How to set up 1 master, 1 read replica using AWS RDS

Requirements:

- 4 subnets (1 for frontend and bastion-host, 1 for backend and 2 for DB instances contains 1 primary and 1 read replica) – 4 different AZs
- Backend: write data record into DB instance per minute (using bash script and crontab)
- Frontend: allow HTTP from fixed IP addresses from customers, only read data in DB Read replica (frontend using PHP)
- Subnet, security group only allow least privileges

References:

- Install PHP and config MySQL

Step by step:

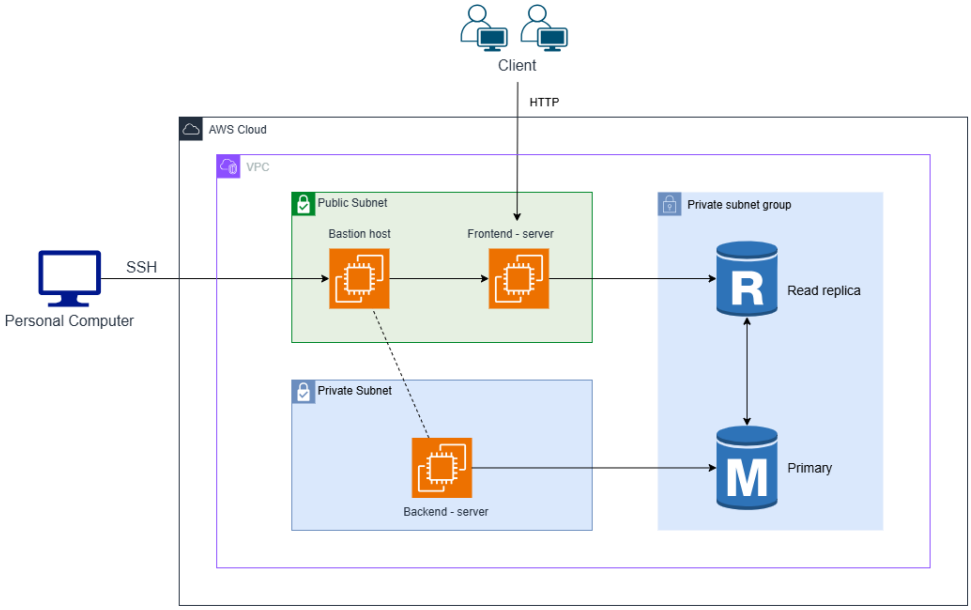
- **Step 1: Infrastructure config**

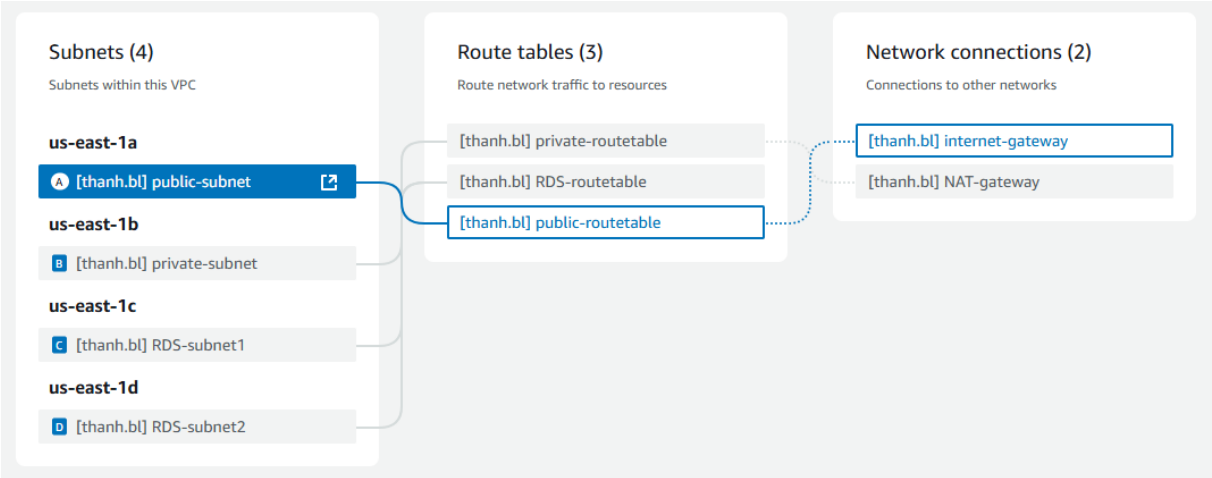
This picture below describe overview of our infrastructure:

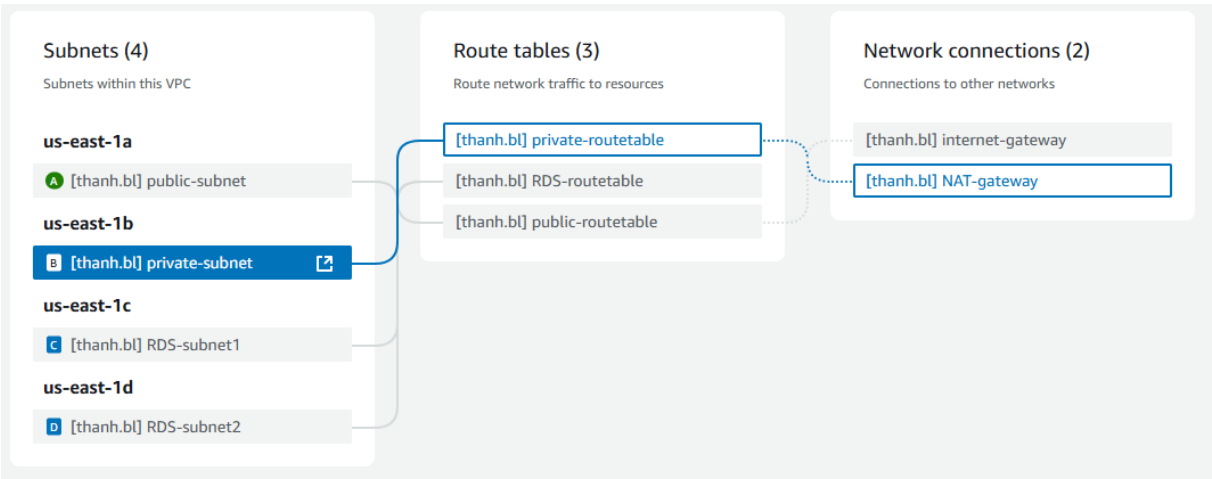
VPC overview:

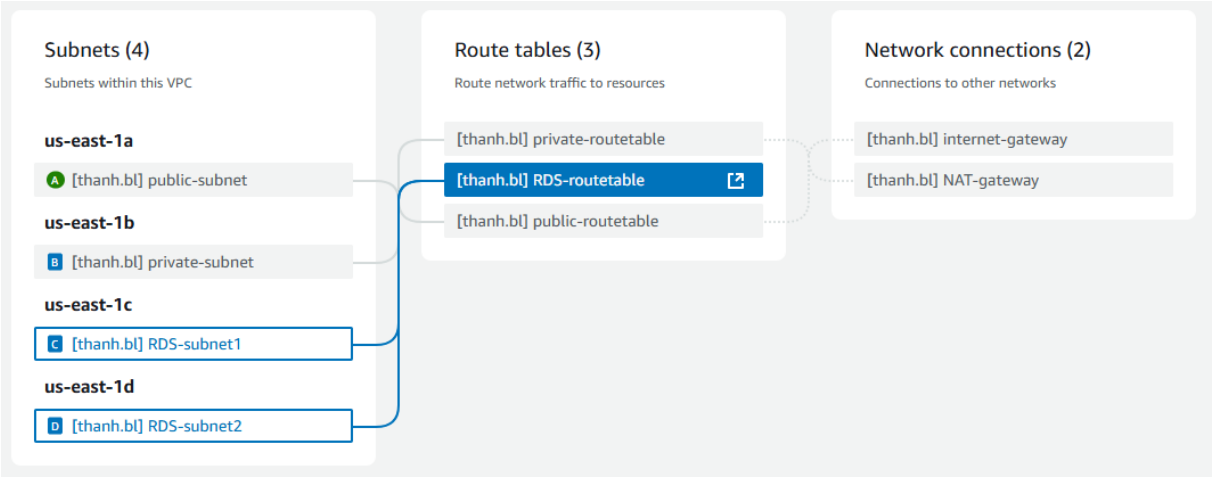
- 1 internet gateway
- 1 NAT gateway
- 4 subnets (3 route tables) in 4 different Azs (1 for bastion and frontend, 1 for backend and 2 for subnet group for RDS instances)

- 4 security groups









Set up least privileges for security group:

- Red: delete after use
- Green: keep config

SG permission (allow)	Inbound	Outbound
Bastion	Allow SSH (local)	FE, BE
Frontend – server	Allow SSH (bastion), HTTP (IP from customers)	RDS (9306)
Backend – server	Allow SSH (bastion)	RDS (9306)
RDS instances	9306 (BE, FE)	None

Subnets route table:

Network Access Control List:

- **Step 2: Set up resources**

This step, we will install neccesary software:

- **Bastion host**: None
- **Frontend – server**: PHP (show data in frontend) and MySQL – client (for access data in read replica)
- **Backend – server**: MySQL – client (access and write data to primary)

