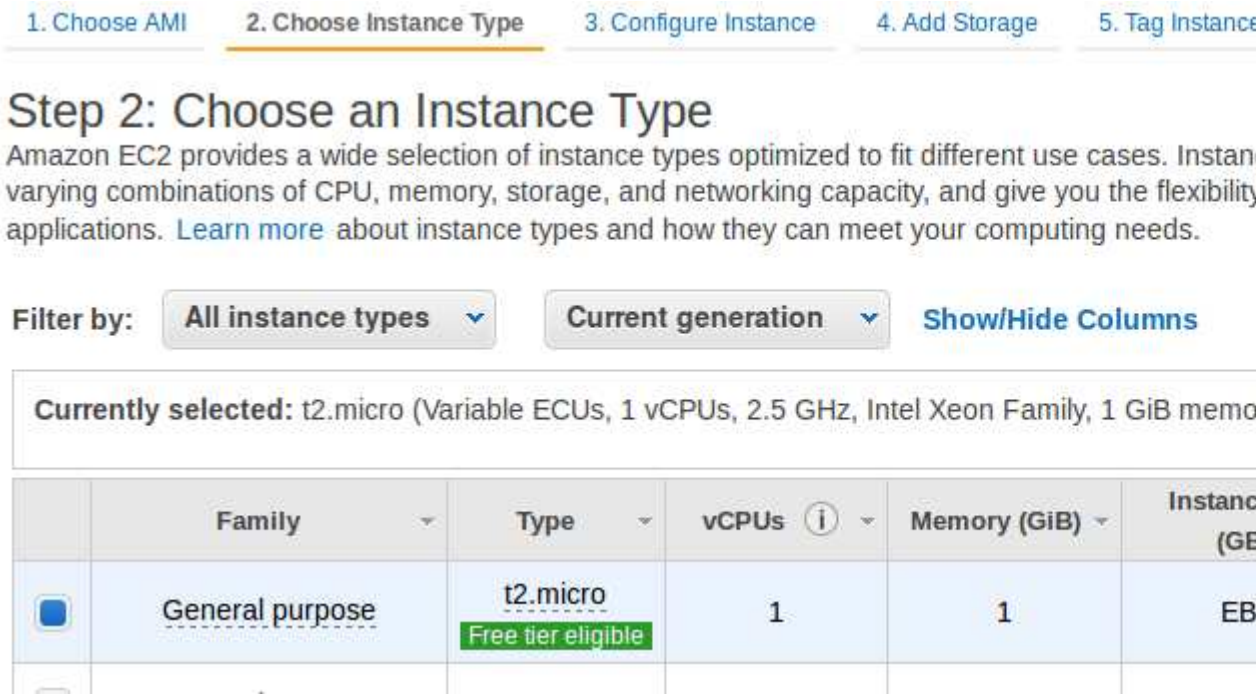
1.5 **Launch Instance if this is your first time. If you already have an instance you can go to the Instances EC2 Dashboard window.**



