
aws
training and
certification

AWS Certified Solutions Architect - Associate

Week 4 Content Review

September 2023 Accelerator

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Week 4 Training Summary

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Week 4 Digital Training Curriculum

Core Trainings

Course
AWS Partner: Data Analytics on AWS (Technical)
AWS Security Fundamentals (English)

Catch Up Week!

Optional Hands-On

AWS Builder Labs

Lab
Building and Deploying a Containerized Application with Amazon Elastic Kubernetes Service
Caching Static Files with Amazon CloudFront

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About the Exam

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About the Exam

- 130 minutes
- 65 Questions
  - *50 questions count to your score*
  - Scored 100 to 1000 (720+ pass)
- $150/voucher
- Multiple Response & Individual response questions
- In-Person & Remote proctoring available

AWS Certified Solutions Architect - Associate

Key Exam Topics

Domains Covered:	% of Exam
Domain 1: Design Secure Architectures	30%
Domain 2: Design Resilient Architectures	26%
Domain 3: Design High-Performing Architectures	24%
Domain 4: Design Cost-Optimized Architectures	20%
Total:	**100%**

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Helpful Resources

Training

- AWS Partner Accreditation: Technical
- AWS Solutions Architect – Accelerator Learning plan

White Papers

- Overview of Amazon Web Services
- AWS Well-Architected Framework
- Management and Governance Lens
- AWS Global Infrastructure
- Shared Responsibility Model
- How AWS Pricing Works
- AWS Architecture Center
- Secure Content Delivery with Amazon CloudFront
- IPv6 on AWS
- Overview of Deployment options on AWS
- Organizing your AWS Environment using multiple accounts

Exam Preparation

- Twitch Power Hours
- Sample Questions
- Schedule an Exam

Looking for more ***Practice Exams***?

*Check out our **Skill Builder Subscription** (information on the next slide)*

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OPTIONAL AWS Skill Builder Subscription

The Skill Builder subscription provides access to official AWS Certification practice exams, self-paced digital training content including open-ended challenges, self-paced labs, and game-based learning. ***Please note, the Skill Builder subscription is not required for this Accelerator program.***

Free digital training

LINK HERE

Special features include:

- 500+ digital courses
- Learning plans
- 10 Practice Question Sets
- *AWS Cloud Quest*

Individual subscription

LINK HERE

Everything in free digital training, plus:

- AWS Cloud Quest (3 additional roles)
- AWS Certification Official Practice Exams
- Exam prep courses
- 100+ AWS Builder Labs
- AWS Jam Journey (lab-based challenges)

Access ***65*** Solutions Architect - Associate Practice Exam Questions with feedback on your answer choices

Individual subscriptions are priced at $29 USD per month (*Flexibility to cancel anytime*) or $299 USD per year.

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Week 4 Homework Assignment

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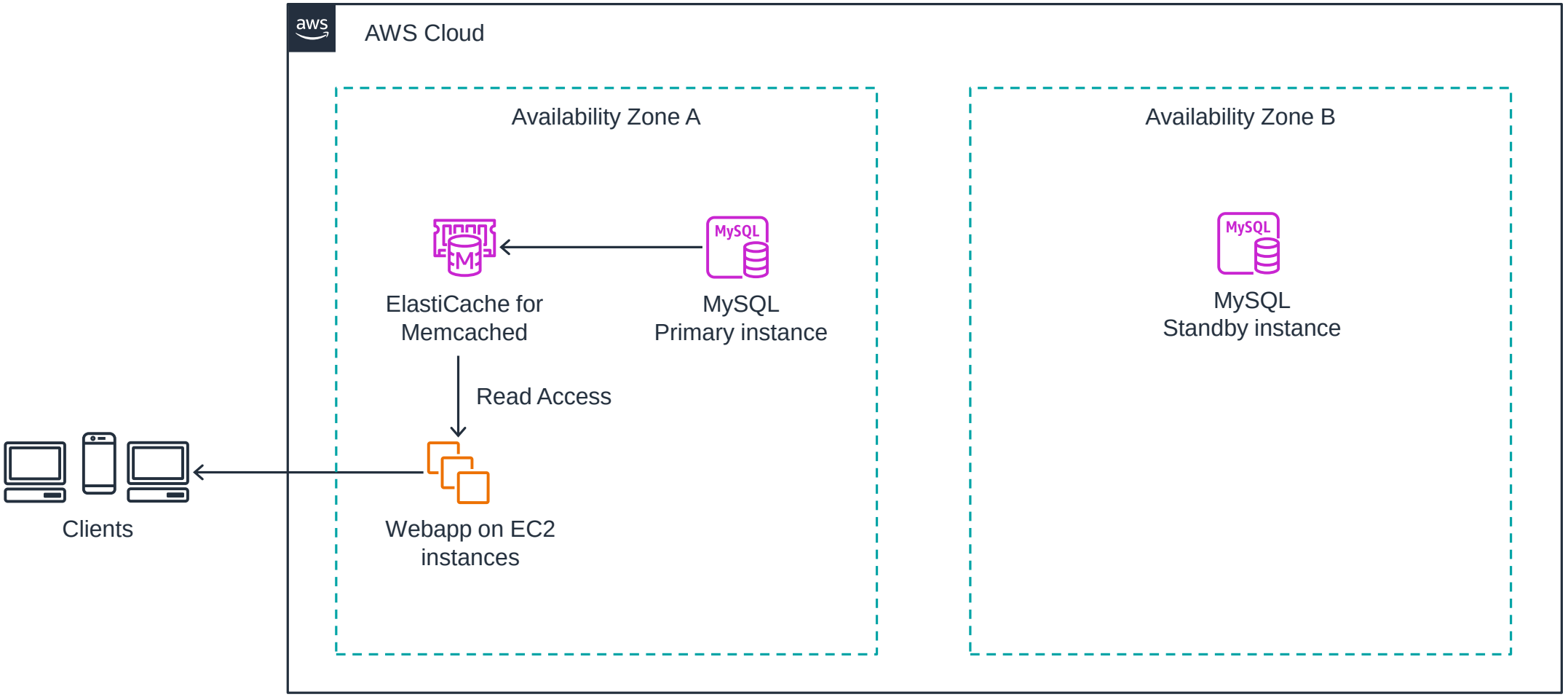
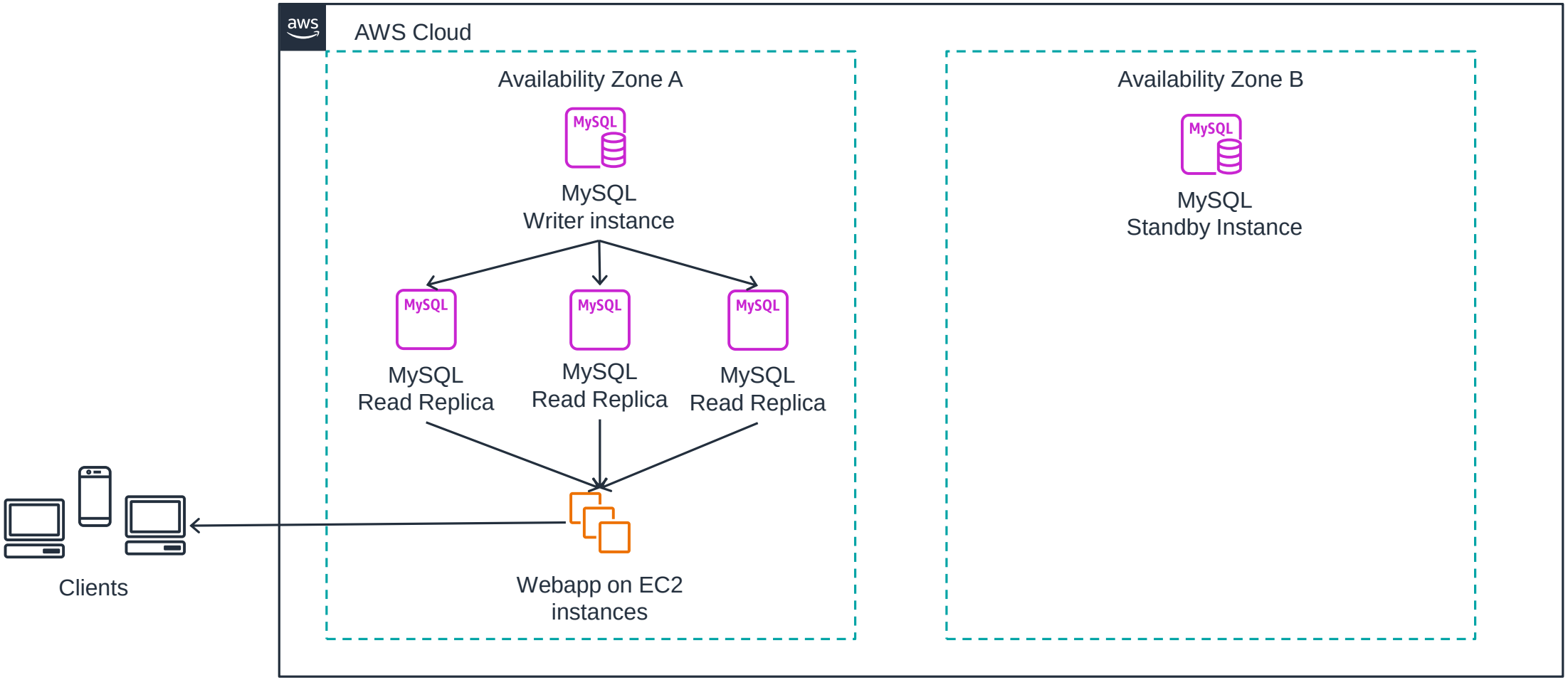
Week 3 Homework – Solution Key



