Ecommerce Website deployment on AWS

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Abstraction

Firstly, I uploaded our HTML, CSS, and JavaScript files to a S3 bucket. This bucket serves as a secure and scalable storage solution for storing our web files. Next, I then create an IAM (identity and access management) Role in order for our EC2 instance to have full access and control over the S3 buckets. Then, we start creating our EC2 instance and assigning it to VPC for security measures and protocols, and then I SSH connect to the instance and ensure installing all the software packages needed for the deployment of our websites. Then we grab our S3 stored web files through the EC2 terminal.

By following these steps, we can access our web files that we stored in our S3 bucket through our EC2 instance. This means that we finally have our e-commerce website hosted on the cloud.

Services and components used

Amazon S3

AWS S3 (Amazon Simple Storage Service) is a scalable object storage service provided by Amazon Web Services (AWS).

It provides users, developers, and businesses with a secure, durable, and highly available storage option used to store and retrieve any amount of data at any time.

Overall, AWS S3 is a flexible and highly reliable storage service suitable for many use cases, including backup and recovery, data archiving, content delivery, data warehousing, data, application data storage, and static web hosting.

Amazon EC2 (elastic cloud compute)

Amazon EC2 is a web service that provides scalable compute in the cloud. It allows users to rent virtual servers, called instances, to run their applications. EC2 instances can be launched with a variety of CPU, memory, storage, and network capacity configurations, providing flexibility and scalability for different workloads.

Users have full control over their instances, including choice of operating system, security settings, and software stack. EC2 is commonly used for hosting websites, running applications, batch processing, etc.

MobaXterm

MobaXterm is a comprehensive software tool for remote computing tasks. It is a powerful solution for system administrators, developers, and IT professionals who need to integrate various networking tools into a single application and access and manage remote servers, computers, or devices.

We are going to use MobaXterm to connect to our EC2 instance to simplify the process of installing the software packages needed for the deployment.

Amazon RDS (relational database service)

Amazon RDS is a managed relational database service that makes it easy to set up, operate, and scale relational databases in the cloud. It supports several popular database engines, including MySQL, PostgreSQL, Oracle, SQL Server, and Amazon Aurora. With RDS, AWS handles common database management tasks such as provisioning, patching, backup, and replication, allowing users to focus on their applications instead of infrastructure management. RDS offers security, durability, and high availability features, making it suitable for many database workloads.

SQLectron

SQLectron is an open-source SQL client that gives a user-friendly interface for connection with different SQL databases. It is planned to be a lightweight and easy-to-use application, permitting clients to oversee and inquiry their databases without requiring heavy, complex setups.

Amazon VPC (virtual private cloud)

Amazon VPC is a virtual networking service that allows users to provision a logically isolated portion of the AWS cloud, including their own IP address ranges, subnets, routing tables, and network gateways. VPC allows users to launch AWS resources, such as EC2 instances and RDS databases, in a virtual network that closely resembles a traditional data centre environment. Users have granular control over network configuration, including the ability to define security groups and network access control lists (ACLs) to restrict access to resources.

IAM (identity and access management)

IAM (Identity and Access Management) is a key service in the AWS ecosystem, allowing users to securely manage access to their resources. It makes it easy to create and manage users and groups, allowing effective organization and delegation of authority. These permissions, defined through policies, provide granular control over access, and allowed actions on AWS resources. IAM roles further improve flexibility by allowing access authorization without the need to share long-term credentials.

Architecture

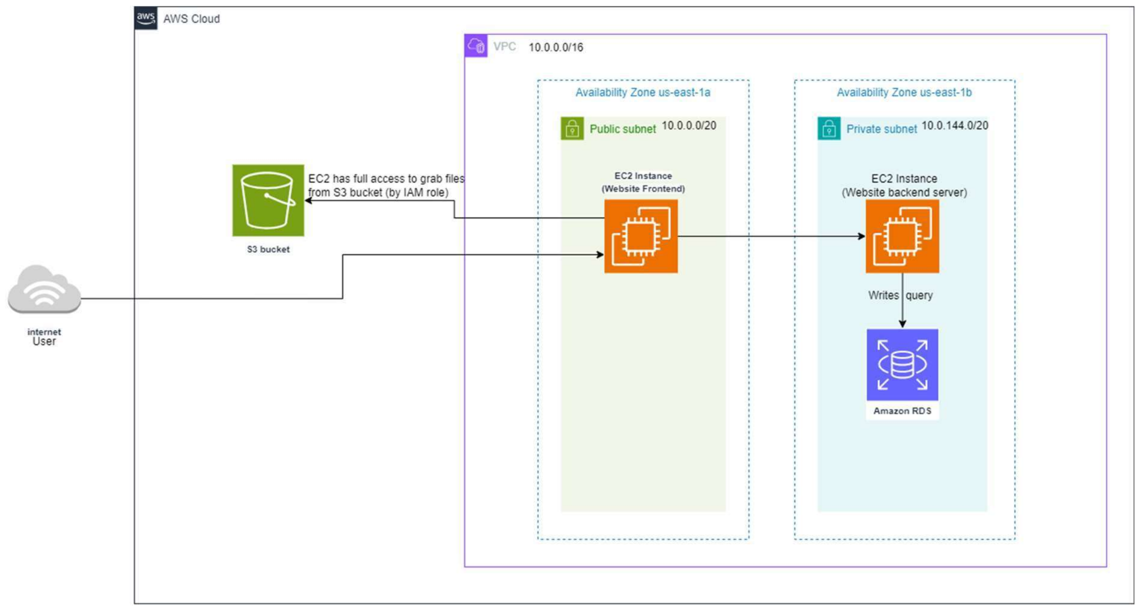

AWS Cloud
VPC 10.0.0.0/16
Availability Zone us-east-1a
Availability Zone us-east-1b
Public subnet 10.0.0.0/20
Private subnet 10.0.144.0/20
EC2 Instance (Website Frontend)
EC2 Instance (Website backend server)
EC2 has full access to grab files from S3 bucket (by IAM role)
S3 bucket
Writes | query
Amazon RDS
internet User

Figure 1 - Project Architecture

We are going to deploy the RDS and Backend server instances in the private subnet of our VPC as it would be more secure, and as the S3 is a global service it would not have a declared region, it would normally reside out of the VPC's scope.

Deploying the Frontend EC2 instance in the public subnet as the users visiting the website would be granted access.

design decisions

We have used a VPC to secure our cloud network from unauthorized access.

We have selected AWS EC2 instances as our website's frontend and backend server as EC2 gives us the freedom to install the software packages of our choice.

