
Getting Started in the Cloud

Practical Everyday Uses for Beginners

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In case you lost your conference guide...

- The cloud is NOT just for SaaS
- By the end of this session you will ...
 - Learn what this whole cloud thing is
 - Learn how to navigate around the Amazon AWS world
 - Learn how to start your own instance
 - And much more!

Paul Koufalis? Who is Paul Koufalis?

- Famous quote from my junior college days
 - Buy me a beer and I'll tell you the story
- Progress DBA and UNIX sysadmin for 17 years
 - That's 1994 for the mathematically-challenged

Menu du jour

- L'entrée: Quick intro to the "Cloud"
 - Le trou normand: AWS walk-through
 - Le repas principal: Your first instance!
 - Le dessert: Some simple benchmarks
 - Le digestif: Q&A
-
- ...all generously accompanied by a 1970 vintage Greek-Canadian white...

Quick Intro

- You need a PROD server – what do you do?
 - You call your favourite vendor
 - You give him specs: CPU, memory, disk, network, operating system...
 - He quotes you a price
 - You buy, take delivery and deploy in your data centre
- 3-5 years later you repeat the process

Quick Intro

- Ok – Now you need a TEST Server
 - What do you do?
- You pull out some old piece of junk
 - Blow off the dust...
- You get the idea

- It doesn't have to be that way

Cloud Computing

- Wikipedia:

Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility...

- Simple translation:

- Hardware is someone else's problem
- Rent as much or as little as you want, for as long as you want, whenever you want, for pennies per hour

Service Providers

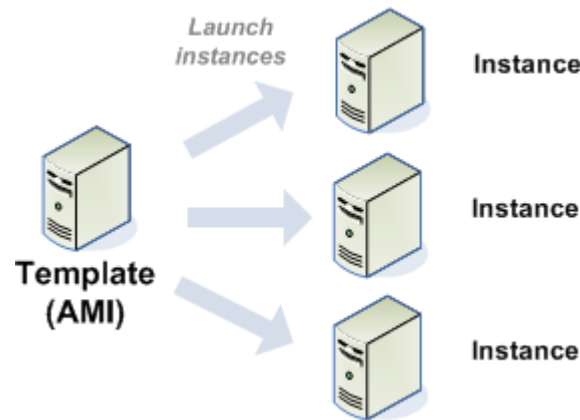
- There are many cloud computing providers
 - Amazon, GoGrid, RackSpace...
- We will concentrate on one of the key players: Amazon Web Services (AWS)

Amazon Web Services

- Arguably the “first” to make the cloud mainstream
- Let’s go over some key concepts first

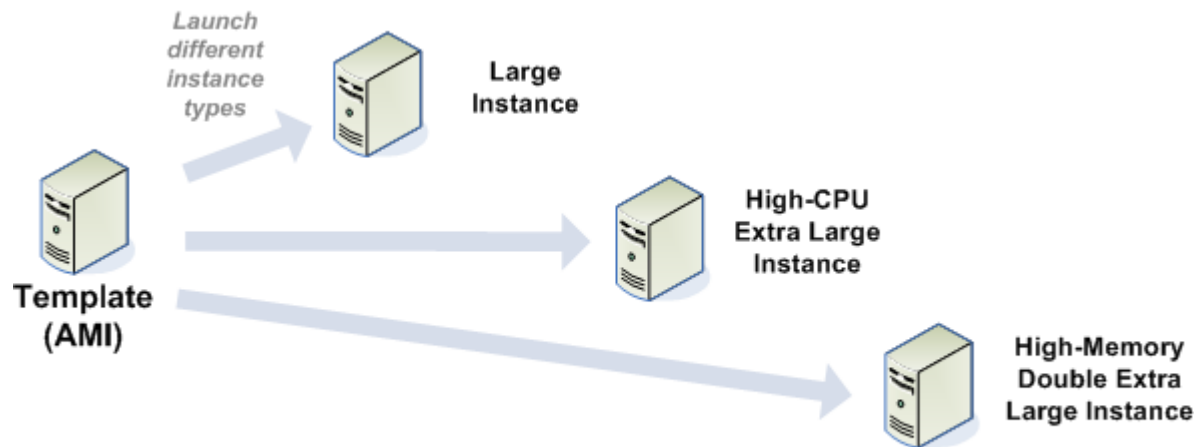
Key Concepts

- AMI: Amazon Machine Image
 - Template definition of your server
 - Like a full backup
- Instance: When you launch an AMI, the running entity is called an instance