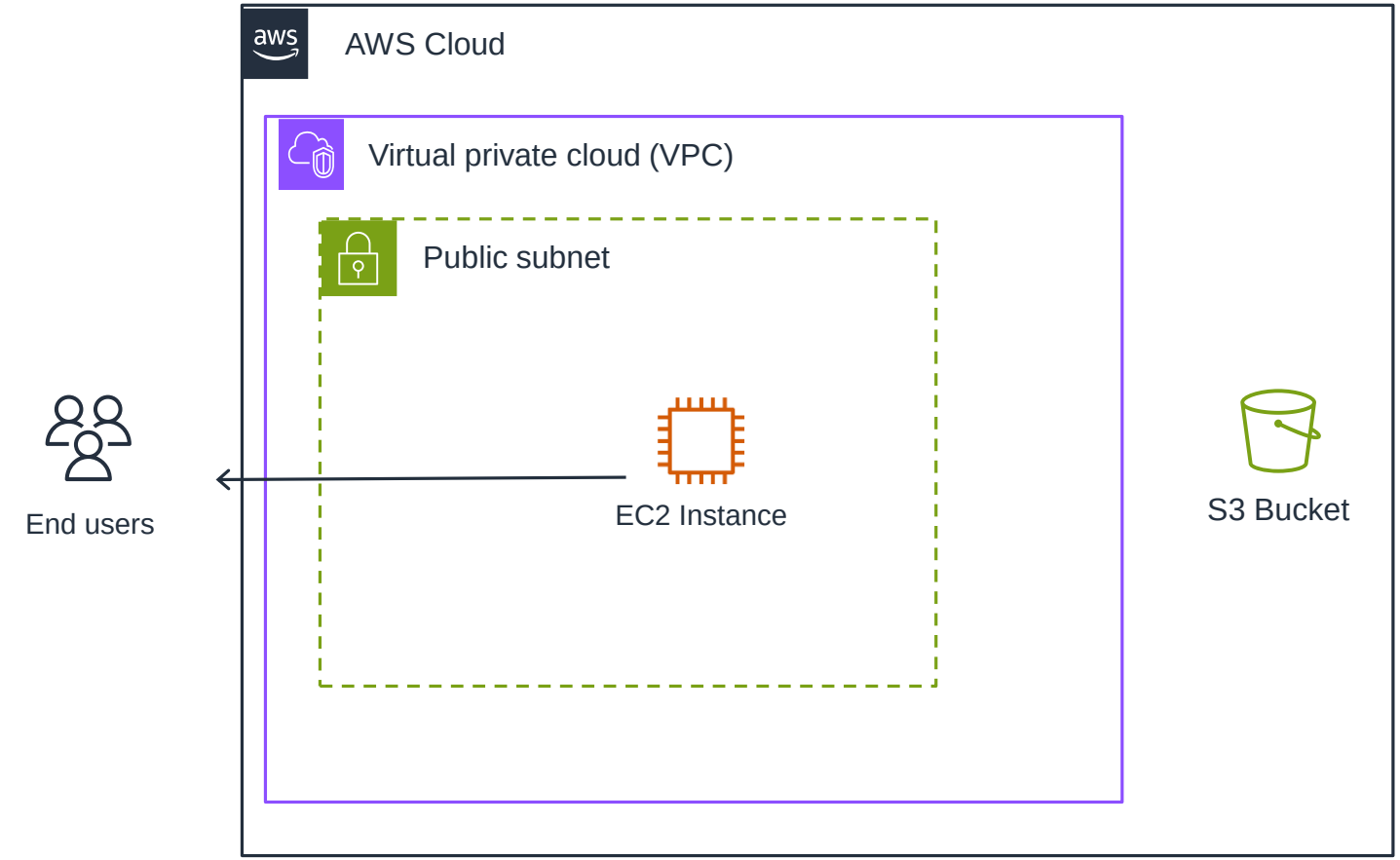
Week 3 Homework – Solution Key – Bonus Question!



Week 4 Homework –

Solution Requirements:

1. **DDoS Protection**
2. **Vulnerability Protection**
3. **Threat Detection**
4. **PII Checks in S3**



<u>Your Task:</u>

Update this simple architecture diagram with the appropriate AWS Security services to meet these requirements.

Week 4 Homework – Bonus Points!

<u>Your Task:</u>

Write a IAM Policy which allow:

- **Limits permissions of the Development team to a shared folder in Amazon S3**
- **Limits an application's access to S3 to read-only**

Week 4 Homework – Show and Tell!

Share us your architecture, answers, and explanation on LinkedIn!

#AWSpartners

#AWSaccelerator

Tag us so we don't miss it!

Kevin, Sam, Brady

Please do not share confidential or proprietary information on social media.

IPv4 vs. IPv6

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IPv4 Addressing

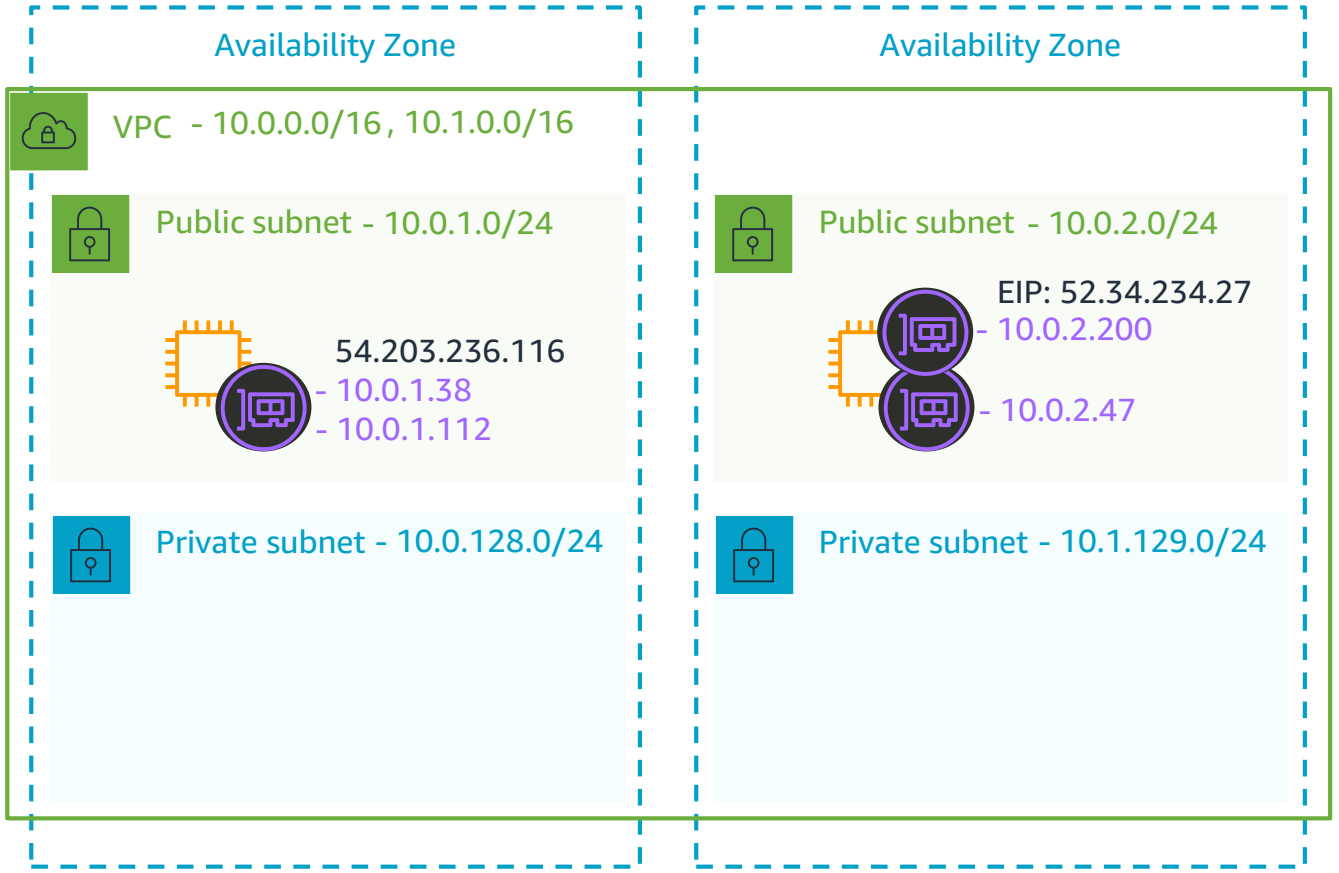
Reserved
10.0.0.0 – VPC Base
+ 2

10.0.0.2 – Route 53 Resolver

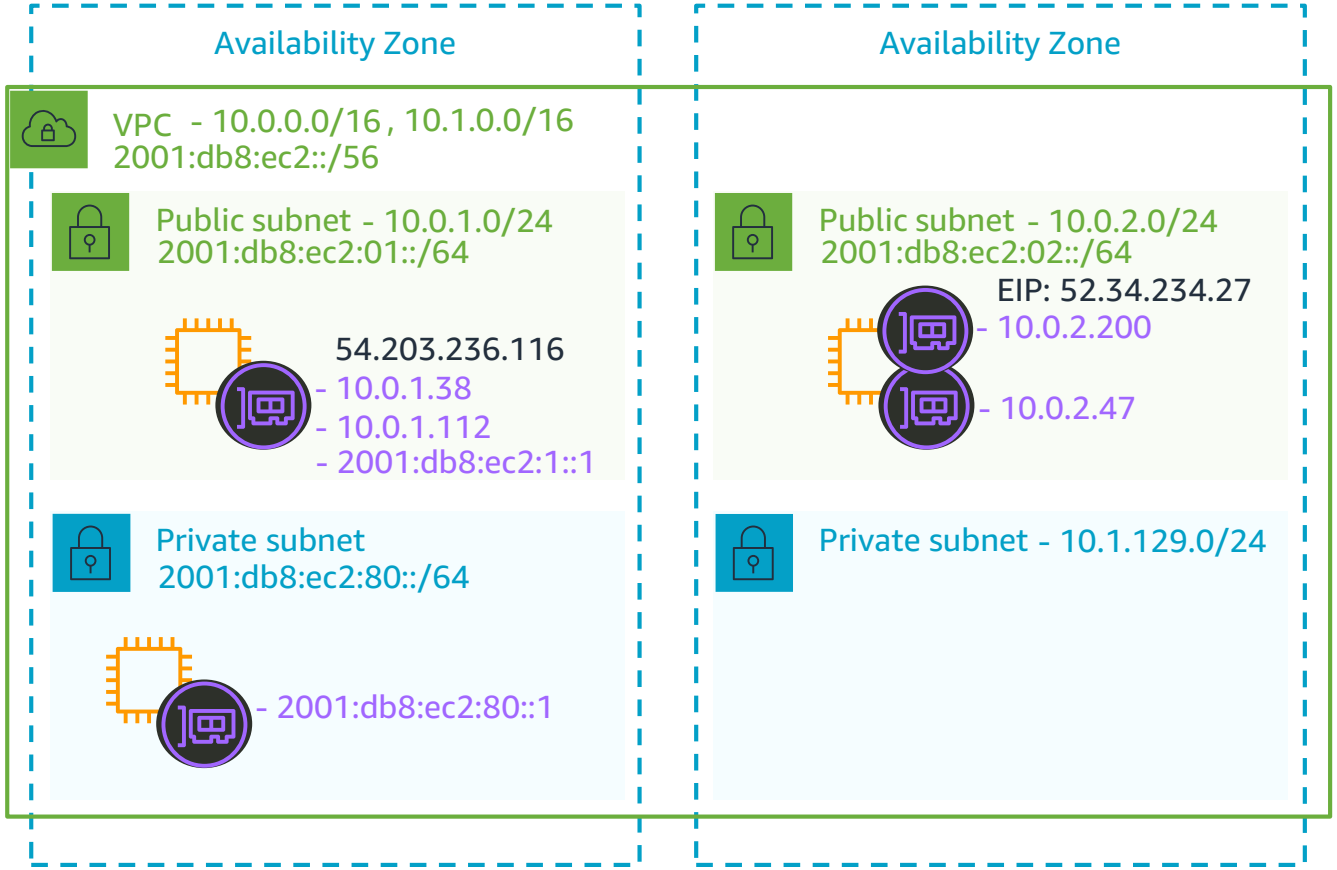
10.0.1.0 – Network Address
10.0.1.1 – VPC Router
10.0.1.2 – Reserved
10.0.1.3 – Reserved
10.0.1.255 – Network Broadcast

. . .

10.0.128.0 – Network Address
10.0.128.1 – VPC Router
10.0.128.2 – Reserved
10.0.128.3 – Reserved
10.0.128.255 – Network Broadcast



IPv6 Addressing



Reserved
fd00:ec2::/32 - Reserved
fe80::X:Xff:feX:X/64 – VPC Router

2001:db8:ec2:01::0
2001:db8:ec2:01::1
2001:db8:ec2:01::2
2001:db8:ec2:01::3
2001:db8:ec2:01:ffff:ffff:ffff:ffff
. . .