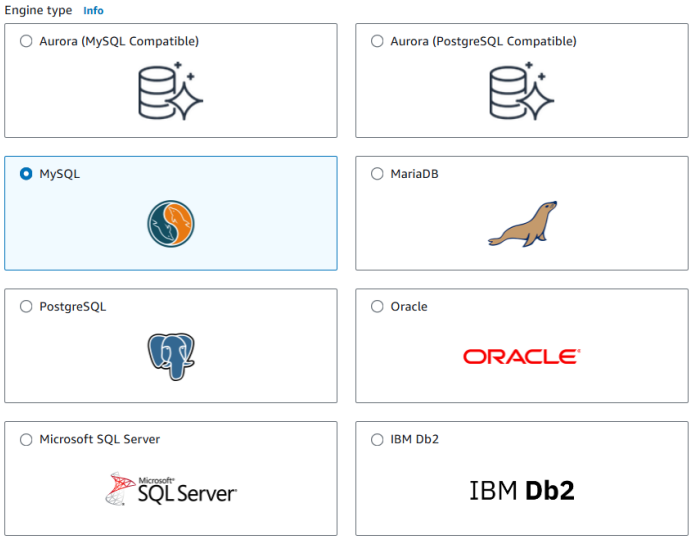
- **Step 3: Config**

- Change default SSH port at all instances: 2222

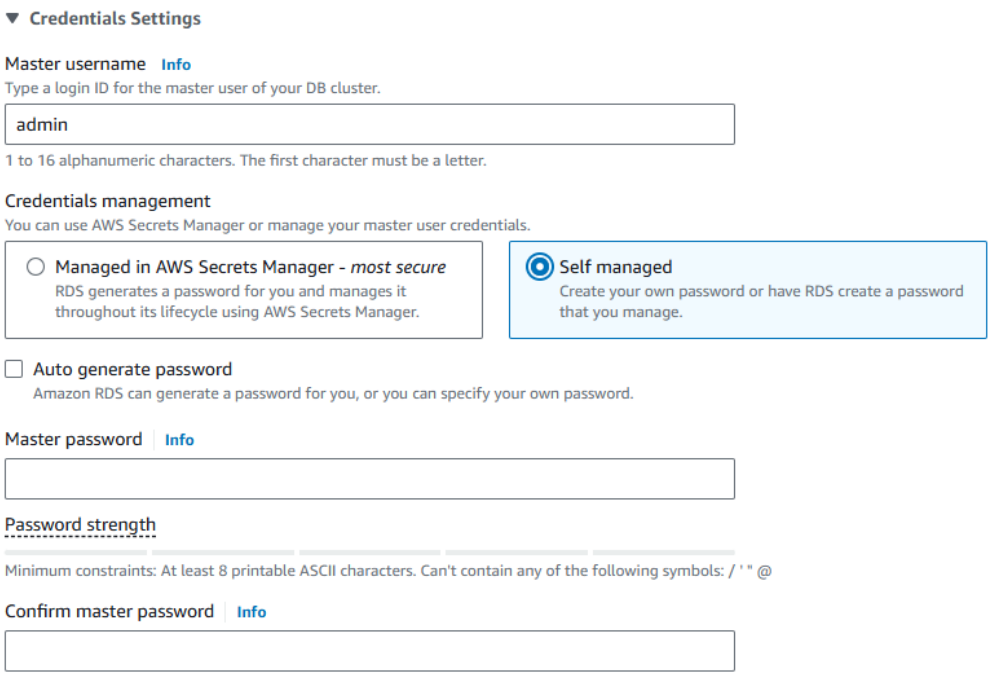
Use userdata to change SSH port when first create instance.

- Create a subnet group for primary RDS database instance
- Create database instance (primary)