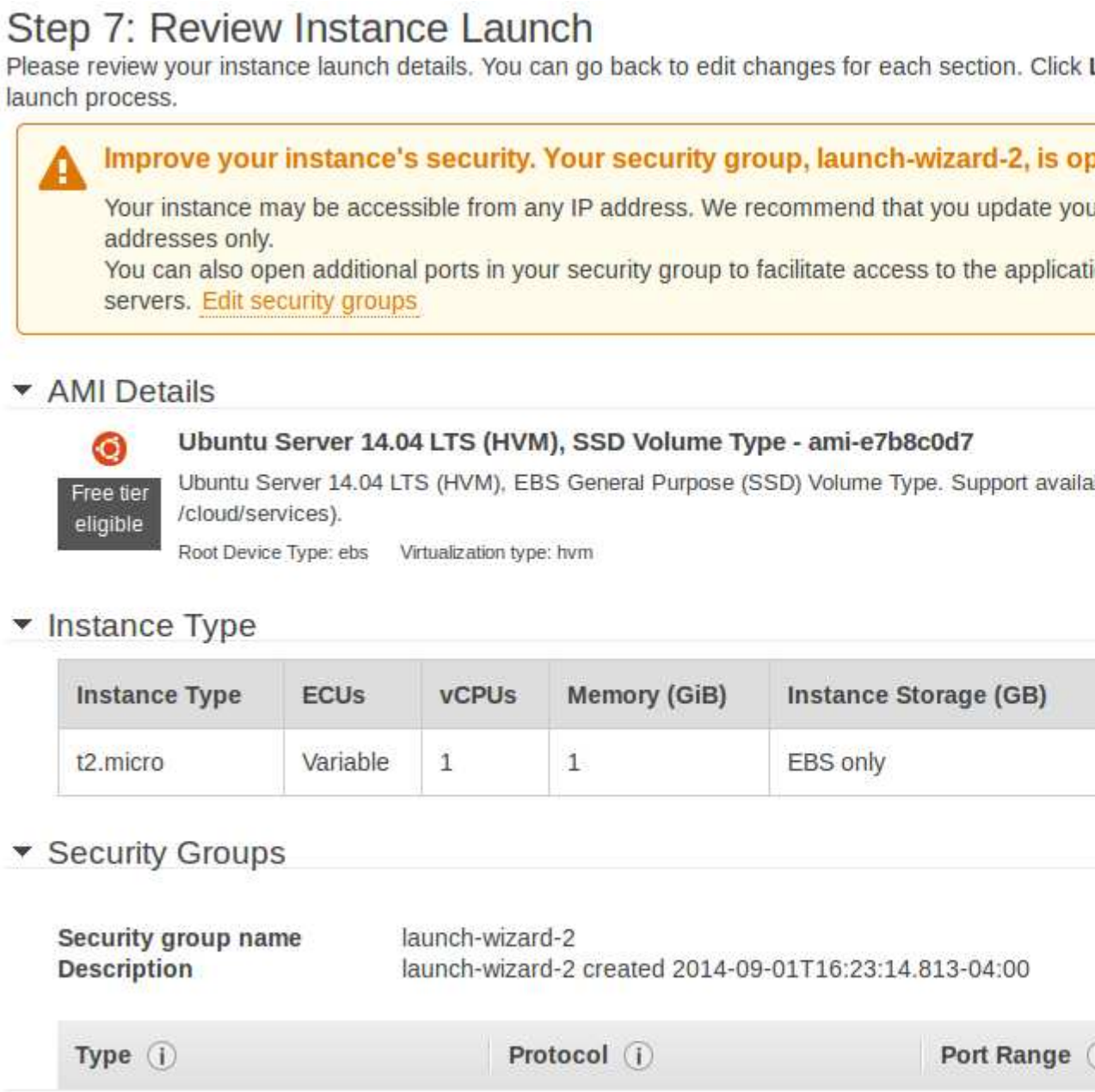
1.6 Choose a machine image to run on your server (instance). The following directions apply to an Ubuntu Linux server.