2001:db8:ec2:80::0
2001:db8:ec2:80::1
2001:db8:ec2:80::2
2001:db8:ec2:80::3
2001:db8:ec2:80:ffff:ffff:ffff:ffff

Elastic Load Balancer

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Elastic Load Balancing

Distribute network traffic to improve the scalability of your applications

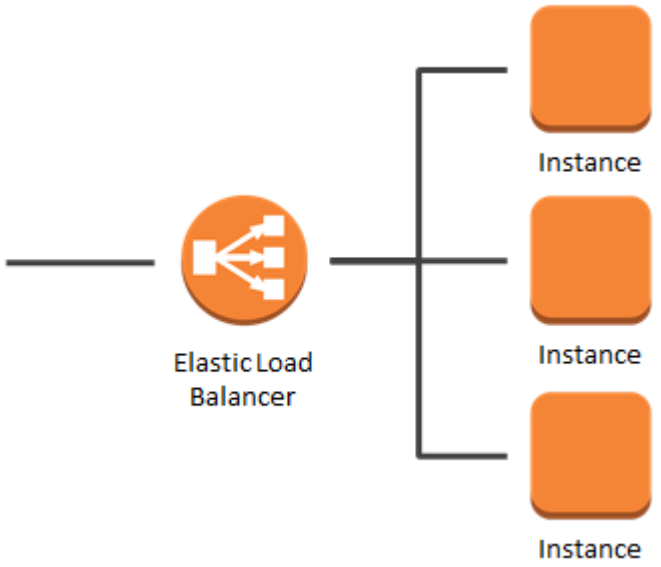
Automatically distributes incoming application traffic across multiple targets, such as Amazon EC2 instances, containers, IP addresses, Lambda functions, and virtual appliances

Availability

Elastic Load Balancing is part of the AWS network, with native awareness of failure boundaries like AZs to keep your applications available across a region

Monitoring

monitor the health of your applications and their performance in real time with Amazon CloudWatch metrics, logging, and request tracing



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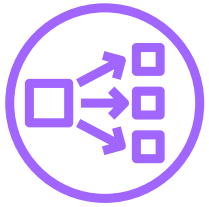
Elastic Load Balancing

Type of load balancers

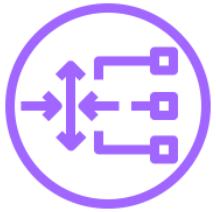
Application Load Balancer

- Layer 7
- Targets: IP, instance, AWS Lambda
- Terminates flows
- Listener: HTTP, HTTPS, gRPC
- Front end: virtual IP



Network Load Balancer

- Layer 4
- Targets: IP, instance, Application Load Balancer
- Terminates flows
- Listener: TCP, UDP, TLS
- Front end: virtual IP



Gateway Load Balancer

- Layer 3 gateway and Layer 4 load balancing
- Targets: IP, instance
- Transparent pass through of flows
- Listener: IP
- Route table entry

Classic Load Balancer

- L4-7 load balancing
- Built for the EC2-Classic environment

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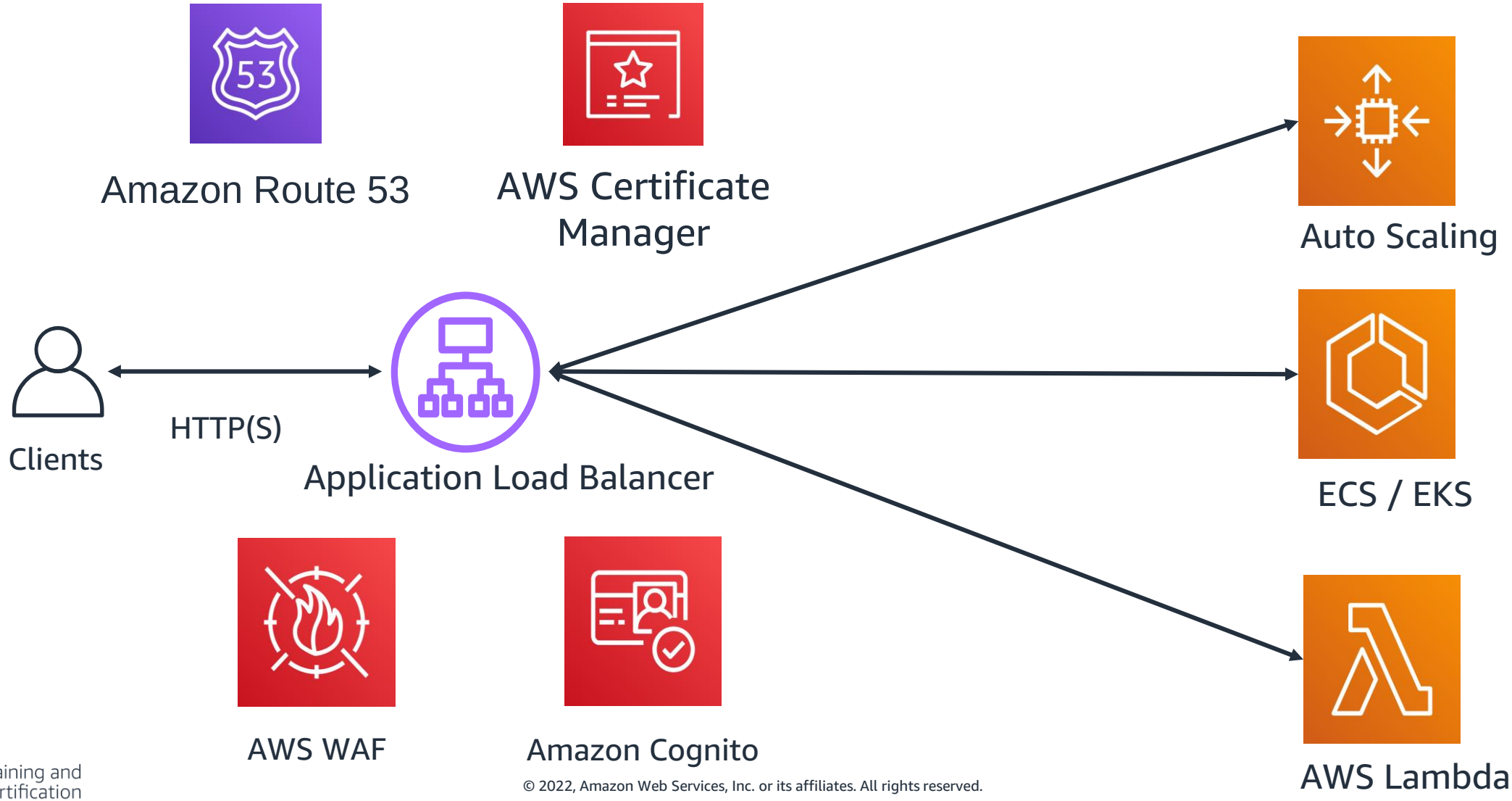
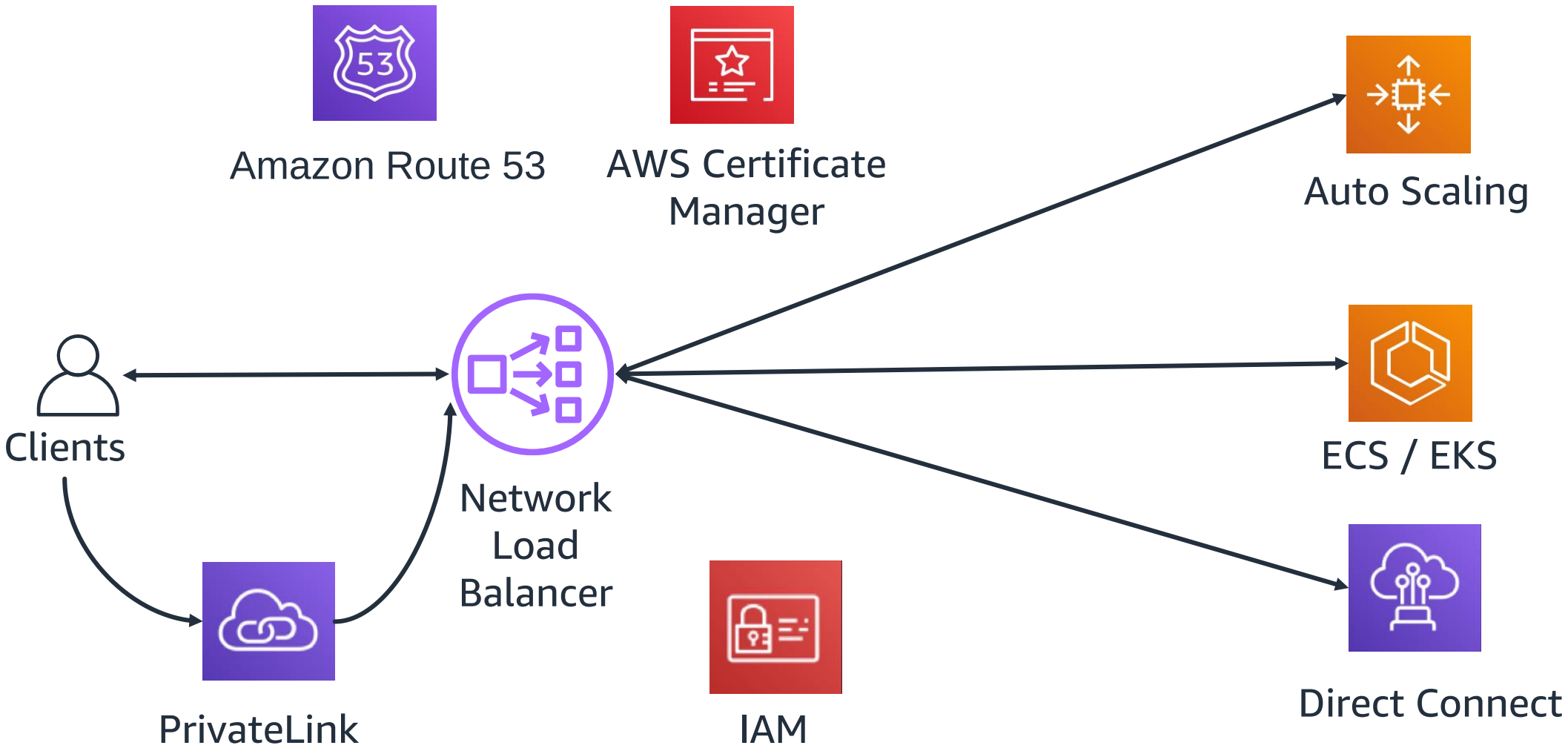
Application Load Balancer (ALB)



