2014 Workshop on Genomics

Starting your Amazon virtual machine

Objectives:

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

- Log into the Amazon Console and start your instance of the Evomicss workshop AWS Image
- Log in to an Amazon EC2 Linux instance using your own computer
- · Continue with the Short read genomics tutorials at your own pace

Introduction

For this workshop we will provide an overview of the cloud as described by Amazon and how, as researchers, we can use this flexible resource to get work done quickly and relatively inexpensively. We will dive right into starting up the pre-prepared Virtual Machine (VM) and logging into the Amazon management console. We will give you a whirlwind tour of the features of Amazon's cloud and then get you to start your AMI and log-in via the NX-client.

For this tutorial I 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 into 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 has also special High Performance Computing nodes (HPC) 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 1TB), 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 drive 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!

We have set up user accounts for each student in the class, take a look at the form given to you in your welcome packet. You need to know the console URL, your username, and your password. You will also find the access key and secret access key, both are used by various tools to log in and use the Amazon cloud programmatically.

Task 2 - Connecting to Your Personal VM

The Rules

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

1. Please only launch a **single** VM instance of the type specified by the instructor at the beginning of the workshop and "**stop**" the instance at the end of the workshop. Do not leave the image running overnight or over a whole week – you will quickly run out of funding

2. Please name your VM instance. Including your name will make it easy to find your resources in the list of class resources

3. Please do not delete EBS volumes or terminate VM instances that don't belong to you

Step 1 – 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 into a web application and most of the functionality of the Amazon tools are available for you and very easy to use.

This workshop has its own Amazon account and each of you have been setup as a sub-account using something called Identity Access Manager. The nice thing about this is you have pretty much free access to the console and we can have very fine grain control on what your sub-accounts can and cannot do.

To get started go to the following URL and login with the username and password below.

<u>https://evomics.signin.aws.amazon.com/console</u> or <u>http://bit.ly/evomics2014</u> (this is the same URL, it's just a little easier to remember :))

Username: student Password: evomics

After logging in you'll be presented with a wide range of options. Click on "EC2" under "Compute & Networking".



On this page you'll get a summary of the EC2 state for your account (EC2 Management

Console). You can see mine below:





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 worry 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 charge for each Gb stored every month and for each hour a machine is run. This can vary from a few cents per hour to a few dollars. Whilst it is very convenient if you are only doing analyses occasionally, at the moment it is still cheaper to have your own computing (although you then have the headache of maintaining it!).

The reason we are using the cloud here is that most of you will only be doing occasional analyses. 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 AMI from home and continue to work through the tutorial from there.

Once logged into the console we can select an Amazon Machine Image (AMI) Virtual Machine and launch it.

Click on the "Launch Instance" button in the centre.

Then click/select 'My AMIs' to continue.

step 1: Choose an	Amazon M	achine Image (AMI)	Cancel and Exit
n AMI is a template that contain mmunity, or the AWS Marketpl	s the software cor ace; or you can se	figuration (operating system, application server, and applications) required to launch your instance. You can s sect one of your own AMIs.	select an AMI provided by AWS, our user
Quick Start	0.0000		<~<~ 1 to 9 of 9 AMIs $~>~> $
My AMIs	G, search my /	wis X	
AWS Marketplace	۵	Stacks_CloudBioLinux_v5 - ami-0cfa4465	Select
Community AMIs	-	Generated for the Lund RADseq methodologies course, October 2012 Root device type: ets Vritualization type: paravirtual Owner: \$71102534555	64-bit
Ownership	۵	QIIME 1.7 - ami-37a3ta5e	Select
Owned by me		clone of public QIME 1.7	64-bit
Shared with me			
' Architecture	۵	Stacks_CloudBioLinux_Jan2014 - ami-4d2a1f24	Select
□ 32-bit □ 64-bit		Root device type: ebs Virtualization type: paravirtual Owner: 971102534555	64-bit
Root device type	٨	Short Read Genomics 2013 - ami-5941ce30	Select

If you don't see the above AMI's, make sure the 'My AMIs' tab is selected.