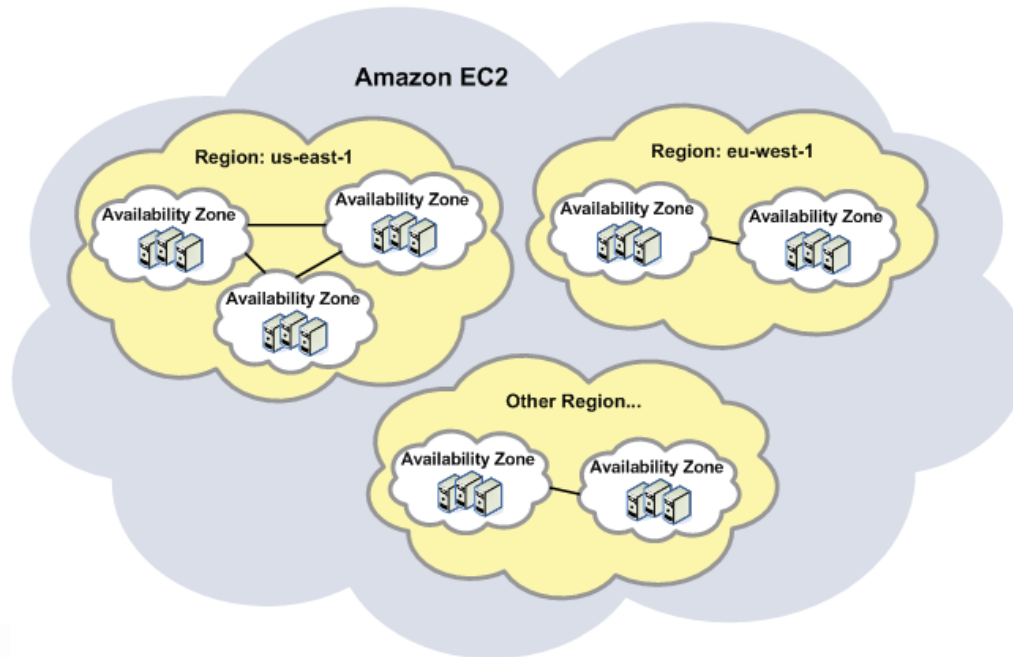
Key Concepts

- Instance Types: Defines the amount of CPU, memory, disk and bandwidth
 - Small, medium, large, etc...



Key Concepts

- Regions and Availability Zones: Where do you want that instance to run?
 - US East? West? EMEA? AsiaPac?

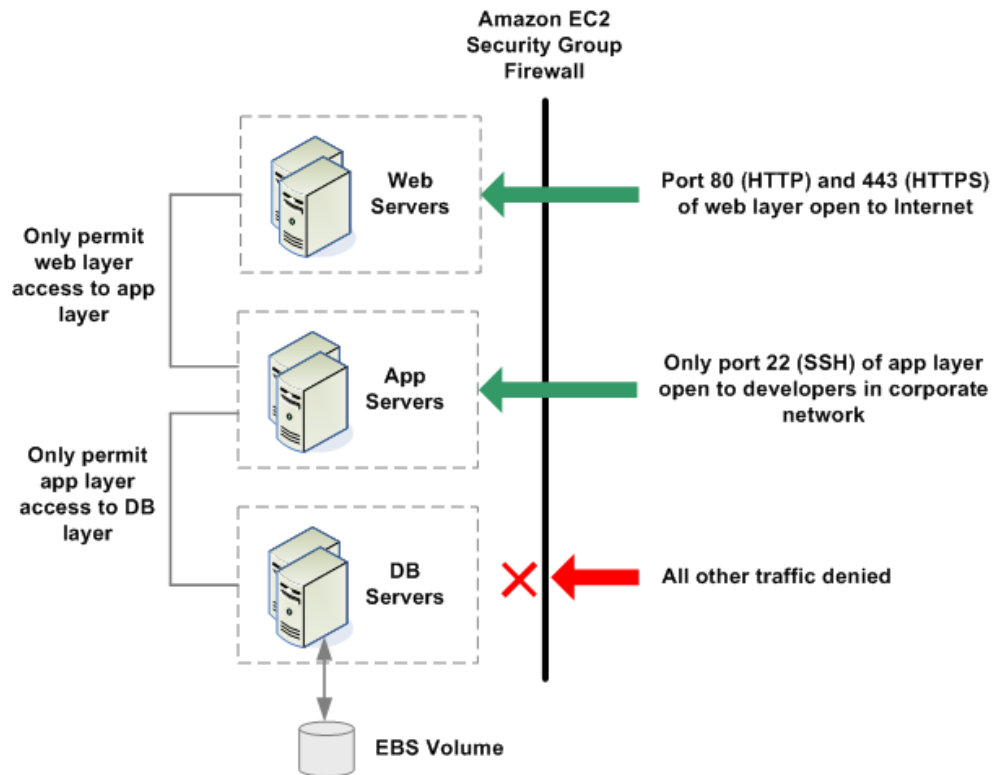


Key Concepts

- Storage: Simple (S3), Block (EBS) and Ephemeral (temporary)
 - S3 is Internet-based storage
 - EBS = Elastic Block Storage
 - Persistent storage
 - Ephemeral – AKA instance store
 - Does not persist after termination