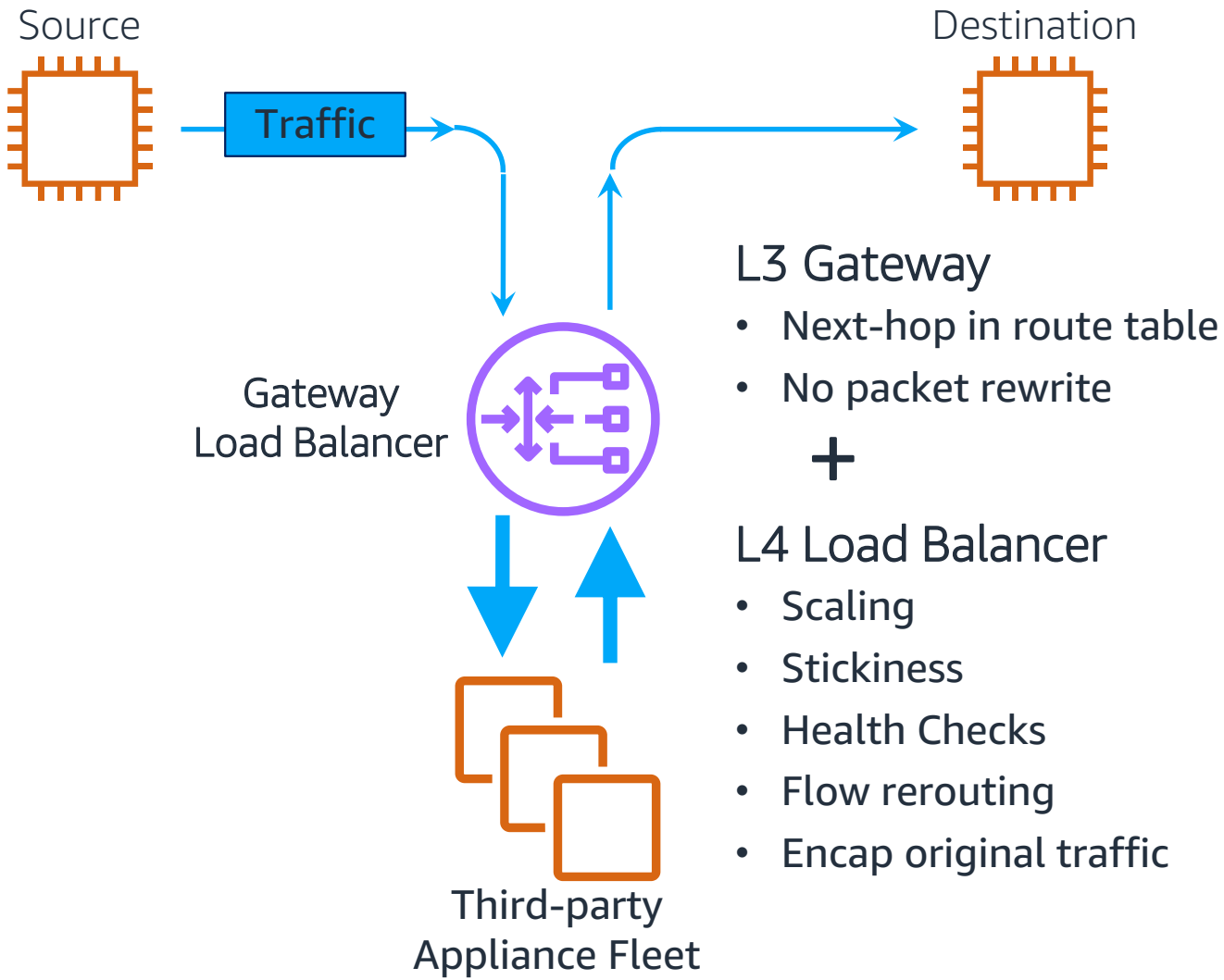
Network Load Balancer (NLB)



Gateway Load Balancer (GLB)

Architecture benefits:

1. Scale and reduce costs
2. Reliability
3. Reduce complexity and deploy faster
4. As-a-Service
5. Use the same Network Appliances on AWS and Hybrid Environments



Management and Governance

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AWS CloudTrail

Track user activity & API usage

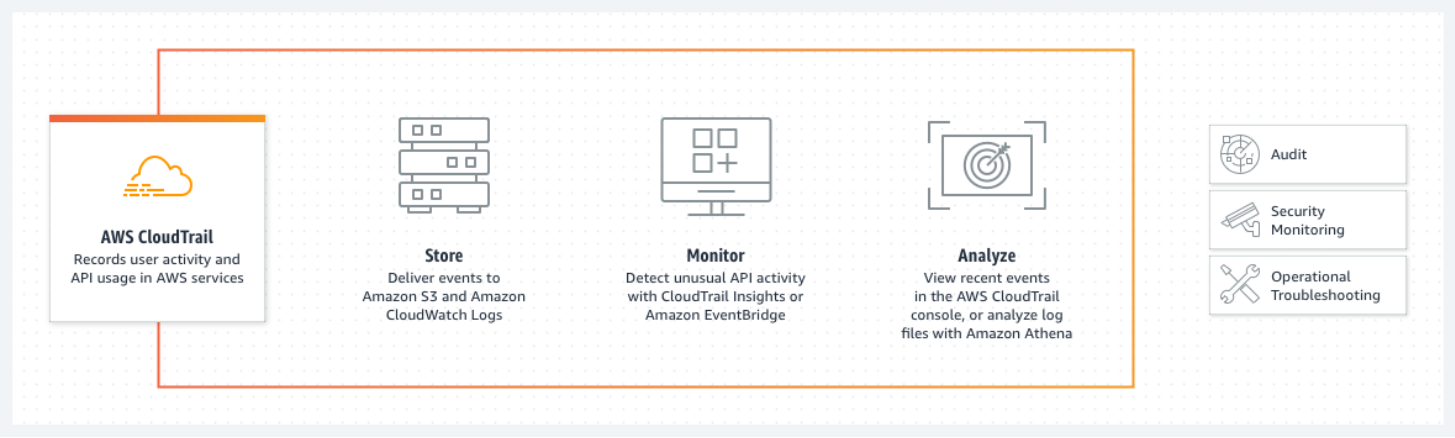
Provides event history of your AWS account activity, including actions taken through the AWS Management Console, AWS SDKs, command line tools, and other AWS services

Compliance

AWS CloudTrail makes it easier to ensure compliance with internal policies and regulatory standards by providing a history of activity in your AWS account

Security

You can perform security analysis and detect user behavior patterns by ingesting AWS CloudTrail events into your log management and analytics solutions



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Amazon CloudWatch

Observability of your AWS resources and applications on AWS and on-premises

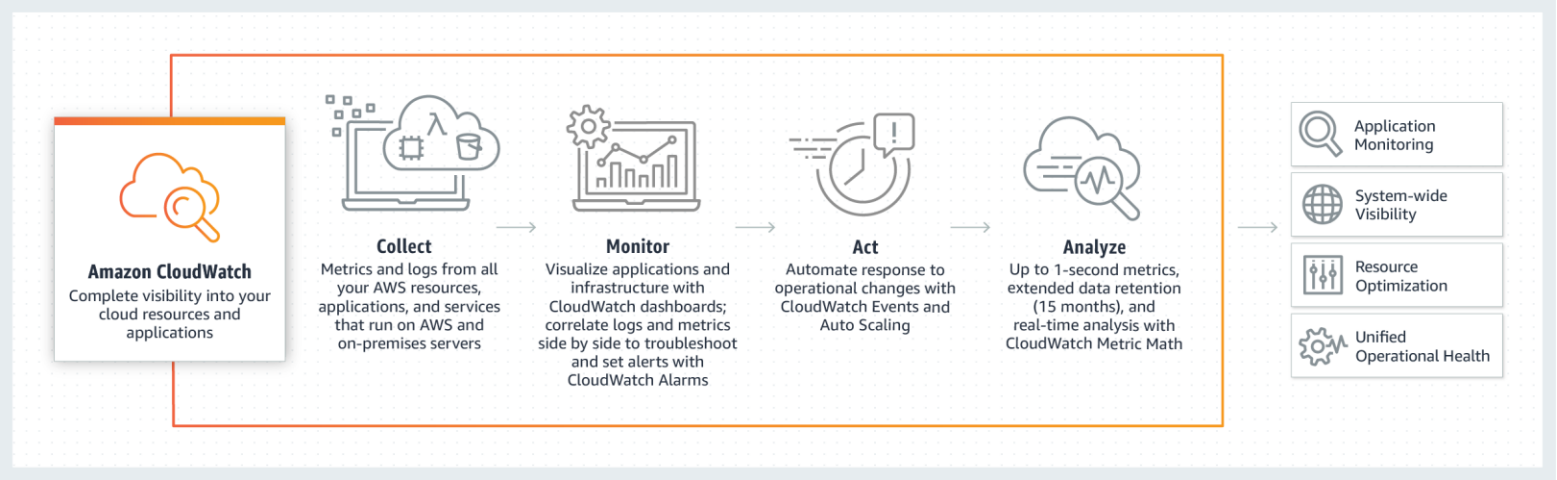
Data and insights to monitor your applications, respond to system-wide performance changes, optimize resource utilization, and get a unified view of operational health

Infra. Monitoring

Monitor key metrics and logs, visualize your application and infrastructure stack, create alarms, and correlate metrics and logs

Scalability

Take action automatically to enable Amazon EC2 Auto Scaling or stop an instance, for example, so you can automate capacity and resource planning.



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AWS Config

Track resource inventory & changes

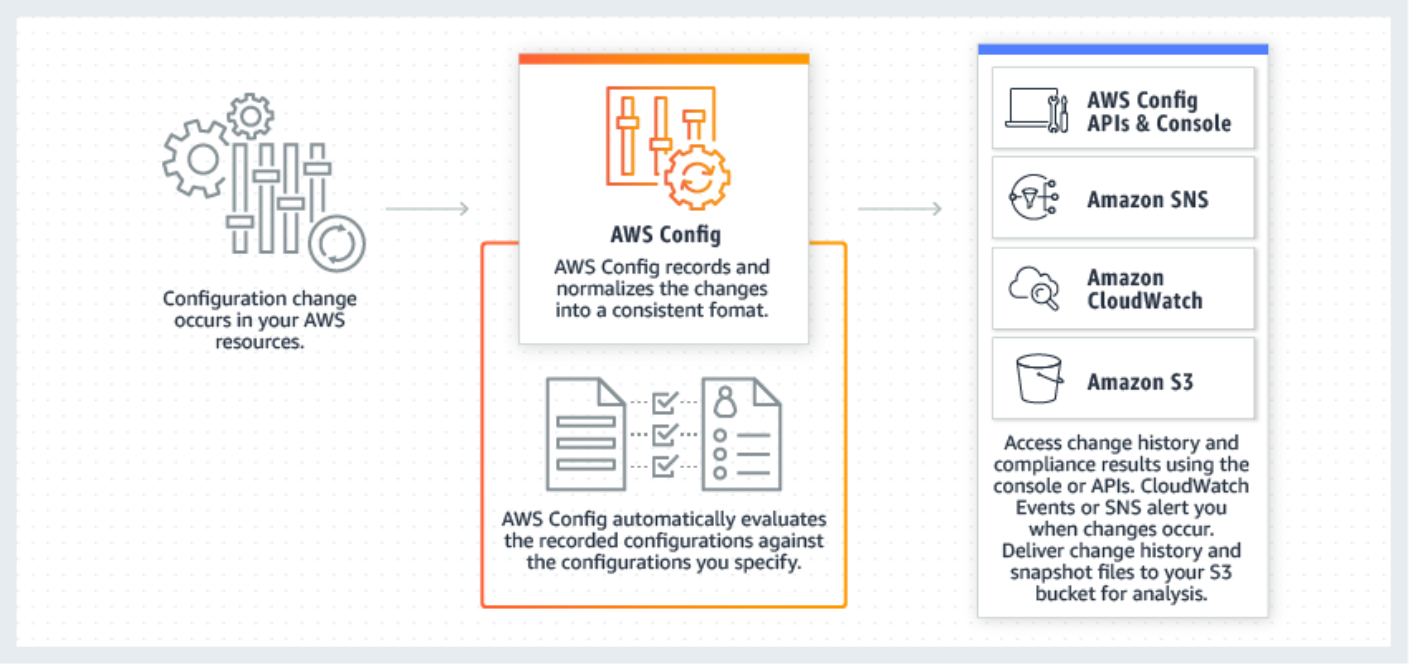
Enables you to assess, audit, and evaluate the configurations of your AWS resources. Continuously monitors and records your AWS resource configurations and allows you to automate the evaluation of recorded configurations against desired configurations