The next step in this process is to select an AMI. The AMI is a "snapshot" of the VM we prepared for you for this class. To select the VM we have prepared for this workshop –

Click "Select" next to "WORKSHOP ON GENOMICS 2014 V1"

Please do not use any other AMI for this workshop!

Once you have selected the instance you will need to make sure the 'General Purpose' tab on the left is selected. This will allow you to see the different Instance Types available. For this class **your choice should be a large instance (m1.xlarge)**. Depending on how many CPUs and how much memory you need you could choose a different instance if you were running this outside the class.

See http://aws.amazon.com/ec2/instance-types/ for information about the instance types and http://aws.amazon.com/ec2/pricing/ for information about pricing per hour.

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1. Choose AMI 2. Choose Instan	ce Type 3. C	onfigure Instance	4. Add Storage	5. Tag Instance	6. Configure Security Group	7. Review			
Step 2: Choose an I	nstance T	Туре							
Amazon EC2 provides a wide sele give you the flexibility to choose the	ction of instance le appropriate n	e types optimized nix of resources f	to fit different use for your application	cases. Instances is. Learn more at	s are virtual servers that can run pout instance types and how the	n applications. They have varying ay can meet your computing need	combinations of CPU, memory, s.	, storage, and networking ca	ipacity, and A
	Currently se	elected: m1.xlar	ge (8 ECUs, 4 vCP	Us, 15 GiB memo	ry, 4 x 420 GiB Storage Capaci	ty)			
All instance types	General p	purpose							
Micro instances	General purp recommende	pose instances p ed for small and r	rovide a balance o nedium databases,	f compute, memo data processing	ry, and network resources, and tasks that require additional me	are a good choice for many appl emory, caching fleets, and for run	cations. They are ning backend servers for SAP,		
General purpose	Microsoft Sha	arePoint, and oth	ier enterprise appli	cations.					
Memory optimized	Size	ECUs (i)	vCPUs (i)	Memory (GiB)	Instance Storage (GiB) (i)	EBS-Optimized Available (i)	Network Performance (i)		
Storage optimized	m1.small	1	1	1.7	1 x 160	-	Low		
Oceand and initial of	m1.medium	2	1	3.7	1 x 410	-	Moderate		
Compute optimized	m1.large	4	2	7.5	2 x 420	Yes	Moderate		
	m1.xlarge	8	4	15	4 x 420	Yes	High		
	m3.xlarge	13	4	15	2 x 40 (SSD)	Yes	Moderate		
	m3.2xlarge	26	8	30	2 x 80 (SSD)	Yes	High		
	M1 instances	s are based on In	tel Xeon processo	rs.					¥
						Cancel Previe	Review and Launch	Next: Configure Insta	nce Details

Choose the "General Purpose" tab to left.

Select the m1.xlarge instance type - that's the *extra* large instance...

Once you have selected the m1.xlarge instance type, click "Next: Configure Instance Details"

We are now on a page which enables us to customise the instance if we so wish. We don't need to change anything so...

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1. Choose AM 2. Ch	oose instance Type	3.0	onfigure Instance	4. Add Storage	5. Tag instance	6. Configure Security Group	7. Raview
Step 3: Config	gure Instan	ce D	Details				
Configure the instance	to suit your require	ements	You can launch n	nultiple instances	from the same AM	I, request Spot Instances to	o take advantage of the lower pricing, assign an access management role to the instance, and r
Numb	er of instances	۲	1				
Pur	chasing option	۲	E Request Spo	t instances			
	Network	۲	Launch into EC2	Classic		C Create new VPC	1
A	vailability Zone	۲	No preference				
	LAM role	۲	None				
Shut	down behavior	۲	Stop				
Enable termina	tion protection	0	Protect again	nst accidental tem	nination		
	Monitoring	۲	Enable Clou Additional charg	dWatch detailed n	nonitoring		
h Advand Date	-ile						

Click on "Next: Add Storage"