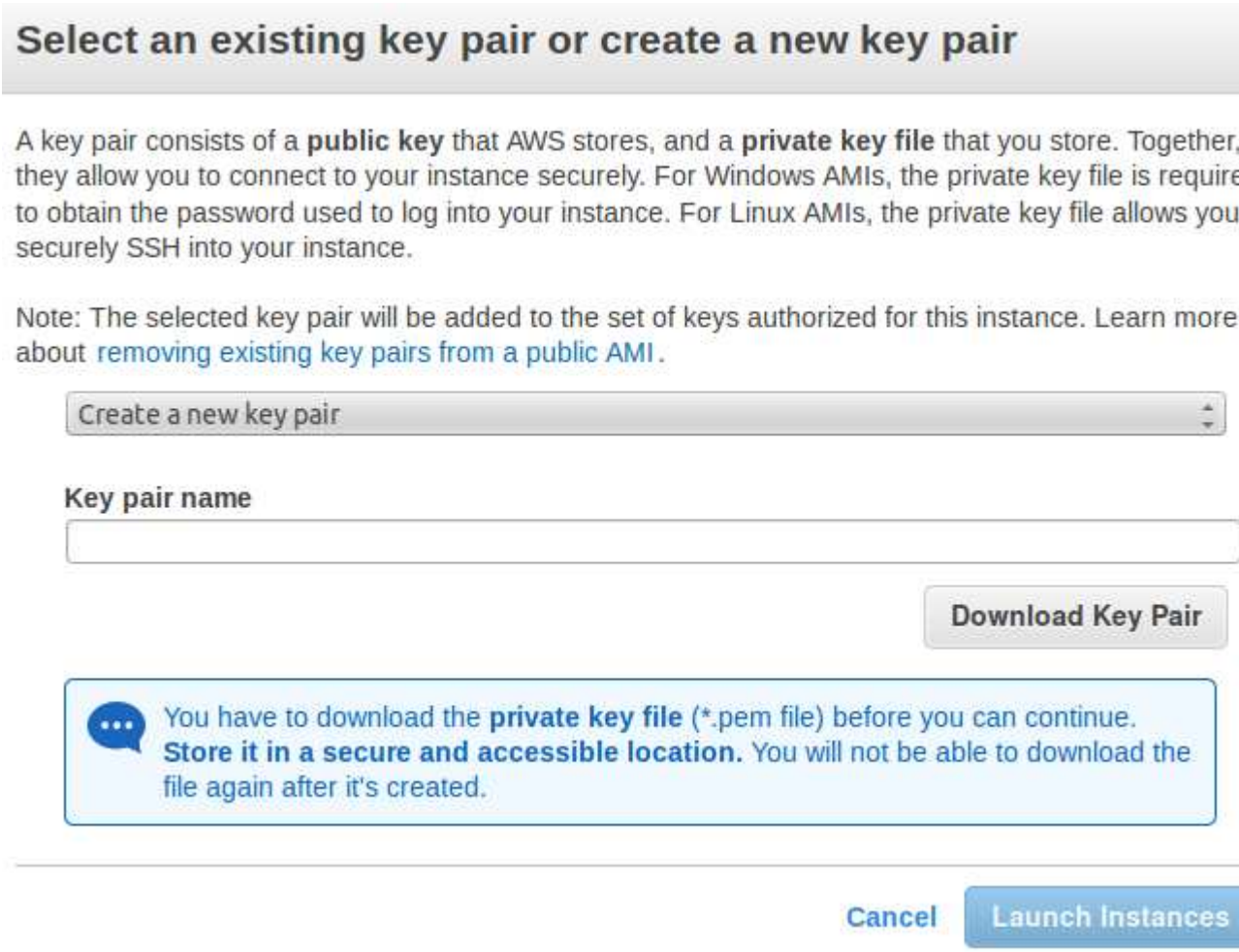
1.7 Choose an instance type. The following directions apply to an Ubuntu Linux server.



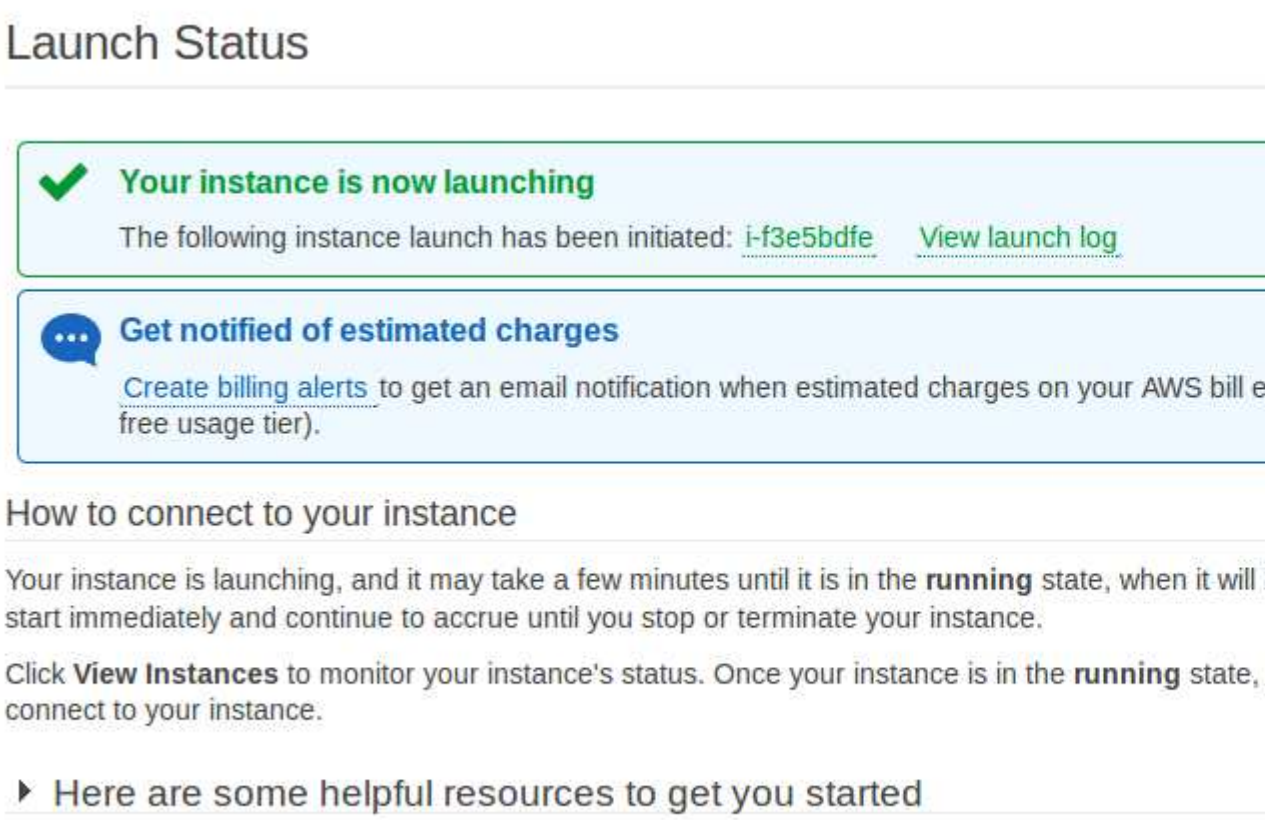
1.8 Review and Launch



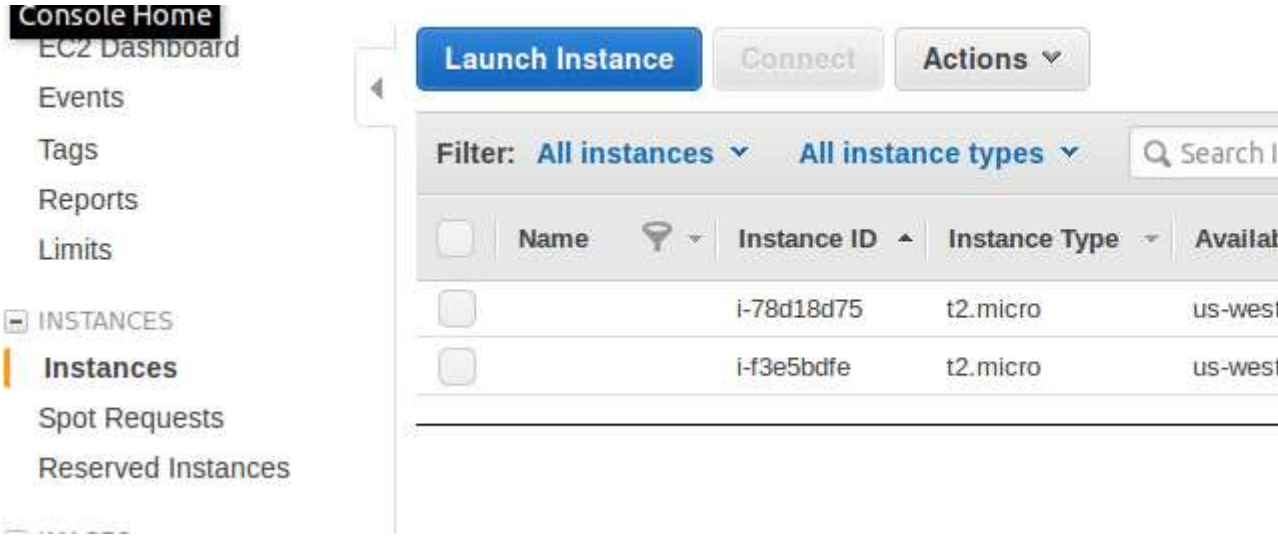
1.9 Generate a key-pair to provide secure access to your instance. If you have multiple instances you can use the same key pair. Store the pem file on your secure local machine in a directory you have access to.



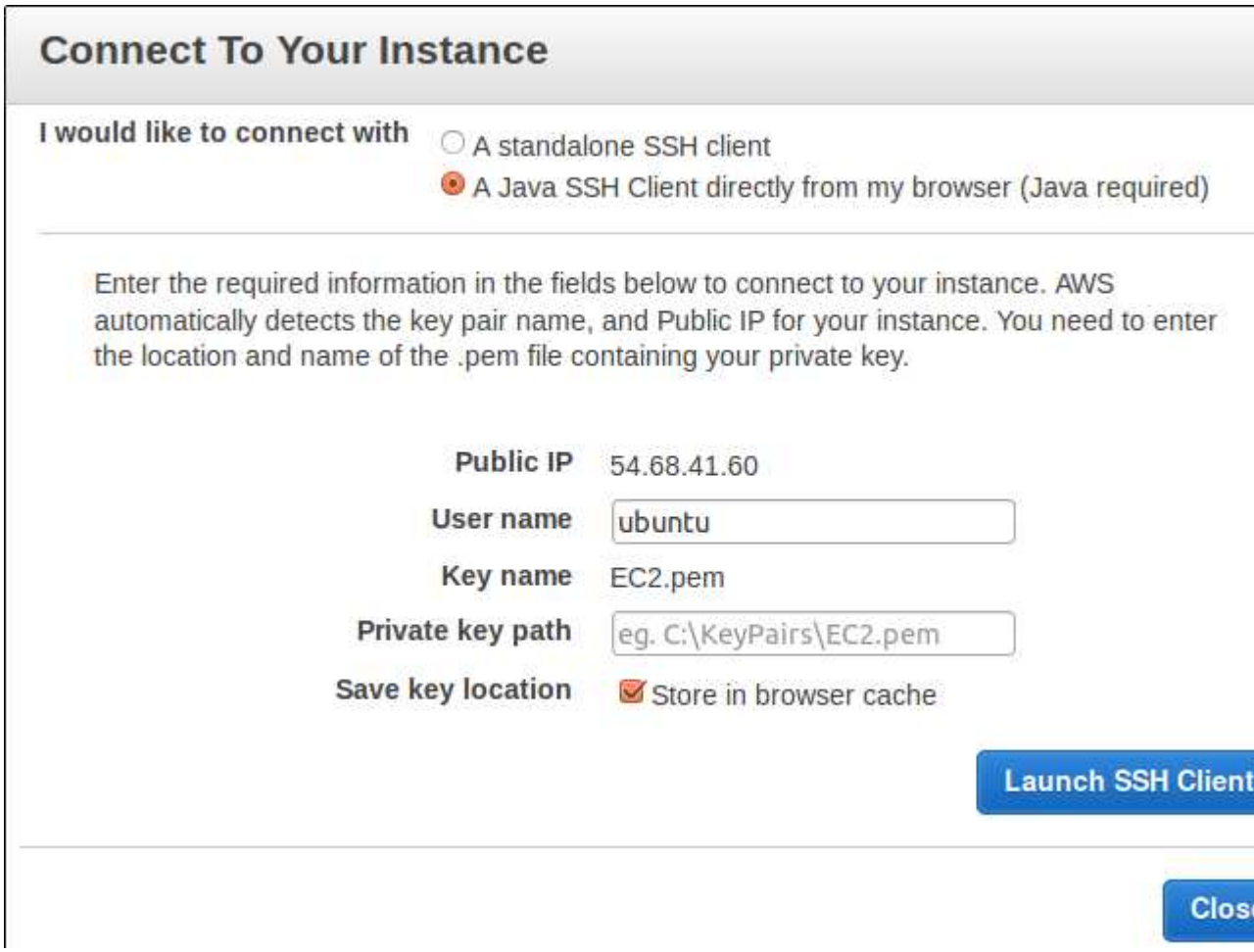
