Task4  
In this AWS project, I created a complete network architecture in the Mumbai (ap-south-1) region using Amazon VPC. I began by creating a custom Virtual Private Cloud (VPC) with a CIDR block of 10.0.0.0/16 to logically isolate my resources. Inside the VPC, I configured two public subnets that allowed internet access and two private subnets meant for internal workloads. An Internet Gateway (IGW) was created and attached to the VPC to enable outbound internet access for public subnets.

To allow private instances to connect to the internet for updates without being publicly exposed, I created a NAT Gateway inside one of the public subnets and allocated an Elastic IP to it. Proper route tables were set up—public subnets were associated with a route pointing to the IGW, and private subnets were associated with a route pointing to the NAT Gateway.

Next, I created an IAM role with the **AmazonSSMManagedInstanceCore** policy so that my EC2 instances could be accessed securely using **AWS Systems Manager (SSM)** instead of SSH. Then, I launched a Linux EC2 instance inside one of the private subnets, attached the IAM role, and connected to it using SSM Session Manager. On this private EC2 instance, I installed the Apache web server, started and enabled it to run on boot, and created a simple test webpage that displayed the message “Hello from Private EC2 - Adarsh's Apache Server!”

After setting up the web server, I took a backup of the instance by creating an **Amazon Machine Image (AMI)**. Once the image was created successfully, I terminated the original EC2 instance and restored a new one using the same AMI, subnet, and VPC to verify that the backup worked correctly.

Finally, I configured **monitoring and alerting** using **Amazon CloudWatch** and **SNS**. I created an SNS topic and subscribed my email address to receive notifications. Then, I set up a CloudWatch alarm that triggers an email alert if the EC2 instance’s CPU utilization exceeds 80%. I tested the alarm by generating artificial CPU load, and the alarm successfully changed state and sent a notification to my email.

After verifying everything worked correctly, I cleaned up all the resources I had created. This included deleting the CloudWatch alarms, SNS topics, EC2 instances, AMIs, NAT Gateway, Elastic IP, route tables, subnets, Internet Gateway, IAM role, and finally the VPC.