1. Choose AMI	2. Choose Instance Type	3. Configure Instance	4. Add Storage	5. Tag Instance	6. Configure Security Gro	oup 7. Review
Step 4: Ad	ld Storage					
Your instance will edit the settings of storage options in	be launched with the folio of the root volume. You can a Amazon EC2.	owing storage device se in also attach additional	ttings. You can att EBS volumes afte	lach additional EB r launching an ins	S volumes and instance tance, but not instance :	store volumes to your instance, or store volumes. Learn more about
Туре 🕕	Device (i)	Snapshot (j)	Size (GB) ()	Volume Type	i) IOPS (i)	Delete on Termination (i)
Root	/dev/sda1	snap-3884c02a	500	Standard	✓ N/A	•
Add New Volu	me					
Free tier	r eligible customers can g	et up to 30 GB of EBS s	forage. Learn mo	re about free usaç	e tier eligibility and usa	ge restrictions.

On this page we can select how much storage we want to add to our instance. Here we've selected the default of 500 Gb. Note that we have also ticked the 'Delete on Termination' box. This deletes the virtual hard drive once the instance is terminated. In real life I would recommend against this as you could easily lose valuable data. However for the purposes of the workshop, it makes management easier so we'll select it.

Select the 'Delete on Termination' check-box and then

Services 🗸 🛛 Edit 🗸 Konrad Paszkiewicz * N. Virginia * Help * 1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Tag Instance 6. Configure Security Group 7. Review 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 (127 characters maximum) Value (255 characters maximum) Name Konrad's instance ⊗ Create Tag (Up to 10 tags maximum)

Click on "Next: Tag Instance"

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.

In the 'Value' column next to 'Name' make sure you give the instance a name which includes your name so that you can identify it

Then click on 'Next: Configure Security Group'

Click on 'Select an existing security group' and select 'default'.

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1. Ch	cose AMI 2. Choose Instance Type	3. Configure Instance	4. Add Storage	5. Tag instance	6. Configure Security Group	7. Review				
Ste	p 6: Configure Securit	y Group								
A secu and all about	urity group is a set of firewall rules the low internet traffic to reach your insta Amazon EC2 security groups.	it control the traffic for y nce, add rules that allo	our instance. On vunrestricted acc	this page, you ca cess to the HTTP :	n add rules to allow specific and HTTPS ports. You can o	traffic to reach yo create a new seco	our instance. For example, if you urity group or select from an exis	u want to sting on	o set up a wel e below. Lear	b server A
	Assign a security gro	up: O Create a new s	ecurity group							- 1
		Select an exist	ing security grou	p						
	Security Group ID		Name			Description			Actions	
	sg-1137e179		default			default group			Copy to	new
	sg-ff296e94		launch-wizard-1			launch-wizard-1 o	created on Friday, November 1,	2013	Copy to	new
	sg-19e5c072		launch-wizard-1	0		launch-wizard-10	created on Monday, December	9, 20	Copy to	new
	sg-35fedb5e		launch-wizard-1	11		launch-wizard-11	created on Monday, December	9, 20	Copy to	new
Inbo	und rules for sg-1137e179									
Prot	locol ()	Type 🕕			Port Range (Code)	D	Source (i)			
AL T	CP	TCP			0 - 65535		sg-1137e179			
AILU	OP	UDP			0 - 65535		sg-1137e179			
4.0.00	11.175						4407-470			v
							Cancel Prev	vious	Review a	nd Launch

Then click on 'Review and Launch'

The next step is to review and launch the instance and set up any access keys

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1. Choose AMI 2. Choose Instance Type 3	. Configure Instance 4. Add St	orage 5. Tag Instance	6. Configure Security Group	7. Review		
Oten 7: Deview Instance I a	un ala					
Step 7: Review Instance La	uncn					
Please review your instance launch details. Yo process.	ou can go back to edit changes	for each section. Click L	aunch to assign a key pair to	your instance a	nd complete the	launch 🔺
Your instance configuration is To launch an instance that's eligible t about free usage tier eligibility and us	not eligible for the free us for the free usage tier, check y sage restrictions.	age tier our AMI selection, instanc	e type, configuration options	, or storage devi	ces. Learn more	x
				Do	n't show me this a	pain
AMI Details					E	fit AMI
Instance Type					Edit instanc	e type
 Security Groups 					Edit security g	roups
 Instance Details 					Edit instance	details
Number of instances	1	Pu	rchasing option On demand			
Network	EC2-Classic					
Availability Zone	No preference					
EBS-optimized	No					
Monitoring	No					
Termination protection	No					
Shutdown behavior	Stop					
IAM role	None					
Tenancy	default					
Kernel ID	Use default					-
				Cancel	Previous	Launch

