



Second: Connecting to an AWS EC2 Instance – OS X

Includes moving files to and moving products out of EC2

Adapted from instructions prepared by C. Stoner, ASF

In this document you will find:

- A. Background
- B. Materials List
- C. Costs
- D. Steps

A) Background

These instructions are not required to complete the recipe tutorial, as sample granules are provided in the AMI.

These instructions tell a user how to move their own selected granules into EC2 for use with the INSAR script, and how to move the resulting INSAR products out, back to the user's computer. These instructions apply generically to moving data in and out of EC2, but the examples are tailored to the GMT5SAR Cloud Data Recipe.

B) Materials

- A. Existing AWS account
- B. Existing EC2 instance

C) Costs

- A. Cost to run recipe (about \$1.00)
- B. Cost to move granules into EC2 (no cost)
- C. Cost to move products out of EC2 (about \$0.15)

D) Steps

- A. Connect to EC2
- B. Move granules into EC2
- C. Move products out of EC2

C) Costs

There is no charge to move files (your Sentinel granules) into EC2. For individual users, the cost to run the recipe once is about \$1.00. Institutional accounts, or spot market may pay less. There is also a charge for moving data (your interferometric products) out of EC2, based on the volume of data moved. The fee is \$0.155/GB. Costs to run this recipe once and move all products out is about \$1.15.

D) Steps

A) Connect to EC2

In the EC2 Management Console, connect to your EC2 instance using SSH

1. In the AWS “Instances” window, click on the “Connect” button (Figure 1).
 - a. The “Connect To Your Instance” window (Figure 2) opens
 - b. You will copy and paste information from this window to your Mac Terminal window later

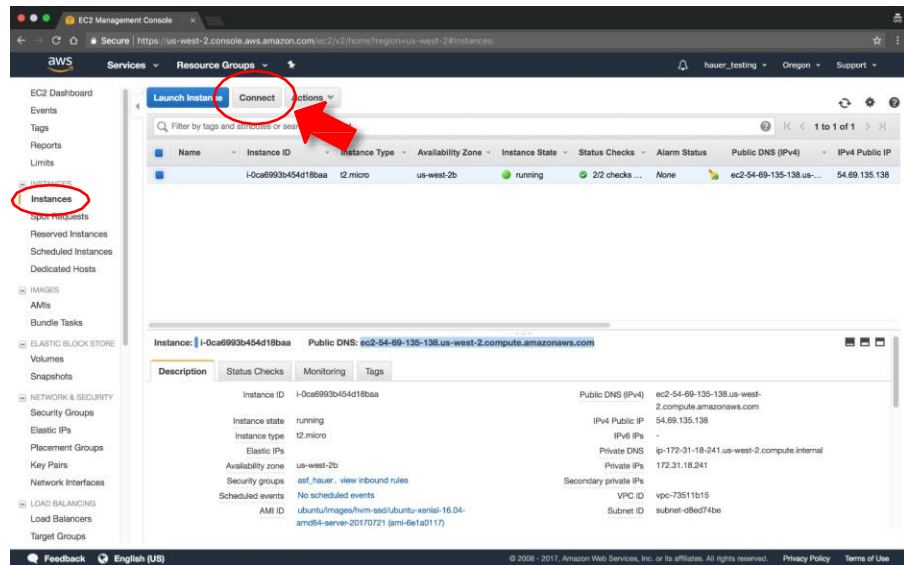


Figure 1. In ‘Instances’ choose ‘Connect’

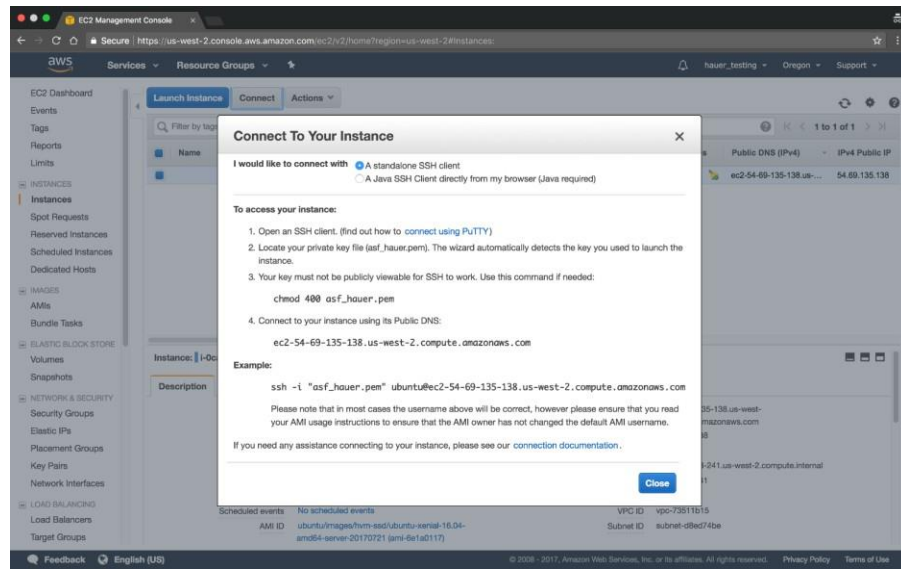


Figure 2. The 'Connect To Your Instance' window.