Key Concepts

- Security Groups: Your custom firewall definitions



Key Concepts

- Key Pairs: Public/private key pair to secure access to your instances

Key Concepts

- How much does it cost?
- Depends on
 - Operating system
 - Instance Type
 - Data Transfer
- Example: micro Linux instance costs \$0.02 per hour
 - Typically much less as a “Spot” instance
- See <http://aws.amazon.com/ec2/pricing/>

Hungry Yet?

- Let's take a look at AWS
- Start at <http://aws.amazon.com>
 - Create an account
 - Will need a credit card
 - There is a “free” tier for the first year

AWS Console

AWS Management Console > Amazon EC2

Paul Koufalis | Help

- AWS Elastic Beanstalk
- Amazon S3
- Amazon EC2**
- Amazon VPC
- Amazon CloudWatch
- Amazon Elastic MapReduce
- Amazon CloudFront
- AWS CloudFormation
- Amazon RDS
- Amazon ElastiCache
- Amazon SQS
- AWS IAM
- Amazon SNS

Navigation

Region: US East (Virginia)

- EC2 Dashboard
- INSTANCES
 - Instances**
 - Spot Requests
 - Reserved Instances
- IMAGES
 - AMIs
 - Bundle Tasks
- ELASTIC BLOCK STORE
 - Volumes
 - Snapshots
- NETWORK & SECURITY
 - Security Groups
 - Elastic IPs
 - Placement Groups
 - Load Balancers
 - Key Pairs

My Instances

Launch Instance Instance Actions Show/Hide Refresh Help

Viewing: All Instances All Instance Types Search 1 to 1 of 1 Instances

Name	Instance	AMI ID	Platform	Type	Status	Public DNS	Security Group	Key Pair Name	Kernel ID
empty	i-91847df2	ami-39529d50		m1.large	running	ec2-50-17-61-21	Open	Paul_Centos_K	aki-f006f399

No EC2 Instances selected.

Select an instance above

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Create a Key Pair

AWS Management Console > **Amazon EC2** Paul Koufalis | Help

Navigation: Region: US East (Virginia)

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 - Load Balancers
 - Key Pairs**

Key Pairs

Create Key Pair Import Key Pair Delete Show/Hide Refresh Help

Viewing: All Key Pairs Search 1 to 2 of 2 Items

	Key Pair Name	Fingerprint
<input type="checkbox"/>	Paul_Centos_Key_1	45:43:24:0a:e2:35:4d:48:99:0a:17:a7:1c:68:8e:de:23:2c:02:ea
<input type="checkbox"/>	TEST2	e2:c3:89:31:ff:e9:f4:e8:2f:4f:3b:8a:92:6e:31:69:1d:83:ea:42

0 Key Pairs selected

Select a key pair above to view information about it here

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Pick an Existing AMI

- This is where it gets tricky
- A gajillion choices
- Use the filters
- Many are based on the same kernel but have different software installed

