

Database Pricing - RDS



- 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

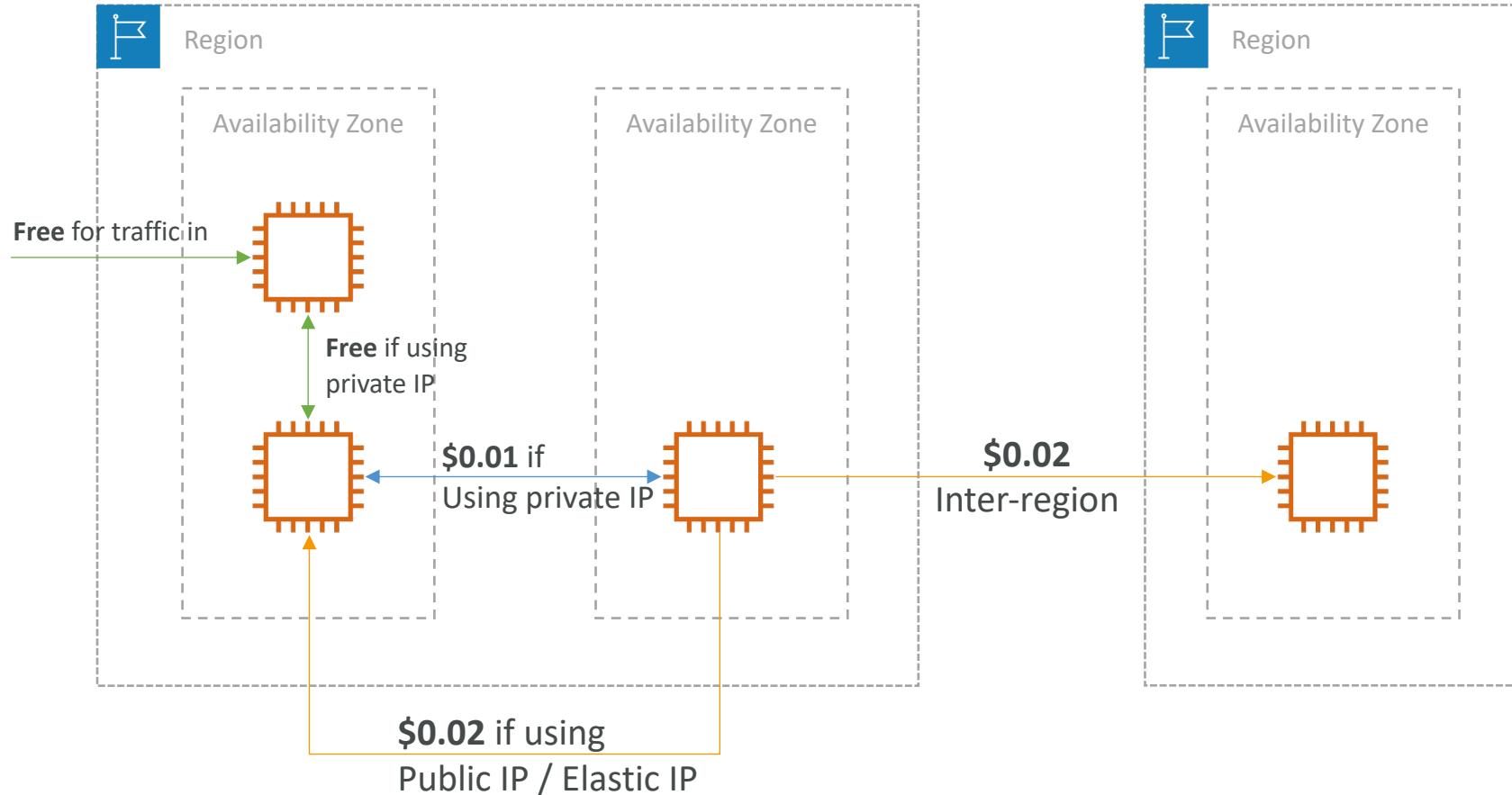


Content Delivery – CloudFront

- 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 in AWS per GB - Simplified



- 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)



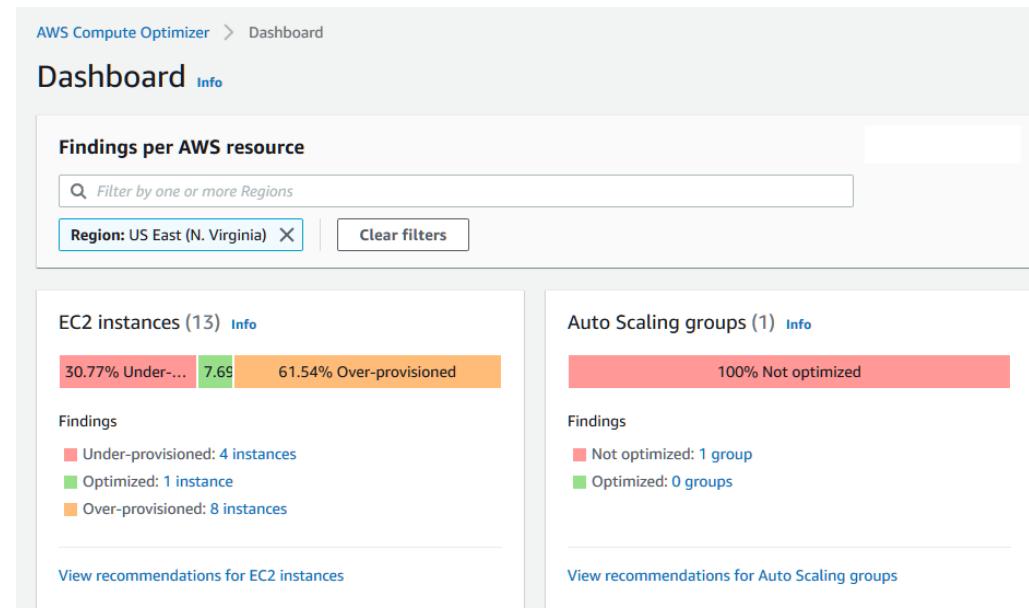
Savings Plan

- 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/>

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

AWS Pricing Calculator

- 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 the total estimated cost: First 12 months total **62,191.68 USD**, Total upfront **0.00 USD**, and Total monthly **5,182.64 USD**. Below this, under the heading "Services (2)", there are two entries:

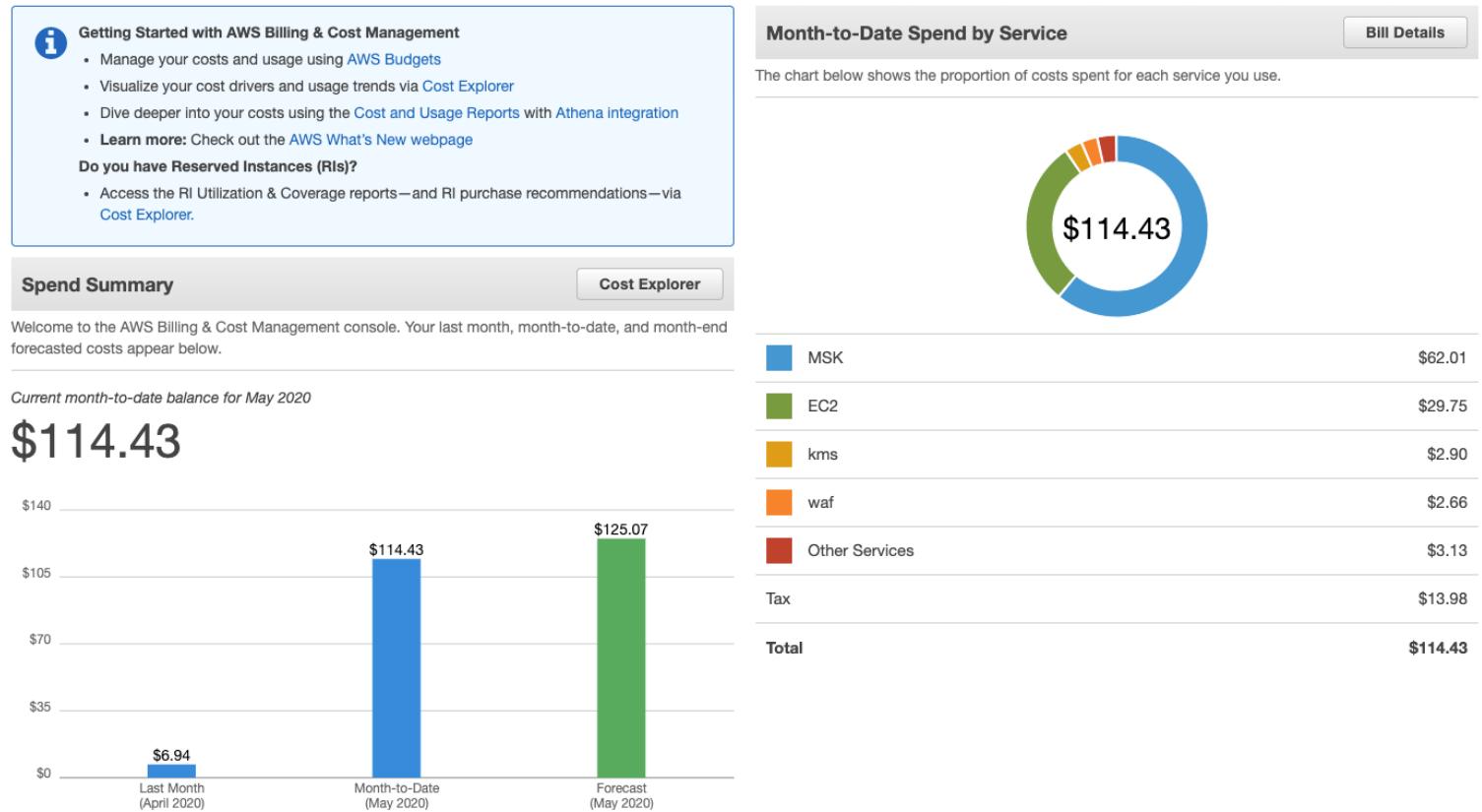
- Amazon Aurora MySQL-Compatible**
Region: US East (Ohio)
Monthly: 5,110.80 USD
- Aurora MySQL-Compatible**
Change records per statement (0.38), (1 instances) db.r5.12xlarge Memory optimized OnDemand, Storage amount (300 GB)
Monthly: 5,110.80 USD

Below these, another section titled "Quick estimate" shows:

- Amazon EC2**
Region: US East (Ohio)
Monthly: 71.84 USD
- Quick estimate**
Operating system (Linux), Quantity (1), Storage for each EC2 instance (General Purpose SSD (gp2)), Storage amount (30 GB), Instance type (t3a.xlarge)
Monthly: 71.84 USD

AWS Billing Dashboard

Billing & Cost Management Dashboard



AWS Free Tier Dashboard

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 | <div><div style="width: 58.51%;">58.51%</div></div> | <div><div style="width: 69.76%;">69.76%</div></div> |
| Amazon Simple Notification Service | 1,000,000 Requests for Amazon Simple Notification Service (APS2) | 575,640 Requests | 686,340 Requests | <div><div style="width: 57.56%;">57.56%</div></div> | <div><div style="width: 68.63%;">68.63%</div></div> |
| AWS Lambda | 400,000 seconds of compute time per month for AWS Lambda | 61,973 seconds | 73,891 seconds | <div><div style="width: 15.49%;">15.49%</div></div> | <div><div style="width: 18.47%;">18.47%</div></div> |
| AWS Key Management Service | 20,000 free requests per month for AWS Key Management Service | 1,533 Requests | 1,828 Requests | <div><div style="width: 7.66%;">7.66%</div></div> | <div><div style="width: 9.14%;">9.14%</div></div> |
| AmazonCloudWatch | 5 GB of Log Data Ingestion for Amazon Cloudwatch | 0 GB | 0 GB | <div><div style="width: 5.81%;">5.81%</div></div> | <div><div style="width: 6.92%;">6.92%</div></div> |
| AmazonCloudWatch | 5 GB of Log Data Archive for Amazon Cloudwatch | 0 GB-Mo | 0 GB-Mo | <div><div style="width: 4.78%;">4.78%</div></div> | <div><div style="width: 5.70%;">5.70%</div></div> |
| Amazon Simple Notification Service | 1,000 email notifications for Amazon Simple Notification Service (USE1) | 25 Notifications | 30 Notifications | <div><div style="width: 2.50%;">2.50%</div></div> | <div><div style="width: 2.98%;">2.98%</div></div> |
| Amazon Simple Queue Service | 1,000,000 Requests of Amazon Simple Queue Service | 11,323 Requests | 13,501 Requests | <div><div style="width: 1.13%;">1.13%</div></div> | <div><div style="width: 1.35%;">1.35%</div></div> |
| CodeBuild | 100 build minutes per month of build.general1.small compute type usage for AWS CodeBuild | 1 minutes | 1 minutes | <div><div style="width: 1.00%;">1.00%</div></div> | <div><div style="width: 1.19%;">1.19%</div></div> |
| AWS Step Functions | 4,000 state transitions per month for AWS Step Functions | 15 StateTransitions | 18 StateTransitions | <div><div style="width: 0.38%;">0.38%</div></div> | <div><div style="width: 0.45%;">0.45%</div></div> |

Cost Allocation Tags

- Use cost allocation tags to track your AWS costs on a detailed level
- 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:

| 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 |

Tagging and 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



Cost and 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.
- Can be integrated with Athena, Redshift or QuickSight

Cost and Usage Reports

| M | N | O | P | R | S | T |
|----------------------|----------------------------------|--------------------|---------------------------|----------------------|-----------------------|---|
| lineItem/ProductCode | lineItem/UsageType | lineItem/Operation | lineItem/AvailabilityZone | lineItem/UsageAmount | lineItem/CurrencyCode | lineItem/LineItemDescription |
| AmazonEC2 | CW:AlarmMonitorUsage | Unknown | | 0.00134409 | USD | \$0.00 per alarm-month - first 10 alarms |
| AmazonS3 | Requests-Tier1 | ListAllMyBuckets | | 2 | USD | \$0.00 per request - PUT, COPY, POST, or LIST requests under the monthly global free tier |
| AmazonEC2 | CW:AlarmMonitorUsage | Unknown | | 0.00134409 | USD | \$0.00 per alarm-month - first 10 alarms |
| 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 |
| 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 |
| 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 |
| AmazonEC2 | USW2-USE1-AWS-Out-Bytes | PublicIP-Out | | 0.00000174 | USD | \$0.000 per GB - data transfer out under the monthly global free tier |
| 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) |
| 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) |
| AmazonS3 | Requests-Tier1 | ListAllMyBuckets | | 2 | USD | \$0.00 per request - PUT, COPY, POST, or LIST requests under the monthly global free tier |
| AmazonEC2 | USW2-DataTransfer-Out-Bytes | RunInstances | | 0.00038144 | USD | \$0.00 per GB - data transfer out under the monthly global free tier |
| AmazonEC2 | USW2-USW1-AWS-Out-Bytes | PublicIP-Out | | 0.00000174 | USD | \$0.000 per GB - data transfer out under the monthly global free tier |
| AmazonEC2 | USW2-DataTransfer-In-Bytes | RunInstances | | 0.00030951 | USD | \$0.00 per GB - data transfer in per month |
| 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 |
| AmazonEC2 | USW2-USW1-AWS-Out-Bytes | PublicIP-Out | | 0.00000349 | USD | \$0.000 per GB - data transfer out under the monthly global free tier |
| 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) |
| 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 |
| AmazonEC2 | CW:AlarmMonitorUsage | Unknown | | 0.00134409 | USD | \$0.00 per alarm-month - first 10 alarms |
| 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 |
| AmazonEC2 | USW2-DataTransfer-Regional-Bytes | PublicIP-Out | | 0.00000349 | USD | \$0.000 per GB - regional data transfer under the monthly global free tier |
| AmazonEC2 | USW2-DataTransfer-In-Bytes | RunInstances | | 0.00032071 | USD | \$0.000 per GB - data transfer in per month |
| AmazonEC2 | USW2-DataTransfer-Regional-Bytes | PublicIP-In | | 0.00000302 | USD | \$0.000 per GB - regional data transfer under the monthly global free tier |
| AmazonEC2 | USW2-USE1-AWS-Out-Bytes | PublicIP-Out | | 0.00000174 | USD | \$0.000 per GB - data transfer out under the monthly global free tier |
| AmazonEC2 | USW2-DataTransfer-Out-Bytes | RunInstances | | 0.00045736 | USD | \$0.000 per GB - data transfer out under the monthly global free tier |
| AmazonEC2 | USW2-DataTransfer-In-Bytes | RunInstances | | 0.00036737 | USD | \$0.000 per GB - data transfer in per month |
| AmazonEC2 | USW2-APN2-AWS-In-Bytes | PublicIP-In | | 0.00000005 | USD | \$0.00 per GB - US West (Oregon) data transfer from Asia Pacific (Seoul) |
| AmazonEC2 | USW2-APN2-AWS-Out-Bytes | PublicIP-Out | | 0.00000018 | USD | \$0.000 per GB - data transfer out under the monthly global free tier |
| 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) |
| AmazonEC2 | USW2-DataTransfer-Out-Bytes | RunInstances | | 0.00039945 | USD | \$0.000 per GB - data transfer out under the monthly global free tier |
| AmazonEC2 | CW:AlarmMonitorUsage | Unknown | | 0.00134409 | USD | \$0.00 per alarm-month - first 10 alarms |

