

2015 Workshop on Molecular Evolution, Český Krumlov

Starting your Amazon virtual machine

Instructors

- Julia Barth jmi.barth@gmail.com
- Adam Bazinet pknut777@gmail.com
- Michael Matschiner michaelmatschiner@mac.com
- Conor Meehan cmeehan@itg.be
- Britta Meyer bmeyer@geomar.de
- Jan Stefka jan.stefka@gmail.com
- Emiliano Trucchi emiliano.trucchi@univie.ac.at

Objectives

By the end of this section you will be expected to:

- Log in to the Amazon Web Services (AWS) Console and start your instance of the appropriate workshop.
- Log in to the Amazon EC2 instance from your own computer.
- Be able to continue with the tutorials at your own pace.

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Introduction

For this workshop we will provide an overview of Amazon's EC2 and how, as researchers, we can use this flexible resource to get work done quickly and relatively inexpensively.

Firstly, some terminology we use throughout the document might be confusing, so here are some definitions.

Amazon Machine Image (AMI): This is the system you will be using for the course. It contains all the programs and data that are required to follow the course. An AMI is analogous to powering down your computer, and pulling out the hard drive---the hard drive is an "image" of your computer.

An Instance: Almost the first thing you will do is create your own copy of the AMI; we call this an *instance*. It contains everything that was in the AMI plus any files you create during the course. One way you can think about an instance, and how it differs from an AMI, is that an instance is analogous to putting a hard drive into a physical computer and powering it on.

We will dive right in by logging into the Amazon management console and starting up your own copy (an instance) of the pre-prepared Amazon Machine Image (AMI) for this workshop. We will give you a whirlwind tour of the features of Amazon's cloud and then log-in to your private instance via the X2Go client.

For this tutorial, we borrowed documentation from the following sites:

- <http://ged.msu.edu/angus/tutorials/unix-and-ssh-and-scp.html>
- <http://aws.amazon.com/documentation>

Task 1 – Tour of Amazon's Cloud

In this section of the workshop we will log in to Amazon's cloud (referred to as Amazon Web Services or AWS) and take a look at the various services offered by Amazon. These include:

- Elastic Cloud Compute (EC2): the service AWS is known for. It enables you to rent Linux and Windows machines by the hour. Amazon now also has special High Performance Computing nodes (HPC nodes) and Graphical Computing nodes (GPU nodes).
- Simple Storage Service (S3): a storage service; not particularly fast, but great for storing large "buckets" of data for long-term storage, sharing, or temporary storage for use between instances.
- Elastic Block Storage (EBS): similar to S3, but limited in size (max 16TB). These are virtual hard drives that you can attach and detach very quickly to and from your running instances. Think of these as the USB flash drives of the cloud computing world.
- A ton of other services that are geared towards building highly scalable and fault-tolerant web-based services. Many can be co-opted for use in research!

Task 2 - Connecting to Your Personal Instance

The Rules

We ask that each participant adhere to the following rules to ensure we have enough resources for the duration of the workshop:

- Please only launch a **single** instance of the type specified by the instructors at the beginning of the workshop.
- Please **stop** instances at the end of the day so we can avoid being billed for resources that are not being actively used.
- Please name your instance. Including your name will make it easy to find your instance in the list of instances for the course.
- Do not delete EBS volumes that do not belong to you.
- Do not **terminate** instances that don't belong to you.

Logging Into the Console

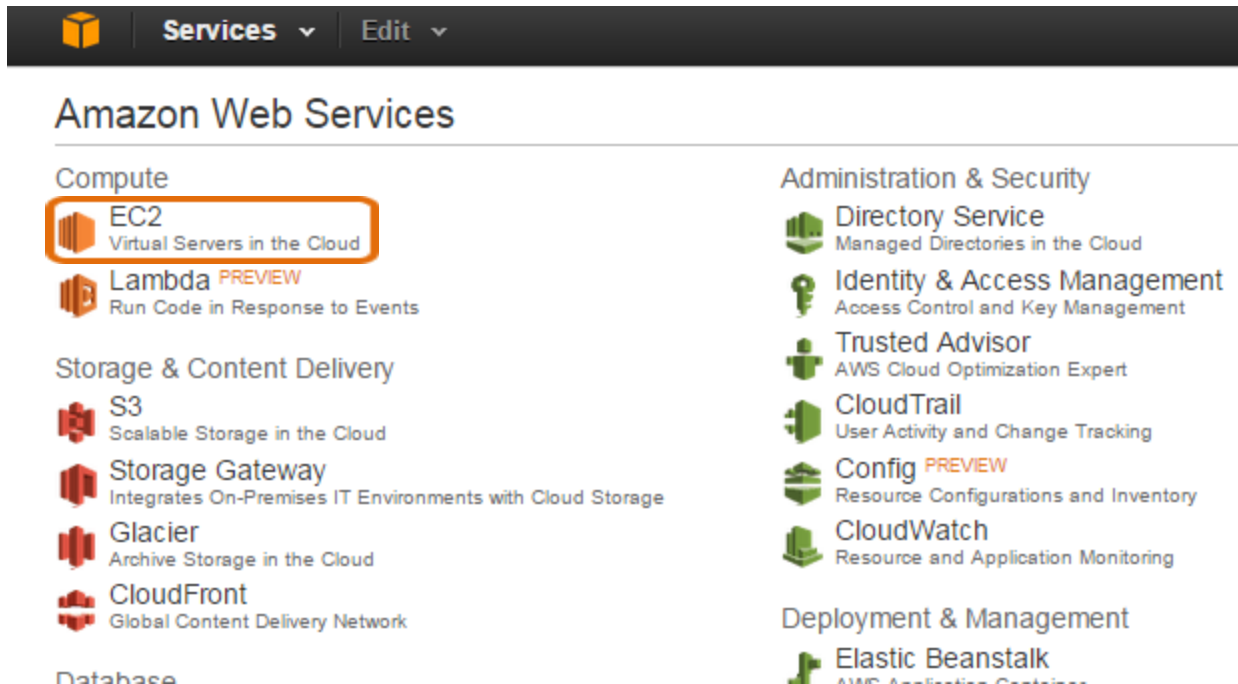
In addition to being extremely comprehensive, the Amazon cloud has a very easy-to-use interface for interacting with all their cloud offerings. All you have to do is log in to a web application and most of the functionality of the Amazon tools is available for you and very easy to use.

This workshop has its own Amazon account, and we have created a sub-account for course participants to use. (If you're wondering, we created the sub-account by using the Identity & Access Management tool.) The nice thing about this is that you have free access to the console, and we have fine-grain control over what your sub-accounts can and cannot do.

To get started, **go to the following URL** and **login** with the username and password given at the workshop.

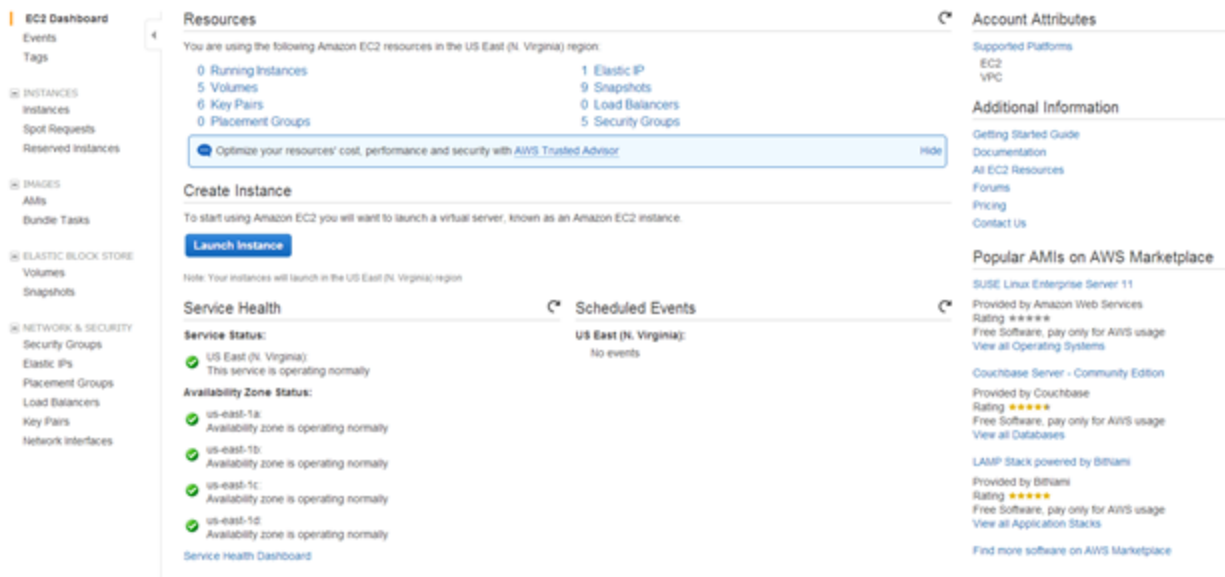
<https://evomics.signin.aws.amazon.com/console>

After logging in you'll be presented with a wide range of options.



The AWS Dashboard. Click on “EC2” in the top-left under “Compute”.

On this page you'll get a summary of the EC2 state for your account (EC2 Management Console). You can see an example below:



An example of the EC2 Management Console.

From here we can create computers on Amazon's “cloud”. What this means is that we can create as many computers as we like, start them, log-in to them, do some work, transfer data to/from them, or destroy them altogether. Amazon worries about the hardware, power, cooling and maintenance; all we

need to do is specify how powerful a computer we want (micro, small, large or extra-large).

Amazon charges for each gigabyte stored every month and for each hour a machine is run. This can vary from a few cents per hour to a few dollars. It is very convenient if you are only doing analyses occasionally, though at the moment it is still cheaper to have your own compute system if you'll be using it frequently, and assuming that you do not need a very large amount of compute. On the other hand, if you have your own resources then you need to administer those resources yourself.

The reason we are using the cloud here is that it is the easiest way for us to provide individual systems that are set up for the learning activities, and because it is a great way to do computational work! In the case of high-throughput sequencing data (e.g., Illumina), you will find that your desktop PC may not be powerful enough to cope with the data. As such, Amazon can offer a good alternative. It also means that you can **start** and **stop** your instance from home and continue to work through the learning activities from there.

Creating an instance

Once logged into the console we can “launch” an instance of a virtual computer.

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

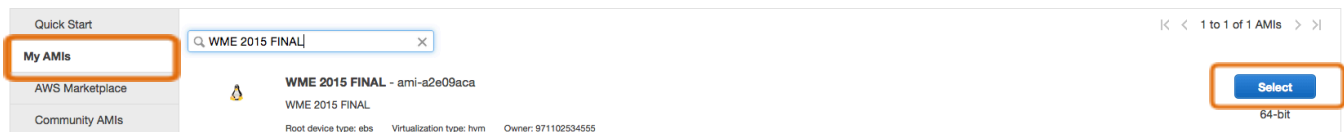
Launch Instance

*The create instance section of the EC2 Management Console. Click on the “**Launch Instance**” button in the center in order to create an instance.*

Choose an AMI

Step 1: Choose an Amazon Machine Image (AMI)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.



*The AMI selection screen. Please choose the “**WME 2015 FINAL**” AMI and click “**Select**”.*

Please make sure you select the correct AMI for this workshop! The correct AMI is named “**WME 2015 FINAL**”. This may not be the AMI at the top of the list.

