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Module 3: Building in the cloud

Patrick Do
Technical Trainer
AWS

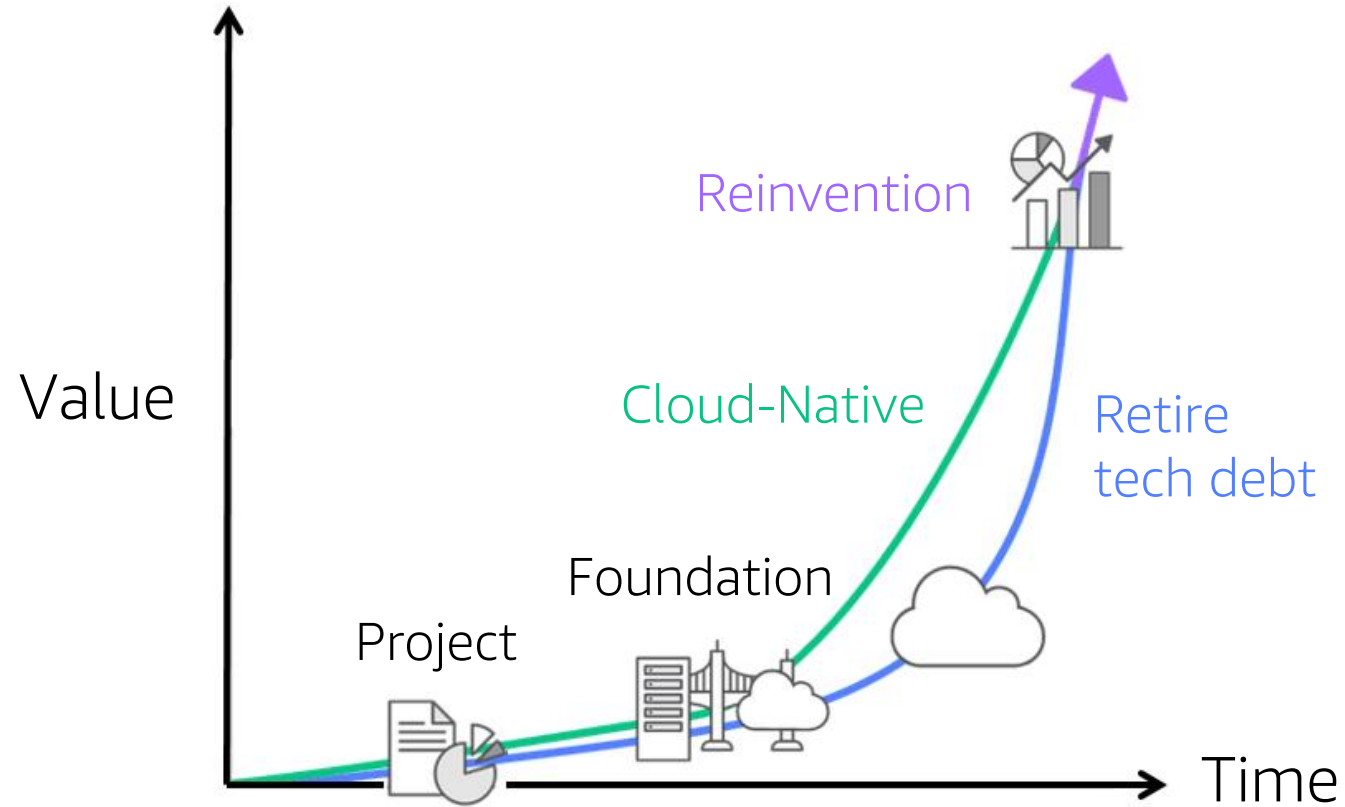


Go beyond
servers and storage