Cost Explorer

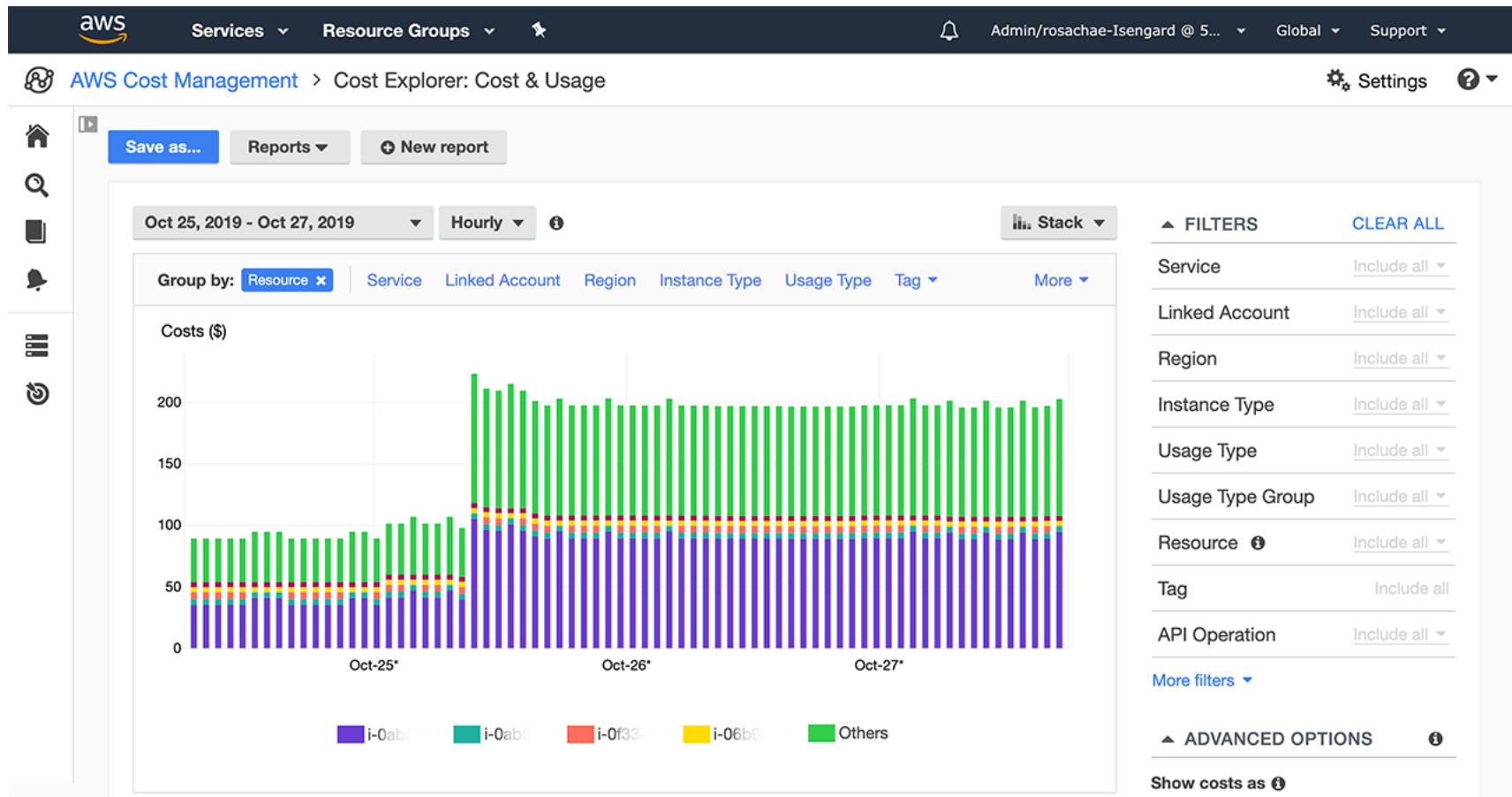


- Visualize, understand, and manage your AWS costs and usage over time
- Create custom reports that analyze cost and usage data.
- Analyze your data at a high level: total costs and usage across all accounts
- Or Monthly, hourly, resource level granularity
- Choose an optimal **Savings Plan** (to lower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

Cost Explorer – Monthly Cost by AWS Service



Cost Explorer– Hourly & Resource Level



Cost Explorer – Savings Plan Alternative to Reserved Instances

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 |
|--|---|---|--|

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 <small> ⓘ</small> \$2,955 (\$4.05/hour) Based on your On-Demand spend over the past 60 days | Estimated monthly spend <small> ⓘ</small> \$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 <small> ⓘ</small> \$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 <small> ⓘ</small> |
|-------------------------------------|--------|----------------|------------------------|--|
| <input checked="" type="checkbox"/> | 3-year | All upfront | \$2.40/hour | \$1.61 (40%) |

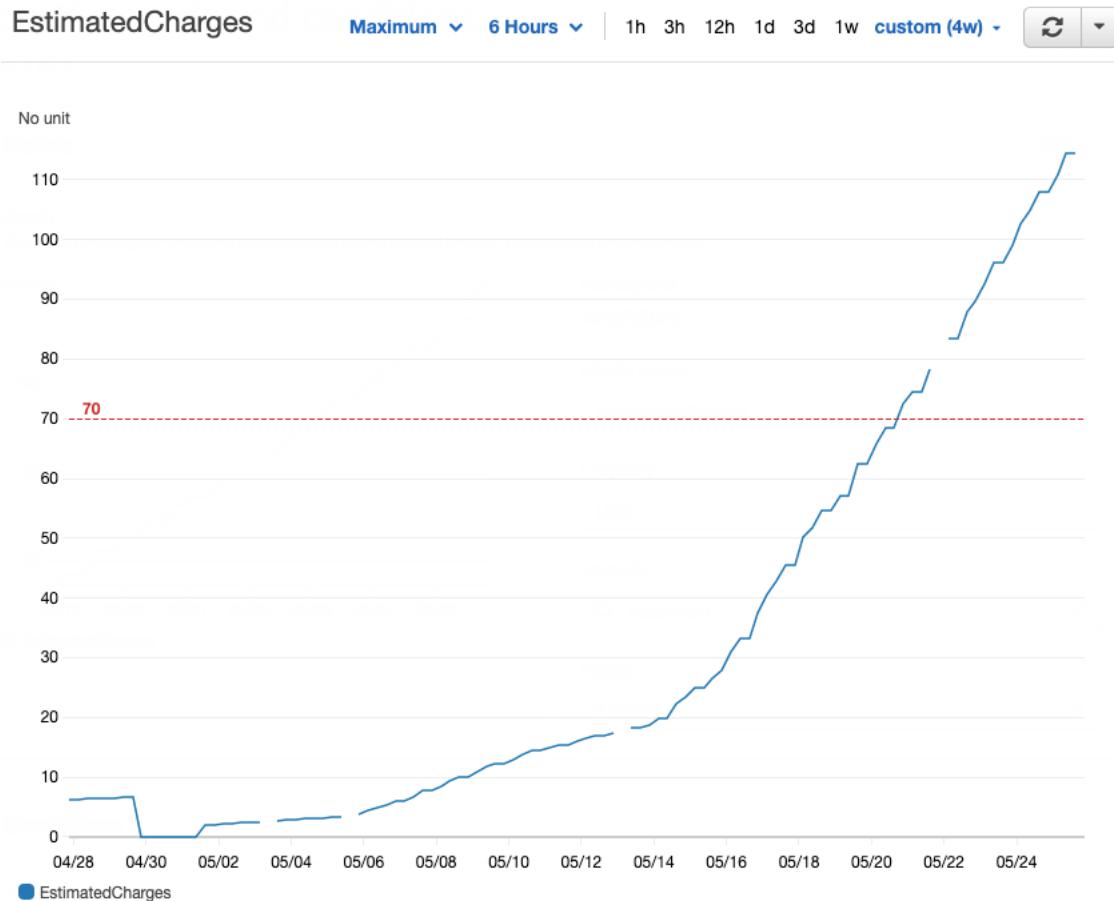
*Average hourly spend and minimum hourly spend based on your current on-demand spend for the given instance family.

Cost Explorer – Forecast Usage



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)



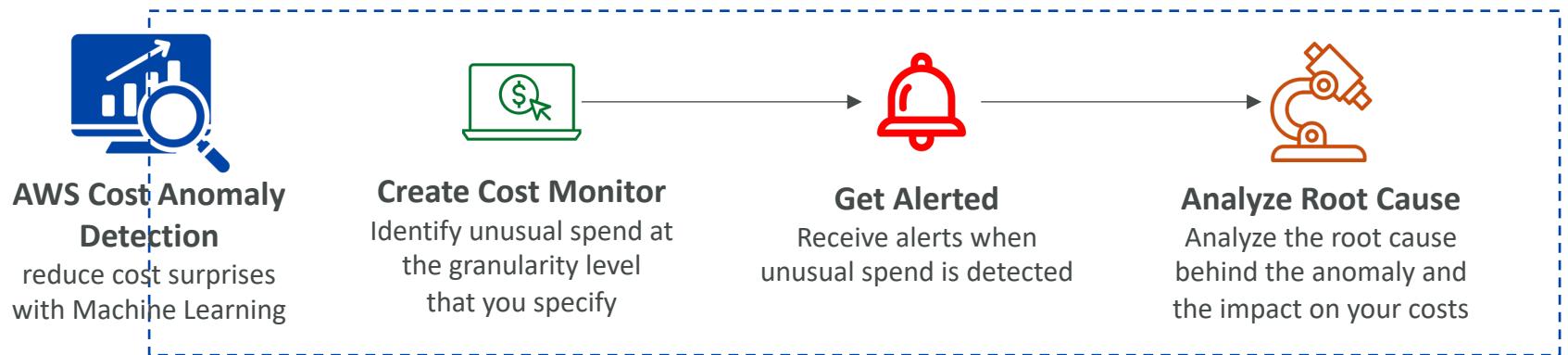
AWS Budgets



- 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

AWS Cost Anomaly Detection

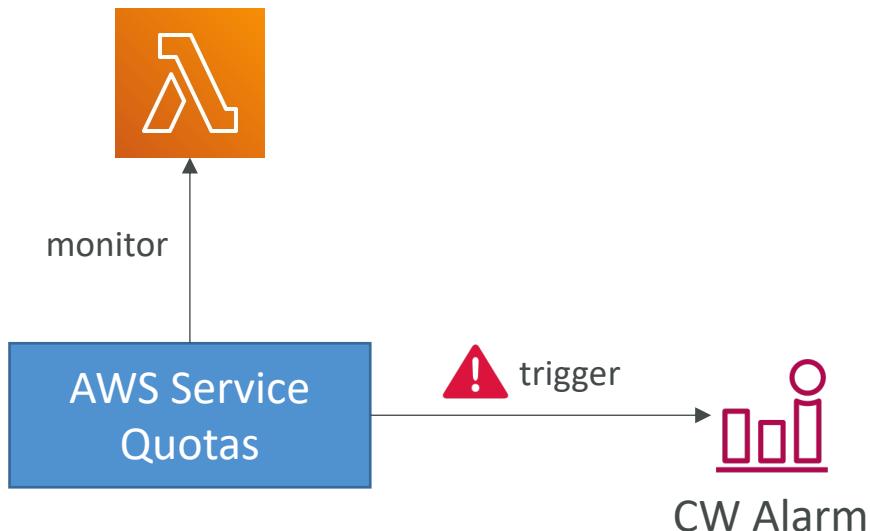
- Continuously monitor your cost and usage using ML to detect unusual spends
- It learns your unique, historic spend patterns to detect one-time cost spike and/or continuous cost increases (you don't need to define thresholds)
- Monitor AWS services, member accounts, cost allocation tags, or cost categories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



AWS Service Quotas

- 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 Lambda Quota



Create a CloudWatch alarm: Concurrent executions

Description
The maximum number of events that functions can process simultaneously in the current Region.

Alarm threshold
This alarm will notify you based on the threshold you choose.

Alarm name

Required. Alarm names must be unique within an AWS account.

Region
US East (N. Virginia) us-east-1

Pricing
Using CloudWatch can incur costs. [CloudWatch pricing](#)

[Cancel](#) [Create](#)



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

Checks

- ▶ ✓ **Amazon EBS Public Snapshots**

Checks the permission settings for your Amazon Elastic
0 EBS snapshots are marked as public.
- ▶ ✓ **Amazon RDS Public Snapshots**

Checks the permission settings for your Amazon Relation
public.
0 RDS snapshots are marked as public.
- ▶ ✓ **IAM Use**

This check is intended to discourage the use of root acce
At least one IAM user has been created for this account.

Trusted Advisor – Support Plans

7 CORE CHECKS

Basic & Developer Support plan

- 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

FULL CHECKS

Business & Enterprise Support plan

- 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 |
|---|--|---|---|
| Greater of \$29.00 - or - 3% of monthly AWS charges | Greater of \$100.00 - or - 10% of monthly AWS charges for the first \$0--\$10K 7% of monthly AWS charges from \$10K--\$80K 5% of monthly AWS charges from \$80K--\$250K 3% of monthly AWS charges over \$250K | Greater of \$5,500.00 - or - 10% of monthly AWS charges | Greater of \$15,000.00 - or - 10% of monthly AWS charges for the first \$0--\$150K 7% of monthly AWS charges from \$150K--\$500K 5% of monthly AWS charges from \$500K--\$1M 3% of monthly AWS charges over \$1M |

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](#)

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

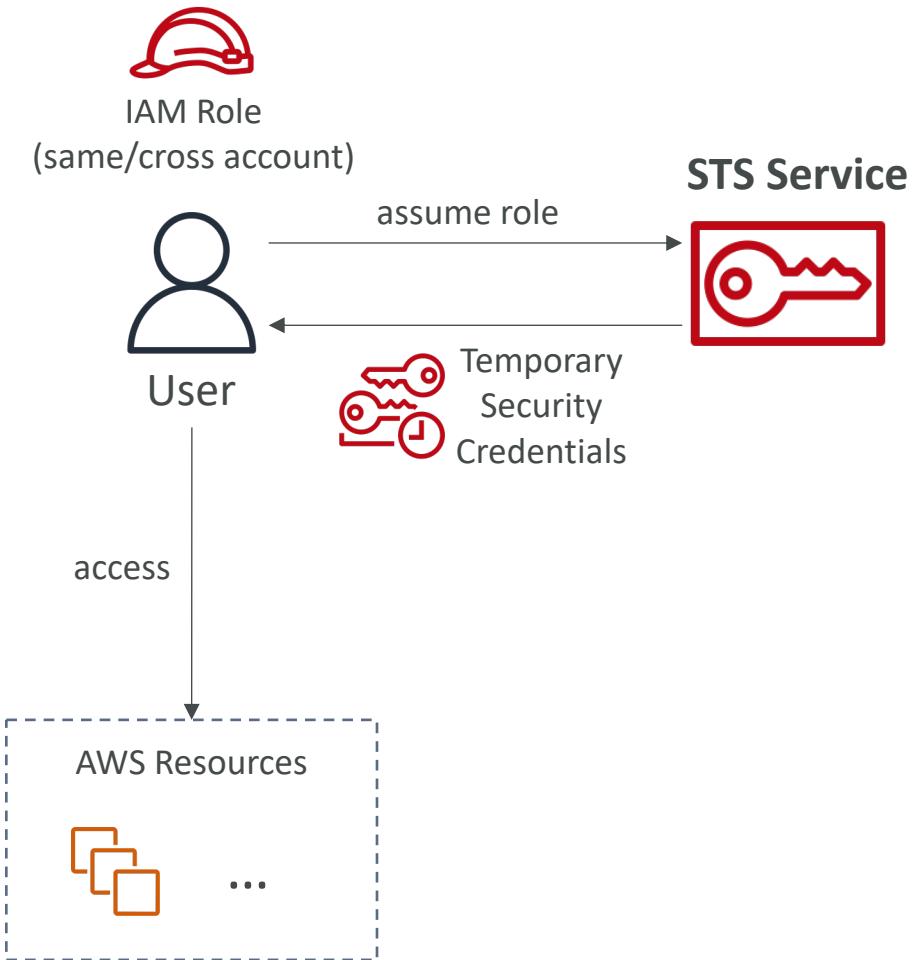


- **Compute Optimizer:** recommends resources' configurations to reduce cost
- **Pricing Calculator:** cost of services on AWS
- **Billing Dashboard:** high level overview + free tier dashboard
- **Cost Allocation Tags:** tag resources to create detailed reports
- **Cost and Usage Reports:** most comprehensive 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

Advanced Identity Section

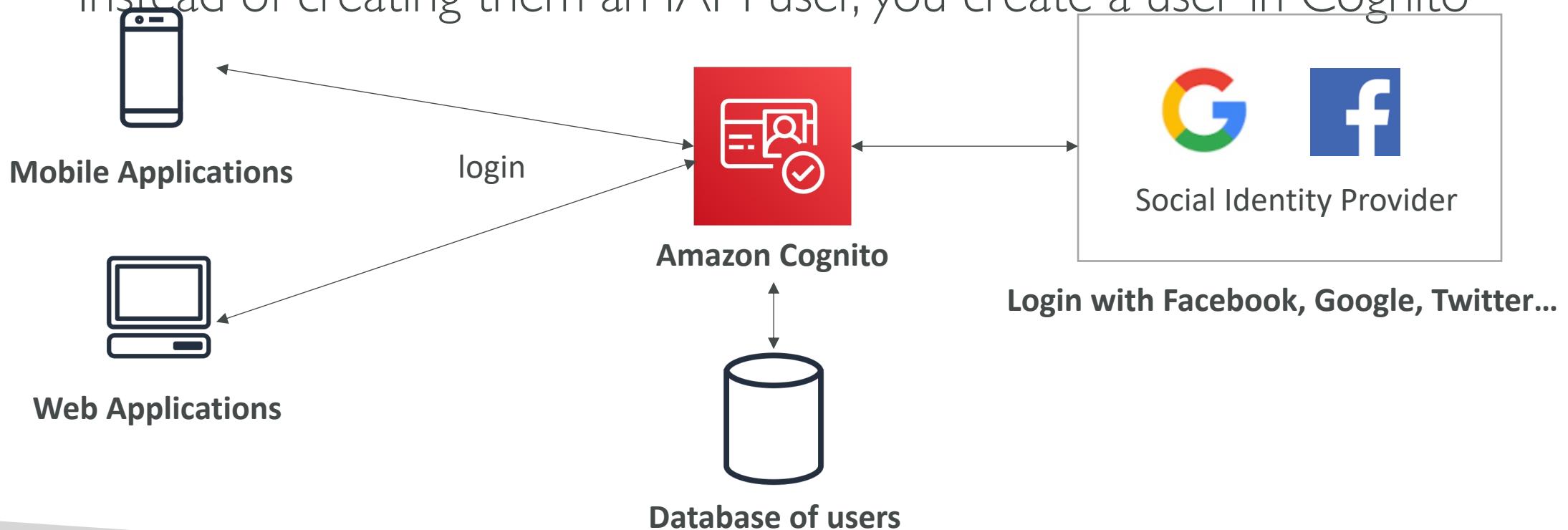
AWS STS (Security Token Service)