1.10 Launch your instance



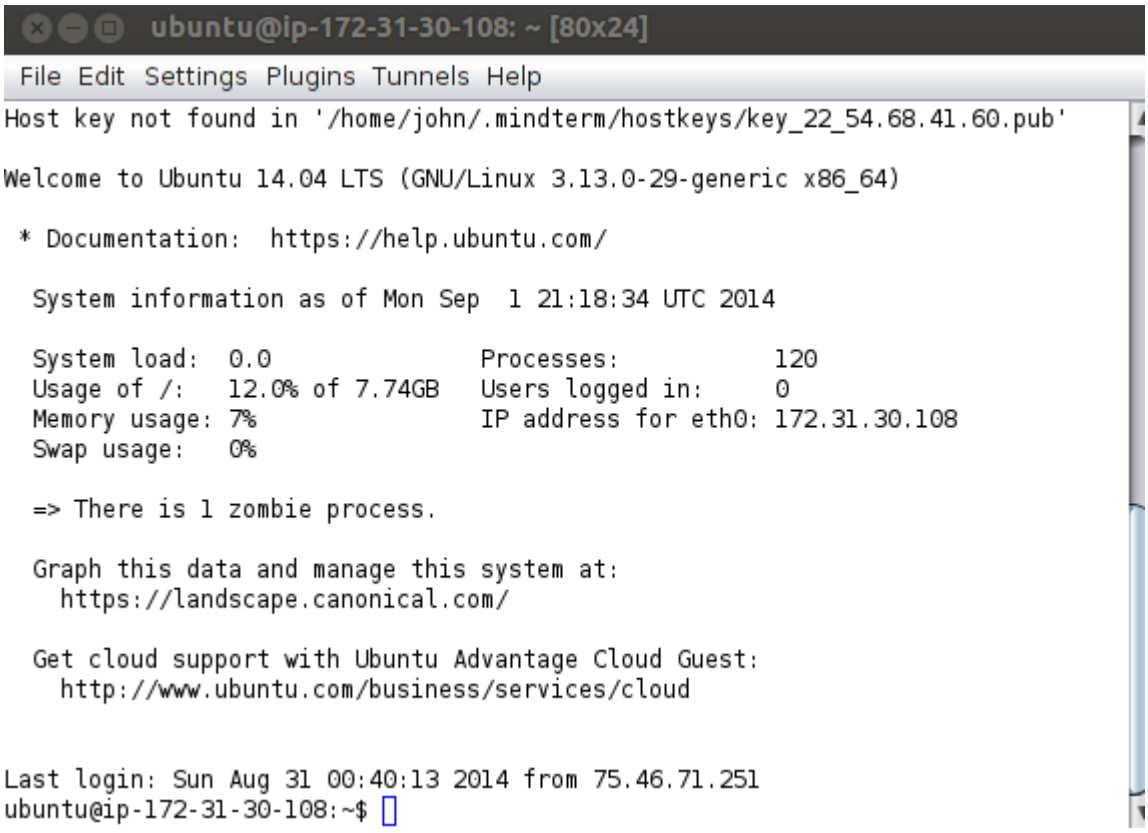
1.11 After launching your instance you can View Instances.



1.12 **Connect to your instance with the Amazon Java Terminal. Set the path to your Private key. Take note of the Public IP and User Name as you will need those to FTP into your instance to upload and download files.**



1.13 Launch the Amazon SSH Client. If this is the first time, you will have to accept a license for the Amazon MindTerm Java Terminal client.