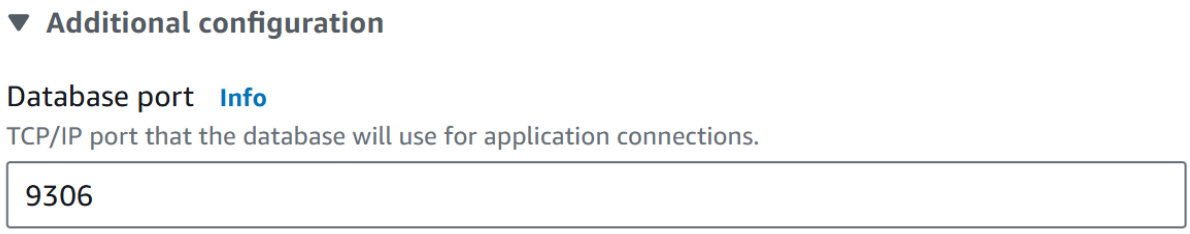
Choose database engine



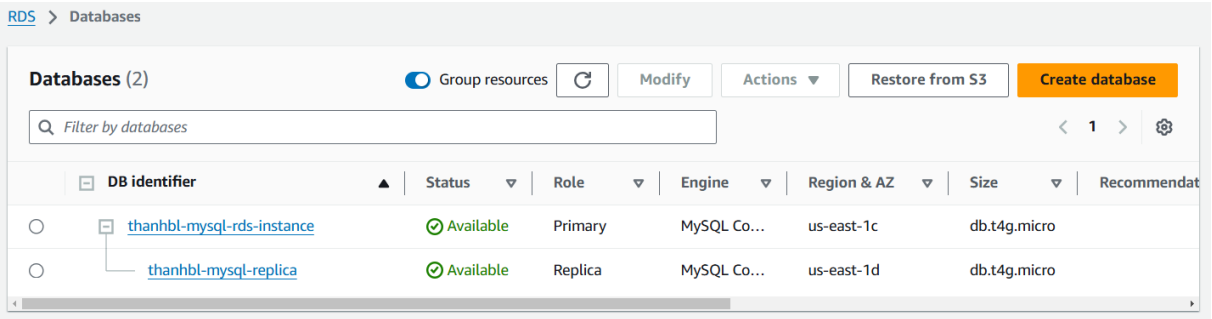
Create a admin user:



Change default MySQL port: 9306 (in /Connectivity/Additional configuration):



- Access primary endpoint using admin user and create a new DB user for frontend – server to read data in read replica
- Create a new replica for DB instance:



- Write a script to write record into *primary RDS* instance and check if record inserted successfully

In this script, we will write data to primary instance so we will use *admin* user:

```
#!/bin/bash
DB_USER="admin"
DB_PASSWORD="admin212"
DB_NAME="todo_list"
TABLE_NAME="todo_list"
DB_HOST="thanhbl-mysql-rds-instance.ceahrljdchqz.us-east-1.rds.amazonaws.com"
DB_PORT="9306"
CURRENT_TIMESTAMP=$(date +"%Y-%m-%d %H:%M:%S")
CONTENT="This database record insert in $CURRENT_TIMESTAMP"
mysql -h "$DB_HOST" -P "$DB_PORT" -u "$DB_USER" -p"$DB_PASSWORD" -D "$DB_NAME" -e
"INSERT INTO $TABLE_NAME (content) VALUES ('$CONTENT');"
```

Check if data inserted successfully:

```
mysql> SELECT * FROM todo_list;
+---------+-----------------------------------------------------+
| item_id | content                                             |
+---------+-----------------------------------------------------+
|       1 | This is first record ever!                          |
|       2 | This database record insert in 2024-11-06 13:00:49 |
+---------+-----------------------------------------------------+
2 rows in set (0.00 sec)
```

Data inserted successfully!

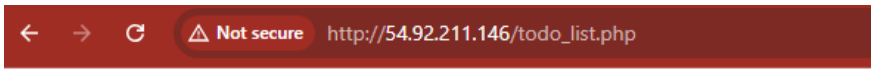
- Config PHP web to read data on *read replica* instance with *client* user:

```php
<?php
$user = "client";
$password = "client212";
$database = "todo_list";
$table = "todo_list";
$host = "thanhbl-mysql-replica.ceahrljdchqz.us-east-1.rds.amazonaws.com";
try {
  $db = new PDO("mysql:host=$host;port=9306;dbname=$database", $user, $password);
  echo "<h2>MySQL record inserted!</h2><ol>";
  foreach($db->query("SELECT content FROM $table") as $row) {
    echo "<li>" . $row['content'] . "</li>";
  }
  echo "</ol>";
} catch (PDOException $e) {
  print "Error!: " . $e->getMessage() . "<br/>";
  die();
}
?>
```

- **Step 4: Check**

  Access frontend server we will get result like:

  We can see list of record by *client* user!



MySQL record inserted!

1. This is first record ever!
2. This database record insert in 2024-11-06 13:00:49
3. This database record insert in 2024-11-06 13:03:01
4. This database record insert in 2024-11-06 13:04:01
5. This database record insert in 2024-11-06 13:05:01
6. This database record insert in 2024-11-06 13:06:01
7. This database record insert in 2024-11-06 13:07:01
8. This database record insert in 2024-11-06 13:08:01
9. This database record insert in 2024-11-06 13:09:01
10. This database record insert in 2024-11-06 13:10:01
11. This database record insert in 2024-11-06 13:11:01
12. This database record insert in 2024-11-06 13:12:01

Check if data in RDS database instance encrypted:

```
PS C:\> aws rds describe-db-instances --db-instance-identifier thanhbl-mysql-rds-instance --query "DBInstances[*].StorageEncrypted"
[
    true
]

PS C:\> aws rds describe-db-instances --db-instance-identifier thanhbl-mysql-replica --query "DBInstances[*].StorageEncrypted"
[
    true
]
```