Introduction to Amazon AWS Development Environment

Robert Chen
Computational Science & Engineering
Georgia Institute of Technology

Intro

- Need a standard environment for development
- Amazon AWS - a popular service
  - web hosting
  - storage

Getting Started

Getting Started

- Visit aws.amazon.com
- make an account
- enter information
- need a **credit card**
- select the **basic(free)** tier
  - 750 hours/month of t1.micro instance
  - 5GB of S3 storage
  - 750 hours/month of database RDS

Contact Information ✓ — Payment Information — Identity Verification — Support Plan — Confirmation

Payment Information

Please enter your payment information below. You will be able to try a broad set of AWS products for free via the Free Usage Tier. We will only bill your credit card for usage that is not covered by our Free Usage Tier.

AWS Free Usage Tier *free for 1 year*	Compute Amazon EC2	Storage Amazon S3	Database Amazon RDS
	750hrs/month*	5GB	750hrs/month*

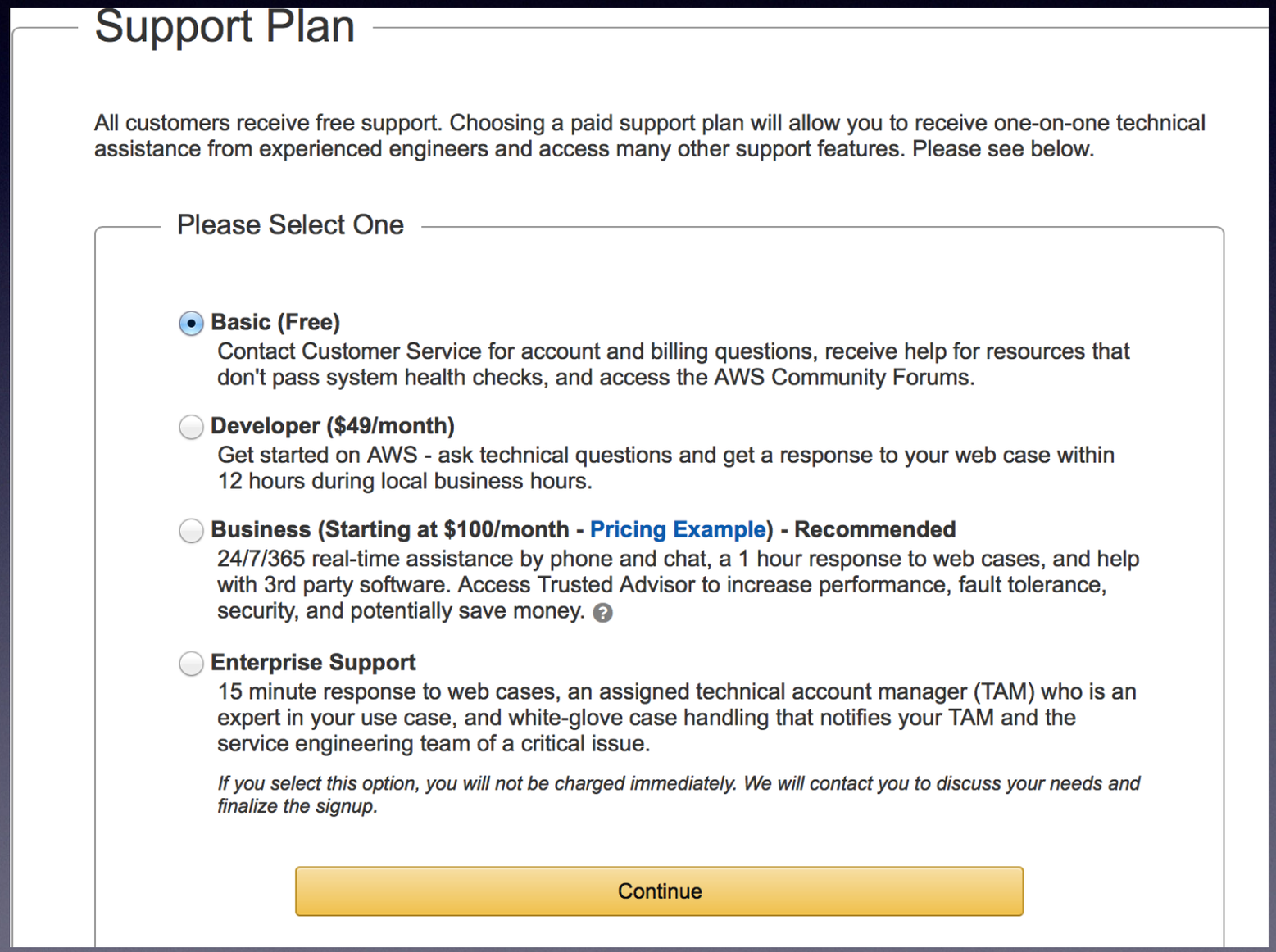
*View full offer details »

Credit Card Number

Expiration Date 01 2014

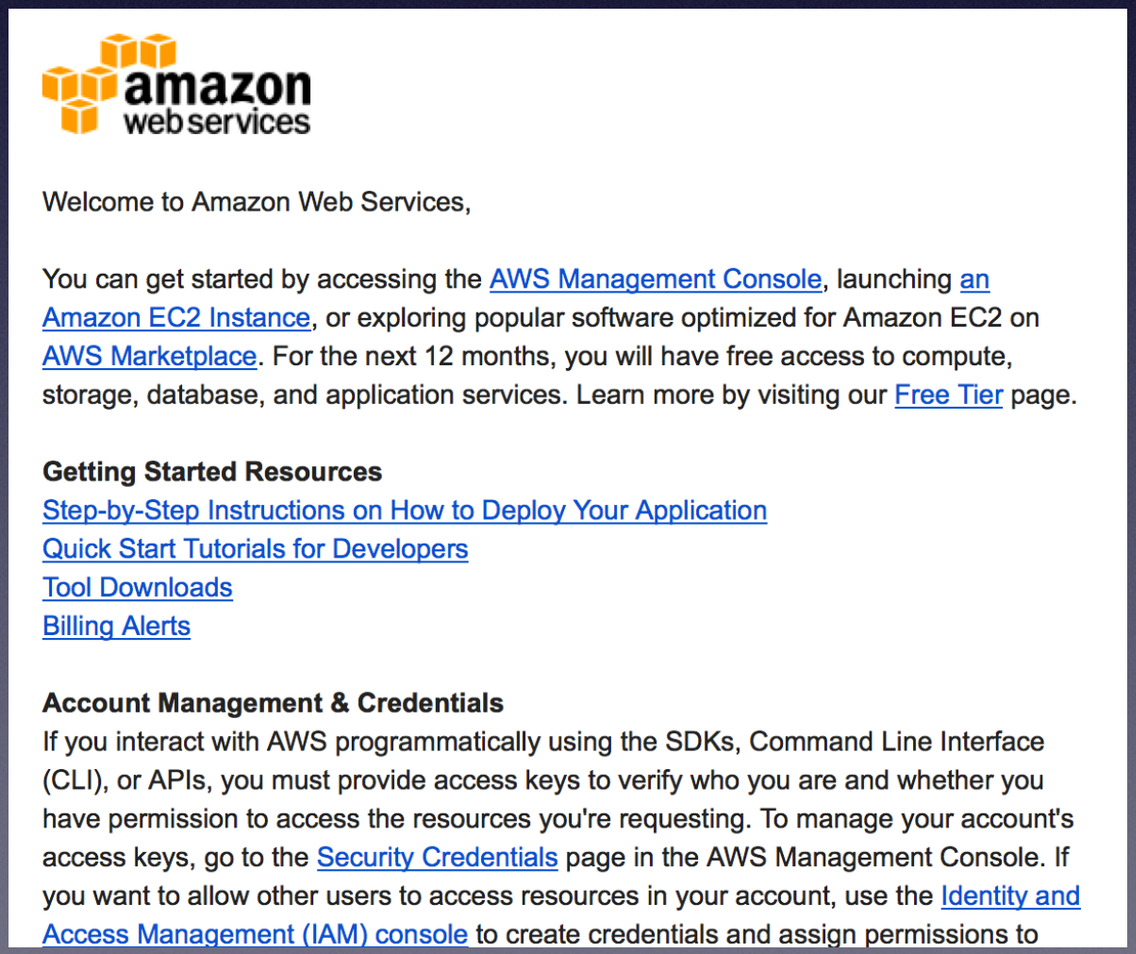
Cardholder's Name

Getting started



Signup confirmation

- you should receive a confirmation email



amazon web services

Welcome to Amazon Web Services,

You can get started by accessing the AWS Management Console, launching an Amazon EC2 Instance, or exploring popular software optimized for Amazon EC2 on AWS Marketplace. For the next 12 months, you will have free access to compute, storage, database, and application services. Learn more by visiting our Free Tier page.