2. Next, open a Terminal window on your Mac and navigate to the folder containing the *private key file* (.pem) that you created previously.

`$ cd <home_directory>/<pem_directory>`

Example: `$ cd wehauer/Downloads`

OR:

`$ cd ~`

`$ cd Downloads`

To view the contents of the directory: `$ ls -ltr`

3. Change access permissions for the *private key file* (.pem)
 - a. At the Terminal prompt, type: `chmod 400 <filename.pem>`
 - i. Or copy the command from the "Connect To Your Instance" window in Step 3 (red arrow) and paste at the Terminal prompt
 - b. Press **<Enter>**

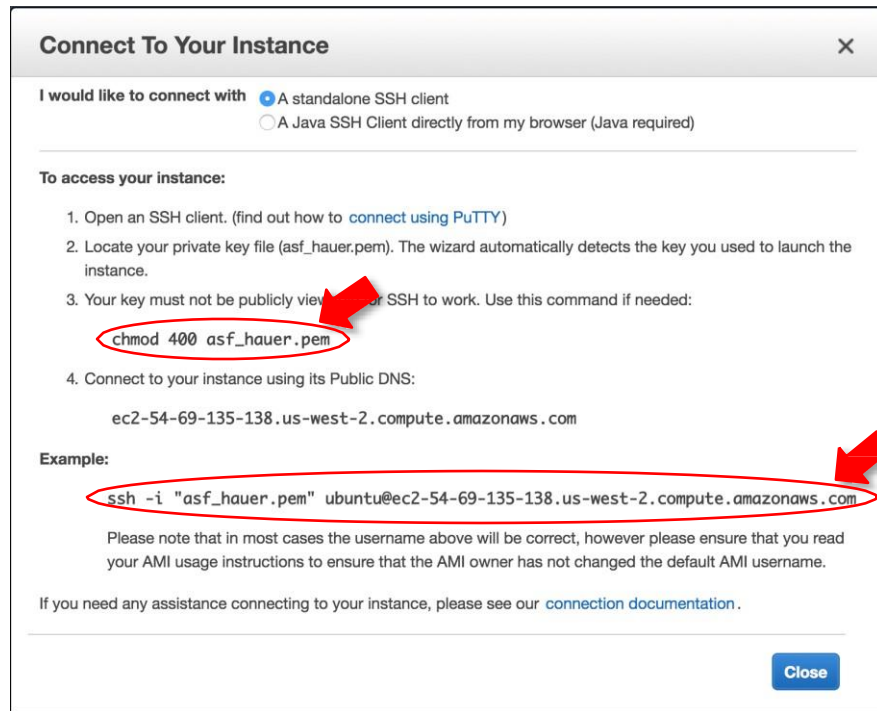


Figure 3. Copy information at the red arrows into your terminal window

4. From the "Connect To Your Instance" window, copy your complete SSH string under "Example:"
 - a. This string includes the username *ubuntu*, your *filename.pem*, and the *Public DNS* of your EC2 instance
5. Paste the string at the Terminal prompt
 - a. Delete the double-quotes enclosing *filename.pem*
 - b. Press <Enter>
6. Type "yes" when prompted "Are you sure you want to continue connecting?"
 - a. Press <Enter>

A terminal window titled 'aws_pem -- ubuntu@ip-172-31-18-241: ~ -- ssh -i asf_hauer.pem ubuntu@ec2-54-69-135-138.us-west-2.compute.amazonaws.com -- 112x28'. The prompt is 'FBK-0D8GNM:aws_pem wehauer\$'. The command entered is 'ssh -i asf_hauer.pem ubuntu@ec2-54-69-135-138.us-west-2.compute.amazonaws.com'. The output shows the Ubuntu 16.04.2 LTS welcome message, documentation links, cloud support information, package update status, and the last login time. The prompt changes to 'ubuntu@ip-172-31-18-241:~\$'.

Figure 4. This is what successful connection to EC2 looks like.