Pick an Existing AMI

AWS Management Console > Amazon EC2 Paul Koufalis | Help ▾

Navigation: Region: US East (Virginia) ▾

Amazon Machine Images

Viewing: EBS Images | All Platforms | Search

Name	AMI ID	Source	Visibility	Status	Architecture	AMI Name	Description	Platform	Root Device	Kernel ID
empty	ami-002dd269	293077032498/...	Public	available	i386	xsd.web.server	Basic Web Ser	Windows	ebs	
empty	ami-0032c769	816268476753/...	Public	available	x86_64	cit-c-2-5-128500		Windows	ebs	
empty	ami-0055ad69	962722313162/...	Public	available	x86_64	ubuntu-jenkins-		Ubuntu	ebs	aki-427d952b
empty	ami-005daf69	amazon/Elastic	Public	available	x86_64	ElasticBeansta	Elastic Beansta	Amazon Lin	ebs	aki-427d952b
empty	ami-00817869	849914840376/...	Public	available	x86_64	Elastic-Beansta	Tomcat 6.0.32	Other Lin	ebs	aki-427d952b
empty	ami-00b14b69	099720109477/...	Public	available	x86_64	ebs/ubuntu-ima		Ubuntu	ebs	aki-825ea7eb
empty	ami-00c53c69	365636171625/...	Public	available	x86_64	Citrix_XenApp6	Citrix_XenApp6	Windows	ebs	
empty	ami-00c83b69	720220196365/...	Public	available	x86_64	openSUSE-11.3	openSUSE 11.3	OpenSUSE	ebs	aki-427d952b
empty	ami-0104c868	099720109477/...	Public	available	x86_64	ebs/ubuntu-ima		Ubuntu	ebs	aki-427d952b
empty	ami-0112dd68	099720109477/...	Public	available	x86_64	ebs/ubuntu-ima		Ubuntu	ebs	aki-825ea7eb
empty	ami-012aec68	979382823631/...	Public	available	i386	bitnami-copperr	BitNami Copper	Windows	ebs	
empty	ami-016fae68	096457495696/...	Public	available	i386	turnkey-mantis-	http://www.turn	Other Linux	ebs	aki-407d9529
empty	ami-01945668	975760374286/...	Public	available	x86_64	ubuntu-hdfs-hba	Ubuntu with hdf	Ubuntu	ebs	aki-427d952b
empty	ami-01965068	amazon/CloudF	Public	available	x86_64	CloudFormation	CloudFormation	Amazon Lin	ebs	aki-427d952b
empty	ami-01a56668	664638949259/...	Public	available	i386	CentOS5.6-i386	CentOS5.6-i386	Cent OS	ebs	aki-a71cf9ce
empty	ami-0201f16b	099720109477/...	Public	available	x86_64	ebs/ubuntu-ima		Ubuntu	ebs	aki-427d952b

0 EC2 Amazon Machine Images selected
Select an image above

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Launch!!

- Wait...first let's talk \$\$
- You can launch a normal instance and pay the regular price
 - Micro: \$0.02; Large: \$0.34 (per hour)
 - See the price list
- OR...you can launch a spot instance
 - Micro: \$0.006; Large: \$0.10 (per hour)

Spot Instance

- You get to buy extra, unused AWS resources at a variable rate, depending on supply and demand
- You simply name your top price
- **CAREFUL:** Your instance will be terminated if the spot price exceeds your max price

Launch!!! (Take 2)

Navigation
Region: US East (Virginia)

Amazon Machine Images

Viewing: EBS Images All Platforms Search

Name	AMI ID	Source	Owner	Visibility	Status	Architecture	AMI Name	Description	Platform	Root Device	Kernel ID
empty	ami-002dd269	293077032498/	293077032498	Public	available	i386	xsd.web.server	Basic Web Ser	Windows	ebs	
empty	ami-0032c769	816268476753/	816268476753	Public	available	x86_64	cit-c-2-5-12850		Windows	ebs	
empty	ami-0055ad69	962722313162/	962722313162	Public	available	x86_64	ubuntu-jenkins-		Ubuntu	ebs	aki-427d952b
<input checked="" type="checkbox"/>	ami-005daf69	amazon/ElasticBeanstalk-Tomcat6-64bit-20110322-2041	amazon (102837901569)	Public	available	x86_64	ElasticBeanstalk-Tomcat6-64bit-20110322-2041	Elastic Beanstalk Tomcat 6 64-bit	Amazon Linux	ebs	aki-427d952b
empty	ami-00817869	8499146/		Public	available	x86_64	Elastic-Beanstalk-Tomcat6-64bit-20110322-2041	Tomcat 6.0.32	Other Linux	ebs	aki-427d952b
empty	ami-00b14b69	099720109477/		Public	available	x86_64	ebs/ubuntu-ima		Ubuntu	ebs	aki-825ea7eb
empty	ami-00c53c69	365636/		Public	available	x86_64	Citrix_XenApp6	Citrix_XenApp6	Windows	ebs	
empty	ami-00c83b69	720220196365/	720220196365	Public	available	x86_64	openSUSE-11.3	openSUSE 11.3	OpenSUSE	ebs	aki-427d952b
empty	ami-0104c868	099720109477/	099720109477	Public	available	x86_64	ebs/ubuntu-ima		Ubuntu	ebs	aki-427d952b
empty	ami-0112dd68	099720109477/	099720109477	Public	available	x86_64	ebs/ubuntu-ima		Ubuntu	ebs	aki-825ea7eb

1 EC2 Amazon Machine Image selected

EC2 Amazon Machine Image: ami-005daf69

Description Tags

AMI ID: ami-005daf69

AMI Name: ElasticBeanstalk-Tomcat6-64bit-20110322-2041

Description: Elastic Beanstalk Tomcat 6 64-bit

Source: amazon/ElasticBeanstalk-Tomcat6-64bit-20110322-2041

Owner: amazon (102837901569) **Visibility:** Public **Product Code:**

State: available **Kernel ID:** aki-427d952b **RAM Disk ID:** -

Image Type: machine **Architecture:** x86_64 **Platform:** Amazon Linux

Launch Spot Instance

Request Instances Wizard Cancel X

CHOOSE AN AMI **INSTANCE DETAILS** CREATE KEY PAIR CONFIGURE FIREWALL REVIEW

Provide the details for your instance(s). You may also decide whether you want to launch your instances as "on-demand" or "spot" instances.