2 Load OpenSCAD onto your server instance

- From OpenSCAD.org There is a PPA (private package archive) for more recent versions of OpenSCAD that is maintained by chrysn. To install, run the following commands in the terminal connected to your instance: (Ctrl-V does not work in the terminal. Type the commands)
- sudo add-apt-repository ppa:chrysn/openscad
- sudo apt-get update
- sudo apt-get install openscad
- Hopefully all goes well and you have OpenSCAD installed
- Test by typing openscad and hit Enter

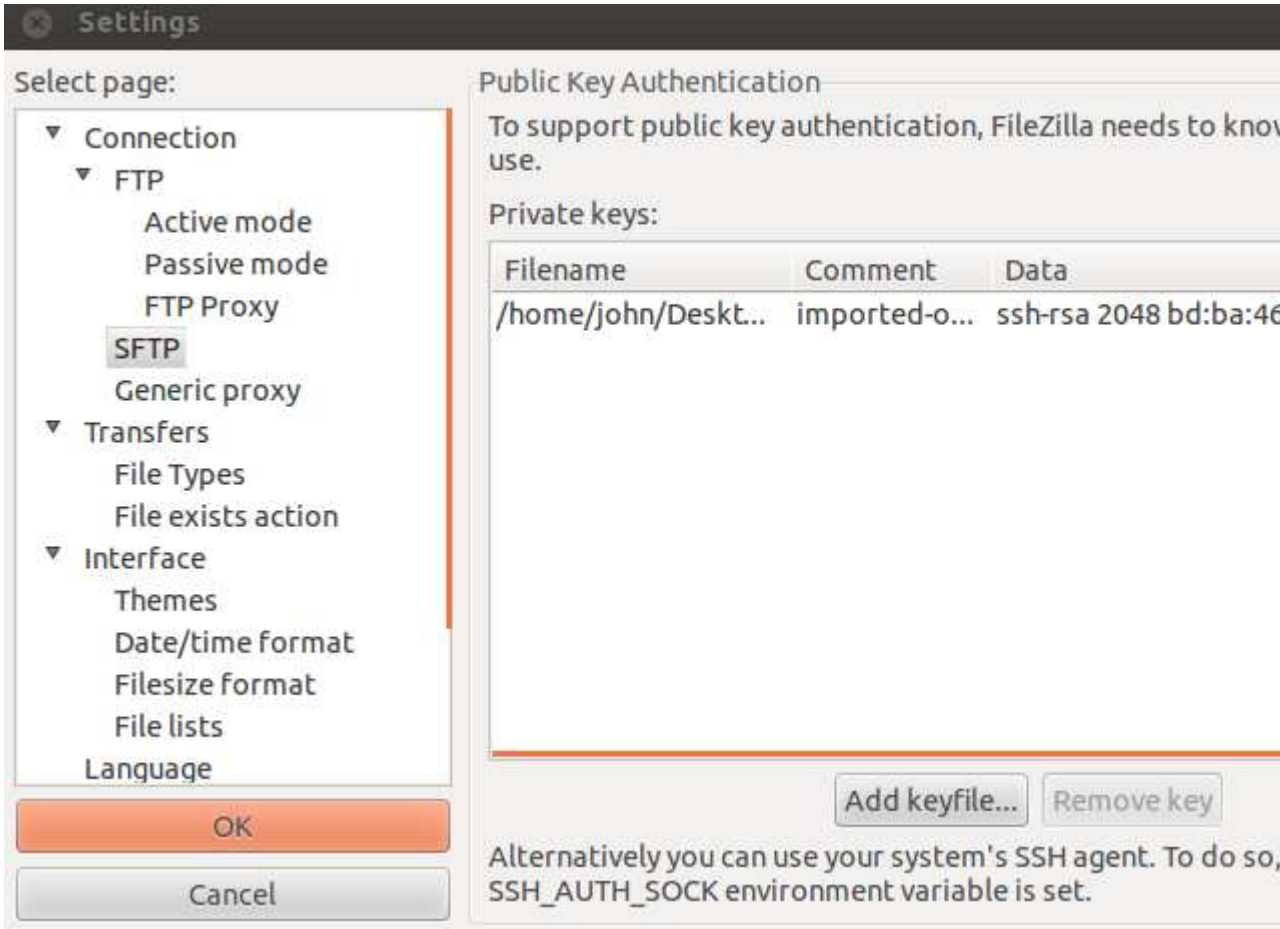
- ```
  ubuntu@ip-172-31-30-108:~/home$ openscad
  Requested GUI mode but can't open display!