Choose an instance type

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: **General purpose** All generations Show/Hide Columns

Currently selected: m3.large (6.5 ECUs, 2 vCPUs, 2.5 GHz, Intel Xeon E5-2670v2, 7.5 GiB memory, 1 x 32 GiB Storage Capacity)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
<input checked="" type="radio"/>	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
<input checked="" type="radio"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate
<input checked="" type="radio"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
<input type="radio"/>	General purpose	m3.medium	1	3.75	1 x 4 (SSD)	-	Moderate
<input checked="" type="radio"/>	General purpose	m3.large	2	7.5	1 x 32 (SSD)	-	Moderate
<input type="radio"/>	General purpose	m3.xlarge	4	15	2 x 40 (SSD)	Yes	High

Cancel Previous **Review and Launch** Next: Configure Instance Details

The instance type page. The instance type page allows you to define the “physical” nature of your instance (e.g., the number of processors, amount of RAM, etc.). Please select “m3.large” and then click on “Next: Configure Instance Details.” If you do not see “m3.large” as an option, please change the “Filter by” to “General purpose.”

Configuring your instance

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot Instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances 1

Purchasing option ☐ Request Spot Instances

Network Launch into EC2-Classical Create new VPC

Availability Zone No preference

IAM role None

Shutdown behavior Stop

Enable termination protection ☐ Protect against accidental termination

Monitoring ☐ Enable CloudWatch detailed monitoring
Additional charges apply.

Advanced Details

Cancel Previous **Review and Launch** Next: Add Storage

The instance configuration page. Nothing needs to be done here; please click “Next: Add Storage.”

Add storage

Step 4: Add Storage
Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Delete on Termination	Encrypted
Root	/dev/sda1	snap-b594783d	500	Magnetic	N/A	<input checked="" type="checkbox"/>	Not Encrypted

[Add New Volume](#)

On this page we can select how much storage we want to add to our instance. Please leave the default at 500GB, make sure the volume type is “**Magnetic**”, and the “**Delete on Termination**” checkbox is ticked. Following this, click “**Next: Tag Instance.**”

The “Delete on Termination” box deletes the virtual hard drive once the instance is terminated. In real life this may not be recommended as you could easily lose valuable data. However, it makes management easier for the workshop, so we’ll select it.

Tagging an instance

Step 5: Tag Instance

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. [Learn more](#) about tagging your Amazon EC2 resources.

Key	Value
Name	Sophie Shaw

[Create Tag](#) (Up to 10 tags maximum)

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Configure Security Group](#)

The instance tagging page. This page allows you to give your instance a name, which makes it easier to identify in the management console. In the **Value** column next to **Name** make sure you give the instance a name that includes your full name so that you can identify it. Then click on “**Next: Configure Security Group.**”

The idea of a “tag” is that if you have multiple instances, you can create tags to identify them. As we are all using a single account, it is important to be able to identify your instance.

Choose a security group

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: ☐ Create a new security group ☒ Select an existing security group

Security Group ID	Name	Description	Actions
<input type="checkbox"/> sg-1137e179	default	default group	Copy to new
<input type="checkbox"/> sg-917a87fc	Genomics Workshop 2015	Genomics Workshop 2015	Copy to new
<input type="checkbox"/> sg-ef60d82	launch-wizard-14	launch-wizard-14 created 2015-01-14T00:11:24.846+01:00	Copy to new
<input type="checkbox"/> sg-d70bf0ba	launch-wizard-15	launch-wizard-15 created 2015-01-14T14:20:22.888+01:00	Copy to new
<input type="checkbox"/> sg-63894e0e	launch-wizard-19	launch-wizard-19 created 2015-01-20T15:49:34.103-05:00	Copy to new
<input type="checkbox"/> sg-c920d8e4	launch-wizard-6	launch-wizard-6 created 2015-01-12T13:25:18.737-05:00	Copy to new
<input type="checkbox"/> sg-26b64d45	launch-wizard-9	launch-wizard-9 created 2015-01-13T14:03:21.246+01:00	Copy to new
<input checked="" type="checkbox"/> sg-17be787a	Workshop on Molecular Evolution 2015	Workshop on Molecular Evolution 2015	Copy to new

Inbound rules for sg-17be787a

Cancel Previous **Review and Launch**

The security group selection page. First, click on **“Select an existing security group.”** Next, select the **“Workshop on Molecular Evolution 2015”** group. Finally, click on **“Review and Launch.”**

You may get the following prompt (don't worry if you don't):

Boot from General Purpose (SSD)

General Purpose (SSD) volumes provide the ability to burst to 3,000 IOPS per volume, independent of volume size, to meet the performance needs of most applications and also deliver a consistent baseline of 3 IOPS/GiB.

- ☐ Make General Purpose (SSD) the default boot volume for all instance launches from the console going forward (recommended).
- ☐ Make General Purpose (SSD) the boot volume for this instance.
- ☒ Continue with Magnetic as the boot volume for this instance.

Free tier eligible customers can get up to 30GB of General Purpose (SSD) storage.

☒ Don't show again **Next**

Sometimes EC2 presents this screen. If this screen shows up, please make sure **“Continue with Magnetic as the boot volume for this instance”** is selected, check **“Don't show again”**, and finally click **“Next”**.

Review and launch the instance (and set a key pair)

The next step is to review and launch the instance

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.



Improve your instances' security. Your security group, Workshop on Molecular Evolution 2015, is open to the world.

Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only.

You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. [Edit security groups](#)

AMI Details

[Edit AMI](#)



WME 2015 FINAL - ami-a2e09aca

WME 2015 FINAL

Root Device Type: ebs Virtualization type: hvm

Instance Type

[Edit instance type](#)

Security Groups

[Edit security groups](#)

[Cancel](#)

[Previous](#)

Launch

*The instance summary page. Please just click “**Launch.**” The screen may show warnings about not being in the “free tier” and “open to the world”, but these warnings are safe to ignore.*

The final step is to select the “key pair” used to let you log in to this machine. This key pair is a file that allows access without a password.

Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. [Learn more about removing existing key pairs from a public AMI.](#)

Proceed without a key pair

☒ I acknowledge that I will not be able to connect to this instance unless I already know the password built into this AMI.

[Cancel](#) **Launch Instances**

*The key pair selection screen. Please select “**Proceed without a key pair**”. Next, ensure the acknowledgement box is ticked. Finally, click on “**Launch Instances.**”*

Launch Status

✓ Your instance is now launching

The following instance launch has been initiated: [i-47a8863d](#) [View launch log](#)

Get notified of estimated charges

Create [billing alerts](#) to get an email notification when estimated charges on your AWS bill exceed \$0.0 (in other words, when you have exceeded the free usage tier).

How to connect to your instance

Your instance is launching, and it may take a few minutes until it is in the **running** state, when it will be ready for you to use. Usage hours on your new instance will start immediately and continue to accrue until you stop or terminate your instance.

Click **View Instances** to monitor your instance's status. Once your instance is in the **running** state, you can **connect** to it from the instances screen. [Find out](#) how to connect to your instance.

Here are some helpful resources to get you started

- How to connect to your Linux instance
- Amazon EC2: User Guide
- Learn about AWS Free Usage Tier
- Amazon EC2: Discussion Forum

While your instances are launching you can also

[Create status check alarms](#) to be notified when these instances fail status checks. (Additional charges may apply)

[Create and attach additional EBS volumes](#) (Additional charges may apply)

[Manage security groups](#)

[View Instances](#)

The **Launch Status** page. This lets you know the instance is currently starting. Please click the **“View Instances”** button to view the running instances. This will let you monitor your instance as it starts up.

Instance monitoring

At this point you wait just a couple minutes for the AMI instance to come online. Below you can see the instance is running; give it a couple minutes to finish its boot cycle. It's booting somewhere on a virtualized cluster node in Virginia, USA! You'll know it's finished when “Status checks” says “2/2 checks passed”.

Services Edit Konrad Paszkiewicz N. Virginia Help

EC2 Dashboard Events Tags

INSTANCES

Instances

Spot Requests

Reserved Instances

IMAGES

AMIs

Bundle Tasks

ELASTIC BLOCK STORE

Volumes

Instances

Launch Instance Connect Actions

Filter: All instances All instance types Search instances

1 to 6 of 6 instances

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Key Name	Launch Time	Security Groups
Konrad_du_n...	i-28a2v058	m1.xlarge	us-east-1b	stopped		Loading...		konrad2	2013-04-19T09...	default
StudentCosma	i-3901a009	m1.small	us-east-1c	terminated		Loading...			2013-08-07T10...	Non exister
mytest	i-42008523	m1.large	us-east-1c	terminated		Loading...		cloudlinux	2013-08-28T13...	default
Konrad's inst...	i-47a8863d	m1.small	us-east-1a	running	2/2 check...	Loading...	ec2-54-205-127-208.co...		2013-10-14T14...	Exeter Academy
Exeter Sequ...	i-744bbe1b	t1.micro	us-east-1a	stopped		Loading...		exatersequenc...	2013-08-01T18...	Web server
	i-4418a0ce	m1.large	us-east-1a	terminated		Loading...			2013-08-28T11...	default

The **instance monitoring** page. Once your instance turns **green** and says **2/2 checks passed**, you should **click on your instance**.

The screenshot displays the AWS Management Console interface for EC2 instances. At the top, there are buttons for 'Launch Instance', 'Connect', and 'Actions'. Below this is a filter bar showing 'All instances' and a search bar. A table lists several instances, including 'Konrad's inst...' which is highlighted. Below the table, the details for instance 'i-47a8863d' are shown. The 'Public DNS' field is highlighted with an orange box, showing the address 'ec2-54-205-127-208.compute-1.amazonaws.com'.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Key Name	Launch Time	Security Group
Konrad's inst...	i-47a8863d	m1.small	us-east-1a	running	2/2 check...	Loading...	ec2-54-205-127-208.co...		2013-10-14T14...	Exeter Academy

Instance: i-47a8863d	
Description	Status Checks
Instance ID: i-47a8863d	Public DNS: ec2-54-205-127-208.compute-1.amazonaws.com
Instance state: running	Elastic IP: -
Instance type: m1.small	Private DNS: ip-10-168-26-218.ec2.internal
Availability zone: us-east-1a	Private IPs: 10.168.26.218
Security groups: Exeter Academy, view rules	Secondary private IPs: -
Scheduled events: No scheduled events	VPC ID: -
AMI ID: Exeter Academy 4 (ami-85a964ec)	Subnet ID: -
Platform: -	Network interfaces: -
IAM role: -	Source/dest. check: False
Key pair name: -	EBS-optimized: False
Owner: 132696832951	Root device type: ebs
Launch time: 2013-10-14T14:28:11.000Z (less than one hour)	Root device: /dev/sda1
Termination protection: False	Block devices: /dev/sda1
Lifecycle: normal	
Monitoring: basic	
Alarm status: -	
Kernel ID: aki-427d962b	
RAM disk ID: -	

Instance details. The instance details provide the specific details for how to actually connect to your instance. The **Public DNS** is the address that you will be using on subsequent steps to connect to your system. This is the “address” of the system on the Internet.

Log in to the Running Instance's Desktop with X2Go

While your instance is initializing---please note it may take some time (~15 minutes)---take this opportunity to install the X2Go client software, which you will need to connect to the instance.