Number of Instances: **Instance Type:**

Launch Instances

Request Spot Instances

Spot Instances let you pay for compute capacity by the hour at a Spot Price that fluctuates based on supply and demand. You specify a maximum price you are willing to pay per hour, and your instance only runs when the Spot Price is at or below that price. This allows for cost reduction on compute tasks with flexible start and end times.

Current Price:	\$0.108	Request Valid From:	<i>any time edit</i>
Max Price:	\$ <input type="text"/> (Ex: 0.045 = 4.5 cents/hour)	Request Valid Until:	<i>any time edit</i>
Launch Group:	<input type="text"/>	Persistent Request?	<input type="checkbox"/>

Launch Into:

EC2

Availability Zone:

Availability Zone Group:

[< Back](#) [Continue >](#)

Your First Instance...

- Don't be impatient
 - Spot instances could take 5-10-15 + minutes to start
- Refresh the “Instances” tab to see when it starts running

Seeing Your First Instance

AWS Management Console > Amazon EC2 Paul Koufalis | Help

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My Instances

Launch Instance Instance Actions Show/Hide Refresh Help

Viewing: All Instances All Instance Types Search

Name	Instance	AMI ID	Platform	Type	Status	Public DNS	Security Group	Key Pair Name	Kernel ID
<input checked="" type="checkbox"/>	empty	i-91847df2	ami-39529d50		running	ec2-50-17-61-2	Open	Paul_Centos_Key_1	aki-f006f399

EC2 Instance: i-91847df2 ec2-50-17-61-215.compute-1.amazonaws.com

Description Monitoring Tags

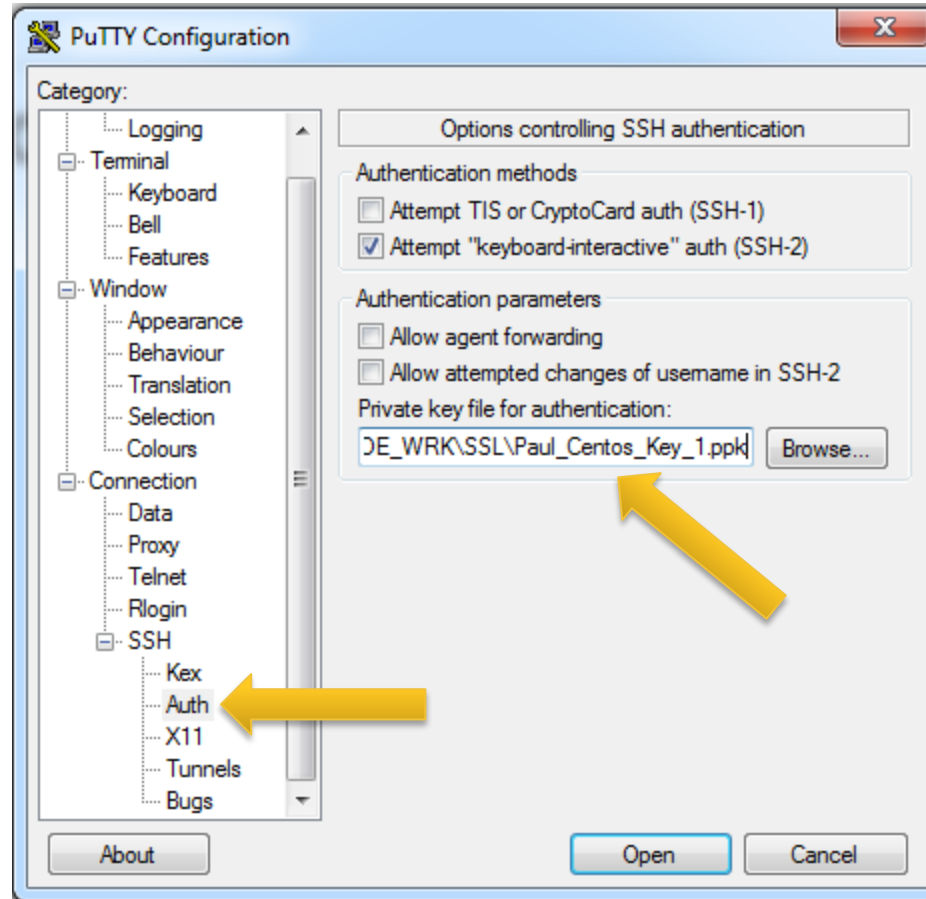
AMI:	Centos57_OE102B05_ATM_10GB (ami-39529d50)	Zone:	us-east-1a
Security Groups:	Open	Type:	m1.large
Status:	running	Owner:	493411239207
VPC ID:	-	Subnet ID:	-
Source/Dest. Check:		Virtualization:	paravirtual
Placement Group:		Reservation:	r-de1a76b0
RAM Disk ID:	ari-f406f39d	Platform:	-
Key Pair Name:	Paul_Centos_Key_1	Kernel ID:	aki-f006f399
Monitoring:	basic	AMI Launch Index:	0
Elastic IP:	-	Root Device:	sda1
Root Device Type:	ebs	Tenancy:	default
Lifecycle:	spot		
Block Devices:	sda1 sdh sdf sdi sdg		
Public DNS:	ec2-50-17-61-215.compute-1.amazonaws.com		
Private DNS:	ip-10-124-93-231.ec2.internal		
Private IP Address:	10.124.93.231		