- Enables you to create **temporary, limited-privileges credentials** to access your AWS resources
- Short-term credentials: you configure expiration period
- Use cases
 - **Identity federation:** manage user identities in external systems, and provide them with STS tokens to access AWS resources
 - **IAM Roles for cross/same account access**
 - **IAM Roles for Amazon EC2:** provide temporary credentials for EC2 instances to access AWS resources



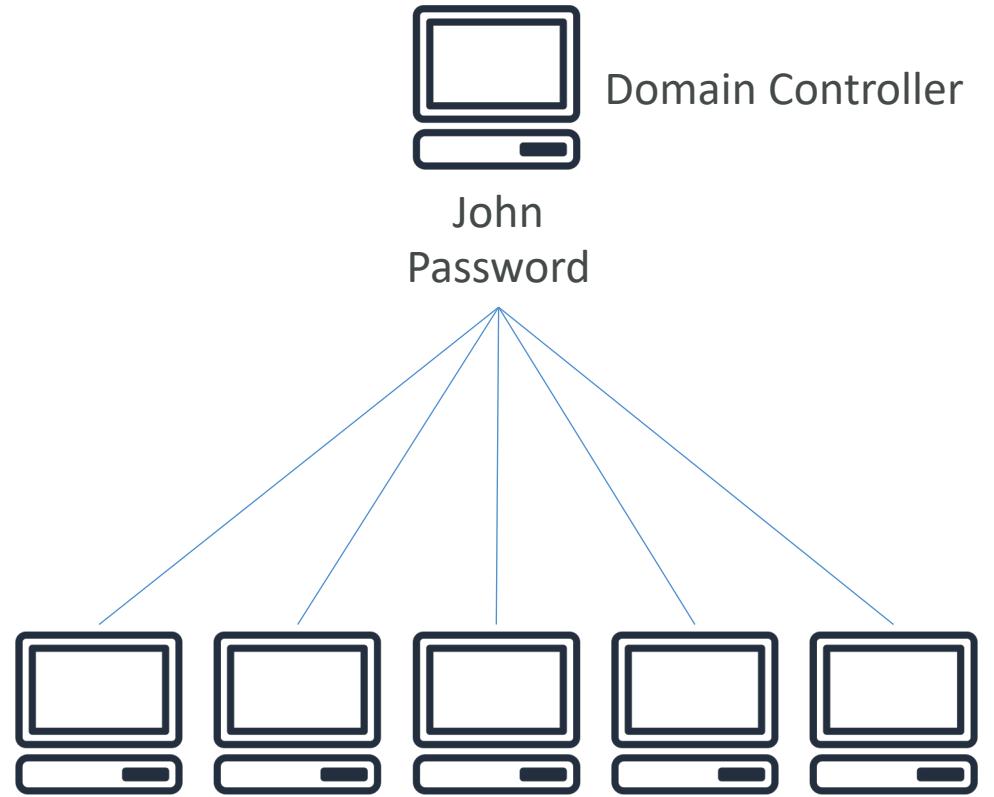
Amazon Cognito (simplified)

- Identity for your Web and Mobile applications users (potentially millions)
- Instead of creating them an IAM user, you create a user in Cognito



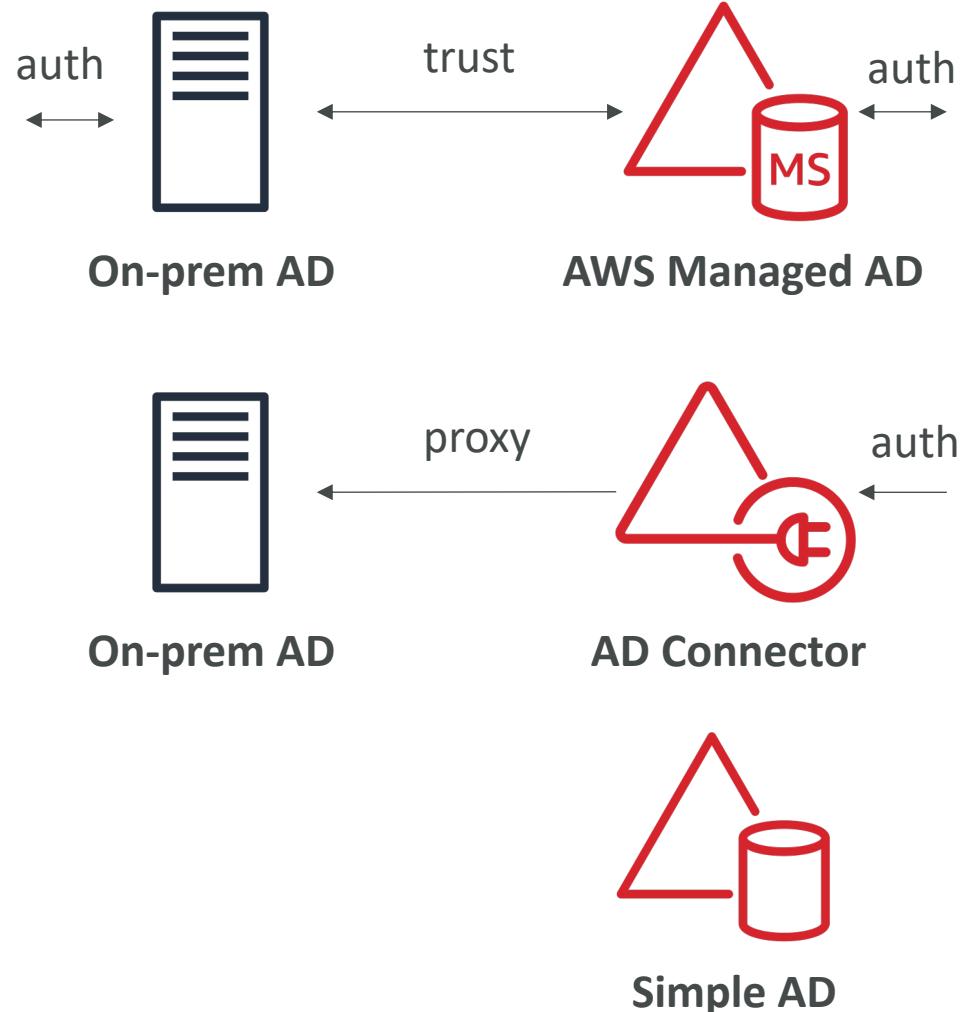
What is Microsoft Active Directory (AD)?

- Found on any Windows Server with AD Domain Services
- Database of **objects**: User Accounts, Computers, Printers, File Shares, Security Groups
- Centralized security management, create account, assign permissions



AWS Directory Services

- AWS Managed Microsoft AD
 - Create your own AD in AWS, manage users locally, supports MFA
 - Establish “trust” connections with your on-premise AD
- AD Connector
 - Directory Gateway (proxy) to redirect to on-premise AD, supports MFA
 - Users are managed on the on-premise AD
- Simple AD
 - AD-compatible managed directory on AWS
 - Cannot be joined with on-premise AD

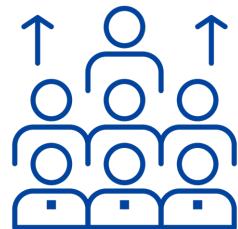


AWS IAM Identity Center

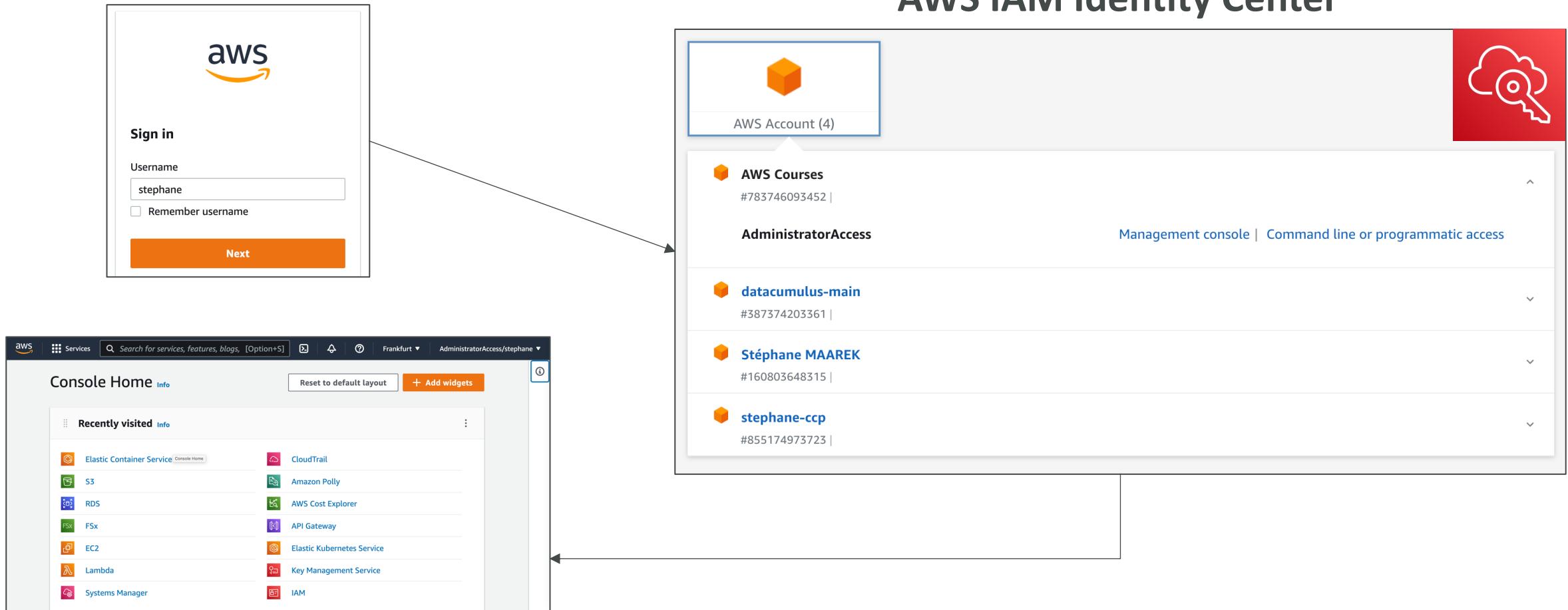
(successor to AWS Single Sign-On)



- One login (single sign-on) for all your
 - AWS accounts in AWS Organizations
 - Business cloud applications (e.g., Salesforce, Box, Microsoft 365, ...)
 - SAML2.0-enabled applications
 - EC2 Windows Instances
- Identity providers
 - Built-in identity store in IAM Identity Center
 - 3rd party: Active Directory (AD), OneLogin, Okta...



AWS IAM Identity Center – Login Flow



Advanced Identity - Summary

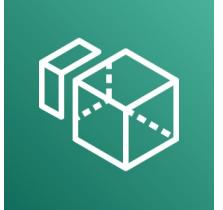
- IAM
 - Identity and Access Management inside your AWS account
 - For users that you trust and belong to your company
- Organizations: Manage multiple accounts
- Security Token Service (STS): temporary, limited-privileges credentials to access AWS resources
- Cognito: create a database of users for your mobile & web applications
- Directory Services: integrate Microsoft Active Directory in AWS
- IAM Identity Center: one login for multiple AWS accounts & applications

Other AWS Services

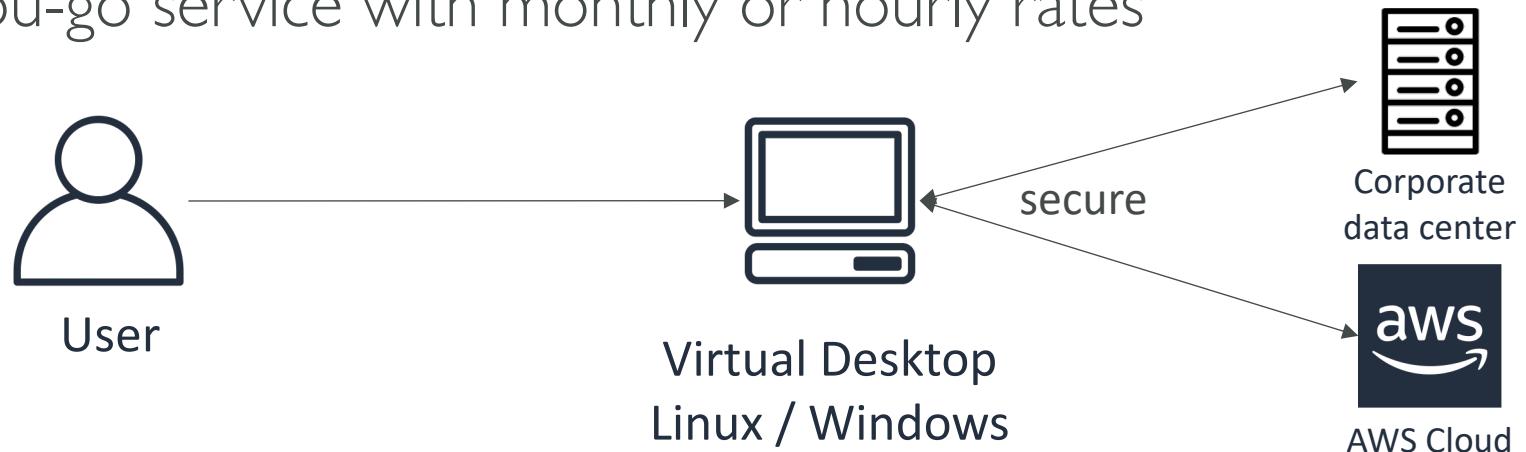
Other AWS services section

- Other services represent services I couldn't group with the other ones
- They are services reported by students as **sometimes, but rarely**, appearing on the AWS exam
- The lectures are short and brief and most likely without hands-on
- No summary lecture at the end of the section to keep things flexible!

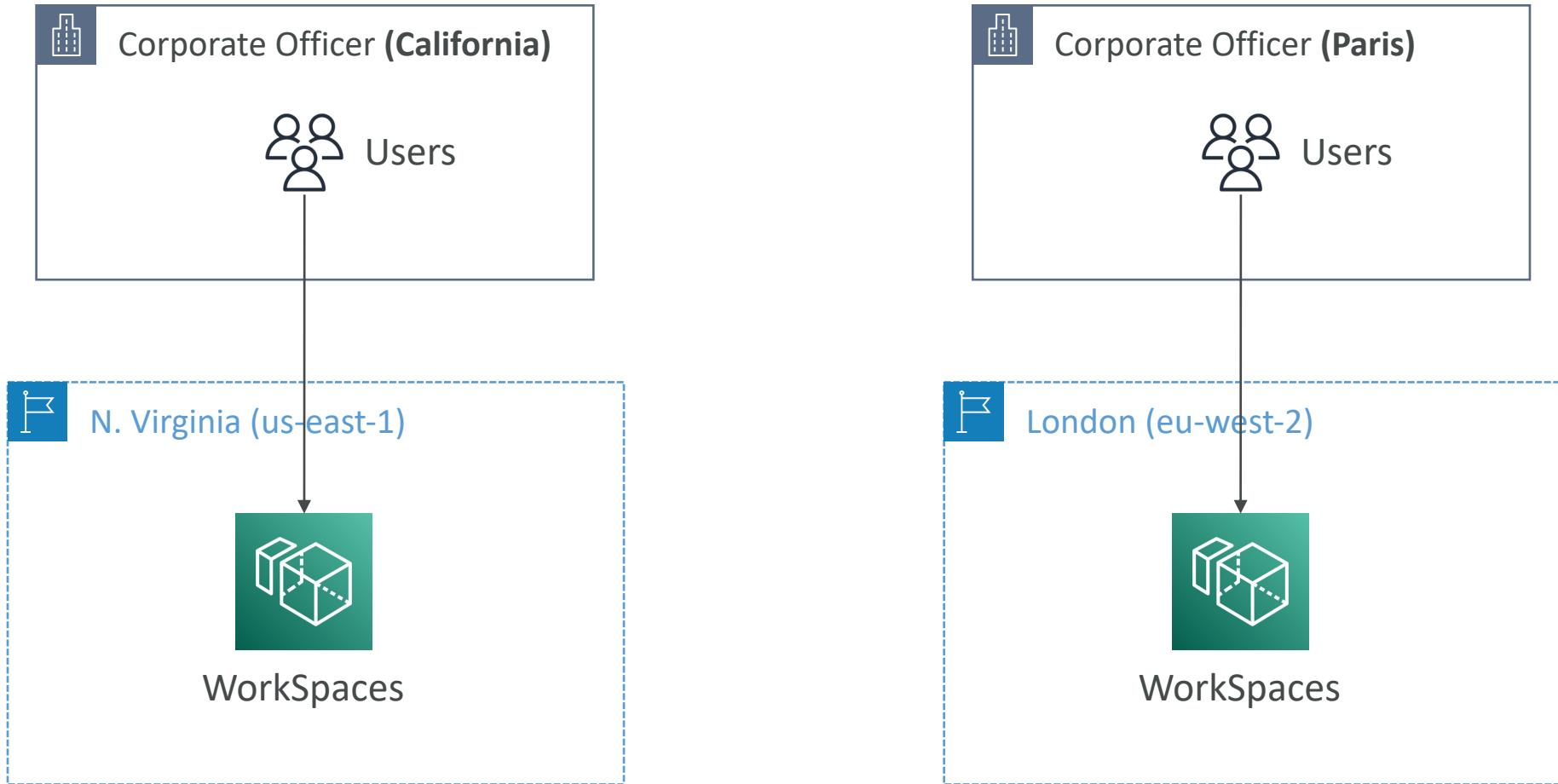
Amazon WorkSpaces

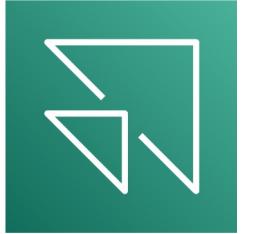


- Managed Desktop as a Service (DaaS) solution to easily provision Windows or Linux desktops
- Great to eliminate management of on-premise VDI (Virtual Desktop Infrastructure)
- Fast and quickly scalable to thousands of users
- Secured data – integrates with KMS
- Pay-as-you-go service with monthly or hourly rates