Discovery

AWS Config will discover resources that exist in your account, record their current configuration, and capture any changes to these configurations

Change Management

When your resources are created, updated, or deleted, AWS Config streams these configuration changes to Amazon Simple Notification Service (SNS), so that you are notified of all the configuration changes



AWS CloudFormation

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AWS CloudFormation

Speed up cloud provisioning with infrastructure as code

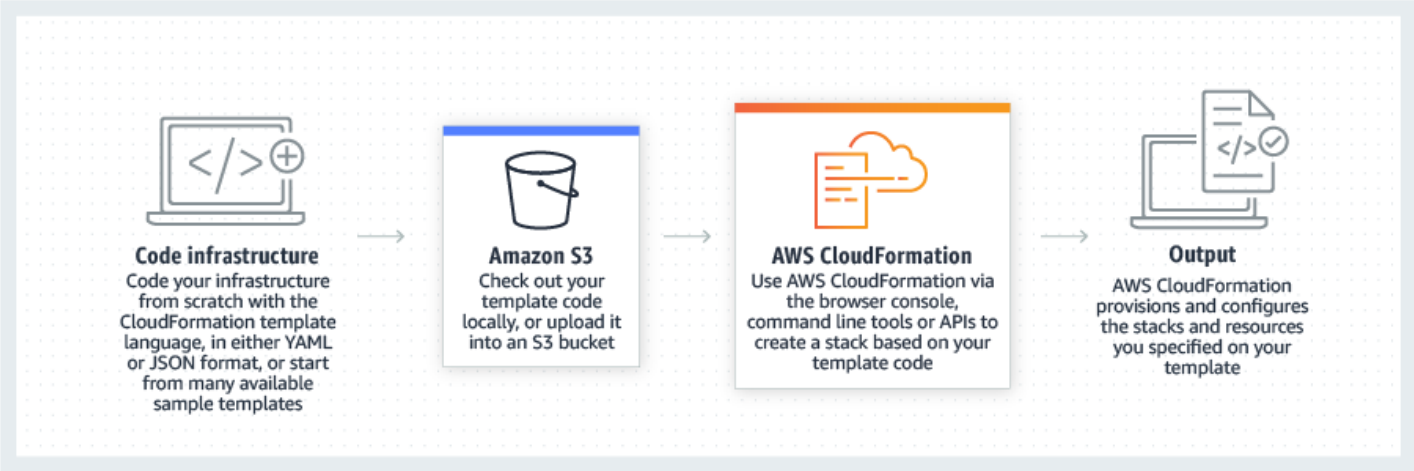
A CloudFormation template describes your desired resources and their dependencies so you can launch and configure them together as a stack

How it Works

AWS CloudFormation lets you model, provision, and manage AWS and third-party resources by treating infrastructure as code.

Use Cases

Common use cases for CloudFormation include managing infrastructure with DevOps through automated, test and deploy infrastructure templates and scaling production stacks at scale.



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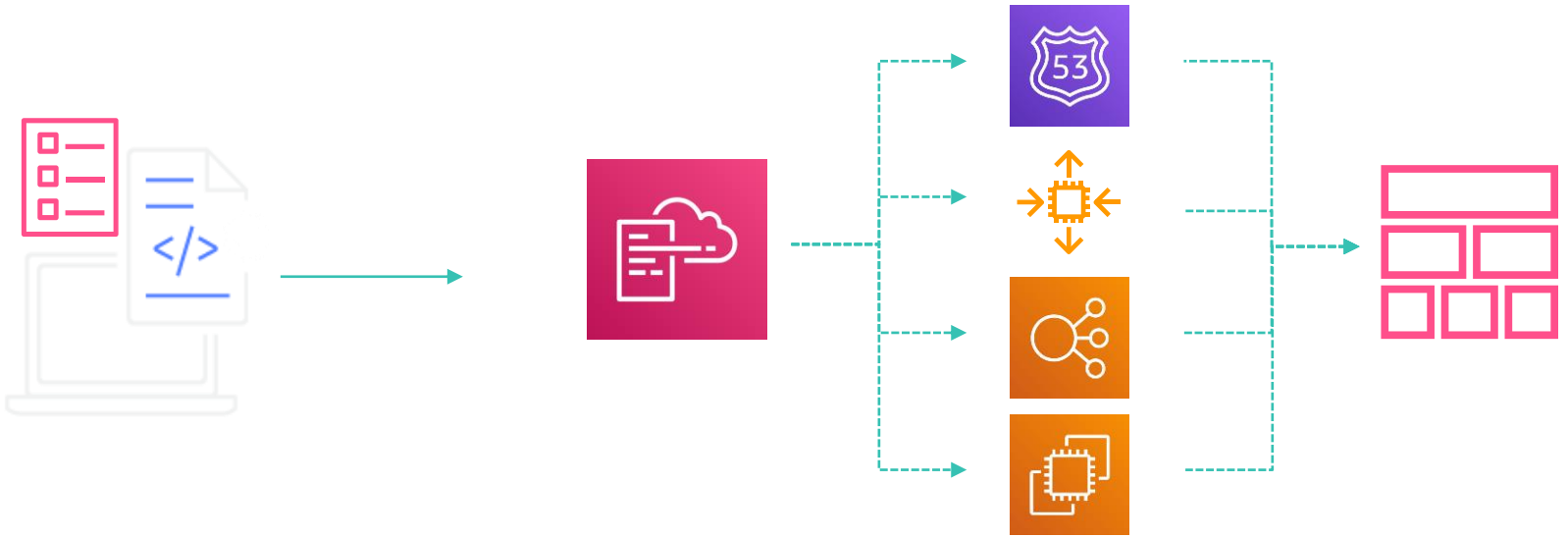
AWS CloudFormation

Service Overview

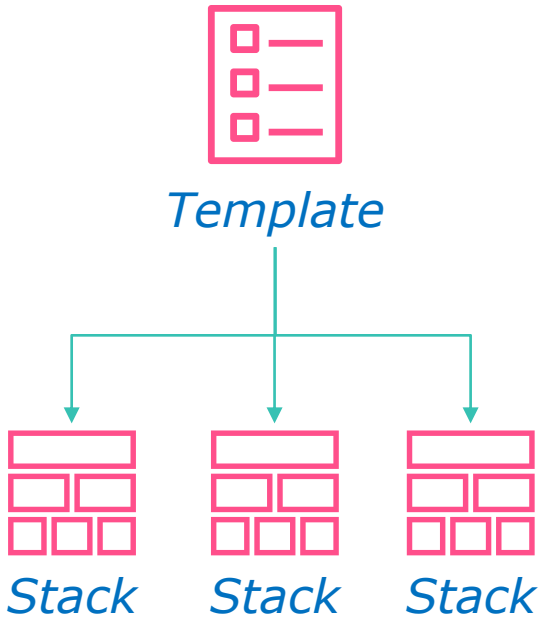
- FREE – you only pay for resources
- All regions
- APIs are called in parallel
- Manages **dependencies / relationships**

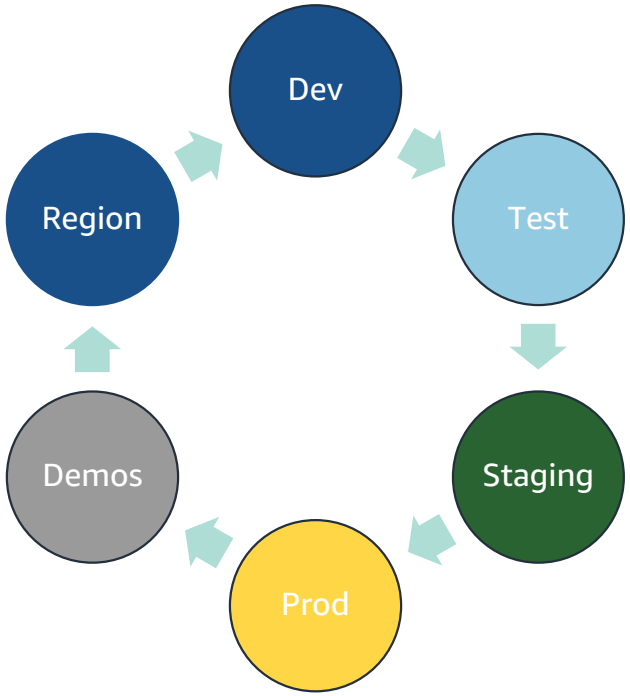


Infrastructure as code

What it means

- Single source of truth to deploy the whole stack
- Infrastructure that you can replicate, re-deploy, and re-purpose
- Control versioning on your infrastructure and your application together
- Service rolls back to the last good state on failures
- Build your infrastructure and run it through your CI/CD pipeline





CloudFormation vs Elastic Beanstalk

Differentiating two complementary services

Elastic Beanstalk

AWS Elastic Beanstalk provides an environment where you can easily deploy and run applications in the cloud. It is integrated with developer tools and provides a one-stop experience for managing application lifecycle. If your application workloads can be managed as Elastic Beanstalk workloads, you can enjoy a more turn-key experience in creating and updating applications. Behind the scenes, Elastic Beanstalk uses CloudFormation to create and maintain resources.

Creates and maintains resources for your application automatically, as a managed service.

CloudFormation

AWS CloudFormation is a convenient provisioning mechanism for a broad range of AWS and third-party resources. It supports the infrastructure needs of many different types of applications such as existing enterprise applications, legacy applications, applications built using a variety of AWS resources, and container-based solutions (including those built using AWS Elastic Beanstalk).

Define and maintain your own application environment.