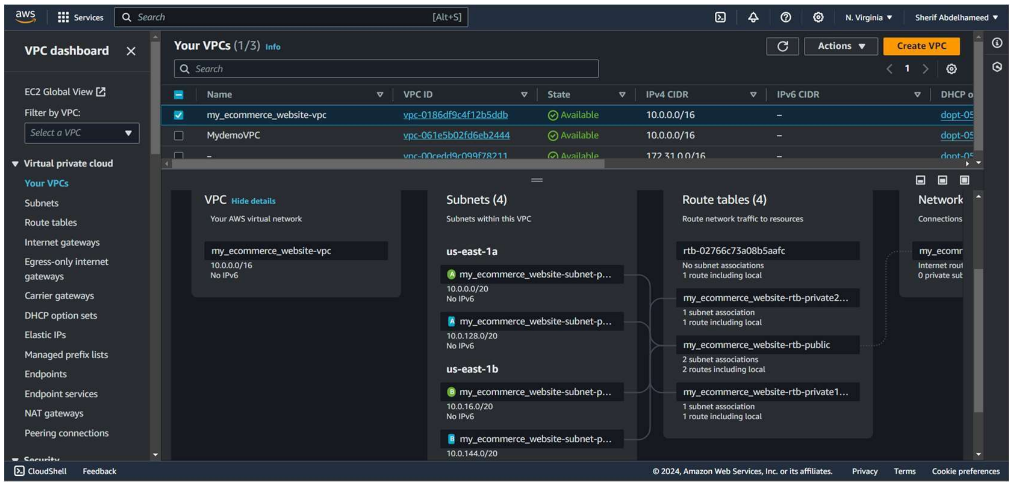
We have used amazon S3 to able to store my web-files, as S3 is a durable and highly available storage solution, I have assigned my EC2 instance a 'FULLS3BUCKETACCESS' role in order to be able to connect to the s3 bucket on my instance's console.

We have used Amazon RDS to host our database, as it is highly scalable, available and has a user-friendly interface, also as our database was relational and runs on mySQL engine it was the perfect choice for database hosting.

implementation details

VPC - Virtual Private Cloud

Firstly, we have implemented the basic component of any AWS architecture, which was the VPC (Virtual Private Cloud) consisting of 2 Availability zones each AZ has 2 subnets one public and one private, we decided to have 2 AZs to make our website highly available and fault tolerant.



Your VPCs (1/3) Info

	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP o
✓	my_ecommerce_website-vpc	vpc-0186df9c4f12b5ddb	Available	10.0.0.0/16	–	dopt-05
	MydemoVPC	vpc-061e5b02fd6eb2444	Available	10.0.0.0/16	–	dopt-05
	–	vpc-00cedd9c099f78211	Available	172.31.0.0/16	–	dopt-05

VPC
Your AWS virtual network
my_ecommerce_website-vpc
10.0.0.0/16
No IPv6

Subnets (4)
Subnets within this VPC
us-east-1a
my_ecommerce_website-subnet-p...
10.0.0.0/20
No IPv6
my_ecommerce_website-subnet-p...
10.0.128.0/20
No IPv6
us-east-1b
my_ecommerce_website-subnet-p...
10.0.16.0/20
No IPv6
my_ecommerce_website-subnet-p...
10.0.144.0/20

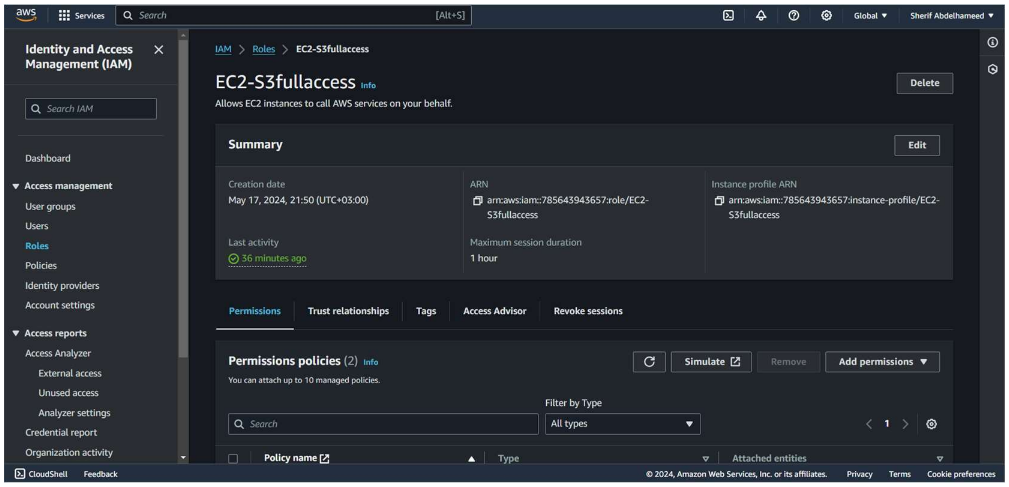
Route tables (4)
Route network traffic to resources
rtb-02766c73a08b5aafc
No subnet associations
1 route including local
my_ecommerce_website-rtb-private2...
1 subnet association
1 route including local
my_ecommerce_website-rtb-public
2 subnet associations
2 routes including local
my_ecommerce_website-rtb-private1...
1 subnet association
1 route including local

Network
Connections
my_ecomr
Internet rout
0 private sub

Figure 2 - VPC details

IAM – Identity and Access Management

We have created a Role for our EC2 instance called EC2-S3fullaccess, we are going to use it to be able to make our EC2 able to grab the web files from the S3 bucket we configured.



EC2-S3fullaccess Info
Allows EC2 instances to call AWS services on your behalf.

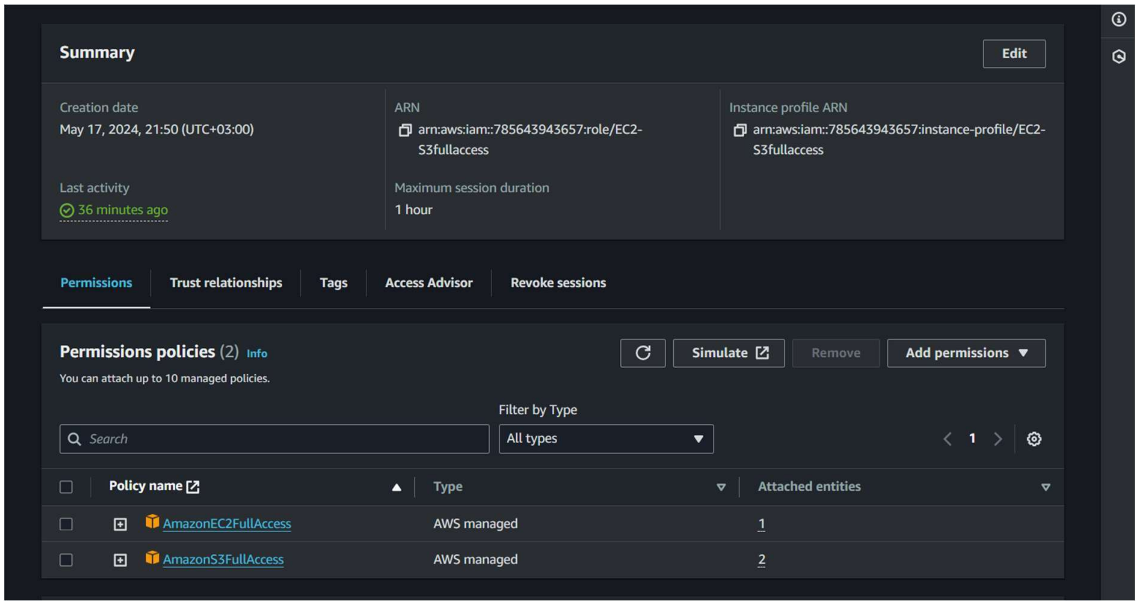
Summary

Creation date May 17, 2024, 21:50 (UTC+03:00)	ARN arn:aws:iam::785643943657:role/EC2-S3fullaccess	Instance profile ARN arn:aws:iam::785643943657:instance-profile/EC2-S3fullaccess
Last activity 36 minutes ago	Maximum session duration 1 hour	