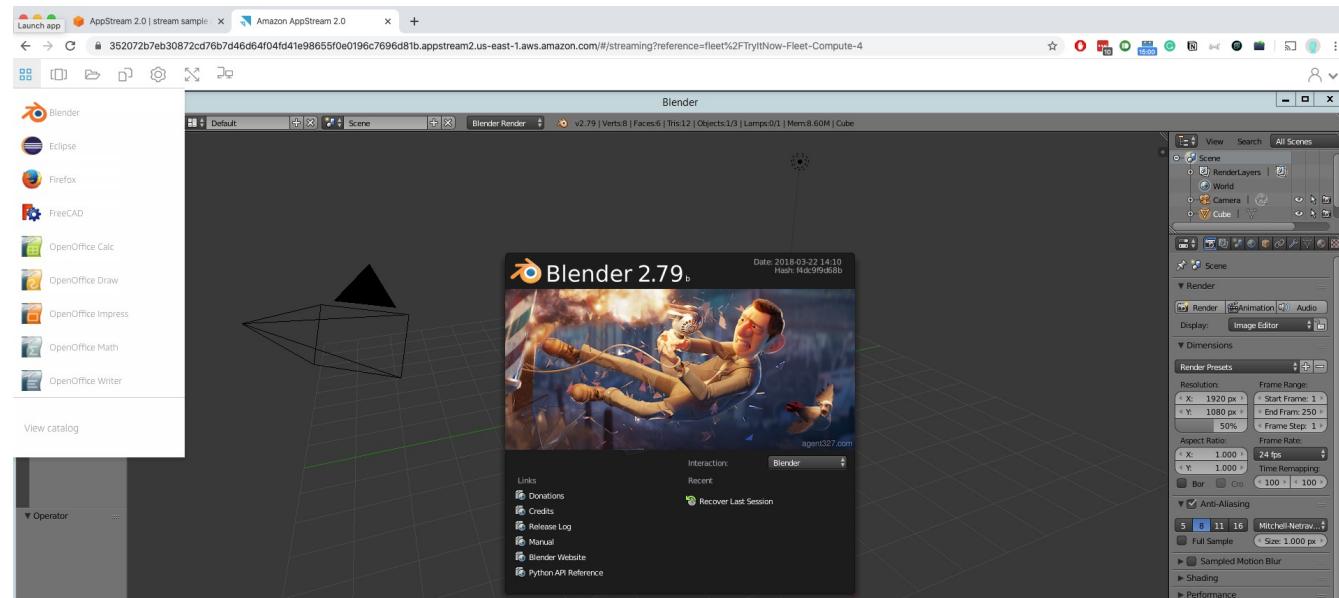
Amazon WorkSpaces – Multiple Regions





Amazon AppStream 2.0

- Desktop Application Streaming Service
- Deliver to any computer; without acquiring, provisioning infrastructure
- The application is delivered from within a web browser



Amazon AppStream 2.0 vs WorkSpaces

- **Workspaces**

- Fully managed VDI and desktop available
- The users connect to the VDI and open native or WAM applications
- Workspaces are on-demand or always on

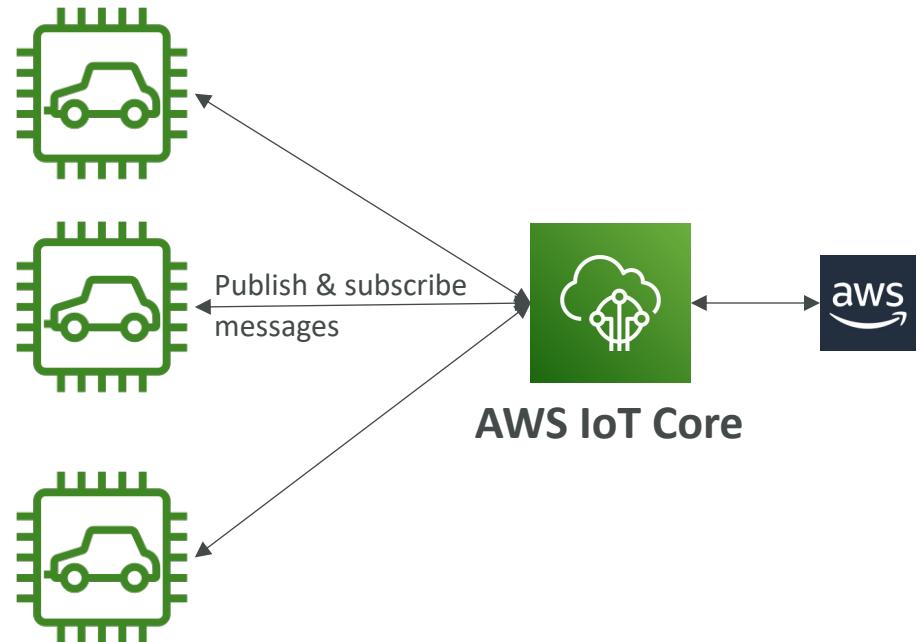
- **AppStream 2.0**

- Stream a desktop application to web browsers (no need to connect to a VDI)
- Works with any device (that has a web browser)
- Allow to configure an instance type per application type (CPU, RAM, GPU)

AWS IoT Core



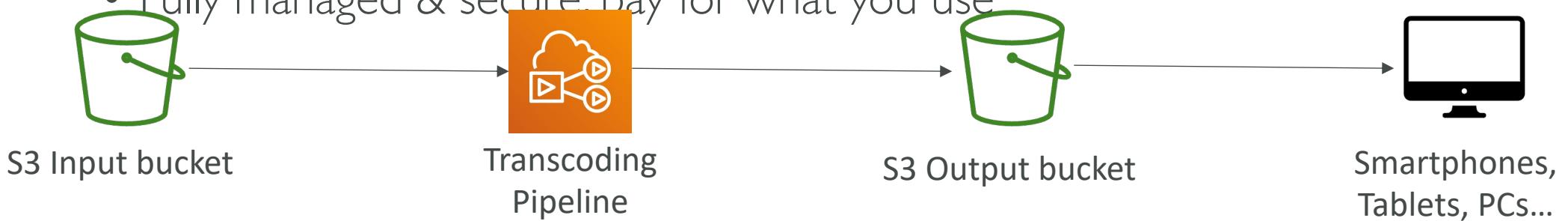
- IoT stands for “Internet of Things” – the network of internet-connected devices that are able to collect and transfer data
- AWS IoT Core allows you to **easily connect IoT devices to the AWS Cloud**
- **Serverless, secure & scalable** to billions of devices and trillions of messages
- Your applications can communicate with your devices even when they aren't connected
- Integrates with a lot of AWS services (Lambda, S3, SageMaker, etc.)
- Build IoT applications that gather, process, analyze, and act on data



Amazon Elastic Transcoder



- Elastic Transcoder is used to convert media files stored in S3 into media files in the formats required by consumer playback devices (phones etc..)
- Benefits:
 - Easy to use
 - Highly scalable – can handle large volumes of media files and large file sizes
 - Cost effective – duration-based pricing model
 - Fully managed & secure, pay for what you use



AWS AppSync



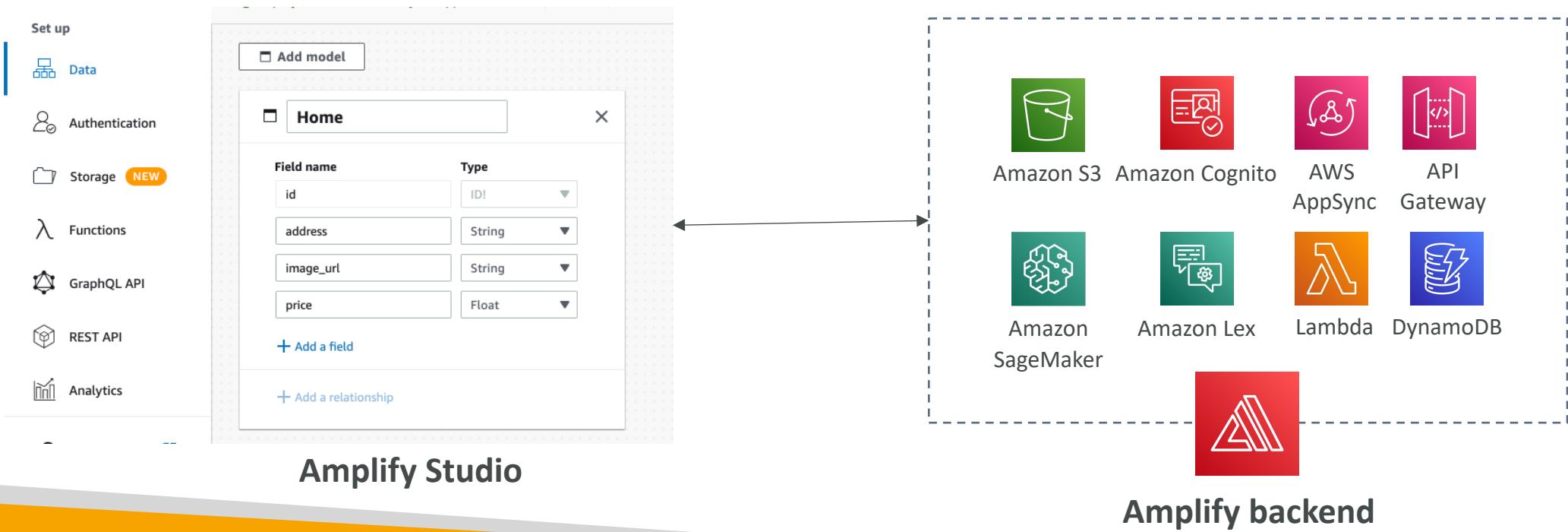
- Store and sync data across mobile and web apps in real-time
- Makes use of GraphQL (mobile technology from Facebook)
- Client Code can be generated automatically
- Integrations with DynamoDB / Lambda
- Real-time subscriptions
- Offline data synchronization (replaces Cognito Sync)
- Fine Grained Security
- AWS Amplify can leverage AWS AppSync in the background!



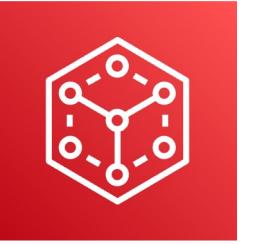
AWS Amplify



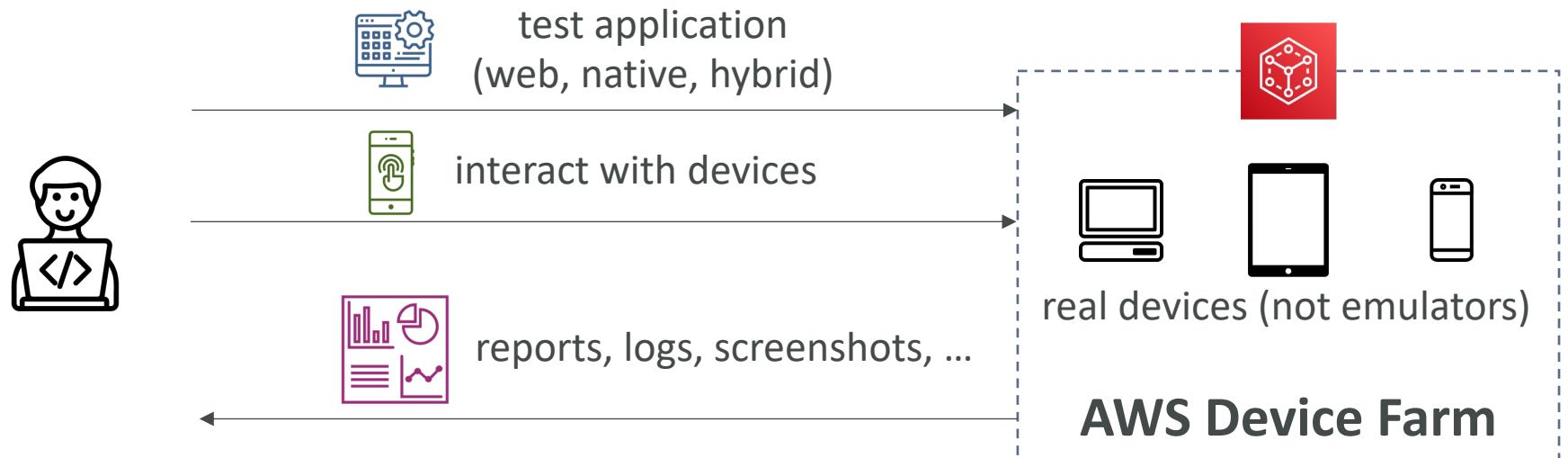
- A set of tools and services that helps you develop and deploy scalable full stack web and mobile applications
- Authentication, Storage, API (REST, GraphQL), CI/CD, PubSub, Analytics, AI/ML Predictions, Monitoring, Source Code from AWS, GitHub, etc...



AWS Device Farm



- Fully-managed service that tests your web and mobile apps against desktop browsers, real mobile devices, and tablets
- Run tests concurrently on multiple devices (speed up execution)
- Ability to configure device settings (GPS, language, Wi-Fi, Bluetooth, ...)

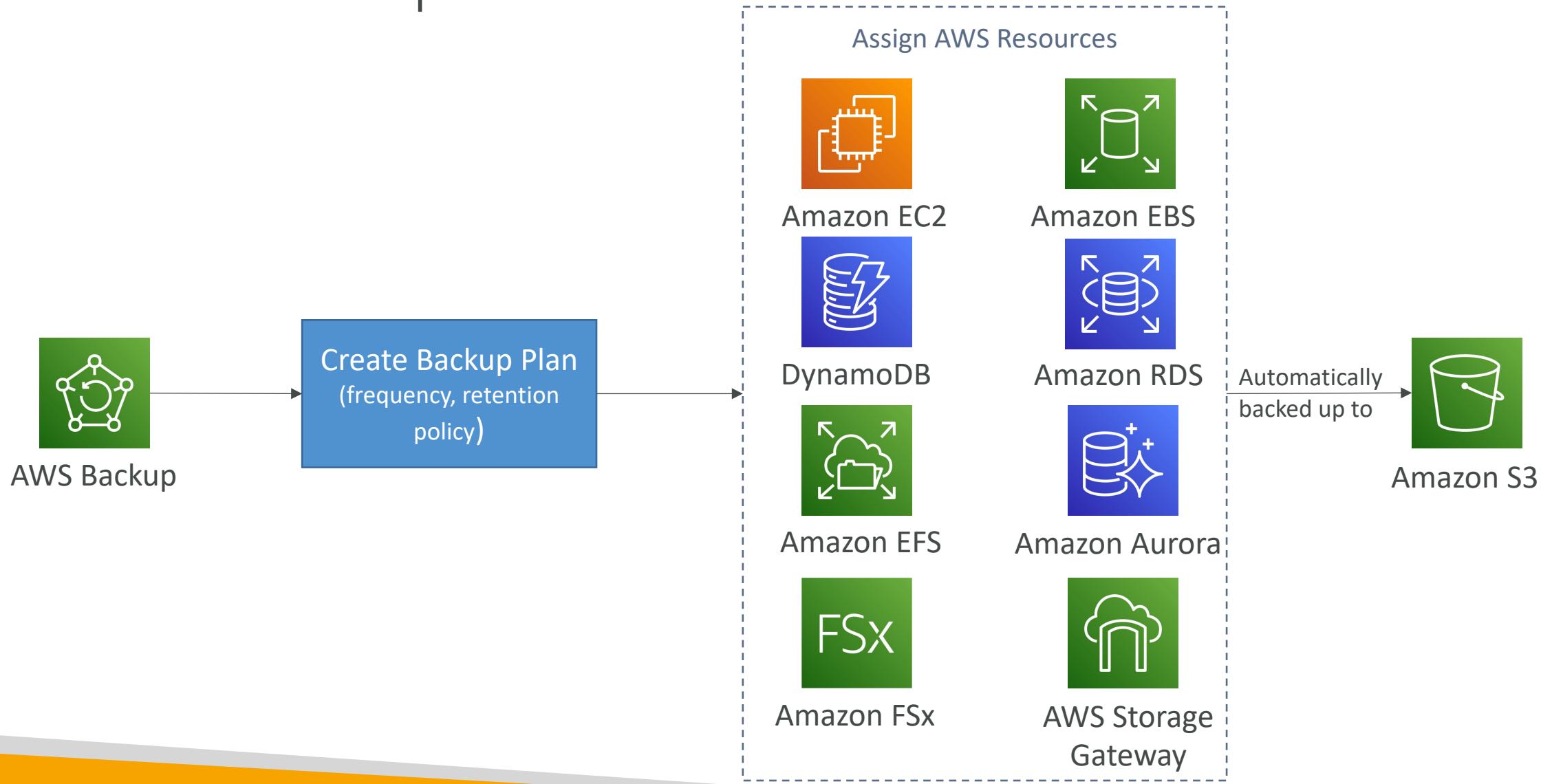


AWS Backup



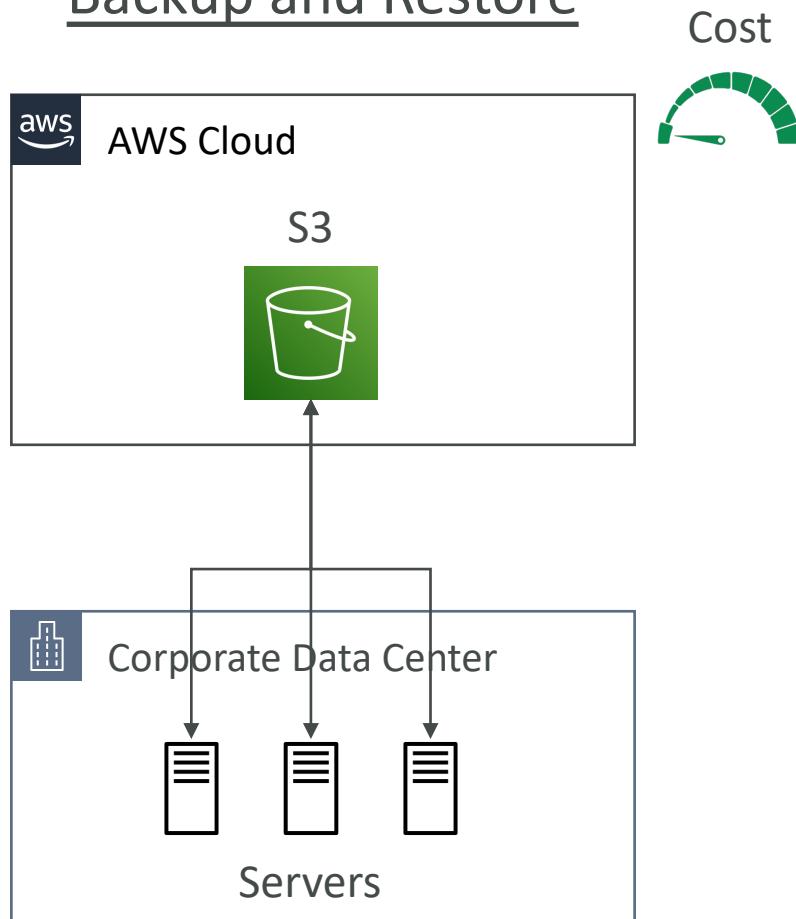
- Fully-managed service to centrally manage and automate backups across AWS services
- On-demand and scheduled backups
- Supports PITR (Point-in-time Recovery)
- Retention Periods, Lifecycle Management, Backup Policies, ...
- Cross-Region Backup
- Cross-Account Backup (using AWS Organizations)

