PMC TECH INSPIRE TO INNOVATE

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AN AUTONOMOUS INSTITUTION

TÜV SÜD ISO 9001

DEPARTMENT OF Computer Science and Engineering

(THIRD YEAR VI SEM)

LABMANUAL

(REGULATION-2021)

CCS336-CLOUD SERVICES MANAGEMENT

LISTOFEXPERIMENTS

1. Create a Cloud Organization in AWS/Google Cloudor any equivalent Open Source cloud softwares like Openstack, Eucalyptus, OpenNebula with Role-based access control.
2. Create a Cost-model for a web application using various services and do Cost-benefit analysis .
3. Create alerts for usage of Cloud resources .
4. Create Billing alerts for your Cloud Organization .
5. Compare Cloud cost for a simple web application across AWS, Azure and GCP and suggest the best one.

TOTAL:60PERIODS

EX.NO:01	**Create a Cloud Organization in AWS/Google Cloud/or any equivalent Open-Source cloud software like OpenStack, Eucalyptus, Open Nebula with Role-based access control**
Date:	

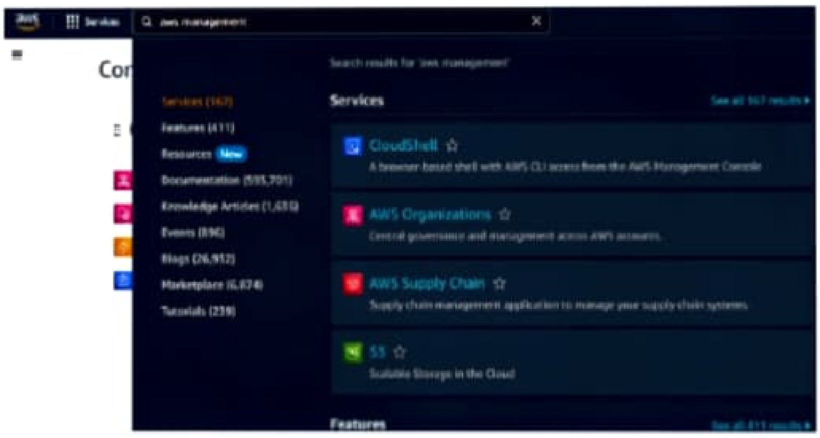
Aim:

To create a Cloud Organization in AWS with Roll-based access control.

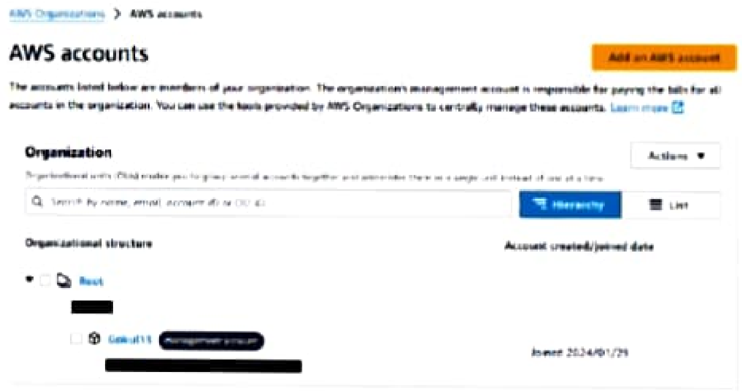
Procedure:

To create an organization in AWS with role-based access, you can follow these general steps:

1. **Create an AWS account:** If you don't already have an AWS account, you'll need to create one. This will be your management account and the root of your organization.


aws management
Search results for 'aws management'
Services (167)
Features (411)
Resources New
Documentation (595,701)
Knowledge Articles (1,635)
Events (896)
Blogs (26,952)
Marketplace (6,074)
Tutorials (239)
Services
CloudShell
A browser-based shell with AWS CLI access from the AWS Management Console
AWS Organizations
Central governance and management across AWS accounts.
AWS Supply Chain
Supply chain management application to manage your supply chain systems.
S3
Scalable Storage in the Cloud
Features

2. **Enable AWS Organizations:** From the AWS Management Console, navigate to the AWS Organizations service and enable it. This will create the organization with your management account as the master account.


AWS Organizations > AWS accounts

AWS accounts

Add an AWS account

The accounts listed below are members of your organization. The organization's management account is responsible for paying the bills for all accounts in the organization. You can use the tools provided by AWS Organizations to centrally manage these accounts. Learn more

Organization

Actions ▼

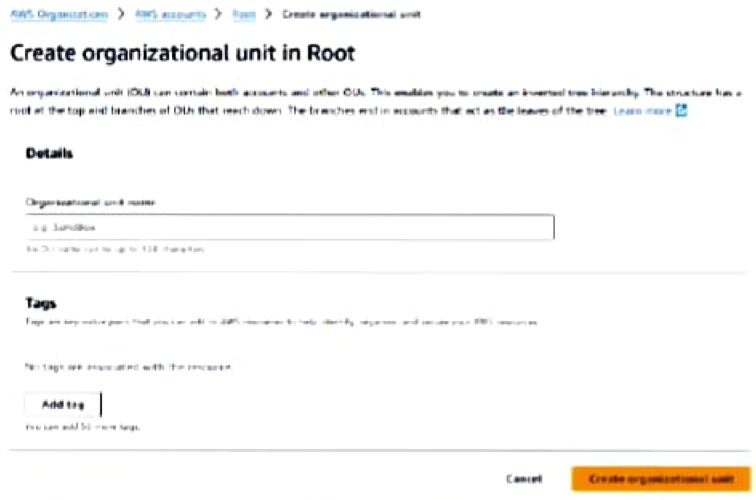
Organizational units (OUs) enable you to group several accounts together and administer them as a single unit instead of one at a time.

Search by name, email, account ID or OU ID

Hierarchy | List

Organizational structure	Account created/joined date
Root	
[redacted]	
Gokul15 Management account	Joined 2024/01/29
[redacted]	

3. **Create OUs (Organizational Units):** You can create one or more OUs to organize your accounts. For example, you might create separate OUs for different departments or environments (e.g., production, staging, development).



AWS Organizations > AWS accounts > Root > Create organizational unit

Create organizational unit in Root

An organizational unit (OU) can contain both accounts and other OUs. This enables you to create an inverted tree hierarchy. The structure has a root at the top and branches of OUs that reach down. The branches end in accounts that act as the leaves of the tree. Learn more

Details

Organizational unit name

e.g. Sandbox

An OU name can be up to 128 characters.

Tags

Tags are key-value pairs that you can add to AWS resources to help identify, organize, and secure your AWS resources.

No tags are associated with the resource.

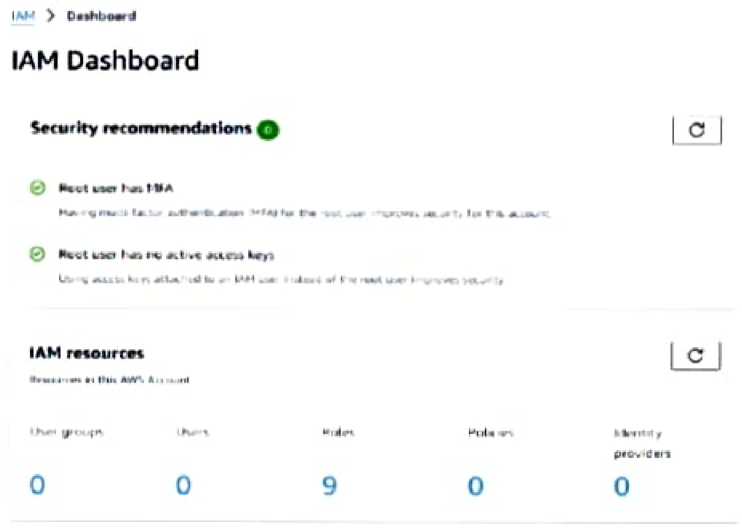
Add tag

You can add 50 more tags.

Cancel | Create organizational unit

4. **Create member accounts:** You can create new AWS accounts and invite existing accounts to join your organization as member accounts. You can add these accounts to the appropriate OUs.

5. **Create service control policies (SCPs):** SCPs are policies that you can attach to OUs or individual accounts to define the maximum set of actions that can be performed on resources in those OUs or accounts. This allows you to enforce role-based access and other security policies across your organization.



IAM > Dashboard

IAM Dashboard

Security recommendations 0

Root user has MFA

Having multi-factor authentication (MFA) for the root user improves security for this account.

Root user has no active access keys

Using access keys attached to an IAM user instead of the root user improves security.

IAM resources

Resources in this AWS Account

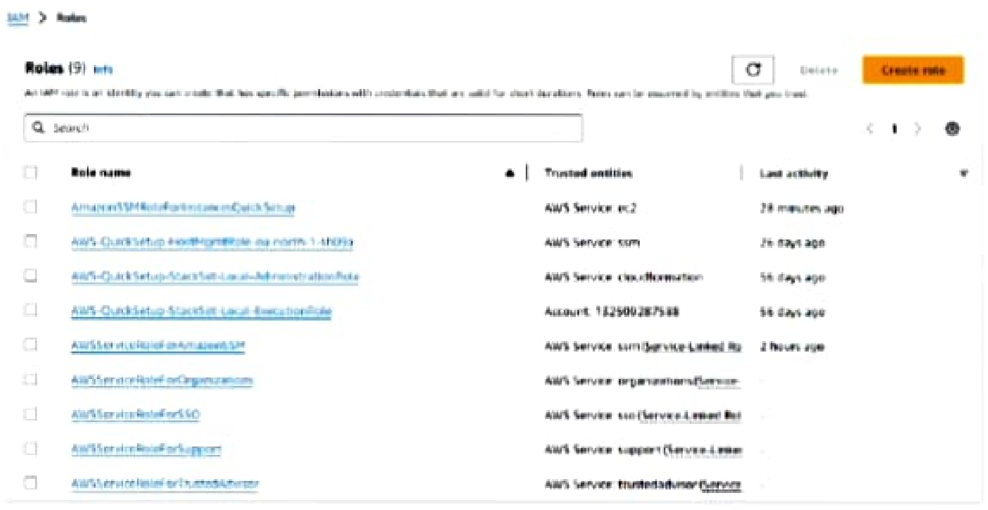
User groups	Users	Roles	Policies	Identity providers
0	0	9	0	0

fi. **Assign IAM roles:** You can create IAM roles in your management account and delegate specific permissions to them. You can then assume these roles from your member accounts to perform actions on resources in the management account or other member accounts.

7. **Configure permissions:** You can use IAM policies to control access to AWS services and resources. You can attach these policies to IAM users, groups, or roles in your management account or member accounts.

<u>To create a role with specific permissions, you can follow these steps:</u>

- Open the IAM console in your management account.
- Create a new role and choose the appropriate trusted entity (e.g., another AWS account, an AWS service, or your AWS Organizations).
- Define the permissions for the role by attaching an IAM policy or a service control policy (SCP).
- Save the role and note down the ARN (Amazon Resource Name) of the role.
- In the AWS Organizations console, attach the role to the appropriate OU or account.
- In the member account, assume the role to perform actions on resources in the management account or other member accounts.



IAM > Roles

Roles (9) Info

An IAM role is an identity you can create that has specific permissions with credentials that are valid for short durations. Roles can be assumed by entities that you trust.

Role name	Trusted entities	Last activity
AmazonSSMRoleForInstancesQuickSetup	AWS Service: ec2	28 minutes ago
AWS-QuickSetup-HostMgmtRole-eu-north-1-[illegible]	AWS Service: ssm	26 days ago
AWS-QuickSetup-StackSet-Local-AdministrationRole	AWS Service: cloudformation	56 days ago
AWS-QuickSetup-StackSet-Local-ExecutionRole	Account: 132500287588	56 days ago
AWSServiceRoleForAmazonSSM	AWS Service: ssm (Service-Linked Ro	2 hours ago
AWSServiceRoleForOrganizations	AWS Service: organizations (Service-	-
AWSServiceRoleForSSO	AWS Service: sso (Service-Linked Rol	-
AWSServiceRoleForSupport	AWS Service: support (Service-Linke	-
AWSServiceRoleForTrustedAdvisor	AWS Service: trustedadvisor (Service	-

Result:

Thus, the Cloud Organization was created in AWS with Role-Based Access Control was implemented successfully.

EX.NO:02	**Create a Cost-model for a web application using various services and do Cost-benefit analysis**
Date:	

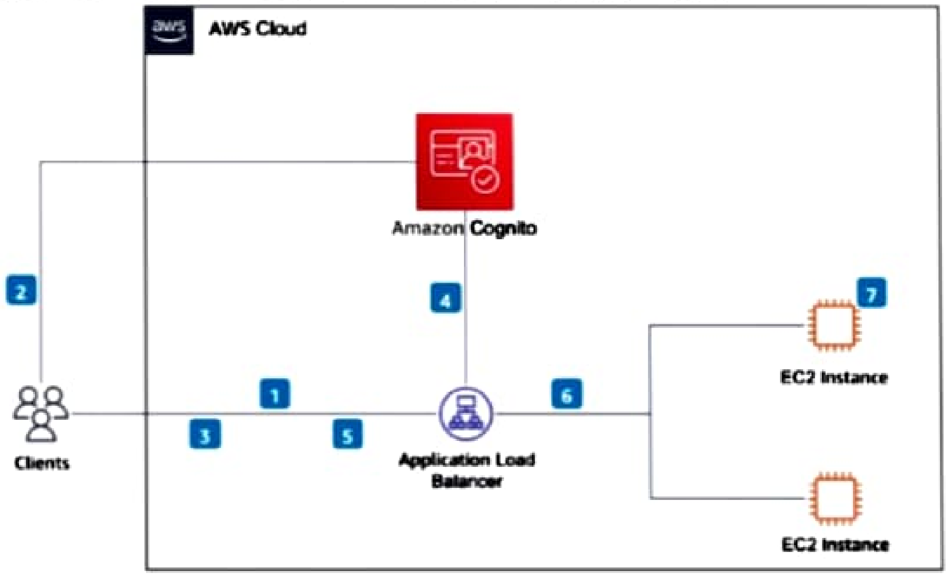
Aim:

To create a Cost-model for a web application using various services and make a analysis for Cost-benefit.

Procedure:

Creating a cost-model for a web application in AWS involves estimating the costs of using various AWS services for the application. Here's a general process to create a cost-model and do cost-benefit analysis:

1. **Identify the AWS services used by the web application:** Some common services used by web applications include Amazon S3, Amazon EC2, Amazon RDS, Amazon API Gateway, AWS Lambda, Amazon DynamoDB, Amazon CloudFront, and Amazon SNS.



2. **Estimate the costs of each service:** You can use the AWS Pricing Calculator to estimate the costs of each service. The pricing calculator allows you to enter the specifics of your usage, such as the number of instances, storage size, and data transfer.
3. **Create a cost-model:** Once you have estimated the costs of each service, you can create a cost-model that summarizes the total costs. You can use a spreadsheet or a cloud cost management tool to create the cost-model.
4. **Do cost-benefit analysis:** After creating the cost-model, you can do a cost-benefit analysis to determine if the benefits of using AWS services outweigh the costs. You can compare the costs of using AWS services to the costs of running the application on-premises or using a different cloud provider.

Program:

Python code:

```
import boto3

# Create a session using your AWS credentials
session = boto3.Session(
    aws_access_key_id='YOUR_ACCESS_KEY',
    aws_secret_access_key='YOUR_SECRET_KEY',
    region_name='us-east-1'
)

# Create a Cost Explorer client
cost_explorer = session.client('ce')

# Define the time period for the cost-model
time_period = {
    'TimeUnit': 'MONTHS',
    'Start': '2022-01-01',
    'End': '2022-12-31'
}

# Define the granularity of the cost-model
granularity = 'DAILY'

# Define the metrics for the cost-model
metrics = ['BlendedCost', 'UsageQuantity']

# Define the grouping for the cost-model
group_by = [{'Type': 'DIMENSION', 'Key': 'SERVICE'}]
```

```
# Get the cost and usage data
response = cost_explorer.get_cost_and_usage(
  TimePeriod=time_period,
  Granularity=granularity,
  Metrics=metrics,
  GroupBy=group_by
)

# Print the cost and usage data
print(response)
```

Output:

```
{
  'ResultsByTime': [
    {
      'TimePeriod': {
        'Start': '2022-01-01',
        'End': '2022-12-31',
        'TimeUnit': 'MONTHS'
      },
      'Groups': [
        {
          'Keys': [
            'AmazonEC2'
          ],
          'Metrics': {
            'BlendedCost': {
              'Amount': '1234.5fi',
              'Unit': 'USD'
            },
                    'UsageQuantity': {
                        'Amount': '1000.0',
                        'Unit': 'Hours'
                    }
                }
            },
            {
                'Keys': [
                    'AWSLambda'
                ],
                'Metrics': {
                    'BlendedCost': {
                        'Amount': '789.0',
                        'Unit': 'USD'
                    },
                    'UsageQuantity': {
                        'Amount': '5000000',
                        'Unit': 'requests'
                    }
                }
            }
        ]
    }
],
'ResponseMetadata': {
    'RequestId': 'abcdefg-1234-5fi78-90ab-cdefghijkl',
    'HTTPStatusCode': 200,
    'HTTPHeaders': {
        'content-type': 'text/xml;charset=UTF-8',
        'content-length': '1234',
            'date': 'Tue, 15 Feb 2022 12:34:5fi GMT'
        },
        'RetryAttempts': 0
    }
}
```

Result:

Thus, Cost-model for a web application using various services created and analysis was implemented successfully.

EX.NO:0fi	**Create alerts for usage of Cloud Resources**
Date:	

Aim:

To create alerts for usage of Cloud Resources.

Procedure:

To create alerts for usage of Cloud resources in AWS, you can use Amazon CloudWatch and AWS Lambda. Here's an example code that creates an alert for Amazon S3 bucket usage:

1. Create an IAM role for the Lambda function with the following policy.
2. Create a new Lambda function with the following code.
3. Set the Lambda function trigger to run every day at a specific time.
4. Create a CloudWatch alarm with the following code.

Program:

Policy for Role: (JSON code)

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "cloudwatch:PutMetricAlarm",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:GetMetricData",
        "cloudwatch:GetMetricStatistics"
      ],
      "Resource": "*"
    },
    {
            "Effect": "Allow",
            "Action": [
              "s3:GetBucketSize"
            ],
            "Resource": [
              "arn:aws:s3:::your-bucket-name"
            ]
          }
      ]
  }
```

__New Lambda Function__: (Python)

```
import boto3
import json

s3 = boto3.client('s3')
cloudwatch = boto3.client('cloudwatch')

def lambda_handler(event, context):
    try:
        response = s3.head_bucket(Bucket='your-bucket-name')
        size = response['ContentLength']
        cloudwatch.put_metric_data(
            Namespace='S3',
            MetricData=[
              {
                  'MetricName': 'BucketSize',
                  'Dimensions': [
                    {
                        'Name': 'BucketName',
                    'Value': 'your-bucket-name'
                  },
                ],
                'Timestamp': datetime.datetime.now(),
                'Value': size,
                'Unit': 'Bytes'
              },
            ]
          )
      except Exception as e:
          print(e)
```

__Cloud Watch Alarm__: (Python)

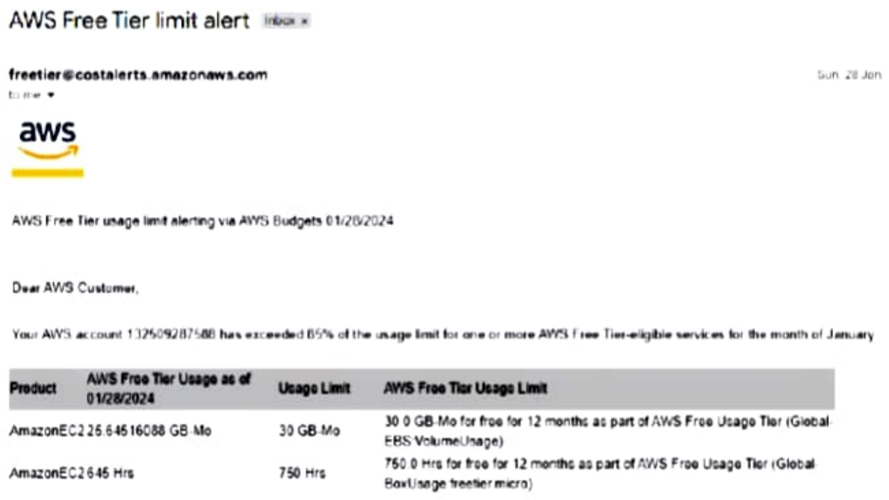
```
import boto3
import datetime

cloudwatch = boto3.client('cloudwatch')

def create_alarm():
    try:
        cloudwatch.put_metric_alarm(
            AlarmName='S3BucketSizeAlarm',
            AlarmDescription='Alarm if S3 bucket size exceeds 10 GB',
            Namespace='S3',
            MetricName='BucketSize',
            Statistic='SampleCount',
            Period='8fi400',
            EvaluationPeriods='1',
            Threshold='10000000000',
            ComparisonOperator='GreaterThanThreshold',
            AlarmActions=[
              'arn:aws:sns:us-east-1:12345fi789012:your-sns-topic-arn'
            ],
            Dimensions=[
              {
                'Name': 'BucketName',
                'Value': 'your-bucket-name'
              },
            ],
            AlarmDescription='Alarm if S3 bucket size exceeds 10 GB'
        )
    except Exception as e:
        print(e)

create_alarm()
```

Output:



AWS Free Tier limit alert

freetier@costalerts.amazonaws.com

Sun 28 Jan

to me

AWS Free Tier usage limit alerting via AWS Budgets 01/28/2024

Dear AWS Customer,

Your AWS account 132509287588 has exceeded 85% of the usage limit for one or more AWS Free Tier-eligible services for the month of January

Product	AWS Free Tier Usage as of 01/28/2024	Usage Limit	AWS Free Tier Usage Limit
AmazonEC2	26.64516088 GB-Mo	30 GB-Mo	30.0 GB-Mo for free for 12 months as part of AWS Free Usage Tier (Global-EBS:VolumeUsage)
AmazonEC2	645 Hrs	750 Hrs	750.0 Hrs for free for 12 months as part of AWS Free Usage Tier (Global-BoxUsage:freetier.micro)

Result:

Thus, usage alerts for cloud resources were implemented successfully.

EX.NO:04	**Create Billing alerts for your Cloud Organization**
Date:	

Aim:

To create billing alerts for your Cloud Organization.

Procedure:

To create billing alerts for your Cloud Organization in AWS, you can follow these steps:

1. Sign in to the AWS Management Console and navigate to the Billing and Cost Management service.
2. In the navigation pane, choose "Budgets".
3. Click on "Create budget" and select "Cost budget".
4. Provide a name and description for your budget.
5. Choose the time period for your budget (e.g., Monthly, Quarterly, Annually).

fi. Configure the budget threshold. You can choose to set a fixed budget amount or a percentage of your actual costs.

7. Configure the alerts. You can choose to receive alerts via email or Amazon SNS.

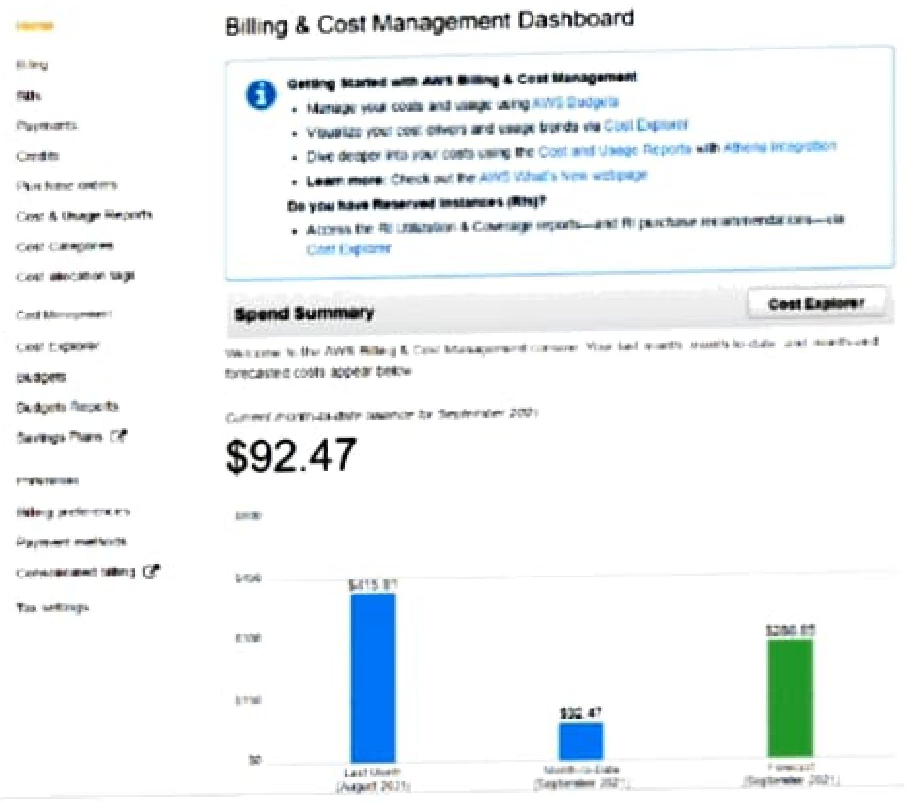
Program:

AWS CLI: (Bash)

```
aws budgets create-budget --account-id 12345fi789012 --budget \
'{
 "BudgetName": "MyCostBudget",
 "BudgetLimit": {
  "Amount": "1000",
  "Unit": "USD"
 },
 "CostFilters": {
  "LinkedAccount": ["12345fi789012"]
 },
 "CostTypes": {
  "IncludeTax": true,
  "IncludeSubscription": true,
  "UseBlended": false,
  "IncludeRefund": true,
  "IncludeCredit": true,
  "IncludeUpfront": true,
  "IncludeRecurring": true,
  "IncludeOtherSubscription": true,
  "IncludeSupport": true,
  "IncludeDiscount": true,
  "UseAmortized": false
 },
 "TimeUnit": "MONTHLY",
 "BudgetType": "COST",
 "NotificationsWithSubscribers": [
  {
   "Notification": {
    "NotificationType": "ACTUAL",
    "ComparisonOperator": "GREATER_THAN",
    "Threshold": 100,
    "ThresholdType": "PERCENTAGE",
    "NotificationState": "ALARM"
   },
   "Subscribers": [
    {
     "SubscriptionType": "EMAIL",
     "Address": "you@example.com"
    }
   ]
  }
 ]
```

}'

Output:



Billing & Cost Management Dashboard

Getting Started with AWS Billing & Cost Management

- Manage your costs and usage using AWS Budgets
- Visualize your cost drivers and usage trends via Cost Explorer
- Dive deeper into your costs using the Cost and Usage Reports with Athena integration
- **Learn more:** Check out the AWS What's New webpage

Do you have Reserved Instances (RIs)?

- Access the RI Utilization & Coverage reports—and RI purchase recommendations—via Cost Explorer

Spend Summary

Welcome to the AWS Billing & Cost Management console. Your last month, month-to-date, and month-end forecasted costs appear below.

Current month-to-date balance for September 2021

$92.47

Result:

Thus, billing alerts for your Cloud Organization were implemented successfully.

EX.NO:05	Compare Cloud cost for a simple web application across AWS, Azure and GCP and suggest the best one
Date:	

Aim:

To compare Cloud cost for a simple web application across AWS, Azure and GCP and suggest the best one

Observation:

1. AWS: AWS offers a rich array of tools, including databases, analytics, management, IoT, security, and enterprise applications. AWS introduced per-second billing in 2017 for EC2 Linux-based instances and EBS volumes.

2. Azure: Azure has slightly surpassed AWS in the percentage of enterprises using it. Azure also offers various services for enterprises, and Microsoft's longstanding relationship with this segment makes it an easy choice for some customers. While Azure is the most expensive choice for general-purpose instances, it's one of the most cost-effective alternatives to compute-optimized instances.

3. Google Cloud Platform (GCP): GCP stands out thanks to its almost limitless internal research and expertise. GCP is different due to its role in developing various open-source technologies. Google Cloud is much cheaper than AWS and Azure for computing optimized cloud-based instances.

The best platform depends on your specific needs and requirements. If you need a wide array of tools and services, AWS might be the best choice. If you're looking for enterprise services and have a longstanding relationship with Microsoft, Azure could be your best bet.

Conclusion:

If you prioritize innovation and open-source technologies, GCP could be the right choice. For compute-optimized instances, GCP seems to be the most cost-effective. However, it's essential to understand your requirements fully before making a decision.

Result:

Thus, the comparison for Cloud cost for a simple web application across AWS, Azure and GCP were implemented successfully.