This will allow you to see a windowing environment (like your Desktop) rather than just a terminal! It is a great option if you want to use a GUI (Graphical User Interface) application like AliView. It's very cool to see a remote desktop with Firefox and every other GUI application rendered quickly and snappily over the Internet!

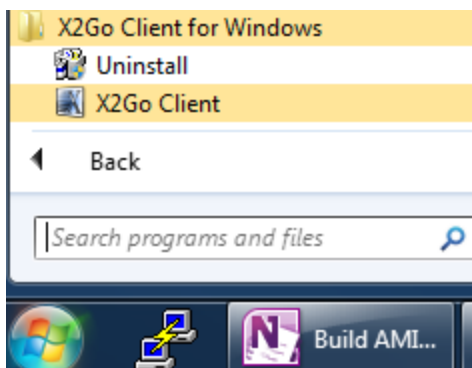
Here are the steps to get remote X2Go login working... *(Note: these instructions will only work for this workshop's particular AMI. Many AMIs will not have the X2Go server installed and therefore you will not be able to connect using the X2Go client. In these cases you will have to look at Step 4 and use SSH. But you should not need to do that for these learning activities.)*

First determine whether the *X2Go Client* is installed on your computer. If it is, skip this section. It is not something that is installed by default, so it is probably not there.

There may be a link on your desktop:



Or look for it in your start menu:



X2Go on Windows

Installing X2Go client in Windows

If you need to install X2Go and you have a Windows computer, install it from the link below (you will need admin rights on your computer). These instructions are specific to people running Windows. If you have a Mac, please scroll down to the section on **Installing X2Go client on Mac OS X**. If you have a Linux machine, please scroll down to the section on **Installing X2Go client on Ubuntu**.

The link to install X2Go for Windows is here:

<http://code.x2go.org/releases/binary-win32/x2goclient/releases/>

(If you do not have admin rights, alternative instructions can be found here:

<http://wiki.x2go.org/doku.php/doc:installation:x2goclient>)

click on the latest link:

 [4.0.3.0-20141021/](#) 27-Nov-2014 11:02 -

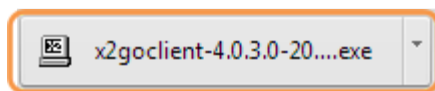
Then select the setup program.

 [x2goclient-4.0.3.0-20141021-setup.exe](#) 21-Oct-2014 14:34 48M

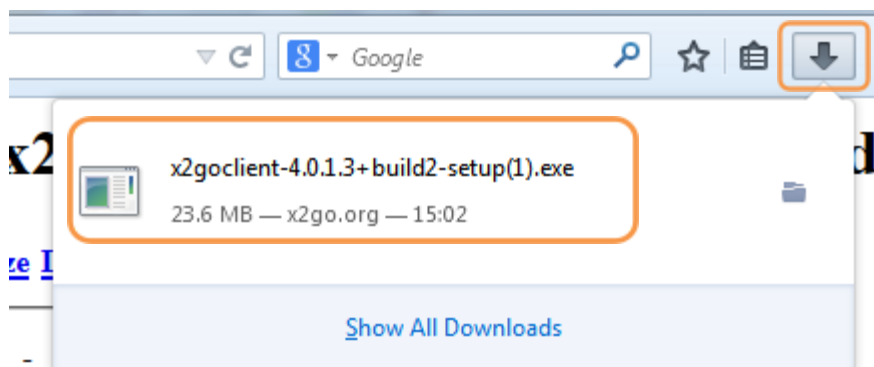
This will download the setup program to your computer.

Find the file and click on it: Depending on what browser you are using

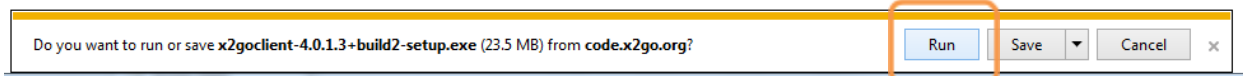
in Chrome:



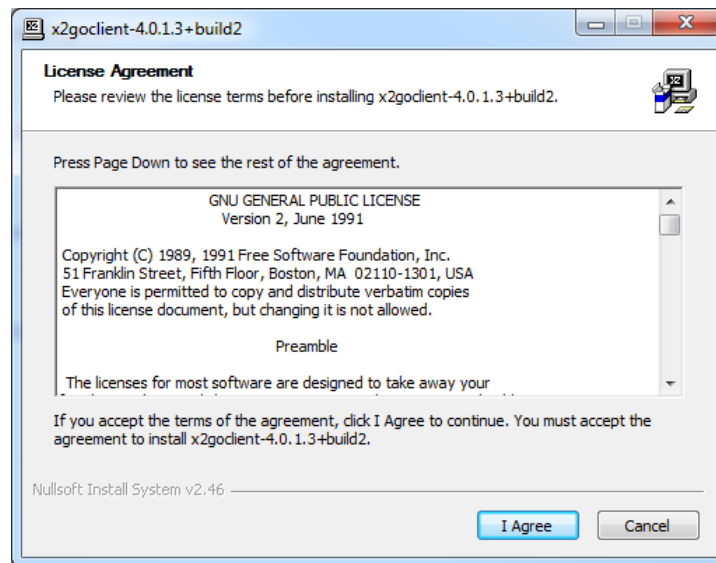
or FireFox:



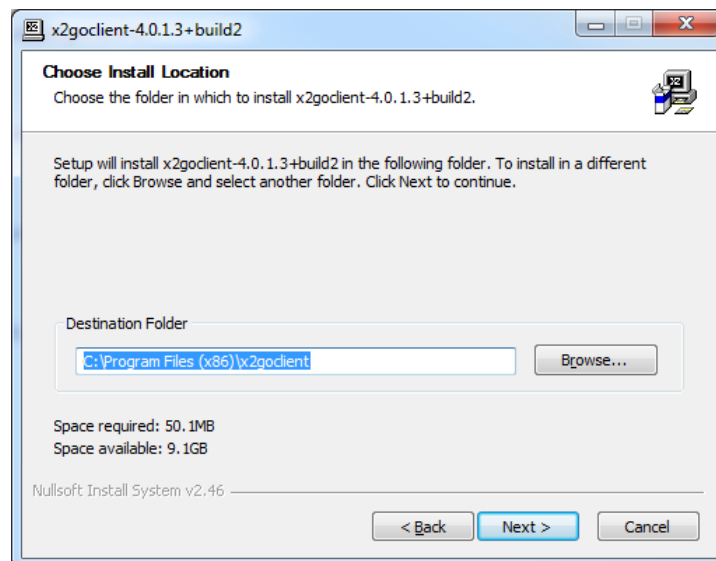
Internet Explorer:



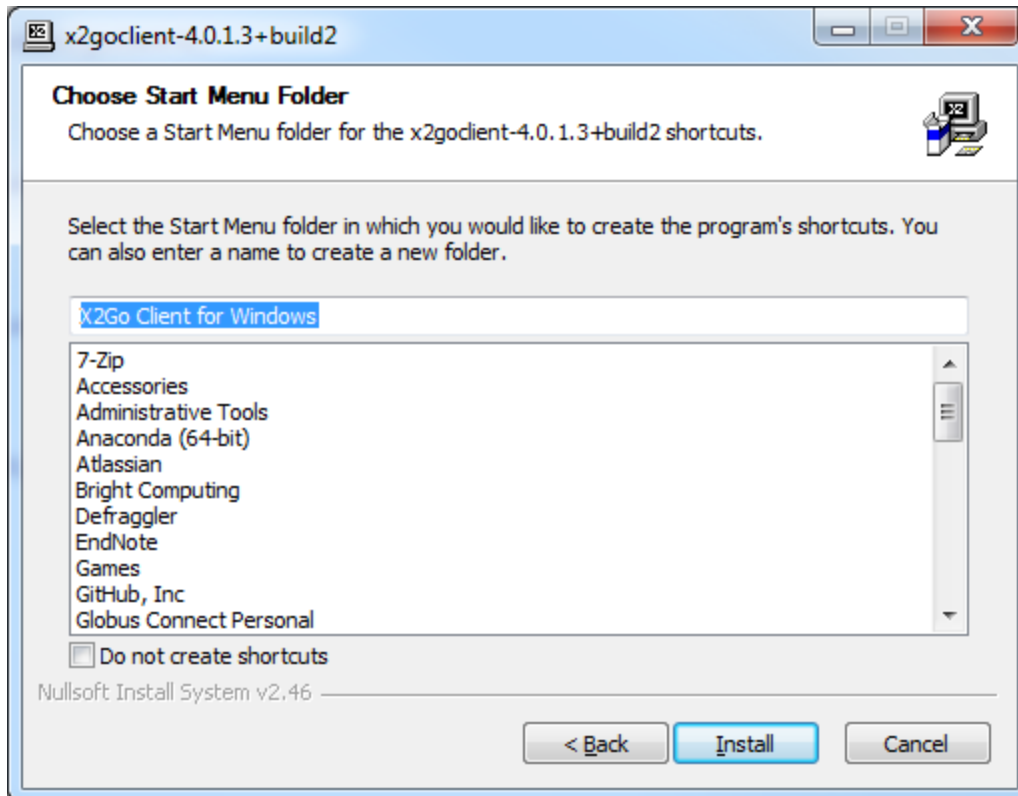
You will get a screen asking for permission to continue - select "yes".



The license agreement. Please simply agree.



*The install location. The default location is acceptable; please just click **Next**.*



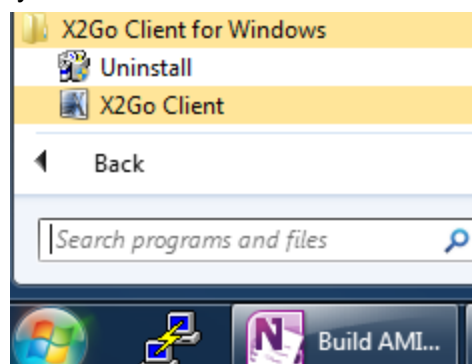
*The start menu location. The defaults are acceptable; please just click **Install**.*

Start X2Go client in Windows.

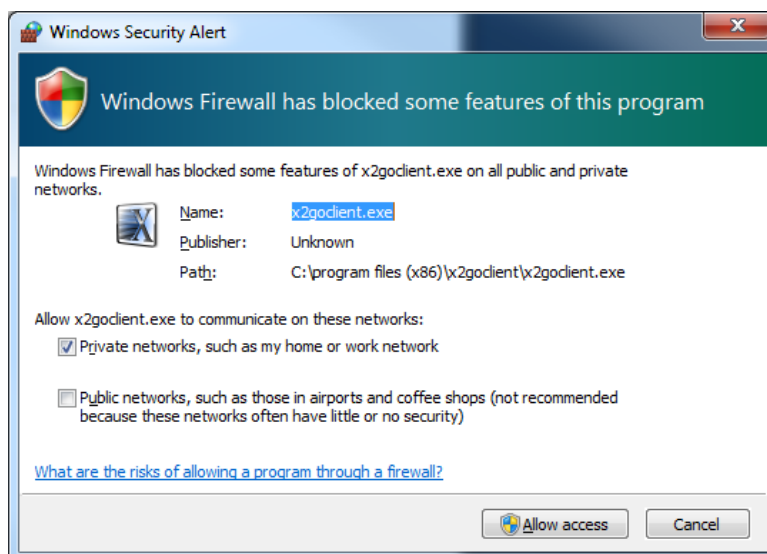
Once installed, you should have an **X2Go Client** icon on your desktop that you can double-click. The icon looks like:



Alternatively, you can look for it in your Start Menu:



When you first run the **X2Go Client**, you may get a message about changes to your firewall. These changes are not necessary, so please just click “Cancel.”