AWS Backup

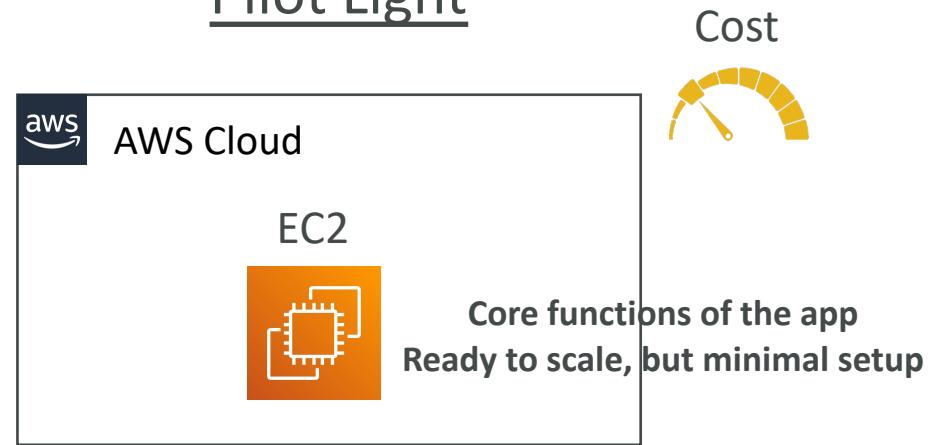


Disaster Recovery Strategies

Backup and Restore



Pilot Light

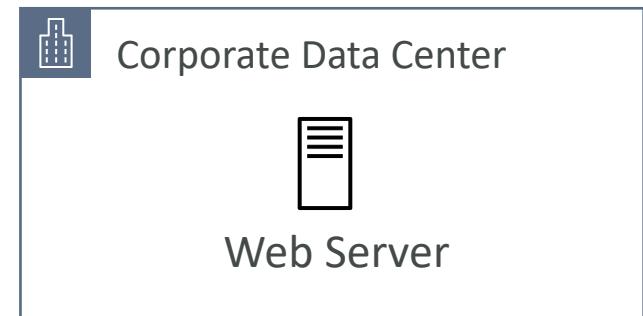
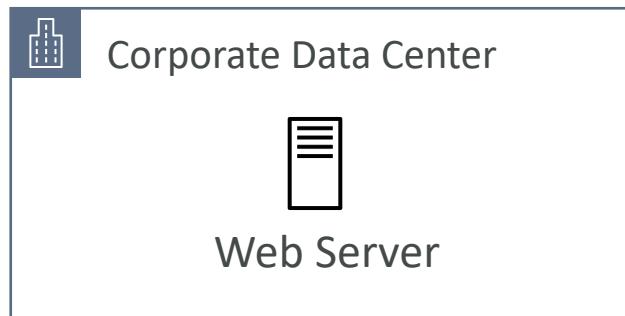
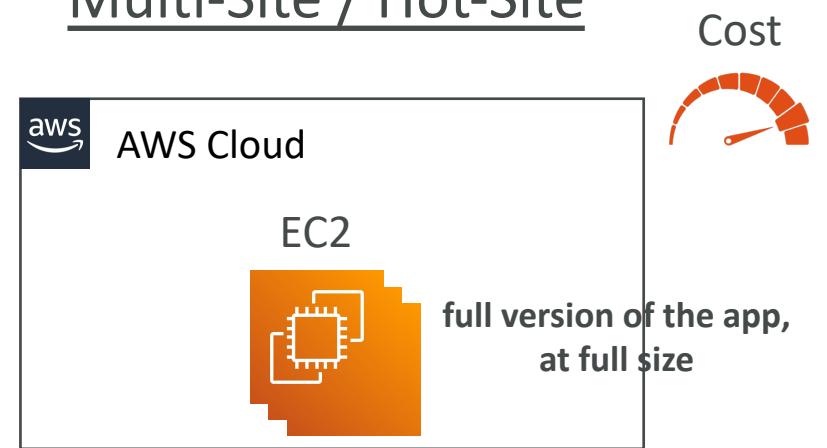


Disaster Recovery Strategies

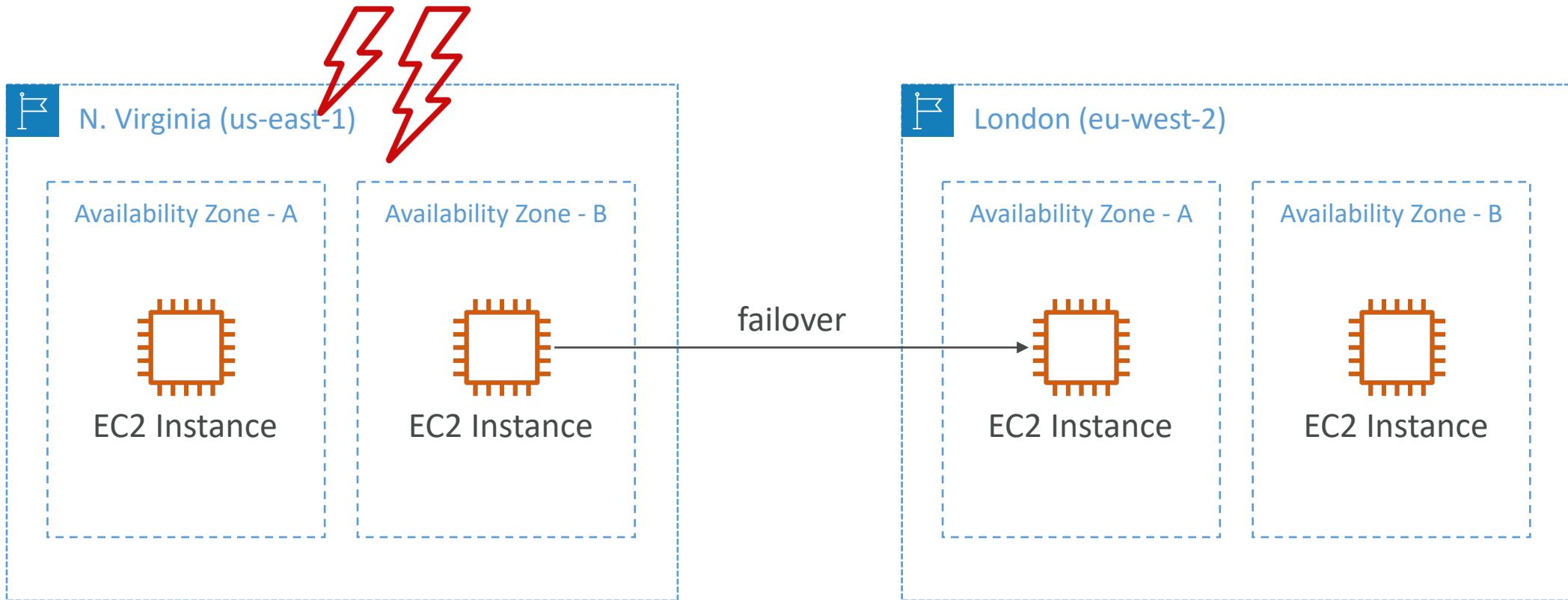
Warm Standby



Multi-Site / Hot-Site



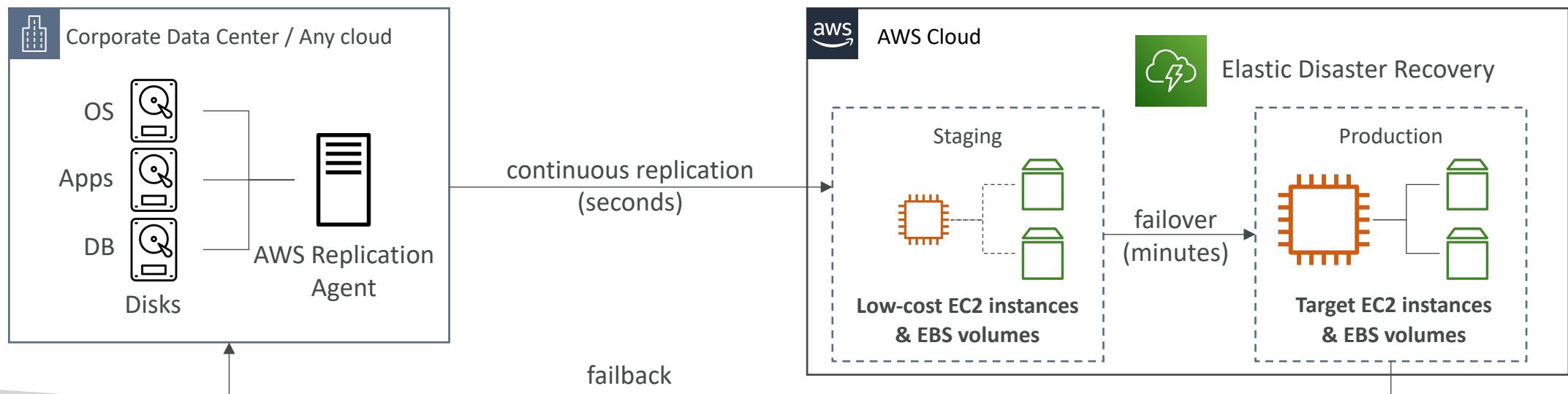
Typical DR Setup for Cloud Deployments



AWS Elastic Disaster Recovery (DRS)



- Used to be named “CloudEndure Disaster Recovery”
- Quickly and easily **recover** your physical, virtual, and cloud-based servers into AWS
- Example: protect your most critical databases (including Oracle, MySQL, and SQL Server), enterprise apps (SAP), protect your data from ransomware attacks, ...
- Continuous block-level replication for your servers

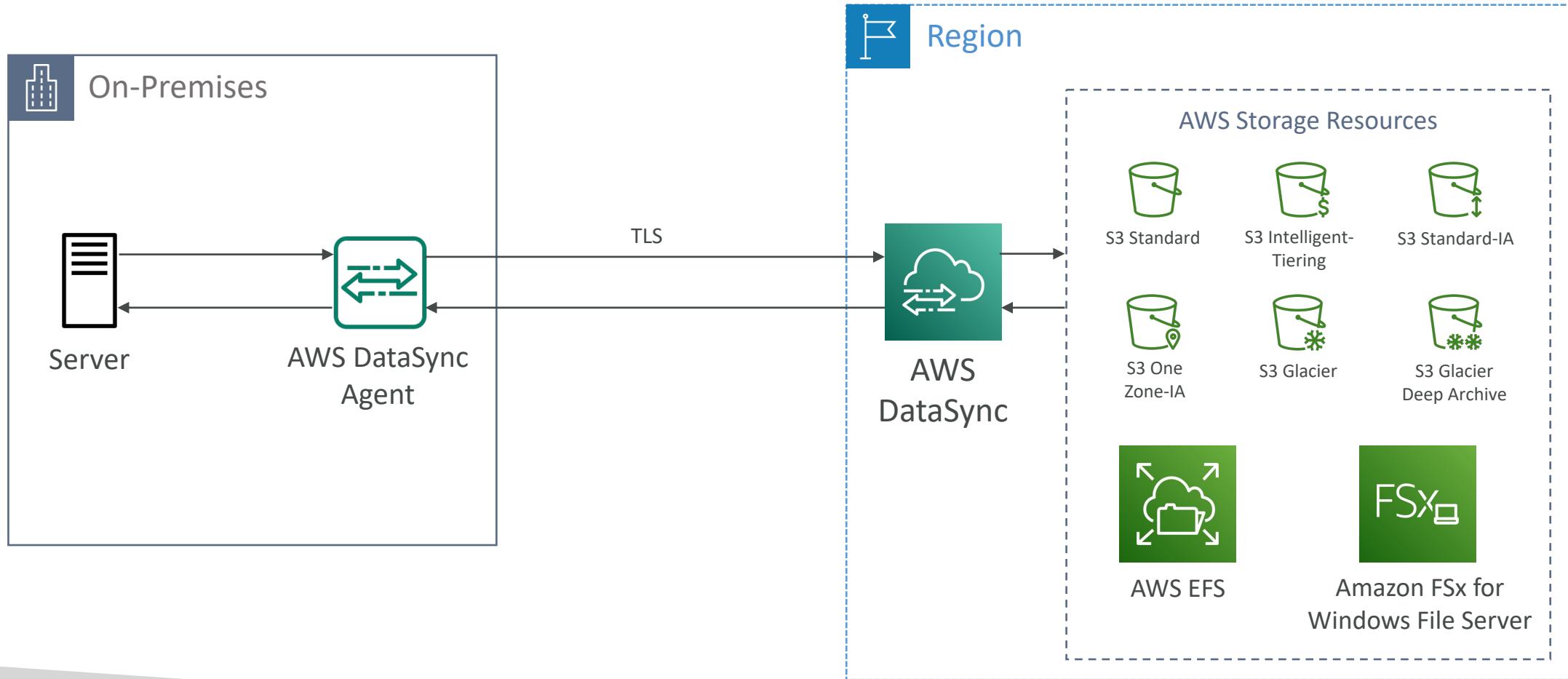




AWS DataSync

- Move large amount of data from on-premises to AWS
- Can synchronize to: Amazon S3 (any storage classes – including Glacier), Amazon EFS, Amazon FSx for Windows
- Replication tasks can be scheduled hourly, daily, weekly
- The replication tasks are incremental after the first full load

AWS DataSync



AWS Application Discovery Service

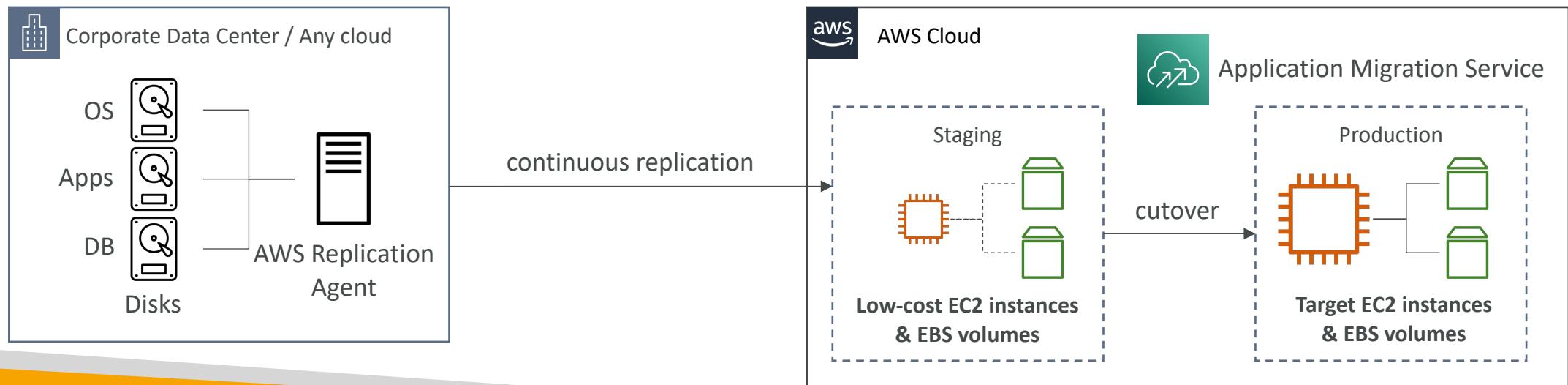


- Plan migration projects by gathering information about on-premises data centers
- Server utilization data and dependency mapping are important for migrations
- **Agentless Discovery (AWS Agentless Discovery Connector)**
 - VM inventory, configuration, and performance history such as CPU, memory, and disk usage
- **Agent-based Discovery (AWS Application Discovery Agent)**
 - System configuration, system performance, running processes, and details of the network connections between systems
- Resulting data can be viewed within AWS Migration Hub