Getting Started Resources
Step-by-Step Instructions on How to Deploy Your Application
Quick Start Tutorials for Developers
Tool Downloads
Billing Alerts

Account Management & Credentials
If you interact with AWS programmatically using the SDKs, Command Line Interface (CLI), or APIs, you must provide access keys to verify who you are and whether you have permission to access the resources you're requesting. To manage your account's access keys, go to the Security Credentials page in the AWS Management Console. If you want to allow other users to access resources in your account, use the Identity and Access Management (IAM) console to create credentials and assign permissions to

Go to EC2 dashboard

Console Home

Web Services

Compute & Networking

Direct Connect
Dedicated Network Connection to AWS

EC2
Virtual Servers in the Cloud

Route 53
Scalable Domain Name System

VPC
Isolated Cloud Resources

Storage & Content Delivery

CloudFront
Global Content Delivery Network

Glacier
Archive Storage in the Cloud

S3
Scalable Storage in the Cloud

Storage Gateway
Integrates On-Premises IT Environments with Cloud Storage

Database

DynamoDB
Predictable and Scalable NoSQL Data Store

ElastiCache
In-Memory Cache

RDS
Managed Relational Database Service

Redshift
Managed Petabyte-Scale Data Warehouse Service

Deployment & Management

CloudFormation
Templated AWS Resource Creation

CloudTrail
User Activity and Change Tracking

CloudWatch
Resource and Application Monitoring

Elastic Beanstalk
AWS Application Container

IAM
Secure AWS Access Control

OpsWorks
DevOps Application Management Service

Trusted Advisor
AWS Cloud Optimization Expert

Analytics

Data Pipeline
Orchestration for Data-Driven Workflows

Elastic MapReduce
Managed Hadoop Framework

Kinesis
Real-time Processing of Streaming Big Data

Mobile Services

Cognito
User Identity and App Data Synchronization

Mobile Analytics
Understand App Usage Data at Scale

SNS
Push Notification Service

App Services

AppStream
Low Latency Application Streaming

CloudSearch
Managed Search Service

Elastic Transcoder
Easy-to-use Scalable Media Transcoding

SES
Email Sending Service

SQS
Message Queue Service

SWF
Workflow Service for Coordinating Application Components

Applications

WorkSpaces
Desktops in the Cloud

Zocalo
Secure Enterprise Storage and Sharing Service

Additional Resources

Getting Started
See our documentation to get started and learn more about how to use our services.

AWS Console Mobile App
View your resources on the go with our AWS Console mobile app, available from Amazon Appstore, Google Play, or iTunes.

AWS Marketplace
Find and buy software, launch with 1-Click and pay by the hour.

Service Health

All services operating normally.

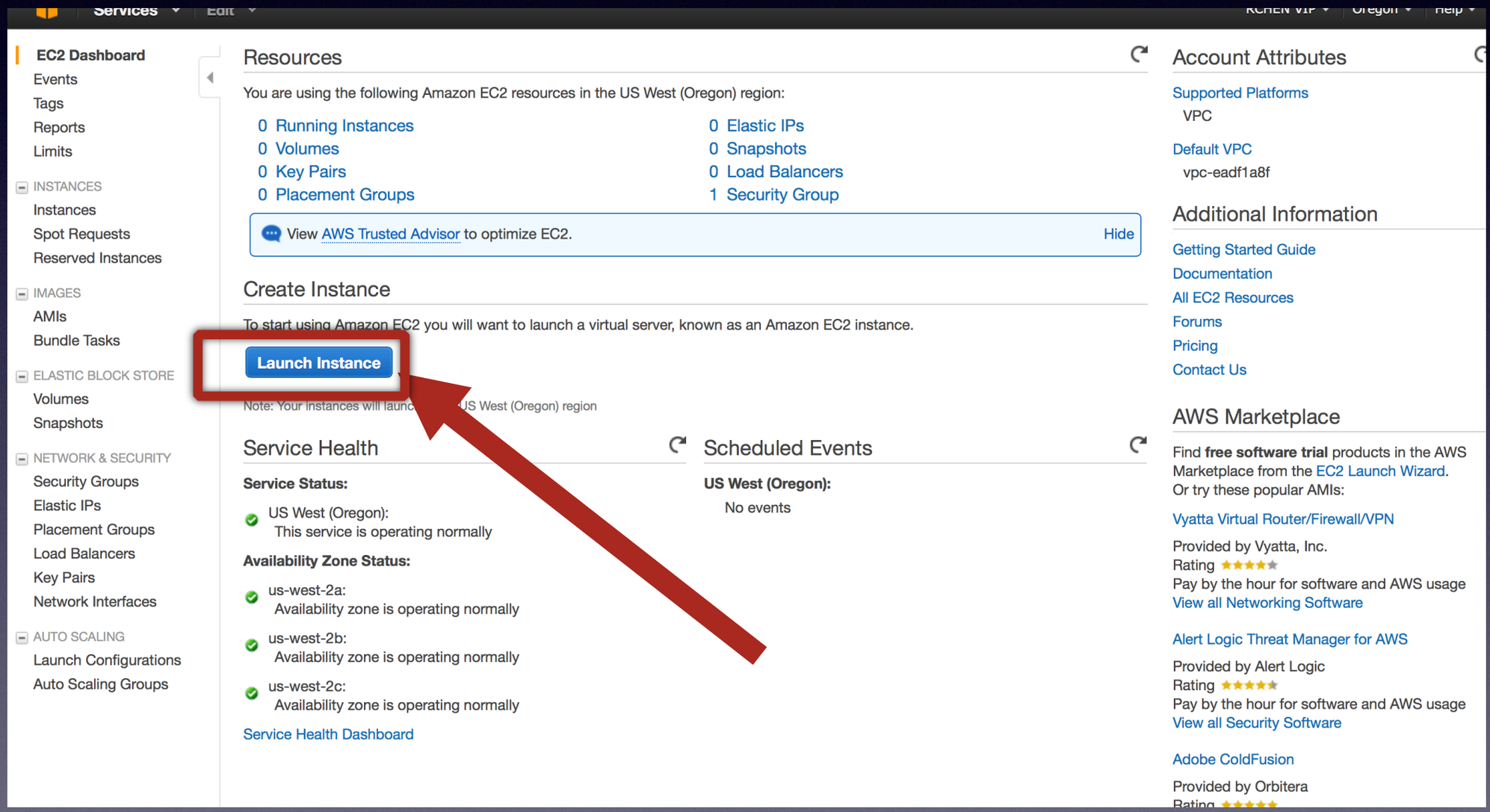
Updated: Aug 18 2014 01:10:00 GMT-0400

Service Health Dashboard

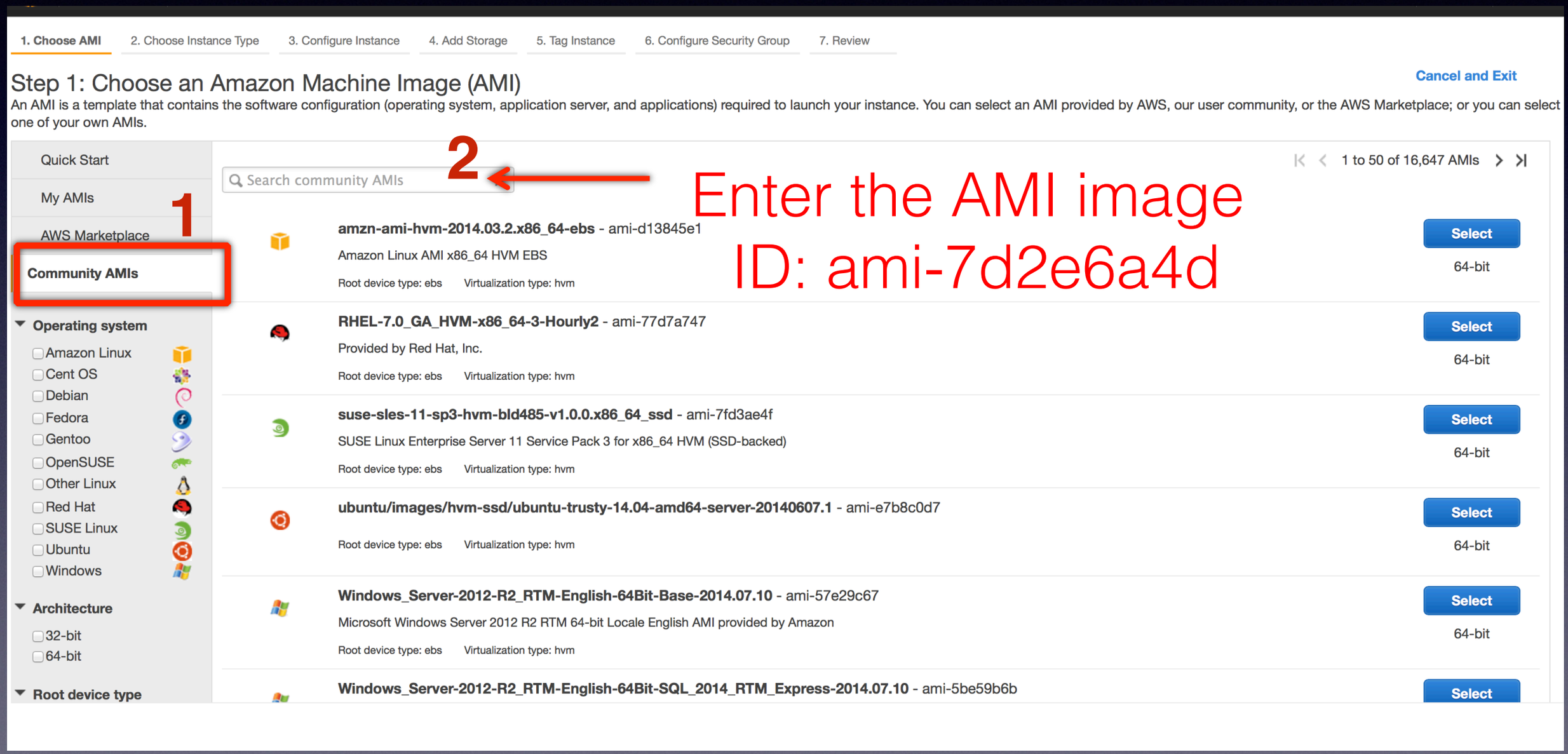
Set Start Page

Console Home

Launch Instance



Load the Image for the class



Select the t2.micro, click Review and Launch

1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Tag Instance | 6. Configure Security Group | 7. Review

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: All instance types | Current generation | Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

1

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
☑	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
☐	General purpose	t2.small	1	2	EBS only	-	Low to Moderate
☐	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
☐	General purpose	m3.medium	1	3.75	1 x 4 (SSD)	-	Moderate
☐	General purpose	m3.large	2	7.5	1 x 32 (SSD)	-	Moderate
☐	General purpose	m3.xlarge	4	15	2 x 40 (SSD)	Yes	High
☐	General purpose	m3.2xlarge	8	30	2 x 80 (SSD)	Yes	High
☐	Compute optimized	c3.large	2	3.75	2 x 16 (SSD)	-	Moderate
☐	Compute optimized	c3.xlarge	4	7.5	2 x 40 (SSD)	Yes	Moderate
☐	Compute optimized	c3.2xlarge	8	15	2 x 80 (SSD)	Yes	High

2

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

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	En
Root	/dev/sda1	snap-5ebe82aa	8	General Purpose (SSD)	24 / 3000	☑	No

1

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD
and usage restrictions.
lity

Increase the size to 15GiB.
(max 30 GiB)

2

Cancel | Previous | Review and Launch | Next: Tag Instance

Modify the 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 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 name: launch-wizard-5

Description: launch-wizard-5 created 2014-08-19T14:30:02.613-04:00

Type	Protocol	Port Range	
SSH	TCP	22	
HTTP	TCP	80	
MYSQL	TCP	3306	
Custom TCP Rule	TCP	5432	Anywhere
Custom TCP Rule	TCP	27017	Anywhere

Add Rule

1

Open the following 4 TCP ports

PostgreSQL

MongoDB

2

Cancel Previous Review and Launch

Click Launch

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 instance's security. Your security group, launch-wizard-1, is open to the world.

Your instance 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

Ubuntu Server 14.04 LTS (HVM), SSD Volume Type - ami-e7b8c0d7

Free tier eligible

Ubuntu Server 14.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).

Root Device Type: ebs Virtualization type: hvm

Instance Type

Edit instance type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	Variable	1	1	EBS only	-	Low to Moderate

Security Groups

Edit security groups

Security group name launch-wizard-1
Description launch-wizard-1 created 2014-08-19T01:13:50.194-04:00

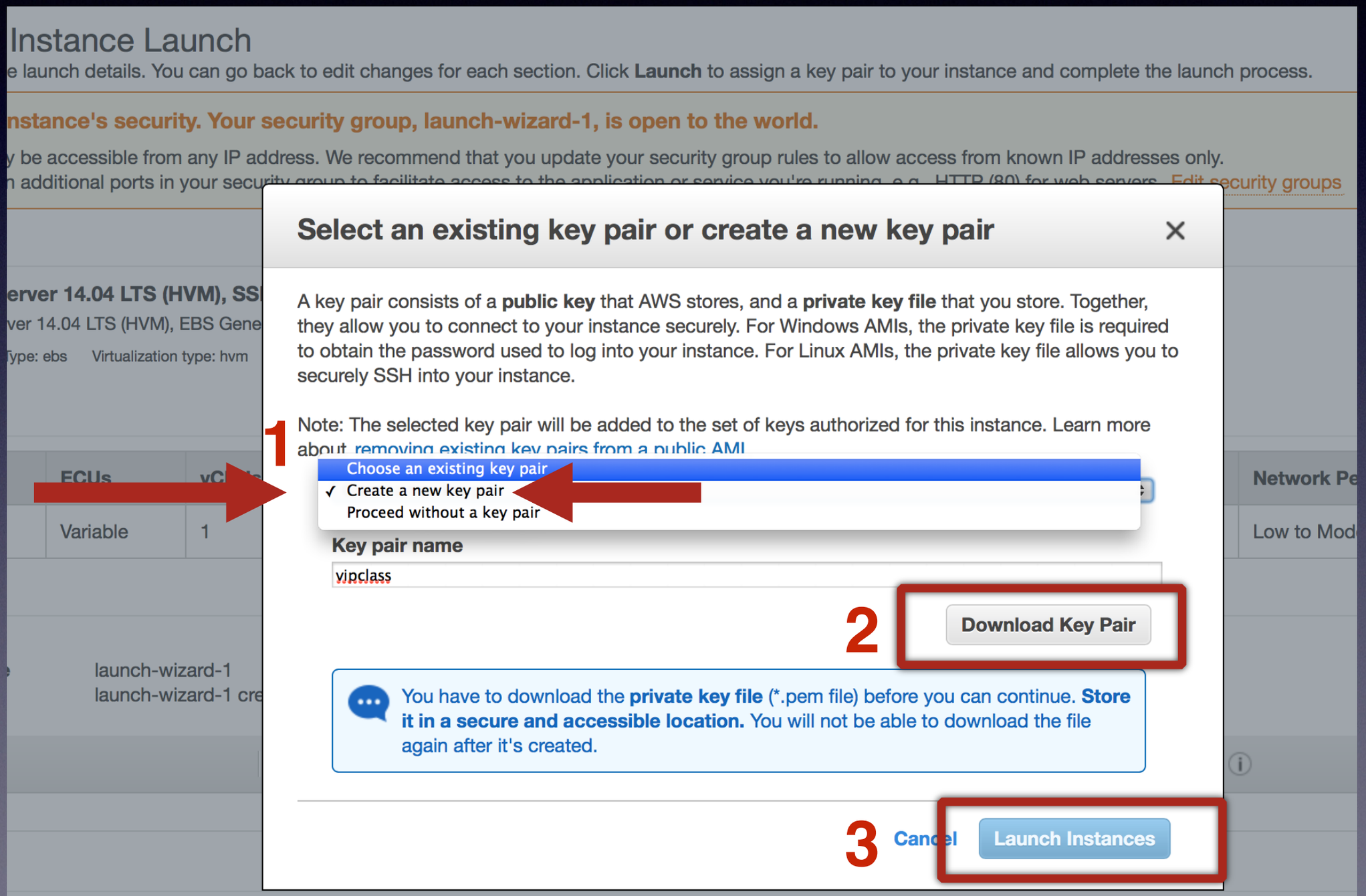
Type	Protocol	Port Range	Source
SSH	TCP	22	0.0.0.0/0

