

Account Management, Billing & Support

AWS Organizations

- AWS Organizations is a service that helps you consolidate multiple AWS accounts into an organization that you create and centrally manage.

- Global service
- Allows to manage multiple AWS accounts
- The main account is the master account
- Cost Benefits:
 - Consolidated Billing across all accounts - single payment method
 - Pricing benefits from aggregated usage (volume discount for EC2, S3...)
 - Pooling of Reserved EC2 instances for optimal savings
- API is available to automate AWS account creation
- Restrict account privileges using Service Control Policies (SCP)

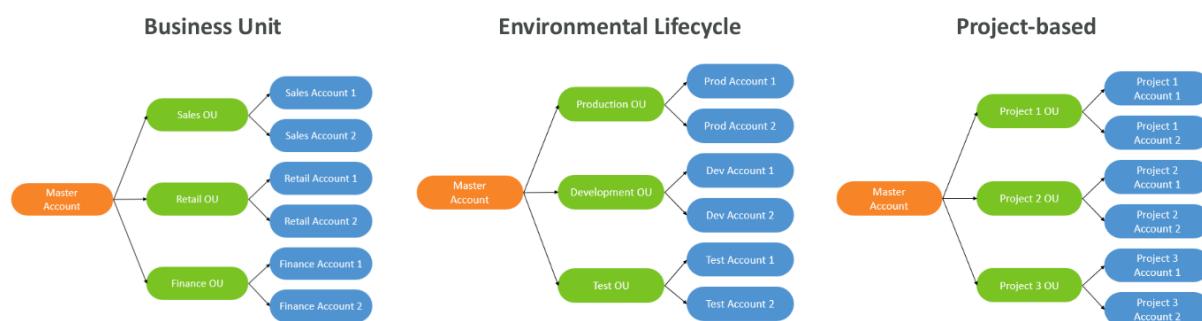


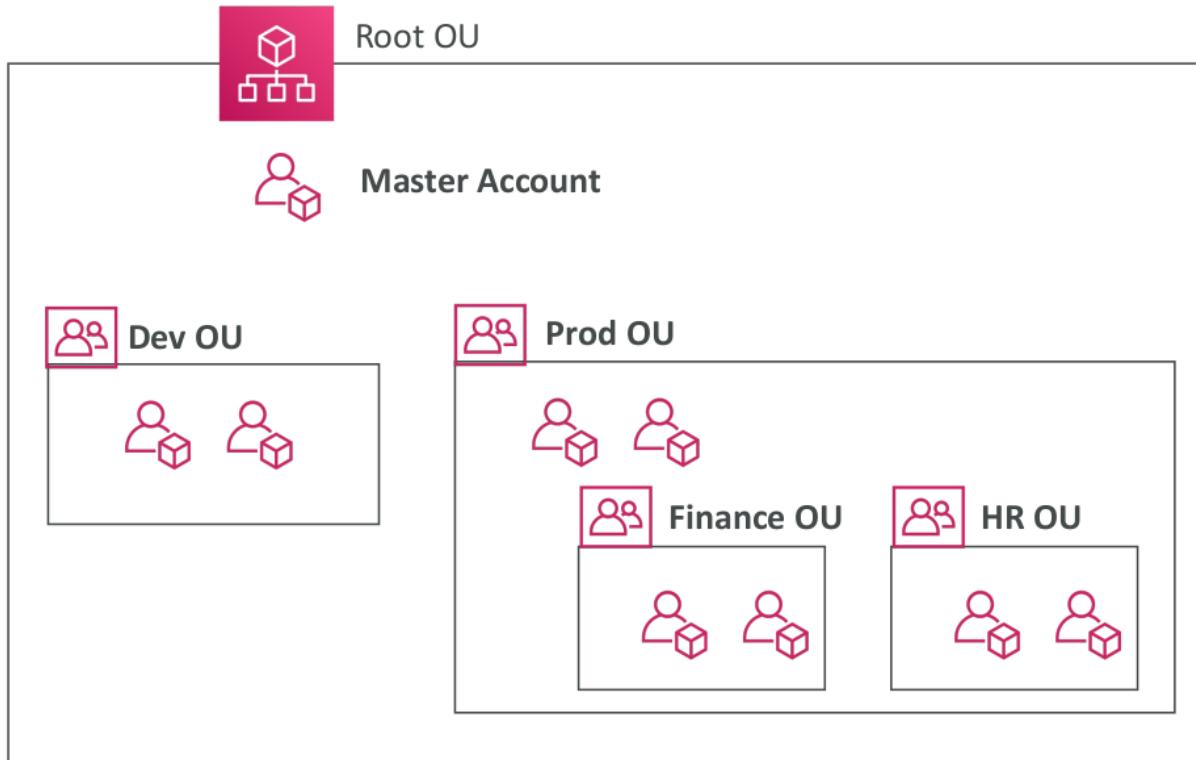
Multi Account Strategies

- Create accounts per **department**, per **cost center**, per **dev / test / prod**, based on **regulatory restrictions** (using SCP), for better **resource isolation** (ex:VPC), to have **separate per-account service limits**, isolated account for **logging**
- Multi Account vs One Account Multi VPC
- Use tagging standards for billing purposes
- Enable CloudTrail on all accounts, send logs to central S3 account
- Send CloudWatch Logs to central logging account
- You have to choose either between multi account or one account multi VPC. It's a trade off.

AWS Organizations Architecture

Organizational Units (OU) - Examples





Service Control Policies (SCP)

Service Control Policy (SCP):

- **What it is:** An SCP is like a set of rules that you create and apply to the AWS accounts within your organization.
- **Purpose:** It helps you control what services and actions (operations) can be performed by the accounts in your AWS organization.
- **Example:** Let's say you want to restrict certain accounts from using a particular AWS service. You can create an SCP to block access to that service for those specific accounts.

Simple Explanation:

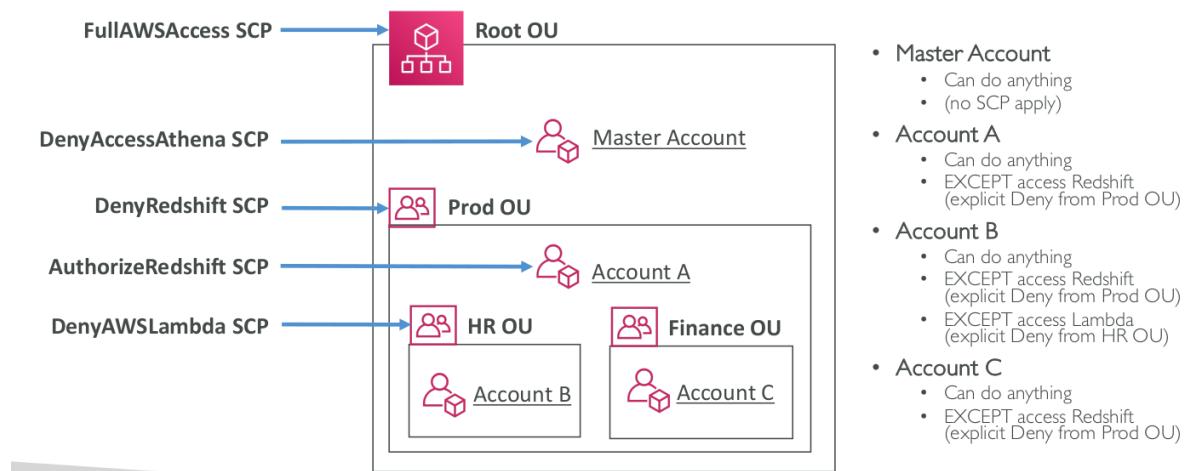
- Think of AWS Organizations as a way to manage and organize multiple AWS accounts.
- An SCP is a tool within AWS Organizations that lets you set rules to control what each account can and cannot do.