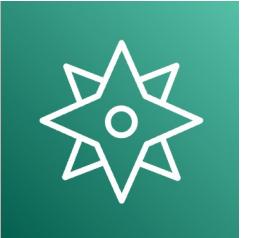
AWS Application Migration Service (MGN)



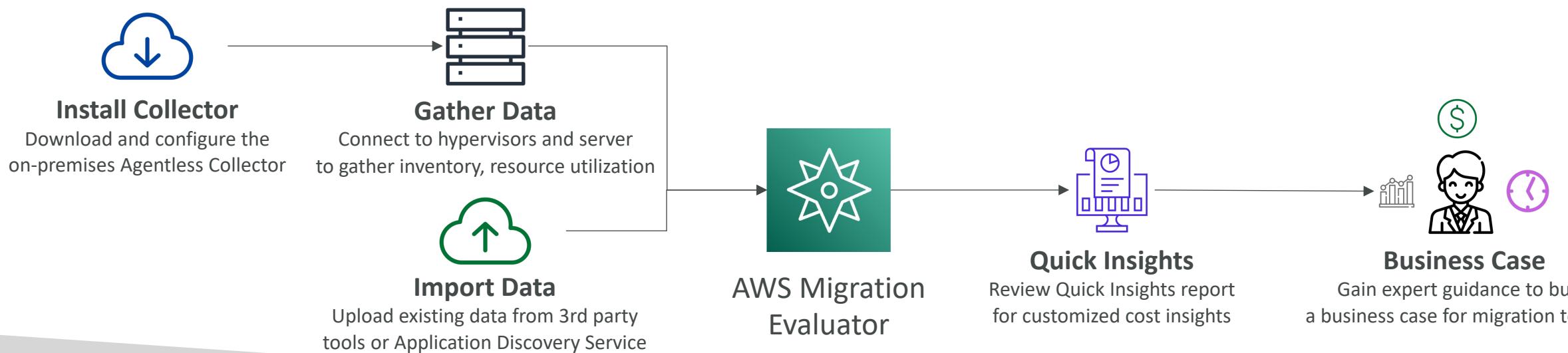
- The “AWS evolution” of CloudEndure Migration, replacing AWS Server Migration Service (SMS)
- Lift-and-shift (rehost) solution which simplify **migrating** applications to AWS
- Converts your physical, virtual, and cloud-based servers to run natively on AWS
- Supports wide range of platforms, Operating Systems, and databases
- Minimal downtime, reduced costs



AWS Migration Evaluator



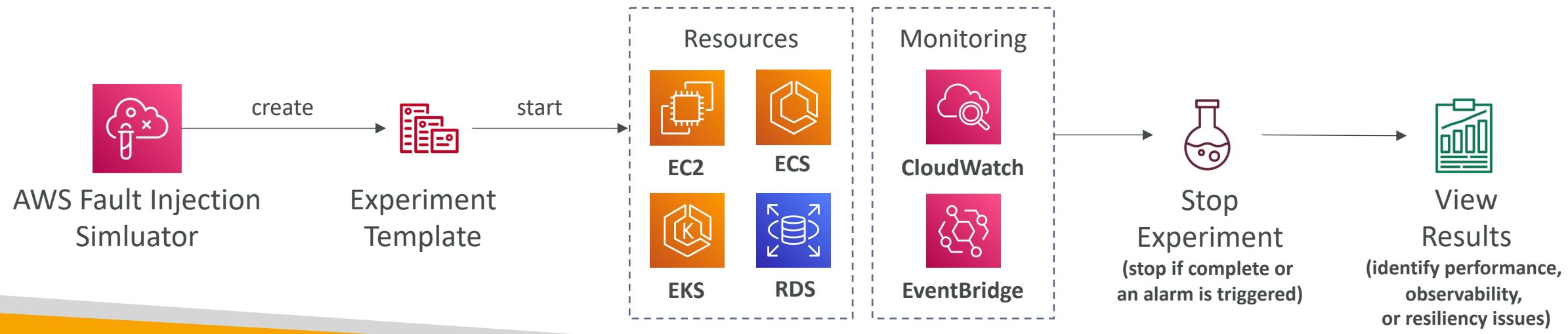
- Helps you build a data-driven business case for migration to AWS
- Provides a clear baseline of what your organization is running today
- Install Agentless Collector to conduct broad-based discovery
- Take a snapshot of on-premises foot-print, server dependencies, ...
- Analyze current state, define target state, then develop migration plan



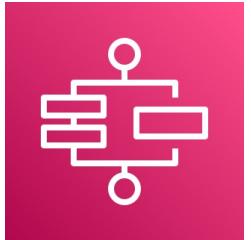
AWS Fault Injection Simulator (FIS)



- A fully managed service for running fault injection experiments on AWS workloads
- Based on **Chaos Engineering** – stressing an application by creating disruptive events (e.g., sudden increase in CPU or memory), observing how the system responds, and implementing improvements
- Helps you uncover hidden bugs and performance bottlenecks
- Supports the following AWS services: EC2, ECS, EKS, RDS...
- Use pre-built templates that generate the desired disruptions

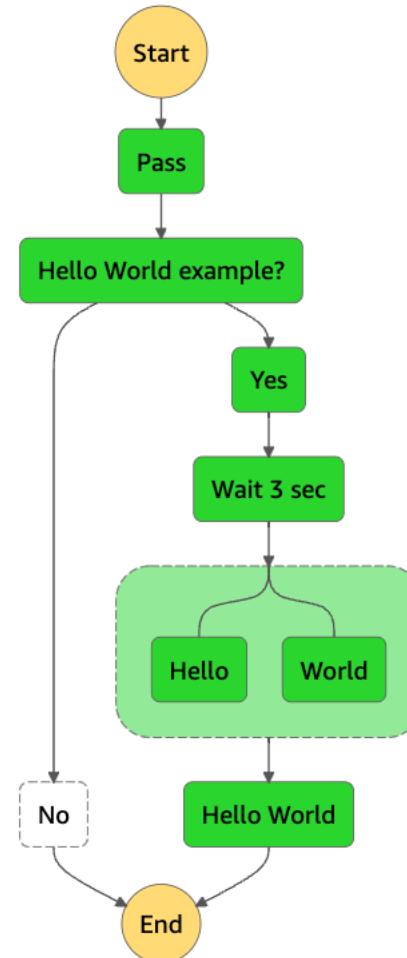


AWS Step Functions

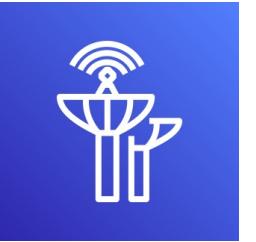


- Build serverless visual workflow to orchestrate your Lambda functions
- **Features:** sequence, parallel, conditions, timeouts, error handling, ...
- Can integrate with EC2, ECS, On-premises servers, API Gateway, SQS queues, etc...
- Possibility of implementing human approval feature
- **Use cases:** order fulfillment, data processing, web applications, any workflow

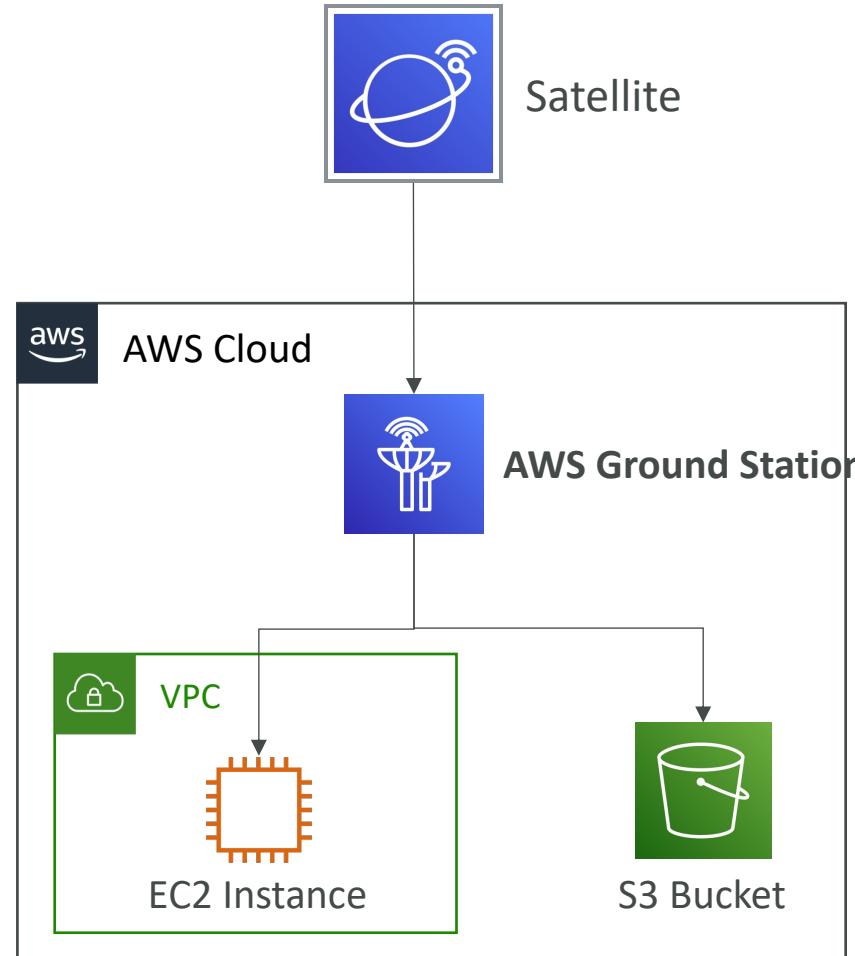
■ In Progress ■ Succeeded ■ Failed ■ Cancelled ■ Caught Error



AWS Ground Station



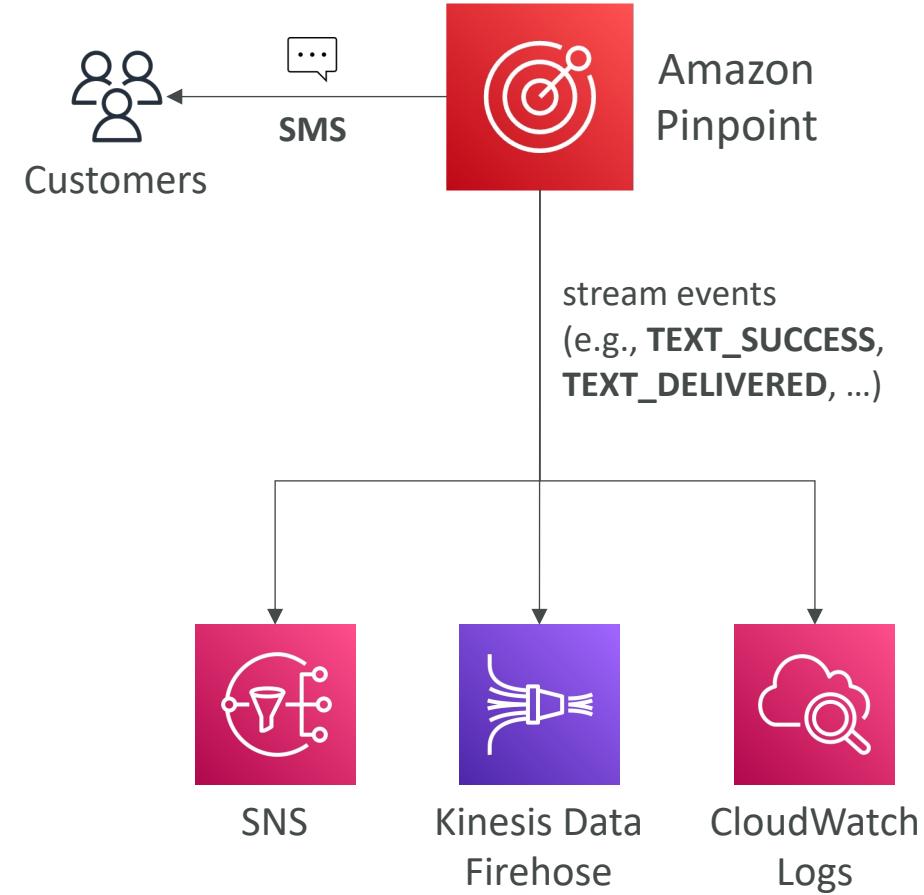
- Fully managed service that lets you control satellite communications, process data, and scale your satellite operations
- Provides a global network of satellite ground stations near AWS regions
- Allows you to download satellite data to your AWS VPC within seconds
- Send satellite data to S3 or EC2 instance
- Use cases: weather forecasting, surface imaging, communications, video broadcasts



Amazon Pinpoint



- Scalable 2-way (outbound/inbound) marketing communications service
- Supports email, SMS, push, voice, and in-app messaging
- Ability to segment and personalize messages with the right content to customers
- Possibility to receive replies
- Scales to billions of messages per day
- Use cases: run campaigns by sending marketing, bulk, transactional SMS messages
- **Versus Amazon SNS or Amazon SES**
 - In SNS & SES you managed each message's audience, content, and delivery schedule
 - In Amazon Pinpoint, you create message templates, delivery schedules, highly-targeted segments, and full campaigns



AWS Architecting & Ecosystem Section

Well Architected Framework

General Guiding Principles

- Stop guessing your capacity needs
- Test systems at production scale
- Automate to make architectural experimentation easier
- Allow for evolutionary architectures
 - Design based on changing requirements
- Drive architectures using data
- Improve through game days
 - Simulate applications for flash sale days

AWS Cloud Best Practices – Design Principles

- **Scalability:** vertical & horizontal
- **Disposable Resources:** servers should be disposable & easily configured
- **Automation:** Serverless, Infrastructure as a Service, Auto Scaling...
- **Loose Coupling:**
 - Monolith are applications that do more and more over time, become bigger
 - Break it down into smaller, loosely coupled components
 - A change or a failure in one component should not cascade to other components
- **Services, not Servers:**
 - Don't use just EC2
 - Use managed services, databases, serverless, etc !

Well Architected Framework

6 Pillars

- 1) Operational Excellence
 - 2) Security
 - 3) Reliability
 - 4) Performance Efficiency
 - 5) Cost Optimization
 - 6) Sustainability
-
- They are not something to balance, or trade-offs, they're a synergy

I) Operational Excellence

- Includes the ability to run and monitor systems to deliver business value and to continually improve supporting processes and procedures
- Design Principles
 - Perform operations as code - Infrastructure as code
 - Annotate documentation - Automate the creation of annotated documentation after every build
 - Make frequent, small, reversible changes - So that in case of any failure, you can reverse it
 - Refine operations procedures frequently - And ensure that team members are familiar with it
 - Anticipate failure
 - Learn from all operational failures

Operational Excellence

AWS Services

- Prepare



AWS CloudFormation



AWS Config

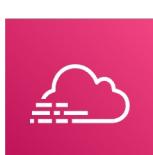
- Operate



AWS CloudFormation



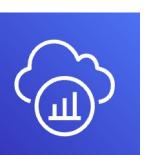
AWS Config



AWS CloudTrail



Amazon CloudWatch



AWS X-Ray

- Evolve



AWS CloudFormation



AWS CodeBuild



AWS CodeCommit



AWS CodeDeploy



AWS CodePipeline

2) Security

- Includes the ability to protect information, systems, and assets while delivering business value through risk assessments and mitigation strategies
- Design Principles
 - **Implement a strong identity foundation** - Centralize privilege management and reduce (or even eliminate) reliance on long-term credentials - Principle of least privilege - IAM
 - **Enable traceability** - Integrate logs and metrics with systems to automatically respond and take action
 - **Apply security at all layers** - Like edge network, VPC, subnet, load balancer, every instance, operating system, and application
 - **Automate security best practices**
 - **Protect data in transit and at rest** - Encryption, tokenization, and access control
 - **Keep people away from data** - Reduce or eliminate the need for direct access or manual processing of data
 - **Prepare for security events** - Run incident response simulations and use tools with automation to increase your speed for detection, investigation, and recovery
 - **Shared Responsibility Model**

Security AWS Services

- Identity and Access Management



IAM



AWS STS



MFA token



AWS Organizations

- Detective Controls



AWS Config



AWS CloudTrail



Amazon CloudWatch

- Infrastructure Protection



Amazon CloudFront



Amazon VPC



AWS Shield



AWS WAF



Amazon Inspector

- Data Protection:



KMS



S3



Elastic Load Balancing (ELB)



Amazon EBS



Amazon RDS

- Incident Response



IAM



AWS CloudFormation



Amazon CloudWatch Events

3) Reliability

- Ability of a system to recover from infrastructure or service disruptions, dynamically acquire computing resources to meet demand, and mitigate disruptions such as misconfigurations or transient network issues
- Design Principles
 - **Test recovery procedures** - Use automation to simulate different failures or to recreate scenarios that led to failures before
 - **Automatically recover from failure** - Anticipate and remediate failures before they occur
 - **Scale horizontally to increase aggregate system availability** - Distribute requests across multiple, smaller resources to ensure that they don't share a common point of failure
 - **Stop guessing capacity** - Maintain the optimal level to satisfy demand without over or under provisioning - Use Auto Scaling
 - **Manage change in automation** - Use automation to make changes to infrastructure