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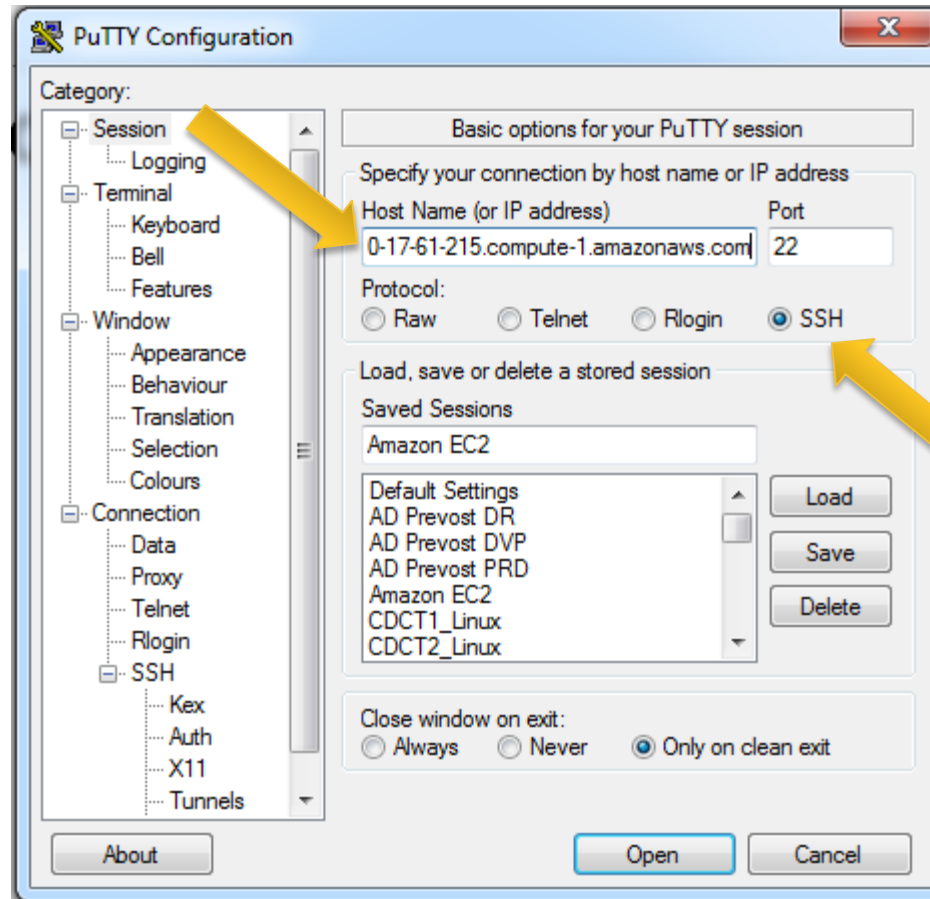
Connect Using Putty

- Remember that Key Pair?
- Use puttygen to convert .pem to .ppk
 - <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>