- You can use SCPs to say "allow" (whitelist) or "deny" (blacklist) specific actions that AWS users or roles can take.
- SCPs can be like rules that you apply to groups of AWS accounts (OU level) or individual accounts (account level)
- **Does not apply to the Master Account.**
- SCP is applied to all the Users and Roles of the Account, including Root user.

So, if there is an AWS account that lies within an OU and has some SCP rule applied to it then, it HAS to be followed even if that account is the root user account.

- SCP rules do not apply to service-linked roles. Service-linked roles are designed to have certain permissions by default and cannot be restricted by SCPs.
- SCP must have an explicit Allow (does not allow anything by default)
- **Use cases: (IMP)**
 - Restrict access to certain services for particular accounts or OUs.
 - Enforce PCI compliance by explicitly disabling services.

- **SCP Hierarchy**



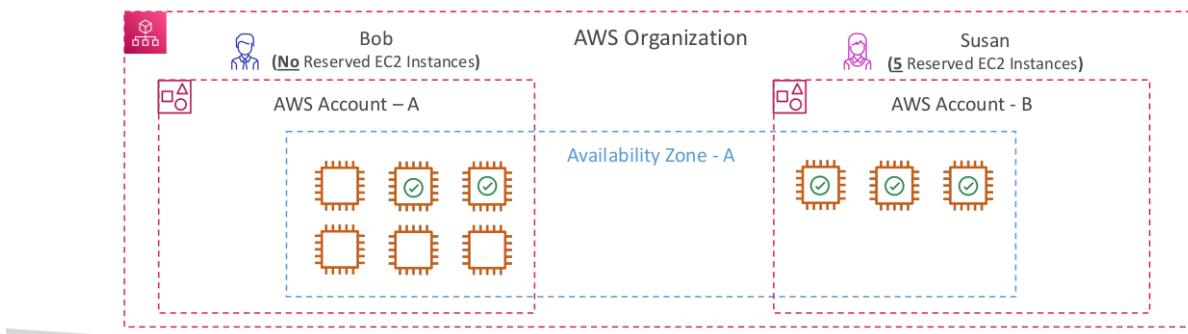
**** Rule applied at OU level has a higher precedence than if applied at account level.**

- What an SCP looks like - JSON doc which either allows Blacklisting resources (explicit deny) or Whitelisting resources (explicit allow)

```
[{"Version": "2012-10-17", "Statement": [{"Sid": "AllowsAllActions", "Effect": "Allow", "Action": "*", "Resource": "*"}, {"Sid": "DenyDynamoDB", "Effect": "Deny", "Action": "dynamodb:*", "Resource": "*"}]}, {"Version": "2012-10-17", "Statement": [{"Effect": "Allow", "Action": ["ec2:*", "cloudwatch:*"], "Resource": "*"}]}]
```

Consolidated Billing - AWS Organization

- When enabled, provides you with:
 - **Combined Usage** – combine the usage across all AWS accounts in the AWS Organization to share the volume pricing, Reserved Instances and Savings Plans discounts
 - **One Bill** – get one bill for all AWS Accounts in the AWS Organization
- The management account can turn off Reserved Instances discount sharing for any account in the AWS Organization, including itself

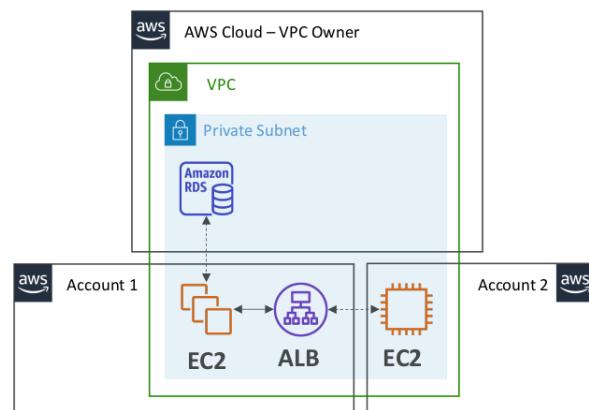


AWS Control Tower

- Easy way to set up and govern a secure and compliant multi-account AWS environment based on best practices
- Benefits:
 - Automate the set up of your environment in a few clicks
 - Automate ongoing policy management using guardrails
 - Detect policy violations and remediate them
 - Monitor compliance through an interactive dashboard
- AWS Control Tower runs on top of AWS Organizations:
 - It automatically sets up AWS Organizations to organize accounts and implement SCPs (Service Control Policies)

AWS RAM (Resource Access Manager)

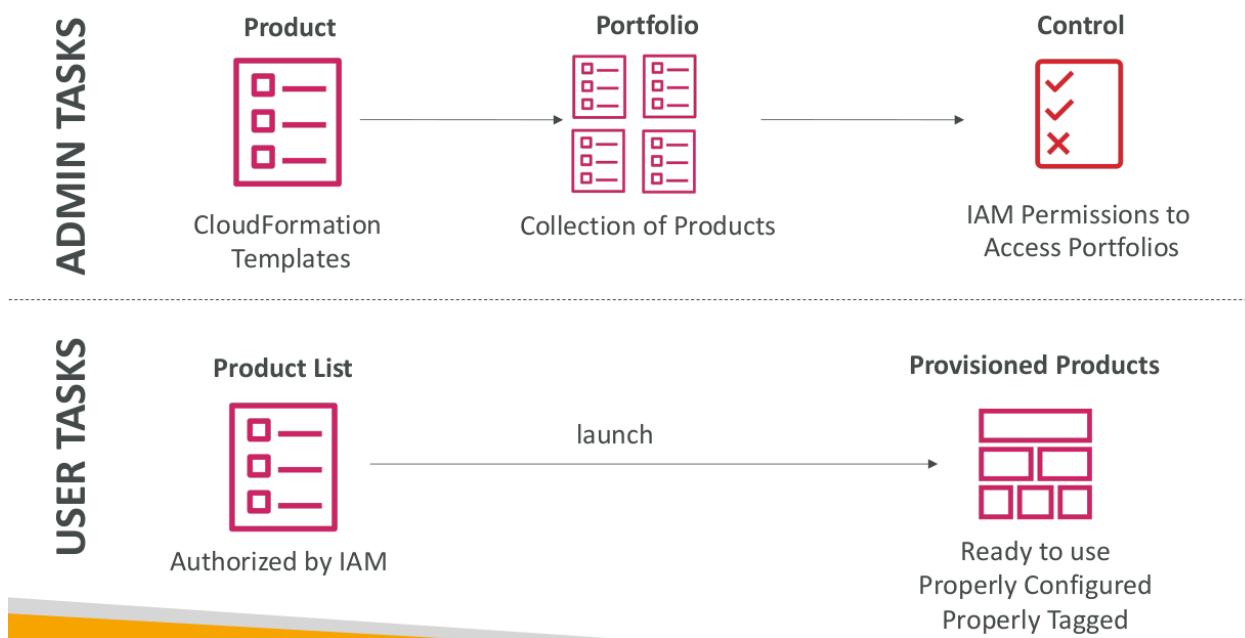
- Share AWS resources that you own with other AWS accounts
- Share with any account or within your Organization
- Avoid resource duplication!
- Supported resources include Aurora, VPC Subnets, Transit Gateway, Route 53, EC2 Dedicated Hosts, License Manager Configurations...
- Instead of duplicating resources in each account, you can share them, saving time and resources.



