
AWS CloudWatch Create Billings Alarm & Service Limits

[Edition 09]

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1 INTRODUCTION

AWS billing alerts are enabled through Amazon CloudWatch. It is the AWS service dedicated to monitoring all activities across your AWS account. In addition to billing alerts, CloudWatch also provides infrastructure for monitoring applications, metrics collection, logs, other metadata, and detecting activity in your AWS usage.

CloudWatch provides a variety of *metrics* based on which you can schedule your alarms. For example, you could create an alarm to notify you when the CPU Utilization of a running instance goes beyond 85% or when the billing amount goes over \$50, With the AWS free tier, we get 10 alarms and 1,000 email notifications per month.

Amazon Web Services (AWS) offers 60 products for free with free tier account however there are limitations to the free services. When you create an AWS account, you're automatically signed up for the AWS Free Tier for 12 months. Your AWS Free Tier eligibility expires at the end of the 12-month period. When your Free Tier expires.

The AWS Free Tier is mainly designed to give hands-on experience with AWS Cloud Services for customers on free of cost for a year.

With AWS Free Tier account all the services are offered have limits on what we can use without being charged.

This activity guide cover steps for:

1. Creating a Billing Alarm
2. Types of free Services
 - a. Always free
 - b. 12 months free
 - c. Trials
3. AWS Free Tier limits
 - a. Database Limits
 - b. Analytics Limits
 - c. Compute Limits
 - d. Storage Limits
4. Hourly usage in the Amazon Web Services Free Tier
5. Why I have been charged

2 DOCUMENTATION LINKS

1. AWS Billing and Cost Management

<https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/billing-what-is.html>

2. Cost and usage report

<https://docs.aws.amazon.com/cur/latest/userguide/what-is-cur.html>

3. AWS Cost Explorer Service

<https://docs.aws.amazon.com/aws-costmanagement/latest/APIReference/Welcome.html>

4. AWS Free Tier limits

<https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/free-tier-limits.html>

5. Eligibility for the AWS Free Tier

<https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/free-tier-eligibility.html>

6. Tracking your AWS Free Tier usage

<https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/tracking-free-tierusage.html>

7. AWS Billing and Cost Management

<https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/billing-what-is.html>

8. Cost and usage report

<https://docs.aws.amazon.com/cur/latest/userguide/what-is-cur.html>

9. AWS Cost Explorer Service

<https://docs.aws.amazon.com/aws-costmanagement/latest/APIReference/Welcome.html>

3 PRE-REQUISITE

1. An AWS Account (Free or Paid).

K21Academy

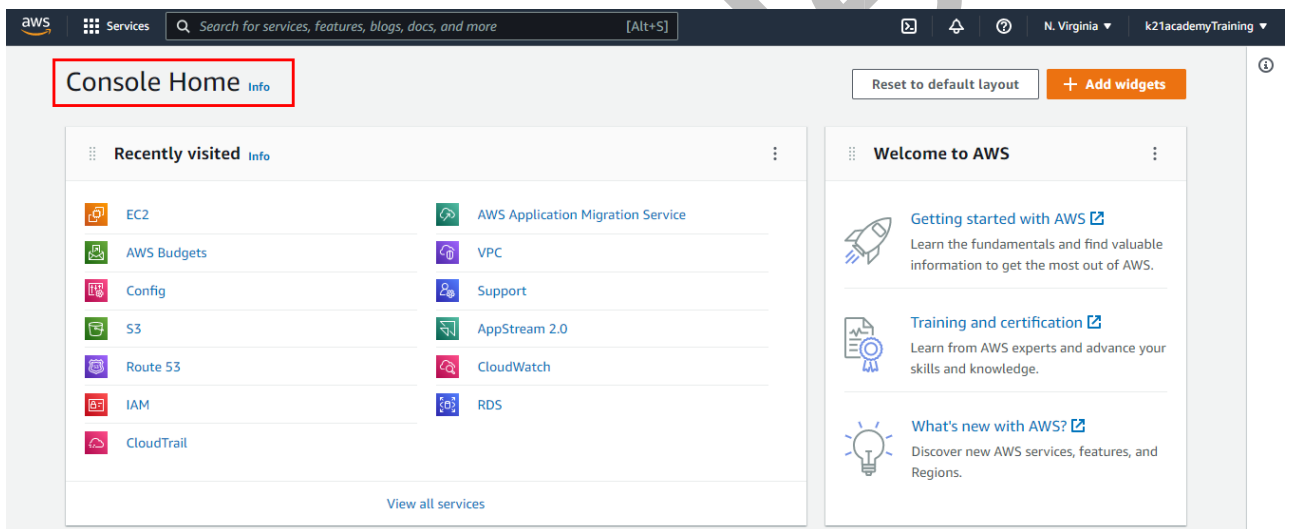
4 SET UP A BILLING ALARM

You can monitor your estimated AWS charges by using Amazon CloudWatch. When you enable the monitoring of estimated charges for your AWS account, the estimated charges are calculated and sent several times daily to CloudWatch as metric data.

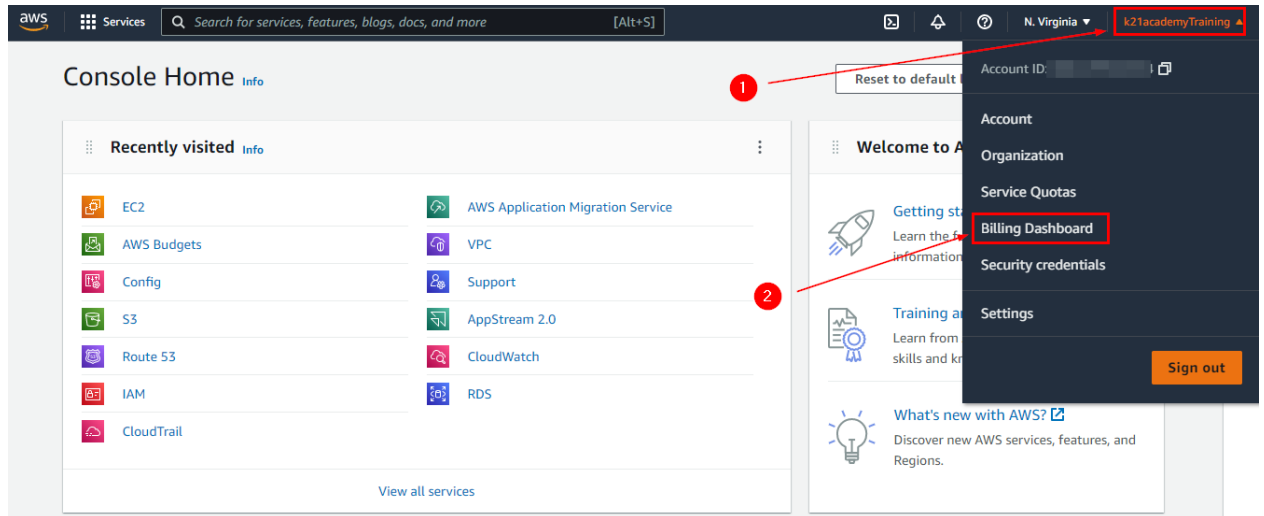
4.1 Enable Billing Alerts

In this section we are going to enable the billing alert in our AWS account.

1. Logged in to the console.



2. Now Click on your **Username** & select **My Billing Dashboard**



3. Now click on **Billing Preferences**.

The screenshot shows the AWS Billing Dashboard. On the left sidebar, under the 'Preferences' section, 'Billing preferences' is highlighted with a red box and a red arrow. The main content area shows the 'AWS Billing Dashboard' with a summary of current month's forecast, MTD balance, and active services.

4. Now enter your mail ID on which you want to receive your billing alerts and check the both boxes for confirmation and click on **Save Preferences**

The screenshot shows the 'Preferences' page in the AWS Billing console. The left sidebar lists various billing-related options. The main content area is titled 'Preferences' and includes sections for 'Billing Preferences' and 'Cost Management Preferences'.

Step 1: An arrow points to the 'Email Address' input field under 'Receive PDF Invoice By Email'.

Step 2: An arrow points to the 'Receive Billing Alerts' checkbox under 'Cost Management Preferences'.

Step 3: An arrow points to the 'Save preferences' button at the bottom of the 'Detailed Billing Reports [Legacy]' section.

5. Now here you shall see that the preference is saved.

The screenshot shows the AWS Management Console interface. On the left is a navigation menu with links like Home, Billing, Bills, Orders and invoices, Credits, Purchase orders, Cost & Usage Reports, Cost Categories, Cost allocation tags, Free Tier, Billing Conductor, Cost Management, Cost Explorer, Budgets, and Budgets Reports. The main content area is titled 'Preferences' and contains sections for 'Billing Preferences' (with 'Receive PDF Invoice By Email' unchecked), 'Cost Management Preferences' (with 'Receive Free Tier Usage Alerts' checked), and 'Receive Billing Alerts' (checked). Below the 'Receive Billing Alerts' section is a text input field for 'Email Address' and a 'Save preferences' button. A notification at the top right says 'Preferences saved'. A large 'K21ACADEMY' watermark is visible across the center of the image.

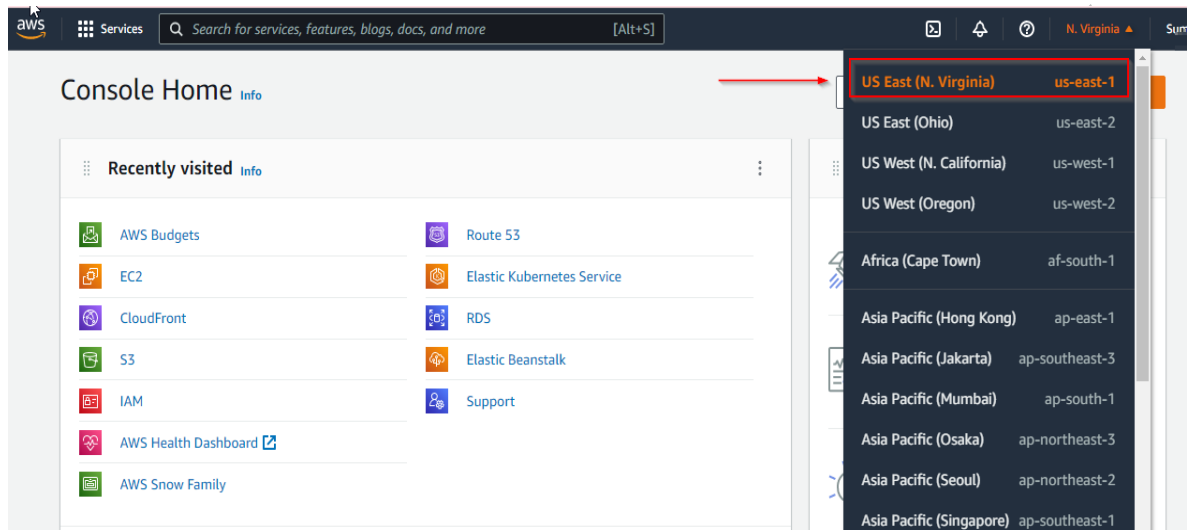
Note: Here we have enabled billing alert in our AWS account

4.2 Create Bill Alarm

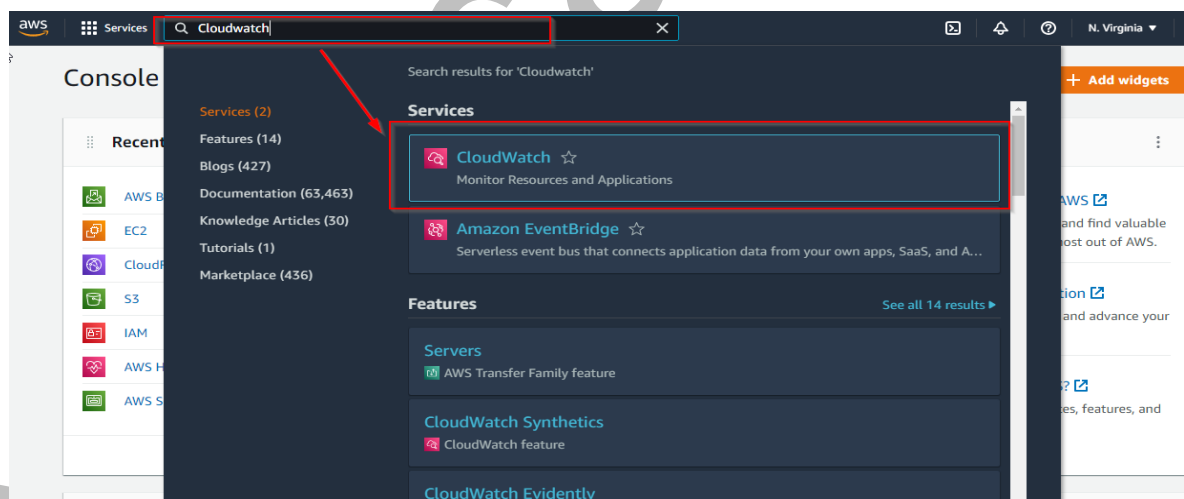
In this section we are going to create a billing alarm in our AWS free trial account

1. Back to your AWS console and to be able to view billings you need to switch region to **US East (N. Virginia)**

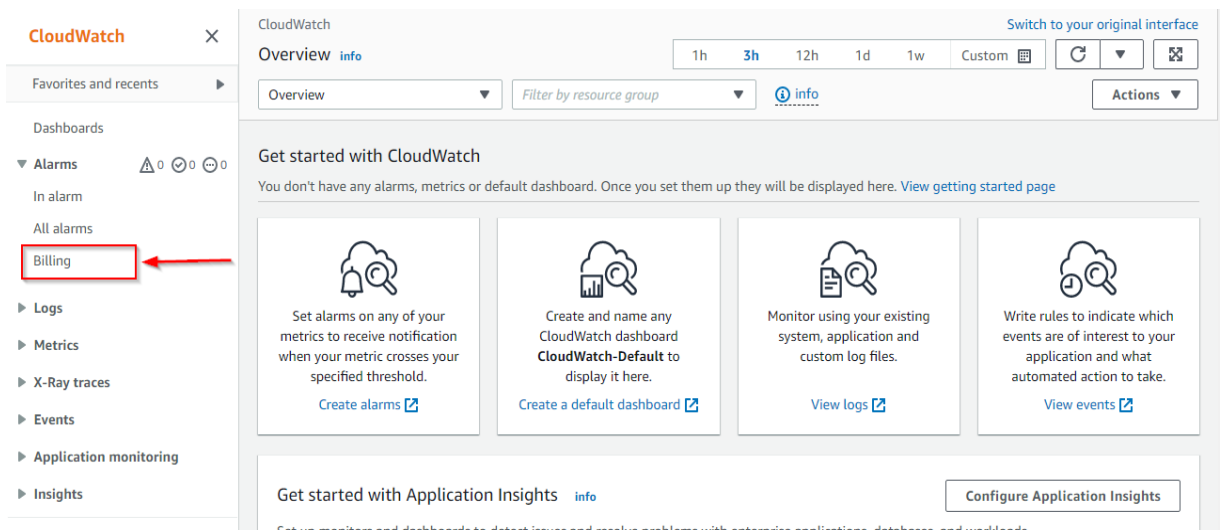
Note: Billing is only visible via US East N. Virginia Region only



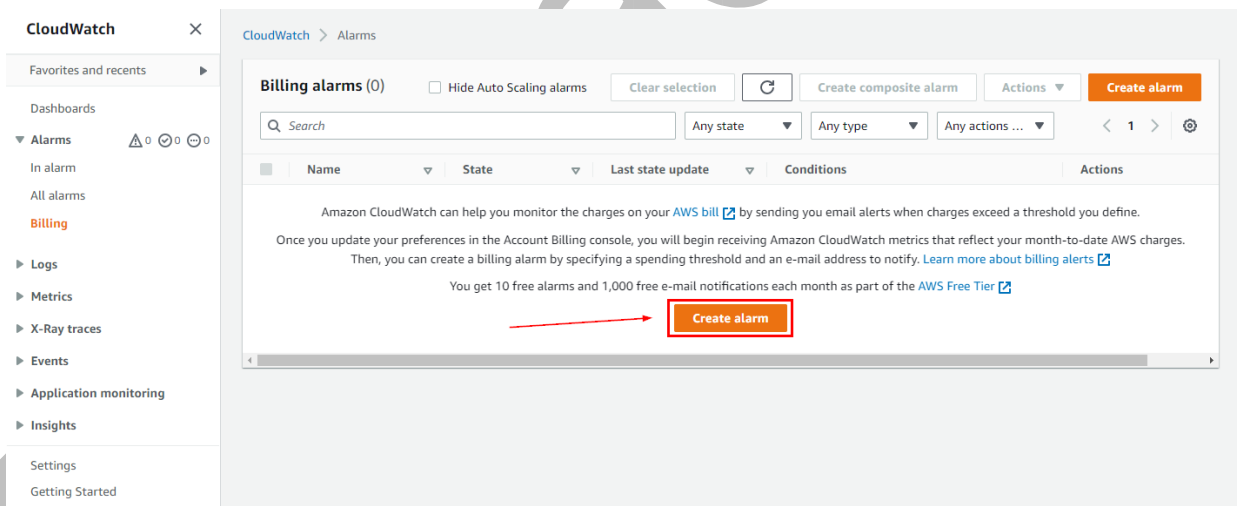
2. Search CloudWatch service and click on it.



3. This is our CloudWatch dashboard, click on **Billing**



4. From the Alarm console click on **Create Alarm** button.



5. From here you will see the name space, Metric Name, Currency, Statistic, Period.

CloudWatch > Alarms > Create alarm

Step 1
Specify metric and conditions

Step 2
Configure actions

Step 3
Add name and description

Step 4
Preview and create

Specify metric and conditions

Metric Edit

Graph
This alarm will trigger when the blue line goes above the red line for 1 datapoints within 6 hours.

No unit
1
0.5
0

08/24 08/26 08/28 08/30

EstimatedCharges

Namespace
AWS/Billing

Metric name
EstimatedCharges

Currency
USD

Statistic
Maximum

Period
6 hours

6. Scroll down to **Conditions** section where we will define the parameters to get notified.

Conditions

Threshold type

☒ **Static**
Use a value as a threshold

☐ Anomaly detection
Use a band as a threshold

Whenever EstimatedCharges is...
Define the alarm condition.

☒ **Greater**
> threshold

☐ Greater/Equal
≥ threshold

☐ Lower/Equal
≤ threshold

☐ Lower
< threshold

than...
Define the threshold value.

10000 USD

Must be a number

► Additional configuration

Cancel **Next**

7. **Threshold type** should be **Static** as we want to get notified when cost is greater than the defined value (here \$10).

Conditions

Threshold type

☒ Static
Use a value as a threshold

☐ Anomaly detection
Use a band as a threshold

Whenever EstimatedCharges is...
Define the alarm condition.

☒ Greater
> threshold

☐ Greater/Equal
≥ threshold

☐ Lower/Equal
≤ threshold

☐ Lower
< threshold

than...
Define the threshold value.

10 USD

Must be a number

► Additional configuration

Cancel Next

8. Click on Next button.

Conditions

Threshold type

☒ Static
Use a value as a threshold

☐ Anomaly detection
Use a band as a threshold

Whenever EstimatedCharges is...
Define the alarm condition.

☒ Greater
> threshold

☐ Greater/Equal
≥ threshold

☐ Lower/Equal
≤ threshold

☐ Lower
< threshold

than...
Define the threshold value.

10 USD

Must be a number

► Additional configuration

Cancel Next

9. Now in Configure action screen select the following fields
- In Alarm

- b. Create new topic
- c. Topic name as BillingAlarm
- d. Email Address: Enter the email on which you want to get notified.

After this click on **create topic** button.

Alarm state trigger
Define the alarm state that will trigger this action.

☒ In alarm
The metric or expression is outside of the defined threshold.

☐ OK
The metric or expression is within the defined threshold.

☐ Insufficient data
The alarm has just started or not enough data is available.

Select an SNS topic
Define the SNS (Simple Notification Service) topic that will receive the notification.

☐ Select an existing SNS topic

☒ Create new topic

☐ Use topic ARN

Create a new topic...
The topic name must be unique.

Default_CloudWatch_Alarms_Topic

SNS topic names can contain only alphanumeric characters, hyphens (-) and underscores (_).

Email endpoints that will receive the notification...
Add a comma-separated list of email addresses. Each address will be added as a subscription to the topic above.

user1@example.com, user2@example.com

Create topic

Add notification

10. After this you will receive an Email where you need to **confirm** the subscription for the billing alert.

AWS Notification - Subscription Confirmation Inbox x



AWS Notifications <no-reply@sns.amazonaws.com>
to me ▾

You have chosen to subscribe to the topic:

arn:aws:sns:us-east-1:467073612314:Default_CloudWatch_Alarms_Topic

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):

[Confirm subscription](#)

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to [sns-opt-out](#)

↩ Reply

➡ Forward



Simple Notification Service

Subscription confirmed!

You have subscribed support@k21academy.com to the topic:

Default_CloudWatch_Alarms_Topic.

Your subscription's id is:

arn:aws:sns:us-east-1:467073612314:Default_CloudWatch_Alarms_Topic:84ee1e99-4b13-4344-b576-f2d9de17a932

If it was not your intention to subscribe, [click here to unsubscribe](#).

11. Now click on **Next**.

Configure actions

Notification

Alarm state trigger

Define the alarm state that will trigger this action.



In alarm

The metric or expression is outside of the defined threshold.



OK

The metric or expression is within the defined threshold.



Insufficient data

The alarm has just started or not enough data is available.

Remove

Select an SNS topic

Define the SNS (Simple Notification Service) topic that will receive the notification.

☒ Select an existing SNS topic

☐ Create new topic

☐ Use topic ARN

Send a notification to...

Q Default_CloudWatch_Alarms_Topic X

Only email lists for this account are available.

Email (endpoints)

support@k21academy.com - View in SNS Console

Add notification

Auto Scaling action

Add Auto Scaling action

EC2 action

This action is only available for EC2 Per-Instance Metrics.

Add EC2 action

Systems Manager OpsCenter action [Info](#)

This action creates OpsItems in Systems Manager OpsCenter to help with the diagnosis and remediation of alarms in alarm state.

Add Systems Manager OpsCenter action

Cancel

Previous

Next

12. Provide **Alarm Name** and **Description** and click on Next.

CloudWatch > Alarms > Create alarm

Step 1
Specify metric and conditions

Step 2
Configure actions

Step 3
Add name and description

Step 4
Preview and create

Add name and description

Name and description

Alarm name
Define a unique name.

BillingAlarm

Alarm description - *optional*
Define a description for this alarm.

Get Email when Bill exceeds \$10

Up to 1024 characters (31/1024)

Cancel Previous **Next**

13. Review all the settings for alarm and click on **Create alarm** button.

CloudWatch > Alarms > Create alarm

Step 1
Specify metric and conditions

Step 2
Configure actions

Step 3
Add name and description

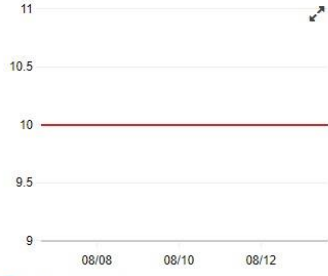
Step 4
Preview and create

Preview and create

Step 1: Specify conditions Edit

Metric

Graph
This alarm will trigger when the blue line goes above the red line for 1 datapoints within 6 hours.



EstimatedCharges

Namespace
AWS/Billing

Metric name
EstimatedCharges

Currency
USD

Statistic
Maximum

Period
6 hours

Conditions

Threshold type
Static

Whenever **EstimatedCharges** is
Greater (>)
than...
10

► Additional configuration

Step 2: Configure actions Edit

Actions

Notification
When In alarm, send a notification to "Default_CloudWatch_Alarms_Topic"

Step 3: Add name and description Edit

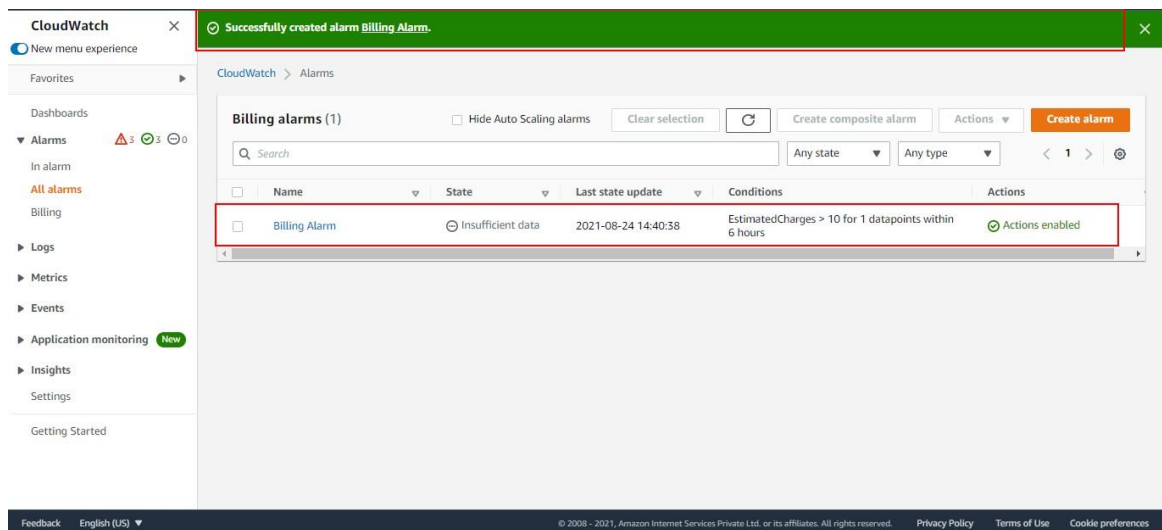
Name and description

Name
BillingAlarm

Description
Get Email when Bill exceeds \$10

Cancel Previous **Create alarm**

14. Now you alarm has been created successfully.



Note: The INSUFFICIENT_DATA state can indicate any of the following:

1. An Amazon CloudWatch alarm just started
2. The metric is unavailable
3. There's not enough data for the metric to determine the alarm state

Note: It might take 4-5 days to populate the data on your dashboard

5 TYPE OF FREE SERVICES

AWS Provides 3 types of Free services.

1. **12-Months Free:** These free tier offers are only available to new customers. When your 12-month free usage expires or if your application use exceeds the tiers, you merely pay standard, pay-as-you-go service rates.
2. **Always Free:** These free tier offers don't automatically expire at the top of your 12month AWS Free Tier term, but are available to both existing and new AWS customers indefinitely.
3. **Trials:** These free tier offers are short term trial offers that start from the time of the first usage begins. Once the test period expires you merely pay standard, pay-as-you-go service rates.

The Amazon AWS Free Tier applies to participate in services across our global regions. Your free usage under the AWS Free Tier is calculated monthly across all regions and automatically applied to your bill – free usage doesn't accumulate.

The AWS Free Tier isn't available within the AWS GovCloud (US) Regions* or the China (Beijing) region at this point.

*The Lambda free tier is out there within the AWS GovCloud (US) Region.

6 AWS FREE TIER LIMITS

All services that provide an AWS Free Tier have limits on what you'll use without being charged.

Many services have multiple sorts of limits. for instance,

Amazon EC2 has limits on both the sort of instance you'll use and the way many hours you'll use in one month.

Amazon S3 features a limit on what proportion storage you'll use and on how often you'll call certain operations monthly. for instance, the AWS Free Tier covers the primary 20,000 times you retrieve a file from Amazon S3, but you're charged for extra file retrievals.

Each service has limits that are unique to service.

6.1 Database Limits

AWS Offer 4 DB Services and all can be available in a Free tier account with few limitations of course.

1. **RDS:** It consists of two components, compute and storage. It is easier to line up, operate, and scale databases within the cloud. It provides cost-efficient, resizable capacity in an industry-standard electronic database and manages common database administration tasks.

 Amazon RDS Managed Relational Database Service for MySQL, PostgreSQL, MariaDB, Oracle BYOL or SQL Server.	750 Hours of Amazon RDS Single-AZ db.t2.micro Instance usage
	20 GB of DB Storage: any combination of General Purpose (SSD) or Magnetic
	20 GB for Backups (with RDS Magnetic storage; I/Os on General Purpose [SSD] are not separately billed)
	10,000,000 I/Os

- DynamoDB:** In this data storage pricing is pretty straight-forward: you're charged a price per GB per month. This rate varies across regions but is between \$0.25 and \$0.30 per GB-month in most regions. The second pricing parameter, provisioned throughput, maybe a little more novel.

 <p>Amazon DynamoDB Fast and flexible NoSQL database with seamless scalability. Learn More »</p>	25 GB of Storage
	25 Units of Write Capacity
	25 Units of Read Capacity
	Enough to handle up to 200M requests per month. Does not expire at the end of your 12 month AWS Free Tier term.

- Amazon ElastiCache:** It provides Caching-as-a-Service from Amazon Web Services. AWS simplifies fixing, managing, and scaling a distributed in-memory cache environment within the cloud.

 <p>Amazon ElastiCache Web service that makes it easy to deploy, operate, and scale an in-memory cache in the Cloud.</p>	750 Hours of cache.t2micro Node usage
	Enough hours to run continuously each month
	Expires 12 months after sign-up.

- Amazon Redshift:** It is a fully managed petabyte-scale data warehouse service. Redshift delivers fast query and I/O performance for virtually any size dataset by using columnar storage technology and parallelizing and distributing queries across multiple nodes

 <p>Amazon Redshift Fast, simple, cost-effective data warehousing Learn More »</p>	Two-month free trial
	750 DC1.Large hours per month for 2 months
	Expires 2 months after sign-up.

6.2 Analytics Limits

Amazon Kinesis Data Analytics is the easiest method to research streaming data, gain actionable insights, and answer your business and customer needs. Amazon Kinesis Data Analytics reduces the complexity of the building, managing, and integrating streaming applications with other AWS services.

1. **AWS Data Pipeline:** Amazon Data Pipeline is an “infrastructure-as-a-service” web services that support automating the transport and transformation of knowledge. Pipelines reflect an ETL process that permits you to get more value from your data across multiple sources via data extraction and data transformation downstream to Amazon Web Services.

	AWS Data Pipeline Orchestration for data-driven workflows.	3 Low Frequency Preconditions
		5 Low Frequency Activities
		Expires 12 months after sign-up.

2. **Amazon Elasticsearch Service (Amazon ES):** It is a fully managed service that creates it easy for you to deploy, secure, operate, and scale Elasticsearch within the AWS Cloud so you'll search, analyse, and visualize your data at scale.

	Amazon Elasticsearch Service Managed service that makes it easy to deploy, operate, and scale Elasticsearch clusters in the AWS Cloud	750 hours per month of a single-AZ t2.micro.elasticsearch instance
		10GB per month of optional EBS storage (Magnetic or General Purpose)
		Expires 12 months after sign-up.

6.3 Compute Limits

The Compute category of services is key resources that allow you to carry out computational abilities via a series of instructions used by applications and systems. These resources cover a range of different services and features.

1. **Amazon EC2:** Amazon charges based on hours of usage, not based on the number of instances you're running. It is designed to form web-scale cloud computing easier for developers. Amazon EC2's simple web service interface allows you to get and configure capacity with minimal friction.

 <p>Amazon EC2 Resizable compute capacity in the Cloud.</p>	<p>750 hours per month of Linux, RHEL, or SLES t2.micro instance usage</p> <p>750 hours per month of Windows t2.micro instance usage</p> <p>For example, run 1 instance x 1 month or 2 instances x half a month</p>
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2. **Amazon EC2 Container Registry (ECR):** It is a secure, fully-managed Docker container registry that makes it easy for developers to store, manage, and deploy Docker container images. Amazon ECR is integrated with Amazon EC2 Container Service (ECS), simplifying your development to production workflow.

 <p>Amazon EC2 Container Registry <i>New AWS Free Tier Offer</i> Store and retrieve Docker images</p>	<p>500 MB-month of Storage</p> <p>Expires 12 months after sign-up.</p>
---	---

3. **AWS Lambda:** Lambda fills the first role of the compute service on AWS. It also integrates with many other AWS services and, alongside API Gateway, DynamoDB and RDS form the idea for Serverless solutions for those using AWS.

 <p>AWS Lambda Compute service that runs your code in response to events and automatically manages the compute resources</p>	<p>1,000,000 free requests per month</p> <p>Up to 3.2 million seconds of compute time per month</p> <p>Does not expire at the end of your 12 month AWS Free Tier term.</p>
--	--

4. **Elastic Load Balancing:** It distributes incoming application or network traffic across multiple targets. Elastic Load Balancing scales your load balancer as traffic to your application changes over time. It can automatically scale to the overwhelming majority of workloads.



Elastic Load Balancing

Automatic distribution of incoming application traffic across multiple Amazon EC2 instances.

750 Hours per month shared between Classic and Application load balancers

15 GB of data processing for Classic load balancers

15 LCUs for Application load balancers


6.4 Storage Limits

For most of the online applications, we'd like some sort of file storage or database storage. AWS provides S3 and EBS file storage.


1. **EBS (Elastic Block Storage):** It is durable block-level storage to be used with EC2 instances in the AWS cloud. EBS Volumes are used by mounting them onto EC2 instance like you will do with a physical hard drive in on-premise and then format the EBS volume to the desired file system.

	Amazon Elastic Block Storage Persistent, durable, low-latency block-level storage volumes for EC2 instances.	30 GB of Amazon EBS: any combination of General Purpose (SSD) or Magnetic 2,000,000 I/Os (with EBS Magnetic) 1 GB of snapshot storage
---	--	--

2. **AWS S3:** It is a secure, durable, and scalable object storage, mostly used as file storage. S3 has been highly used for hosting web content with support for high bandwidth and demand. Scripts can also be stored in S3 making it possible to store static websites that use JavaScript.

	Amazon S3 Secure, durable, and scalable object storage infrastructure.	5 GB of Standard Storage 20,000 Get Requests 2,000 Put Requests
---	--	--

3. **Amazon CloudFront:** It is a global Content Delivery Network (CDN) service that securely delivers a website's dynamic, static, and streaming content by making it available from a worldwide network of edge locations. Amazon CloudFront supports all kinds of files which will be served over HTTP.

	Amazon CloudFront Web service to distribute content to end users with low latency and high data transfer speeds.	50 GB of Data Transfer Out 2,000,000 HTTP or HTTPS Requests Expires 12 months after sign-up.
---	--	--

Some of the foremost common limits are by time, like hourly or by the minute, or by requests, which are the requests you send to the service.

Some of the foremost common limits are by time, like hourly or by the minute, or by requests, which are the requests you send to the service.

7 HOURLY USAGE IN THE AMAZON WEB SERVICES FREE TIER

Some services, like Amazon EC2, Amazon RDS, and Elastic Load Balancing, charged on an hourly basis.

The AWS Free Tier for these services provides you with a monthly allotment of hours for the first 12 months.

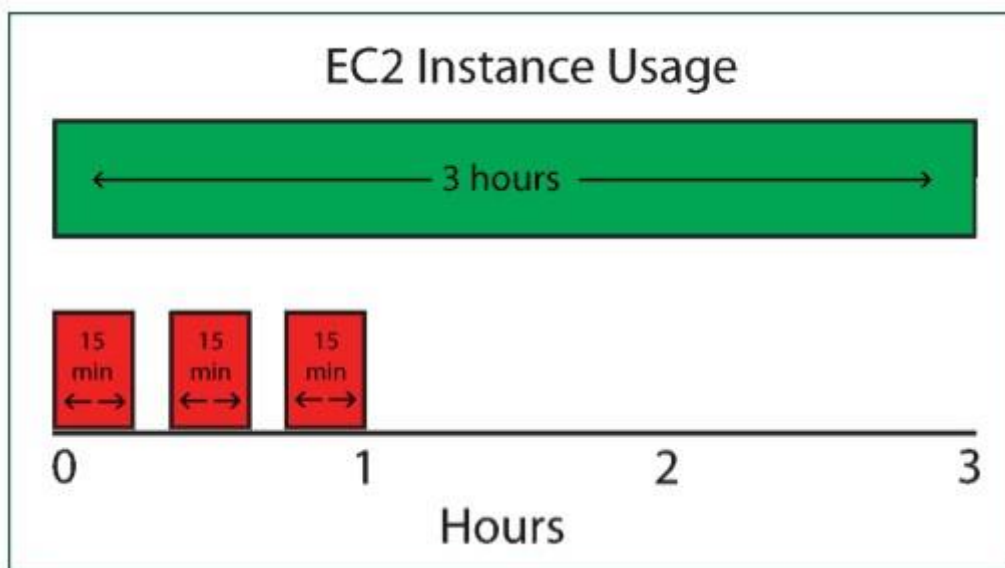
AWS Free Tier includes 750 hours of Linux and Windows t2.micro instances, (t3.micro for the regions in which t2.micro is unavailable) each month for one year. To stay within the Free Tier, use only EC2 Micro instances.

If you leave your resources running maximizes your AWS Free Tier benefits.

For example, if you run an Amazon EC2 instance for less than some of an hour, AWS may count that as a whole hour depending upon the AMI.

For Windows Instances, if you stop and begin instance 3 times during a single hour, you employ up three hours of your monthly allotment.

The following diagram illustrates how this works. Both the red and green usage scenarios use up three hours of your monthly allotment.



You can track your AWS Free Tier usage to assist you to stay under the AWS Free Tier limits.

AWS automatically provides alerts through AWS Budgets to notify you by email once you exceed 85 percent of your AWS Free Tier limits for every service. you'll also view the highest AWS Free Tier Services by Usage.

The table on the Billing and price Management dashboard to ascertain which five services you've got used the foremost and how much you've got used them.

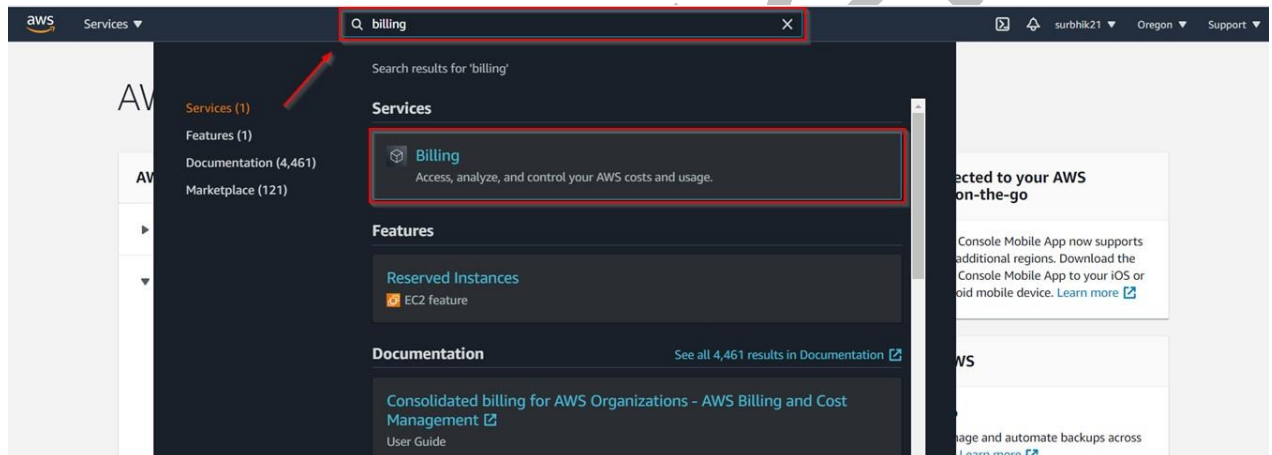
8 WHY I HAVE BEEN CHARGED?

In this section we are going to cover how to check our AWS account billing for which services you have been charged by AWS.

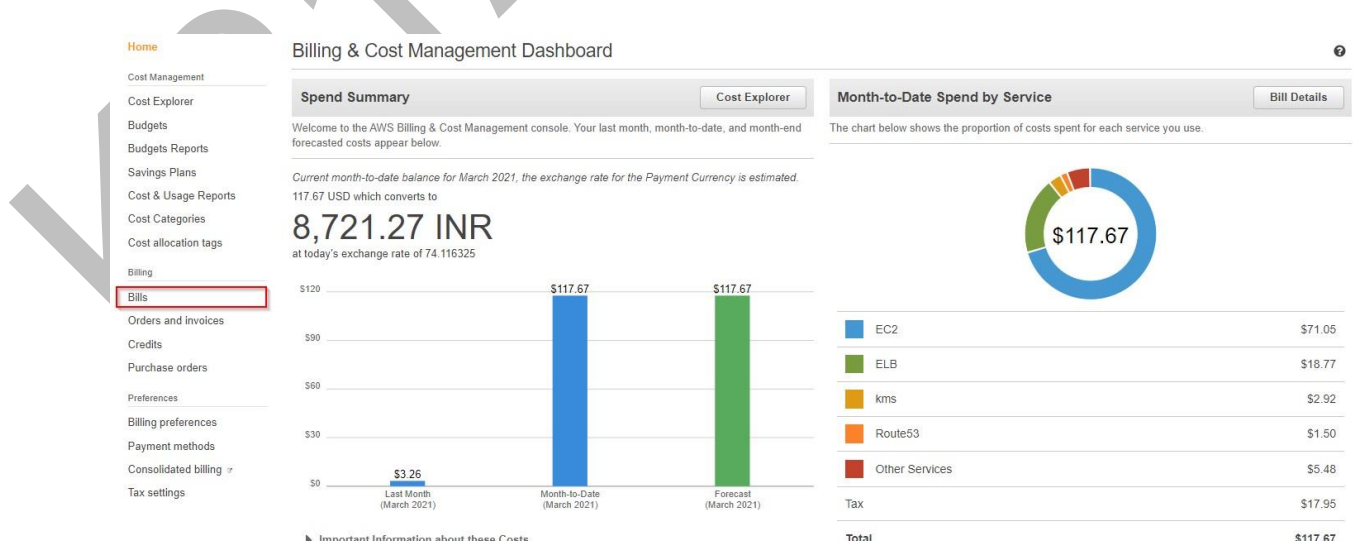
8.1 AWS Billing

In this section we will see how to check billing of your AWS Account by using AWS Billing service.

1. Search for Billing under services



2. Now Click on Bills to see your billings



3. Here you shall see the services by which you are getting charged as per their region basis.

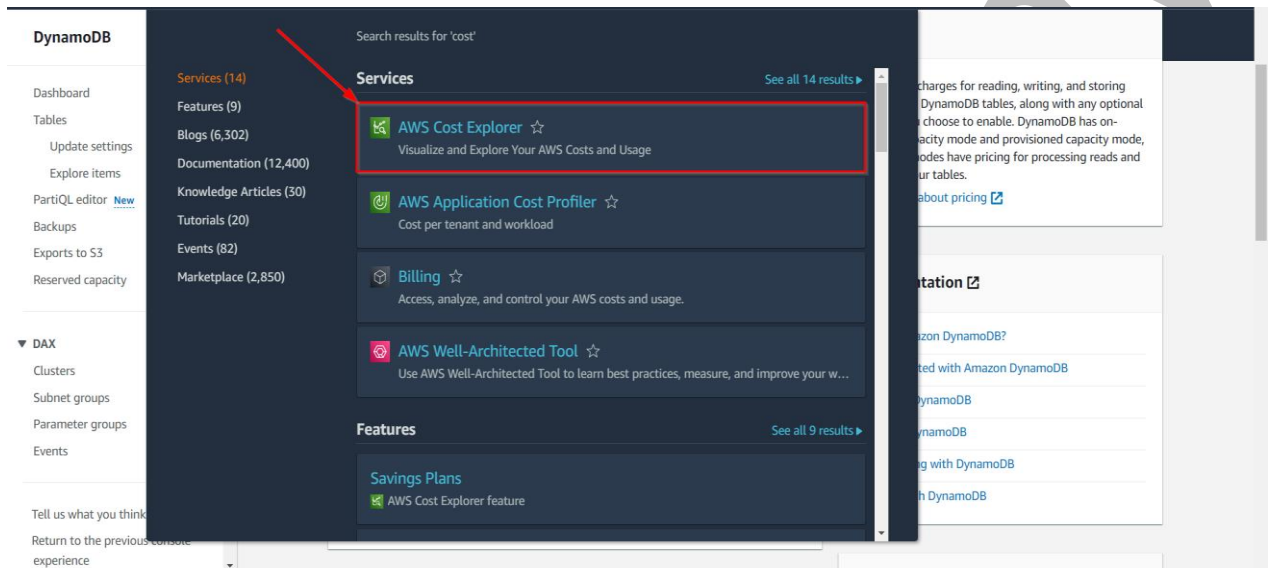
Cost Explorer	Estimated Total	₹ 8,721.27 INR	\$117.67
Budgets	Credits		
Budgets Reports	▶ Credits		
Savings Plans	Your invoiced total will be displayed once an invoice is issued.		
Cost & Usage Reports			
Cost Categories			
Cost allocation tags			
Billing	Details		+ Expand All
Bills	Amazon Internet Services Private Ltd.		\$117.67
Orders and invoices	▶ Amplify		\$0.00
Credits	▶ Budgets		\$0.00
Purchase orders	▶ CloudFront		\$0.00
Preferences	▶ CloudTrail		\$1.08
Billing preferences	▶ CloudWatch		\$0.01
Payment methods	▶ CodeArtifact		\$0.00
Consolidated billing	▶ CodeBuild		\$0.00
Tax settings	▶ CodeCommit		\$0.00
	▶ CodePipeline		\$0.00
	▶ Data Transfer		\$0.02
	▶ DynamoDB		\$0.00
	▶ EC2 Container Registry (ECR)		\$0.01
	▼ Elastic Compute Cloud		\$71.05
	▶ No Region		-\$0.02
	▶ Asia Pacific (Mumbai)		\$3.22
	▶ Asia Pacific (Sydney)		\$0.09
	▶ South America (Sao Paulo)		\$1.46
	▶ US East (N. Virginia)		\$30.24
	▶ US East (Ohio)		\$3.11

Note: Here you can see all your services by which you are getting charged and in which region your service is running that you are getting charged

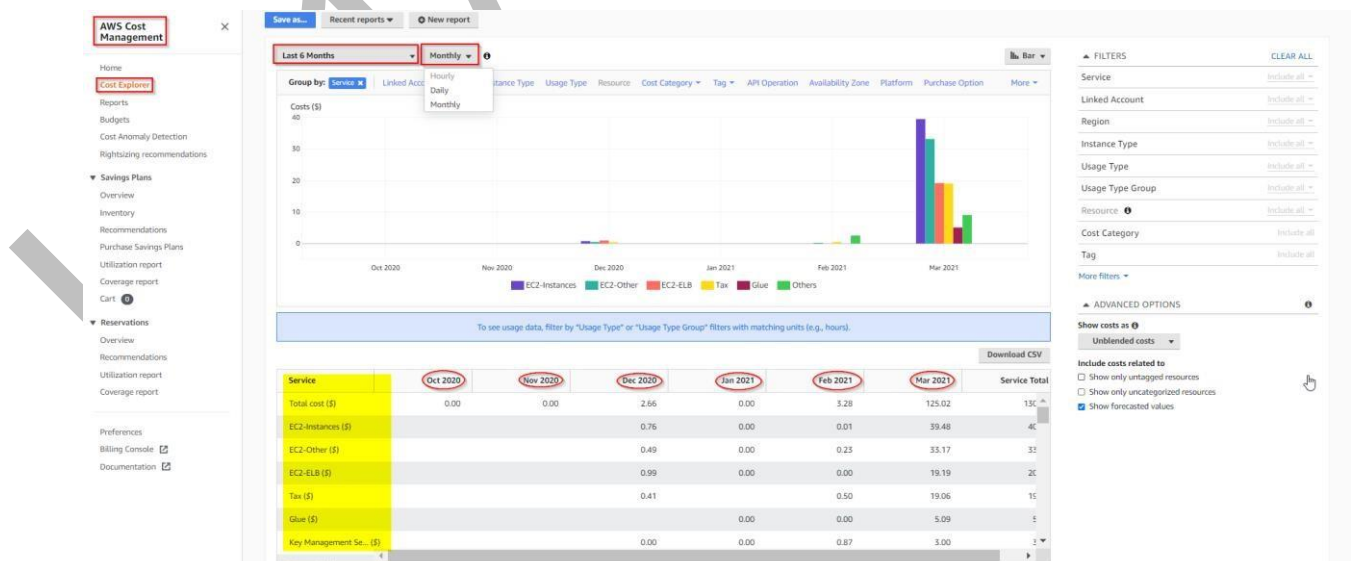
8.2 AWS Cost Explorer

In this section we will see that how to check Billing of your account using the Cost explorer service.

1. Search for AWS Cost Explorer on AWS console



2. Here Under Cost Explorer Dashboard, Click on Cost Explorer. Here you can filter you bills according to your month, daily and hourly.



9 SUMMARY

This activity guide covered:

1. How to Create a Billing Alarm on your free trial account.
2. Types of free Services
 - a. Always free
 - b. 12 months free
 - c. Trials
3. AWS Free Tier limits
 - a. Database Limits
 - b. Analytics Limits
 - c. Compute Limits
 - d. Storage Limits
4. Hourly usage in the Amazon Web Services Free Tier
5. Why I have been charged