Reliability AWS Services

- Foundations



IAM



Amazon VPC



Service Quotas



AWS Trusted Advisor

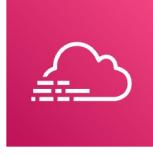
- Change Management



AWS Auto Scaling



Amazon CloudWatch



AWS CloudTrail



AWS Config

- Failure Management



Backups



AWS CloudFormation



Amazon S3



Amazon S3 Glacier



Amazon Route 53

4) Performance Efficiency

- Includes the ability to use computing resources efficiently to meet system requirements, and to maintain that efficiency as demand changes and technologies evolve
- Design Principles
 - **Democratize advanced technologies** - Advance technologies become services and hence you can focus more on product development
 - **Go global in minutes** - Easy deployment in multiple regions
 - **Use serverless architectures** - Avoid burden of managing servers
 - **Experiment more often** - Easy to carry out comparative testing
 - **Mechanical sympathy** - Be aware of all AWS services

Performance Efficiency AWS Services

- Selection



AWS Auto Scaling



AWS Lambda



Amazon Elastic Block Store
(EBS)



Amazon Simple Storage
Service (S3)



Amazon RDS

- Review



AWS CloudFormation



AWS Lambda

- Monitoring



Amazon CloudWatch



AWS Lambda

- Tradeoffs



Amazon RDS



Amazon ElastiCache



AWS Snowball



Amazon CloudFront

AWS News Blog

5) Cost Optimization

- Includes the ability to run systems to deliver business value at the lowest price point
- Design Principles
 - Adopt a consumption mode - Pay only for what you use
 - Measure overall efficiency - Use CloudWatch
 - Stop spending money on data center operations - AWS does the infrastructure part and enables customer to focus on organization projects
 - Analyze and attribute expenditure - Accurate identification of system usage and costs, helps measure return on investment (ROI) - Make sure to use tags
 - Use managed and application level services to reduce cost of ownership - As managed services operate at cloud scale, they can offer a lower cost per transaction or service

Cost Optimization AWS Services

- Expenditure Awareness



AWS Budgets



AWS Cost and Usage Report



AWS Cost Explorer



Reserved Instance Reporting

- Cost-Effective Resources



Spot instance

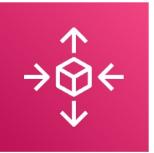


Reserved instance



Amazon S3 Glacier

- Matching supply and demand



AWS Auto Scaling



AWS Lambda

- Optimizing Over Time



AWS Trusted Advisor



AWS Cost and Usage Report

AWS News Blog

6) Sustainability

- The sustainability pillar focuses on minimizing the environmental impacts of running cloud workloads.
- Design Principles
 - **Understand your impact** – establish performance indicators, evaluate improvements
 - **Establish sustainability goals** – Set long-term goals for each workload, model return on investment (ROI)
 - **Maximize utilization** – Right size each workload to maximize the energy efficiency of the underlying hardware and minimize idle resources.
 - **Anticipate and adopt new, more efficient hardware and software offerings** – and design for flexibility to adopt new technologies over time.
 - **Use managed services** – Shared services reduce the amount of infrastructure; Managed services help automate sustainability best practices as moving infrequent accessed data to cold storage and adjusting compute capacity.
 - **Reduce the downstream impact of your cloud workloads** – Reduce the amount of energy or resources required to use your services and reduce the need for your customers to upgrade their devices

Sustainability AWS Services

- EC2 Auto Scaling, Serverless Offering (Lambda, Fargate)
- Cost Explorer, AWS Graviton 2, EC2 T instances, @Spot Instances
- EFS-IA, Amazon S3 Glacier, EBS Cold HDD volumes
- S3 Lifecycle Configurations, S3 Intelligent Tiering
- Amazon Data Lifecycle Manager
- Read Local, Write Global: RDS Read Replicas, Aurora Global DB, DynamoDB Global Table, CloudFront

EC2 Auto Scaling



Lambda



Fargate



Cost Explorer



EC2 (Graviton, T)



Spot Instances



EFS-IA



S3 Glacier



EBS Cold HDD



S3 Intelligent Tiering



Data Lifecycle Manager



RDS



Aurora



DynamoDB



CloudFront



AWS Well-Architected Tool



- Free tool to review your architectures against the 6 pillars Well-Architected Framework and adopt architectural best practices
- How does it work?
 - Select your workload and answer questions
 - Review your answers against the 6 pillars
 - Obtain advice: get videos and documentations, generate a report, see the results in a dashboard
- Let's have a look: <https://console.aws.amazon.com/wellarchitected>

The screenshot shows the AWS Well-Architected Tool interface. At the top, there is a navigation bar with links for 'Well-Architected Tool' and 'Workloads'. Below the navigation is a search bar labeled 'Search by workload name'. A toolbar contains buttons for 'Generate report', 'View details', 'Edit', 'Delete', and 'Define workload'. A small icon of a person is also present. The main area displays a table titled 'Workloads' with the following data:

| Name | Overall status | High risks | Medium risks | Improvement status | Last updated |
|-------------------------------|----------------|------------|--------------|--------------------|----------------------------|
| Internal Employee Portal | Answered | 13 | 2 | None | Nov 24, 2018 3:40 PM UTC-8 |
| Mobile app - Android | Answered | 9 | 1 | None | Nov 24, 2018 3:43 PM UTC-8 |
| Mobile app - iOS | Answered | 0 | 1 | None | Nov 24, 2018 3:49 PM UTC-8 |
| Retail Website- EU | Unanswered | 0 | 0 | None | Nov 24, 2018 3:52 PM UTC-8 |
| Retail Website- North America | Unanswered | 0 | 0 | None | Nov 24, 2018 3:19 PM UTC-8 |

At the bottom of the page, there is a footer with links for '© 2008 - 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved.', 'Privacy Policy', and 'Terms of Use'.

<https://aws.amazon.com/blogs/aws/new-aws-well-architected-tool-review-workloads-against-best-practices/>

AWS Cloud Adoption Framework (AWS CAF)

- Helps you build and then execute a comprehensive plan for your digital transformation through innovative use of AWS
- Created by AWS Professionals by taking advantage of AWS Best Practices and lessons learned from 1000s of customers
- AWS CAF identifies specific organizational capabilities that underpin successful cloud transformations
- AWS CAF groups its capabilities in six perspectives: Business, People, Governance, Platform, Security, and Operations

Business

People

Governance

Platform

Security

Operations

CAF Perspectives and Foundational Capabilities

Business Capabilities



- **Business Perspective** helps ensure that your cloud investments accelerate your digital transformation ambitions and business outcomes.
- **People Perspective** serves as a bridge between technology and business, accelerating the cloud journey to help organizations more rapidly evolve to a culture of continuous growth, learning, and where change becomes business-as-normal, with focus on culture, organizational structure, leadership, and workforce.
- **Governance Perspective** helps you orchestrate your cloud initiatives while maximizing organizational benefits and minimizing transformation-related risks.



CAF Perspectives and Foundational Capabilities

Business Capabilities



Business

- Strategy Management
- Portfolio Management
- Innovation Management
- Product Management
- Strategic Partnership
- Data Monetization
- Business Insight
- Data Science



People

- Culture Evolution
- Transformational Leadership
- Cloud Fluency
- Workforce Transformation
- Change Acceleration
- Organization Design
- Organizational Alignment



Governance

- Program and Project Management
- Benefits Management
- Risk Management
- Cloud Financial Management
- Application Portfolio Management
- Data Governance
- Data Curation

CAF Perspectives and Foundational Capabilities

Technical Capabilities



- **Platform Perspective** helps you build an enterprise-grade, scalable, hybrid cloud platform; modernize existing workloads; and implement new cloud-native solutions.



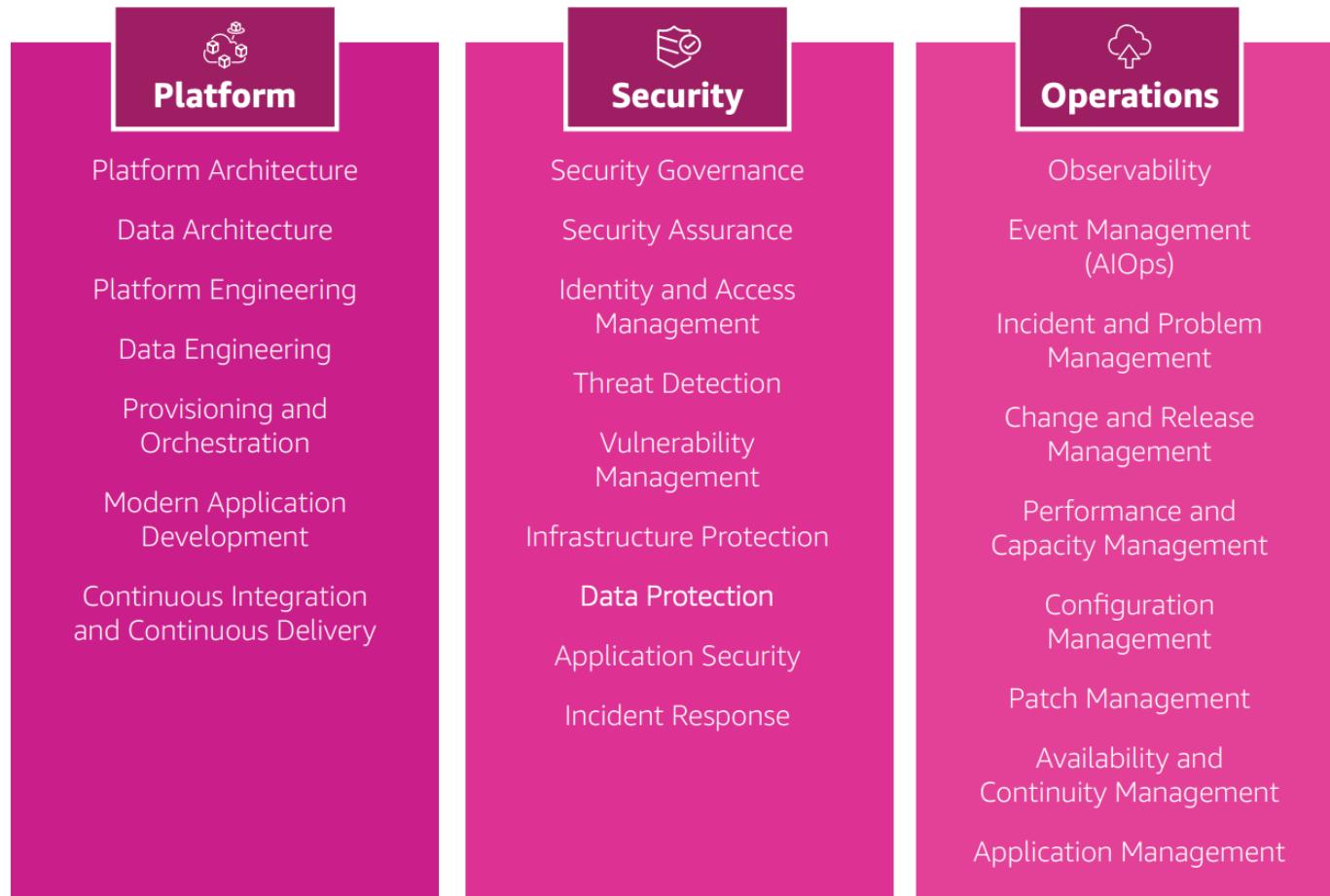
- **Security Perspective** helps you achieve the confidentiality, integrity, and availability of your data and cloud workloads.



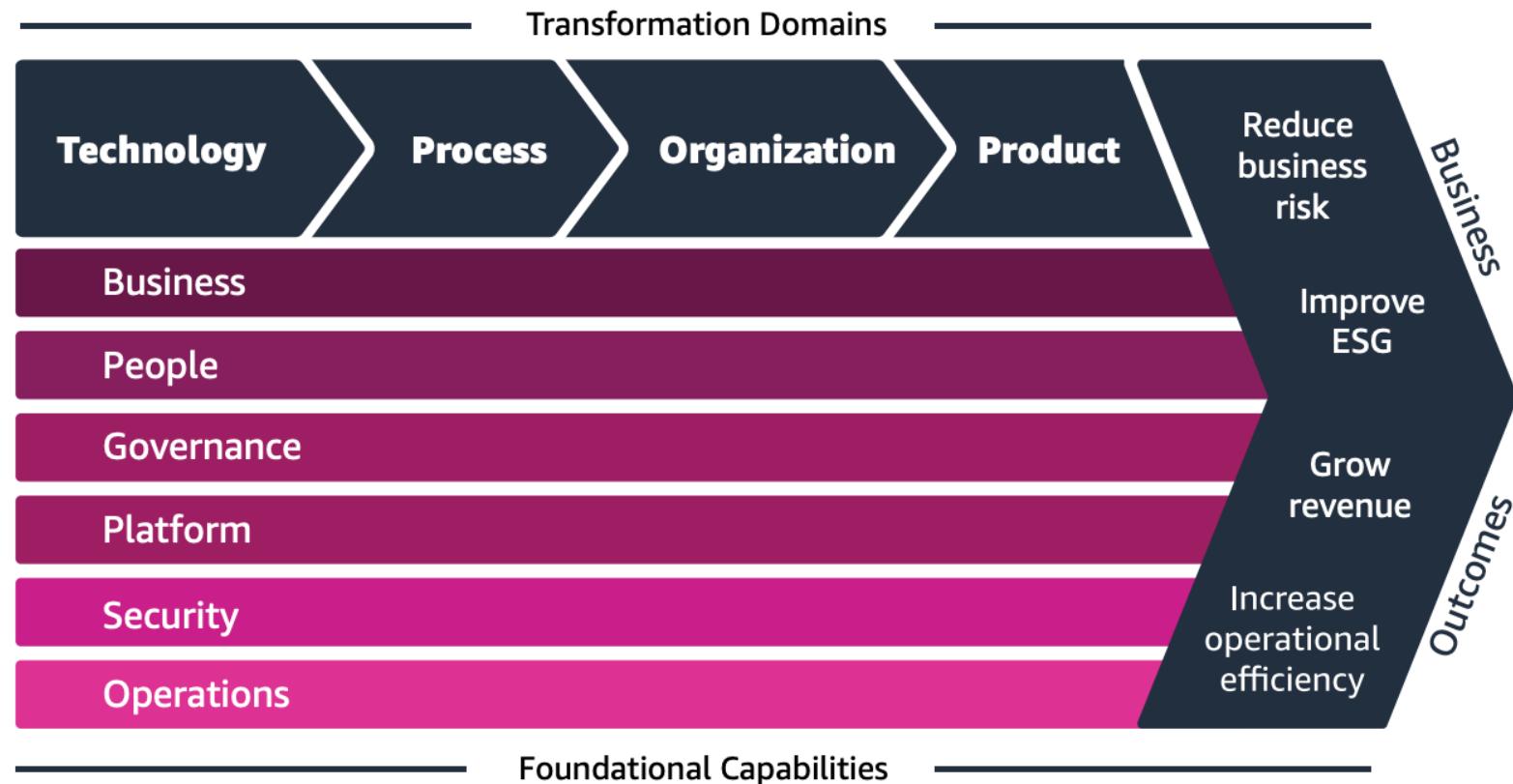
- **Operations Perspective** helps ensure that your cloud services are delivered at a level that meets the needs of your business.

CAF Perspectives and Foundational Capabilities

Technical Capabilities

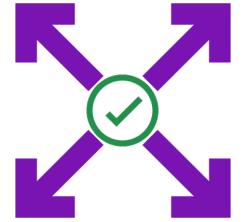


Cloud transformation value chain



AWS CAF – Transformation Domains

- **Technology** - using the cloud to migrate and modernize legacy infrastructure, applications, data and analytics platforms...
- **Process** - digitizing, automating, and optimizing your business operations
 - leveraging new data and analytics platforms to create actionable insights
 - using machine learning (ML) to improve your customer service experience...
- **Organization** - Reimagining your operating model
 - Organizing your teams around products and value streams
 - Leveraging agile methods to rapidly iterate and evolve
- **Product** – reimagining your business model by creating new value propositions (products & services) and revenue models



AWS Right Sizing

- EC2 has many instance types, but choosing the most powerful instance type isn't the best choice, because the cloud is **elastic**
- Right sizing is the process of matching instance types and sizes to your workload performance and capacity requirements **at the lowest possible cost**
- **Scaling up is easy so always start small**
- It's also the process of looking at deployed instances and identifying opportunities to eliminate or downsize without compromising capacity or other requirements, which results in lower costs
- It's important to Right Size...
 - before a Cloud Migration
 - continuously after the cloud onboarding process (requirements change over time)
- CloudWatch, Cost Explorer, Trusted Advisor, 3rd party tools can help

AWS Ecosystem – Free resources

- AWS Blogs: <https://aws.amazon.com/blogs/aws/>
- AWS Forums (community): <https://forums.aws.amazon.com/index.jspa>
- AWS Whitepapers & Guides: <https://aws.amazon.com/whitepapers>
- AWS Partner Solutions (formerly Quick Starts):
<https://aws.amazon.com/quickstart/>
 - Automated, gold-standard deployments in the AWS Cloud
 - Build your production environment quickly with templates
 - Example: WordPress on AWS https://fwd.aws/P3yyv?did=qs_card&trk=qs_card
 - Leverages CloudFormation
- AWS Solutions: <https://aws.amazon.com/solutions/>
 - Vetted Technology Solutions for the AWS Cloud
 - Example - AWS Landing Zone: secure, multi-account AWS environment
 - <https://aws.amazon.com/solutions/implementations/aws-landing-zone/>
 - “Replaced” by AWS Control Tower

AWS Ecosystem - AWS Support

| | |
|-------------------|--|
| DEVELOPER | <ul style="list-style-type: none">• Business hours email access to Cloud Support Associates• General guidance: < 24 business hours• System impaired: < 12 business hours |
| BUSINESS | <ul style="list-style-type: none">• 24x7 phone, email, and chat access to Cloud Support Engineers• Production system impaired: < 4 hours• Production system down: < 1 hour |
| ENTERPRISE | <ul style="list-style-type: none">• Access to a Technical Account Manager (TAM)• Concierge Support Team (for billing and account best practices)• Business-critical system down: < 15 minutes |

AWS Marketplace



- Digital catalog with thousands of software listings from **independent software vendors** (3rd party)
- Example:
 - Custom AMI (custom OS, firewalls, technical solutions...)
 - CloudFormation templates
 - Software as a Service
 - Containers
- If you buy through the AWS Marketplace, it goes into your AWS bill
- You can **sell your own solutions** on the AWS Marketplace

AWS Training

- AWS Digital (online) and Classroom Training (in-person or virtual)
- AWS Private Training (for your organization)
- Training and Certification for the U.S Government
- Training and Certification for the Enterprise
- AWS Academy: helps universities teach AWS
- And your favorite online teacher...
teaching you all about AWS Certifications and more!