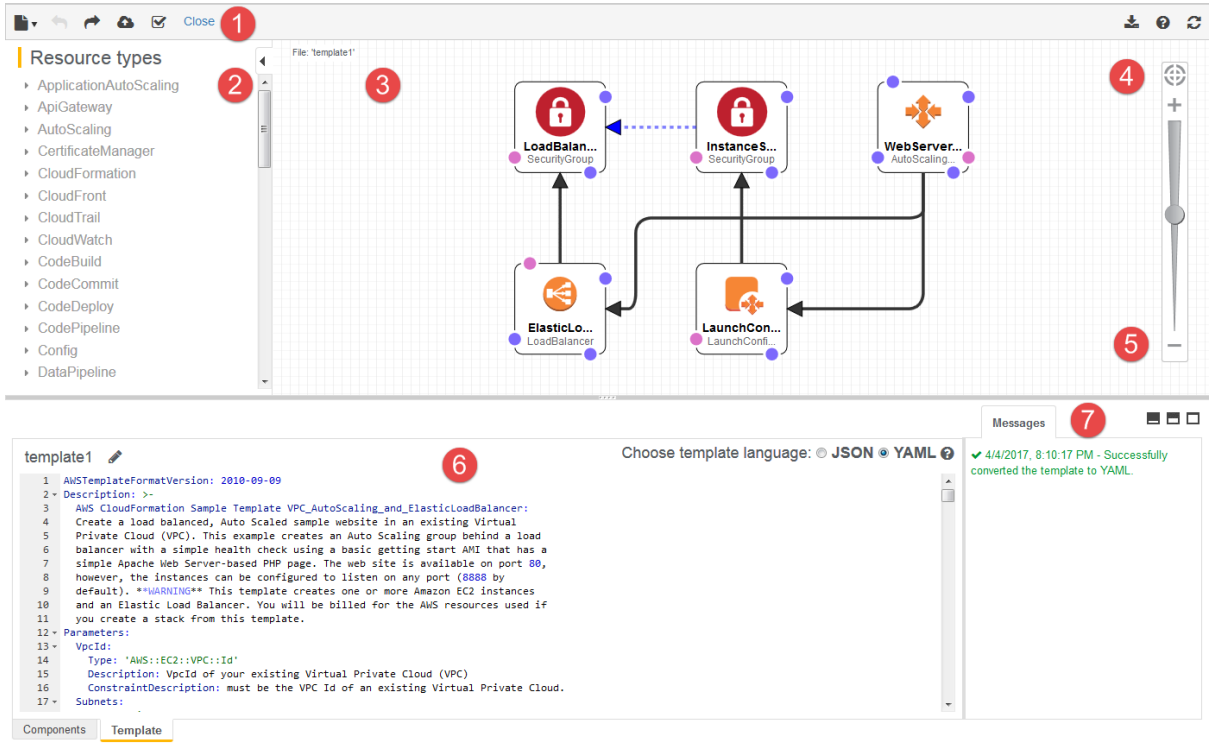
AWS CloudFormation Templates

Create templates to describe your AWS resources and their properties.

Templates

A CloudFormation template is a JSON or YAML formatted text file. CloudFormation uses these templates as blueprints for building your AWS resources. For example, in a template, you can describe an Amazon EC2 instance, such as the instance type, the AMI ID, block device mappings, and its Amazon EC2 key pair name.

1. An optional list of template parameters (input values supplied at stack creation time)
2. An optional list of output values (e.g., the complete URL to a web application)
3. An optional list of data tables used to look up static configuration values (e.g., AMI names)
4. The list of AWS resources and their configuration values
5. A template file format version number



AWS CloudFormation Stack

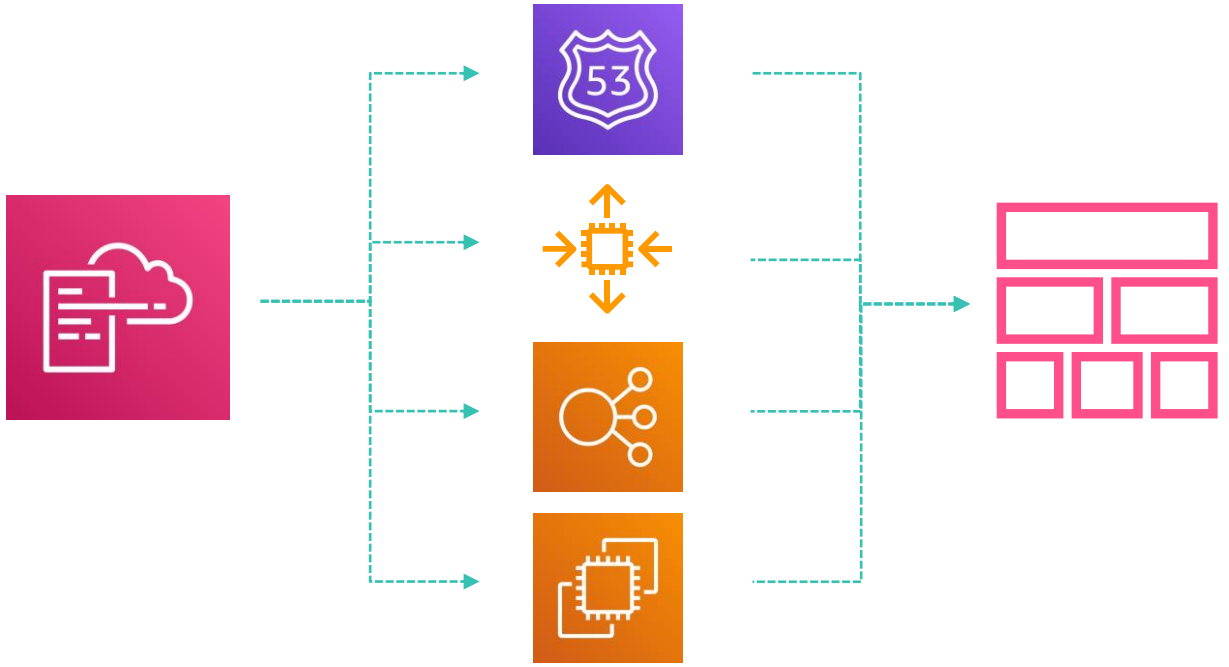
Stacks

A stack is a collection of AWS resources that you can manage as a single unit, or a template

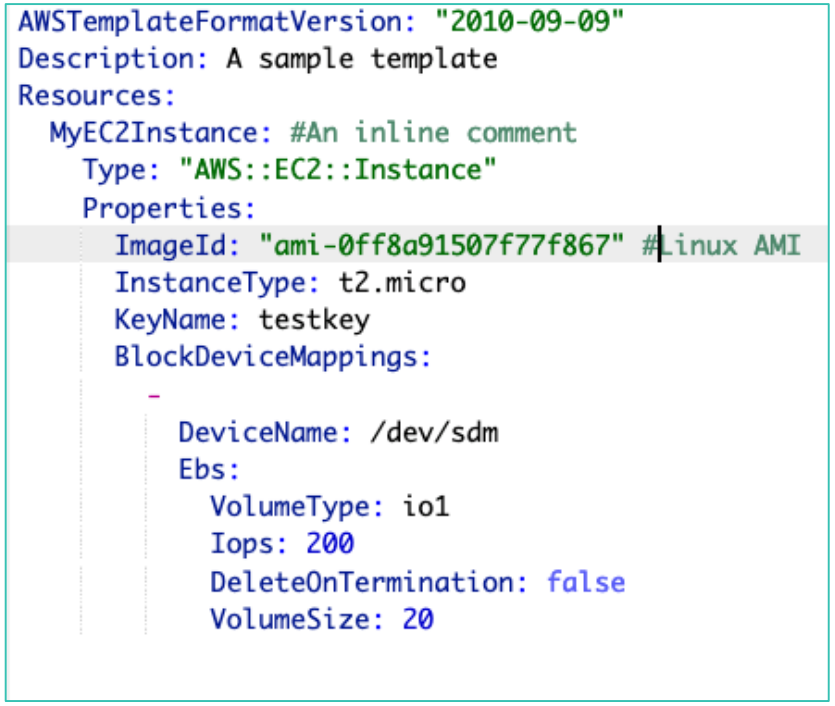
AWS CloudFormation ensures all stack resources are created or deleted as appropriate

You can work with stacks by using the AWS CloudFormation console, API, or AWS CLI.

Nested stacks are stacks created as part of other stacks. You create a nested stack within another stack by using the AWS::CloudFormation::Stack resource



CloudFormation Template Syntax



```yaml
AWSTemplateFormatVersion: "2010-09-09"
Description: A sample template
Resources:
  MyEC2Instance: #An inline comment
    Type: "AWS::EC2::Instance"
    Properties:
      ImageId: "ami-0ff8a91507f77f867" #Linux AMI
      InstanceType: t2.micro
      KeyName: testkey
      BlockDeviceMappings:
        -
          DeviceName: /dev/sdm
          Ebs:
            VolumeType: io1
            Iops: 200
            DeleteOnTermination: false
            VolumeSize: 20
```

```json
{
    "AWSTemplateFormatVersion": "2010-09-09",
    "Description": "A sample template",
    "Resources": {
        "MyEC2Instance": {
            "Type": "AWS::EC2::Instance",
            "Properties": {
                "ImageId": "ami-0ff8a91507f77f867",
                "InstanceType": "t2.micro",
                "KeyName": "testkey",
                "BlockDeviceMappings": [
                    {
                        "DeviceName": "/dev/sdm",
                        "Ebs": {
                            "VolumeType": "io1",
                            "Iops": 200,
                            "DeleteOnTermination": false,
                            "VolumeSize": 20
                        }
                    }
                ]
            }
        }
    }
}
```

- YAML – Not a markup language
- YAML is a human friendly data serialization standard
- Comments – Use #

- JSON – JavaScript object notation
- Attribute-value pairs
- Similar to XML

Template Anatomy

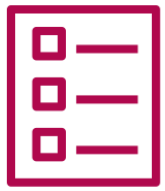
- Use templates to create and manage stacks
- JSON or YAML-formatted text files that describe your AWS infrastructure
- AWS CloudFormation JSON template structure and sections

```
{
   "AWSTemplateFormatVersion” : "version date”,
   "Description”: "JSON string”,
   "Metadata”: {
      template metadata
   },
   "Parameters”: {
      set of parameters
   },
   "Mappings”: {
      set of mappings
   },
   "Conditions”: {
      set of conditions
   },
   "Transform”: {
      set of transforms
   },
   "Resources”: {
      set of resources
   },
   "Outputs”: {
      set of outputs
   }
}
```

CloudFormation Template Example

What will CloudFormation Provision?

JSON

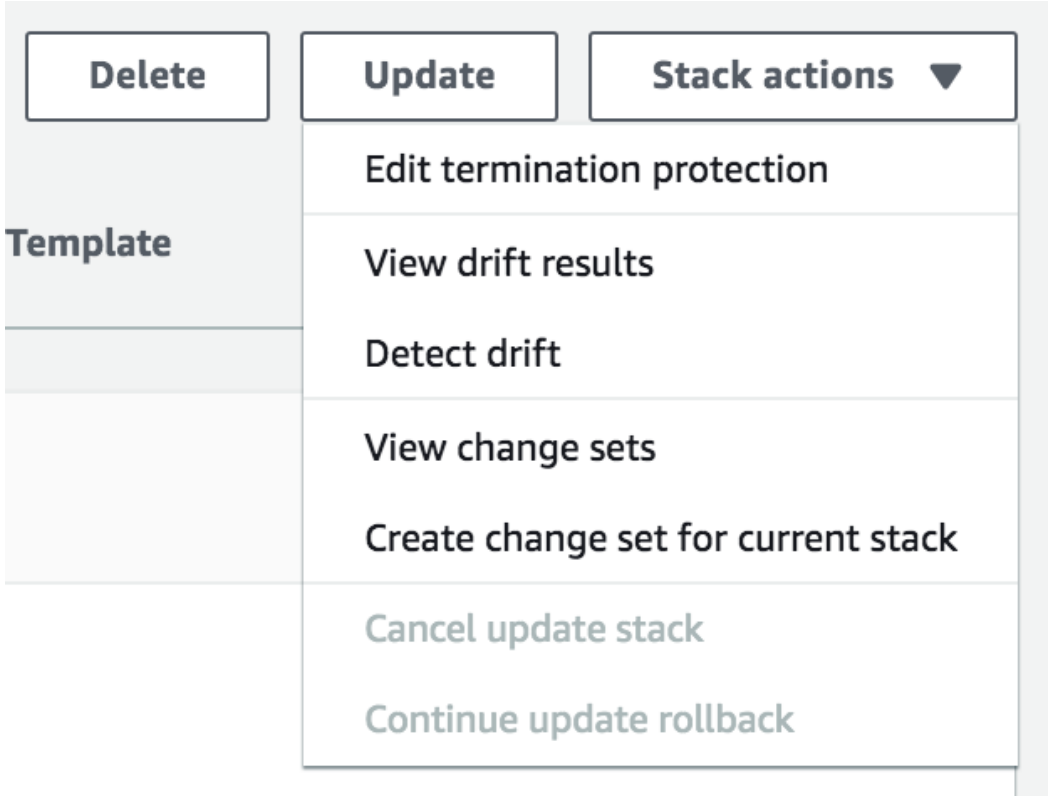


Cloud Formation Template

```
"AWSTemplateFormatVersion": "2010-09-09",
"Description": "A sample template",
"Resources": {
          "MyEC2Instance": {
                    "Type": "AWS::EC2::Instance",
                    "Properties": {
                              "ImageId": "ami-0ff8a91507f77f867",
                              "InstanceType": "t2.micro",
                              "KeyName": "testkey",
                              "BlockDeviceMappings": [
                                        {
                                                  "DeviceName": "/dev/sdm",
                                                  "Ebs": {
                                                  "VolumeType": "io1",
                                                  "Iops": 200,
                                                  "DeleteOnTermination": false,
                                                  "VolumeSize": 20
```