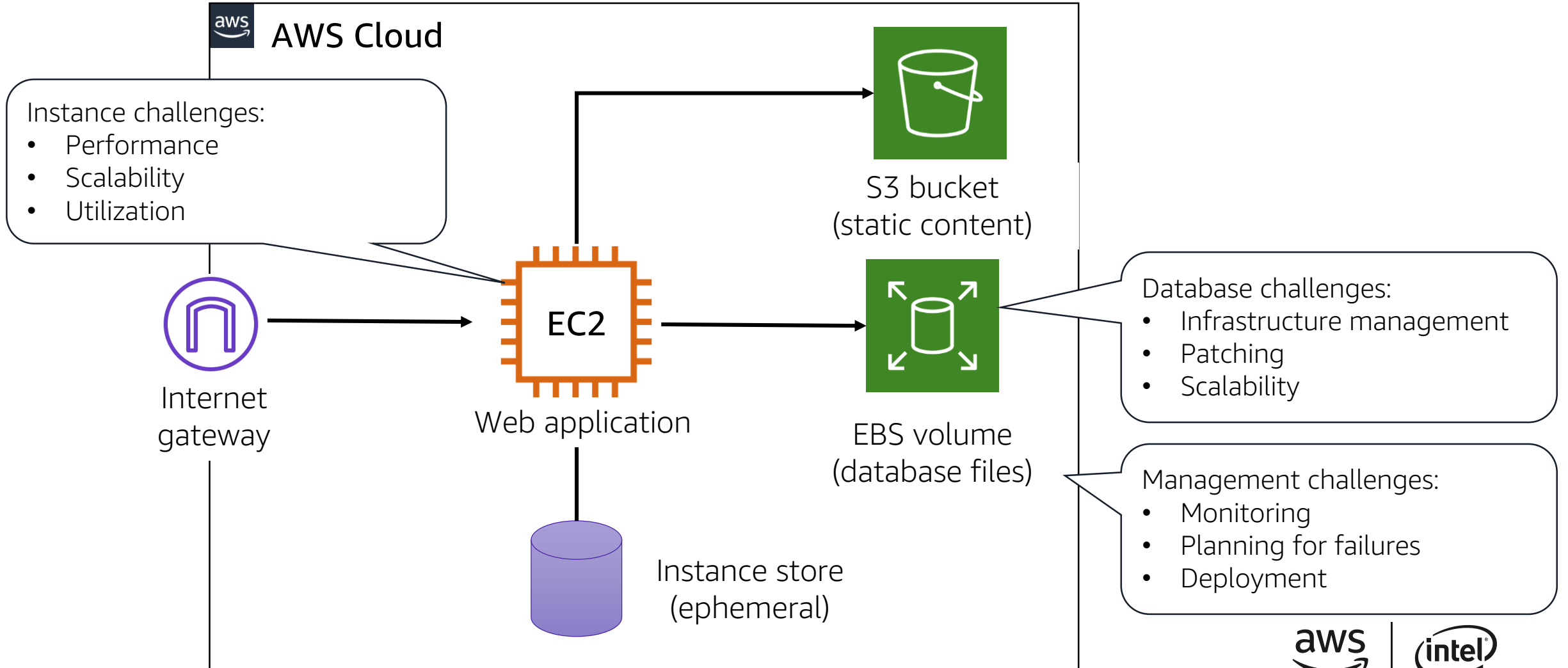
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Migration and reinvention

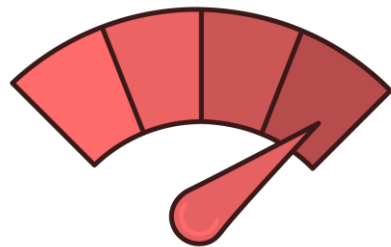
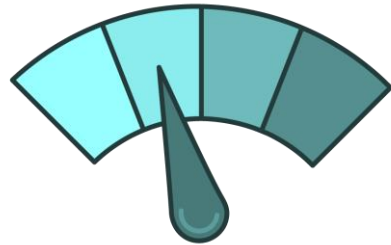