  ubuntu@ip-172-31-30-108:~/home$
  ```
- This response indicates OpenSCAD is present but it won't run because it cannot open a GUI window. Success!

3 Time to upload a .scad file

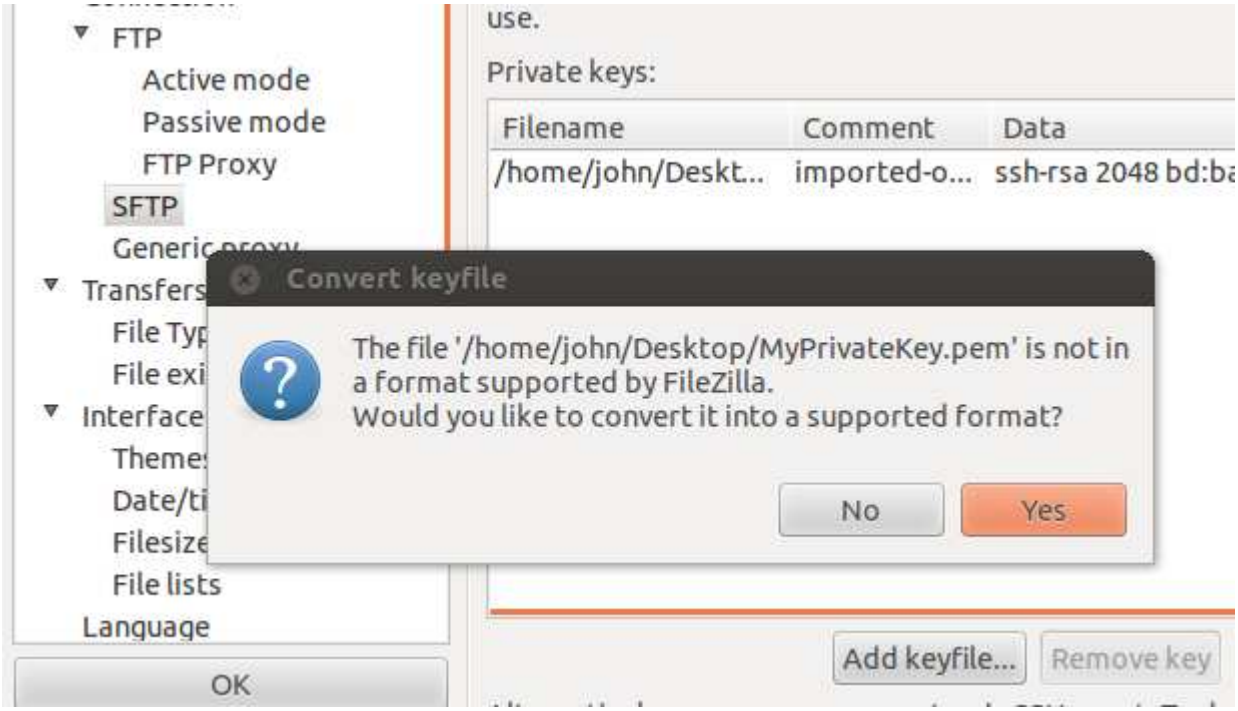
3.1 Download and install FileZilla if you have not done so already


  ```

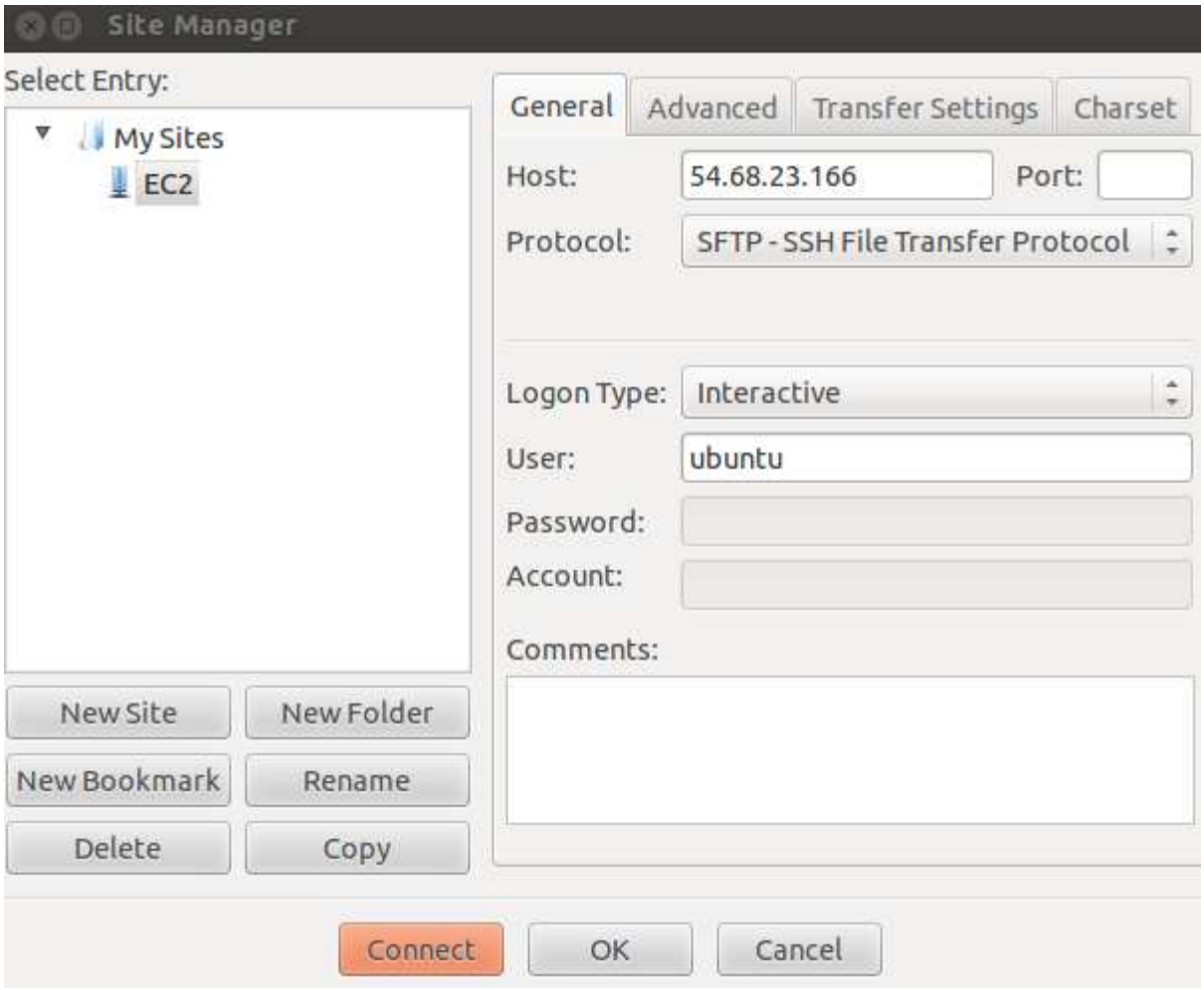
3.2 Open FileZille Edit > Settings. Select SFTP.



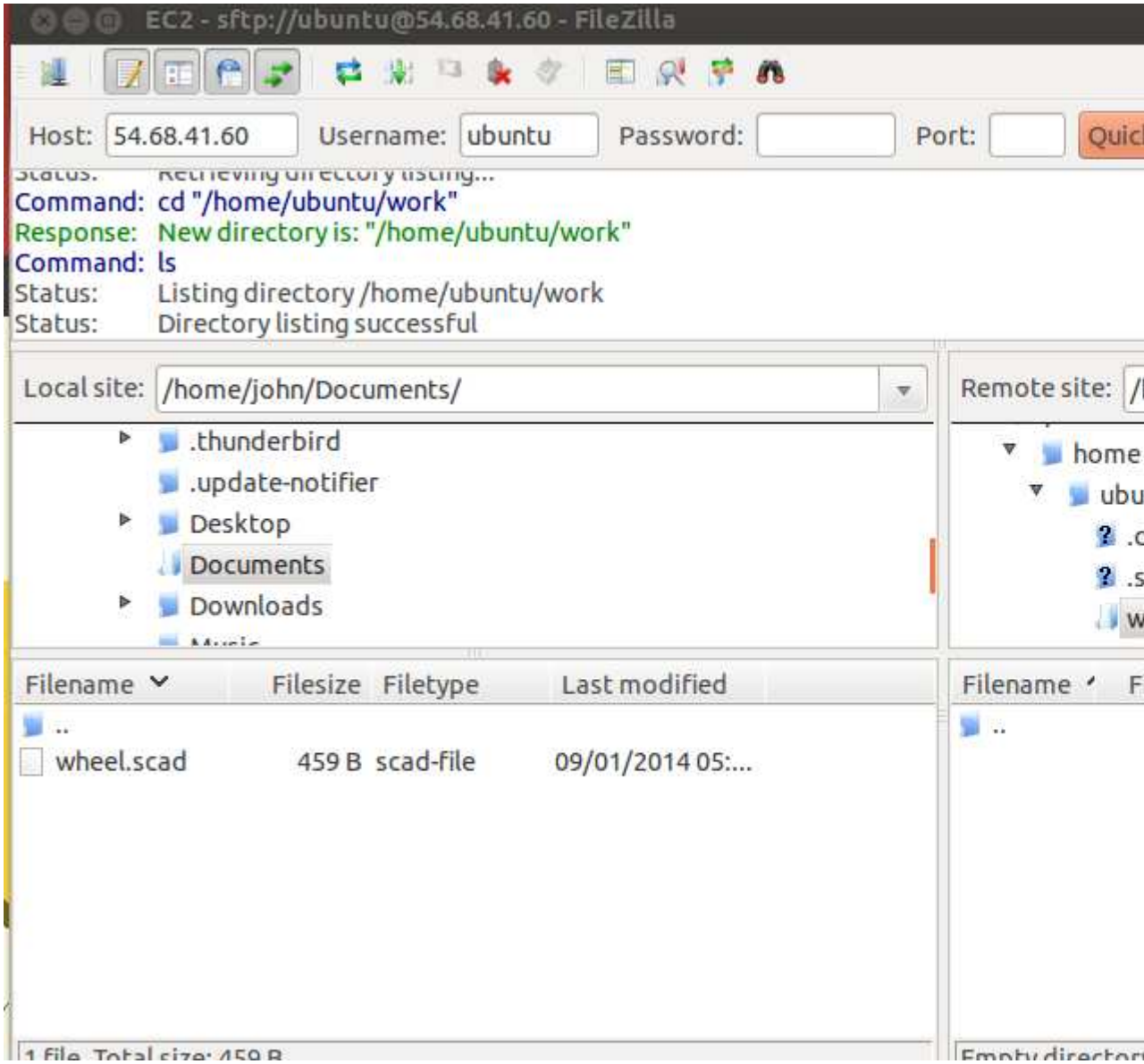
3.3 Add your Private Key from the Key Pair you generated during your server instance set-up. Note: Your Private Key is in .pem format but FZ will ask you to convert it to PuTTY .ppk format. Convert the file format to use it in FZ.