Permissions policies (2) Info
You can attach up to 10 managed policies.
Filter by Type: All types

	Policy name	Type	Attached entities

Figure 3 - EC2 instance role


Summary

Creation date	ARN	Instance profile ARN
May 17, 2024, 21:50 (UTC+03:00)	arn:aws:iam::785643943657:role/EC2-S3fullaccess	arn:aws:iam::785643943657:instance-profile/EC2-S3fullaccess

Last activity	Maximum session duration
36 minutes ago	1 hour

Permissions policies (2)

You can attach up to 10 managed policies.

Filter by Type: All types

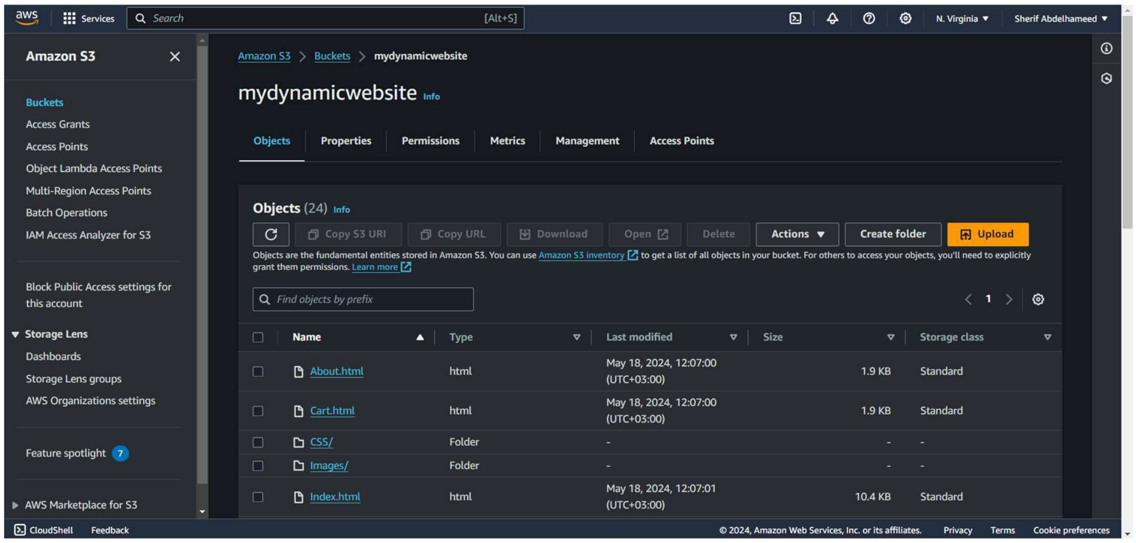
Policy name	Type	Attached entities
AmazonEC2FullAccess	AWS managed	1
AmazonS3FullAccess	AWS managed	2

Figure 4 - EC2 instance role policies

We have used an AmazonEC2fullaccess policy to ensure that the frontend EC2 instance can access the backend EC2 instance.

S3 Bucket

We used a S3 bucket to store our HTML, CSS and, JavaScript web files to later connect to it by an EC2 instance and download these files through the EC2 console.


Amazon S3 > Buckets > mydynamicwebsite

mydynamicwebsite

Objects (24)

Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more

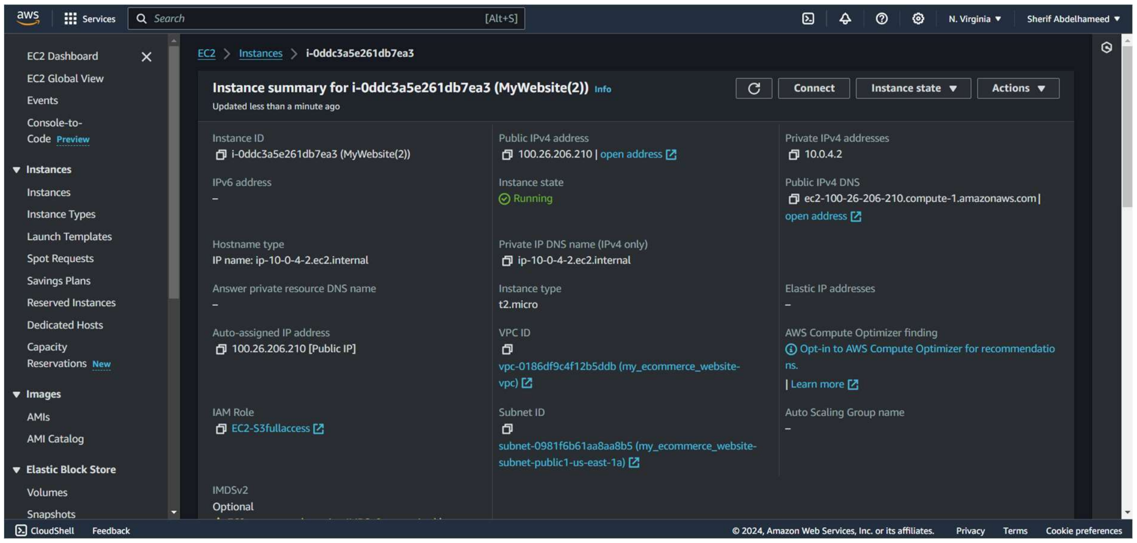
Name	Type	Last modified	Size	Storage class
About.html	html	May 18, 2024, 12:07:00 (UTC+03:00)	1.9 KB	Standard
Cart.html	html	May 18, 2024, 12:07:00 (UTC+03:00)	1.9 KB	Standard
CSS/	Folder	-	-	-
Images/	Folder	-	-	-
Index.html	html	May 18, 2024, 12:07:01 (UTC+03:00)	10.4 KB	Standard

© 2024, Amazon Web Services, Inc. or its affiliates.

Figure 5 - S3 bucket files and configuration

EC2 - Elastic Cloud Compute

We have created and deployed 2 EC2 instances, one responsible for hosting the Web files and the other responsible for hosting the Nodejs backend server.