Congratulations! You are now connected to your EC2 instance.

Note 1

If you would rather not store your .pem file in the Downloads folder, provide a path to the .pem file in the SSH string, instead of just the file name.

Example

```
$ ssh -i ~/Documents/aws_pem/asf_hauer.pem ubuntu@ec2-54-69-135-138.us-west-2.compute.amazonaws.com
```

Note 2

If you choose to stop your EC2 instance (Action/Instance State/Stop) and restart it, a new Public DNS will be assigned. You can view the new DNS on the “Instance” page. Use the new DNS in Step 4 to reconnect.

The screenshot shows the AWS Management Console for an EC2 instance. The top navigation bar includes buttons for 'Launch Instance', 'Connect', and 'Actions'. A red arrow points to the 'Actions' button. Below the navigation bar, a table lists EC2 instances. One instance is shown with ID 'i-0ca6993b454d18baa' and state 'running'. A dropdown menu is open under the 'Actions' button, showing options like 'Connect', 'Launch More Like This', 'Instance State', 'Instance Settings', 'Image', 'Networking', and 'CloudWatch Monitoring'. The 'Instance State' sub-menu is open, showing 'Start', 'Stop', 'Reboot', and 'Terminate'. Below the table, the 'Instance: i-0ca6993b454d18baa' details are shown. A red arrow points to the 'Public DNS' field, which displays 'ec2-35-167-95-183.us-west-2.compute.amazonaws.com'. The 'Description' tab is selected, showing details like Instance ID, Instance state, Instance type, Elastic IPs, Availability zone, Security groups, Scheduled events, AMI ID, Platform, IAM role, and Key pair name. The 'Status Checks' tab shows '2/2 checks passed'. The 'Monitoring' tab shows 'None'. The 'Tags' tab shows 'None'.

Instance ID	Instance state	Instance type	Elastic IPs	Availability zone	Security groups	Scheduled events	AMI ID	Platform	IAM role	Key pair name	Public DNS (IPv4)	IPv4 Public IP	IPv6 IPs	Private DNS	Private IPs	Secondary private IPs	VPC ID	Subnet ID	Network interfaces	Source/dest. check
i-0ca6993b454d18baa	running	t2.micro		us-west-2b	asf_hauer - view inbound rules	No scheduled events	ubuntu/images/hvm-ssd/ubuntu-xenial-16.04-amd64-server-20170721 (ami-6e1a0117)	-	-	asf_hauer	ec2-35-167-95-183.us-west-2.compute.amazonaws.com	35.167.95.183	-	ip-172-31-18-241.us-west-2.compute.internal	172.31.18.241		vpc-73511b15	subnet-d8ed74be	eth0	True

B) Move Files Into EC2

Move a file, for example a Sentinel granule, from your computer to your EC2 instance Home directory of user *ubuntu*. This will allow the GMT5SAR script to access it for processing.

- From the Terminal prompt of your Mac OS computer:

```
$ scp -i your.pem your_filename ubuntu@EC2instance_publicDNS:/home/ubuntu/
```

- **Example** of moving a file from my Mac computer to my EC2 Instance:

```
$ scp -i asf_hauer.pem  
S1A_EW_GRDM_1SDH_20160207T165226_20160207T165330_009843_00E69A_501D.zip  
ubuntu@ec2-52-89-147-172.us-east-2.compute.amazonaws.com:/home/ubuntu/
```

- Briefly:

```
$ scp -i pemfile filename ubuntu@publicDNS:/path/
```

C) Move Files Out of EC2

Move files, for example your phase unwrapped product, from your EC2 instance PRODUCT directory of user *ubuntu* to your computer using SCP

- From the Terminal prompt of your MacOS computer:

```
$ scp -i your.pem ubuntu@EC2instance_publicDNS:/home/ubuntu/PRODUCT/filename  
~/path_to_local_folder
```

- **Example** of moving a file from my EC2 Instance to my Mac computer:

```
$ scp -i asf_hauer.pem ubuntu@ec2-52-89-147-172.us-east-  
2.compute.amazonaws.com:/home/ubuntu/PRODUCT/20150526_20150607_F2_unw_phase.tif  
~/Downloads
```

- Briefly:

```
$ scp -i pemfile ubuntu@publicDNS:/path/filename ~/my_local_folder
```

D) Run the GMT5SAR Script to create interferometric products

Now that you have moved your granules into EC2, you can run the GMT5SAR script from the command line in your EC2 instance. Plain text instructions for running the script are included in the AMI.

Or see the PDF Data Recipe:

“Sentinel-1 InSAR and Unwrapping with GMT5SAR - Cloud”