3.4 Open FileZilla Menu>Site Manager and create a new site to connect to your server (instance). Enter the IP and User Name that you used earlier. Choose Interactive login and FZ will use your Private Key to login. Click Connect in the Site Manager window.

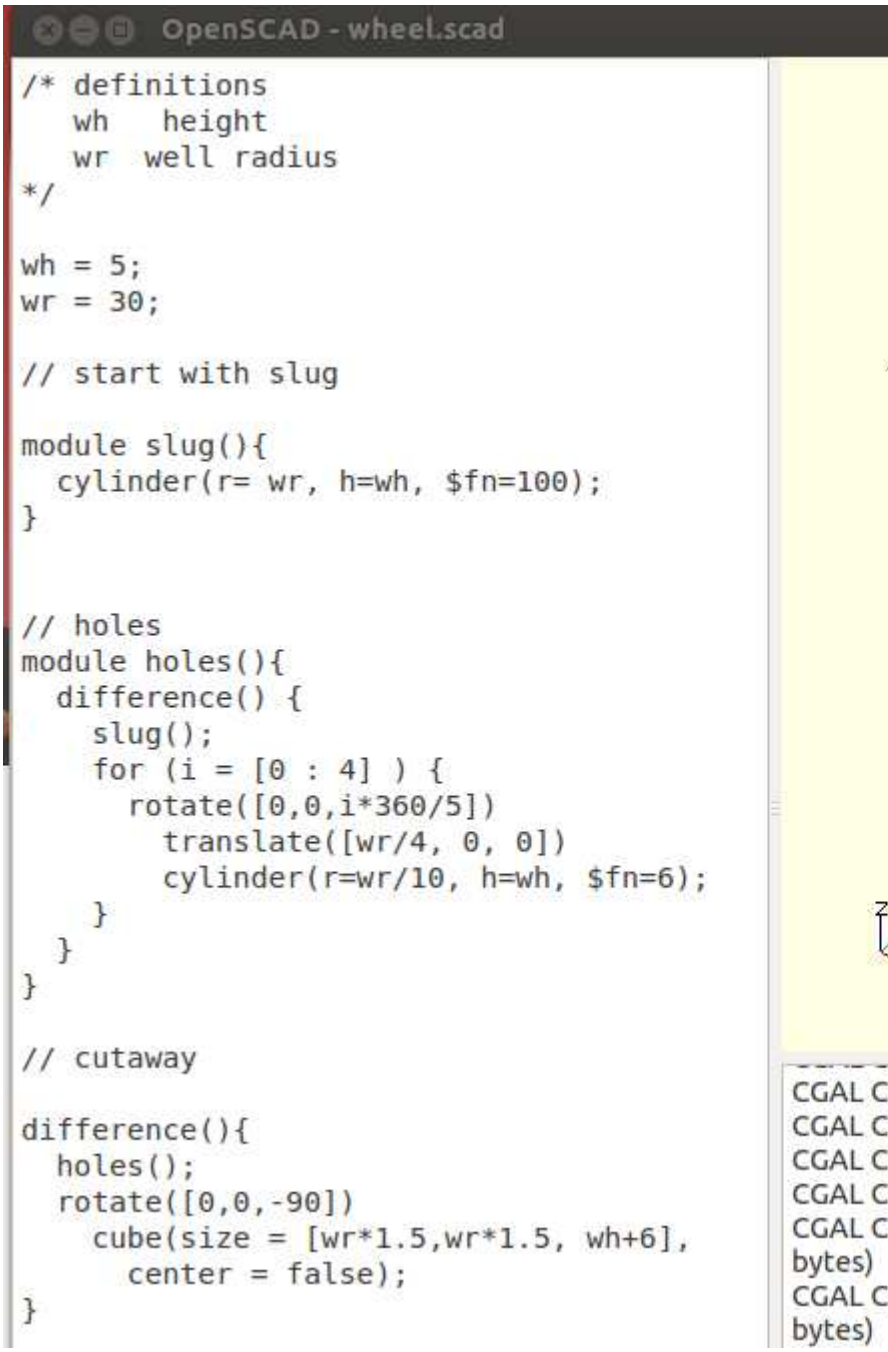


3.5 Using the FZ main window navigate to your local directory containing your .scad files and your working directory on your Amazon EC2 instance. Drag (copy) the files you want to process from your local machine to your EC2 instance.



4 Prepare your .scad file.

This is a trivial example as it runs quickly on most CPUs. However, if the holes are made smooth with $fn=100, the time required to com-



pute increases dramatically.

5 Upload your .scad files with FileZilla. You can use FZ to make directories and delete files on your Amazon EC2 instance.