Instance summary for i-0ddc3a5e261db7ea3 (MyWebsite(2)) Info
Updated less than a minute ago

Instance ID
i-0ddc3a5e261db7ea3 (MyWebsite(2))

Public IPv4 address
100.26.206.210 | open address

Private IPv4 addresses
10.0.4.2

IPv6 address
–

Instance state
Running

Public IPv4 DNS
ec2-100-26-206-210.compute-1.amazonaws.com | open address

Hostname type
IP name: ip-10-0-4-2.ec2.internal

Private IP DNS name (IPv4 only)
ip-10-0-4-2.ec2.internal

Answer private resource DNS name
–

Instance type
t2.micro

Elastic IP addresses
–

Auto-assigned IP address
100.26.206.210 [Public IP]

VPC ID
vpc-0186df9c4f12b5ddb (my_ecommerce_website-vpc)

AWS Compute Optimizer finding
Opt-in to AWS Compute Optimizer for recommendations. | Learn more

IAM Role
EC2-S3fullaccess

Subnet ID
subnet-0981f6b61aa8aa8b5 (my_ecommerce_website-subnet-public1-us-east-1a)

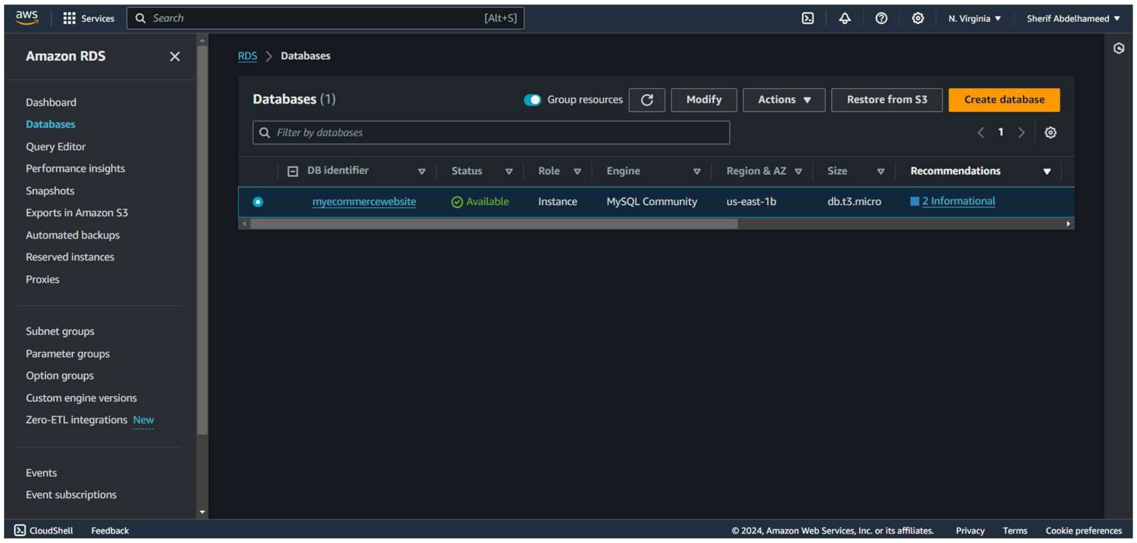
Auto Scaling Group name
–

IMDSv2
Optional

Figure 6 - Frontend Instance configuration

RDS – Relational Database Service

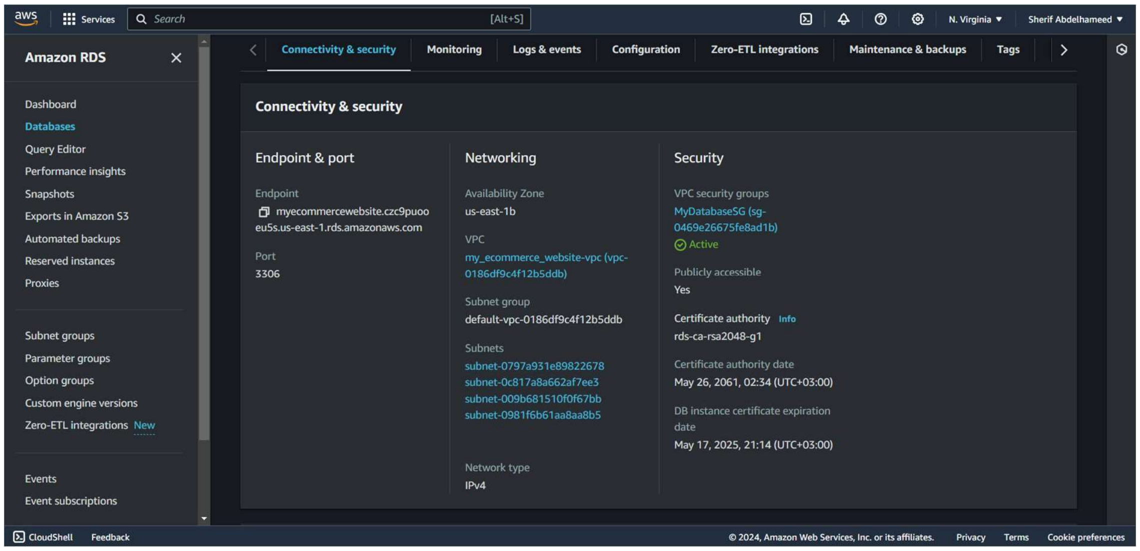
We are running our relational database by a mySQL engine, so we thought that the AWS RDS is the best option to host our Database on the cloud.



Databases (1)

DB identifier	Status	Role	Engine	Region & AZ	Size	Recommendations
myecommercewebsite	Available	Instance	MySQL Community	us-east-1b	db.t3.micro	2 Informational

Figure 7 - RDS instance name



Connectivity & security

Endpoint & port

Endpoint
myecommercewebsite.czc9puooeu5s.us-east-1.rds.amazonaws.com

Port
3306

Networking

Availability Zone
us-east-1b

VPC
my_ecommerce_website-vpc (vpc-0186df9c4f12b5ddb)

Subnet group
default-vpc-0186df9c4f12b5ddb

Subnets
subnet-0797a931e89822678
subnet-0c817a8a662af7ee3
subnet-009b681510f0f67bb
subnet-0981f6b61aa8aa8b5