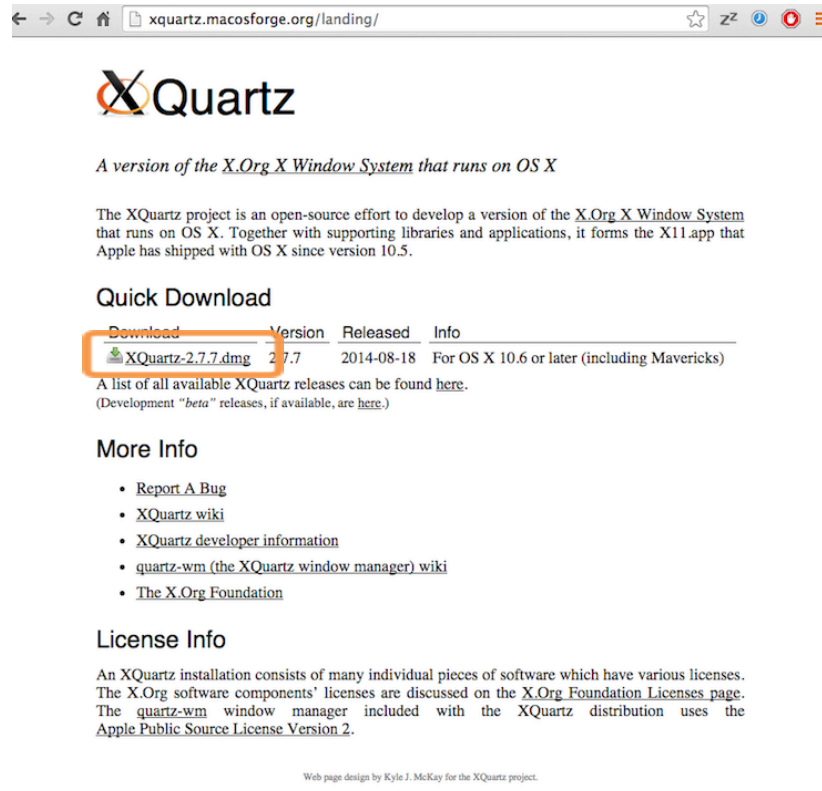
Windows firewall changes. These changes are not necessary, so please just click “Cancel.”

X2Go on Mac OS X

Installing X2Go client on Mac OS X

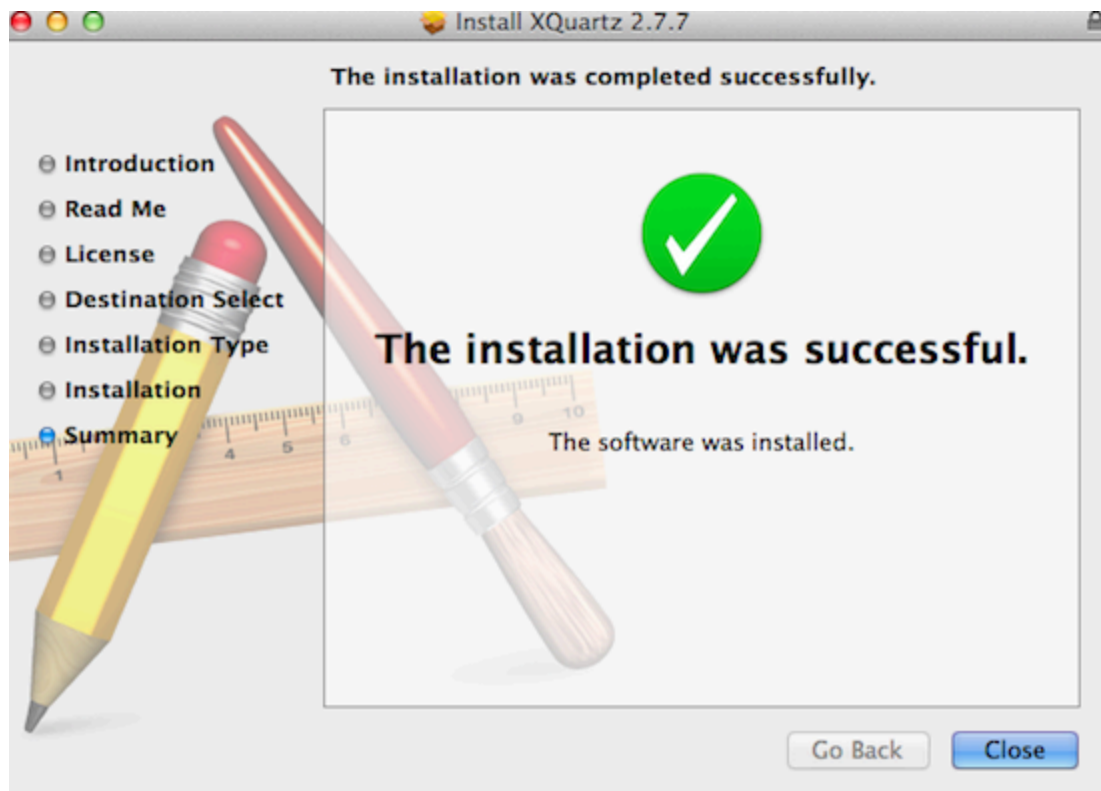
Prior to the installation of **X2Go**, you will have to install **XQuartz** (if you have not done it at home already).

Download the dmg file: <http://xquartz.macosforge.org/landing/>




The XQuartz download page.

Once it is downloaded, just click on *XQuartz-2.7.7.dmg* and then open *XQuartz.pkg*. Follow the standard installation procedures until you reach the following screen:



Once XQuartz is installed, then you'll be able to install X2Go. Go to <http://wiki.x2go.org/doku.php> and click on the MacOS dmg file to download (see screenshot below).

X2Go - everywhere@home

Login


Recent changesMedia ManagerSitemap

Trace: • [start](#)

start

Sidebar

Get X2Go



- Installing X2Go (client/server)
- Download X2Go Client (Windows installer (XP and Later), [MacOS dmg](#))
- Download PyHoca-GUI (Windows installer (XP and Later))

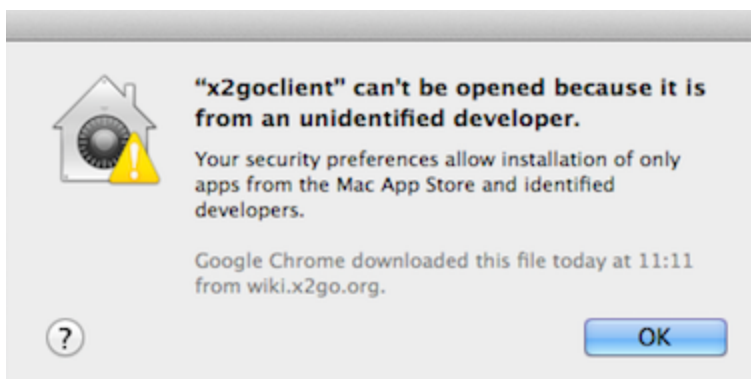
X2Go - everywhere@home

Announcements

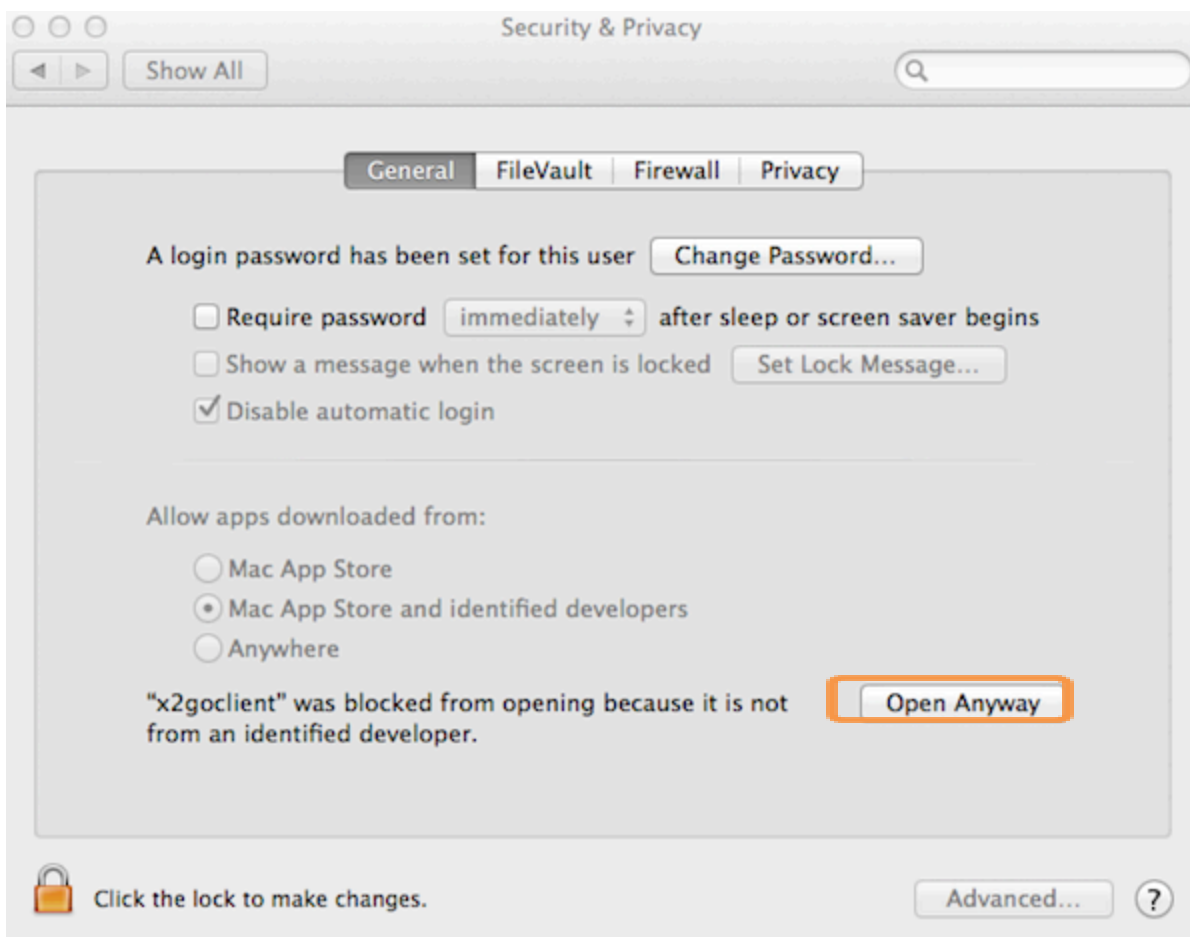
- NX-redistributed (3.5.0.28) released
- X2Go Client (4.0.3.0) released
- PyHoca-GUI (0.5.0.2) released
- PyHoca-CLI (0.5.0.1) released
- Python X2Go (0.5.0.1) released
- PyHoca-CLI (0.5.0.0) released
- PyHoca-GUI (0.5.0.0) released
- Python X2Go (0.5.0.0) released

The X2Go download page. Please click on the “**MacOS dmg**” link.

