

# RStudio on AWS

*Rohit Padebettu 5/21/2017*

## RStudio in the Cloud

At the end of this tutorial, we will be able to install RStudio on an Amazon Web Services(AWS) EC2 Instance and use it via any web browser. This tutorial uses Amazon Web Services (AWS), but it could just as easily use Microsoft, Google, or any other provider.

The only prerequisite is an AWS account, which you can [sign up](#) for if you haven't already. A credit card is required to sign up, but you will only be charged for computing time you use, and Amazon offers an excellent [free tier](#) that is suitable for small jobs.

We will be using [Louis Aslett's pre-configured AMI's](#) to speed up our configuration and installation of required software.

## Introduction to AWS

Amazon Web Services (AWS) provides on-demand computing resources and services in the cloud, with pay-as-you-go pricing. Using AWS resources instead of your own is like purchasing electricity from a power company instead of running your own generator, and it provides many of the same benefits: capacity exactly matches your need, you pay only for what you use, economies of scale result in lower costs.

## AWS Elastic Compute Cloud (EC2) Service

While AWS is a platform which a plethora of cloud computing services, this tutorial's focus will be on one service called Elastic Compute Cloud or EC2. You can learn more about the service [here](#). EC2 gives users the ability to quickly deploy virtual computers (called instances) in the cloud. The specifications (number of cores, RAM, and storage) of an instance can be tailored to the size and complexity of the task.

## Why Use Cloud Computing for datascience?

1. **Access from Anywhere** : Having a computer in the cloud with RStudio configured, allows you to access your datascience platform with a customizable and predictable setup from anywhere in the world, on any computer in a platform independent fashion. All you need is a web browser with a working internet connection on the local computer to access your work.
2. **Scalable Computing Power** : It is not always practical to upgrade the computing power, memory, disk space on a personal computer frequently to suit the computing power required to solve the problem at hand. Cloud computers afforded by services like EC2 make tremendous computing power available to you at your finger tips, that you can turn up and turn down depending on your requirement in seconds. In most cases all you pay for is the computing power you use, for the time you use it.

## Getting Started

To get started you first need to sign up for an account on [AWS](#). Your credit card details will be required to do so, but don't fret, we would be using a T2 Micro Instance which is free if you qualify for the free tier. Even if you don't the charges for this machine are minimal.

## Configuring your machine

Once you sign up, we typically would need to select EC2 service and configure our instance via the AWS Console Dashboard. The detailed tutorial to do so for a generic EC2 instance is available [here](#) if you are interested.

However for our purpose, in order to keep it simple for beginners, we would be using pre-configured AMI (Amazon Machine Image) very generously made available by [Louis Aslett](#). This method reduces the time required to get up and running to just a few minutes. As an added advantage, the configured machine also makes Python, Julia and R Jupyter notebook interfaces available in addition to RStudio and Shiny server. There is also a script to connect you *DropBox* account to this machine, so you have portability for your files across different machines.

So to begin

### STEP1 : Select AMI

Navigate to [Louis Aslett's AMI page](#) and click on RStudio 0.99.903 R 3.3.1 Julia 0.4.6 AMI for your region, which happens to be the latest AMI as of this writing.

### AMI Release History

Check back for updates as I will be periodically removing old AMIs because I can't afford indefinite storage for them. For historical purposes, the AMI release history is recorded here (scroll right to see all):

Release	EU West (Ireland)	EU Central (Frankfurt)	US East (Virginia)	US West (N. Calif.)	US West (Oregon)	S. America (São Paulo)	Asia Pacific (Singapore)	Asia Pacific (Tokyo)	Asia Pacific (Seoul)	Asia Pacific (Sydney)	
RStudio 0.99.903 R 3.3.1 Julia 0.4.6 Available	64-bit HVM	<a href="#">ami-b1b0c3c2</a>	<a href="#">ami-ca46b6a5</a>	<a href="#">ami-8fe18f98</a>	<a href="#">ami-c0b8f5a0</a>	<a href="#">ami-6a52840a</a>	<a href="#">ami-55079639</a>	<a href="#">ami-ce9c47ad</a>	<a href="#">ami-1f79b17e</a>	<a href="#">ami-41f4212f</a>	<a href="#">ami-b9093fda</a>
RStudio 0.99.896 R 3.3.0 Julia 0.4.5 Available	64-bit HVM	<a href="#">ami-ca149fb9</a>	<a href="#">ami-6ec92401</a>	<a href="#">ami-0acd2067</a>	<a href="#">ami-ada2dbcd</a>	<a href="#">ami-c78875a7</a>	<a href="#">ami-af26afc3</a>	<a href="#">ami-3f9a4c5c</a>	<a href="#">ami-90dd39f1</a>	<a href="#">ami-6e68a000</a>	<a href="#">ami-72def211</a>
RStudio 0.99.491 R 3.2.3 Available	64-bit HVM	<a href="#">ami-e95df59a</a>	<a href="#">ami-52edf33e</a>	<a href="#">ami-7f9dc615</a>	<a href="#">ami-d1e792b1</a>	<a href="#">ami-1d7f657c</a>	<a href="#">ami-50f1703c</a>	<a href="#">ami-b277bad1</a>	<a href="#">ami-2549744b</a>	N/A*	<a href="#">ami-a54a6fc6</a>

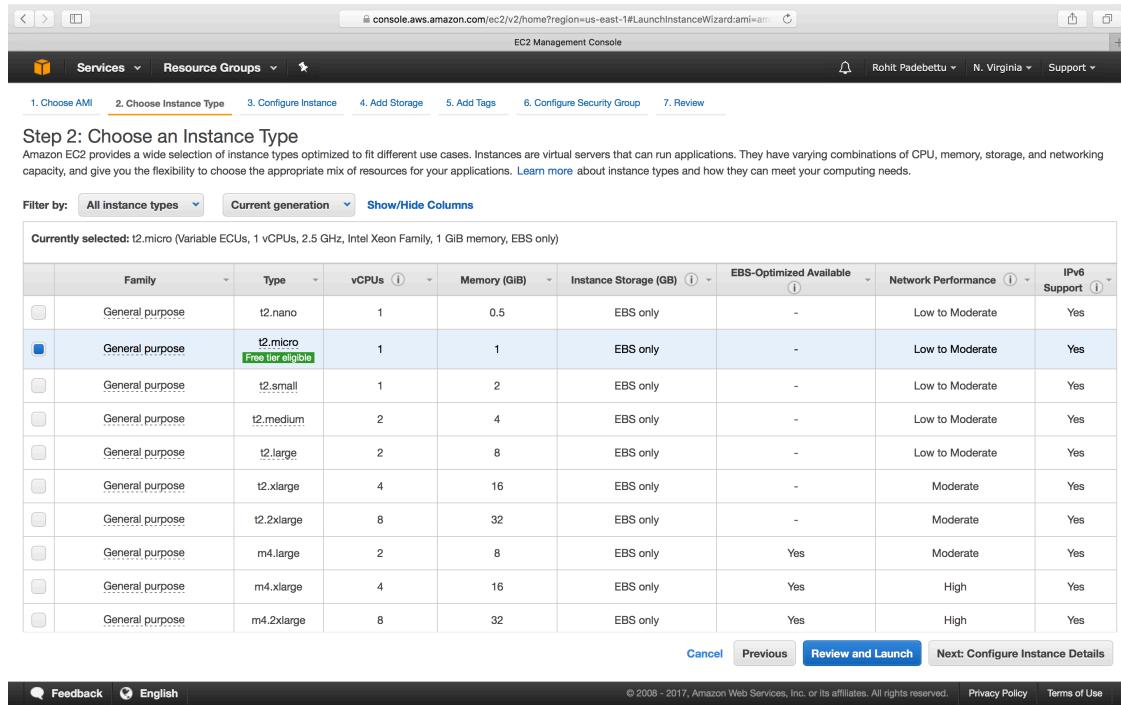
### AMI List

[Link for the US East \(Virginia\) region](#)

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## STEP 2: Choose type of Machine

Once you click on a suitable AMI above, the browser should redirect you to an AWS page where you need to select the instance type.



Step 2: Choose an Instance Type

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

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

Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
General purpose	<b>t2.micro</b> Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes
General purpose	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
General purpose	m4.large	2	8	EBS only	Yes	Moderate	Yes
General purpose	m4.xlarge	4	16	EBS only	Yes	High	Yes
General purpose	m4.2xlarge	8	32	EBS only	Yes	High	Yes

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

### Choose Instance Type

Select the General purpose t2.micro instance which is free tier eligible as shown.

Click **Next: Configure Instance Details**

## STEP 3 : Configure Instance Details

On the Configure Instance Details page, review the default settings. The defaults are fine here

The screenshot shows the 'Configure Instance Details' step of the EC2 wizard. Key configuration options visible include:

- Purchasing option:** Request Spot instances (unchecked)
- Network:** vpc-8db0a8eb (default) - Create new VPC
- Subnet:** No preference (default subnet in any Availability Zone) - Create new subnet
- Auto-assign Public IP:** Use subnet setting (Enable)
- IAM role:** None - Create new IAM role
- Shutdown behavior:** Stop
- Enable termination protection:** Protect against accidental termination (unchecked)
- Monitoring:** Enable CloudWatch detailed monitoring (Additional charges apply.)
- Tenancy:** Shared - Run a shared hardware instance (Additional charges will apply for dedicated tenancy.)

At the bottom, there are navigation buttons: Cancel, Previous, Review and Launch (highlighted in blue), and Next: Add Storage.

### Configure Instance Details

Click Next: Add Storage

## STEP 4: Add Disk Storage

On the Add Storage page, you'll be asked to specify the amount of storage you want. The defaults are fine here as well. The storage here has been optimized at 10GB to reduce the running costs of this machine even after the free tier period ends

The screenshot shows the AWS EC2 Management Console with the URL <https://console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstanceWizard:ami=ami-0>. The top navigation bar includes 'Services' (selected), 'Resource Groups', and user information 'Rohit Padebetti - N. Virginia - Support'. Below the navigation is a step navigation bar: 1. Choose AMI, 2. Choose Instance Type, 3. Configure Instance, 4. Add Storage (selected), 5. Add Tags, 6. Configure Security Group, 7. Review.

**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	Encrypted
Root	/dev/sda1	snap-75197be8	10	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.

At the bottom are buttons: Cancel, Previous, **Review and Launch** (highlighted in blue), and Next: Add Tags.

*Add Storage*

Click Next: Add Tags

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## STEP 5: Name your Machine

On this page you can give your instance a name (e.g. rstudio).

The screenshot shows the AWS EC2 Management Console interface. The top navigation bar includes 'Services' (selected), 'Resource Groups', and user information ('Rohit Padebetta', 'N. Virginia', 'Support'). Below the navigation is a breadcrumb trail: '1. Choose AMI' → '2. Choose Instance Type' → '3. Configure Instance' → '4. Add Storage' → '5. Add Tags' (highlighted in orange) → '6. Configure Security Group' → '7. Review'. The main content area is titled 'Step 5: Add Tags'. It contains a note: 'A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.' Below this, it says 'A copy of a tag can be applied to volumes, instances or both.' and 'Tags will be applied to all instances and volumes.' A link 'Learn more' is provided for tagging resources. The 'Add Tags' section has two fields: 'Key' (labeled 'Name') and 'Value' (labeled 'rstudio'). To the right of these fields are checkboxes for 'Instances' and 'Volumes', both of which are checked. Below these fields is a button 'Add another tag' with the note '(Up to 50 tags maximum)'. At the bottom of the page are buttons for 'Cancel', 'Previous', 'Review and Launch' (which is blue and highlighted), and 'Next: Configure Security Group'. The footer includes links for 'Feedback', 'English', and copyright information: '© 2008 - 2017, Amazon Web Services, Inc. or its affiliates. All rights reserved.' and links to 'Privacy Policy' and 'Terms of Use'.

*Add Tags*

Click Next: Configure Security Group

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## STEP6: Make your Machine accessible

On this page you tell the AWS how you want your instance to interact with the outside world. - Select Create a new security group as shown below. - Give your Security Group a name and description. This can be reused later across machine if you like - SSH on port number 22 should already be enabled by default on this page. Just change the Source drop down from Custom to Anywhere. **SSH allows us to securely log into this cloud machine via a terminal if needed (we won't be doing so in this tutorial)** - You can use the Add Rule button to add a new rule - Select HTTP from the Type dropdown list this time - Change the Source from Custom to Anywhere to allow access to this machine via the browser from any machine

The settings once done should look as shown below

The screenshot shows the AWS EC2 Management Console interface. The top navigation bar includes 'Services', 'Resource Groups', and tabs for 'Choose AMI', 'Choose Instance Type', 'Configure Instance', 'Add Storage', 'Add Tags', 'Configure Security Group', and 'Review'. The 'Configure Security Group' tab is selected.

**Step 6: Configure Security Group**

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

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

Security group name: **SSH\_HTTP**  
Description: SSH and HTTP for RStudio Server

Type	Protocol	Port Range	Source
SSH	TCP	22	Anywhere <input type="radio"/> 0.0.0.0/0, ::/0 <input type="checkbox"/>
HTTP	TCP	80	Anywhere <input type="radio"/> 0.0.0.0/0, ::/0 <input type="checkbox"/>

**Add Rule**

**Warning**  
Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Cancel Previous Review and Launch

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## Security Group Settings

Click Review and Launch

## STEP 7: Launch your Machine

If a warning is presented as shown below. Ignore it for now as the discussion of Network Security is beyond the scope of this tutorial.

The screenshot shows the AWS EC2 Management Console with the URL <https://console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstanceWizard:ami=ami-0fe18f98>. The top navigation bar includes 'Services' (selected), 'Resource Groups', and user information 'Rohit Padebettu N. Virginia Support'. Below the navigation is a progress bar with steps 1 through 7: '1. Choose AMI', '2. Choose Instance Type', '3. Configure Instance', '4. Add Storage', '5. Add Tags', '6. Configure Security Group', and '7. Review' (selected).  
  
The main content area is titled 'Step 7: Review Instance Launch'. It contains a note: '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.' A warning box highlights: '⚠ Improve your instances' security. Your security group, SSH\_HTTP, is open to the world.' It explains that instances may be accessible from any IP address and recommends updating security group rules.  
  
Under 'AMI Details', the selected AMI is 'RStudio-0.99.903\_R-3.3.1\_Julia-0.4.6\_ubuntu-16.04-LTS-64bit - ami-0fe18f98'. It is described as ready to run RStudio + (experimental) Julia server for statistical computation. It lists the root device type as ebs and virtualization type as hvm.  
  
Under 'Instance Type', the selected instance type is 't2.micro'. The table shows the following specifications:

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

  
Under 'Security Groups', the selected security group is 'SSH\_HTTP'. It is described as allowing SSH and HTTP for RStudio Server. The table shows the following rule:

Type	Protocol	Port Range	Source
SSH	TCP	22	0.0.0.0/0

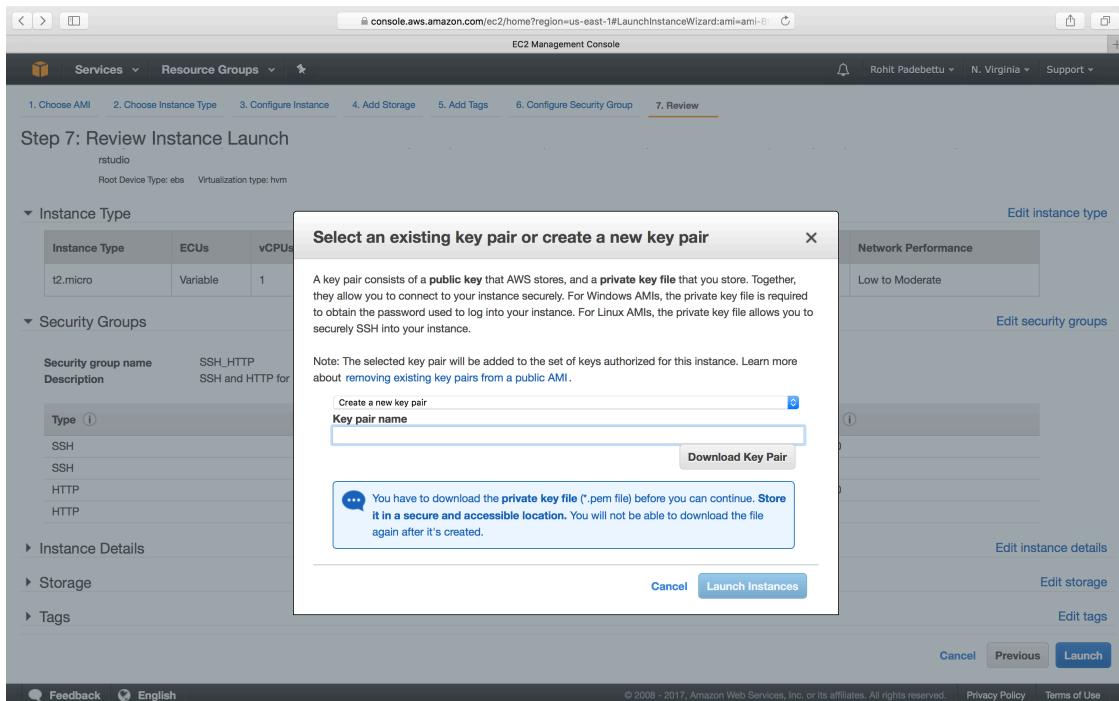
  
At the bottom, there are buttons for 'Cancel', 'Previous', and a large blue 'Launch' button. The footer includes links for 'Feedback', 'English', 'Privacy Policy', and 'Terms of Use'.  
  
A note at the bottom left says: '© 2008 - 2017, Amazon Web Services, Inc. or its affiliates. All rights reserved.'

*Review Launch*

Click Launch

## Download Key Pair

You will now be presented with a pop-up window asking you to create a Key Pair. A Key Pair is a secure way of accessing the cloud machine. It is like an encrypted username/password combination which only you and AWS know about. Give your Key Pair a name you like and click the Download Key Pair button. You should store this file safely on your personal local machine in a safe place. You will not be able to download this file again (Although you can create a new Key Pair if required). This file is required to access the cloud machine through SSH and other means if required.



## Create Key Pair

This is it for configuration of your machine.

Click Launch Instance button once you have saved the key pair file

Once done you should be presented with the following page to indicate your instance is running

The screenshot shows the EC2 Management Console with the URL <https://console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstanceWizard:ami=ami-8>. The page title is "Launch Status". At the top, there's a green box with a checkmark stating "Your instances are now launching" and a link to "View launch log". Below it, a blue box contains a link to "Get notified of estimated charges" with a note about creating billing alerts. The main content area has a heading "How to connect to your instances" followed by a note about instance launching and a link to "View Instances". A section titled "Here are some helpful resources to get you started" lists links to the User Guide and Discussion Forum. At the bottom, there are links for "Feedback", "English", and "View Instances".

## Launch Status

Your instances are now launching  
The following instance launches have been initiated: i-0c4d655ace6df8bd3 [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](#)

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](#)

[Feedback](#) | [English](#)

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## Instance Running

**Verify Instance State on Dashboard:** The last step is to review the instance whether it is running on your EC2 dashboard. If you named your instance `rstudio` as suggested in STEP 5, then you should see a row named `rstudio` running. Click on it to view your instance details and to get the public address of the machine to enable you to access RStudio Server remotely.

Copy the `Public DNS (IPv4)` in the bottom pane on the left side. This will vary for each one of you and each time you restart your cloud machine. For my account and instance, the address assigned this time is **ec2-34-201-250-34.compute-1.amazonaws.com**

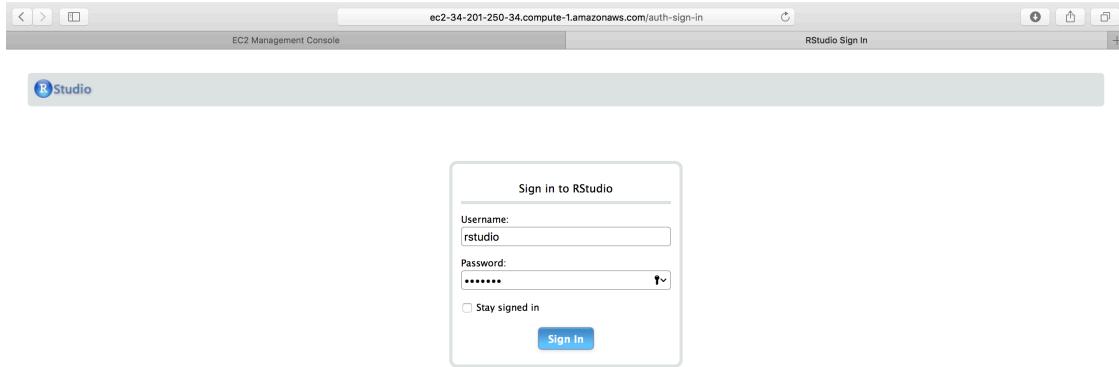
The screenshot shows the AWS EC2 Management Console interface. On the left, there's a navigation sidebar with various services like EC2 Dashboard, Events, Tags, Reports, and several sections under Instances, Images, Elastic Block Store, Network & Security, Load Balancing, and Auto Scaling. The main content area has a header with 'Launch Instance', 'Connect', and 'Actions' buttons, and a search bar. Below that is a table showing two instances: 'RStudio Server' (stopped) and 'rstudio' (running). The 'rstudio' row is selected. At the bottom of the table, the Public DNS (IPv4) is listed as 'ec2-34-201-250-34.compute-1.amazonaws.com'. A large modal window is open for the 'rstudio' instance, showing its detailed configuration. The 'Description' tab is selected, displaying fields such as Instance ID (i-0c4d655ace6df8bd3), Instance state (running), Instance type (t2.micro), Availability zone (us-east-1a), Security groups (SSH, HTTP, view inbound rules), AMI ID (RStudio-0.99.903.R-3.3.1-Julia-0.4.6\_ubuntu-16.04-LTS-64bit (ami-bfe18f98)), Platform (-), IAM role (-), Key pair name (rstudio test), Owner (857272315274), and Launch time (May 21, 2017 at 1:38:12 PM UTC-4 (less than one)). Other tabs in the modal include 'Status Checks', 'Monitoring', and 'Tags'. The bottom of the modal shows copyright information: '© 2008 - 2017, Amazon Web Services, Inc. or its affiliates. All rights reserved.' and links to 'Privacy Policy' and 'Terms of Use'.

*Public DNS*

## Launch RStudio via web browser

Now you have configured a cloud computer for yourself and started it. If everything worked as expected, your cloud computer is now running and available for access via a web browser.

Launch a web browser of your choice on your local computer. Paste in the Public DNS you copied in the last step into the address bar and hit enter. If you have followed the steps until here, you should see a screen which looks like below

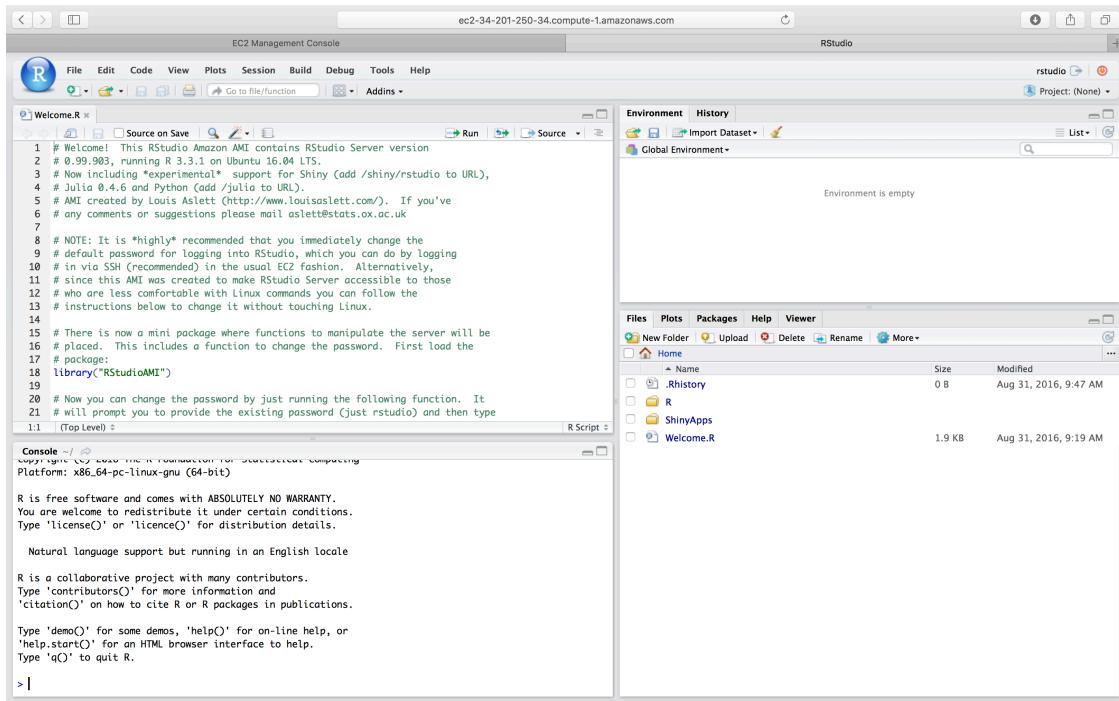


*RStudio Login Page*

## Sign in to RStudio

Username: rstudio and Password: rstudio

Presto! You should see RStudio running in your browser. It works exactly like RStudio installed on your local machine. You can go ahead and customize the look and feel, install your favorite package, create projects and work on solving your next Data Science problem, right from any browser.



RStudio running

## Additional Configuration

The RStudio version running in your browser was configured to open a very helpful and important `Welcome.R` script.

Read through it and follow the instructions there to reset you password to something only you would remember. The following command should allow you to do so

```
RStudioAMI::passwd()
```

**Note:** *If you don't do this, your machine is now accessible to anyone on the internet with a browser*

If interested, you could also use the instructions to link this machine to your Dropbox account, so that you have access to all the same files you have synced up to your Dropbox account. Dropbox is free for a limited storage space, so it is recommended you sign up for an account there and link it to this machine. You can use that folder to store the scripts and data files you produce while working in R. This allows you to retain your copy of the files even if you terminate or delete this cloud computer at some point later.

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## Stop or Terminate the Instance

Right clicking on the instance in the AWS Console EC2 Dashboard, will give you options to Stop the Instance or Terminate the Instance.

*Stopping the instance is like shutting down the computer, while terminating the instance is like returning the computer back to Amazon.*

**Note:** *To keep the data and latest configuration on this cloud computer, remember you only need to STOP the computer after use and there is no need to TERMINATE it, unless you decide to TERMINATE for cost or reasons. Under free tier currently, running only this continuously for a year, shouldn't cost you anything*

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## Increased Computing Power

To increase the computing power available to you, all you need to do is go back to the AWS Console. Navigate to the EC2 dashboard.

- Right click on the Stopped Instance and select Instance Settings -> Change Instance Type.

The screenshot shows the AWS EC2 Instances page. On the left, there's a sidebar with various services like EC2 Dashboard, Events, Tags, Reports, Limits, Instances, Images, Elastic Block Store, Network & Security, Load Balancing, and Auto Scaling. The 'Instances' section is expanded, showing 'Instances' (RStudio Server and rstudio), 'Spot Requests', 'Reserved Instances', 'Scheduled Instances', and 'Dedicated Hosts'. The main area lists two instances: 'RStudio Server' (stopped, t2.micro, us-east-1b) and 'rstudio' (stopped, t2.micro, us-east-1a). A context menu is open over the 'rstudio' instance, with 'Change Instance Type' highlighted. The menu also includes options like 'Get Windows Password', 'Launch More Like This', 'Instance State', 'Add/Edit Tags', 'Image', 'Networking', 'CloudWatch Monitoring', 'Change Instance Type', 'Change Termination Protection', 'View/Change User Data', 'Change Shutdown Behavior', 'Get System Log', 'Get Instance Screenshot', and 'Modify Instance Placement'. Below the menu, detailed instance information is shown, including Instance ID (i-0c4d655ace6df8bd3), Instance state (stopped), Instance type (t2.micro), Availability zone (us-east-1a), Security groups (SSH\_HTTP, view inbound rules), Scheduled events, AMI ID (RStudio-0.99.903\_R-3.3.1\_Julia-0.4.6\_ubuntu-16.04-LTS-64bit (ami-8fe1bf98)), Platform, IAM role, Key pair name (rstudio test), Owner (857272315274), Launch time (May 21, 2017 at 1:38:12 PM UTC-4 (4 hours)), and network details like Public DNS (ip-172-31-75-186.ec2.internal), Private IP (172.31.75.186), VPC ID (vpc-8db0a8eb), Subnet ID (subnet-e60afbc), Network interfaces (eth0), and Source/dest. check (True). EBS-optimized is set to False, and Root device type is ebs.

## Change Instance Type

This should bring a pop-up window with a drop down menu that allows you to select the new instance type.

The screenshot shows the same AWS EC2 Instances page as before, but now the 'Change Instance Type' dialog box is open over the 'rstudio' instance. The dialog box has 'Instance ID' (i-0c4d655ace6df8bd3) and 'Instance Type' (t2.micro) fields. A dropdown menu lists various instance types: t2.nano, t2.small, t2.medium, t2.large, t2.xlarge, m4.large, m4.xlarge, m4.4xlarge, m4.10xlarge, m4.16xlarge, m3.medium, m3.large, m3.xlarge, m3.2xlarge, c4.large, c4.xlarge, c4.2xlarge, c4.4xlarge, c4.8xlarge, c3.large, c3.xlarge, c3.2xlarge, c3.4xlarge, c3.8xlarge, and c3.12xlarge. The 't2.micro' option is currently selected. Below the dialog box, the instance details and network configuration are visible, including Public DNS (ip-172-31-75-186.ec2.internal), Private IP (172.31.75.186), VPC ID (vpc-8db0a8eb), Subnet ID (subnet-e60afbc), Network interfaces (eth0), and Source/dest. check (True). EBS-optimized is set to False, and Root device type is ebs.

## Select Instance Type

## AWS Instance Pricing

As of this writing, the pricing for various instance types on Amazon are as follows. For example you can rent a m4.4x large cloud computer with 4 CPU cores and 16GB of memory (similar to my Mac Pro Laptop) for only about \$0.20 cents an hour.

Region: US East (Ohio) ▼

	vCPU	ECU	Memory (GiB)	Instance Storage (GB)	Linux/UNIX Usage
<strong>General Purpose - Current Generation</strong>					
t2.nano	1	Variable	0.5	EBS Only	\$0.0059 per Hour
t2.micro	1	Variable	1	EBS Only	\$0.012 per Hour
t2.small	1	Variable	2	EBS Only	\$0.023 per Hour
t2.medium	2	Variable	4	EBS Only	\$0.047 per Hour
t2.large	2	Variable	8	EBS Only	\$0.094 per Hour
t2.xlarge	4	Variable	16	EBS Only	\$0.188 per Hour
t2.2xlarge	8	Variable	32	EBS Only	\$0.376 per Hour
m4.large	2	6.5	8	EBS Only	\$0.1 per Hour
m4.xlarge	4	13	16	EBS Only	\$0.2 per Hour
m4.2xlarge	8	26	32	EBS Only	\$0.4 per Hour
m4.4xlarge	16	53.5	64	EBS Only	\$0.8 per Hour
m4.10xlarge	40	124.5	160	EBS Only	\$2 per Hour
m4.16xlarge	64	188	256	EBS Only	\$3.2 per Hour

### *Instance Pricing*

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## **Summary**

*This tutorial was intended to get you started quickly on Amazon AWS. Demonstrate how tremendous cloud computing power is available to us virtually On Demand these days at our finger tips. The tutorial was also intended to help you get started with RStudio and other Data Science software in the cloud.*