Network type
IPv4

Security

VPC security groups
MyDatabaseSG (sg-0469e26675fe8ad1b)
Active

Publicly accessible
Yes

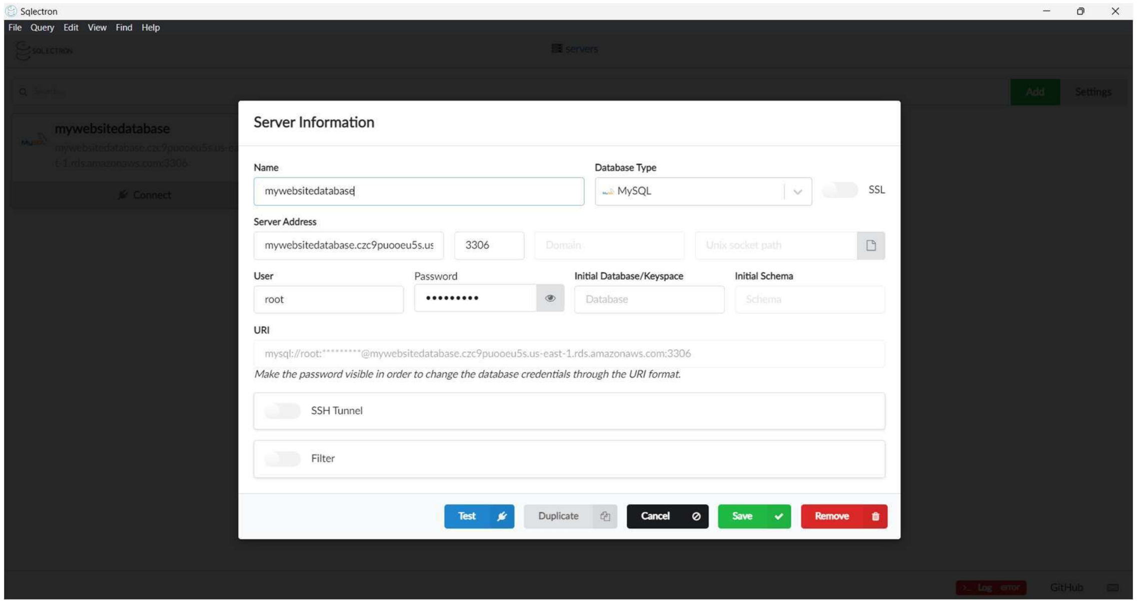
Certificate authority Info
rds-ca-rsa2048-g1

Certificate authority date
May 26, 2061, 02:34 (UTC+03:00)

DB instance certificate expiration date
May 17, 2025, 21:14 (UTC+03:00)

Figure 8 - RDS instance configuration

Making your RDS instance publicly accessible isn't the best choice when it comes to security, but we decided to keep it publicly accessible to connect to it using a 3rd party software called SQLectron, it is used to access any database you host on the cloud to make the process of configuring your database and tables easier.



Server Information

Name: mywebsitedatabase
Database Type: MySQL
SSL
Server Address: mywebsitedatabase.czc9puooeu5s.us 3306 Domain Unix socket path
User: root
Password: •••••••••
Initial Database/Keyspace: Database
Initial Schema: Schema
URI: mysql://root:*********@mywebsitedatabase.czc9puooeu5s.us-east-1.rds.amazonaws.com:3306
Make the password visible in order to change the database credentials through the URI format.
SSH Tunnel
Filter

Figure 9 - SQLectron configuration

The screen shots provided show how we used the application 'SQLectron' to connect to our RDS instance and create the database, tables, insert queries and show tables content.

Final result

Frontend sections

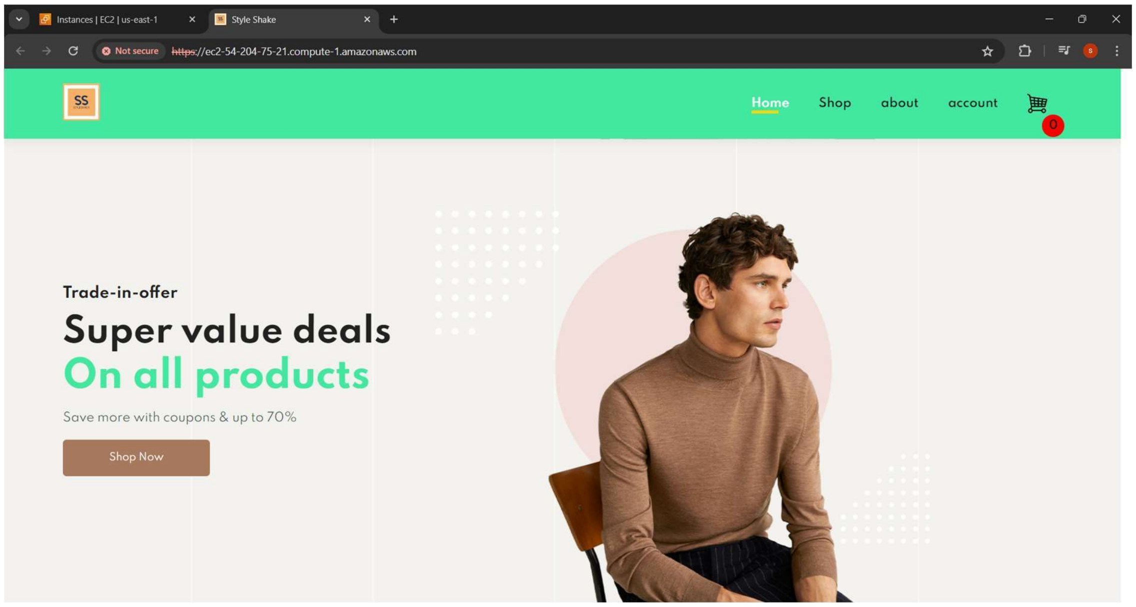

Instances | EC2 | us-east-1
Style Shake
Not secure
https://ec2-54-204-75-21.compute-1.amazonaws.com
SS
Home
Shop
about
account
0
Trade-in-offer
Super value deals
On all products
Save more with coupons & up to 70%
Shop Now

Figure 10 - Frontend Homepage

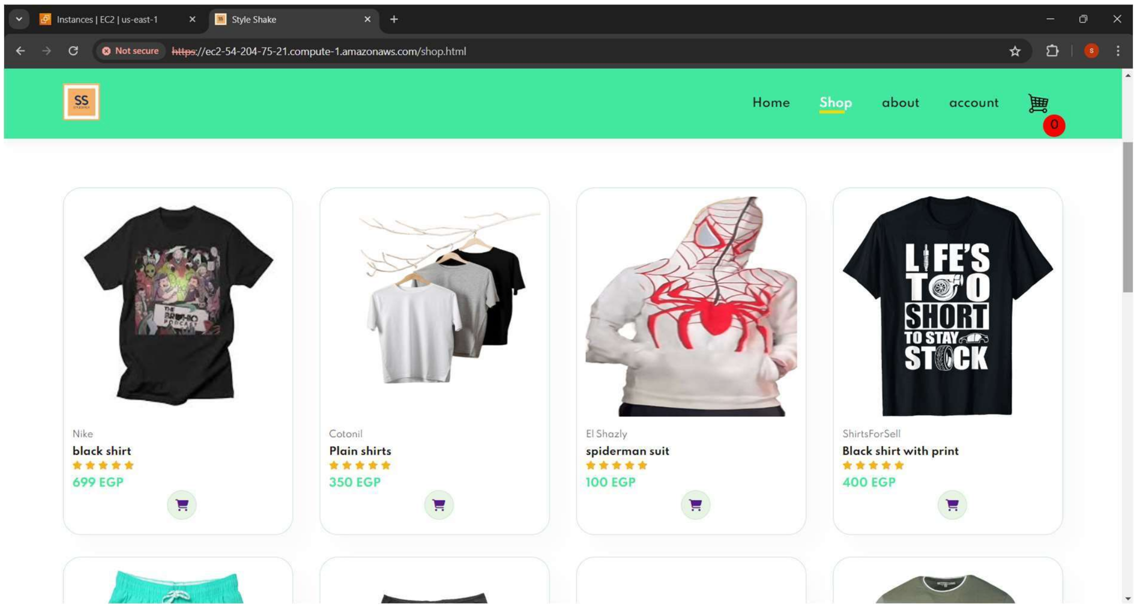
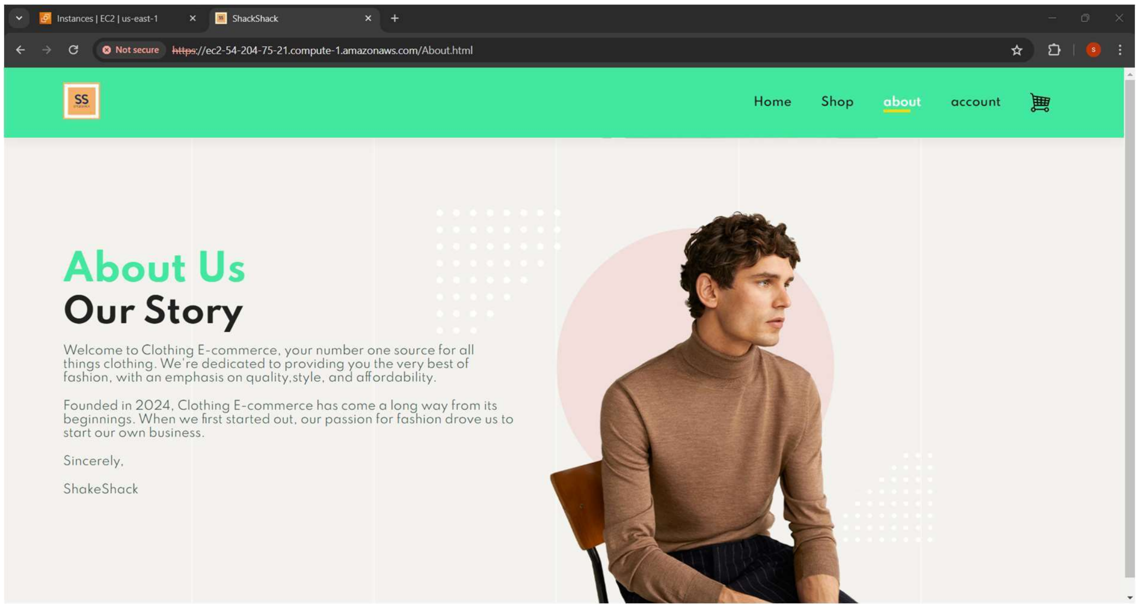


Figure 11 - Shop section


Instances | EC2 | us-east-1
ShackShack
Not secure https://ec2-54-204-75-21.compute-1.amazonaws.com/About.html

SS

Home Shop about account

About Us
Our Story

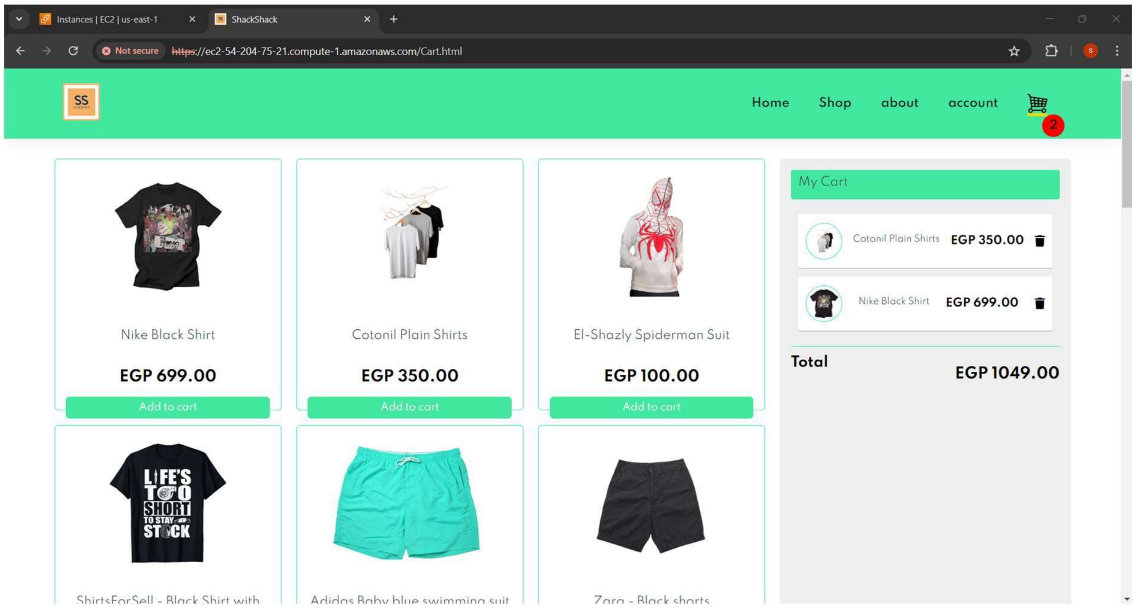
Welcome to Clothing E-commerce, your number one source for all things clothing. We're dedicated to providing you the very best of fashion, with an emphasis on quality,style, and affordability.

Founded in 2024, Clothing E-commerce has come a long way from its beginnings. When we first started out, our passion for fashion drove us to start our own business.

Sincerely,

ShakeShack

Figure 12 - About us section


Instances | EC2 | us-east-1
ShackShack
Not secure https://ec2-54-204-75-21.compute-1.amazonaws.com/Cart.html

SS

Home Shop about account 2

Nike Black Shirt
EGP 699.00
Add to cart

Cotonil Plain Shirts
EGP 350.00
Add to cart

El-Shazly Spiderman Suit
EGP 100.00
Add to cart

ShirtsForSell - Black Shirt with

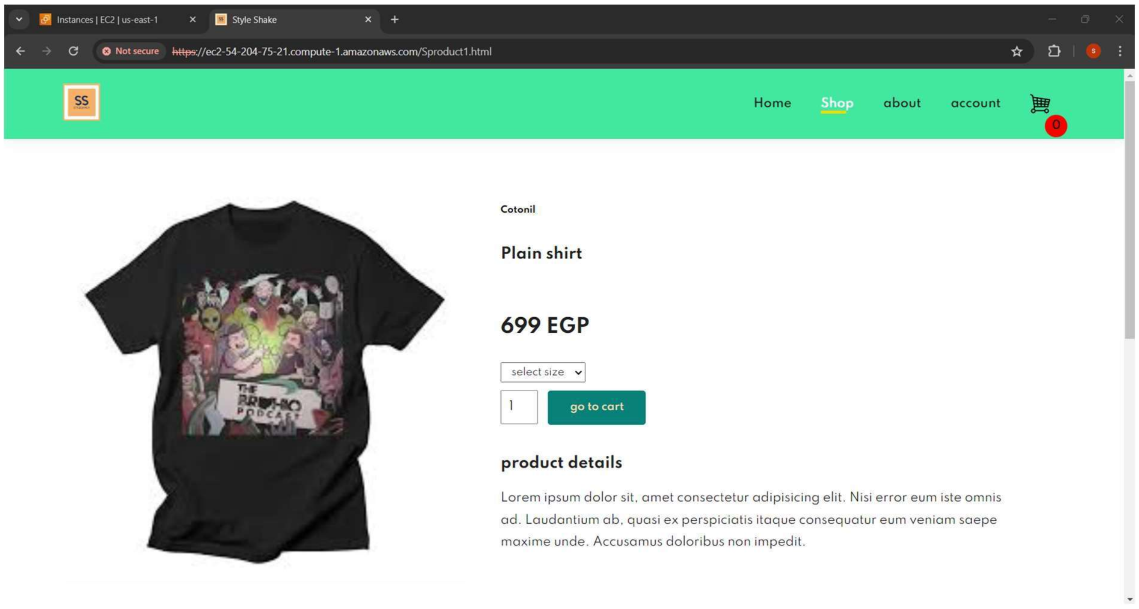
Adidas Baby blue swimming suit

Zara - Black shorts

My Cart

Cotonil Plain Shirts	EGP 350.00
Nike Black Shirt	EGP 699.00
Total	EGP 1049.00

Figure 13 - Cart section


Instances | EC2 | us-east-1
Style Shake
Not secure
https://ec2-54-204-75-21.compute-1.amazonaws.com/Sproduct1.html
Home
Shop
about
account
0
select size
1
go to cart

Cotonil

Plain shirt

699 EGP

product details

Lorem ipsum dolor sit, amet consectetur adipisicing elit. Nisi error eum iste omnis ad. Laudantium ab, quasi ex perspiciatis itaque consequatur eum veniam saepe maxime unde. Accusamus doloribus non impedit.

Figure 14 - Each product has it's own info page

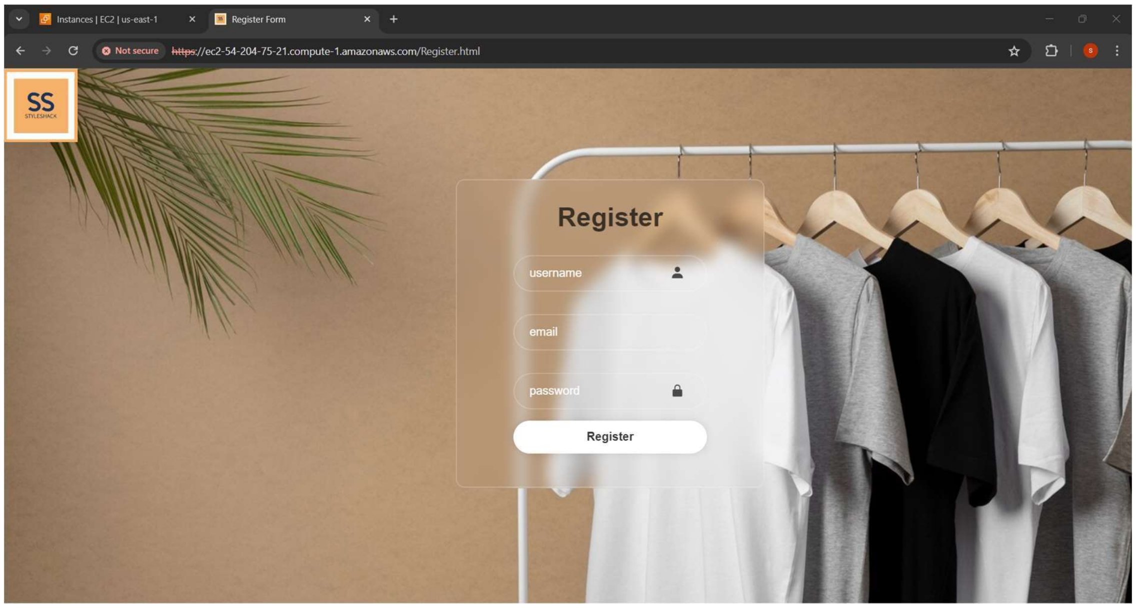

Instances | EC2 | us-east-1
Register Form
Not secure
https://ec2-54-204-75-21.compute-1.amazonaws.com/Register.html
SS
STYLESHACK
Register
username
email
password
Register

Figure 15 - Registration section

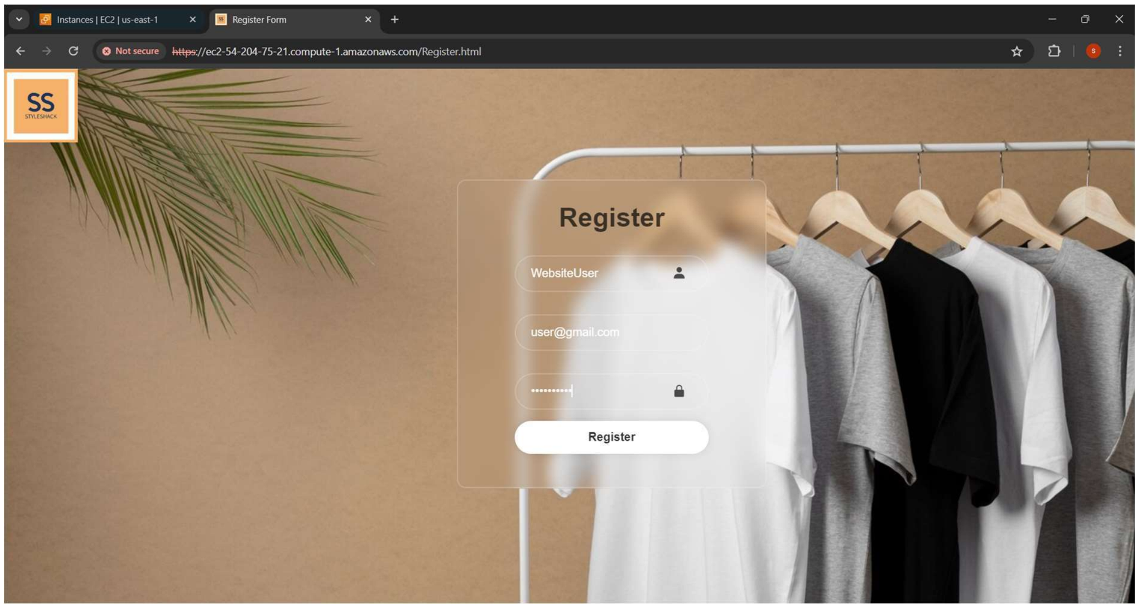
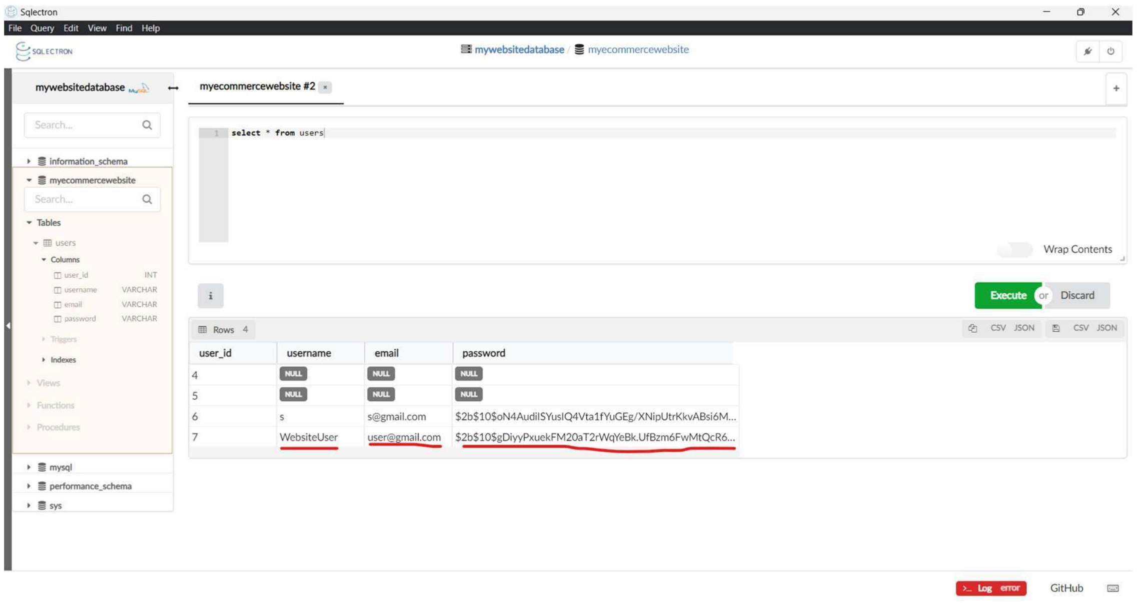

Instances | EC2 | us-east-1
Register Form
Not secure
~~https~~://ec2-54-204-75-21.compute-1.amazonaws.com/Register.html
SS
STYLESHACK
Register
WebsiteUser
user@gmail.com
Register

Figure 16 - inputting info in registration form



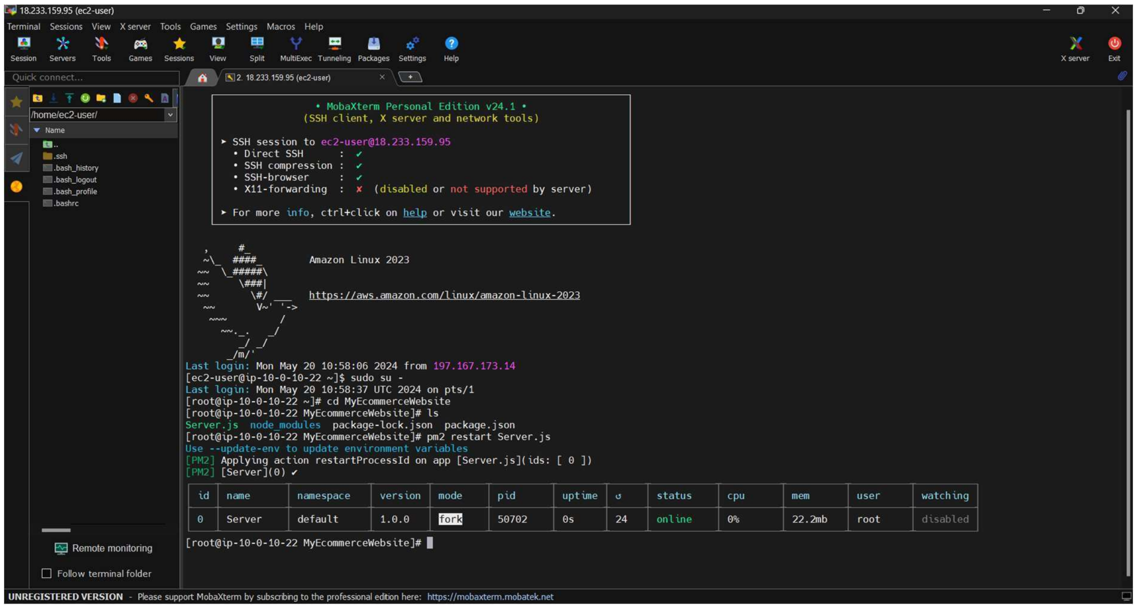
```
select * from users
```

Rows 4

user_id	username	email	password
4	NULL	NULL	NULL
5	NULL	NULL	NULL
6	s	s@gmail.com	$2b$10$oN4AudilSYusIQ4Vta1fYuGEg/XNipUtrKkvABsi6M...
7	WebsiteUser	user@gmail.com	$2b$10$gDiyyPxuekFM20aT2rWqYeBk.UfBzm6FwMtQcR6...

Figure 17 - Database values

Backend instance connect and running server



```
• MobaXterm Personal Edition v24.1 •
(SSH client, X server and network tools)

➤ SSH session to ec2-user@18.233.159.95
  • Direct SSH       :  ✓
  • SSH compression  :  ✓
  • SSH-browser      :  ✓
  • X11-forwarding   :  ✗  (disabled or not supported by server)

➤ For more info, ctrl+click on help or visit our website.

   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
Last login: Mon May 20 10:58:06 2024 from 197.167.173.14
[ec2-user@ip-10-0-10-22 ~]$ sudo su -
Last login: Mon May 20 10:58:37 UTC 2024 on pts/1
[root@ip-10-0-10-22 ~]# cd MyEcommerceWebsite
[root@ip-10-0-10-22 MyEcommerceWebsite]# ls
Server.js  node_modules  package-lock.json  package.json
[root@ip-10-0-10-22 MyEcommerceWebsite]# pm2 restart Server.js
Use --update-env to update environment variables
[PM2] Applying action restartProcessId on app [Server.js](ids: [ 0 ])
[PM2] [Server](0) ✓
┌────┬────────┬───────────┬─────────┬──────┬───────┬────────┬────┬────────┬─────┬────────┬──────┬──────────┐
│ id │ name   │ namespace │ version │ mode │ pid   │ uptime │ ↺  │ status │ cpu │ mem    │ user │ watching │
├────┼────────┼───────────┼─────────┼──────┼───────┼────────┼────┼────────┼─────┼────────┼──────┼──────────┤
│ 0  │ Server │ default   │ 1.0.0   │ fork │ 50702 │ 0s     │ 24 │ online │ 0%  │ 22.2mb │ root │ disabled │
└────┴────────┴───────────┴─────────┴──────┴───────┴────────┴────┴────────┴─────┴────────┴──────┴──────────┘
[root@ip-10-0-10-22 MyEcommerceWebsite]#
```

18.233.159.95 (ec2-user)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
2. 18.233.159.95 (ec2-user)
/home/ec2-user/
Name
..
.ssh
.bash_history
.bash_logout
.bash_profile
.bashrc
Remote monitoring
Follow terminal folder
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net

*Figure 18 - Backend instance console *starting server**

Website's URL: https://ec2-54-204-75-21.compute-1.amazonaws.com/