Improving your initial project



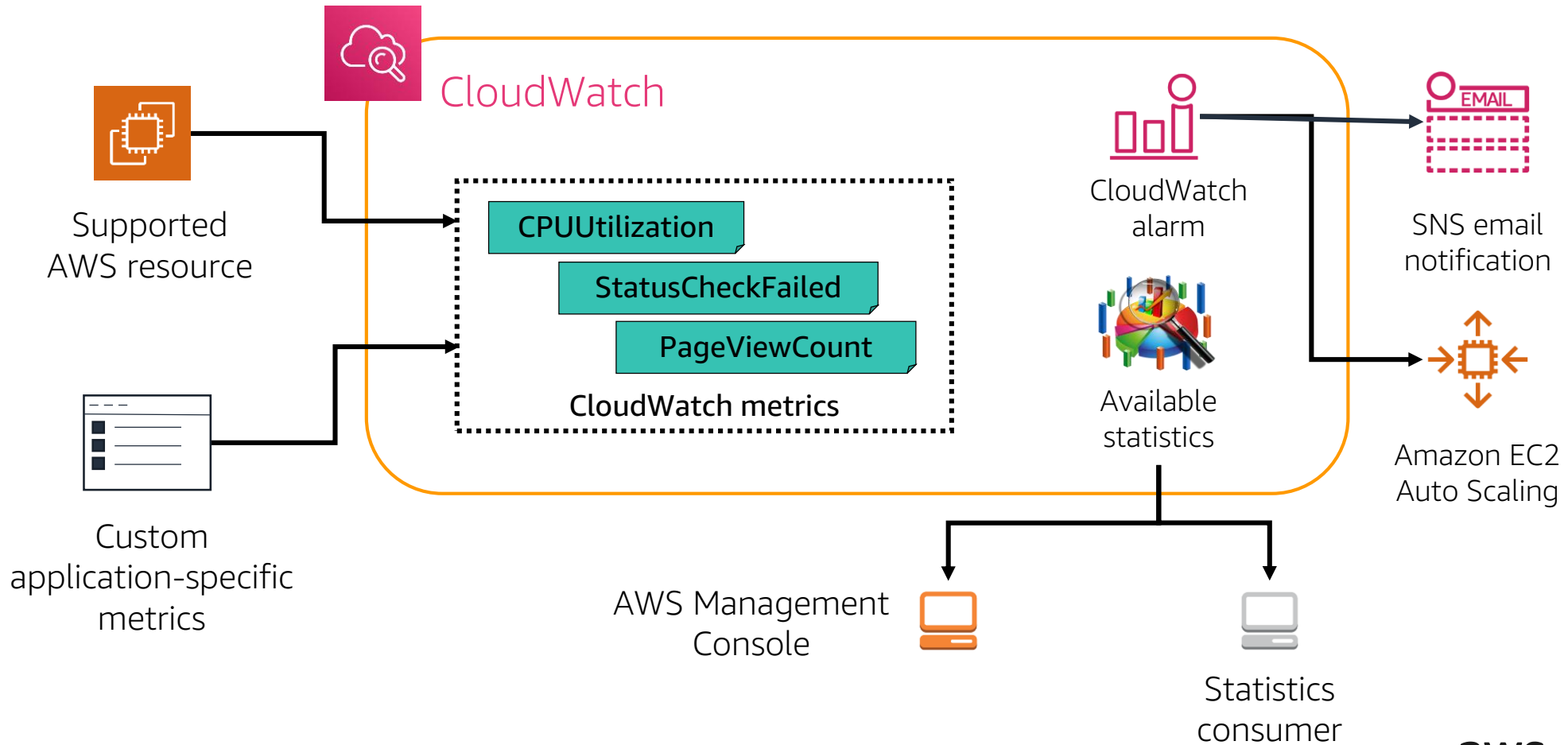
Monitor AWS resources

What is Amazon CloudWatch?



- Monitors:
 - AWS resources
 - Applications running on AWS
- Collects and tracks:
 - Standard metrics
 - Custom metrics
- Alarms:
 - Send notifications
 - Automatically make changes based on rules you define