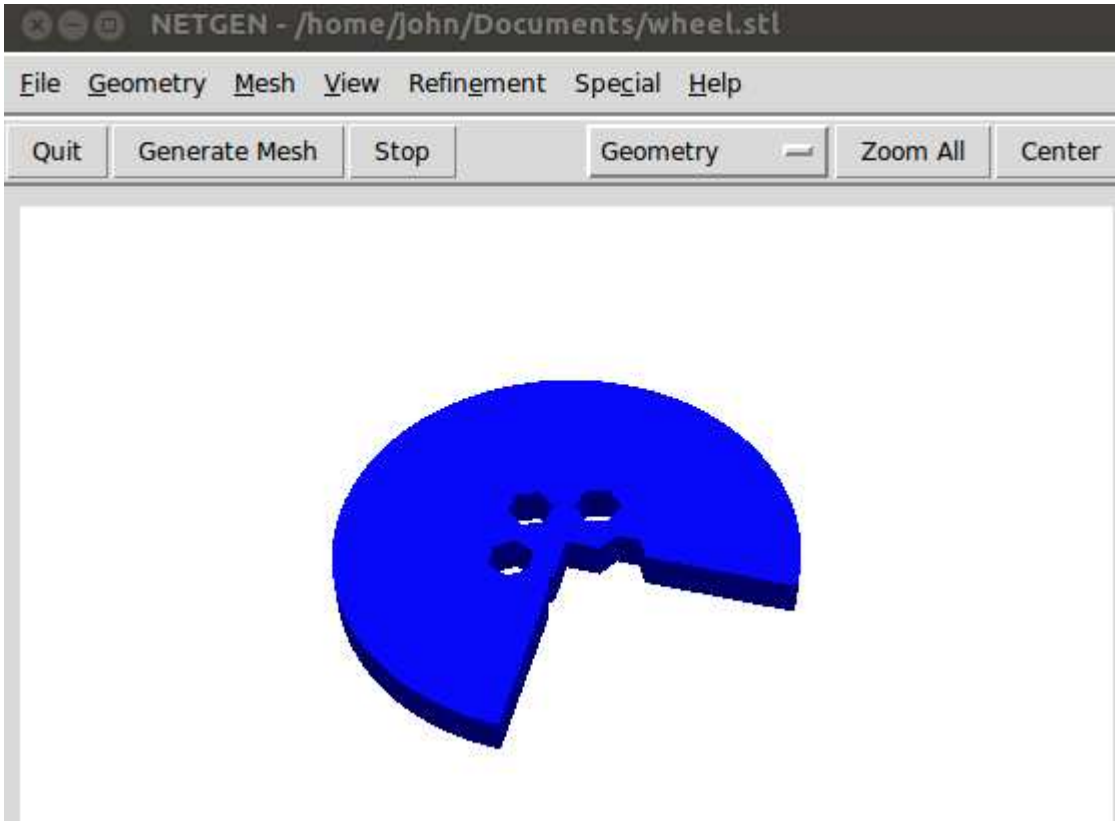
6 Run your .scad files on your EC2 instance. Using the Terminal.

- openscad -o file.stl file.scad to run OpenSCAD in Command Line mode on "file.scad" outputting "file.stl" . You have to use the -o parameter to run OpenSCAD in Command Line mode. If your file is too processor/memory intensive it may be killed. This indicates that you need to use an instance with more memory and virtual processor power than the one CPU that is given free.

```
ubuntu@ip-172-31-30-108:~/home$ ls
wheel.scad
ubuntu@ip-172-31-30-108:~/home$ openscad -o wheel.stl wheel.scad
CGAL Cache insert: cylinder($fn=100,$fa=12,$fs=2,h=5,r1=30, (259704 bytes)
CGAL Cache insert: cylinder($fn=6,$fa=12,$fs=2,h=5,r1=3,r2= (16056 bytes)
CGAL Cache insert: multmatrix([[1,0,0,7.5],[0,1,0,0],[0,0,1 (16056 bytes)
CGAL Cache hit: multmatrix([[1,0,0,7.5],[0,1,0,0],[0,0,1 (16056 bytes)
CGAL Cache hit: multmatrix([[1,0,0,7.5],[0,1,0,0],[0,0,1 (16056 bytes)
CGAL Cache hit: multmatrix([[1,0,0,7.5],[0,1,0,0],[0,0,1 (16056 bytes)
CGAL Cache hit: multmatrix([[1,0,0,7.5],[0,1,0,0],[0,0,1 (16056 bytes)
CGAL Cache insert: multmatrix([[1,0,0,0],[0,1,0,0],[0,0,1,0 (16056 bytes)
CGAL Cache insert: multmatrix([[0.309017,-0.951057,0,0],[0. (16056 bytes)
CGAL Cache insert: multmatrix([[-0.809017,-0.587785,0,0],[0 (16056 bytes)
CGAL Cache insert: multmatrix([[-0.809017,0.587785,0,0],[-0 (16056 bytes)
CGAL Cache insert: multmatrix([[0.309017,0.951057,0,0],[-0. (16056 bytes)
CGAL Cache insert: group(){cylinder($fn=100,$fa=12,$fs=2,h= (259704 bytes)
CGAL Cache insert: group(){multmatrix([[1,0,0,0],[0,1,0,0], (79896 bytes)
CGAL Cache insert: difference(){group(){cylinder($fn=100,$f (337944 bytes)
CGAL Cache insert: cube(size=[45,45,11],center=false); (10872 bytes)
CGAL Cache insert: group(){difference(){group(){cylinder($f (337944 bytes)
CGAL Cache insert: multmatrix([[2.22045e-16,1,0,0],[-1,2.22 (10872 bytes)
CGAL Cache insert: difference(){group(){difference(){group( (267768 bytes)
CGAL Cache insert: group(){difference(){group(){difference( (267768 bytes)
ubuntu@ip-172-31-30-108:~/home$ ls
wheel.scad  wheel.stl
ubuntu@ip-172-31-30-108:~/home$
```

7 **Return to FileZilla to download your .stl file to your local machine for viewing.**

8 **Use an STL file viewer to inspect the .stl file. I use NetGenMesh generator.**



9 **Don't forget to Stop your EC2 instance when finished. No sense using up your free hours with non-activity.**

ITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this work; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA.