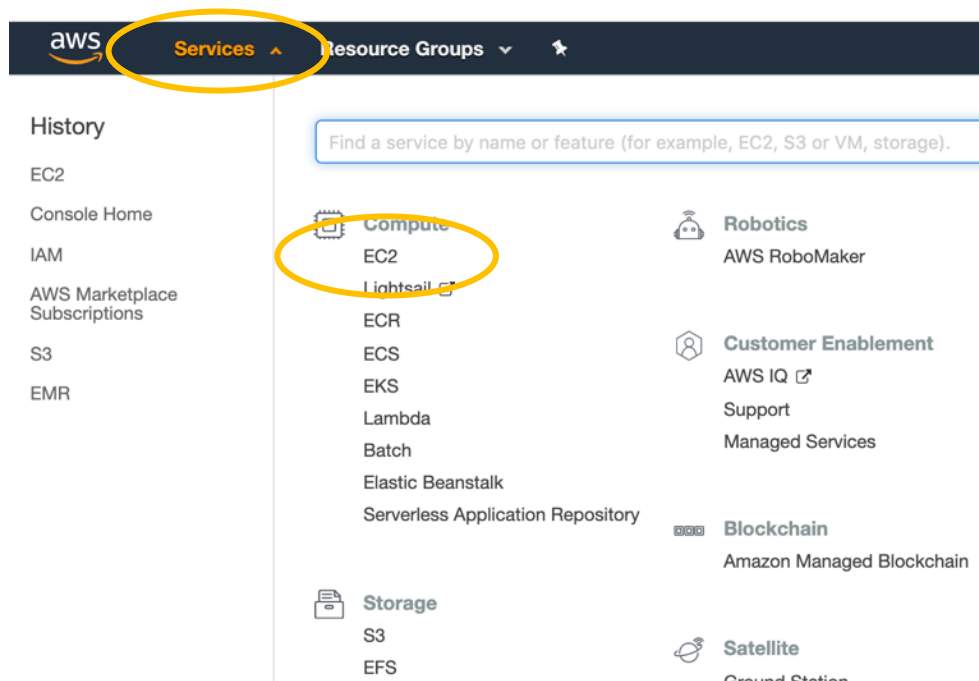


# Instructions for Installing and Configuring a Single Node Cassandra Database

The Cassandra database is installed and configured for production use onto a cluster of several virtual machines. For exploring the use of this technology on a small scale, however, it is possible to set it up to execute on a single virtual machine which is what these instructions describe. The installation proceeds in two phases: create a virtual machine and then install and start Cassandra.

## Section 1: Instructions for setting up an EC2 instance (virtual machine)

- 1) Select “Services” on the AWS console. Then select “EC2”



2) Launch a new EC2 instance by clicking on “Launch Instance”

The screenshot shows the AWS Management Console's EC2 Dashboard. On the left is a navigation menu with categories like INSTANCES, IMAGES, and ELASTIC BLOCK STORE. The main content area is titled 'Resources' and shows a summary of EC2 resources in the US East (N. Virginia) region: 0 Running Instances, 0 Dedicated Hosts, 0 Volumes, 2 Key Pairs, and 0 Placement Groups. Below this is a 'Create Instance' section with a blue 'Launch Instance' button circled in yellow. To the right of the button is a 'Migrate a I' section. At the bottom, there are sections for 'Service Health' and 'Scheduled' updates.

3) Select the Ubuntu 18.04 Amazon Machine Image (AMI)

The screenshot shows the 'Amazon Machine Image (AMI)' selection page. It lists several AMIs. The 'Ubuntu Server 18.04 LTS (HVM), SSD Volume Type' AMI is circled in yellow. Other visible AMIs include 'SUSE Linux Enterprise Server 15 SP1 (HVM), SSD Volume Type' and 'Ubuntu Server 16.04 LTS (HVM), SSD Volume Type'. Each AMI entry includes its name, ID, architecture, and a 'Select' button. There is also a promotional banner for Amazon RDS at the bottom.