Instance Details

Edit ce details

Cancel Previous Launch

Create a NEW public + private key pair; name the key pair; download the key pair and save it; then press Launch Instances



click View Instances

Launch Status

Your instance is now launching

The following instance launch has been initiated: i-b32568be View launch log

Get notified of estimated charges

Create billing alerts to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed 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.

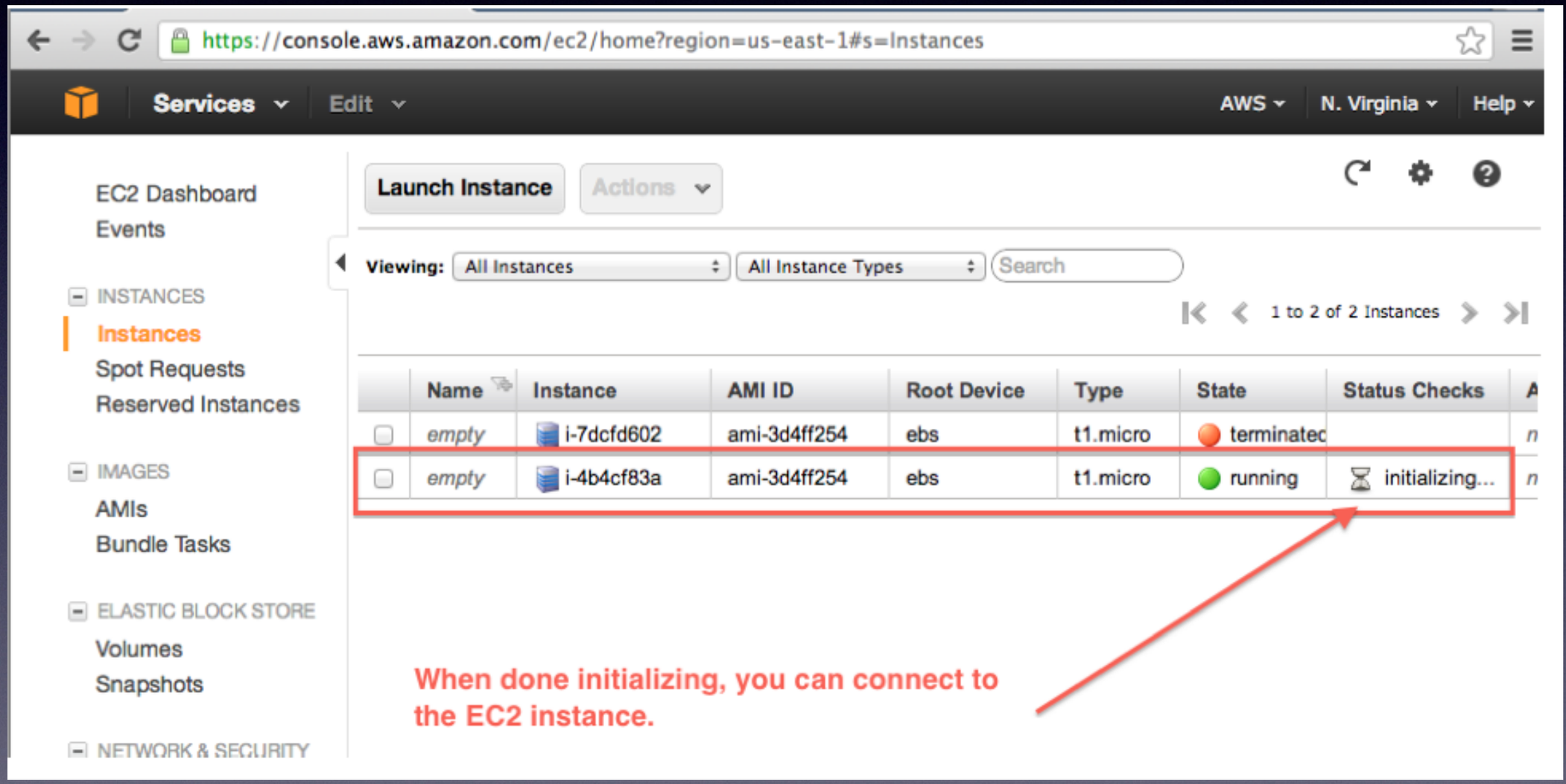
Here are some helpful resources to get you started