Stack Updates

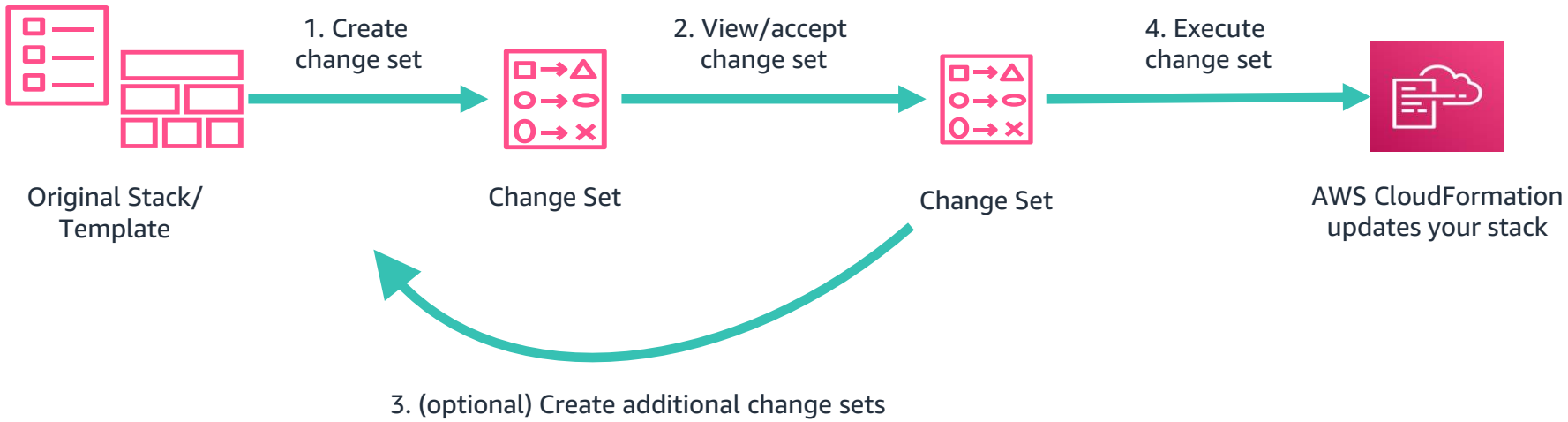
- Make changes to a stack's settings or change its resources by updating stack
- When you update a stack, you submit changes to AWS CloudFormation
- Two methods for updating stacks: *direct update* or *change sets* (you create and execute)




```
aws cloudformation update-stack --stack-name mystack --use-previous-template --notification-arns "arn:aws:sns:us-east-1:12345678912:mytopic" "arn:aws:sns:us-east-1:12345678912:mytopic2"
```

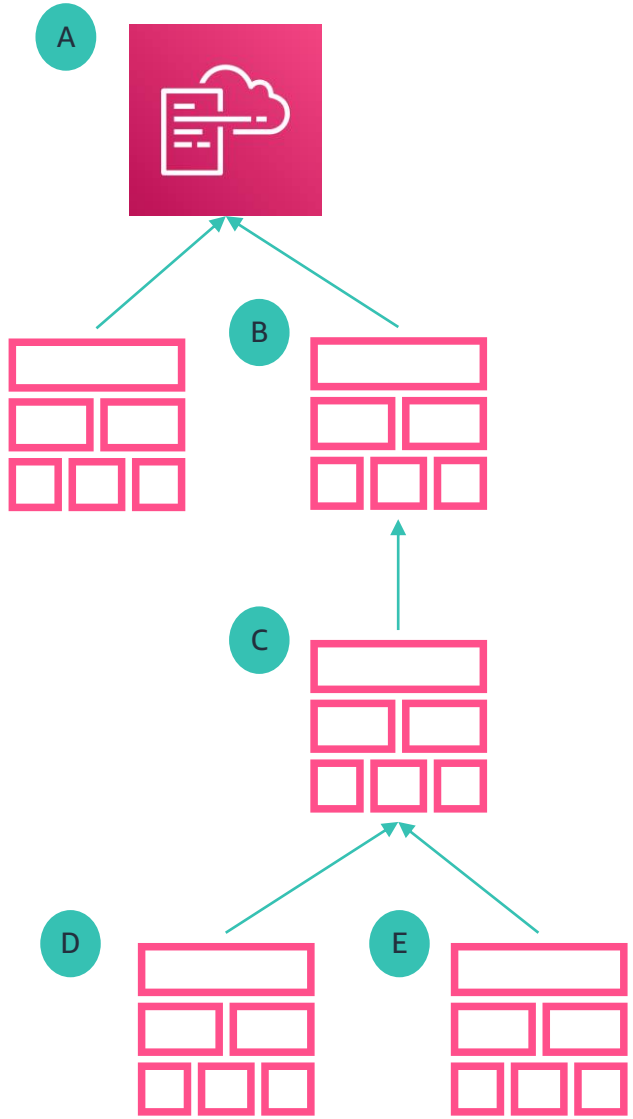
Change Sets

- Change sets enable you to preview how proposed changes to a stack might impact your running resources
- AWS CloudFormation makes the changes to your stack only when you decide to execute the change set



Nested Stacks

- Monolithic to Modular: common patterns can emerge in which you declare the same components in multiple templates
- Root (A) AWS CloudFormation is the root stack for all the other, nested, stacks in the hierarchy
- Nested stack templates must be placed in Amazon S3
- Broad permissions required to create a stack
- Blast radius – Takes one parent stack to destroy them all
- Using nested stacks to declare common components is considered a best practice



Possible in-scope Data Analytics & Machine Learning AWS services on the exam

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Possible In-Scope AWS Analytics Services

AMAZON REDSHIFT

Data warehousing

AMAZON ATHENA

Interactive query with SQL

AMAZON EMR

Big data processing

AMAZON OPENSEARCH SERVICE

Log and search analytics

AMAZON KINESIS & MSK

Real-time analytics

Possible In-Scope AWS Analytics Services (continued)

AWS GLUE

Extract, transform, and load (ETL) jobs

AWS DATA EXCHANGE

Data marketplace

AWS DATA PIPELINE

Automate data movement and transformation

AWS LAKE FORMATION

Build, manage, and secure data lakes

AMAZON QUICKSIGHT

Build visualizations

Possible In-Scope Machine Learning AWS Services

AUTOMATED DATA EXTRACTION AND ANALYSIS

AMAZON TEXTRACT

Extract text and data

AMAZON COMPREHEND

Acquire insights

LANGUAGE AI

AMAZON LEX

Build chatbots and virtual agents

AMAZON TRANSCRIBE

Automate speech recognition

AMAZON POLLY

Give your apps a voice

Possible In-Scope Machine Learning AWS Services

COMPUTER VISION

AMAZON RECOGNITION

Analyze images and videos

BUSINESS METRICS

AMAZON FORECAST

Forecast business metrics

AMAZON FRAUD DETECTOR

Detect online fraud

IMPROVE CUSTOMER EXPERIENCE

AMAZON KENDRA

Find accurate information faster

AMAZON TRANSLATE

Engage audiences in every language

Possible In-Scope Machine Learning AWS Services

ML MODELS

AMAZON SAGEMAKER

Notebook

Canvas

Model

Train

Amazon SageMaker is a fully managed service to build, train, and deploy machine learning (ML) models for any use case with fully managed infrastructure, tools, and workflows.

Analytics Services

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Amazon Athena

Interactive query service that makes it easy to analyze data in Amazon S3 using standard SQL

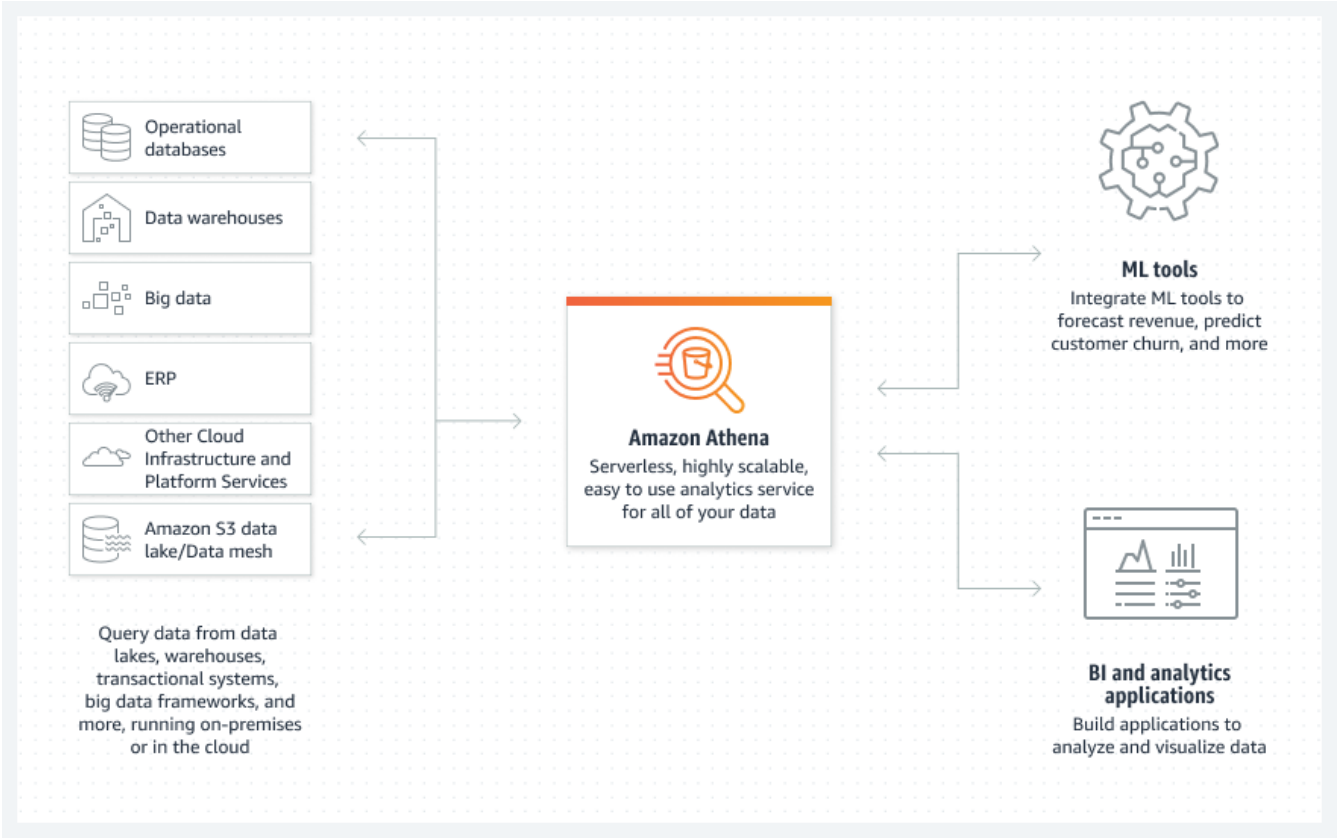
Serverless with pricing based only on queries run

Summary

Point to your data in Amazon S3, define the schema, and start querying with standard SQL. Removes need for complex ETL jobs to prepare data for analysis. Out of the box integrations with AWS Glue Data Catalog.