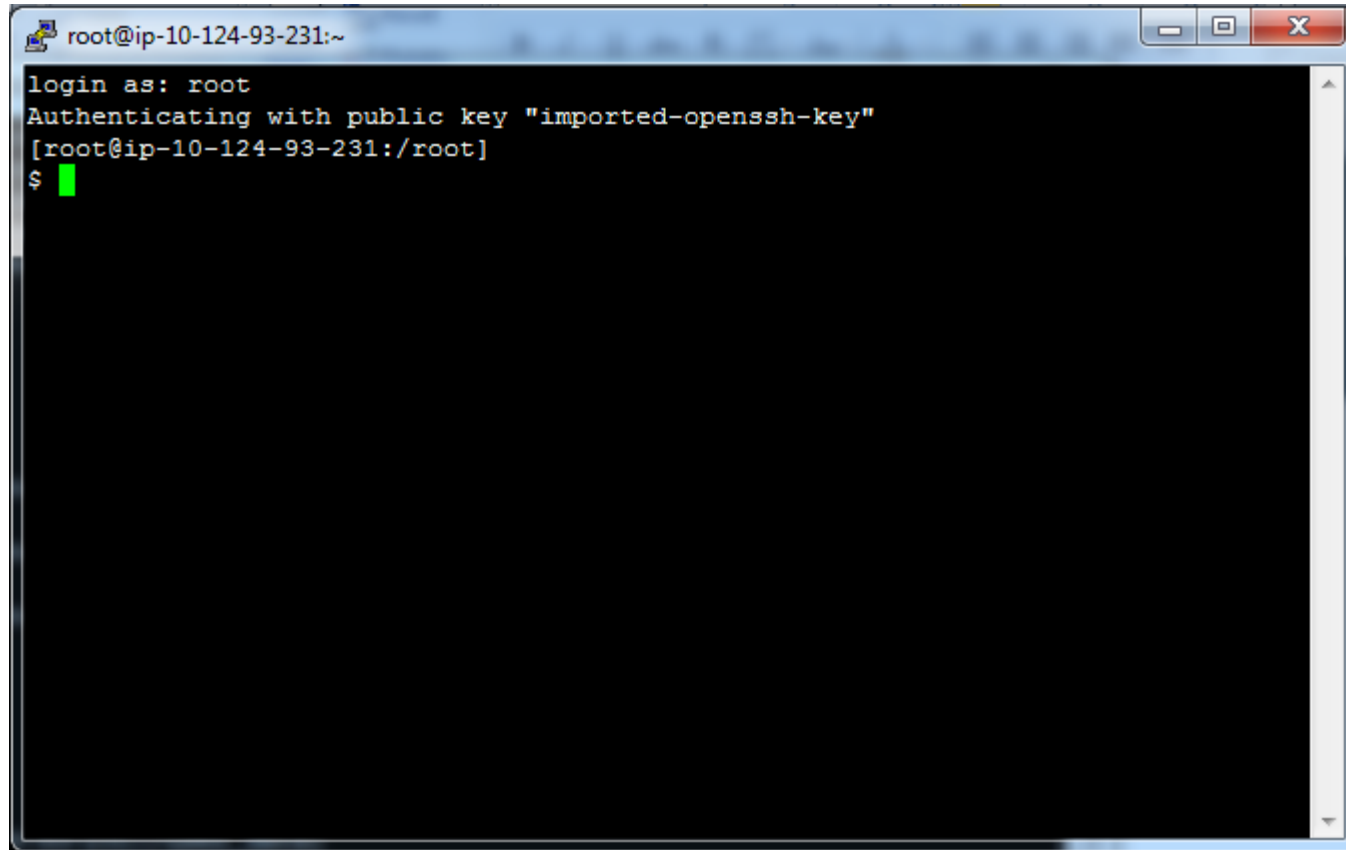
Putty



...and connect



Tada!!



```
root@ip-10-124-93-231:~  
login as: root  
Authenticating with public key "imported-openssh-key"  
[root@ip-10-124-93-231:/root]  
$ █
```

Now what?

- Customize the image
 - Install software
 - Download patches
 - Pre-configure entire environments
- Once you have it the way you want it, take a snapshot

Snapshots and Custom AMI Creation

- Anything you change in the instance will be lost on termination
- Create your own AMI from the running instance to save your custom image
 - AMI will appear in your console as a private image
- Start that image next time

Snapshots and Custom AMI Creation

The screenshot displays the AWS Management Console interface for Amazon EC2. The navigation pane on the left shows the 'INSTANCES' section selected. The main content area shows a table of instances with one instance selected. The context menu for the instance is open, highlighting the 'Create Image (EBS AMI)' option. A yellow arrow points to this option, and another yellow arrow points to the 'AMI ID' column header in the table.

Name	Instance	AMI ID	Platform	Type	Status	Public DN	Security G	Key Pair N	Kernel ID
empty	i-91847df2	ami-39529d50			running	ec2-50-17-6...	Open	Paul_Cent...	aki-f006f399

1 EC2 Instance selected.

EC2 Instance: i-91847df2

Description | Monitoring | Tags

AMI:	Loading ami-39529d50...	Zone:	us-east-1a
Security Groups:	Open	Type:	m1.large
Status:	running	Owner:	493411239207

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https://console.aws.amazon.com/ec2/home?region=us-east-1#

Bonus Material

- For the adventurous: add some disks
 - Must be in same zone as your image
 - Right-click – Attach to attach to your instance

The screenshot shows the AWS Management Console interface for the Amazon EC2 service. The main content area displays the 'EBS Volumes' page. A yellow arrow points to the 'Attach Volume' button in the top toolbar. Below the toolbar is a table of EBS volumes. A second yellow arrow points to the 'Zone' column in the table, which shows 'us-east-1a' for all listed volumes.