## Select an instance (VM) type of m4.xlarge

### Step 2: Choose an Instance Type

<input type="checkbox"/>	General purpose	m5.4xlarge	16	64	EBS only	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.8xlarge	32	128	EBS only	Yes	10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.12xlarge	48	192	EBS only	Yes	10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.16xlarge	64	256	EBS only	Yes	20 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.24xlarge	96	384	EBS only	Yes	25 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.metal	96	384	EBS only	Yes	25 Gigabit	Yes
<input type="checkbox"/>	General purpose	m4.large	2	8	EBS only	Yes	Moderate	Yes
<input type="checkbox"/>	General purpose	m4.xlarge	4	16	EBS only	Yes	High	Yes
<input type="checkbox"/>	General purpose	m4.2xlarge	8	32	EBS only	Yes	High	Yes
<input type="checkbox"/>	General purpose	m4.4xlarge	16	64	EBS only	Yes	High	Yes
<input type="checkbox"/>	General purpose	m4.10xlarge	40	160	EBS only	Yes	10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m4.16xlarge	64	256	EBS only	Yes	10 Gigabit	Yes

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Configure Instance Details](#)

## 4) Select “Next: Configure Instance Details”

### Step 2: Choose an Instance Type

<input type="checkbox"/>	General purpose	m5.4xlarge	16	64	EBS only	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.8xlarge	32	128	EBS only	Yes	10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.12xlarge	48	192	EBS only	Yes	10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.16xlarge	64	256	EBS only	Yes	20 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.24xlarge	96	384	EBS only	Yes	25 Gigabit	Yes
<input type="checkbox"/>	General purpose	m5.metal	96	384	EBS only	Yes	25 Gigabit	Yes
<input type="checkbox"/>	General purpose	m4.large	2	8	EBS only	Yes	Moderate	Yes
<input type="checkbox"/>	General purpose	m4.xlarge	4	16	EBS only	Yes	High	Yes
<input type="checkbox"/>	General purpose	m4.2xlarge	8	32	EBS only	Yes	High	Yes
<input type="checkbox"/>	General purpose	m4.4xlarge	16	64	EBS only	Yes	High	Yes
<input type="checkbox"/>	General purpose	m4.10xlarge	40	160	EBS only	Yes	10 Gigabit	Yes
<input type="checkbox"/>	General purpose	m4.16xlarge	64	256	EBS only	Yes	10 Gigabit	Yes

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Configure Instance Details](#)

## 5) Select “Next: Add Storage”

Step 3: Configure Instance Details

Purchasing option ⓘ ☐ Request Spot instances

Network ⓘ vpc-b02c12d7 (default) [Create new VPC](#)

Subnet ⓘ No preference (default subnet in any Availability Zone) [Create new subnet](#)

Auto-assign Public IP ⓘ Use subnet setting (Enable)

Placement group ⓘ ☐ Add instance to placement group

Capacity Reservation ⓘ Open [Create new Capacity Reservation](#)

IAM role ⓘ None [Create new IAM role](#)

CPU options ⓘ ☐ Specify CPU options

Shutdown behavior ⓘ Stop

Enable termination protection ⓘ ☐ Protect against accidental termination

Monitoring ⓘ ☐ Enable CloudWatch detailed monitoring  
[Additional charges apply.](#)

EBS-optimized instance ⓘ ☒ Launch as EBS-optimized instance

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Add Storage](#)

## 6) Change the root storage size from 8 GiB to 32 GiB. Then select “Review and Launch”

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.

Volume Type ⓘ	Device ⓘ	Snapshot ⓘ	Size (GiB) ⓘ	Volume Type ⓘ	IOPS ⓘ	Throughput (MB/s) ⓘ	Delete on Termination ⓘ	Encryption ⓘ
Root	/dev/sda1	snap-02e105f837cd927	8	General Purpose SSD (gp2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

[Add New Volume](#)

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Add Tags](#)

## 7 Now “Launch” the instance

Step 7: Review Instance Launch

eligible 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
t3a.xlarge	Variable	4	16	EBS only	Yes	Up to 5 Gigabit

▼ Security Groups [Edit security groups](#)

Security group name: launch-wizard-2  
Description: launch-wizard-2 created 2019-10-23T13:12:36.320-05:00

Type	Protocol	Port Range	Source	Description
This security group has no rules				

► Instance Details [Edit instance details](#)

► Storage [Edit storage](#)

[Cancel](#) [Previous](#) [Launch](#)

- 8) Select an existing key pair (or create a new pair). You can use the same key pair you created for your EMR instances. Make sure to check the “I acknowledge...” checkbox.

Step 7: Review Instance Launch

eligible Root Device Type: ebs Virtualization type: hvm

▼ Instance Type [Edit instance type](#)

Instance Type	ECUs	vCPUs
t3a.xlarge	Variable	4

▼ Security Groups [Edit security groups](#)

Security group name: launch-wizard-2  
Description: launch-wizard-2 created 2019-10-23T13:12:36.320-05:00

Type	Protocol	Port Range	Source	Description
This security group has no rules				

► Instance Details [Edit instance details](#)

► Storage [Edit storage](#)

[Cancel](#) [Previous](#) [Launch](#)

**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](#).

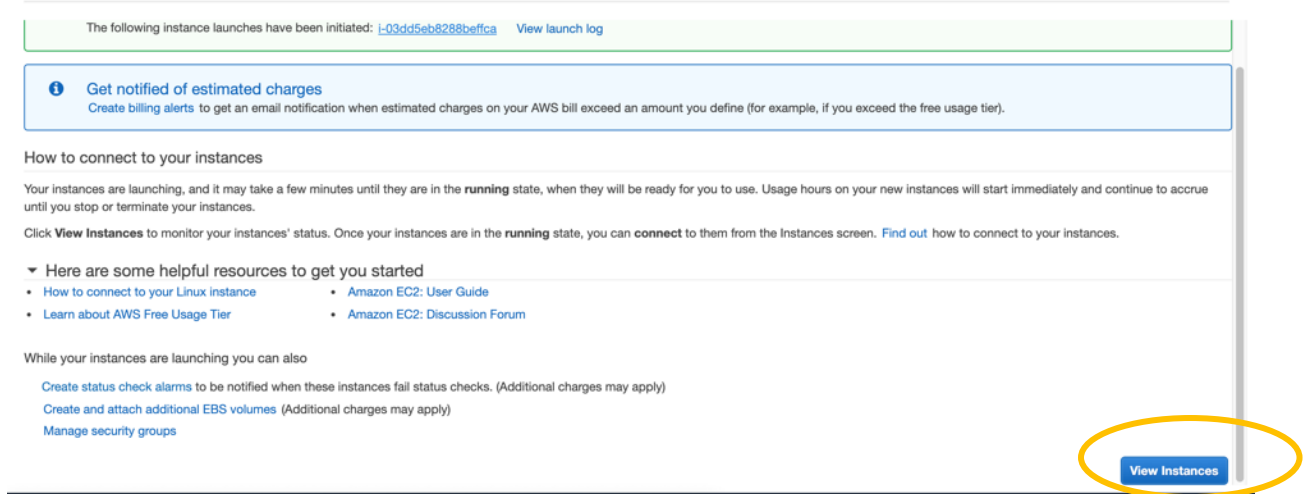
**Select a key pair**

☐ I acknowledge that I have access to the selected private key file (emr-key-pair.pem), and that without this file, I won't be able to log into my instance.

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

9) You should see this. Select “View Instances”

#### Launch Status



The following instance launches have been initiated: [i-03dd5eb8288beffca](#) [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 instances**  
Your instances are launching, and it may take a few minutes until they are in the **running** state, when they will be ready for you to use. Usage hours on your new instances will start immediately and continue to accrue until you stop or terminate your instances.  
Click **View Instances** to monitor your instances' status. Once your instances are in the **running** state, you can **connect** to them from the Instances screen. [Find out](#) how to connect to your instances.

▼ Here are some helpful resources to get you started

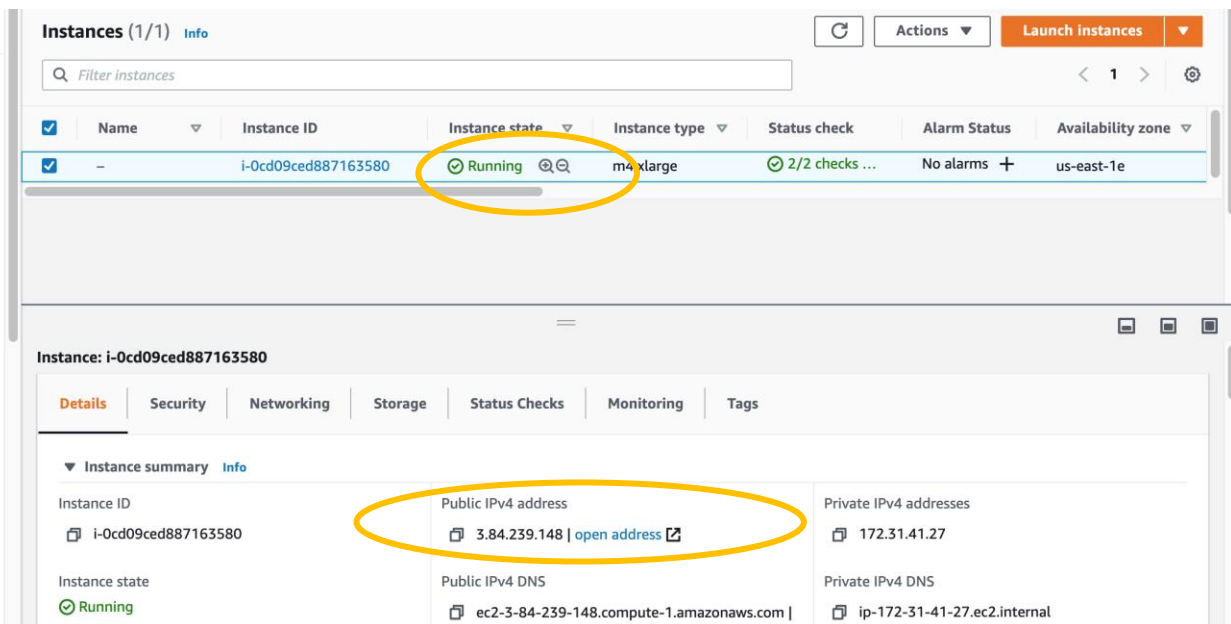
- [How to connect to your Linux instance](#)
- [Amazon EC2: User Guide](#)
- [Learn about AWS Free Usage Tier](#)
- [Amazon EC2: Discussion Forum](#)

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**

10) Wait until the instance state is “running”. Note that the public address (Public DNS) is provided for use in connecting via ssh or scp to the instance.



**Instances (1/1)** [Info](#)

☒ **Name** ☐ **Instance ID** ☐ **Instance state** ☐ **Instance type** ☐ **Status check** ☐ **Alarm Status** ☐ **Availability zone**

<input checked="" type="checkbox"/>	-	i-0cd09ced887163580	<b>Running</b>	m4.xlarge	2/2 checks ...	No alarms +	us-east-1e
-------------------------------------	---	---------------------	----------------	-----------	----------------	-------------	------------

**Instance: i-0cd09ced887163580**

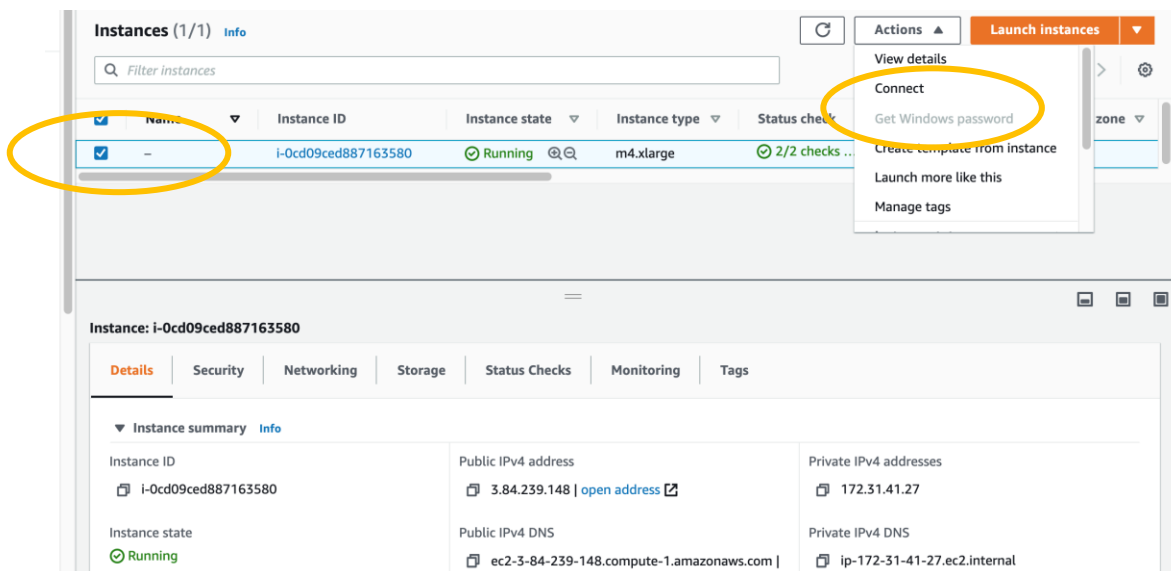
**Details** [Security](#) [Networking](#) [Storage](#) [Status Checks](#) [Monitoring](#) [Tags](#)

▼ **Instance summary** [Info](#)

Instance ID	<b>Public IPv4 address</b>	Private IPv4 addresses
i-0cd09ced887163580	3.84.239.148   <a href="#">open address</a>	172.31.41.27
Instance state	<b>Public IPv4 DNS</b>	Private IPv4 DNS
<b>Running</b>	ec2-3-84-239-148.compute-1.amazonaws.com	ip-172-31-41-27.ec2.internal

10 Now you can ssh to the instance the easy way as follows.

- a. Make sure you check the EC2 instance
- b. Click on the “Connect” button.



- c) Select the “SSH Client” tab

EC2 / Instances / i-0cd09ced887163580 / Connect to instance

### Connect to instance [Info](#)

Connect to your instance i-0cd09ced887163580 using any of these options

EC2 Instance Connect

Session Manager

SSH client

---

Instance ID  
i-0cd09ced887163580

Public IP address  
3.84.239.148

User name

Connect using a custom user name, or use the default user name ubuntu for the AMI used to launch the instance.

**Note:** In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.

Cancel

Connect

d) Cut and paste the example ssh command that appears into your terminal to connect to your instance

### Connect to instance [Info](#)

Connect to your instance i-0cd09ced887163580 using any of these options

EC2 Instance Connect

Session Manager

SSH client

---

Instance ID  
i-0cd09ced887163580

1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is emr-key-pair.pem
3. Run this command, if necessary, to ensure your key is not publicly viewable.  
chmod 400 emr-key-pair.pem
4. Connect to your instance using its Public DNS:  
ec2-3-84-239-148.compute-1.amazonaws.com

Example:

```
ssh -i "emr-key-pair.pem" ubuntu@ec2-3-84-239-148.compute-1.amazonaws.com
```

**Note:** In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.



Note that in this case the user name of your account is “ubuntu” and the address of your instance <Public DNS (IPv4)> is also used. So the ssh command about is built as follows. Note <Public DNS (IPv4)> is replaced with the actual value listed in the previously shown instance information pane.

11) Now you can ssh to the instance as follows.

```
ssh -i emr-key-pair.pem ubuntu@<Public DNS (IPv4)>
```

## Section 2: Instructions for installing Cassandra

1) Run below commands to install Java 8 on Ubuntu:

```
sudo apt update
sudo apt install openjdk-8-jdk openjdk-8-jre
```

2) Install the apt-transport-https package that is necessary to access a repository over HTTPS:

```
sudo apt install apt-transport-https
```

3) Add the Apache repository of Cassandra to /etc/apt/sources.list.d/cassandra.sources.list.

Import the repository's GPG using the following wget command. The command should output OK which means that the key has been successfully imported and packages from this repository will be considered trusted:

```
wget -q -O - https://www.apache.org/dist/cassandra/KEYS | sudo apt-key add -
```

Next, add the Cassandra repository to the system by issuing (all on one line):

```
sudo sh -c 'echo "deb http://www.apache.org/dist/cassandra/debian 311x main"
> /etc/apt/sources.list.d/cassandra.list'
```

4) Update the repositories:

```
sudo apt update
```

5) Install Cassandra:

```
sudo apt install cassandra
```

The Cassandra service will automatically start after the installation process is complete. You can verify that Cassandra is running by typing:

```
nodetool status
```

You should see something similar to this:

```
Datacenter: datacenter1
```

```
=====
```

```
Status=Up/Down
```

```
|/ State=Normal/Leaving/Joining/Moving
```

```
-- Address    Load       Tokens     Owns (effective)  Host ID                               Rack
```

```
UN 127.0.0.1  114.55 KiB  256        100.0%           d8c27e24-ea26-4eeb-8
```

- 6) You can start or stop Cassandra manually with

```
sudo service cassandra start
```

```
sudo service cassandra stop
```

- 7) You can start the Cassandra Query Language Shell with the following. Do this to do the assignment exercises:

```
cqlsh
```