- When you share a resource, other AWS accounts can use it as if it's in their own account.
- You specify permissions and access levels when sharing resources to control what others can do with them.

AWS Service Catalog

- Users that are new to AWS have too many options, and may create stacks that are not compliant / in line with the rest of the organization
- Some users just want a quick **self-service portal** to launch a set of authorized products pre-defined by admins
 - Includes: virtual machines, databases, storage options, etc...
- Enter AWS Service Catalog!
 - Simply, **as an admin**, you can create a product (a CloudFormation template) and list multiple products within a portfolio — and attach IAM permissions to those portfolios which will then define who can launch or provision which product from the portfolio.
 - **As a user**, you get a product list containing the products you are authorized to launch (according to the IAM policy) — so, you can launch those products through the CloudFormation templates and you will be provisioned with ready-to-use, properly configured and tagged environments.



Pricing Models in AWS

- AWS has 4 pricing models:
- **Pay as you go:** pay for what you use, remain agile, responsive, meet scale demands
- **Save when you reserve:** minimize risks, predictably manage budgets, comply with long-terms requirements
 - Reservations are available for EC2 Reserved Instances, DynamoDB Reserved Capacity, ElastiCache Reserved Nodes, RDS Reserved Instance, Redshift Reserved Nodes
- **Pay less by using more:** volume-based discounts
- **Pay less as AWS grows**
- Services within the free tier:

- IAM
 - VPC
 - Consolidated Billing
 - Elastic Beanstalk
 - CloudFormation
 - Auto Scaling Groups
 - Free Tier: <https://aws.amazon.com/free/>
 - EC2 t2.micro instance for a year
 - S3, EBS, ELB, AWS Data transfer
- ⚠ You do pay for the resources created

Pricing Models - Services

Compute Pricing - EC2

- Only charged for what you use
- Number of instances
- Instance configuration:
 - Physical capacity
 - Region
 - OS and software
 - Instance type
 - Instance size
- ELB running time and amount of data processed
- Detailed monitoring

- **On-demand instances:**
 - Minimum of 60s
 - Pay per second (Linux/Windows) or per hour (other)
- **Reserved instances:**
 - Up to 75% discount compared to On-demand on hourly rate
 - 1- or 3-years commitment
 - All upfront, partial upfront, no upfront
- **Spot instances:**
 - Up to 90% discount compared to On-demand on hourly rate
 - Bid for unused capacity
- **Dedicated Host:**
 - On-demand
 - Reservation for 1 year or 3 years commitment
- **Savings plans** as an alternative to save on sustained usage

Compute Pricing - Lambda & ECS

- Lambda:
 - Pay per call
 - Pay per duration
- ECS:
 - EC2 Launch Type Model: No additional fees, you pay for AWS resources stored and created in your application

- Fargate:
 - Fargate Launch Type Model: Pay for vCPU and memory resources allocated to your applications in your containers

- In case of Fargate, since you're not provisioning any EC2 instances, you basically pay for the CPU and memory provisioned for each container of your application.

Storage Pricing - S3

- **Key:** Sending data into S3 is free but transfer out is paid.

- Storage class: S3 Standard, S3 Infrequent Access, S3 One-Zone IA, S3 Intelligent Tiering, S3 Glacier and S3 Glacier Deep Archive
 - Number and size of objects: Price can be tiered (based on volume)
 - Number and type of requests
 - Data transfer OUT of the S3 region
 - S3 Transfer Acceleration
 - Lifecycle transitions
-
- Similar service: EFS (pay per use, has infrequent access & lifecycle rules)

Storage Pricing - EBS

- EBS is provisioned by estimation and not on-demand.
 - If you provision x GB of EBS then you will be paying on a monthly basis whether you use it or not.
-
- Volume type (based on performance)
 - Storage volume in GB per month provisionned
 - IOPS:
 - General Purpose SSD: Included
 - Provisioned IOPS SSD: Provisionned amount in IOPS
 - Magnetic: Number of requests
 - Snapshots:
 - Added data cost per GB per month
 - Data transfer:
 - Outbound data transfer are tiered for volume discounts
 - Inbound is free

Database Pricing - RDS

-
- Per hour billing
 - Database characteristics:
 - Engine
 - Size
 - Memory class
 - Purchase type:
 - On-demand
 - Reserved instances (1 or 3 years) with required up-front
 - Backup Storage: There is no additional charge for backup storage up to 100% of your total database storage for a region.
-
- Additional storage (per GB per month)
 - Number of input and output requests per month
 - Deployment type (storage and I/O are variable):
 - Single AZ
 - Multiple AZs
 - Data transfer:
 - Outbound data transfer are tiered for volume discounts
 - Inbound is free

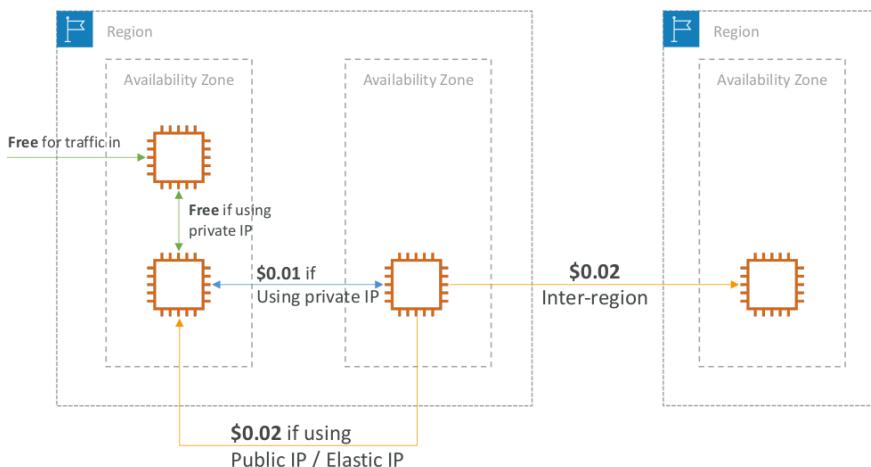
Content Delivery - CloudFront

- CloudFront is global service.