Then click on 'Launch'

The final step is to select the "keypair" used to let you log into this machine. This keypair is a file you download and supply to your SSH client in order to connect to the running server. Our instance does not need this so,

Select "Proceed without a Key Pair" and tick the check box. Click 'Launch Instances'

	ande rype o. Goningure instance 4. Hus diskage o. Lag instance o. Goningure decany droup	
Step 7: Review Ins	tance Launch	
ease review your instance lau rocess.	nch details. You can go back to edit changes for each section. Click Launch to assign a key pair to	your instance and complete the launc
Your instance conf	iguration is not eligible for the free usage tier	·
To launch an instanc about free usage tier	Select an existing key pair or create a new key pair	devices. Learn more
		Don't show me this again
AMI Details	A key pair consists of a public key that AWS stores, and a private key file that you store. Toge they allow you to connect to your instance securely. For Windows AMIs, the private key file is requ to obtain the password used to log into your instance. For Linux AMIs, the private key file allows y	ther, uired Edit AM
Instance Type	securely SSH into your instance. Proceed without a key pair	Edit instance type
Security Groups	I acknowledge that I will not be able to connect to this instance unless I already know the	Edit security groups
Instance Details	password built into this AMI.	Edit instance details
Numb	Cancel Launch Instance	es
At		

Launch Status

~	Your instance is now launching The following instance launch has been initiated: H47a8863d 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 t	to connect to your instance
Your in immedia	istance 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 iately and continue to accrue until you stop or terminate your instance.
Click Vi connec	iew 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 t to your instance.
✓ He	ere are some helpful resources to get you started
· How	v to connect to your Linux instance Amazon EC2: User Guide
• Lea	rn 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

At this point, click "View Instance" and you can watch your instance boot.

At this point you wait just a couple minutes for the AMI instance to come online.

Above 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!

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EC2 Dashboard Events	C	Laun	ch Instance	Connect	ctions Y									0	\$ 0
Tags	1	Filter	All instances	 All instan 	ce types * (Q.)	learch Instances)	ĸ				К	< 1 to 6 of 6 ins	tances	i > 2i
■ INSTANCES			Name 💡 -	Instance ID *	Instance Type -	Availability Zone -	Instance State -	Status Checks ·	Alarm Status -	Public DNS	- Key Name		Launch Time -	Secu	rity Groups
Instances			Korvad_do_n	i-28a2cd58	m1.xlarge	us-east-1b	🥥 stopped		C Loading		korvad2		2013-04-19709	default	
Spot Requests			StudentCosima	i-3901b659	m1.smail	us-east-1c	🥥 terminated		C Loading				2013-08-07710	Non er	weter
Reserved instances			mytest	i-42008523	m1.large	us-east-1c	🥥 terminated		C Loading		cloudbiolinux		2013-08-28713	default	
Q MARKET			Konrad's inst	i-47a0063d	m1.smail	us-east-fa	nunning	2/2 check	C Loading	+c2-54-205-127-208.co			2013-10-14714	Exeter	Academy
AMs			Exeter Segu	i-Te4bbe1b	t1.micro	us-east-Ta	🥥 stopped		C Loading		exatersequero		2013-08-01718	Web s	lerver
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ELASTIC BLOCK STORE Volumes Reambods															

Once it turns **green**, you should **click on the AMI** and **copy the Public DNS address to the clipboard** – (shown below is an example where the Public DNS is ec2-54-205-127-208.compute-1.amazonaws.com). We will need it in a moment.