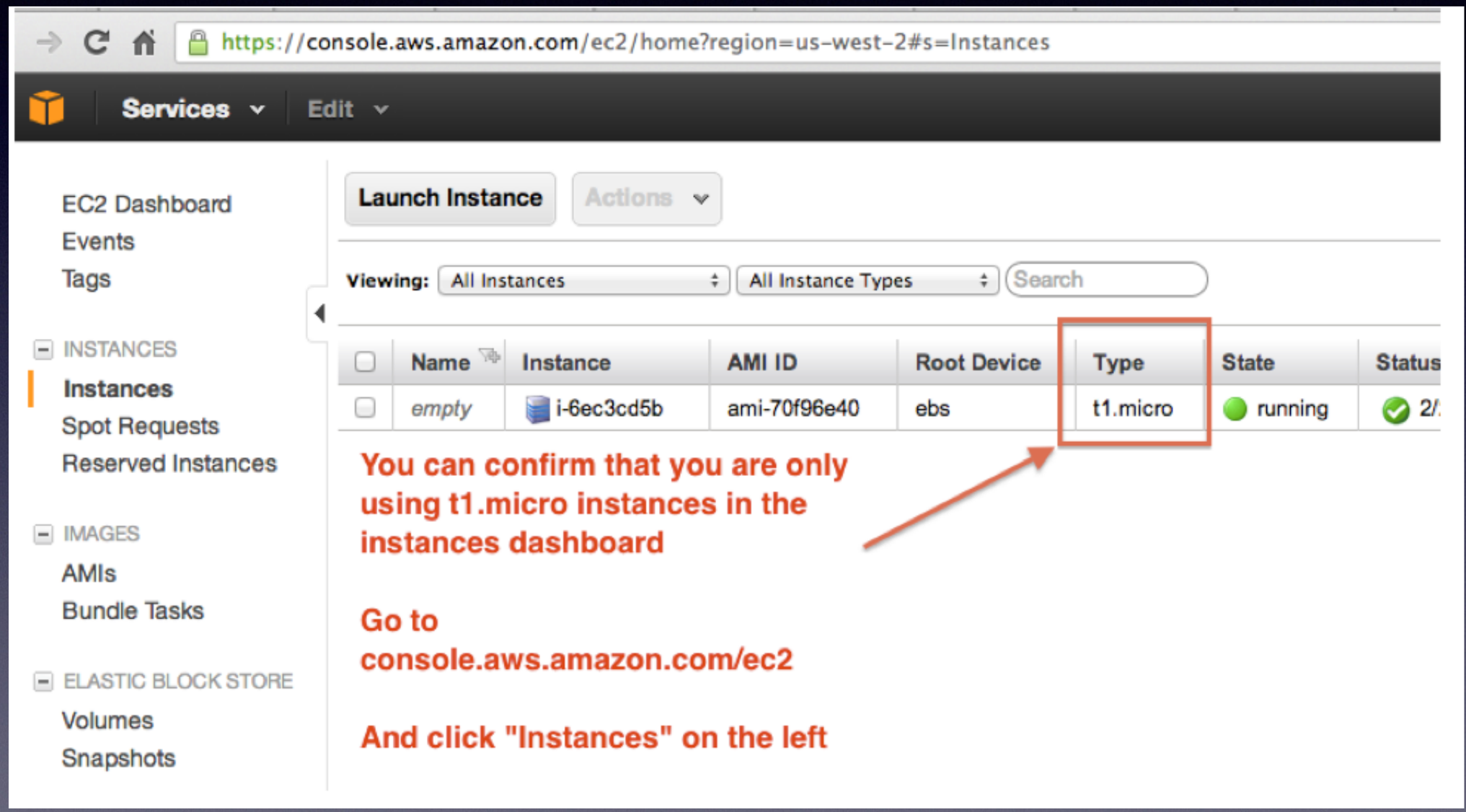
- How to connect to your Linux instance
- Learn about AWS Free Usage Tier
- Amazon EC2: User Guide
- Amazon EC2: Discussion Forum

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


https://console.aws.amazon.com/ec2/home?region=us-east-1#s=Instances
Services
Edit
AWS
N. Virginia
Help
EC2 Dashboard
Events
INSTANCES
Instances
Spot Requests
Reserved Instances
IMAGES
AMIs
Bundle Tasks
ELASTIC BLOCK STORE
Volumes
Snapshots
NETWORK & SECURITY
Launch Instance
Actions
Viewing: All Instances
All Instance Types
Search
1 to 2 of 2 Instances
Name
Instance
AMI ID
Root Device
Type
State
Status Checks
empty
i-7dcfd602
ami-3d4ff254
ebs
t1.micro
terminated
empty
i-4b4cf83a
ami-3d4ff254
ebs
t1.micro
running
initializing...
When done initializing, you can connect to the EC2 instance.

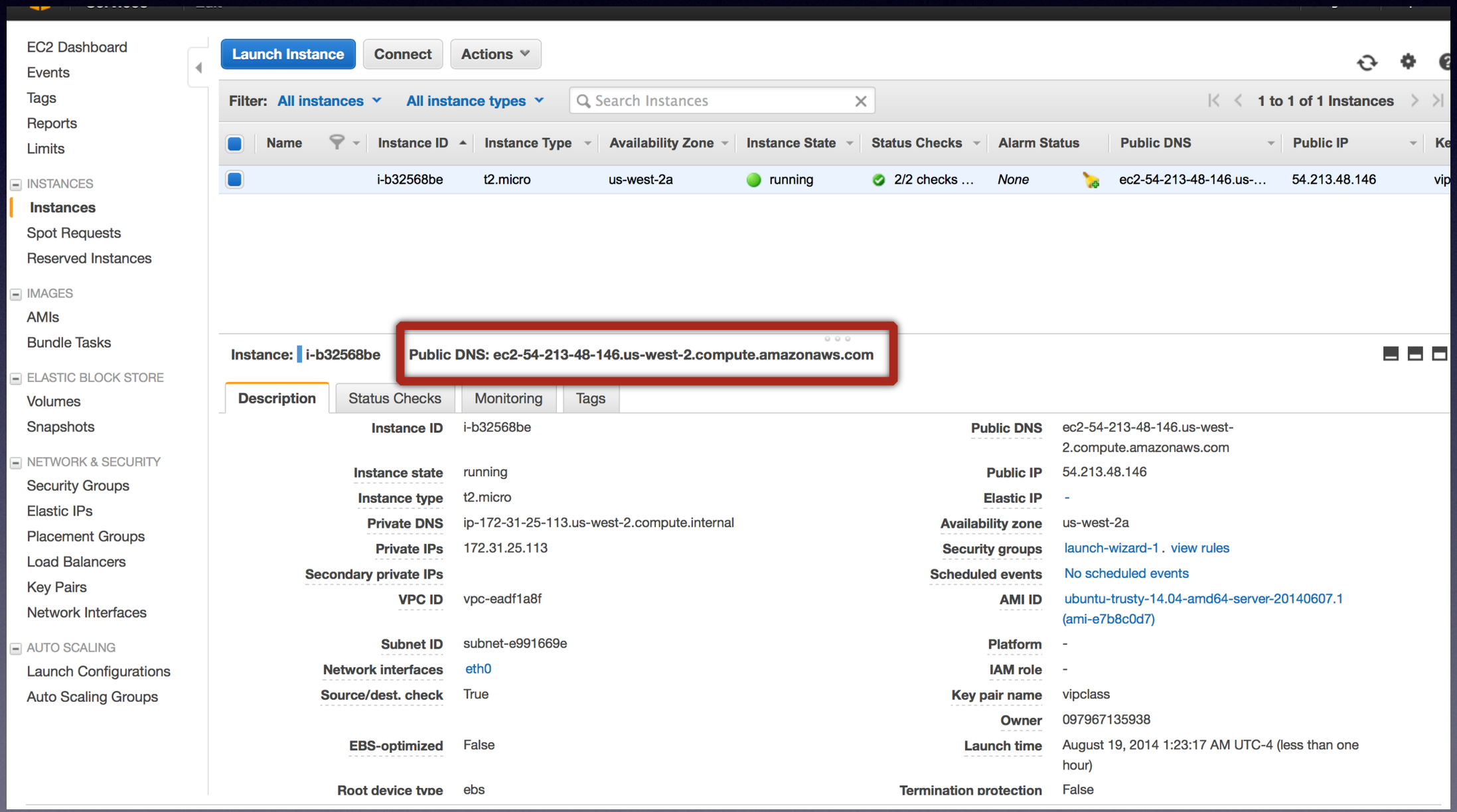

https://console.aws.amazon.com/ec2/home?region=us-west-2#s=Instances
Services
Edit
EC2 Dashboard
Events
Tags
INSTANCES
Instances
Spot Requests
Reserved Instances
IMAGES
AMIs
Bundle Tasks
ELASTIC BLOCK STORE
Volumes
Snapshots
Launch Instance
Actions
Viewing:
All Instances
All Instance Types
Search
Name
Instance
AMI ID
Root Device
Type
State
Status
empty
i-6ec3cd5b
ami-70f96e40
ebs
t1.micro
running
You can confirm that you are only using t1.micro instances in the instances dashboard
Go to console.aws.amazon.com/ec2
And click "Instances" on the left

Software preloaded into the instance

1. Databases (MongoDB, PostgreSQL, MySQL)
2. Python (numpy, scipy, MySQLdb, pymongo)
3. PHP
4. Git/Mercurial
5. Text editors (vi and emacs)
6. Apache web server
7. DB example connection script for MySQL and MongoDB (/var/www/html)