- Pricing is different across different geographic regions
- Aggregated for each edge location, then applied to your bill
- Data Transfer Out (volume discount)
- Number of HTTP/HTTPS requests

Per Month	United States & Canada	Europe & Israel	South Africa, Kenya, & Middle East	South America	Japan	Australia	Singapore, South Korea, Taiwan, Hong Kong, & Philippines	India
First 10TB	\$0.085	\$0.085	\$0.110	\$0.110	\$0.114	\$0.114	\$0.140	\$0.170
Next 40TB	\$0.080	\$0.080	\$0.105	\$0.105	\$0.089	\$0.098	\$0.135	\$0.130
Next 100TB	\$0.060	\$0.060	\$0.090	\$0.090	\$0.086	\$0.094	\$0.120	\$0.110

Networking Costs (per GB)



- Use Private IP instead of Public IP for good savings and better network performance
- Use same AZ for maximum savings (at the cost of high availability)

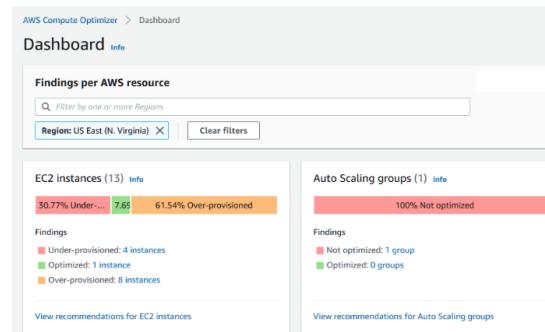
Savings Plan

- Commit a certain \$ amount per hour for 1 or 3 years
- Easiest way to setup long-term commitments on AWS
- **EC2 Savings Plan**
 - Up to 72% discount compared to On-Demand
 - **Commit to usage of individual instance families in a region (e.g. C5 or M5)**
 - Regardless of AZ, size (m5.xl to m5.4xl), OS (Linux/Windows) or tenancy
 - All upfront, partial upfront, no upfront
- **Compute Savings Plan**
 - Up to 66% discount compared to On-Demand
 - Regardless of Family, Region, size, OS, tenancy, compute options
 - Compute Options: EC2, Fargate, Lambda
- **Machine Learning Savings Plan:** SageMaker...
- Setup from the AWS Cost Explorer console
- Estimate pricing at <https://aws.amazon.com/savingsplans/pricing/>

- Compute savings plan = most flexible

AWS Compute Optimizer

- Reduce costs and improve performance by recommending optimal AWS resources for your workloads
- Helps you choose optimal configurations and right-size your workloads (over/under provisioned)
- Uses Machine Learning to analyze your resources' configurations and their utilization CloudWatch metrics
- Supported resources
 - EC2 instances
 - EC2 Auto Scaling Groups
 - EBS volumes
 - Lambda functions
- Lower your costs by up to 25%
- Recommendations can be exported to S3



Billing and Costing Tools

- Estimating costs in the cloud:
 - Pricing Calculator
- Tracking costs in the cloud:
 - Billing Dashboard
 - Cost Allocation Tags
 - Cost and Usage Reports
 - Cost Explorer
- Monitoring against costs plans:
 - Billing Alarms
 - Budgets

Estimation - Pricing Calc

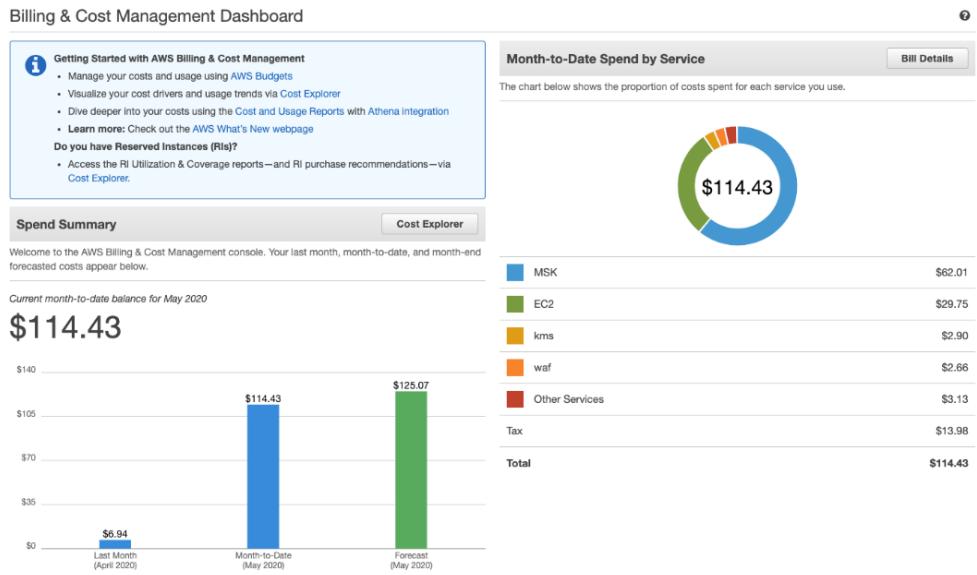
- Available at <https://calculator.aws/>
- Estimate the cost for your solution architecture

The screenshot shows the AWS Pricing Calculator interface. At the top, it displays 'My Estimate' with a total of 62,191.68 USD for the first 12 months. Below this, there are two service sections: 'Amazon Aurora MySQL-Compatible' and 'Amazon EC2'. The Aurora section shows a monthly cost of 5,110.80 USD. The EC2 section shows a monthly cost of 71.84 USD. At the bottom, there is a 'Quick estimate' section with some placeholder text.

- Advanced or Quick estimate.

Tracking - Billing Dashboard

- Shows you all the cost for the month, the forecast and month-to-date.



- It includes the AWS Free Tier Dashboard through which you can look at the usage for each free tier based on your activities for the month.

All Free Tier services by usage					
Service	Free Tier usage limit	Current usage	Forecasted usage	Month-to-date actual usage	Month-end forecasted usage
AWS Lambda	1,000,000 free requests per month for AWS Lambda	585,089 Requests	697,606 Requests	58.51%	69.76%
Amazon Simple Notification Service	1,000,000 Requests for Amazon Simple Notification Service (APS2)	575,640 Requests	686,340 Requests	57.56%	68.63%
AWS Lambda	400,000 seconds of compute time per month for AWS Lambda	61,973 seconds	73,891 seconds	15.49%	18.47%
AWS Key Management Service	20,000 free requests per month for AWS Key Management Service	1,533 Requests	1,828 Requests	7.66%	9.14%
AmazonCloudWatch	5 GB of Log Data Ingestion for Amazon Cloudwatch	0 GB	0 GB	5.81%	6.92%
AmazonCloudWatch	5 GB of Log Data Archive for Amazon Cloudwatch	0 GB-Mo	0 GB-Mo	4.78%	5.70%
Amazon Simple Notification Service	1,000 email notifications for Amazon Simple Notification Service (USE1)	25 Notifications	30 Notifications	2.50%	2.98%
Amazon Simple Queue Service	1,000,000 Requests of Amazon Simple Queue Service	11,323 Requests	13,501 Requests	1.13%	1.35%
CodeBuild	100 build minutes per month of build.general1.small compute type usage for AWS CodeBuild	1 minutes	1 minutes	1.00%	1.19%
AWS Step Functions	4,000 state transitions per month for AWS Step Functions	15 StateTransitions	18 StateTransitions	0.38%	0.45%

Tracking - Cost Allocation Tags

- Allows us to track our costs on a detailed level and group them together.
- You can basically tag a group or user or an activity and then get detailed estimates of cost scoped to that tag.