AWS Professional Services & Partner Network

- The AWS Professional Services organization is a global team of experts
- They work alongside your team and a chosen member of the APN
- APN = AWS Partner Network
- APN Technology Partners: providing hardware, connectivity, and software
- APN Consulting Partners: professional services firm to help build on AWS
- APN Training Partners: find who can help you learn AWS
- AWS Competency Program: AWS Competencies are granted to APN Partners who have demonstrated technical proficiency and proven customer success in specialized solution areas.
- AWS Navigate Program: help Partners become better Partners

AWS Knowledge Center

- Contains the most frequent & common questions and requests

What AWS service can we help with?



Popular Services



Analytics



Application Integration



Account and Billing Management



Business Applications



Compute



Customer Engagement



Database



Developer Tools



Front-End Web & Mobile



Internet of Things



Management and Governance



Migration & Transfer



Networking & Content Delivery



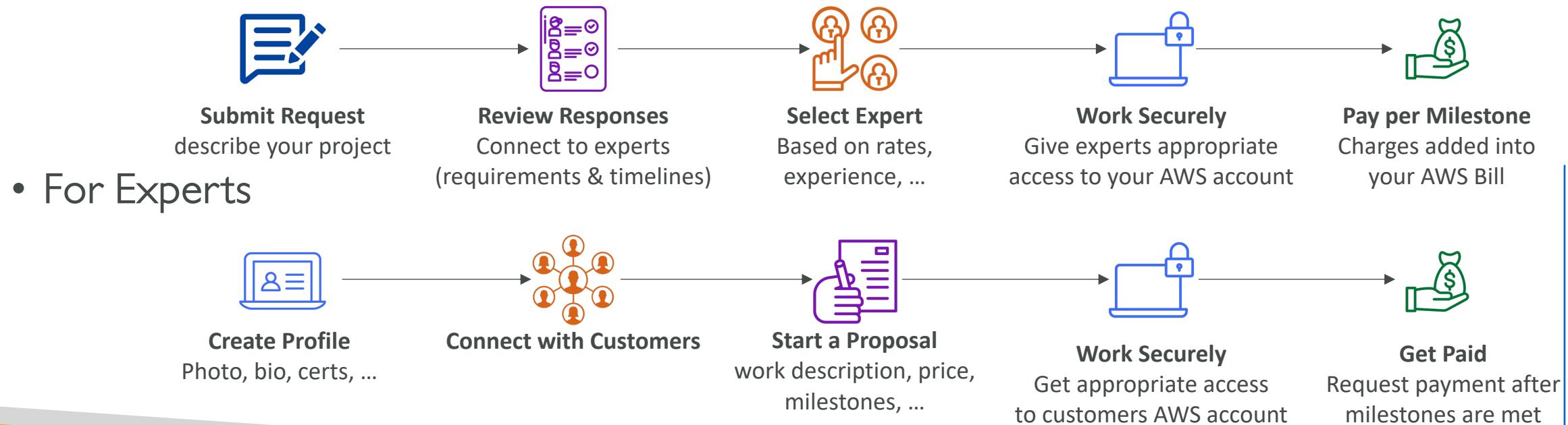
Security, Identity & Compliance

<https://aws.amazon.com/premiumsupport/knowledge-center/>

AWS IQ



- Quickly find professional help for your AWS projects
- Engage and pay AWS Certified 3rd party experts for on-demand project work
- Video-conferencing, contract management, secure collaboration, integrated billing
- For Customers



AWS re:Post



- AWS-managed Q&A service offering crowd-sourced, expert-reviewed answers to your technical questions about AWS that replaces the original AWS Forums
- Part of the AWS Free Tier
- Community members can earn reputation points to build up their community expert status by providing accepted answers and reviewing answers from other users
- Questions from AWS Premium Support customers that do not receive a response from the community are passed on to AWS Support engineers
- AWS re:Post is not intended to be used for questions that are time-sensitive or involve any proprietary information

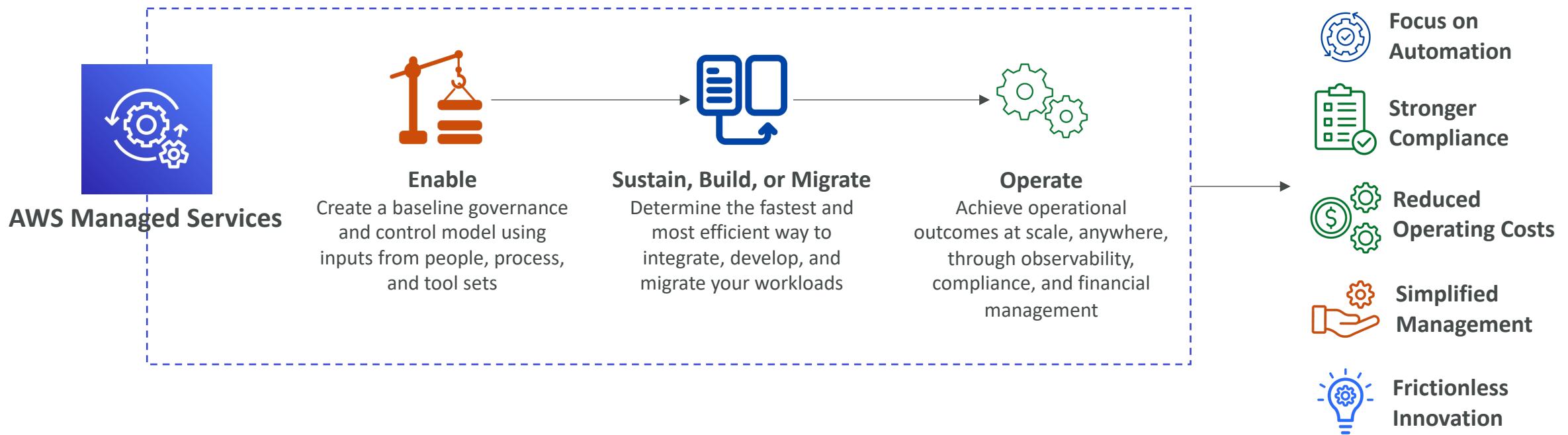
The screenshot shows a question titled 'Import a self-signed Root CA in ACM PCA'. The question has 0 answers and 0 comments. It includes a link to documentation: <https://docs.aws.amazon.com/acm-pca/latest/userguide/PcImportCaCert.html> and <https://docs.aws.amazon.com/cli/latest/reference/acm-pca/import-certificate-authority-certificate.html>. Below the question is a section titled '1 Answers' with one accepted answer. The accepted answer is from a user named 'AWS Employee EXPERT' who answered a year ago. The answer discusses three scenarios for installing a CA certificate and states that it is not possible to import an external ROOT CA in ACM-PCA.

AWS Managed Services (AMS)



- Provides infrastructure and application support on AWS.
- **AMS offers a team of AWS experts** who manage and operate your infrastructure for security, reliability, and availability
- Helps organizations offload routine management tasks and focus on their business objectives.
- Fully managed service, so AWS handles common activities such as change requests, monitoring, patch management, security, and backup services
- Implements best practices and maintains your AWS infrastructure to reduce your operational overhead and risk
- AMS business hours are 24/365

AWS Managed Services (AMS)



Exam Preparation Section

Quick note on Distractors

- There are many services you will find in questions that are **distractors**
- There are **over 200 AWS services**, and we can't cover them all
 - Quicksight, Cognito, AppStreams, Server Migration Service, etc...
- I have covered all services that from my research and experience, people get questions for at the exam.
- If you see a service not covered by my course, but in someone else's practice exam, don't panic, I must have intentionally left it out
- If you see a service that is an answer at the exam but not covered in my course, please let me know!

State of learning checkpoint

- Let's look how far we've gone on our learning journey
- <https://aws.amazon.com/certification/certified-cloud-practitioner/>

Practice makes perfect

- If you're new to AWS, take a bit of AWS practice thanks to this course before rushing to the exam
 - The exam recommends you have 6 months or more of hands-on experience on AWS
 - Practice makes perfect!
-
- If you feel overwhelmed by the amount of knowledge you just learned, just go through it one more time

Exam content

- Two types of questions:
 - **Multiple choice:** has one correct answer and three incorrect responses
 - **Multiple response:** has two or more correct responses out of five or more options – CAREFUL: the exam software does not tell you if you selected the right number of answers (but the required number is mentioned)
- **Always try to answer the question**
 - Unanswered questions are considered as incorrect
 - No penalty for a wrong answer → guess!
- If you need to review a question for later (when you're done answering all questions), you can **flag it**

MULTIPLE CHOICE QUESTION

Which AWS service does rock...?

- Option 1
- Option 2
- Option 3
- Option 4

MULTI REONSE QUESTION

Blabla question...? (SELECT TWO)

- Option 1
- Option 2
- Option 3
- Option 4
- Option 5

Proceed by elimination

- Most questions are going to be high-level “pick-a-service” questions
 - For all the questions, rule out answers that you know for sure are wrong
 - For the remaining answers, understand which one makes the most sense
-
- There are very few trick questions
 - Don’t over-think it
 - If a solution seems feasible but highly complicated, it’s probably wrong

Read each service's Overview

- Example: <https://aws.amazon.com/s3/>
- Overviews cover a lot of the questions asked at the exam
- They help confirm your understanding of a service

Get into the AWS Community

- Help and discuss with other people in the course Q&A
- Review questions asked by other people in the Q&A
- Do the practice test in this section
- Do extra practice exams (for example from my practice exam course)

- Read forums online
- Read online blogs
- Attend local meetups and discuss with other AWS engineers
- Watch re-invent videos on YouTube (AWS Conference)

How will the exam work?

- You'll have to register online at <https://www.aws.training/>
- Fee for the exam is 100 USD
- Provide two identity documents (ID, Credit Card, details are in emails sent to you)
- No notes are allowed, no pen is allowed, no speaking
- 65 questions will be asked in 90 minutes
- At the end you can optionally review all the questions / answers

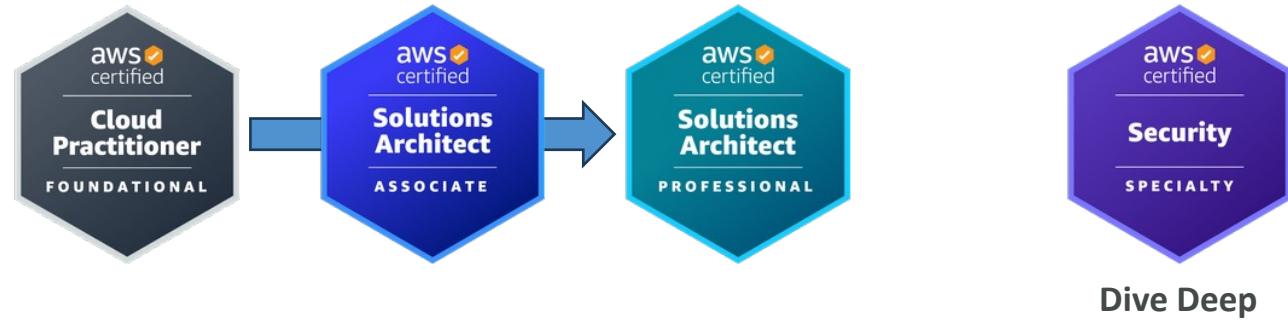
- You would know right away if you passed / failed the exams
- You will not know which answers were right / wrong
- You will know the overall score a few days later (email notification)
- To pass you need a score of **at least 700 out of 1000**
- If you fail, you can retake the exam again 14 days later

AWS Certification Paths – Architecture

Architecture

Solutions Architect

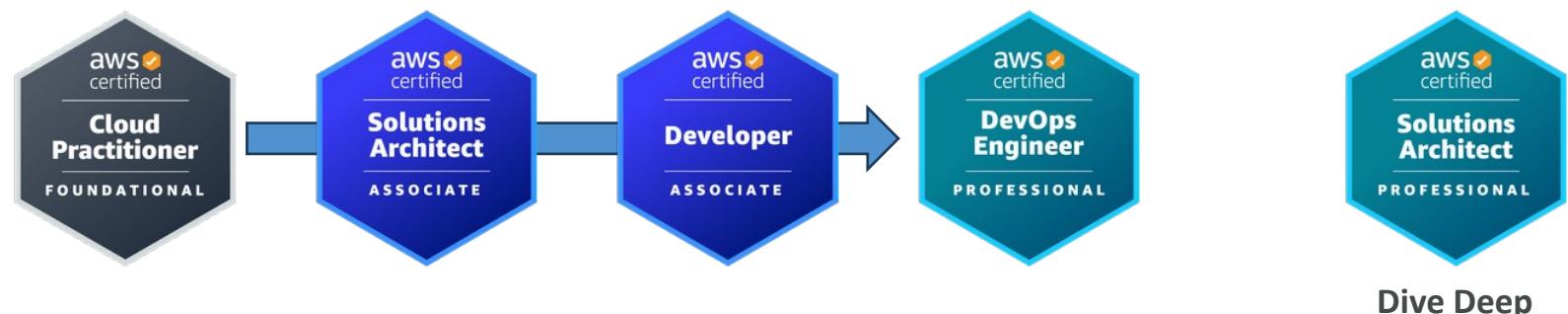
Design, develop, and manage cloud infrastructure and assets, work with DevOps to migrate applications to the cloud



Architecture

Application Architect

Design significant aspects of application architecture including user interface, middleware, and infrastructure, and ensure enterprise-wide scalable, reliable, and manageable systems



https://d1.awsstatic.com/training-and-certification/docs/AWS_certification_paths.pdf

AWS Certification Paths – Operations

Operations

Systems Administrator

Install, upgrade, and maintain computer components and software, and integrate automation processes



Dive Deep

Operations

Cloud Engineer

Implement and operate an organization's networked computing infrastructure and Implement security systems to maintain data safety



Dive Deep

AWS Certification Paths – DevOps

DevOps

Test Engineer

Embed testing and quality best practices for software development from design to release, throughout the product life cycle



DevOps

Cloud DevOps Engineer

Design, deployment, and operations of large-scale global hybrid cloud computing environment, advocating for end-to-end automated CI/CD DevOps pipelines



Optional

Dive Deep

DevOps

DevSecOps Engineer

Accelerate enterprise cloud adoption while enabling rapid and stable delivery of capabilities using CI/CD principles, methodologies, and technologies



AWS Certification Paths – Security

Security

Cloud Security Engineer

Design computer security architecture and develop detailed cyber security designs.
Develop, execute, and track performance of security measures to protect information



Dive Deep



Security

Cloud Security Architect

Design and implement enterprise cloud solutions applying governance to identify, communicate, and minimize business and technical risks



Dive Deep

AWS Certification Paths – Data Analytics & Development

Data Analytics Cloud Data Engineer

Automate collection and processing of structured/semi-structured data and monitor data pipeline performance



Development Software Development Engineer

Develop, construct, and maintain software across platforms and devices

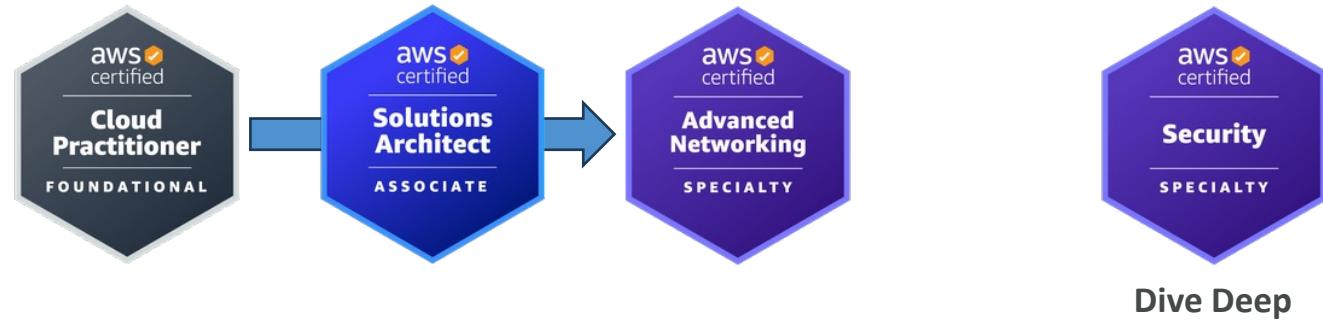


AWS Certification Paths – Networking & AI/ML

Networking

Network Engineer

Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, etc.



AI/ML

Machine Learning Engineer

Research, build, and design artificial intelligence (AI) systems to automate predictive models, and design machine learning systems, models, and schemes



Congratulations!

Congratulations!

- Congrats on finishing the course!
- I hope you will pass the exam without a hitch ☺
- If you haven't done so yet, I'd love a review from you!
- If you passed, I'll be more than happy to know I've helped
 - Post it in the Q&A to help & motivate other students. Share your tips!
 - Post it on LinkedIn and tag me!
- Overall, I hope you learned how to use AWS and that you will be a tremendously good AWS Cloud Practitioner

Your AWS Certification journey

FOUNDATIONAL

Six months of fundamental AWS Cloud and industry knowledge



PROFESSIONAL

Two years of experience designing, operating, and troubleshooting solutions using the AWS Cloud



ASSOCIATE

One year of experience solving problems and implementing solutions using the AWS Cloud



SPECIALTY

Technical AWS Cloud experience in the Specialty domain as specified in the exam guide



https://d1.awsstatic.com/training-and-certification/docs/AWS_certification_paths.pdf