Launch Instance Connec	t Actions Y								0 ¢	0
Filter: All instances * All	instance types * Q	Search Instances	>	ĸ			K	< 1 to 6 of 6 Ins	tances >	>
Name 🖓 - Instance	e ID * Instance Type ~	Availability Zone -	Instance State ~	Status Checks	- Alarm Status -	Public DNS	Key Name	Launch Time *	Security G	
Konrad_do_n i-28a2cd	58 m1.xlarge	us-east-1b	stopped		C Loading		konrad2	2013-04-19709	default	
StudentCosima i-3901b6	69 m1.small	us-east-1c	terminated		C Loading			2013-08-07T10	Non exeter	, i i
mytest i-420085	23 m1.large	us-east-1c	terminated		C Loading		cloudbiolinux	2013-08-28T13	default	-1
Konrad's inst i-47a886	3d m1.small	us-east-1a	nunning	2/2 check	C Loading	ec2-54-205-127-208.co		2013-10-14T14	Exeter Aca	der
Exeter Sequ i-7e4bbe	1b t1.micro	us-east-1a	stopped		C Loading		exetersequenc	2013-08-01T18	Web server	
i-a418eb	ce m1.large	us-east-1a	terminated		C Loading			2013-08-28T11	default	
<										•
Instance: I-47a8863d Publ	ic DNS: ec2-54-205-127-	208.compute-1.amaz	onaws.com						881	۳ĥ
Description Status Chec	ks Monitoring Tay	25								- 11
Instance ID	i-47a8863d				Public DN	s ec2-54-205-127-208.c	ompute-1 amazonawi	s.com		-11
Instance state	running				Elastic II	Ρ.				- 11
Instance type	m1.small				Private DN:	5 ip-10-168-26-218.ec2	internal			
Availability zone	us-east-1a				Private IP	s 10.168.26.218				- 11
Security groups	Exeter Academy, view rule	es			Secondary private IP	s				- 11
Scheduled events	No scheduled events				VPC II	D -				- 11
AMI ID	Exeter Academy 4 (ami-8	5a964ec)			Subnet II	D -				- 11
Platform					Network interface	5 -				- 11
LAM role					Source/dest. check	k False				
Key pair name										- 11
Owner	132696832951				EBS-optimized	d False				- 11
Launch time	2013-10-14T14:28:11.0002	(less than one hour)			Root device type	e ebs				- 11
Termination protection	False				Root device	e /dev/sda1				- 11
Lifecycle	normal				Block device	s /dev/sda1				- 11
Monitoring	basic									
Alarm status	1									
Kernel ID	aki-4276952b									
RAM disk ID										
P4										

Step 3 – Log into the Running VM's Remote Desktop with NoMachine

Whilst your AMI is initializing - please note it may take some time (~15 minutes) - take this opportunity to install the NoMachine (sometimes referred to as NX) client software you will need to connect to the AMI.

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

Here are the steps to get remote NoMachine login working... Note that these instructions will only work for this workshops' particular VM AMI. Many AMIs will not have the NX server installed and therefore you will not be able to connect using the NX-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 tutorials.

1. Download an NX Client

Use the following NX clients depending on the operating system:

Mac OSX: https://www.nomachine.com/download/download&id=15

Windows 7 & Windows 8: https://www.nomachine.com/download/download&id=16

Windows XP: You may need an old version called NX 3.5

<u>http://nx-client-for-windows.software.informer.com/3.5/</u> - please try the Win7 version first, if you cannot get it to work, please ask an instructor to help with the settings of the old version as it looks somewhat different to the instructions below....

Linux: <u>https://www.nomachine.com/download/linux&id=4</u> - Debian (Ubuntu etc) should install this via 'sudo dpkg -i nomachine.deb' and not from the source install.

2. Launch the Client and Connect

Once it is installed, start the NoMachine on your laptop. On Windows the start menu the icon will look like:



On Mac OSX it should be in your applications folder and for Ubuntu the NoMachine client will be in your menu system (e.g. Unity)

At the next screen you may get some introductory screens if this is the first time you have run this application. Click through these until you see the main screen and make sure to check the box so that you don't see them again...:



Click on the highlighted icon:

You should name the connection Genomics Workshop and set the host-name to be the public DNS address of your Amazon AMI (copied from earlier). Also, ensure that the Protocol is set to SSH and that the port is set to 22. Now Click on 'Advanced'.



Set the connection to use the 'NoMachine login' and 'Click Continue'.