Once downloaded, try to open the `X2GoClient_latest_macosx.dmg` file. You will get the following warning:

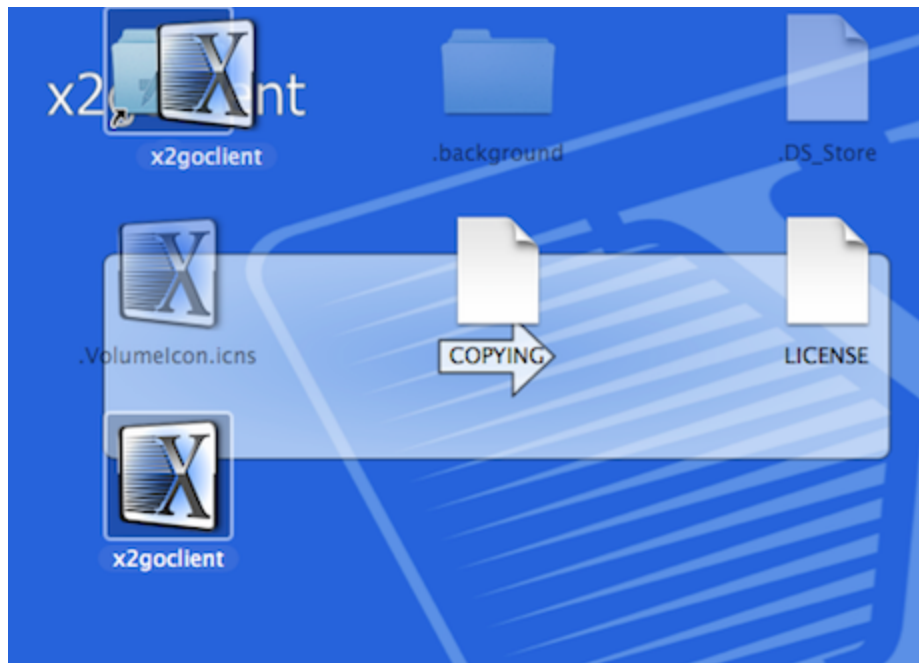


In order to open the file, please navigate to your Security and Privacy settings. You can do this by going to your System Preferences (under the Apple menu in the upper-left of your screen) and then clicking on “**Security and Privacy**.”



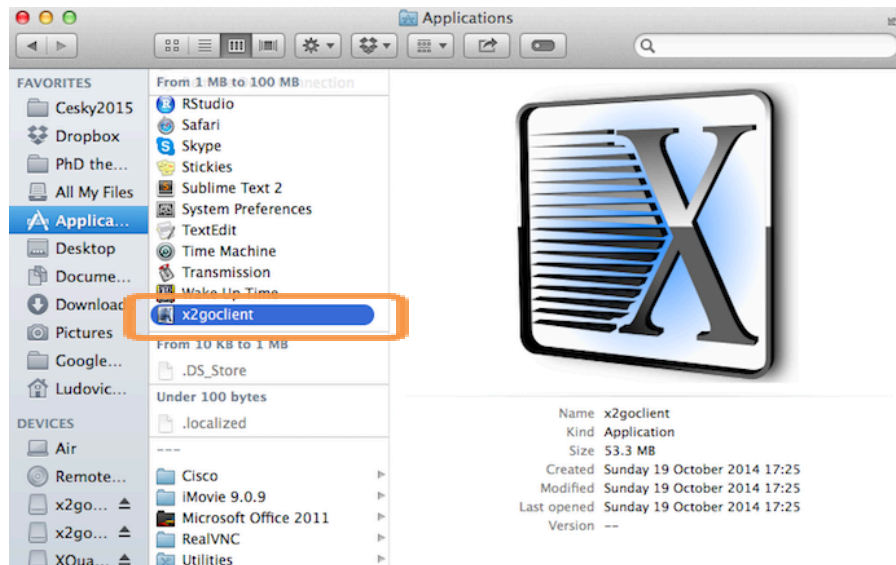
OS X's Security and Privacy settings. Please “**Open Anyway**” for the x2goclient.

You can now go back and open the *X2GoClient_latest_macosx.dmg* file. Once open, please move **x2goclient** into your **Applications** folder.



Starting the X2Go client on Mac OS X

From Applications, open **x2goclient**.

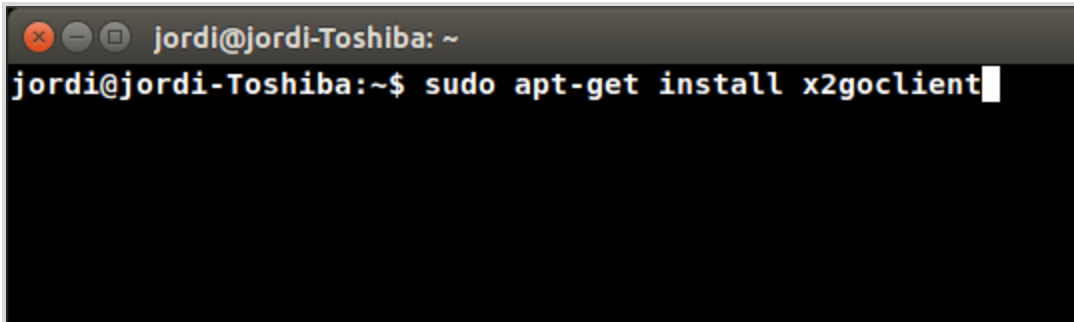


X2Go on Linux

Installing X2Go client on Ubuntu (Linux).

X2Go Client is part of Ubuntu 12.04 & later, as well as Debian Wheezy & Jessie. In Ubuntu, to install it you will probably need admin rights (sudo, root, etc.):

- Open a terminal (Ctrl + Alt + T)
- In the terminal, type “sudo apt-get install x2goclient”

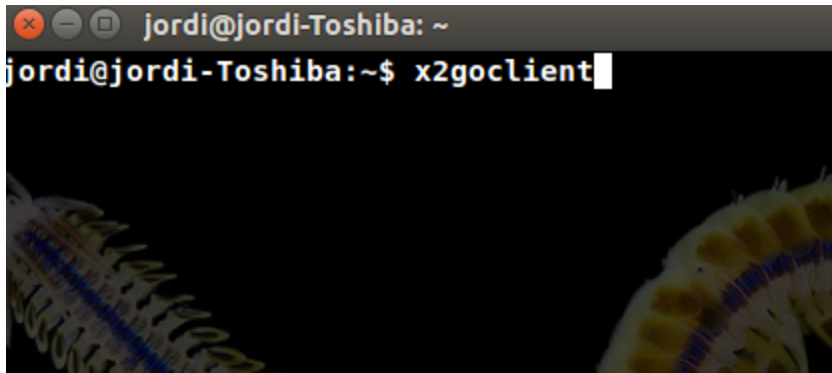
A screenshot of a terminal window. The title bar shows window control buttons and the text 'jordi@jordi-Toshiba: ~'. The terminal content shows the prompt 'jordi@jordi-Toshiba:~\$' followed by the command 'sudo apt-get install x2goclient' with a cursor at the end of the line.

Detailed instructions for other Linux flavors can be found here:

<http://wiki.x2go.org/doku.php/doc:installation:x2goclient>

Start X2Go client in Ubuntu (Linux).

In a terminal, type “x2goclient”.

A screenshot of a terminal window. The title bar shows window control buttons and the text 'jordi@jordi-Toshiba: ~'. The terminal content shows the prompt 'jordi@jordi-Toshiba:~\$' followed by the command 'x2goclient' with a cursor at the end of the line. The bottom of the image is partially obscured by a spiral notebook.

Create a session with X2Go client (all OSes).

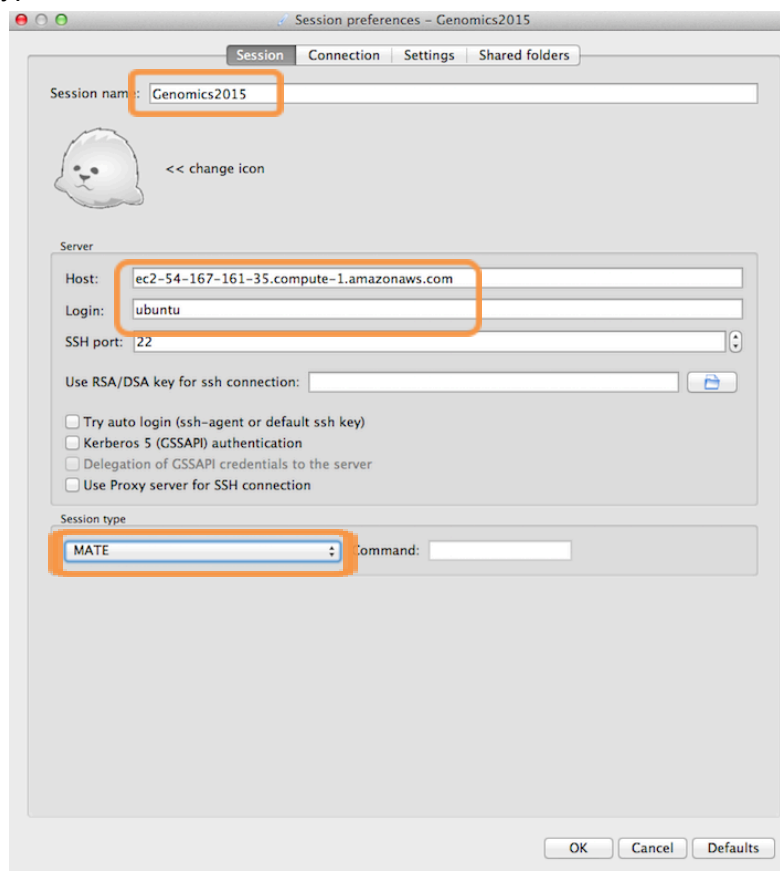
After launching X2Go in your OS (see above), you should see the main screen. **Note: on some versions of Windows you might get a security message. If so, please select “keep blocking.”**

Now you need to tell your computer where to connect to. If this is the first time you’ve opened X2Go, a new dialog will automatically pop up. If this is not the first time, then you’ll need to click on the “New session” icon.