How to connect to your EC2 instance (Mac OS terminal)

find the public DNS



Open up terminal, change permissions for public key, and use it to SSH into the EC2 instance

```
[localadmin@Administrators-MacBook-Pro:~]$cd ~/Downloads
[localadmin@Administrators-MacBook-Pro:~/Downloads]$chmod 400 vipclass.pem
[localadmin@Administrators-MacBook-Pro:~/Downloads]$ssh -i vipclass.pem ubuntu@ec2-54-213-48-146.us-west-2.compute.amazonaws.com
Welcome to Ubuntu 14.04 LTS (GNU/Linux 3.13.0-29-generic x86_64)

 * Documentation:  https://help.ubuntu.com/

  System information as of Tue Aug 19 05:32:06 UTC 2014

  System load:  0.0               Processes:           98
  Usage of /:   9.7% of 7.74GB   Users logged in:     0
  Memory usage: 6%                IP address for eth0: 172.31.25.113
  Swap usage:   0%

  Graph this data and manage this system at:
    https://landscape.canonical.com/

  Get cloud support with Ubuntu Advantage Cloud Guest:
    http://www.ubuntu.com/business/services/cloud

0 packages can be updated.
0 updates are security updates.


Last login: Tue Aug 19 05:32:10 2014 from c-67-191-153-35.hsd1.ga.comcast.net
ubuntu@ip-172-31-25-113:~$
```

(optional) setup SSH config

```
[localadmin@Administrators-MacBook-Pro:~]$mkdir -p ~/.ssh
[localadmin@Administrators-MacBook-Pro:~]$cp ~/Downloads/vipclass.pem ~/.ssh/
[localadmin@Administrators-MacBook-Pro:~]$chmod 400 ~/.ssh/vipclass.pem
[localadmin@Administrators-MacBook-Pro:~]$chmod 700 ~/.ssh/
[localadmin@Administrators-MacBook-Pro:~]$nano ~/.ssh/config # edit the file as shown below
[localadmin@Administrators-MacBook-Pro:~]$cat ~/.ssh/config
Host aws_vipclass
HostName ec2-54-213-48-146.us-west-2.compute.amazonaws.com
User ubuntu
IdentityFile "~/.ssh/vipclass.pem"
[localadmin@Administrators-MacBook-Pro:~]$
```

Setting up Git / Bitbucket

Bitbucket

- Code is hosted in repositories at bitbucket.org. There will be one repository for each of the 3 projects in the class.

- At this point, make sure you have a bitbucket account.

- If not, signup for bitbucket ASAP, and email the TAs your username.

Git

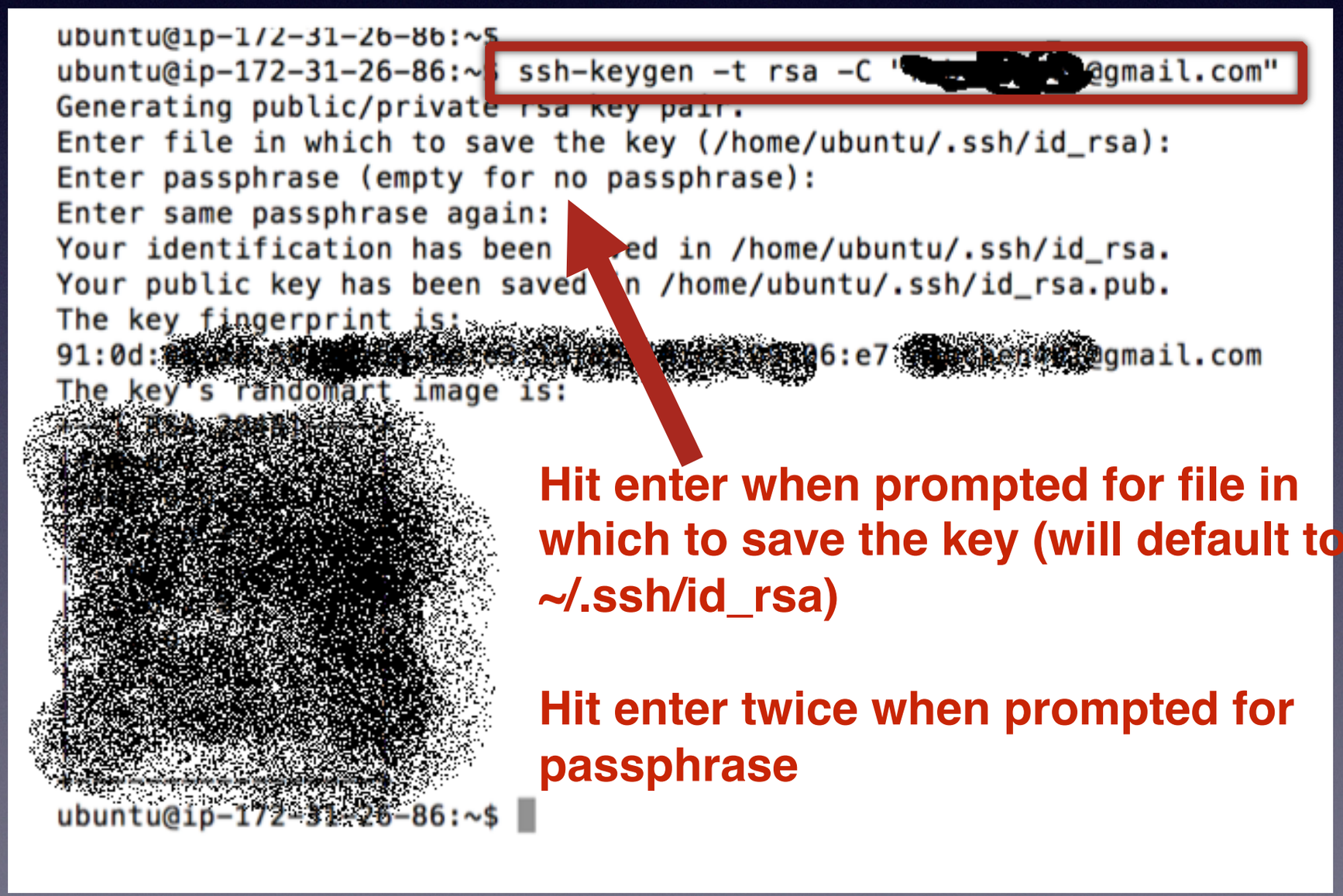
- Git is a version control system.
- We use Git to push code to the Bitbucket repository.
- You will connect your Bitbucket username to Git
- You will track your progress in the class (and you will be evaluated) based upon your commits to the Bitbucket project repositories