Benefits

- Instant querying – Serverless, no ETL required
- Pay per query – only for data scanned
- Very fast – interactive even w/ large data sets



Amazon OpenSearch Service

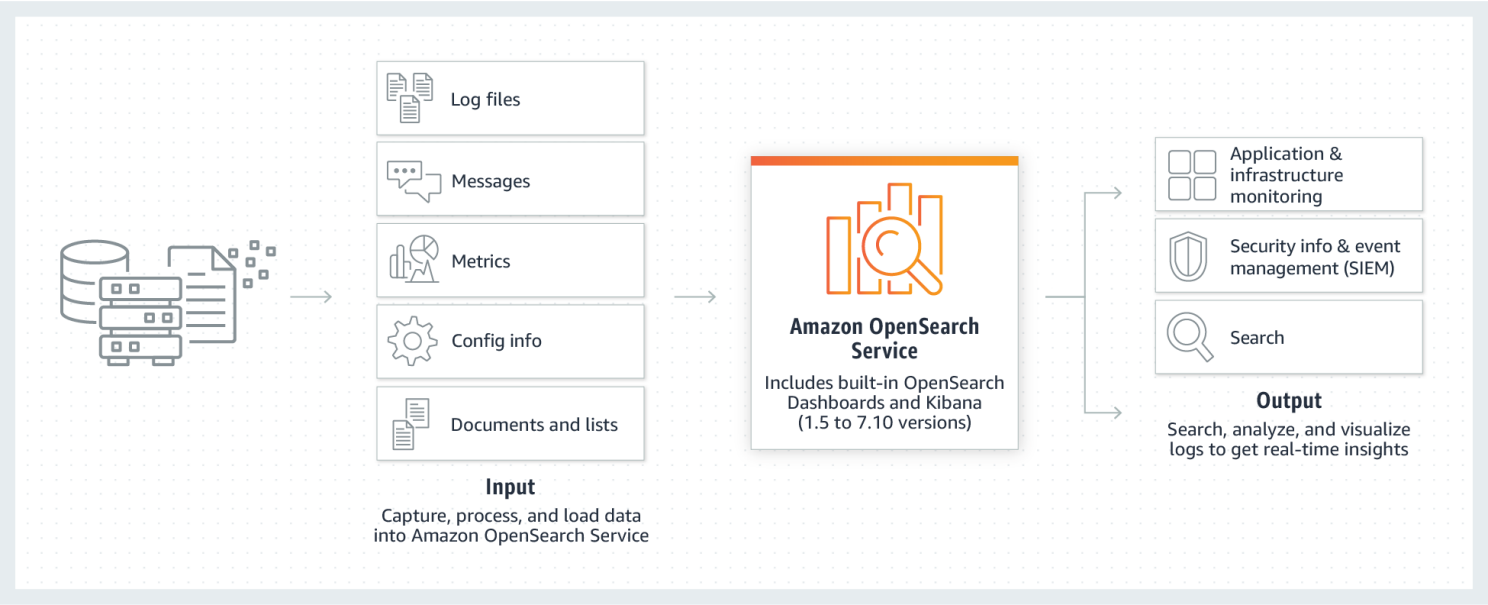
Securely unlock real-time search, monitoring, and analysis of business and operational data

Features

- Managed OpenSearch
- Secure
- Observability
- Cost-conscious

Uses

- Monitor and debug apps / infra
- Manage security & event info (SIEM)
- Enable seamless, personalized search
- Observability



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Amazon EMR

Easily run and scale Apache Spark, Hive, Presto, and other big data workloads

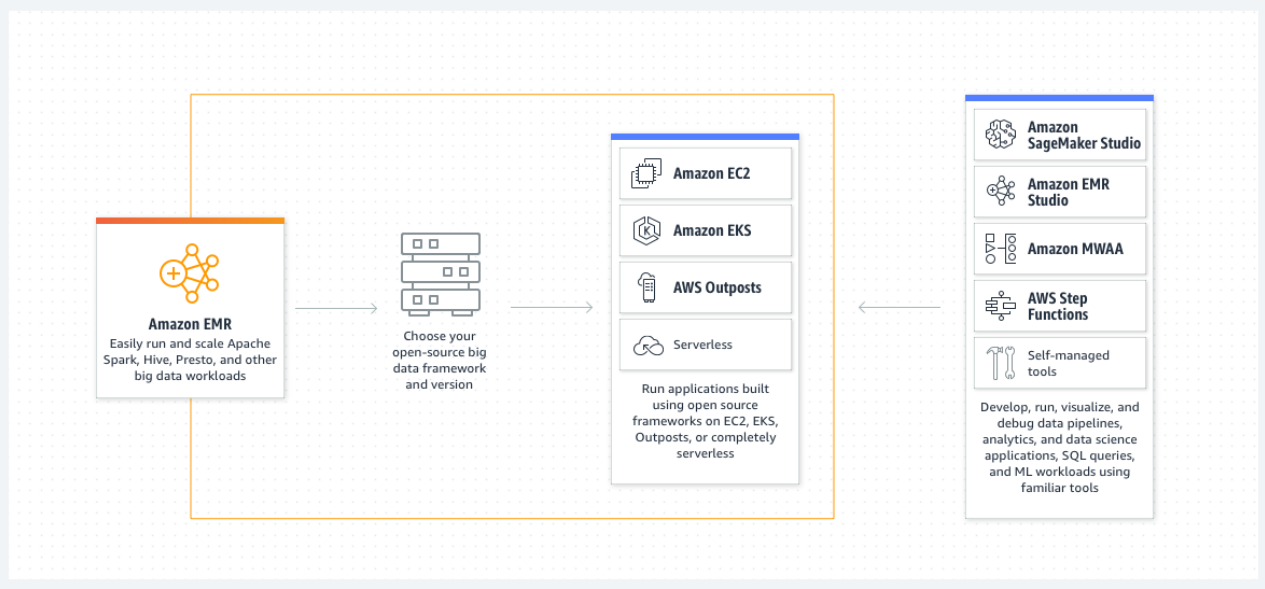
Amazon EMR is a cloud big data platform for running large-scale distributed data processing jobs, interactive SQL queries, and machine learning (ML) applications using open-source analytics frameworks such as Apache Spark, Apache Hive, and Presto.

Why to use

Focus on transforming and analyzing your data, without managing compute capacity or open-source applications, and at lower cost.

Deployments

Deploy workloads to EMR using EC2, EKS, or on-premises AWS Outposts.



Amazon Athena vs EMR vs Redshift

Differentiating these services

Amazon Athena

Query service. Amazon Athena provides the easiest way to run interactive queries for data in S3 without the need to setup or manage any servers. No formatting, data structure concerns, get started fast. Use when needing a quick query run against data in S3.

Amazon EMR

Data processing framework. Makes it simple and cost effective to run highly distributed processing frameworks such as Hadoop, Spark, and Presto when compared to on-premises deployments. Amazon EMR is flexible - you can run custom applications and code, and define specific compute, memory, storage, and application parameters to optimize your analytic requirements.

Amazon Redshift

Datawarehouse. Amazon Redshift provides the fastest query performance for enterprise reporting and business intelligence workloads, particularly those involving extremely complex SQL with multiple joins and sub-queries. Use when you need to pull together data from many different sources.

AWS Glue

Simple, scalable, and serverless data integration

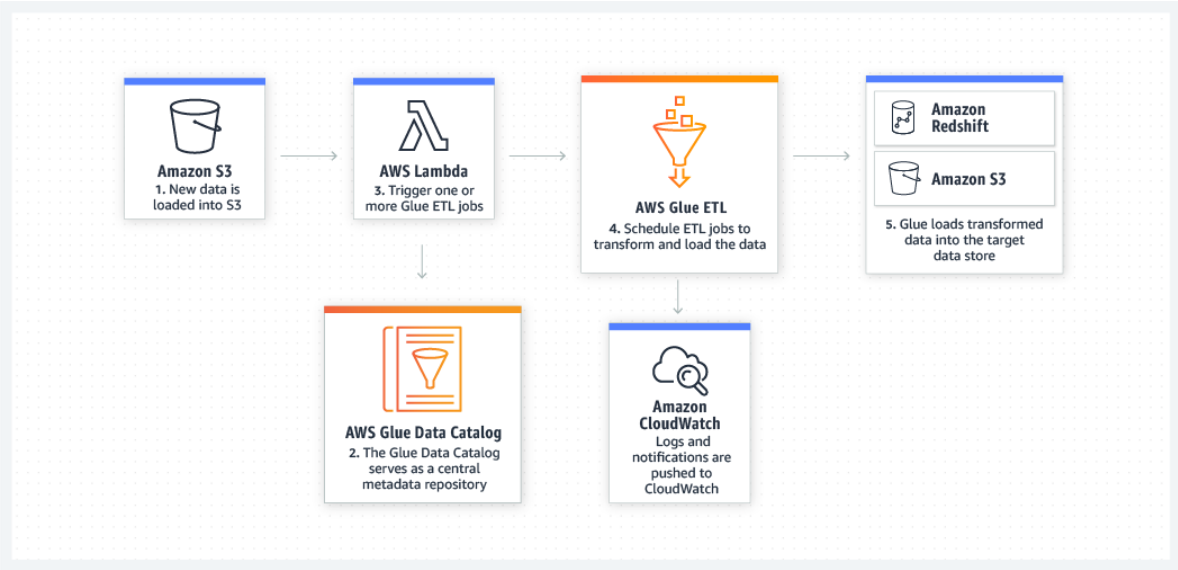
Serverless data integration service; easy to discover, prepare, and combine data.

Data Integration

Preparing and combining data for analytics, machine learning, and application development. May include discovering and extracting data from various sources; enriching, cleaning, normalizing, and combining data; and loading and organizing data in databases, data warehouses, and data lakes.

Use Cases

- Build event-driven ETL pipelines
- Create unified catalog to find data across multiple data stores
- Create, run, and monitor ETL jobs without coding
- Explore data with self-service visual data preparation



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Amazon QuickSight

The most popular cloud-native, serverless BI service

Democratizes data with natural language queries, interactive dashboards, or automatically looking for patterns and outliers powered by machine learning.

Features

- QuickSight Q – Enable BI for everyone
- ML Insights – advanced analytics
- Embedded analytics to applications

Benefits

- Connect & Scale all of your data
- Build customizable dashboards
- Leverage ML integrations
- Native AWS services integrations
- Serverless, managed solution – pay by usage

Thank you!

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