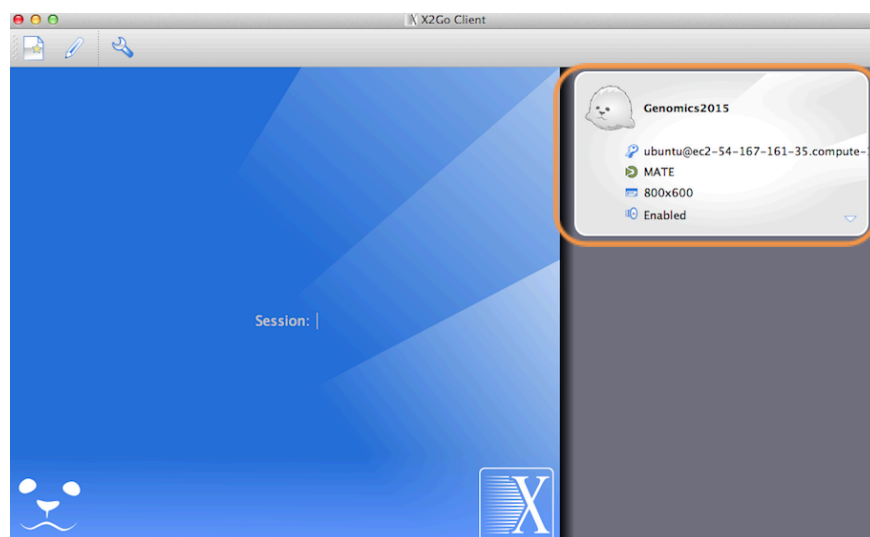


Within the new session dialog box, you’ll need to specify:

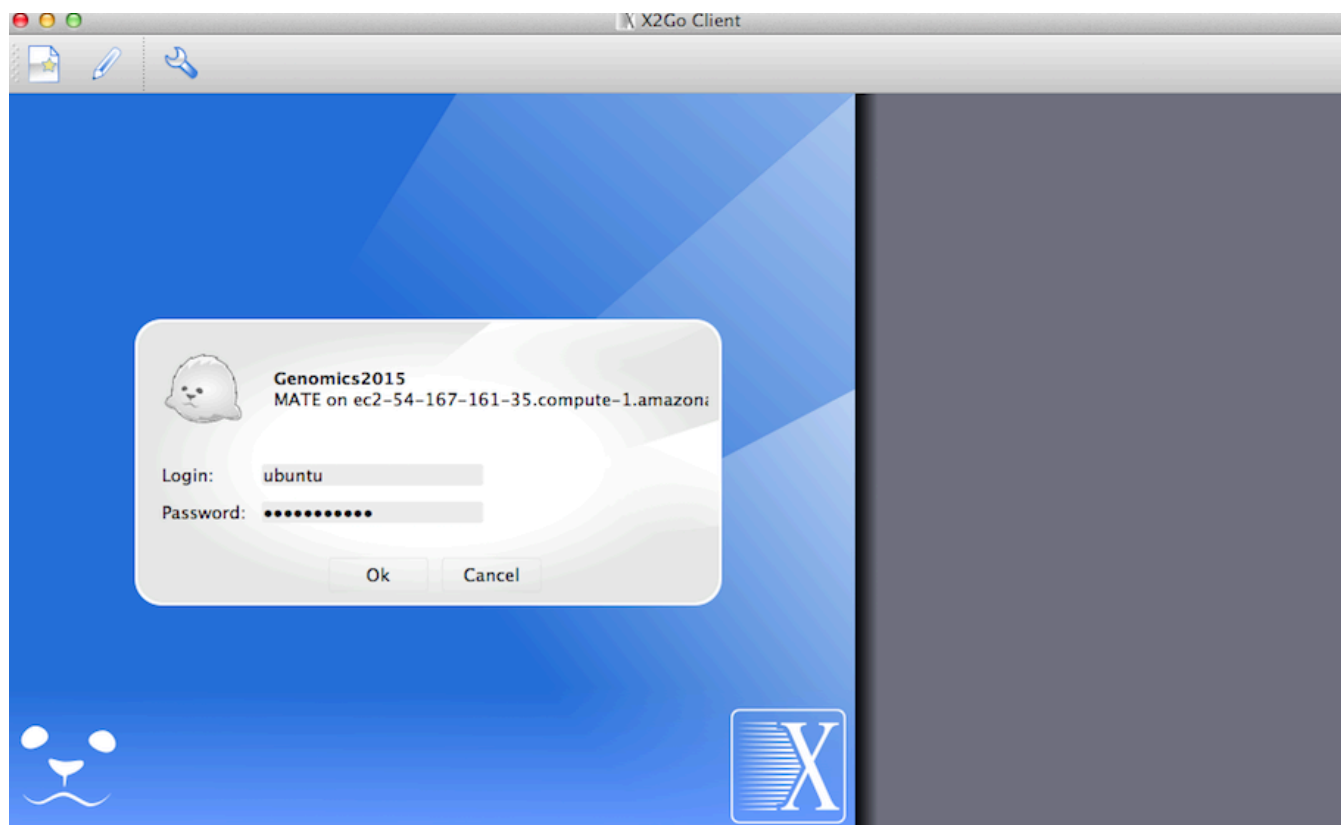
- A session name. We recommend “WME 2015.”
- A host. This is your instance. Please enter the **Public DNS** of your EC2 instance (copied from the Amazon console).
- A login. This is the username. Please enter “**ubuntu**”.
- The session type. Please select “**MATE**.”



When you click on OK, you should be taken to a new page that looks like the following:



Click anywhere on the white box. This will bring up a new prompt that will allow you to enter a password. Please enter “**evomics2015**” as the password.



The first time you connect to your instance (or if the public DNS changes) you will see a message that looks like:

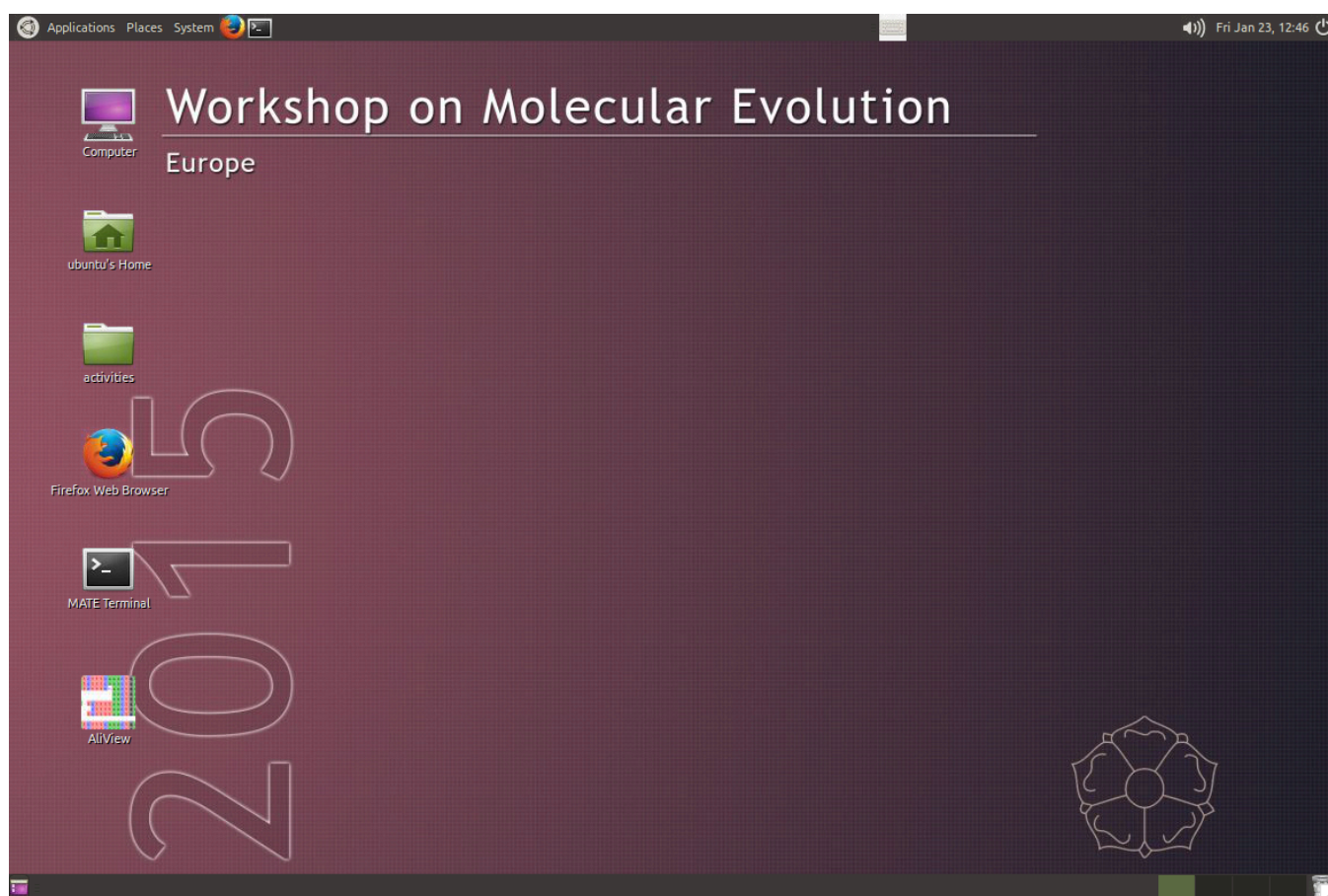
```
The server is unknown. Do you trust the host key?  
Public key hash: ec2-54-211-57-191.compute-1.amazonaws.com:22 -  
50:d9:4a:5f:db:43:9e:ea:ea:cd:ae:5b:36:a1:7e:b2
```

Simply click next to continue.

Note: If you are using Mac, you will see two error messages, one after the other; just ignore them.

After approximately 30 seconds, you should see the connection open as below.

Congratulations!



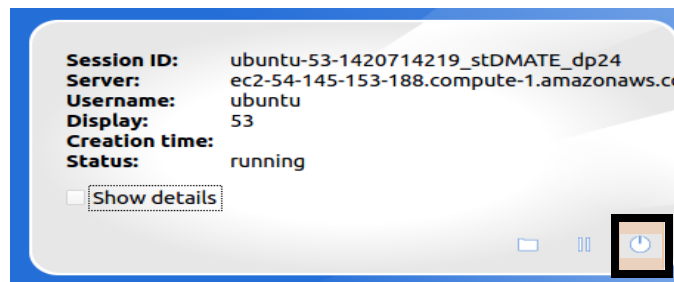
Connection Management

At the end of a working session, first we will need to suspend the connection from X2Go to the Amazon Cloud, and then stop the Amazon Cloud instance.

Suspending and reconnecting the X2Go connection

Disconnecting

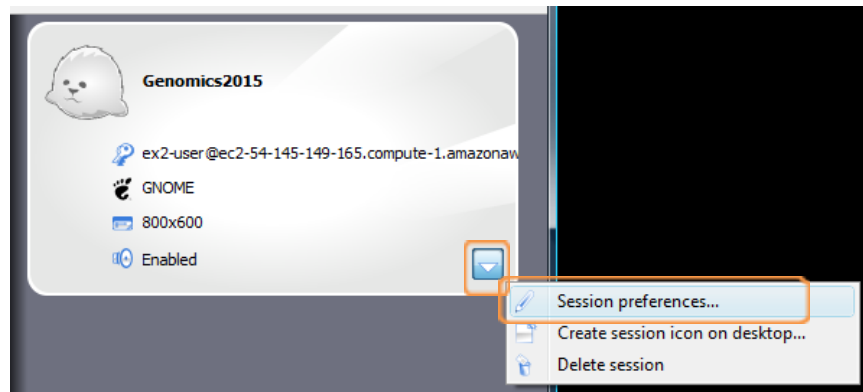
When you disconnect from X2Go, this will close all your windows and log you off the instance. **The Instance will still be running, so make sure you stop it in the AWS console – see below.** To disconnect, please go to your X2Go terminal, and click the button on the bottom right.



The connection details for X2Go. To disconnect, please click the button on the lower-right.