Git setup - username/email for your EC2

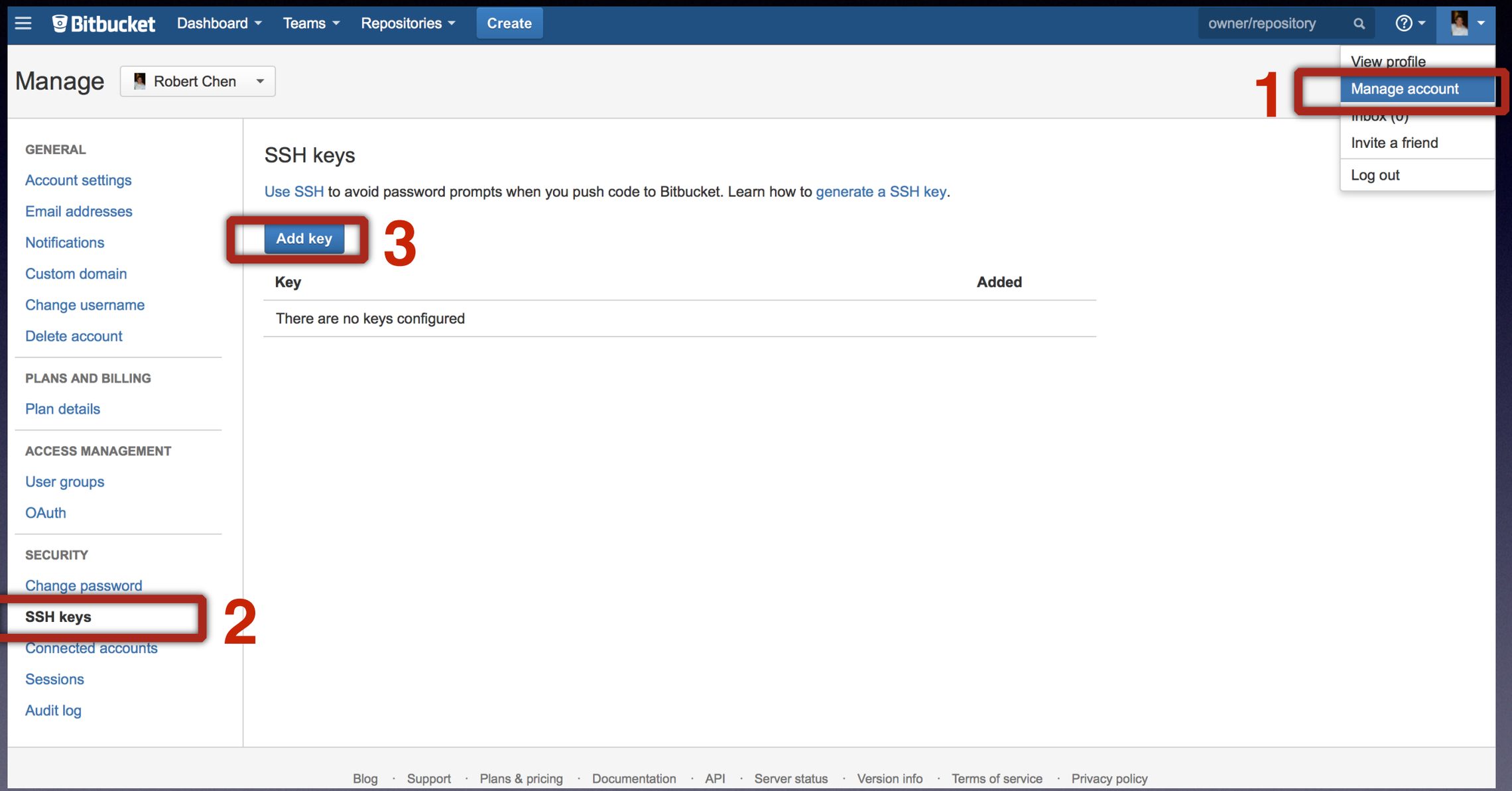
```
ubuntu@ip-172-31-26-86:~$ git config --global user.name "Robert Chen"
ubuntu@ip-172-31-26-86:~$ git config --global user.email [redacted]@gmail.com
ubuntu@ip-172-31-26-86:~$ git config user.name
Robert Chen
ubuntu@ip-172-31-26-86:~$ git config user.email
[redacted]gmail.com
ubuntu@ip-172-31-26-86:~$
```

Git setup - SSH key

- Now, we will generate an ssh-key pair on the EC2 machine
- Do the following, from your HOME directory (~/)



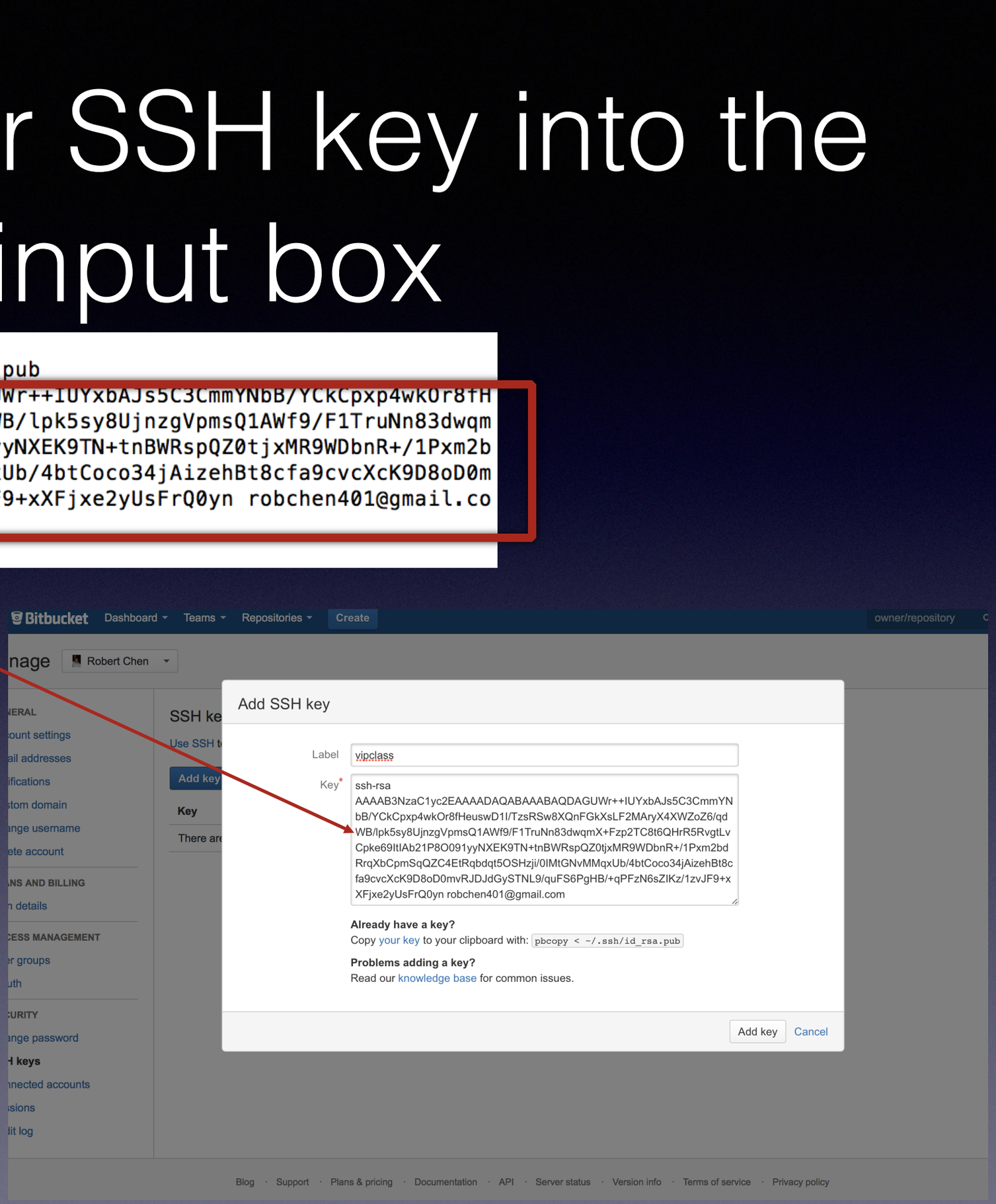
In Bitbucket, add SSH key



Copy your SSH key into the input box

```
ubuntu@ip-172-31-26-86:~$ cd ~/.ssh
ubuntu@ip-172-31-26-86:~/.ssh$ cat id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDAGUWr++IUYxbAJs5C3CmmYNbB/YCkCpxp4wkOr8fH
euswD1I/TzsRSw8XQnFGkXsLF2MAryX4XWZoZ6/qdWB/lpk5sy8UjnzgVpmsQ1AWf9/F1TruNn83dwqm
X+Fzp2TC8t6QHrR5RvgtLvCpke69ItIAb21P8O091yyNXEK9TN+tnBWRspQZ0tjxMR9WDbnR+/1Pxm2b
dRrqXbCpmSqQZC4EtRqbdqt5OSHzji/0IMtGNvMMqxUb/4btCoco34jAizehBt8cfa9cvcXcK9D8oD0m
vRJDJdGySTNL9/quFS6PgHB/+qPFzN6sZIKz/1zvJF9+xXFjxe2yUsFrQ0yn robchen401@gmail.co
m
ubuntu@ip-172-31-26-86:~/.ssh$
```

