Task-6

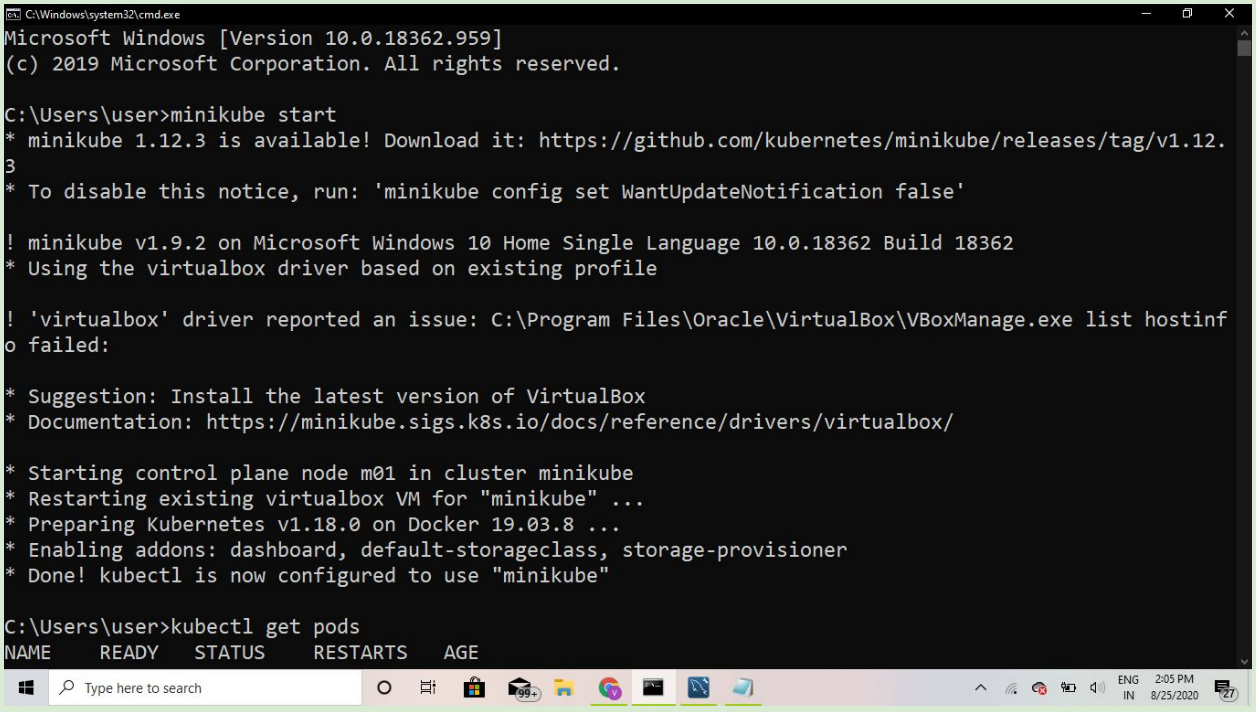
Deploy the Wordpress application on Kubernetes and AWS using terraform including the following steps;

1. Write an Infrastructure as code using terraform, which automatically deploy the Wordpress application
2. On AWS, use RDS service for the relational database for Wordpress application.
3. Deploy the Wordpress as a container either on top of Minikube or EKS or Fargate service on AWS
4. The Wordpress application should be accessible from the public world if deployed on AWS or through workstation if deployed on Minikube.

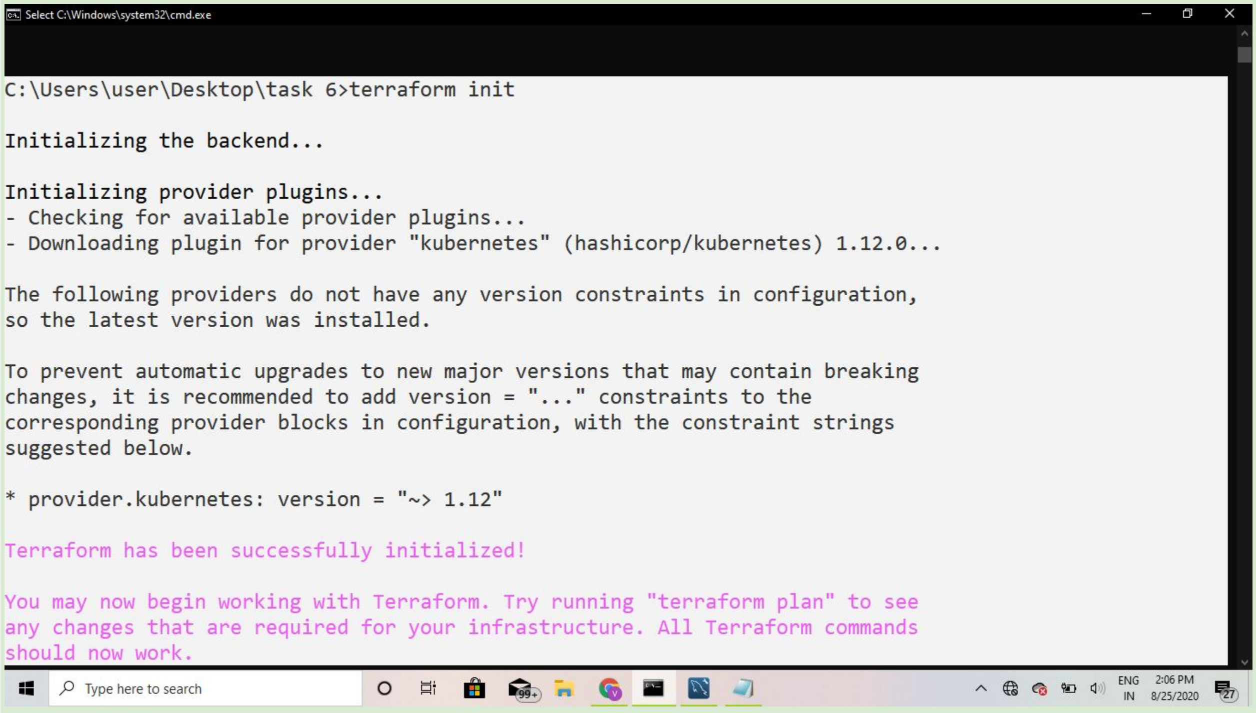
Step 1:
Create a deployment using terraform and expose the port of the wordpress using service

```
provider "kubernetes" {
 config_context_cluster = "minikube"
}

resource "kubernetes_deployment" "wordpress" {
 metadata {
   name = "wordpress"

 }

 spec {
   replicas = 1

   selector {
     match_labels = {
        env = "production"
        region = "IN"
        App = "wordpress"
      }
       match_expressions {
              key      = "env"
              operator = "In"
              values   = ["production", "webserver"]
            }
    }


    template {
      metadata {
        labels = {
          env = "production"
          region = "IN"
          App = "wordpress"
        }
      }


      spec {
       container {
      image = "wordpress"
      name  = "mywordpress-cont"



        }
      }
    }
  }
}

resource "kubernetes_service" "wordpress" {
  metadata {
    name = "wordpress"
  }
```

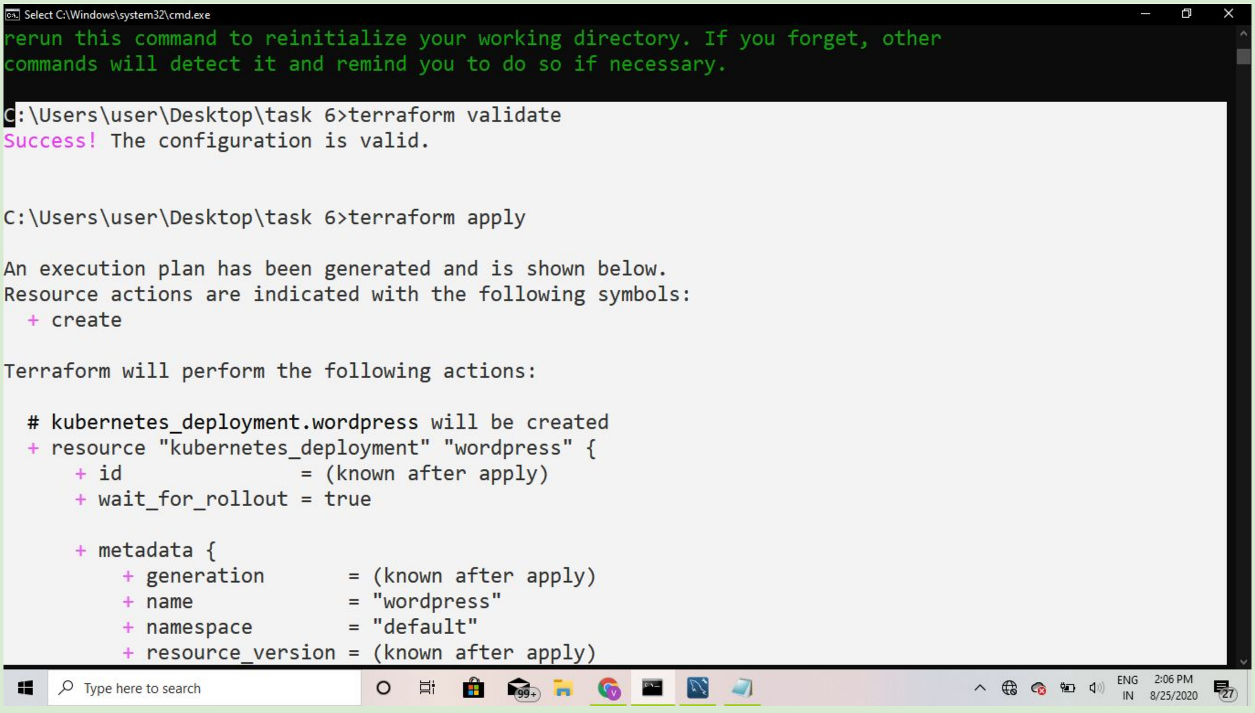
```
   spec {
        selector = {
      App =
kubernetes_deployment.wordpress.spec.0.template.0.metadata[0].labels.App
    }
    port {
      node_port   = 30201
      port        = 80
      target_port = 80
    }

    type = "NodePort"
  }
}
```



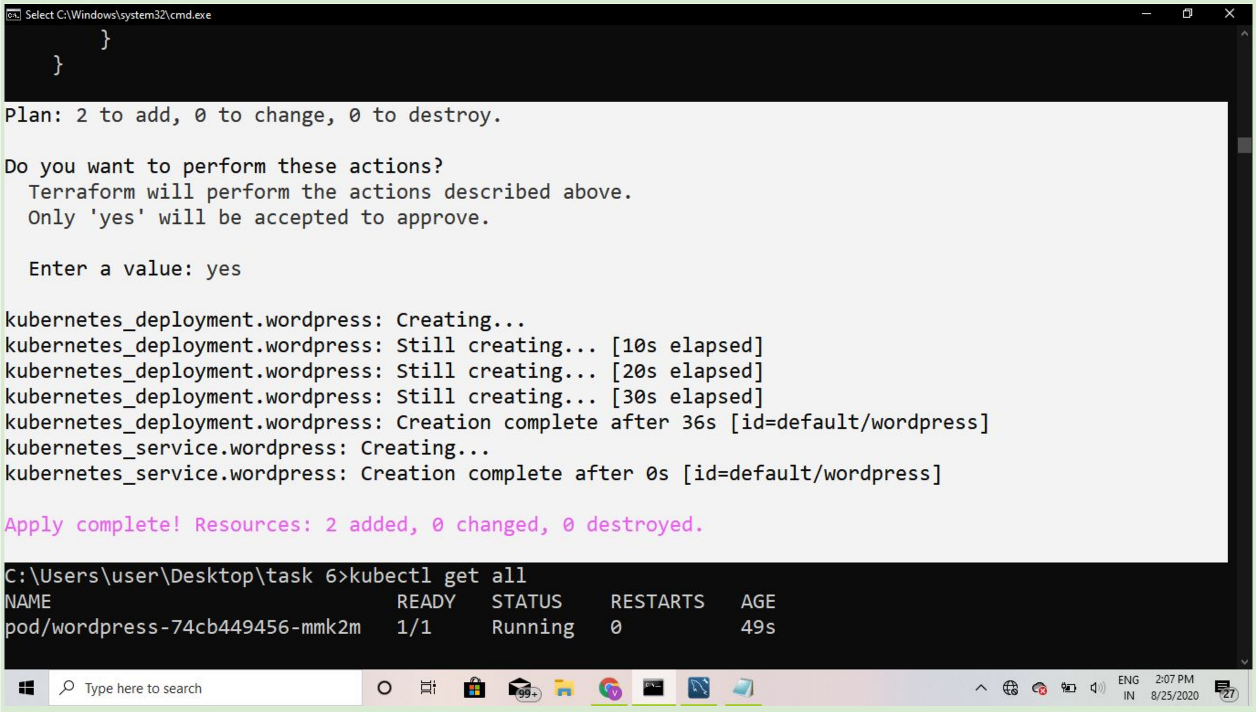
```
Microsoft Windows [Version 10.0.18362.959]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\user>minikube start
* minikube 1.12.3 is available! Download it: https://github.com/kubernetes/minikube/releases/tag/v1.12.
3
* To disable this notice, run: 'minikube config set WantUpdateNotification false'

! minikube v1.9.2 on Microsoft Windows 10 Home Single Language 10.0.18362 Build 18362
* Using the virtualbox driver based on existing profile

! 'virtualbox' driver reported an issue: C:\Program Files\Oracle\VirtualBox\VBoxManage.exe list hostinf
o failed:

* Suggestion: Install the latest version of VirtualBox
* Documentation: https://minikube.sigs.k8s.io/docs/reference/drivers/virtualbox/

* Starting control plane node m01 in cluster minikube
* Restarting existing virtualbox VM for "minikube" ...
* Preparing Kubernetes v1.18.0 on Docker 19.03.8 ...
* Enabling addons: dashboard, default-storageclass, storage-provisioner
* Done! kubectl is now configured to use "minikube"

C:\Users\user>kubectl get pods
NAME     READY   STATUS    RESTARTS   AGE
```



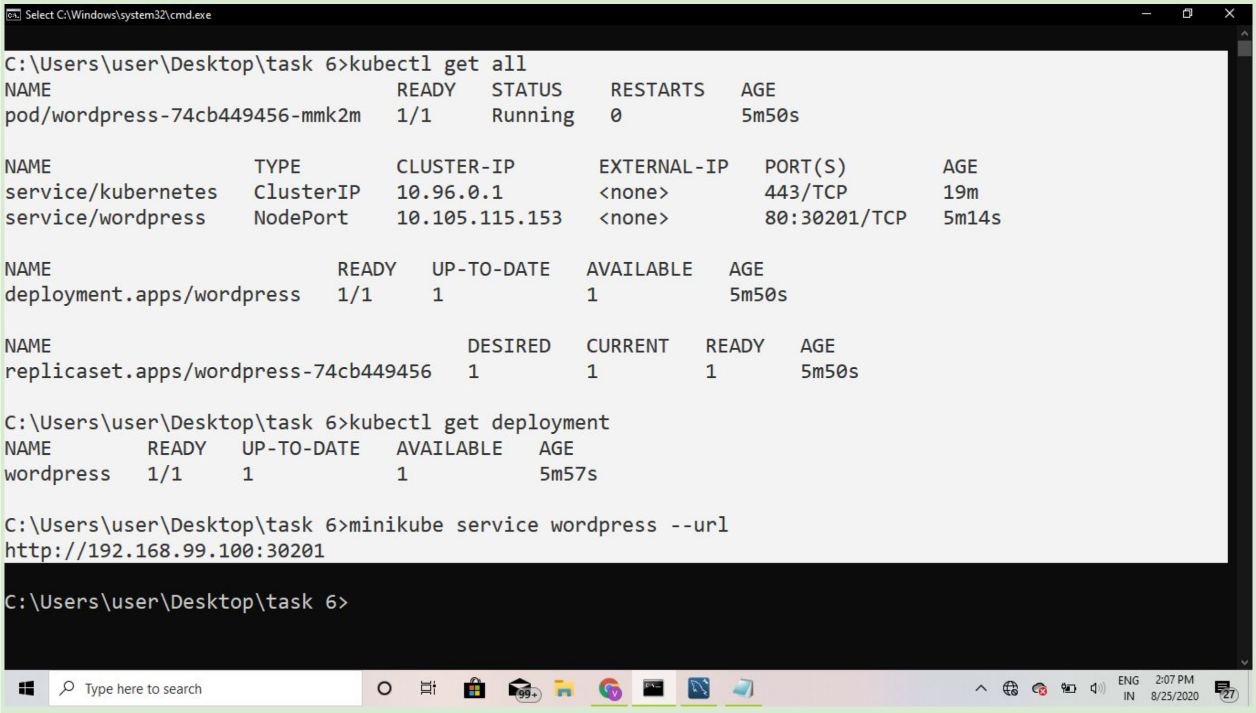
```
C:\Users\user\Desktop\task 6>terraform init

Initializing the backend...

Initializing provider plugins...
- Checking for available provider plugins...
- Downloading plugin for provider "kubernetes" (hashicorp/kubernetes) 1.12.0...

The following providers do not have any version constraints in configuration,
so the latest version was installed.

To prevent automatic upgrades to new major versions that may contain breaking
changes, it is recommended to add version = "..." constraints to the
corresponding provider blocks in configuration, with the constraint strings
suggested below.

* provider.kubernetes: version = "~> 1.12"

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.
```



```
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.

C:\Users\user\Desktop\task 6>terraform validate
Success! The configuration is valid.


C:\Users\user\Desktop\task 6>terraform apply

An execution plan has been generated and is shown below.
Resource actions are indicated with the following symbols:
  + create

Terraform will perform the following actions:

  # kubernetes_deployment.wordpress will be created
  + resource "kubernetes_deployment" "wordpress" {
      + id               = (known after apply)
      + wait_for_rollout = true

      + metadata {
          + generation       = (known after apply)
          + name             = "wordpress"
          + namespace        = "default"
          + resource_version = (known after apply)
```



```
        }
    }

Plan: 2 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

  Enter a value: yes

kubernetes_deployment.wordpress: Creating...
kubernetes_deployment.wordpress: Still creating... [10s elapsed]
kubernetes_deployment.wordpress: Still creating... [20s elapsed]
kubernetes_deployment.wordpress: Still creating... [30s elapsed]
kubernetes_deployment.wordpress: Creation complete after 36s [id=default/wordpress]
kubernetes_service.wordpress: Creating...
kubernetes_service.wordpress: Creation complete after 0s [id=default/wordpress]

Apply complete! Resources: 2 added, 0 changed, 0 destroyed.

C:\Users\user\Desktop\task 6>kubectl get all
NAME                              READY   STATUS    RESTARTS   AGE
pod/wordpress-74cb449456-mmk2m    1/1     Running   0          49s
```



```
C:\Users\user\Desktop\task 6>kubectl get all
NAME                              READY   STATUS    RESTARTS   AGE
pod/wordpress-74cb449456-mmk2m    1/1     Running   0          5m50s

NAME                    TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)        AGE
service/kubernetes      ClusterIP   10.96.0.1        <none>        443/TCP        19m
service/wordpress       NodePort    10.105.115.153   <none>        80:30201/TCP   5m14s

NAME                         READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/wordpress    1/1     1            1           5m50s

NAME                                    DESIRED   CURRENT   READY   AGE
replicaset.apps/wordpress-74cb449456    1         1         1       5m50s

C:\Users\user\Desktop\task 6>kubectl get deployment
NAME        READY   UP-TO-DATE   AVAILABLE   AGE
wordpress   1/1     1            1           5m57s

C:\Users\user\Desktop\task 6>minikube service wordpress --url
http://192.168.99.100:30201

C:\Users\user\Desktop\task 6>
```

Step 2:

Launch a RDS mysql database using terraform with the required configuration

Resources:

```
data "aws_vpc" "default" {
  default = true
}

data "aws_subnet_ids" "all" {
  vpc_id = data.aws_vpc.default.id
}

data "aws_security_group" "default" {
  vpc_id = data.aws_vpc.default.id
  name   = "launch-wizard-1"
}

module "db" {
  source  = "terraform-aws-modules/rds/aws"
  version = "~> 2.0"

  identifier = "database-1"

  engine            = "mysql"
  engine_version    = "5.7.19"
  instance_class    = "db.t2.micro"
  storage_type = "gp2"
  allocated_storage = 20
  storage_encrypted = false

  username = "root"
  password = "visheshgarg"
  port     = "3306"

  vpc_security_group_ids = [data.aws_security_group.default.id]
  subnet_ids = data.aws_subnet_ids.all.ids
  publicly_accessible = true

  availability_zone = "ap-south-1a"
```

```
maintenance_window = "Mon:00:00-Mon:03:00"
backup_window      = "03:00-06:00"

multi_az = false

 backup_retention_period = 0

tags = {
  Owner       = "user"
  Environment = "dev"
}

enabled_cloudwatch_logs_exports = ["audit", "general"]

iam_database_authentication_enabled = false


# DB parameter group
family = "mysql5.7"

# DB option group
major_engine_version = "5.7"

# Snapshot name upon DB deletion
final_snapshot_identifier = "demodb"

# Database Deletion Protection
deletion_protection = false

parameters = [
  {
    name  = "character_set_client"
    value = "utf8"
  },
  {
    name  = "character_set_server"
    value = "utf8"
  }
]
```

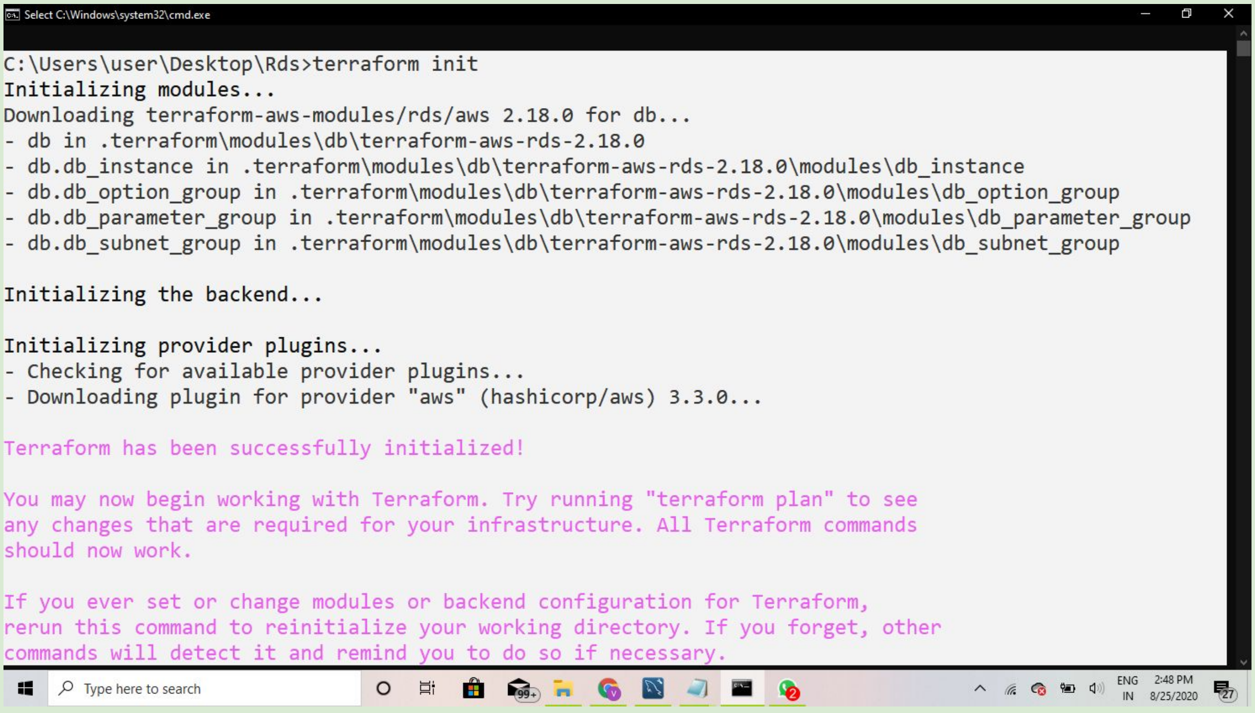
```
  options = [
    {
      option_name = "MARIADB_AUDIT_PLUGIN"

      option_settings = [
        {
          name  = "SERVER_AUDIT_EVENTS"
          value = "CONNECT"
        },
        {
          name  = "SERVER_AUDIT_FILE_ROTATIONS"
          value = "37"
        },
      ]
    },
  ]
}
```

Provider:

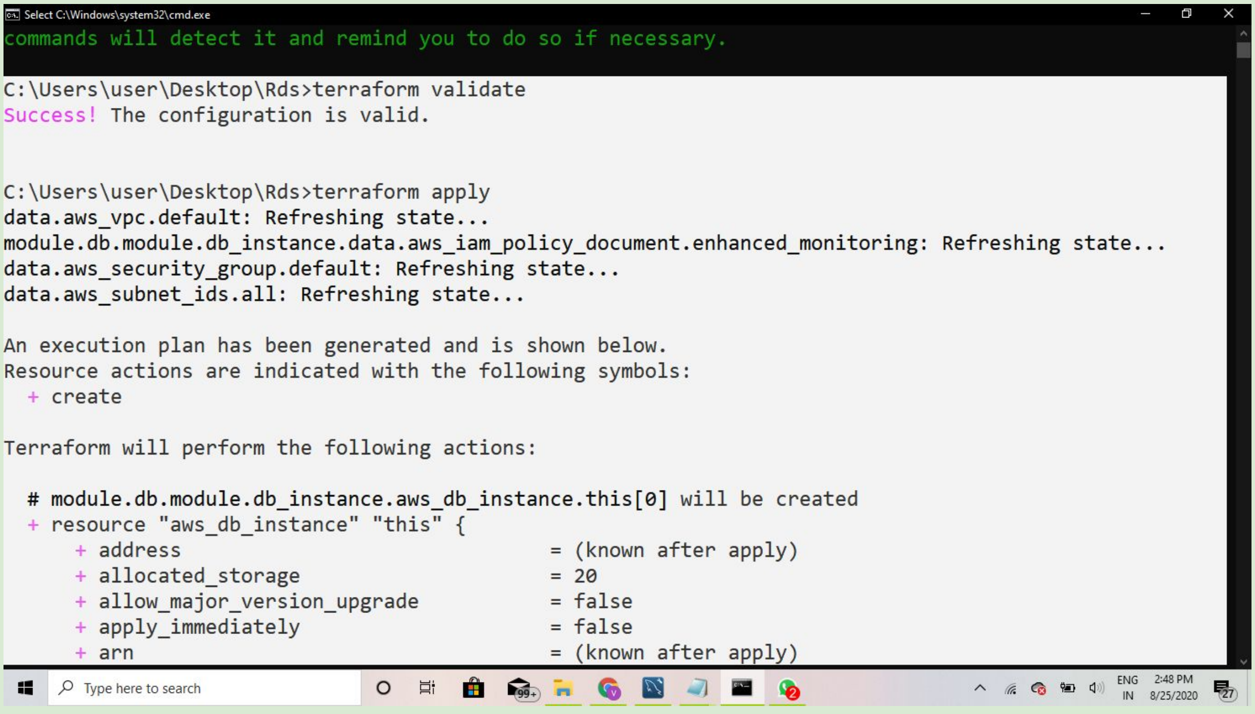
```
provider "aws" {
  access_key = var.AWS_ACCESS_KEY
  secret_key = var.AWS_SECRET_KEY
  region = var.AWS_REGION
}
```

Variable:

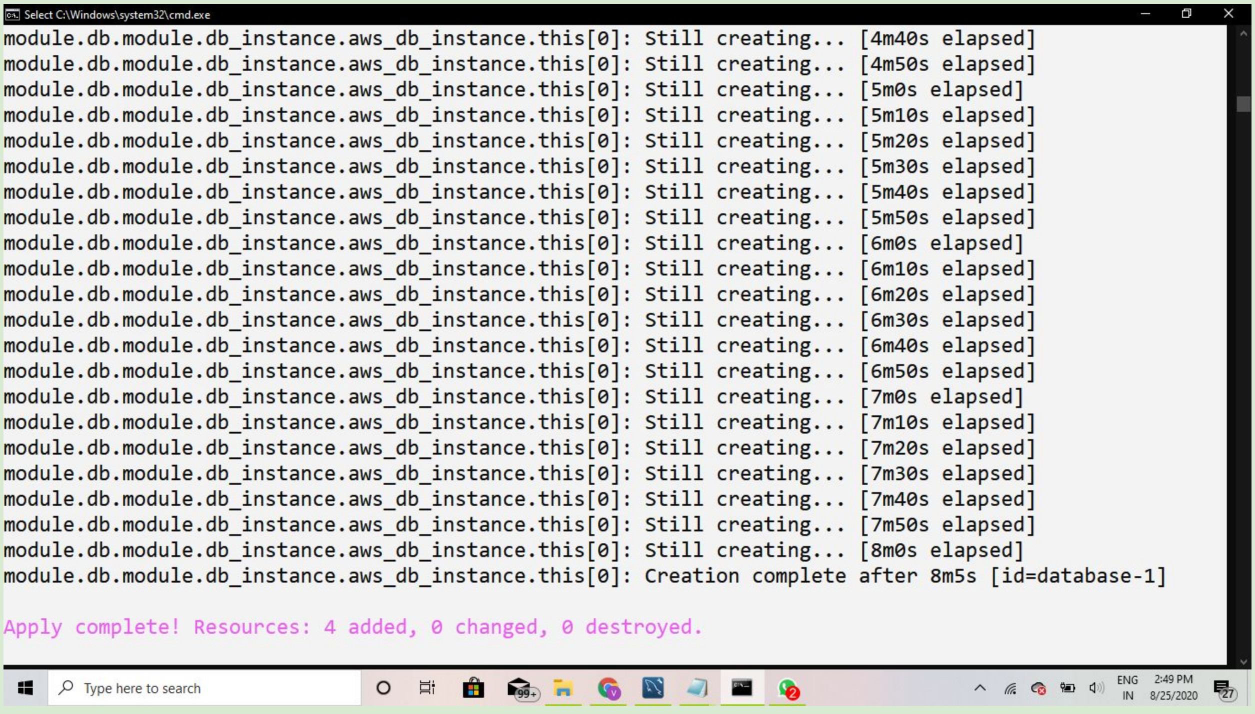
```
variable "AWS_ACCESS_KEY" {
default = "*************"
}
variable "AWS_SECRET_KEY" {
default = "*****************”
}
variable "AWS_REGION" {
default = "ap-south-1"
}
```



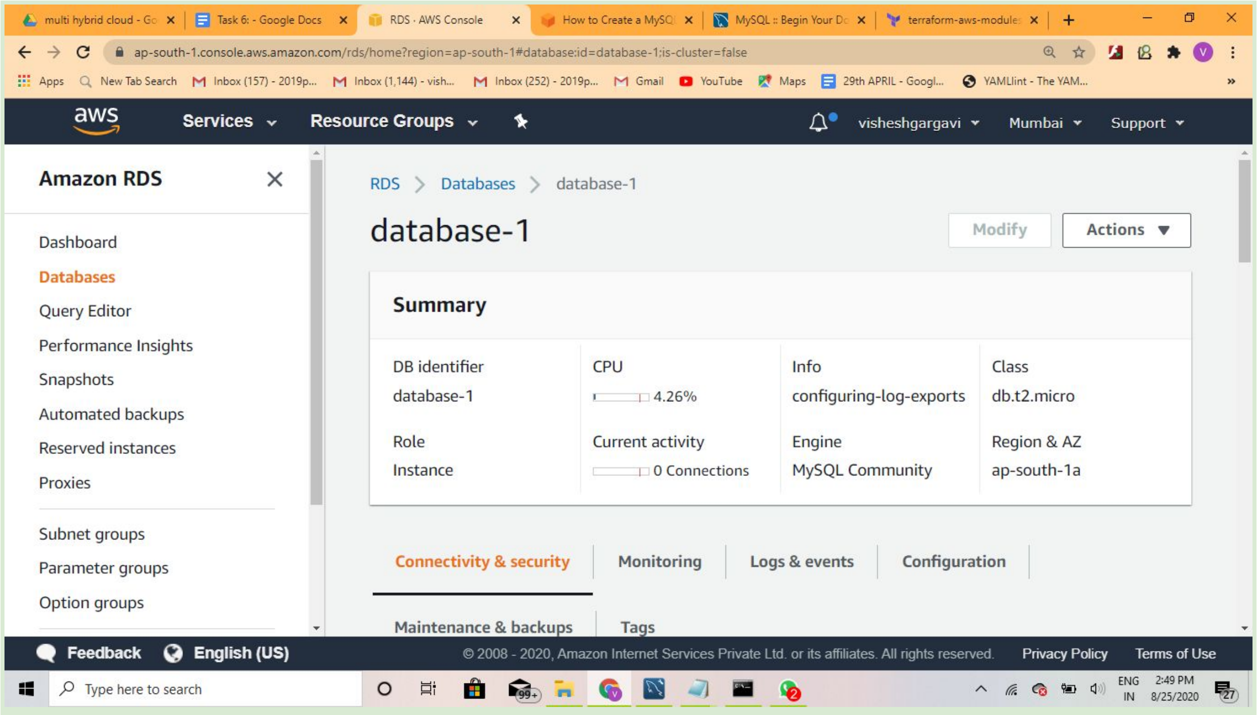
```
C:\Users\user\Desktop\Rds>terraform init
Initializing modules...
Downloading terraform-aws-modules/rds/aws 2.18.0 for db...
- db in .terraform\modules\db\terraform-aws-rds-2.18.0
- db.db_instance in .terraform\modules\db\terraform-aws-rds-2.18.0\modules\db_instance
- db.db_option_group in .terraform\modules\db\terraform-aws-rds-2.18.0\modules\db_option_group
- db.db_parameter_group in .terraform\modules\db\terraform-aws-rds-2.18.0\modules\db_parameter_group
- db.db_subnet_group in .terraform\modules\db\terraform-aws-rds-2.18.0\modules\db_subnet_group

Initializing the backend...

Initializing provider plugins...
- Checking for available provider plugins...
- Downloading plugin for provider "aws" (hashicorp/aws) 3.3.0...

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
```



```
commands will detect it and remind you to do so if necessary.

C:\Users\user\Desktop\Rds>terraform validate
Success! The configuration is valid.


C:\Users\user\Desktop\Rds>terraform apply
data.aws_vpc.default: Refreshing state...
module.db.module.db_instance.data.aws_iam_policy_document.enhanced_monitoring: Refreshing state...
data.aws_security_group.default: Refreshing state...
data.aws_subnet_ids.all: Refreshing state...

An execution plan has been generated and is shown below.
Resource actions are indicated with the following symbols:
  + create

Terraform will perform the following actions:

  # module.db.module.db_instance.aws_db_instance.this[0] will be created
  + resource "aws_db_instance" "this" {
      + address                               = (known after apply)
      + allocated_storage                     = 20
      + allow_major_version_upgrade           = false
      + apply_immediately                     = false
      + arn                                   = (known after apply)
```



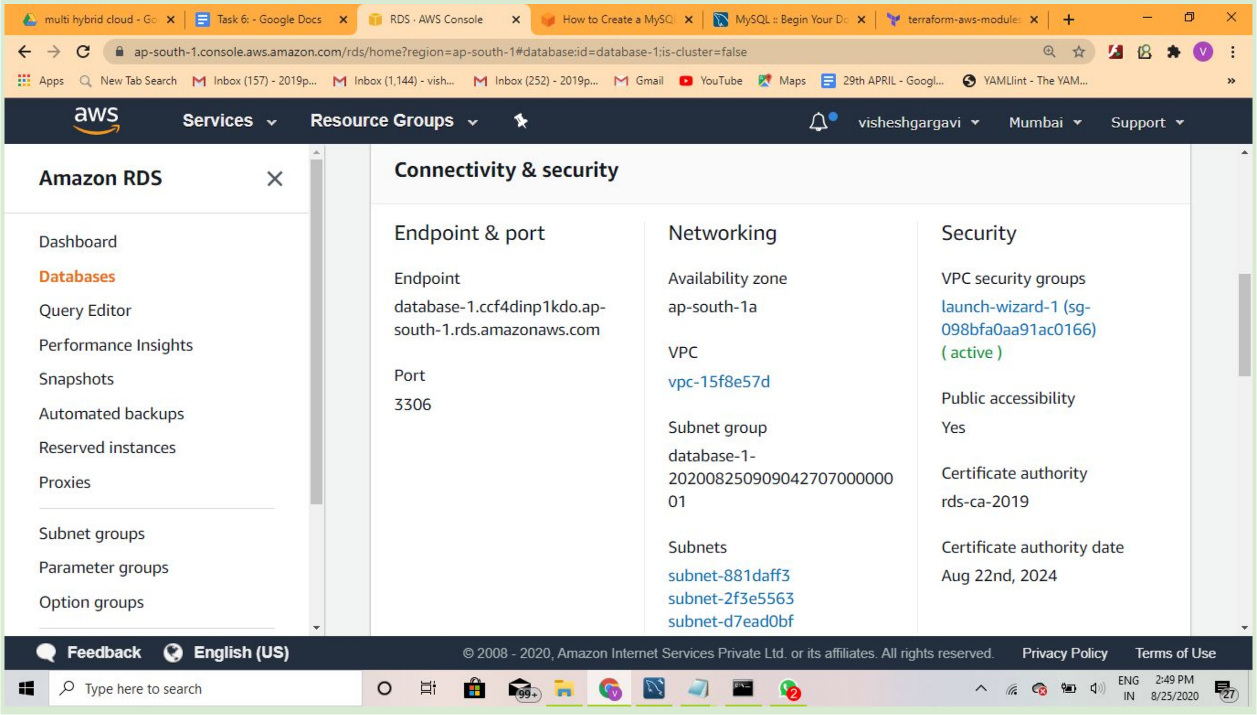
```
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [4m40s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [4m50s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [5m0s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [5m10s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [5m20s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [5m30s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [5m40s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [5m50s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [6m0s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [6m10s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [6m20s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [6m30s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [6m40s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [6m50s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [7m0s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [7m10s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [7m20s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [7m30s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [7m40s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [7m50s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Still creating... [8m0s elapsed]
module.db.module.db_instance.aws_db_instance.this[0]: Creation complete after 8m5s [id=database-1]

Apply complete! Resources: 4 added, 0 changed, 0 destroyed.
```



database-1

Summary

DB identifier	CPU	Info	Class
database-1	4.26%	configuring-log-exports	db.t2.micro
Role	Current activity	Engine	Region & AZ
Instance	0 Connections	MySQL Community	ap-south-1a



Connectivity & security

Endpoint & port

Endpoint
database-1.ccf4dinp1kdo.ap-south-1.rds.amazonaws.com

Port
3306

Networking

Availability zone
ap-south-1a

VPC
vpc-15f8e57d

Subnet group
database-1-2020082509090427070000001

Subnets
subnet-881daff3
subnet-2f3e5563
subnet-d7ead0bf

Security

VPC security groups
launch-wizard-1 (sg-098bfa0aa91ac0166)
(active)

Public accessibility
Yes

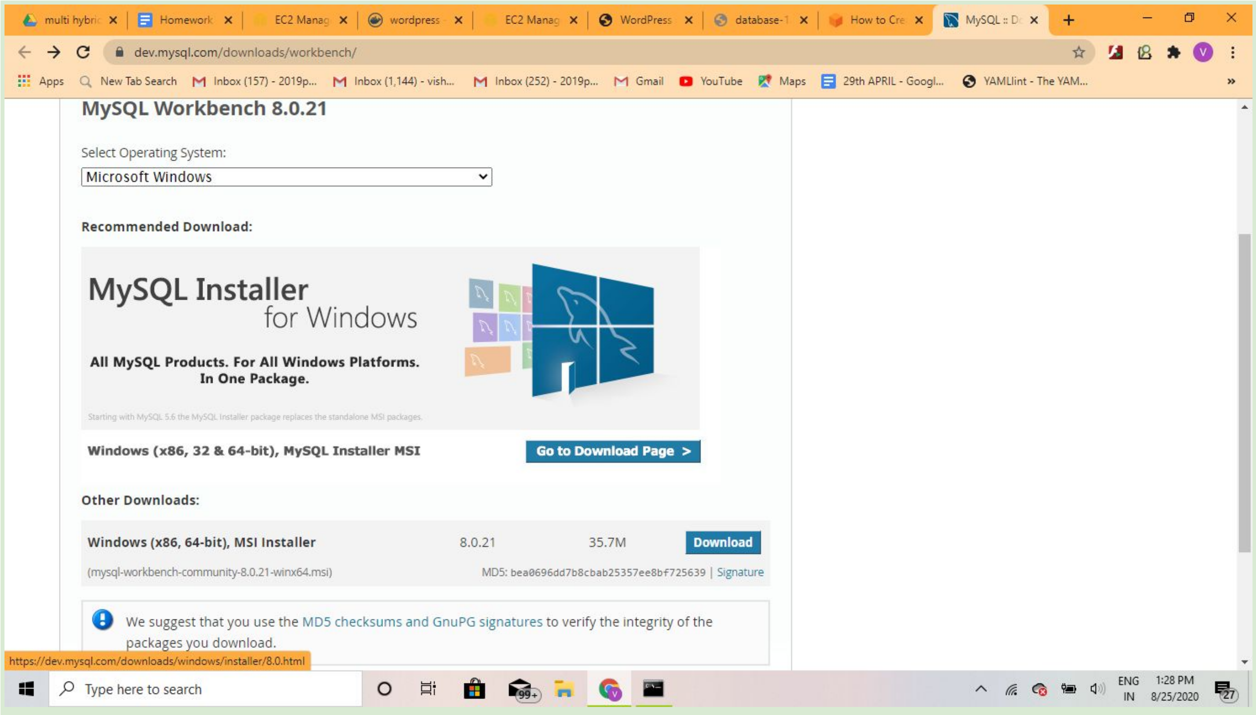
Certificate authority
rds-ca-2019

Certificate authority date
Aug 22nd, 2024

Step 2: Download a SQL Client

Once the database instance creation is complete and the status changes to available, you can connect to a database on the DB instance using any standard SQL client. In this step, we will download MySQL Workbench, which is a popular SQL client.

a. Go to the Download MySQL Workbench page to download and install MySQL Workbench. For more information on using MySQL, see the MySQL Documentation.
Note: Remember to run MySQL Workbench from the same device from which you created the DB Instance. The security group your database is placed in is configured to allow connection only from the device from which you created the DB instance.



dev.mysql.com/downloads/workbench/

MySQL Workbench 8.0.21

Select Operating System:

Microsoft Windows

Recommended Download:

MySQL Installer for Windows

All MySQL Products. For All Windows Platforms. In One Package.

Starting with MySQL 5.6 the MySQL Installer package replaces the standalone MSI packages.

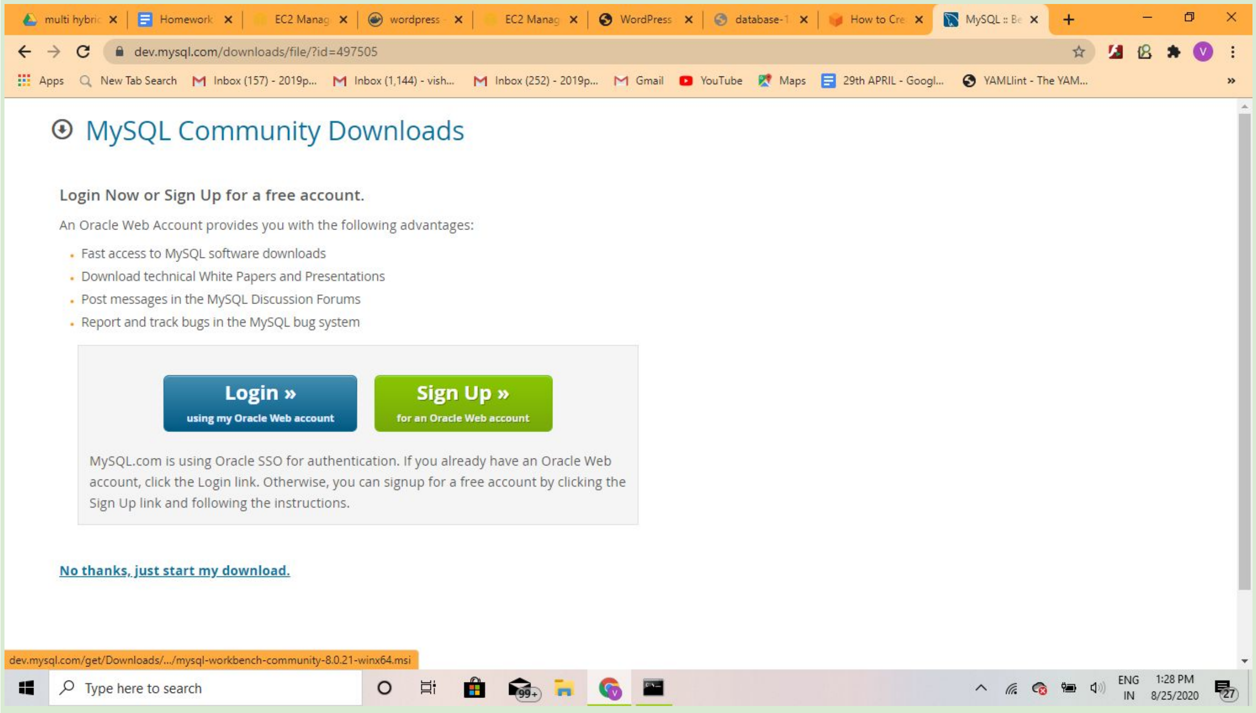
Windows (x86, 32 & 64-bit), MySQL Installer MSI

Other Downloads:

Windows (x86, 64-bit), MSI Installer	8.0.21	35.7M	Download
(mysql-workbench-community-8.0.21-winx64.msi)		MD5: bea0696dd7b8cbab25357ee8bf725639 | Signature	

We suggest that you use the MD5 checksums and GnuPG signatures to verify the integrity of the packages you download.

https://dev.mysql.com/downloads/windows/installer/8.0.html



dev.mysql.com/downloads/file/?id=497505

MySQL Community Downloads

Login Now or Sign Up for a free account.

An Oracle Web Account provides you with the following advantages:

- Fast access to MySQL software downloads
- Download technical White Papers and Presentations
- Post messages in the MySQL Discussion Forums
- Report and track bugs in the MySQL bug system

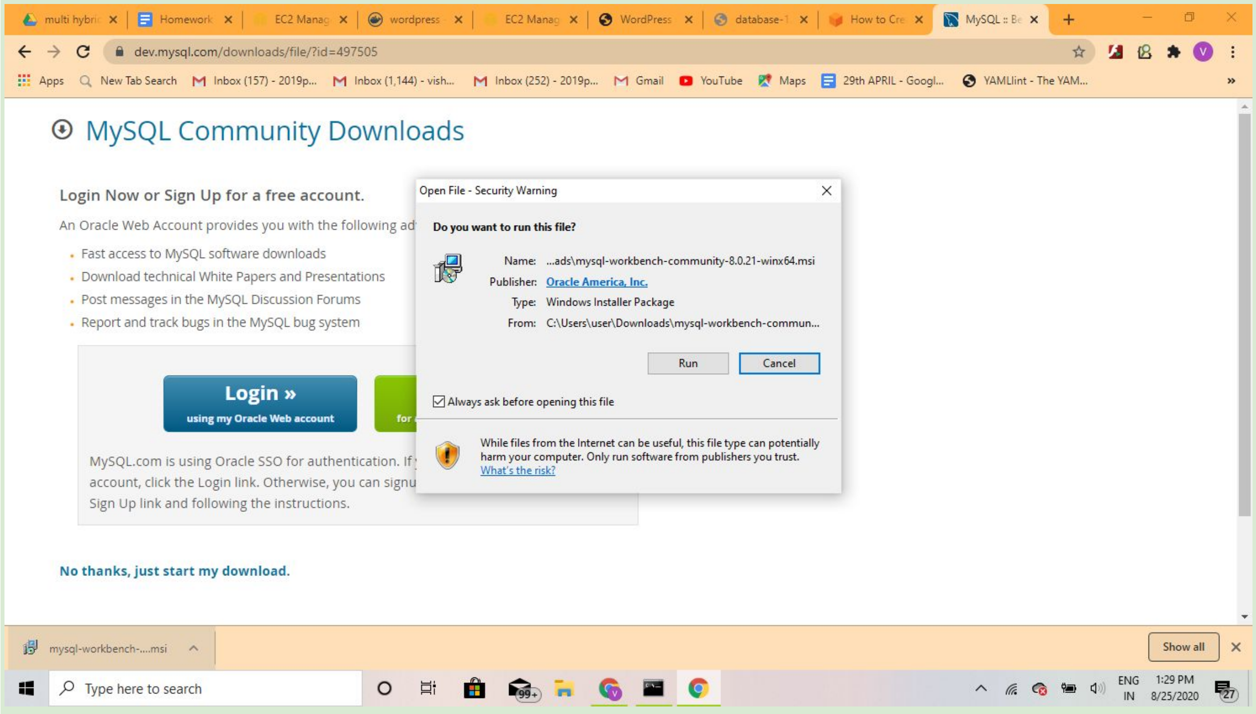
MySQL.com is using Oracle SSO for authentication. If you already have an Oracle Web account, click the Login link. Otherwise, you can signup for a free account by clicking the Sign Up link and following the instructions.

No thanks, just start my download.

dev.mysql.com/get/Downloads/.../mysql-workbench-community-8.0.21-winx64.msi

b. You will be prompted to login, sign up, or begin your download. You can click No thanks, just start my download for a quick download.

C. Installation Part


dev.mysql.com/downloads/file/?id=497505
MySQL Community Downloads
Login »
using my Oracle Web account
mysql-workbench-....msi
Show all
Type here to search
1:29 PM
8/25/2020

Login Now or Sign Up for a free account.

An Oracle Web Account provides you with the following ad

- Fast access to MySQL software downloads
- Download technical White Papers and Presentations
- Post messages in the MySQL Discussion Forums
- Report and track bugs in the MySQL bug system

MySQL.com is using Oracle SSO for authentication. If y account, click the Login link. Otherwise, you can signu Sign Up link and following the instructions.

No thanks, just start my download.

Open File - Security Warning

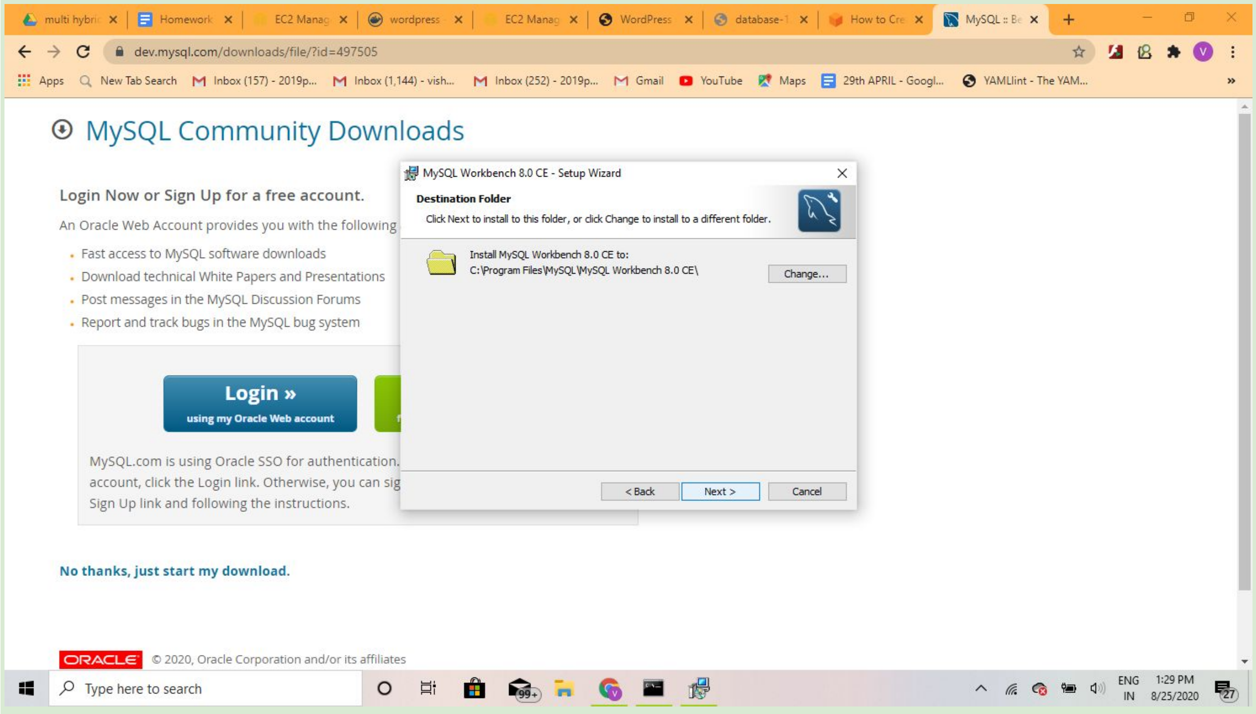
Do you want to run this file?

Name: ...ads\mysql-workbench-community-8.0.21-winx64.msi
Publisher: Oracle America, Inc.
Type: Windows Installer Package
From: C:\Users\user\Downloads\mysql-workbench-commun...

Run | Cancel

☑ Always ask before opening this file

While files from the Internet can be useful, this file type can potentially harm your computer. Only run software from publishers you trust. What's the risk?


dev.mysql.com/downloads/file/?id=497505
MySQL Community Downloads
Login »
using my Oracle Web account
ORACLE
© 2020, Oracle Corporation and/or its affiliates
Type here to search
1:29 PM
8/25/2020

MySQL Workbench 8.0 CE - Setup Wizard

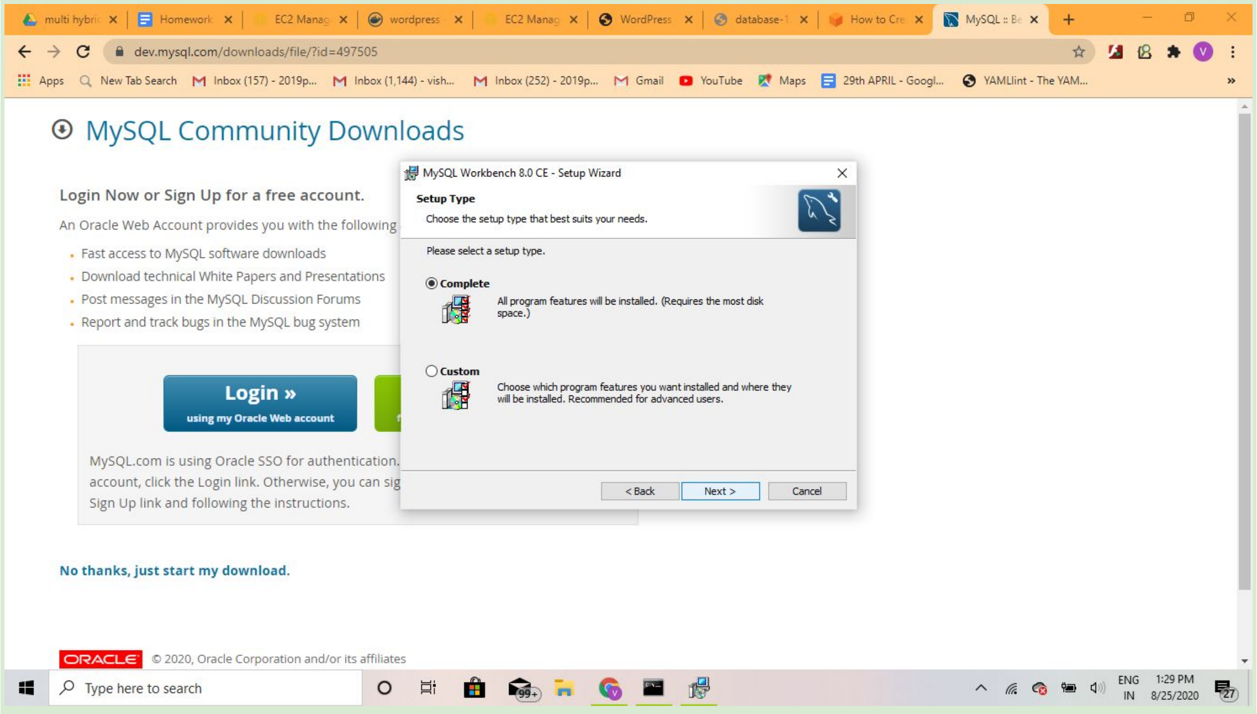
Destination Folder

Click Next to install to this folder, or click Change to install to a different folder.

Install MySQL Workbench 8.0 CE to:
C:\Program Files\MySQL\MySQL Workbench 8.0 CE\

Change...

< Back | Next > | Cancel



MySQL Community Downloads

Login Now or Sign Up for a free account.

An Oracle Web Account provides you with the following

- Fast access to MySQL software downloads
- Download technical White Papers and Presentations
- Post messages in the MySQL Discussion Forums
- Report and track bugs in the MySQL bug system

Login » using my Oracle Web account

MySQL.com is using Oracle SSO for authentication. account, click the Login link. Otherwise, you can sig Sign Up link and following the instructions.

No thanks, just start my download.

© 2020, Oracle Corporation and/or its affiliates

MySQL Workbench 8.0 CE - Setup Wizard

Setup Type

Choose the setup type that best suits your needs.

Please select a setup type.

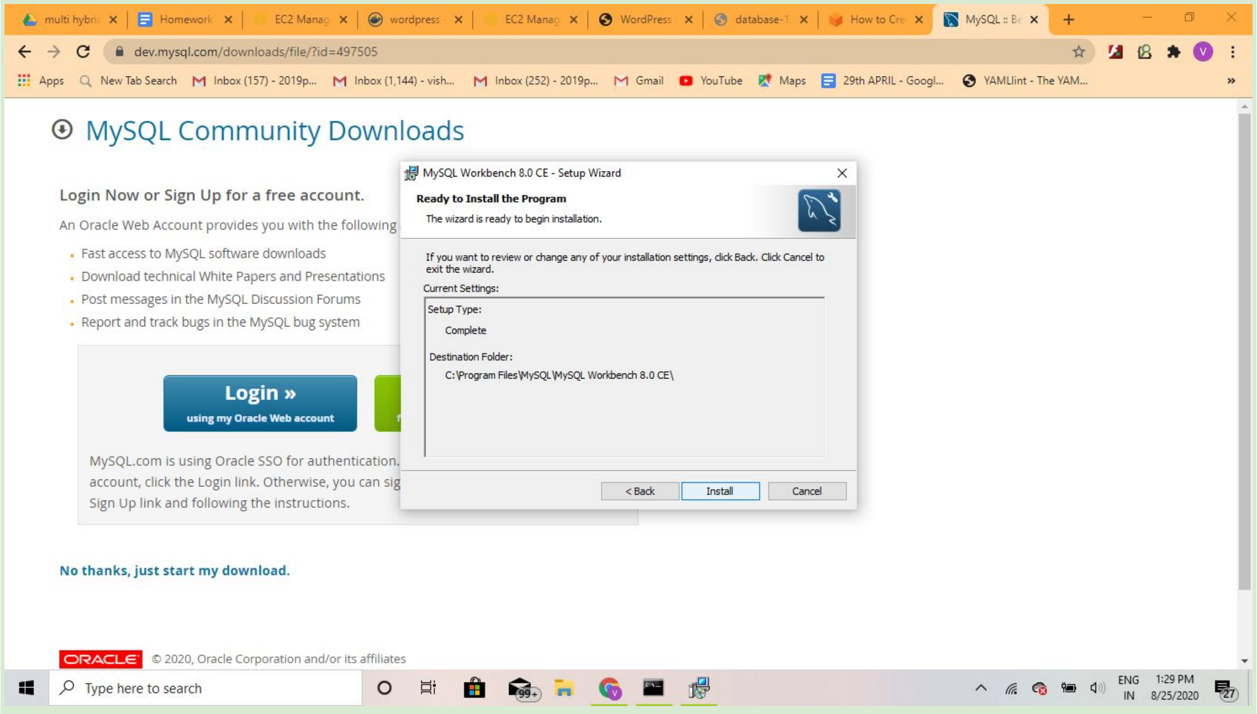
● Complete

All program features will be installed. (Requires the most disk space.)

○ Custom

Choose which program features you want installed and where they will be installed. Recommended for advanced users.

< Back | Next > | Cancel



MySQL Workbench 8.0 CE - Setup Wizard

Ready to Install the Program

The wizard is ready to begin installation.

If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.

Current Settings:

Setup Type:

Complete

Destination Folder:

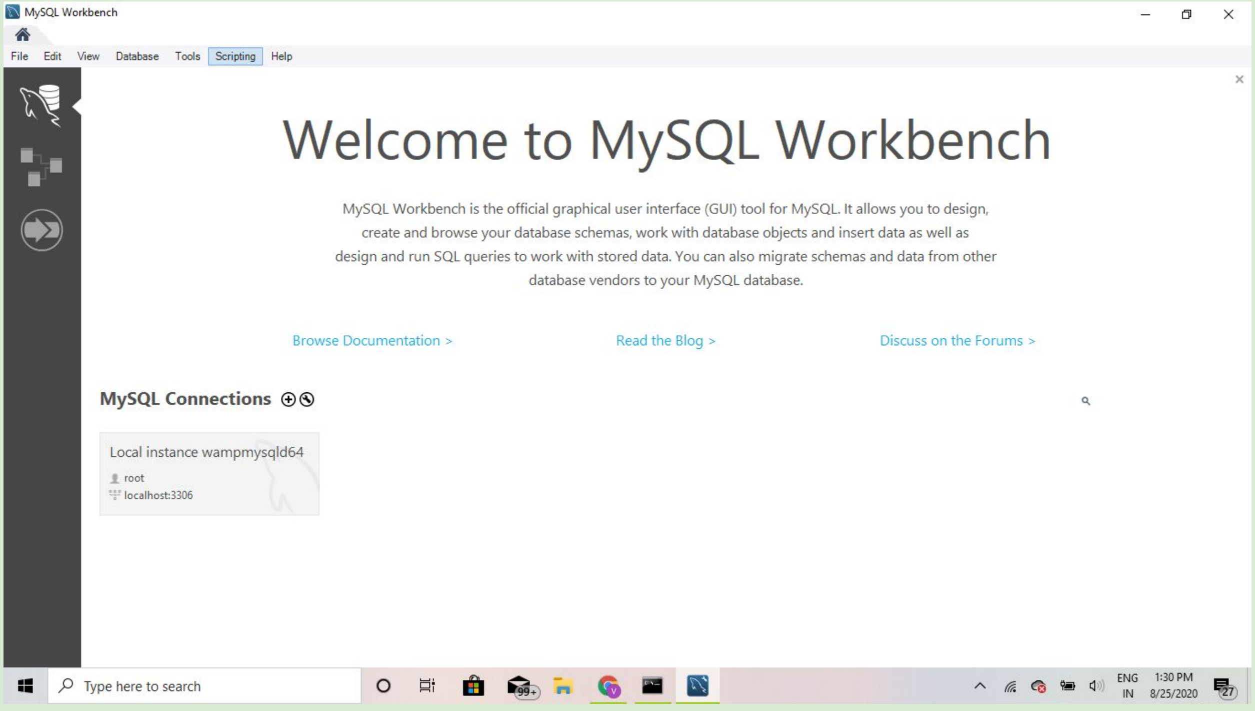
C:\Program Files\MySQL\MySQL Workbench 8.0 CE\

< Back | Install | Cancel

Step 3: Connect to the MySQL Database

In this step, we will connect to the database you created using MySQL Workbench.

a. Launch the MySQL Workbench application and go to Database > Connect to Database (Ctrl+U) from the menu bar.

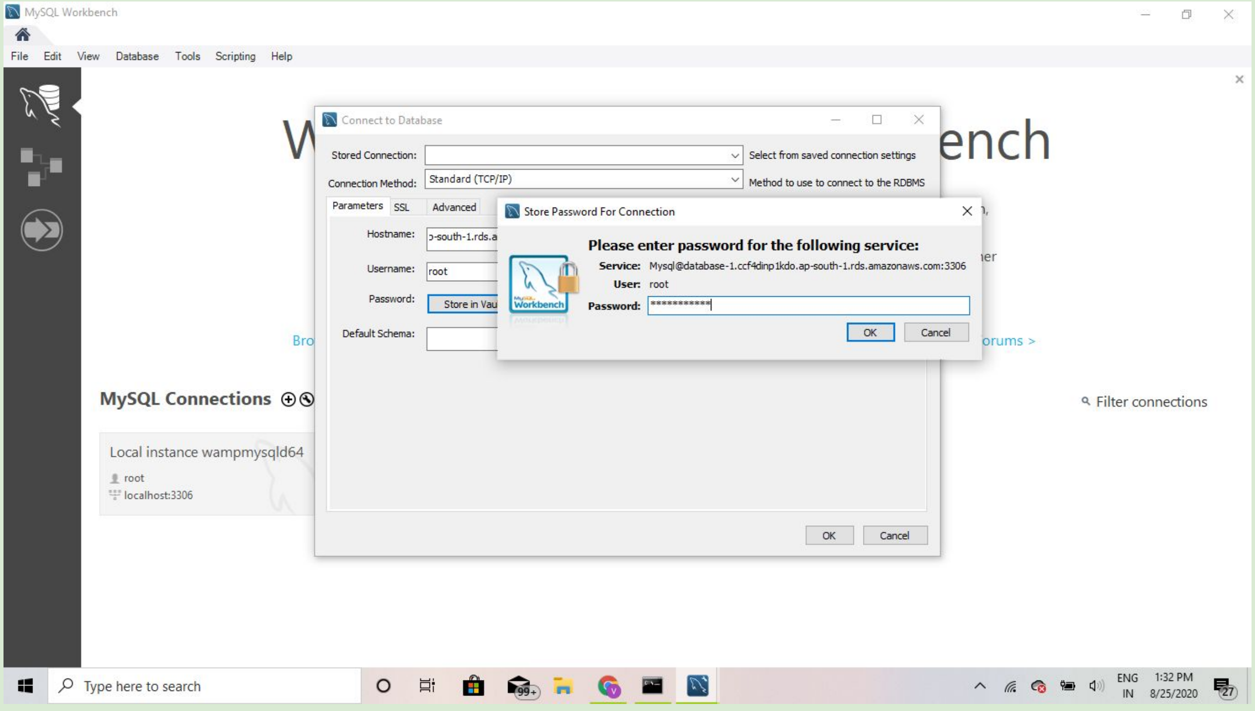


Welcome to MySQL Workbench

MySQL Workbench is the official graphical user interface (GUI) tool for MySQL. It allows you to design, create and browse your database schemas, work with database objects and insert data as well as design and run SQL queries to work with stored data. You can also migrate schemas and data from other database vendors to your MySQL database.

MySQL Connections

Local instance wampmysqld64
root
localhost:3306



Stored Connection: Select from saved connection settings

Connection Method: Standard (TCP/IP) Method to use to connect to the RDBMS

Hostname: ɔ-south-1.rds.a

Username: root

Password:

Default Schema:

Please enter password for the following service:

Service: Mysql@database-1.ccf4dinp1kdo.ap-south-1.rds.amazonaws.com:3306

User: root

Password: ************

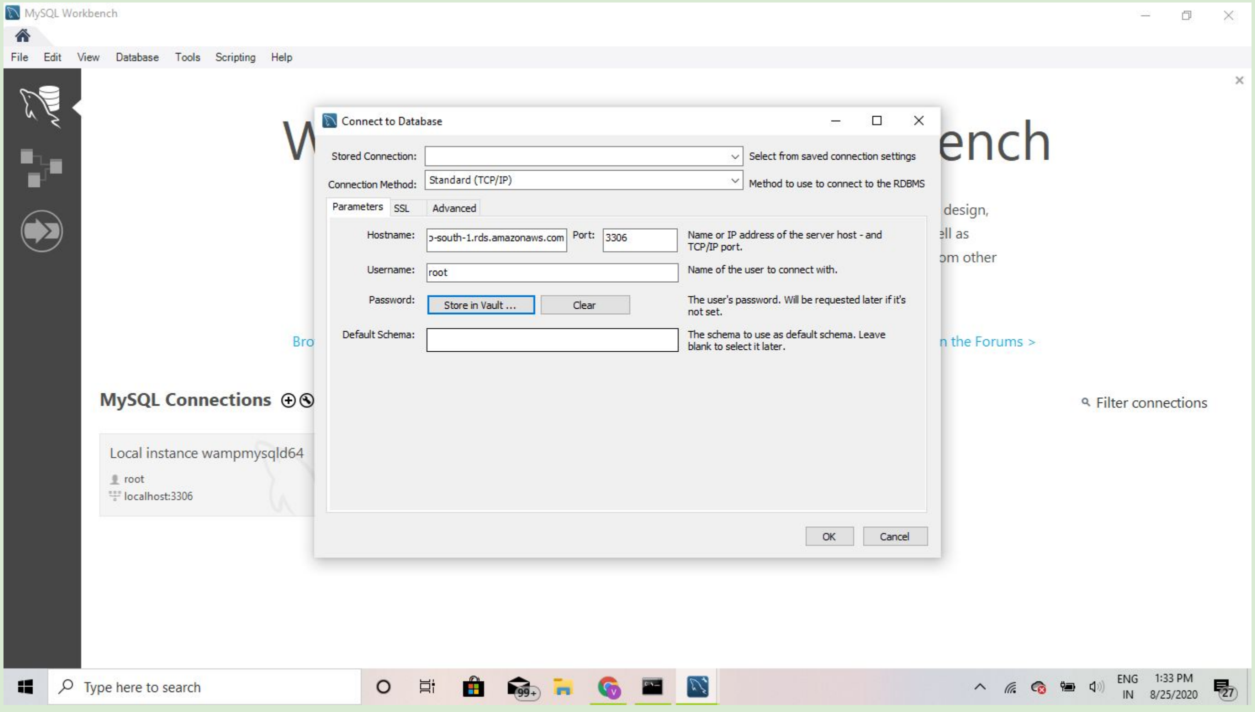
MySQL Connections

Local instance wampmysqld64
root
localhost:3306

b. A dialog box appears. Enter the following:

- **Hostname: You can find your hostname on the Amazon RDS console as shown in the screenshot to the right.**
- **Port: The default value should be 3306.**
- **Username: Type in the username you created for the Amazon RDS database. In this tutorial, it is 'masterUsername.'**
- **Password: Click Store in Vault (or Store in Keychain on macOS) and enter the password that you used when creating the Amazon RDS database.**

Click OK



Connect to Database

Stored Connection: Select from saved connection settings

Connection Method: Standard (TCP/IP) Method to use to connect to the RDBMS

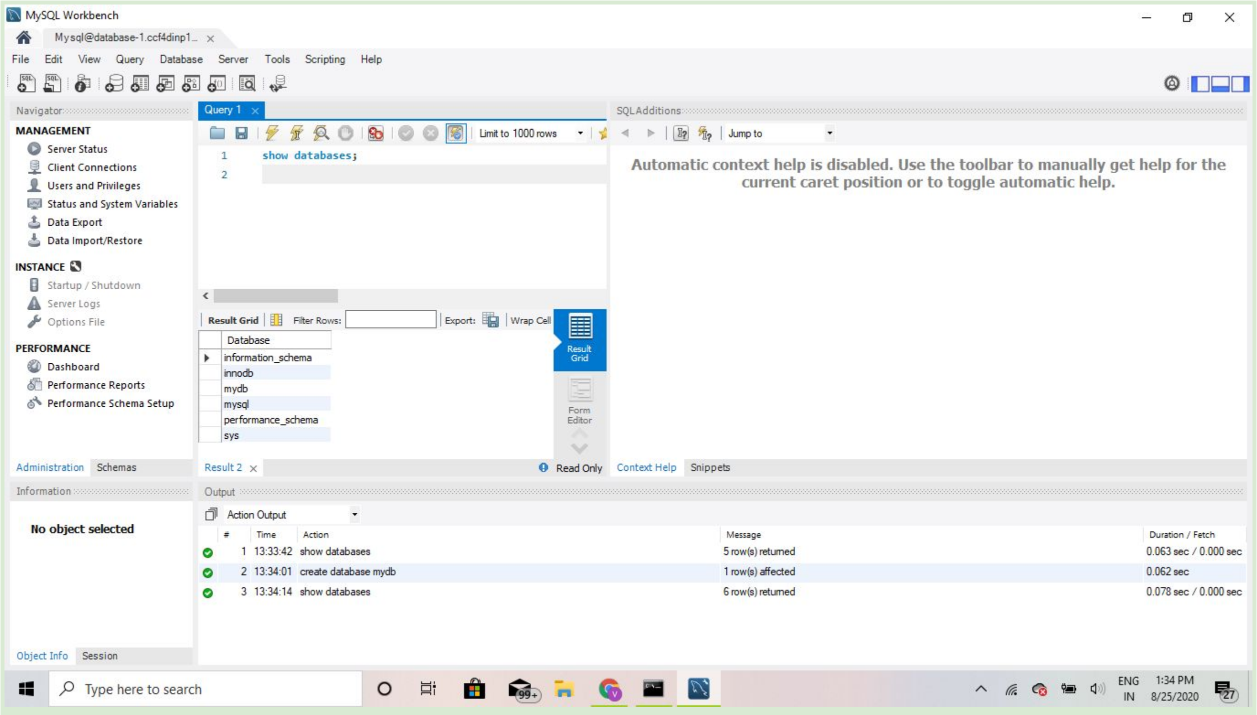
Hostname: ɔ-south-1.rds.amazonaws.com Port: 3306 Name or IP address of the server host - and TCP/IP port.

Username: root Name of the user to connect with.

Password: Store in Vault ... Clear The user's password. Will be requested later if it's not set.

Default Schema: The schema to use as default schema. Leave blank to select it later.

c. You are now connected to the database! On the MySQL Workbench, you will see various schema objects available in the database. Now you can start creating tables, insert data, and run queries.

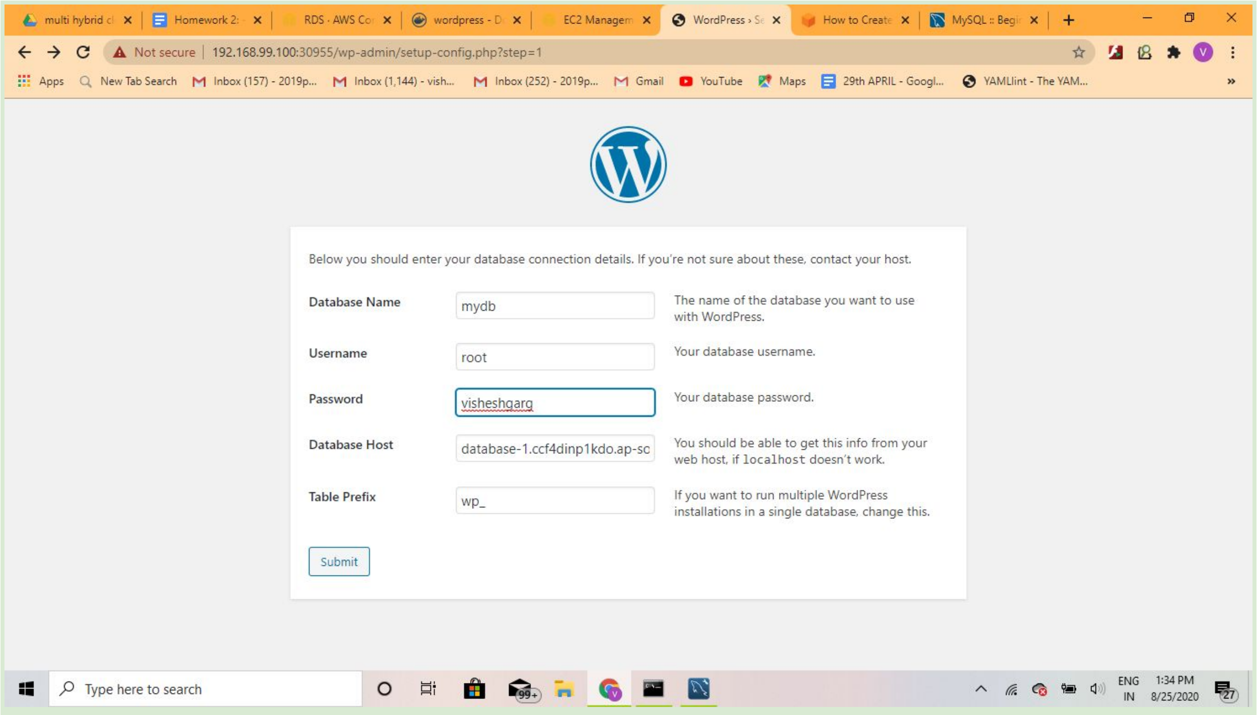


```
show databases;
```

Database
information_schema
innodb
mydb
mysql
performance_schema
sys

#	Time	Action	Message	Duration / Fetch
1	13:33:42	show databases	5 row(s) returned	0.063 sec / 0.000 sec
2	13:34:01	create database mydb	1 row(s) affected	0.062 sec
3	13:34:14	show databases	6 row(s) returned	0.078 sec / 0.000 sec

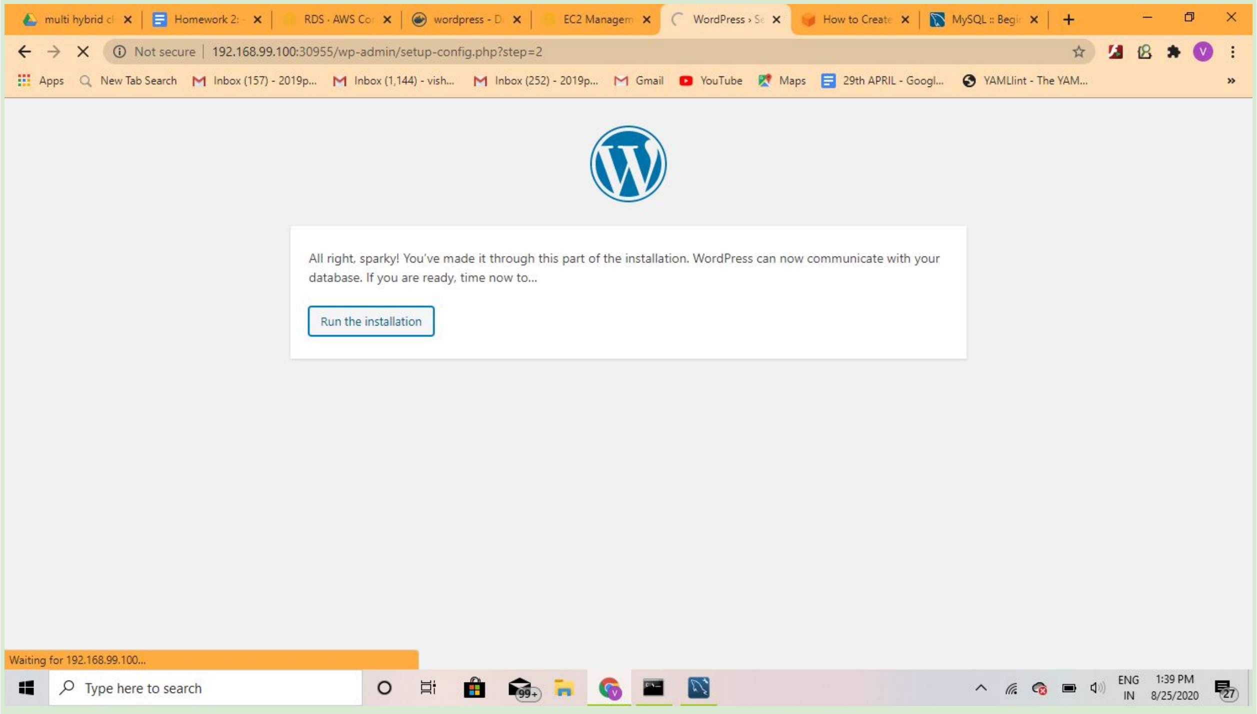
Output:



Below you should enter your database connection details. If you're not sure about these, contact your host.

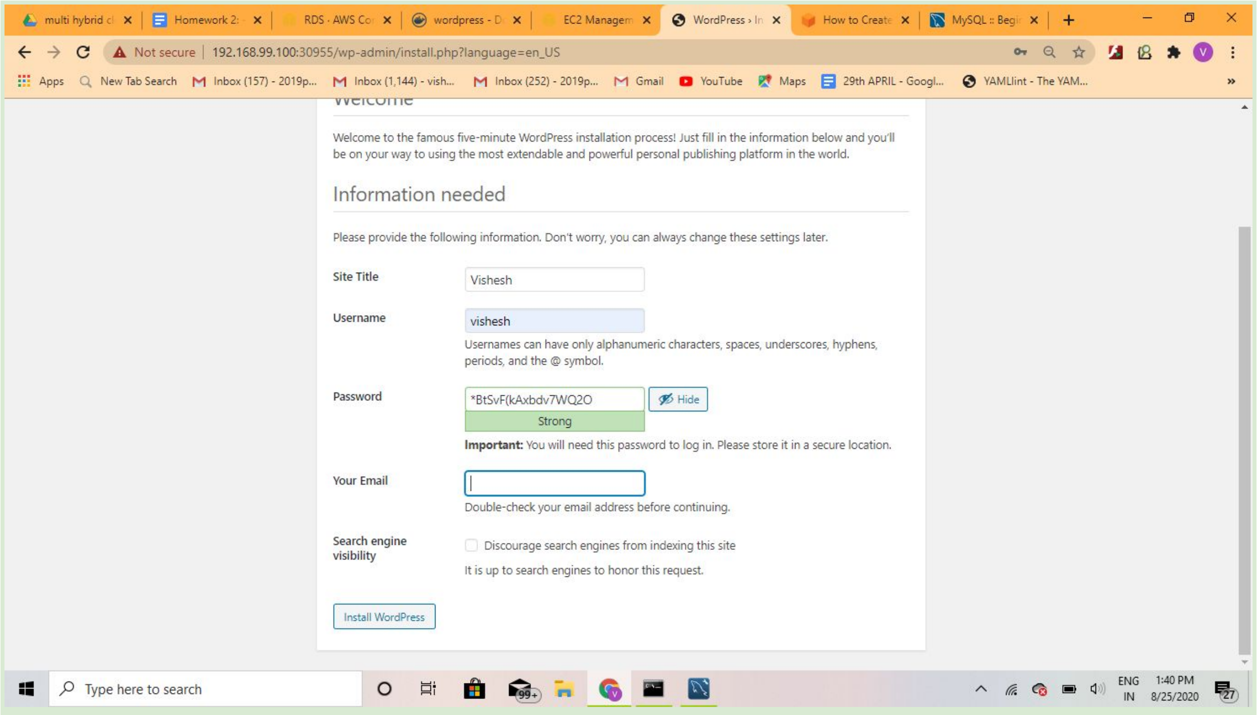
Database Name	mydb	The name of the database you want to use with WordPress.
Username	root	Your database username.
Password	visheshgarg	Your database password.
Database Host	database-1.ccf4dinp1kdo.ap-sc	You should be able to get this info from your web host, if `localhost` doesn't work.
Table Prefix	wp_	If you want to run multiple WordPress installations in a single database, change this.

Submit



All right, sparky! You've made it through this part of the installation. WordPress can now communicate with your database. If you are ready, time now to…

Run the installation



Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Don't worry, you can always change these settings later.

Site Title: Vishesh

Username: vishesh

Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password: *BtSvF(kAxbdv7WQ2O Hide

Strong

Important: You will need this password to log in. Please store it in a secure location.

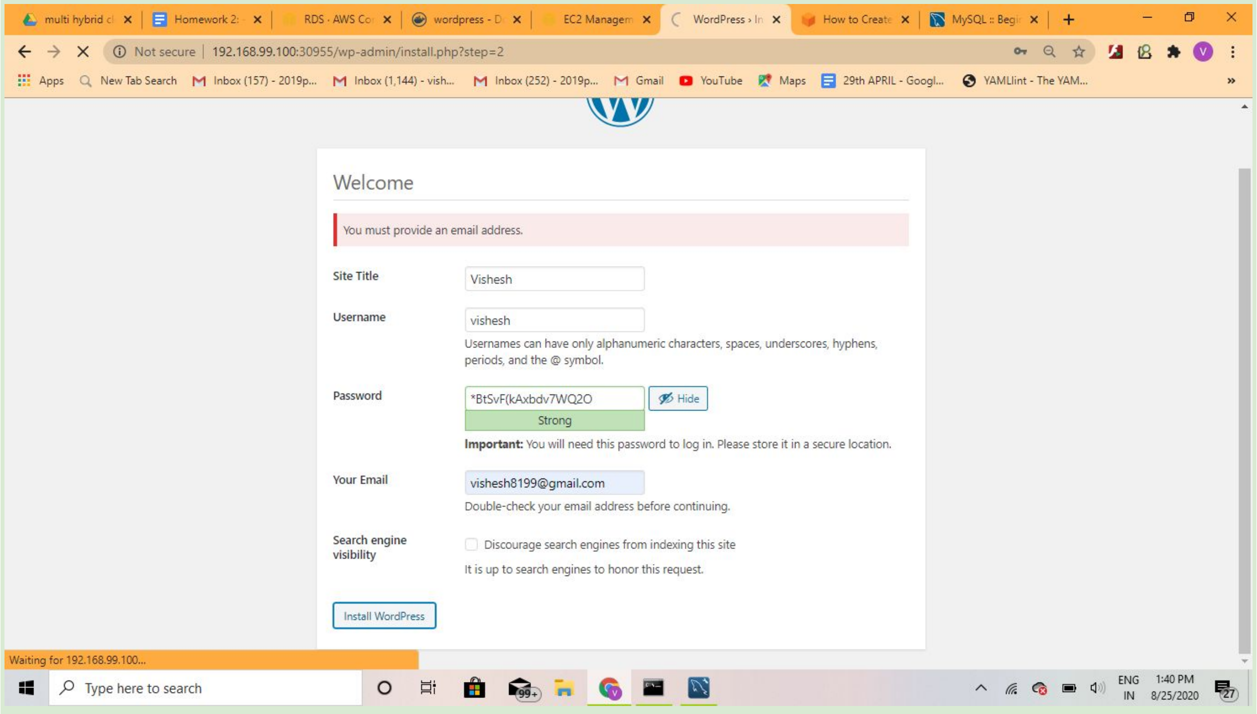
Your Email:

Double-check your email address before continuing.

Search engine visibility: □ Discourage search engines from indexing this site

It is up to search engines to honor this request.

Install WordPress



Welcome

You must provide an email address.

Site Title: Vishesh

Username: vishesh

Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password: *BtSvF(kAxbdv7WQ2O Hide

Strong

Important: You will need this password to log in. Please store it in a secure location.

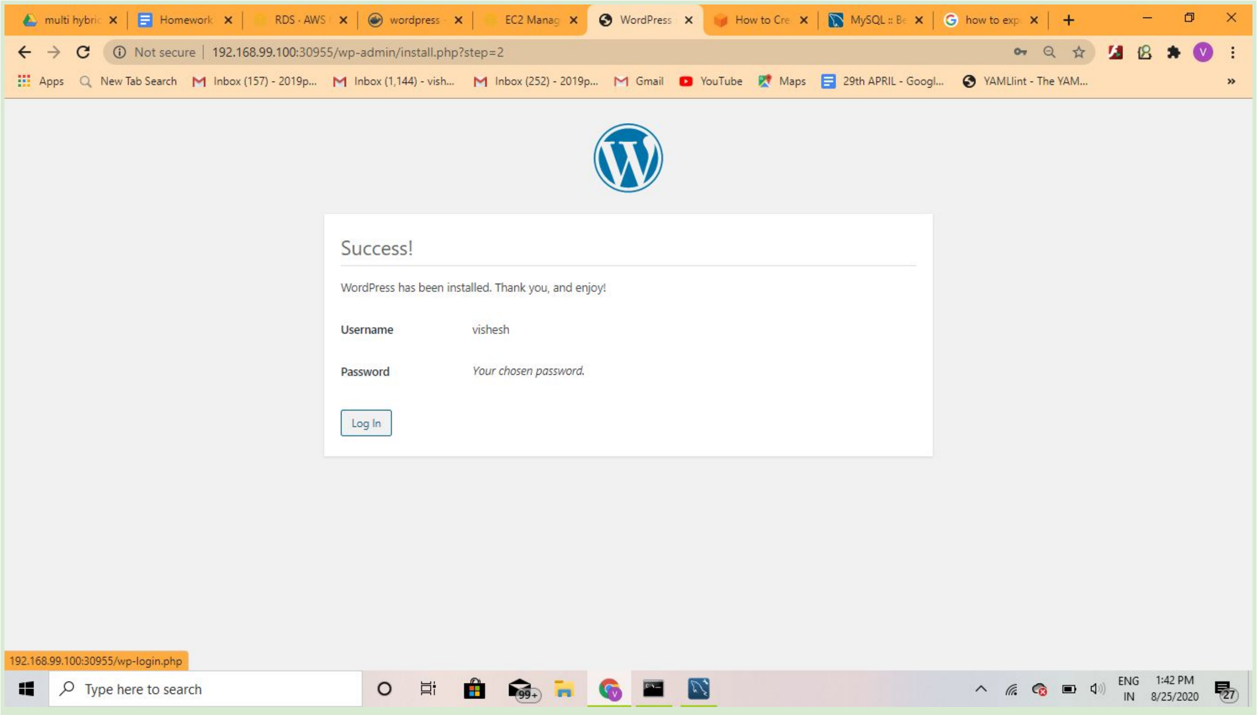
Your Email: vishesh8199@gmail.com

Double-check your email address before continuing.

Search engine visibility: □ Discourage search engines from indexing this site

It is up to search engines to honor this request.

Install WordPress



192.168.99.100:30955/wp-admin/install.php?step=2

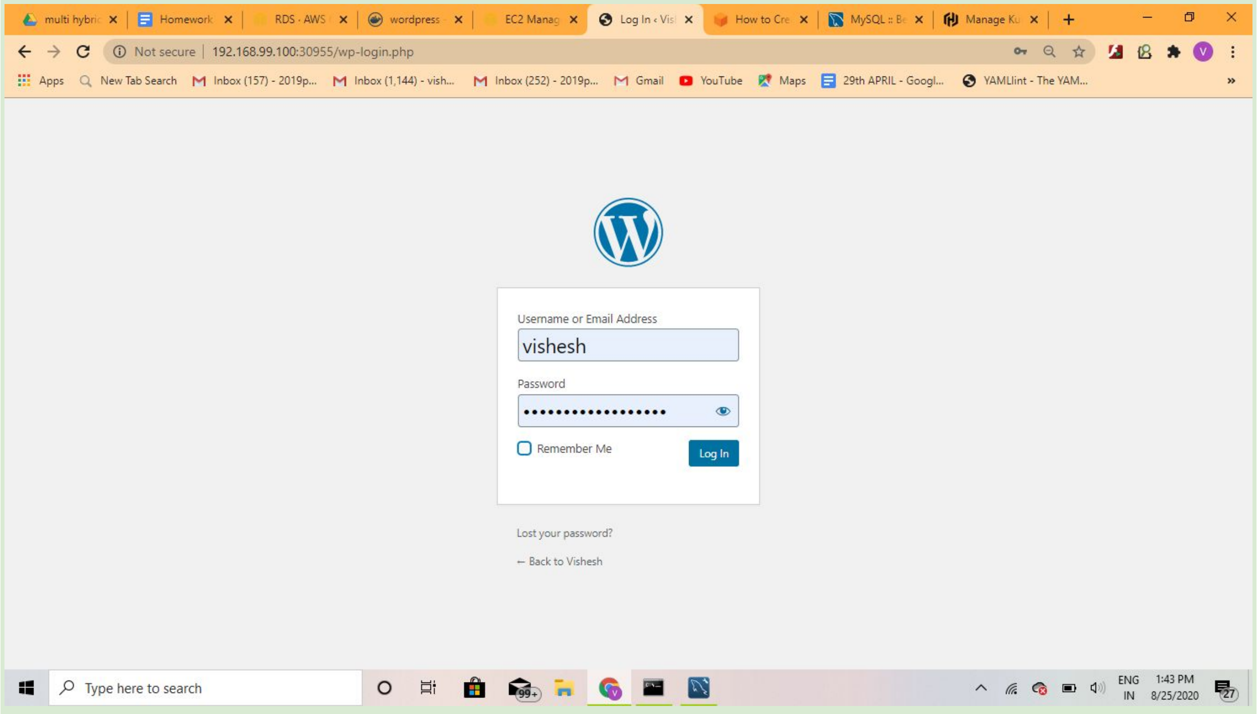
Success!

WordPress has been installed. Thank you, and enjoy!

Username	vishesh
Password	*Your chosen password.*

Log In

192.168.99.100:30955/wp-login.php



192.168.99.100:30955/wp-login.php

Username or Email Address

vishesh

Password

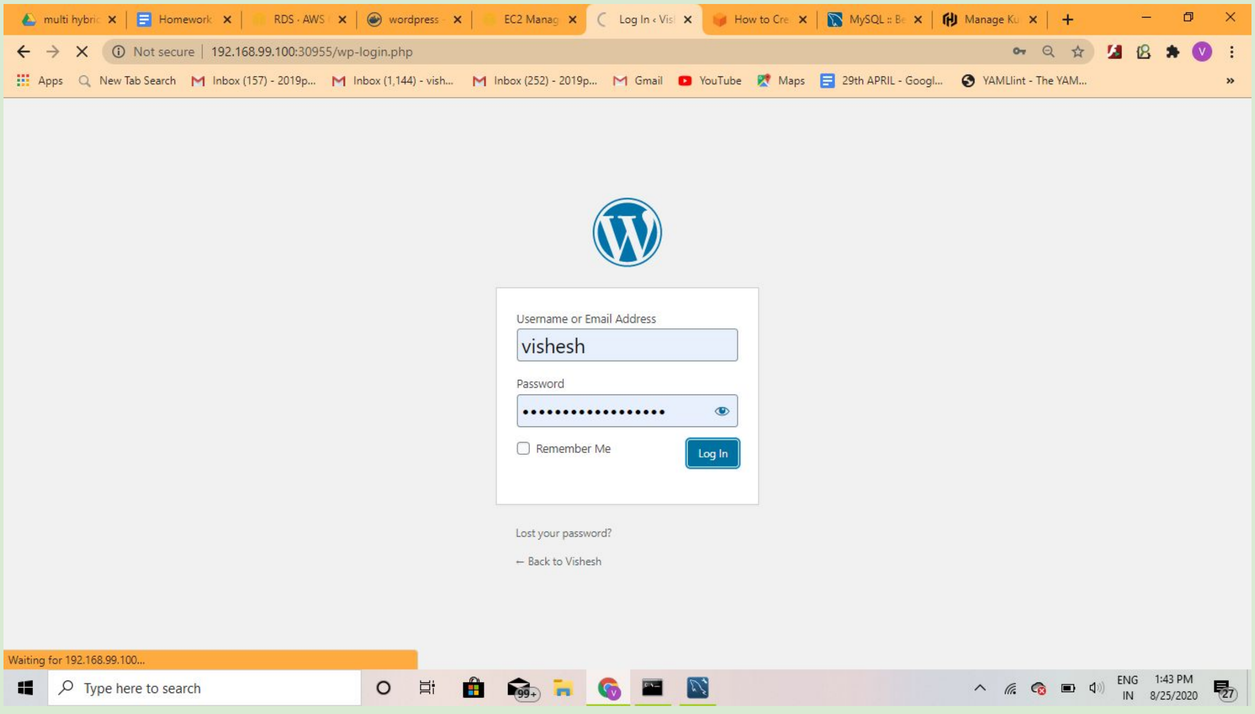
••••••••••••••••••

□ Remember Me

Log In

Lost your password?

← Back to Vishesh



Not secure | 192.168.99.100:30955/wp-login.php

Username or Email Address

vishesh

Password

••••••••••••••••••

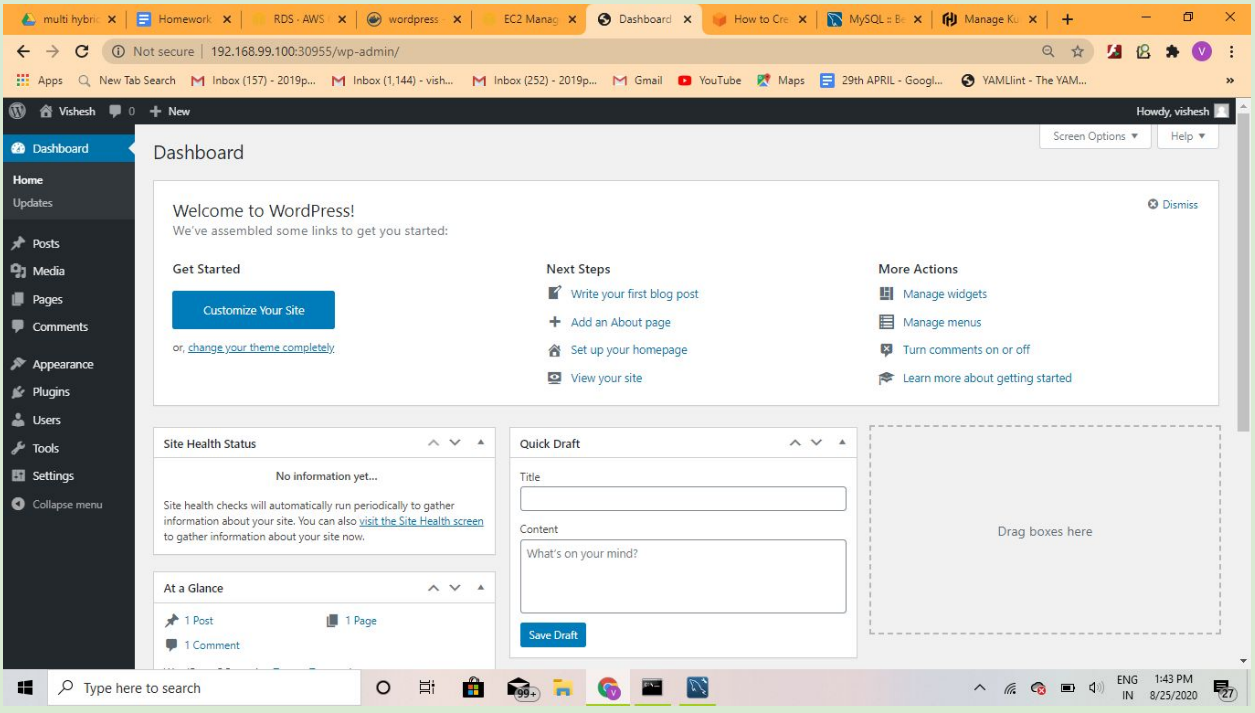
□ Remember Me

Log In

Lost your password?

← Back to Vishesh

Waiting for 192.168.99.100...



Not secure | 192.168.99.100:30955/wp-admin/

Dashboard

Welcome to WordPress!

We've assembled some links to get you started:

Dismiss

Get Started

Customize Your Site

or, change your theme completely

Next Steps

- Write your first blog post
- Add an About page
- Set up your homepage
- View your site

More Actions

- Manage widgets
- Manage menus
- Turn comments on or off
- Learn more about getting started

Site Health Status

No information yet...

Site health checks will automatically run periodically to gather information about your site. You can also visit the Site Health screen to gather information about your site now.

Quick Draft

Title

Content

What's on your mind?

Save Draft

Drag boxes here

At a Glance

1 Post

1 Page

1 Comment