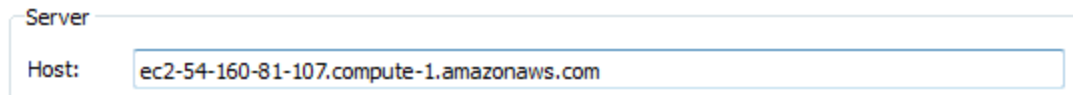
Reconnecting

Whenever you restart your AMI on Amazon (see later), your public DNS will change and you will need to update it in the X2Go client. To update, please navigate to your session preferences.



An example of navigating to your X2Go session preferences.

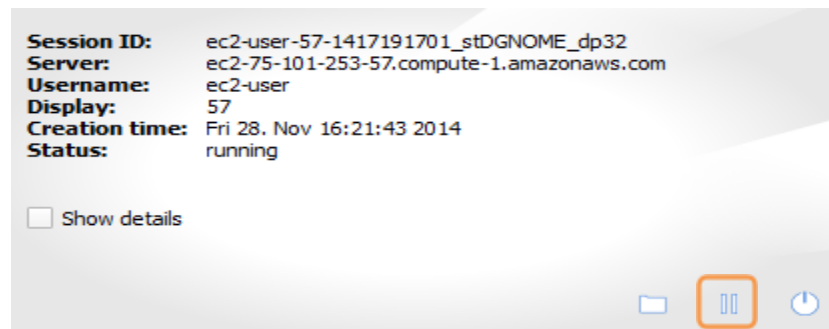
Within the session preferences, go to the Session tab. You can modify the “**host**”, which is where you need to specify your new **Public DNS**.



The host field in the Session tab of your Session preferences. The value in this field needs to be the same as the **Public DNS** of your EC2 instance.

Suspending

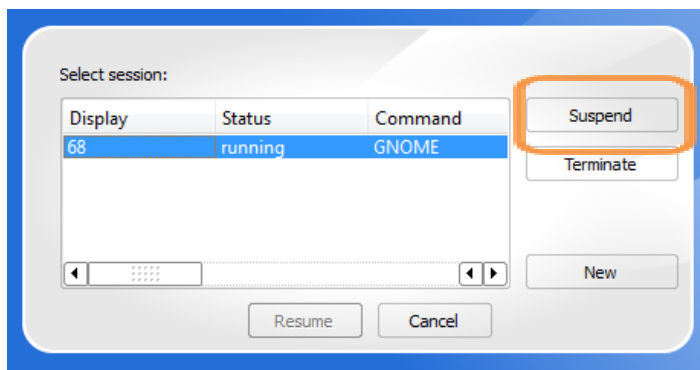
If you want to close X2Go but leave windows open and running you can *suspend* the session instead of disconnecting.



Within your session details, if you'd like to suspend the session, please click the pause button.

You can now resume your session later on from exactly where you left off.

If your desktop computer crashes or disconnects for any reason - your session should still be running. When you try to log on you will see this window:

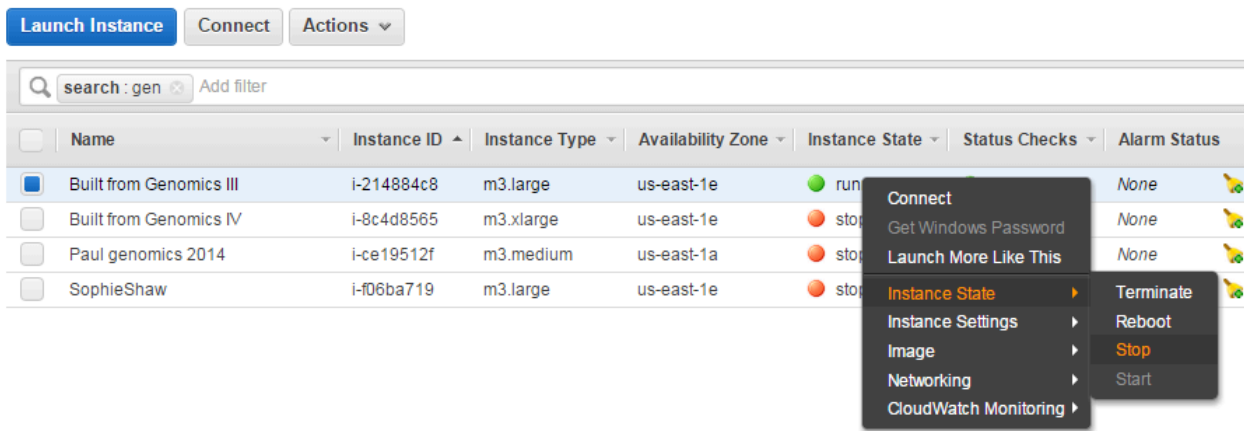


Note that "Resume" is grayed out...

Click on suspend first and then you can click on resume.

Stopping and starting the Instance in Amazon

When you're not working on the course it's very important to turn off your instance to avoid unnecessary charges. Log back on to the AWS console and find your instance; then right-click the instance to get the menu.



The AWS EC2 instance viewer. The image above shows the navigation menu that appears when you “right-click” on an instance.

If you wish to keep your data, use the “Stop” option. In this state you will not be charged for computing time, but will still be charged for storage.

When you're completely finished with the workshop, right-click the instance and select “Terminate”. It will ask you to confirm. You can then watch the status change from “shutting down” to “terminated”.

Note – this will destroy all work done to date.

Very important! If you stop and then start your instance, your Public DNS address may change. If this happens you will need to use the new DNS address with the X2Go.

Although much of what we have just done may not make much sense yet, most of you will feel totally comfortable and confident working on an EC2 node running Linux within a few hours. It's really amazing how quickly the fact that this is a remote computer will fade away. It may be hundreds of miles away but it will act just like a local computer, especially if you connect via X2Go.

Optional – Log in to the Running instance via SSH

This is intended for advanced users who may want to access the server via SSH.

To connect over SSH you need to get the public DNS address, as above, and type:

```
$> ssh ubuntu@<public DNS address>
```

You will then be asked to enter your password; you may also have to accept the encryption key.

Note: if you were working on another AMI that requires a key pair, you must provide the path to the key file in your SSH command. For example, the command might look like the following, assuming key-StudentKonrad.pem is in the same directory:

```
$> ssh -i key-StudentKonrad.pem ubuntu@ec2-174-129-70-43.compute-1.amazonaws.com
```

Linux/Mac Tip:

When you do the above command it may complain and say “permissions are too loose on the .pem file”. If this happens use chmod to make the file read/writable only by you (it's supposed to be private):

```
chmod a-rwx key-StudentKonrad.pem
```

```
chmod u+rw key-StudentKonrad.pem
```

And try the SSH command again.

(You'll learn exactly what these commands do during the Unix tutorial.)

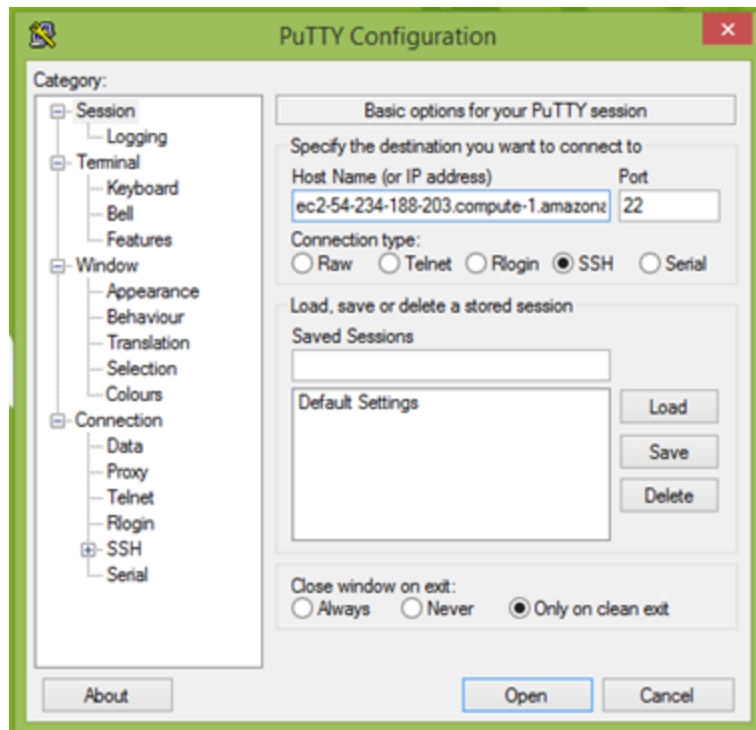
Windows Tip:

If you ever use a different AMI from the one used in this workshop, the chances are you will need an “SSH” client to connect to the instance. Mac and Linux have this built in---just open a terminal and you're ready to execute the command above. For Windows you should [download the Putty program \(http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html\)](http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html) or MobaXTerm (http://mobaxterm.mobatek.net/MobaXterm_v6.6.zip), which gives you a very easy-to-use SSH program for Windows. Instructions for both of these programs can be found below.

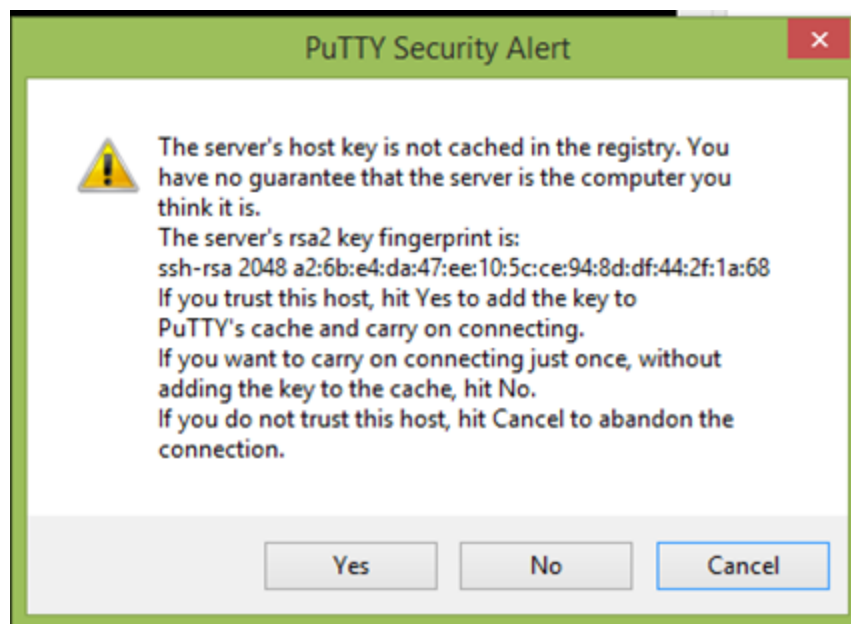
Note, again, if you're using a instance that requires a key pair, when you launch this program look for the following setting; you'll need to provide the program with the path to your .pem file that you downloaded when launching your cluster node. See the “Private key file for authentication” option in the screenshots below.

Using PuTTY (Windows Only)

PuTTY is a SSH terminal for Windows. It can be used to access our instance as a terminal. To download putty go to <http://www.chiark.greenend.org.uk/~sgtatham/putty/>.