Total Cost	user:Owner	user:Stack	user:Cost Center	user:Application
0.95	DbAdmin	Test	80432	Widget2
0.01	DbAdmin	Test	80432	Widget2
3.84	DbAdmin	Prod	80432	Widget2
6.00	DbAdmin	Test	78925	Widget1
234.63	SysEng	Prod	78925	Widget1
0.73	DbAdmin	Test	78925	Widget1
0.00	DbAdmin	Prod	80432	Portal
2.47	DbAdmin	Prod	78925	Portal

- For this you can use different tags:
 - **AWS generated tags**
 - Automatically applied to the resource you create
 - Starts with Prefix **aws:** (e.g. aws: createdBy)
 - **User-defined tags**
 - Defined by the user
 - Starts with Prefix **user:**
- **You can also tag your resources to from resource groups**

- Tags are used for organizing resources:
 - EC2: instances, images, load balancers, security groups...
 - RDS, VPC resources, Route 53, IAM users, etc...
 - Resources created by CloudFormation are all tagged the same way
- Free naming, common tags are: Name, Environment, Team ...
- Tags can be used to create **Resource Groups**
 - Create, maintain, and view a collection of resources that share common tags
 - Manage these tags using the Tag Editor

Tracking - Cost Usage Reports

- Dive deeper into your AWS costs and usage
- The AWS Cost & Usage Report contains **the most comprehensive set of AWS cost and usage data available**, including additional metadata about AWS services, pricing, and reservations (e.g., Amazon EC2 Reserved Instances (RIs)).
- The AWS Cost & Usage Report lists AWS usage for each service category used by an account and its IAM users in hourly or daily line items, as well as any tags that you have activated for cost allocation purposes.
- This report can also be integrated with Athena, Redshift or QuickSight to be analysed.

M	N	O	P	R	S	T
lineItem/ProductCode	lineItem/UsageType	lineItem/Operation	lineItem/AvailabilityZone	lineItem/UsageAmount	lineItem/CurrencyCode	lineItem/lineItemDescription
1 AmazonEC2	CW:AlarmMonitorUsage	Unknown		0.00134409 USD		\$0.00 per alarm-month - first 10 alarms
2 AmazonS3	Requests-Tier1	ListAllMyBuckets		2 USD		\$0.00 per request - PUT, COPY, POST, or LIST requests under the monthly global free tier
4 AmazonEC2	CW:AlarmMonitorUsage	Unknown		0.00134409 USD		\$0.00 per alarm-month - first 10 alarms
5 AmazonEC2	APS2-EBS-VolumeUsage-gp2	CreateVolume-Gp2		0.01344086 USD		\$0.00 per GB-month of General Purpose (SSD) provisioned storage under monthly free tier
6 AmazonEC2	APS2-EBS-VolumeUsage-gp2	CreateVolume-Gp2		0.01344086 USD		\$0.00 per GB-month of General Purpose (SSD) provisioned storage under monthly free tier
7 AmazonEC2	USW2-BoxUsage:t2.micro	RunInstances:0002	us-west-2a	1 USD		\$0.00 per Windows t2.micro instance-hour (or partial hour) under monthly free tier
8 AmazonEC2	USW2-USE1-AWS-Out-Bytes	PublicIP-Out		0.00000174 USD		\$0.00 per GB - data transfer out under the monthly global free tier
9 AmazonEC2	USW2-USE1-AWS-In-Bytes	PublicIP-In		0.00000138 USD		\$0.00 per GB - US West (Oregon) data transfer from US East (Northern Virginia)
10 AmazonEC2	USW2-USW1-AWS-In-Bytes	PublicIP-In		0.00000149 USD		\$0.00 per GB - US West (Oregon) data transfer from US West (Northern California)
11 AmazonS3	Requests-Tier1	ListAllMyBuckets		2 USD		\$0.00 per request - PUT, COPY, POST, or LIST requests under the monthly global free tier
12 AmazonEC2	USW2-DataTransfer-Out-Bytes	RunInstances		0.00038144 USD		\$0.00 per GB - data transfer out under the monthly global free tier
13 AmazonEC2	USW2-USW1-AWS-Out-Bytes	PublicIP-Out		0.00000174 USD		\$0.00 per GB - data transfer out under the monthly global free tier
14 AmazonEC2	USW2-DataTransfer-In-Bytes	RunInstances		0.00030951 USD		\$0.00 per GB - data transfer in per month
15 AmazonEC2	USW2-BoxUsage:t2.micro	RunInstances:0002	us-west-2a	1 USD		\$0.00 per Windows t2.micro instance-hour (or partial hour) under monthly free tier
16 AmazonEC2	USW2-USW1-AWS-Out-Bytes	PublicIP-Out		0.00000349 USD		\$0.00 per GB - data transfer out under the monthly global free tier
17 AmazonEC2	USW2-USW1-AWS-In-Bytes	PublicIP-In		0.00000276 USD		\$0.00 per GB - US West (Oregon) data transfer from US West (Northern California)
18 AmazonEC2	APS2-EBS-VolumeUsage-gp2	CreateVolume-Gp2		0.01344086 USD		\$0.00 per GB-month of General Purpose (SSD) provisioned storage under monthly free tier
19 AmazonEC2	CW:AlarmMonitorUsage	Unknown		0.00134409 USD		\$0.00 per alarm-month - first 10 alarms
20 AmazonEC2	USW2-BoxUsage:t2.micro	RunInstances:0002	us-west-2a	1 USD		\$0.00 per Windows t2.micro instance-hour (or partial hour) under monthly free tier
21 AmazonEC2	USW2-DataTransfer-Regional-Bytes	PublicIP-Out		0.00000349 USD		\$0.00 per GB - regional data transfer under the monthly global free tier
22 AmazonEC2	USW2-DataTransfer-In-Bytes	RunInstances		0.00032071 USD		\$0.00 per GB - data transfer in per month
23 AmazonEC2	USW2-DataTransfer-Regional-Bytes	PublicIP-In		0.00000302 USD		\$0.00 per GB - regional data transfer under the monthly global free tier
24 AmazonEC2	USW2-USE1-AWS-Out-Bytes	PublicIP-Out		0.00000174 USD		\$0.00 per GB - data transfer out under the monthly global free tier
25 AmazonEC2	USW2-DataTransfer-Out-Bytes	RunInstances		0.00045736 USD		\$0.00 per GB - data transfer out under the monthly global free tier
26 AmazonEC2	USW2-DataTransfer-In-Bytes	RunInstances		0.00036737 USD		\$0.00 per GB - data transfer in per month
27 AmazonEC2	USW2-APN2-AWS-In-Bytes	PublicIP-In		0.00000005 USD		\$0.00 per GB - US West (Oregon) data transfer from Asia Pacific (Seoul)
28 AmazonEC2	USW2-APN2-AWS-Out-Bytes	PublicIP-Out		0.00000018 USD		\$0.00 per GB - data transfer out under the monthly global free tier
29 AmazonEC2	USW2-USE1-AWS-In-Bytes	PublicIP-In		0.00000153 USD		\$0.00 per GB - US West (Oregon) data transfer from US East (Northern Virginia)
30 AmazonEC2	USW2-DataTransfer-Out-Bytes	RunInstances		0.00039945 USD		\$0.00 per GB - data transfer out under the monthly global free tier
31 AmazonEC2	CW:AlarmMonitorUsage	Unknown		0.00134409 USD		\$0.00 per alarm-month - first 10 alarms

- A super comprehensive report which contains the answer to what, when, where and why — allowing you to deeply analyse your costs.

Tracking - Cost Explorer

- Visualize, understand, and manage your AWS costs and usage over time
- Create custom reports that analyze cost and usage data.
- Analyze your data at a high level: total costs and usage across all accounts
- Or Monthly, hourly, resource level granularity
- Choose an optimal **Savings Plan** (to lower prices on your bill)
- Forecast usage up to 12 months based on previous usage



- KEY: forecast of next 12 months based on previous usage patterns.



- Cost Explorer also lets you define **savings plan** which acts as an alternative to using Reserved Instances. It provides you recommendations on savings plan

directly from Cost Explorer.

how is aws cost explorer - savings plan an alternative to reserved instances?

ChatGPT

AWS Cost Explorer with Savings Plans and Reserved Instances (RIs) are both cost-saving options in AWS, but they operate under different models. Here's a simple comparison:

1. Reserved Instances (RIs):

- **What they are:** RIs are a way to commit to a specific instance type in a specific region for a term of 1 or 3 years.
- **How they work:** You pay an upfront fee or choose a no-upfront option, and in return, you get a significant discount on the hourly rate of the instance.
- **Flexibility:** RIs offer a capacity reservation, ensuring you have the instance when you need it, but they can be less flexible if your usage changes.

2. AWS Cost Explorer with Savings Plans:

- **What it is:** Savings Plans provide a flexible pricing model that offers significant savings (up to 72%) on your AWS usage, in exchange for a commitment to a consistent amount of usage (measured in \$/hr) for a 1 or 3-year term.
- **How it works:** Unlike RIs, Savings Plans provide savings across a broader range of instance types in a region, giving you more flexibility. You commit to a certain amount of usage, and the discount applies regardless of instance type or family.
- **Flexibility:** Savings Plans are more flexible than RIs. You can change instance types, families, or regions while maintaining the same level of savings, adapting to your evolving needs.

Recommendation options

Savings Plans type <input checked="" type="radio"/> Compute <input type="radio"/> EC2 Instance	Savings Plans term <input type="radio"/> 1-year <input checked="" type="radio"/> 3-year	Payment option <input checked="" type="radio"/> All upfront <input type="radio"/> Partial upfront <input type="radio"/> No upfront	Based on the past <input type="radio"/> 7 days <input type="radio"/> 30 days <input checked="" type="radio"/> 60 days
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Recommendation: Purchase a Compute Savings Plan at a commitment of \$2.40/hour

You could save an estimated \$1,173 monthly by purchasing the recommended Compute Savings Plan.

Based on your past 60 days of usage, we recommend purchasing a Savings Plan with a commitment of \$2.40/hour for a 3-year term. With this commitment, we project that you could save an average of \$1.61/hour - representing a 40% savings compared to On-Demand. To account for variable usage patterns, this recommendation maximizes your savings by leaving an average \$0.04/hour of On-Demand spend.

Before recommended purchase	After recommended purchase (based on your past 60 days of usage)	
Monthly On-Demand spend ⓘ \$2,955 (\$4.05/hour) Based on your On-Demand spend over the past 60 days	Estimated monthly spend ⓘ \$1,782 (\$2.44/hour) Your recommended \$2.40/hour Savings Plans commitment + an average \$0.04/hour of On-Demand spend	Estimated monthly savings ⓘ \$1,173 (\$1.61/hour) 40% monthly savings over On-Demand \$2,955 - \$1,782 = \$1,173

This recommendation examines your usage over the past 60 days (including your existing Savings Plans and EC2 Reserved Instances) and calculates what your costs would have been had you purchased the recommended Savings Plans. See applicable rates for Savings Plans [here](#). To generate this recommendation, AWS simulates your bill for different commitment amounts and recommends the commitment amount that provides the greatest estimated savings. [Learn more](#)

Recommended Compute Savings Plans

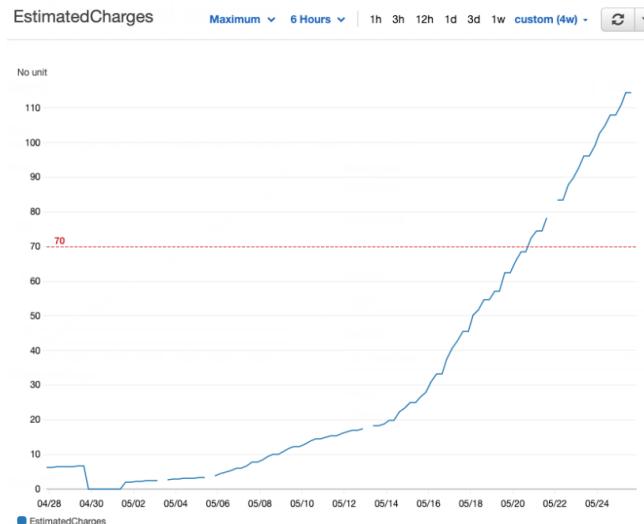
[Download CSV](#) [Add selected Savings Plan\(s\) to cart](#)

x	Term	Payment option	Recommended commitment	Estimated hourly savings ⓘ
<input checked="" type="checkbox"/>	3-year	All upfront	\$2.40/hour	\$1.61 (40%)

*Average hourly spend and minimum hourly spend based on your current on-demand spend for the given instance family.

Monitoring Costs - Billing Alarms in CloudWatch

- Billing data metric is stored in CloudWatch us-east-1
- Billing data are for overall **worldwide AWS costs**
- It's for actual cost, not for projected costs
- Intended a simple alarm (not as powerful as AWS Budgets)

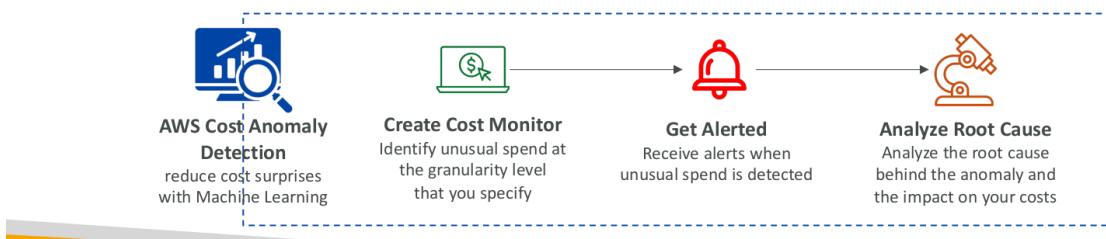


Monitoring Costs - AWS Budgets

- AWS Budgets gives you the ability to set custom budgets that alert you when your costs or usage exceed (**or are forecasted to exceed**) your budgeted amount.
- Create budget and send alarms when costs exceeds the budget
- 4 types of budgets: Usage, Cost, Reservation, Savings Plans
- For Reserved Instances (RI)
 - Track utilization
 - Supports EC2, ElastiCache, RDS, Redshift
- Up to 5 SNS notifications per budget
- Can filter by: Service, Linked Account, Tag, Purchase Option, Instance Type, Region, Availability Zone, API Operation, etc...
- Same options as AWS Cost Explorer!
- 2 budgets are free, then \$0.02/day/budget
- Up to 5 SNS notifs per budget = 5 TYPES of notifications are allowed to be sent per budget like emails, calls, etc.

AWS Cost Anomaly Detection

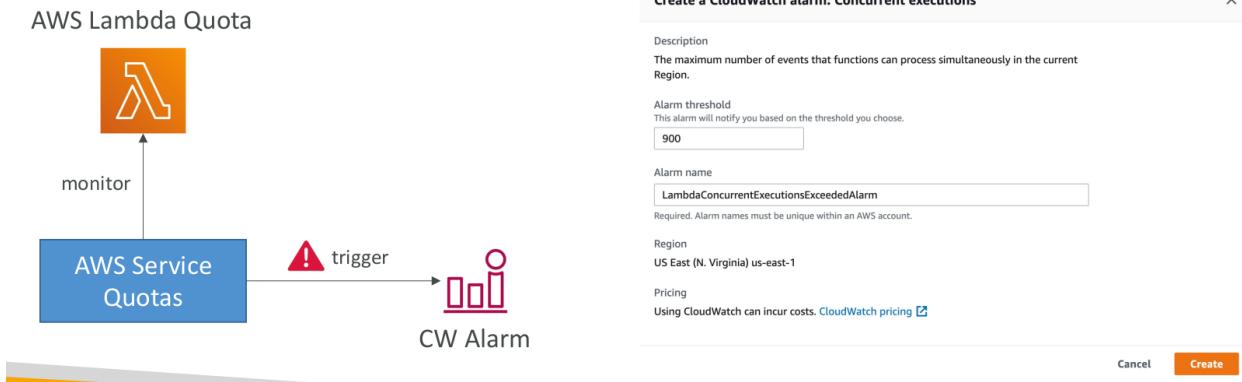
- With this service, you don't need to define any thresholds. Instead, it will analyse your patterns and alert you when something looks weird or sudden.
- Continuously monitor your cost and usage using ML to detect unusual spends
- It learns your unique, historic spend patterns to detect one-time cost spike and/or continuous cost increases (you don't need to define thresholds)
- Monitor AWS services, member accounts, cost allocation tags, or cost categories
- Sends you the anomaly detection report with root-cause analysis
- Get notified with individual alerts or daily/weekly summary (using SNS)



AWS Service Quotas

- Quotas = Limits by default on AWS.
- This service monitors ALL the quotas within AWS.
- It alerts you directly through CloudWatch Alarm

- Notify you when you're close to a service quota value threshold
- Create CloudWatch Alarms on the Service Quotas console
- Example: Lambda concurrent executions
- Request a quota increase from AWS Service Quotas or shutdown resources before limit is reached



AWS Trusted Advisor

- No need to install anything – high level AWS account assessment
- Analyze your AWS accounts and provides recommendation on 5 categories
- Cost optimization
- Performance
- Security
- Fault tolerance
- Service limits
- Remember the 5 categories
- **Support Plans**
 - Basic & Developer = 7 Core checks = learn which are those core checks

Checks
<ul style="list-style-type: none"> ▶ (✓) Amazon EBS Public Snapshots Checks the permission settings for your Amazon Elastic Block Store snapshots. 0 EBS snapshots are marked as public.
<ul style="list-style-type: none"> ▶ (✓) Amazon RDS Public Snapshots Checks the permission settings for your Amazon Relational Database Service snapshots. 0 RDS snapshots are marked as public.
<ul style="list-style-type: none"> ▶ (✓) IAM Use This check is intended to discourage the use of root access keys. At least one IAM user has been created for this account.

- Business & Enterprise = Full checks

Trusted Advisor – Support Plans

7 CORE CHECKS	FULL CHECKS
<u>Basic & Developer</u> Support plan	<u>Business & Enterprise</u> Support plan
<ul style="list-style-type: none"> • S3 Bucket Permissions • Security Groups – Specific Ports Unrestricted • IAM Use (one IAM user minimum) • MFA on Root Account • EBS Public Snapshots • RDS Public Snapshots • Service Limits 	<ul style="list-style-type: none"> • Full Checks available on the 5 categories • Ability to set CloudWatch alarms when reaching limits • Programmatic Access using AWS Support API

AWS Support Plans Pricing

- Basic Support: free

Developer	Business	Enterprise On-Ramp	Enterprise
<p>Greater of \$29.00</p> <p>- or -</p> <p>3% of monthly AWS charges</p>	<p>Greater of \$100.00</p> <p>- or -</p> <p>10% of monthly AWS charges for the first \$0-\$10K</p> <p>7% of monthly AWS charges from \$10K--\$80K</p> <p>5% of monthly AWS charges from \$80K--\$250K</p> <p>3% of monthly AWS charges over \$250K</p>	<p>Greater of \$5,500.00</p> <p>- or -</p> <p>10% of monthly AWS charges</p>	<p>Greater of \$15,000.00</p> <p>- or -</p> <p>10% of monthly AWS charges for the first \$0-\$150K</p> <p>7% of monthly AWS charges from \$150K--\$500K</p> <p>5% of monthly AWS charges from \$500K--\$1M</p> <p>3% of monthly AWS charges over \$1M</p>

AWS Basic Support Plan

- **Customer Service & Communities** - 24x7 access to customer service, documentation, whitepapers, and support forums.
- **AWS Trusted Advisor** - Access to the 7 core Trusted Advisor checks and guidance to provision your resources following best practices to increase performance and improve security.
- **AWS Personal Health Dashboard** - A personalized view of the health of AWS services, and alerts when your resources are impacted.

AWS Developer Support Plan

- All Basic Support Plan +
- **Business hours email access** to Cloud Support Associates
- Unlimited cases / 1 primary contact
- Case severity / response times:
 - General guidance: < 24 business hours
 - System impaired: < 12 business hours

AWS Business Support Plan (24/7)

- Intended to be used if you have **production workloads**
- **Trusted Advisor** – Full set of checks + API access
- **24x7 phone, email, and chat access** to Cloud Support Engineers
- Unlimited cases / unlimited contacts
- Access to Infrastructure Event Management **for additional fee.**
- Case severity / response times:
 - General guidance: < 24 business hours
 - System impaired: < 12 business hours
 - Production system impaired: < 4 hours
 - Production system down: < 1 hour

AWS Enterprise On-Ramp Support Plan (24/7)

- Intended to be used if you have **production or business critical workloads**
- All of Business Support Plan +
- Access to a pool of **Technical Account Managers (TAM)**
- **Concierge Support Team** (for billing and account best practices)
- Infrastructure Event Management, Well-Architected & Operations Reviews
- Case severity / response times:
 - ...
 - Production system impaired: < 4 hours
 - Production system down: < 1 hour
 - Business-critical system down: < 30 minutes

AWS Enterprise Support Plan (24/7)

- Intended to be used if you have mission critical workloads
- All of Business Support Plan +
- Access to a [designated Technical Account Manager \(TAM\)](#)
- Concierge Support Team (for billing and account best practices)
- Infrastructure Event Management, Well-Architected & Operations Reviews
- Case severity / response times:
 - ...
 - Production system impaired: < 4 hours
 - Production system down: < 1 hour
 - Business-critical system down: [**< 15 minutes**](#)
- Key diff between on-ramp enterprise plan and enterprise plan is that
 - **TAM:** pool of TAMs for on-ramp and designated TAM for enterprise
 - **Business-critical system down response time:** 30 min for on-ramp vs 15 min for enterprise