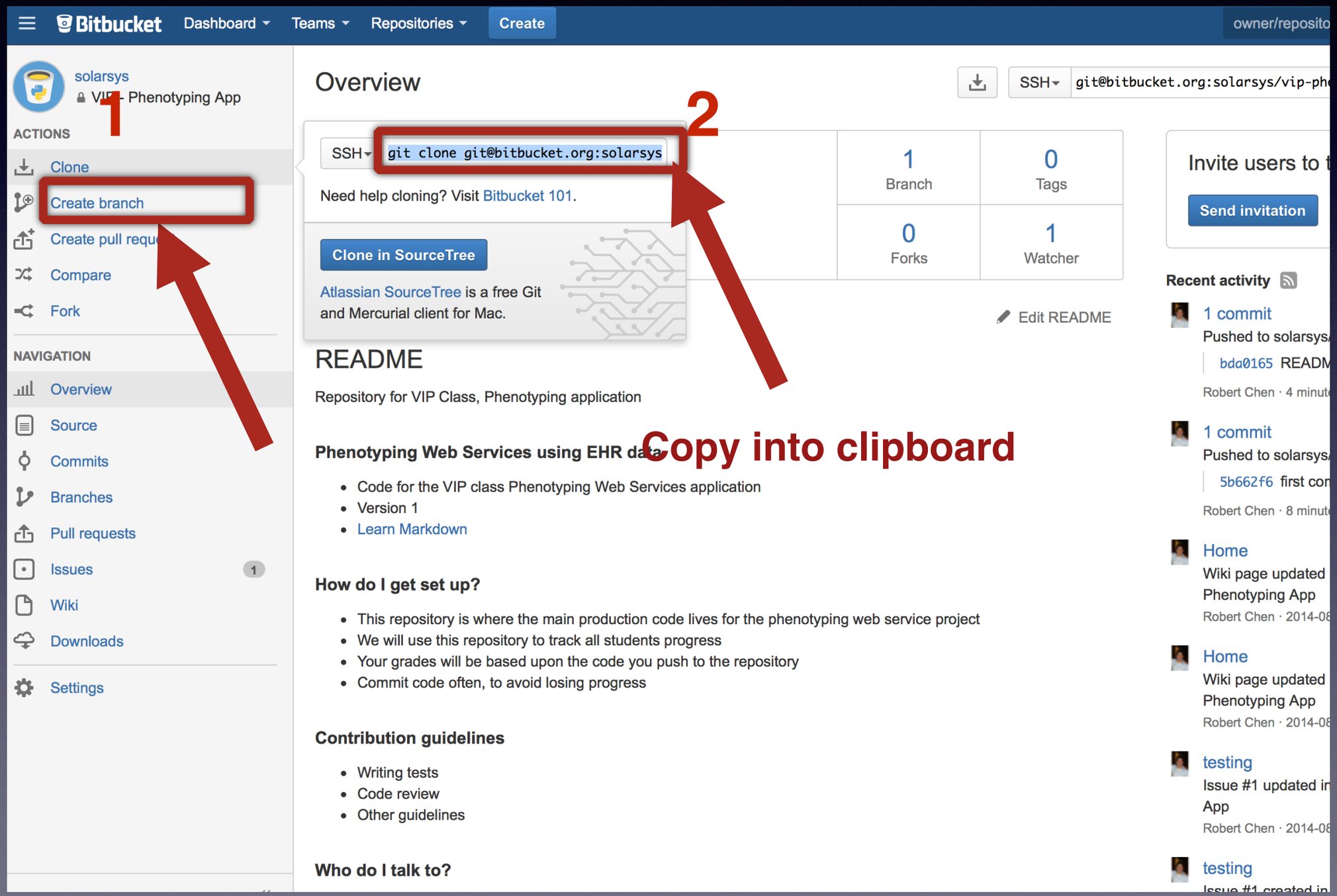
COPY INTO THE “Key” box!



First Checkpoint —

check code to your project’s repository

Clone the repository for your project



Clone repository - into home directory of your EC2 instance

```
ubuntu@ip-172-31-26-86:~$ cd
ubuntu@ip-172-31-26-86:~$ git clone git@bitbucket.org:solarsys/vip-phenotyping-app.git
Cloning into 'vip-phenotyping-app'...
Warning: Permanently added the RSA host key for IP address '131.103.20.168' to the list of known hosts.
remote: Counting objects: 10, done.
remote: Compressing objects: 100% (7/7), done.
remote: Total 10 (delta 1), reused 0 (delta 0)
Receiving objects: 100% (10/10), done.
Resolving deltas: 100% (1/1), done.
Checking connectivity... done.
ubuntu@ip-172-31-26-86:~$
```

Go to the team_members/ folder, make a file with your name and contact info.

```
ubuntu@ip-172-31-26-86:~$
ubuntu@ip-172-31-26-86:~$ cd vip-phenotyping-app/
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app$ cd team_members/
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app/team_members$ nano rchen.txt #create a file named <first initial><lastname>.txt, with format shown below
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app/team_members$ cat rchen.txt
Robert Chen
PhD student - CS
rchen87@gatech.edu
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app/team_members$
```

Then, do:

git add <files>
git commit -m “<description>”
git push <

Git Add, Commit, Push

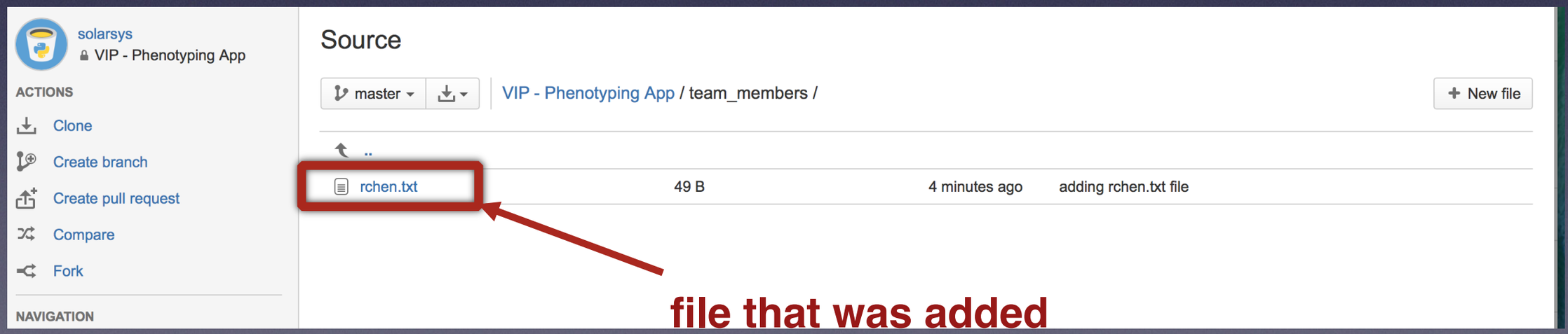
```
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app/team_members$ git add rchen.txt
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app/team_members$ git commit -m "adding rchen.txt file"
[master 1db9203] adding rchen.txt file
 1 file changed, 1 insertion(+), 1 deletion(-)
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app/team_members$ git push origin master
Counting objects: 10, done.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (8/8), 808 bytes | 0 bytes/s, done.
Total 8 (delta 0), reused 0 (delta 0)
To git@bitbucket.org:solarsys/vip-phenotyping-app.git
   235ad55..1db9203  master -> master
ubuntu@ip-172-31-26-86:~/vip-phenotyping-app/team_members$
```

add the file

write a message describing the commit

push code changes from the "master" (your machine) to the "origin" (the repository on bitbucket)

Changes shown on Bitbucket



file that was added