Name	Volume ID	Capacity	Snapshot	Created	Zone	Status	Attachment Information
	vol-19312273	10 GiB	snap-f7789d95	2011-10-26T18:22:12.000Z	us-east-1a	in-use	i-91847df2:/dev/sda1 (attached)
	vol-71cdde1b	10 GiB	--	2011-10-26T19:40:11.000Z	us-east-1a	in-use	i-91847df2:/dev/sdf (attached)
	vol-4dcdde27	10 GiB	--	2011-10-26T19:40:19.000Z	us-east-1a	in-use	i-91847df2:/dev/sdg (attached)
	vol-23cdde49	10 GiB	--	2011-10-26T19:40:25.000Z	us-east-1a	in-use	i-91847df2:/dev/sdh (attached)
	vol-39cdde53	10 GiB	--	2011-10-26T19:40:32.000Z	us-east-1a	in-use	i-91847df2:/dev/sdi (attached)

Adding Disks

- Disks show up as `/dev/sdf`, `/dev/sdg` etc based on how you named them in the AWS console
- Use `mdadm` command to create striped volume

```
$ mdadm --create /dev/md1 --level 0 --raid-devices 4  
  -c 2048 /dev/sdf /dev/sdg /dev/sdh /dev/sdi  
$ mkfs -t ext3 /dev/md1  
$ mount /dev/md1 /db
```

Ephemeral Disks

- m1.Large includes ephemeral (temporary) disk space if you want it
 - 2 X 450 Gb
 - Cannot use it through AWS Console
 - Need to use the API:

```
$ ec2rsi ami-f99c5390 -p 0.25 -n 1 -k  
Paul_Centos_Key_1 -t m1.large -b  
/dev/sdb=ephemeral0 -b /dev/sdc=ephemeral1
```

- NB: `ec2rsi` = *Request Spot Instance*

Some Comparison Benchmarks

- Simple comparisons using prostrct create
 - 20 Gb void structure
- Micro and large instance
- Ephemeral and EBS storage
- Striped or not

Benchmark #1

■ Micro + Ephemeral disks

Formatting extents:

size	area name	path name	
8	Primary Recovery Area	/dbl/atm_big.b1	00:00:00
16	Schema Area	/dbl/atm_big.d1	00:00:00
500000	atm	/dbl/atm_big_7.d1	00:00:51
500000	atm	/dbl/atm_big_7.d2	00:01:06
500000	atm	/dbl/atm_big_7.d3	00:01:11
500000	atm	/dbl/atm_big_7.d4	00:01:21
500000	atm	/dbl/atm_big_7.d5	00:01:13
512	atm	/dbl/atm_big_7.d6	00:00:01
500000	atm2	/dbl/atm_big_8.d1	00:01:09
500000	atm2	/dbl/atm_big_8.d2	00:02:46
500000	atm2	/dbl/atm_big_8.d3	00:03:34
500000	atm2	/dbl/atm_big_8.d4	00:03:35
500000	atm2	/dbl/atm_big_8.d5	00:03:35
512	atm2	/dbl/atm_big_8.d6	00:00:02

real 20m49.771s

user 0m7.761s

sys 0m21.476s

Benchmark #2

- Micro + Single EBS Volume

```
real    18m49.924s
user    0m6.18s
sys     0m17.404s
```


Benchmark #3

- Large + ephemeral

```
real    6m40.553s
user    0m9.969s
sys     0m31.751s
```

Benchmark #4

- Large + Single EBS Volume

```
real    9m0.712s
user    0m10.220s
sys     0m30.635s
```

Benchmark #5

- Large + stripe on two ephemeral

```
real    6m43.462s
user    0m10.361s
sys     0m25.690s
```

Benchmark #6

- Large + stripe on four EBS volumes

```
real    5m01.647s
user    0m10.835s
sys     0m26.873s
```

Benchmark Comparison

- Micro versus large with ephemeral
 - 20:49 min versus 6:40
- Large ephemeral versus large + EBS stripe
 - 6:40 versus 5:01
- Definitely significant!

Time to Digest

- Hope you enjoyed this quick intro
- Other cloud presentations :
 - *Leveraging VMWare and EC2 API*
 - Gilles Querret
 - *The Cloud RIA Performance Race*
 - Frank Hilhorst

Questions?



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- ...and security of Progress-based systems

Credits

Thanks!