Click "Connect".

You may find that you get a screen like this:



This is just SSH telling you that it hasn't connected to this server before and cannot be sure that someone isn't pretending to be your server. Click "Yes".

Please type your username an	d password to login			
	Username			
	Password			
<u>A</u>	Login as a guest user			
	Save this password in the configuration file			
		Pack	Ok	
		Back	UK	

Enter the login username "ubuntu" and password "evomics" (without the quotation marks)

At the next screen you should see the option to start a 'New virtual desktop or custom session'. Click on this.

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		r Nau vietual daeletor	or suiton serion
		<new desktop<="" td="" virtual=""><td>or custom session></td></new>	or custom session>

If you do not get to this screen, wait a little time as the AMI might not have initialized just yet, double check your settings in the meantime and try again. If you are still having issues then please alert an instructor... Don't panic!

Select "Create a new GNOME virtual desktop":

Unnamed connection 1		MACHINE
Create a new GNOME virtual desktop		
Create a new KDE virtual desktop		
Create a new XDM virtual desktop		
Create a new VNC virtual desktop		
Create a new RDP virtual desktop		
Create a new CDE virtual desktop		
Save this setting in the configuration file		
	Park	
	Dack	

Click 'Next >' and 'Next >' again on the next screen. Double click on the NX shortcut which will be on your Desktop.

Once connected you should get a nice desktop with links to the Terminal and to the Firefox web-browser. *If a window pops up asking if you would like to run any updates, do not apply any updates – it will take hours.*

Once you have logged in and dismissed any update windows, you'll notice that the window is somewhat small and low-resolution. We can improve this, by moving the mouse cursor over the top-right-hand corner of the screen and clicking on the 'page-curl' illustrated below. If you cannot find the "page-curl" then you can press Ctrl+Alt+0:



This should bring up a window similar to this. Click on the 'Display icon'.

CI	Click on the items below or click Done to close the menu panel							
	×	<u>s</u>			<u>.</u>			
	Input	Devices	Display	Audio	Mic in	Recording	Connection	
							Done	

This will give you some more options:



Click on the 'Resize remote screen' and also the small icon circled in blue in the figure above. Then click on 'Done'. This should give you a nice full size desktop to work on. If you need to move out of it, you can again return to the top right hand corner 'page-curl' icon and deselect the options you've just used.

One final task is to change your password from ubuntu to something less easy to guess. Double-click on the 'Terminal' icon and type the command 'passwd' (without the quote marks). Enter 'evomics' as the current password (again without the quotes) and then type in a new password of your choice. Note that for security, no characters will appear as you type. Please make it difficult for someone to guess your new password! You will then need to re-enter it to confirm.

Every time you log in via NX after this you will need to enter 'ubuntu' as the username and the password you have just entered. *Please do not forget it!*



To close the connection just close the window, you can choose "Disconnect" if you want to log back in later and pick up where you left off. However, if you stop or restart the AMI via the console, any unsaved information will be lost.

At this point you've logged into the machine.

If you do stop or restart, remember to check and change the Public DNS address using the AWS console and change the DNS address in NX.

Please see the next page...

		No	Machine				-		×
Recent conne	ections					NOMACH	INE		
م 💷 🖽		¥	¢ 🕈	9	ß				
Genomics Works ubuntu O SS	hop, Intermediate H Workshop, User O SSH								
	Show details								
	Open connection								
	Remove connection								
						Conne	ect		

To do this, right-click on the Connection and Select "Show Details"

Select Edit and update the Public DNS number:

	NoMachine - Genomics Workshop -						
	Genomics Workshop		ND	MACHINE			
		Host: Port: Protocol: User: Connected:	ec2-174-129-149-152.compute 22 SSH ubuntu 09/01/2014 14:01:55	-			
				Edit			
	Reset login information and preferences		Back	Connect			

Step 4 – Stopping and starting the Instance

When you're done with the workshop it's very important to turn off the VM to avoid unnecessary charges. Just log back into the console, 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.** If you wish to keep your data, use the 'Stop' option instead. In this state you will not be charged for computing time, but will still be charged for storage.