SUMMARY

Account Best Practices – Summary

- Operate multiple accounts using **Organizations**
- Use **SCP** (service control policies) to restrict account power
- Easily setup multiple accounts with best-practices with **AWS Control Tower**
- Use **Tags & Cost Allocation Tags** for easy management & billing
- **IAM guidelines:** MFA, least-privilege, password policy, password rotation
- **Config** to record all resources configurations & compliance over time
- **CloudFormation** to deploy stacks across accounts and regions
- **Trusted Advisor** to get insights, Support Plan adapted to your needs
- Send Service Logs and Access Logs to **S3 or CloudWatch Logs**
- **CloudTrail** to record API calls made within your account
- If your Account is compromised: change the root password, delete and rotate all passwords / keys, contact the AWS support
- Allow users to create pre-defined stacks defined by admins using **AWS Service Catalog**

Billing and Costing Tools – Summary



- **Compute Optimizer:** recommends resources' configurations to reduce cost
- **Pricing Calculator:** cost of services on AWS
- **Billing Dashboard:** high level overview + free tier dashboard
- **Cost Allocation Tags:** tag resources to create detailed reports
- **Cost and Usage Reports:** most comprehensive billing dataset
- **Cost Explorer:** View current usage (detailed) and forecast usage
- **Billing Alarms:** in us-east-1 – track overall and per-service billing
- **Budgets:** more advanced – track usage, costs, RI, and get alerts
- **Savings Plans:** easy way to save based on long-term usage of AWS
- **Cost Anomaly Detection:** detect unusual spends using Machine Learning
- **Service Quotas:** notify you when you're close to service quota threshold

QUIZ

Account Management, Billing & Support



Good job!

AWS Control Tower offers the easiest way to set up and govern a new, secure, multi-account AWS environment. It establishes a landing zone that is based on best-practices blueprints, and enables governance using guardrails you can choose from a pre-packaged list.

This was discussed in Lecture 216: [AWS Control Tower Overview](#) >

Question 2:

You would like to automatically set up and govern a secure multi-account AWS environment with best practices for your organization. Which AWS tool can you use?



Control Tower



Organizations



Trusted Advisor



Security Hub

**Good job!**

AWS Trusted Advisor is an online tool that provides you real time guidance to help you provision your resources following AWS best practices, including performance, security, and fault tolerance, but also cost optimization and service limits.

Question 3:

A company would like recommendations regarding its performance, security, and fault tolerance. What can it use?

 Inspector Config Trusted Advisor Technical Account Manager

**Good job!**

Business Support Plan is the most cost-effective option that offers 24x7 phone, email, and chat support.

Question 5:

What is the most cost-effective option to have 24x7 phone, email, and chat support?

Basic Support Plan

Developer Support Plan

Enterprise Support Plan

Business Support Plan

**Good job!**

The Enterprise Support Plan comes with a business-critical system down response under 15 minutes and offers access to a Technical Account Manager, as well as a Concierge Support Team. It is the only plan to have these features.

Question 7:

The Enterprise Support Plan comes with a business-critical system down response under 15 minutes and offers access to a Technical Account Manager, as well as a Concierge Support Team.

True

False

**Good job!**

AWS Pricing Calculator is a web based service that you can use to create cost estimates to suit your AWS use cases. AWS Pricing Calculator is useful both for people who have never used AWS and for those who want to reorganize or expand their usage.

Question 8:

A company is not sure whether or not it is cost-effective to migrate to the AWS Cloud. Which service can help the executive board make a decision?

Simple Monthly Calculator

Pricing Calculator

Billing Dashboard

Cost Explorer

**Good job!**

AWS Budgets gives you the ability to set custom budgets that alert you when your costs or usage exceed (or are forecasted to exceed) your budgeted amount. Difference with CloudWatch Billing Alarms: CloudWatch Billing Alarms only send alerts when your costs and usage are exceeding your budget, not when it is forecasted to exceed your budget, while AWS Budgets does both.

Question 10:

What can you use to get alerts when your costs and usage are exceeding or are forecasted to exceed your budgeting amount?

CloudWatch Billing Alarms

Budgets

Cost and Usage Reports

Billing Dashboard

**Good job!**

Cost Explorer can be used to forecast usage up to 12 months based on the previous usage. It can also be used to choose an optimal Savings Plan. Cost Explorer has an easy-to-use interface that lets you visualize, understand, and manage your AWS costs and usage over time.

Question 11:

A company would like to choose the best Savings Plan and forecast its cost in the next 3 months. Which AWS service can help?

 Cost and Usage Reports Budgets Cost Explorer Forecast

Pricing

**Good job!**

These services are free to use. Be careful, the resources created in Elastic Beanstalk (as well as in CloudFormation and Auto Scaling Groups) are not free.

Question 1:

Which services are free to use in AWS?

IAM, VPC, Consolidated Billing, and Elastic Beanstalk

Elastic Beanstalk, CloudFormation, Auto Scaling Groups, and Lambda

SNS, SQS, IAM, VPC

All services have a free tier included

**Good job!**

When the upfront payment is higher, the discount is bigger.

This was discussed in Lecture 220: [Pricing Models of the Cloud](#) >

Question 3:

When you reserve, the larger the upfront payment, the smaller the discount.

True

False, the upfront payment does not matter on the discount

False, the larger the upfront, the bigger the discount

**Good job!**

Compute Savings Plans provide the most flexibility and help to reduce your costs by up to 66% in exchange for a commitment to a consistent amount of usage for a 1 or 3 year term. These plans automatically apply to EC2 instance usage regardless of instance family, size, AZ, region, OS or tenancy, and also apply to Fargate or Lambda usage.

Question 6:

Which of the following options can provide up to 66% discount compared to On-demand for a commitment to a consistent amount of usage for 1 or 3 years and offers the possibility to change EC2 instances family type?

Spot instances

Reserved instances

Compute Savings Plans

EC2 Instance Savings Plans

**Good job!**

With Linux EC2 instances, you pay per second of compute capacity. There is also a minimum of 60s of use.

Question 7:

You are running an on-demand Linux EC2 instance, what timing is applied regarding billing?

Pay per minute

Pay per hour

Pay per day

Pay per second

**Good job!**

Reservations are available for EC2 Reserved Instances, DynamoDB Reserved Capacity, ElastiCache Reserved Nodes, RDS Reserved Instance, Redshift Reserved Nodes. Reservations allow you to minimize risks, predictably manage budgets and comply with long-term requirements.

Question 8:

Which pricing model allows you to minimize risks, predictably manage budgets, and comply with long-term requirements, and is available for EC2, DynamoDB, ElastiCache, RDS, and Redshift?

Pay as you go

Pay less as AWS grows

Pay less by using more

Save when you reserve

**Good job!**

Reserved Instances are good and more cost-effective (up to 69% discount compared to On-demand pricing, depending on the upfront) for long workloads. You can reserve instances for 1 or 3 years in RDS.

Question 9:

Which RDS pricing option is the most cost-effective if you need capacity for 3 years?

On-demand

Spot Instances

Dedicated Instances

Reserved Instances