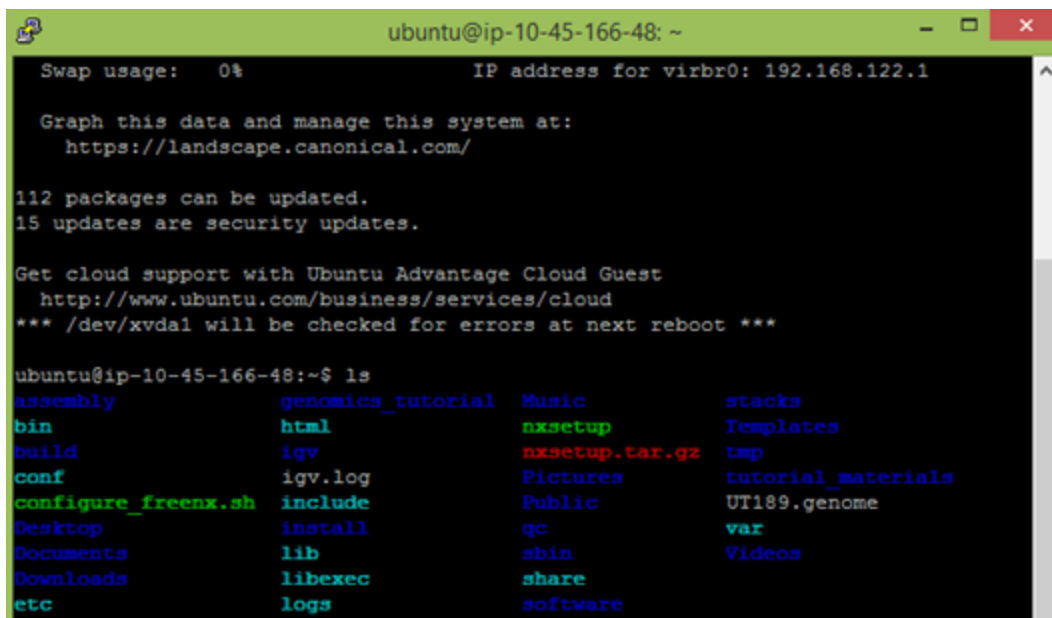
In the Host Name bar insert the Public DNS number for the Amazon Instance.



If this warning message appears, click “Yes”. This is a check that you trust the computer you are connecting to.



Enter the username “ubuntu” and the password “evomics2015”.



You are now accessing your instance via the command line. Here we can see all the files are listed.

Using MobaXTerm (Windows Only)

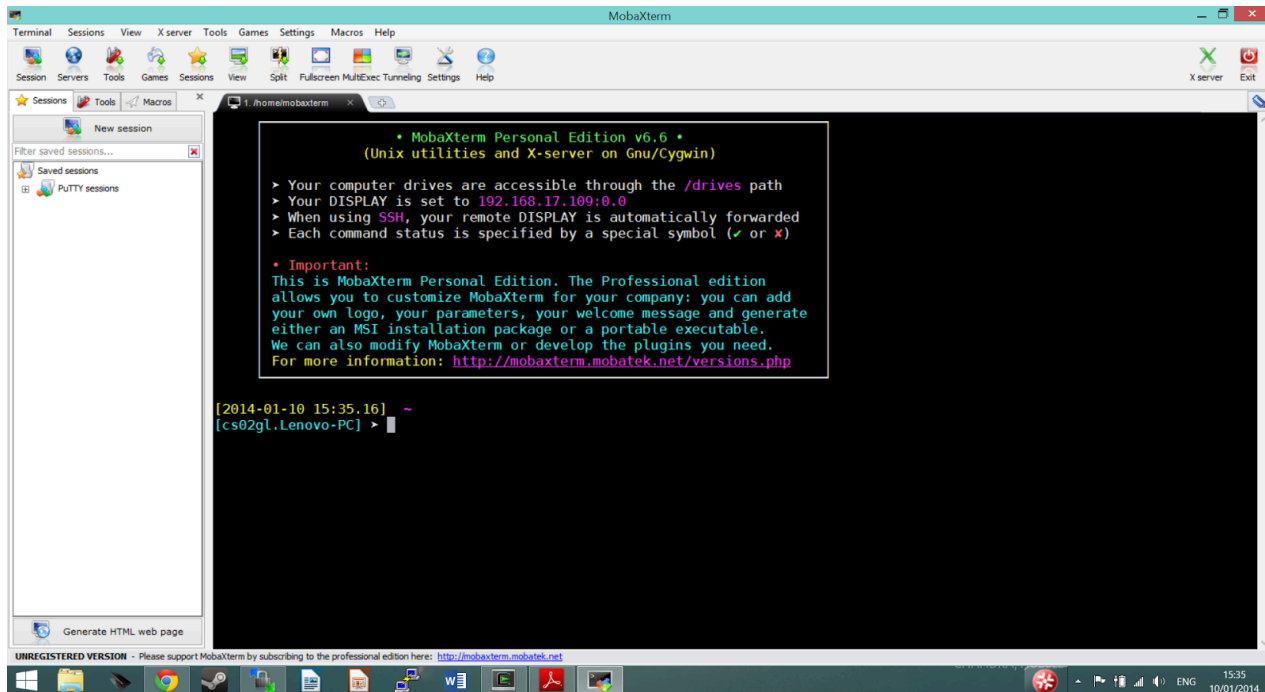
MobaXTerm is another terminal for use in Windows environments. It has more features and options than PuTTY, some of which you will need to pay for to use. However, the majority of the options/features you will use in these sessions are available in the free portable version! This means you do not need to be an administrator to use/install the program.

Download here - http://mobaxterm.mobatek.net/MobaXterm_v6.6.zip

Use your favorite unzip manager (e.g. 7-Zip) to unzip the archive and place the executable file somewhere you can find it (perhaps in your "Program Files" folder under MobaXTerm---not your Desktop if you can help it!). Double-click the file to run the program...



When the program has started you will be shown a screen like below:



The black screen - terminal - gives you access to your local computer file system with many of the UNIX commands built in (e.g. ls, cat, head). You may also see saved PuTTY sessions already loaded on the left side of the screen, if you have used that program before and saved them.



However, if you do not, you should click the “Session” button on the top-left. You will then be shown a screen with many options of session type (e.g. SSH, Telnet, RDP, FTP). You will want to select “SSH”.

Enter your Public DNS in the “Remote host” box and specify your username as “ubuntu”. You will then be asked for your password, “evomics2015”, in the terminal as below...

```
Permanently added 'ec2-54-204-244-21.compute-1.amazonaws.com' (ECDSA) to the list of known hosts.
ubuntu@ec2-54-204-244-21.compute-1.amazonaws.com's password:
ubuntu@ec2-54-204-244-21.compute-1.amazonaws.com's password: █
```

Please leave all settings as their defaults. You may also notice a checkbox that says “Use private key”. This is where you would specify your private key if you were using one with a different instance of an AMI; i.e., not for this workshop.

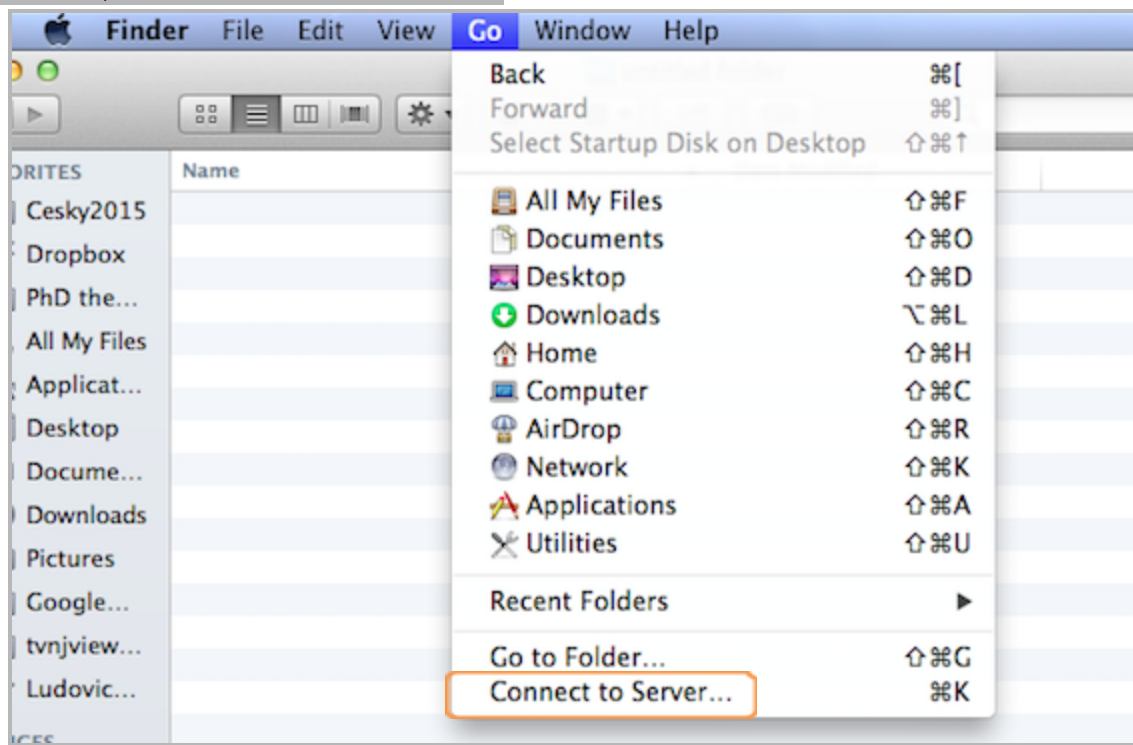
Once you are logged in, one of the nice features of MobaXTerm is that you can easily transfer files with an inbuilt browser (via sFTP) on the left-hand side of the program window in the Sftp toolbar. You can also detach your tabbed window terminal session (much like you can in Firefox or Chrome with a website tab) and should try and auto-reconnect if you lose your connection.

MobaXTerm should also save all your session details, including passwords and private keys between sessions of using it. Your saved sessions will appear on the left-hand side of your program screen.

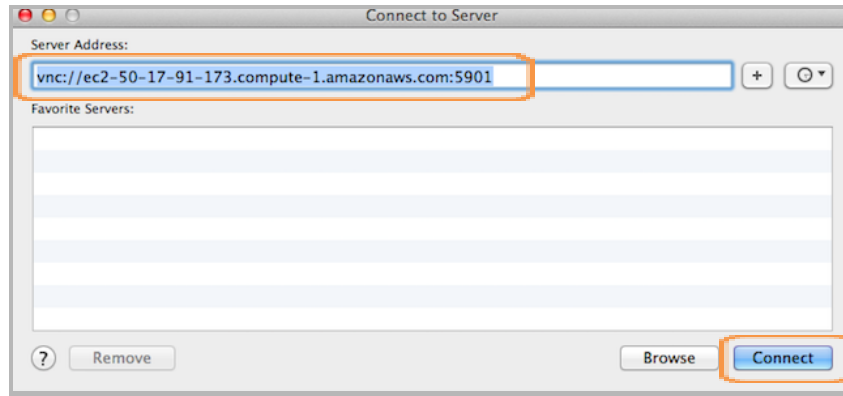
VNC Connection from OS X:

In the event that you **cannot** get X2Go running from your OS X system, you can try the following VNC connection. **You very likely do not need to go through this section!**

Go in the finder, Select *Go> Connect to server*



In the Finder, click the “Go” pull down menu, and select “Connect to Server...”.



*Enter “vnc://**Public DNS**:5901” in the server address section. Please make sure to replace **Public DNS** with the public DNS of your instance. Then click “**Connect**.”*

When prompted for a password, enter “**evomics**”.