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 NoMachine.

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 NX.

Optional Step 5 – Log into the Running VM via SSH

Note – this is for advanced users who may want to access the server via SSH. Do NOT try this during these tutorials.

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

\$> ssh ubuntu@public-dns-numbers.amazonaws.com

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 which requires a key pair, you should have the key file you downloaded present in the same directory that you execute the command from. For example, the command might look like the following and this assumes 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/write only to 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 (<u>http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html</u>) or MobaXTerm (<u>http://mobaxterm.mobatek.net/MobaXterm_v6.6.zip)</u> which gives you a very_easy-to-use SSH program for Windows. The username above is "ubuntu" and the server is " ec2-174-129-70-43.compute-1.amazonaws.com". You'll use the server name that's assigned to the one you launched. Instructions for both of these programmes can be found below.

Note, again if you're using a VM 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 VM as a terminal. To download putty go to <u>http://www.chiark.greenend.org.uk/~sgtatham/putty/</u>.

8	PuTTY Configuration	×			
Category:					
- Session	Basic options for your PuTTY sess	on			
Logging ⊡- Terminal Keyboard	Specify the destination you want to connect Host Name (or IP address)	to Port			
Bell Features E Window	Connection type: Raw Telnet Riogin SSH	⊖ Serial			
- Appearance - Behaviour - Translation - Selection	Load, save or delete a stored session Saved Sessions				
Colours Connection	Default Settings	Load			
Proxy Telnet		Delete			
B-SSH Serial	Close window on exit: Always Never Only on clean exit				
About	Open	Cancel			

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

	PuTTY Security Alert	×
Â	The server's host key is not cached in the registry. You have no guarantee that the server is the computer you think it is. The server's rsa2 key fingerprint is: ssh-rsa 2048 a2:6b:e4:da:47:ee:10:5c:ce:94:8d:df:44:2f:1a:68 If you trust this host, hit Yes to add the key to PuTTY's cache and carry on connecting. If you want to carry on connecting just once, without adding the key to the cache, hit No. If you do not trust this host, hit Cancel to abandon the connection.	
	Yes No Cancel	

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 "evomics".

B	ubuntu@ip-	10-45-166-48: ~			×		
Swap usage: 0%	IP	address for virb	r0: 192.168.122	.1	^		
Graph this data and https://landscape	d manage this syste e.canonical.com/	m at:					
112 packages can be	updated.						
15 updates are security updates.							
Get cloud support with http://www.ubuntu.c *** /dev/xvda1 will h ubuntu@ip-10-45-166-6	th Ubuntu Advantage com/business/servic be checked for erro 48:~\$ 1s	Cloud Guest es/cloud rs at next reboo	t ***				
assembly							
bin	html	nxsetup					
build							
conf	igv.log						
configure_freenx.sh	include		UT189.genome				
Desktop			var				
Documents	lib						
Downloads	libexec	share					
etc	logs						

You are now accessing the terminal of your VM. 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 favourite 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".

	Session settings									
SSH	Telnet	Rsh	Xdmcp	RDP	VNC	FTP	SFTP	Serial	File/Url	Shell
Basic Remote	SSH settings	2-54-204	-244-21.	V 5	Specify use	ername	ubuntu		Port 22	
X11-F	nced SSH sett	ings 💽 🗹 Con	Terminal setti npression	ngs 😭 B Remote	ookmark set	tings	tive shell	∨		
Displa Use prov	Execute command Do not exit after command ends Display SFTP browser Follow SSH path (experimental) 2-step authentication Use private key Extra option Image: Command ends Use proxy (experimental): None Host: Port: 1080									
Gater	nect through way SSH serv se private key	SSH gatev er	way (jump ho	st) Port 2	22	User				1
			V	ОК		🔀 Ca	ncel			

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

Permanently added 'ec2-54-204-244-21.comp	ute-1.amazonaws.com	(ECDSA)	to	the	list	of	known	hosts.
ubuntu@ec2-54-204-244-21.compute-1.amazon	aws.com's password:	_						
ubuntu@ec2-54-204-244-21.compute-1.amazona	aws.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 but your own instance.

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.