How CloudWatch works

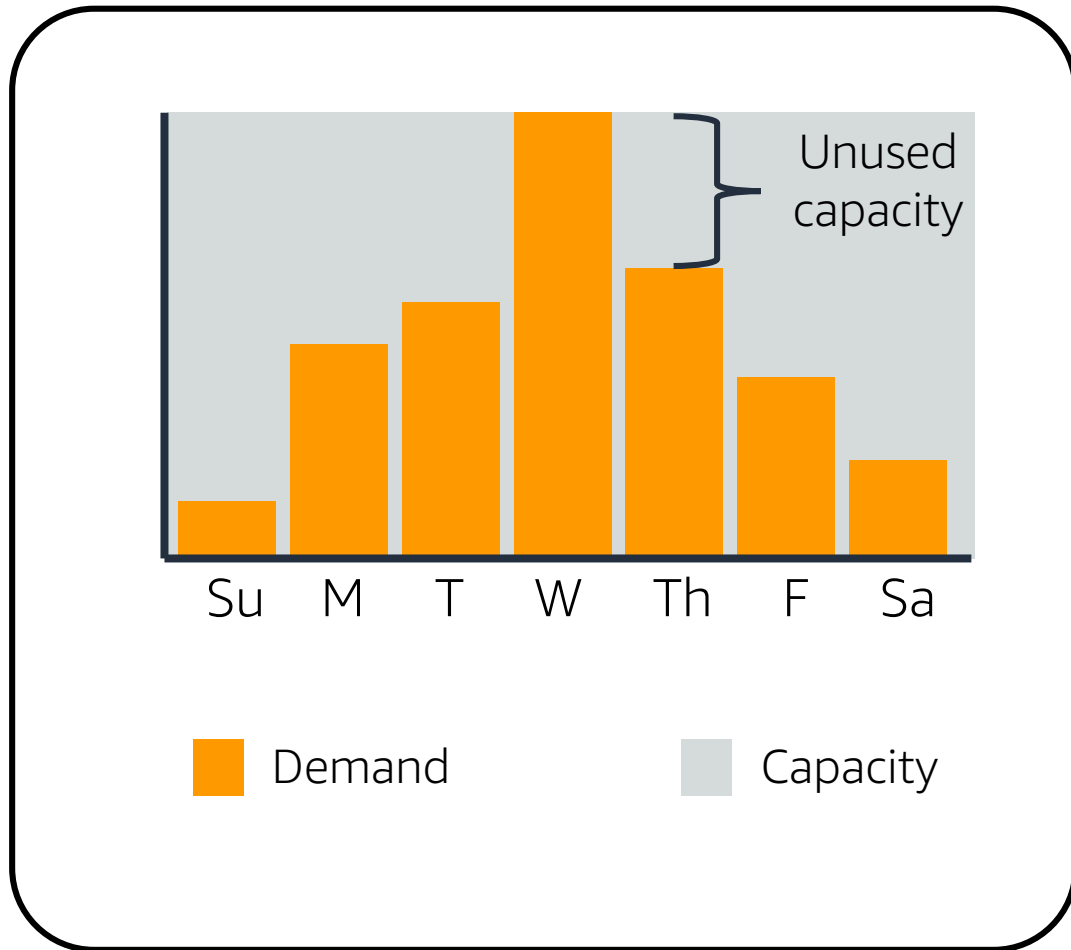


Manage demand efficiently

Why scaling matters



Why scaling matters



Why scaling matters



Why scaling matters



Amazon EC2 Auto Scaling adjusts capacity as needed

- Scale out for spikes
- Scale in during off-peak
- Replace unhealthy instances
- Pay only for what you use

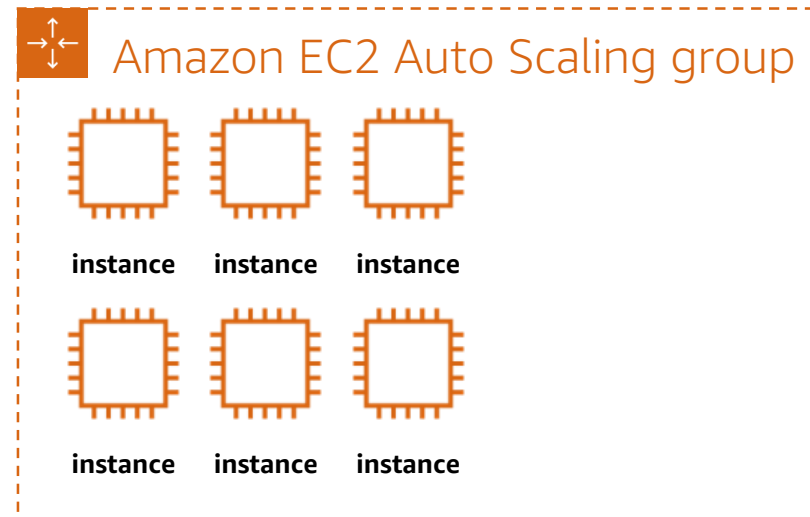


Dynamic scaling with Amazon EC2 Auto Scaling

Follow the demand curve for your applications

- Select a load metric for your application
- Set as conditional and/or scheduled
- Use with CloudWatch, optionally

Max	10
Min	2
Desired	6



Average Demand

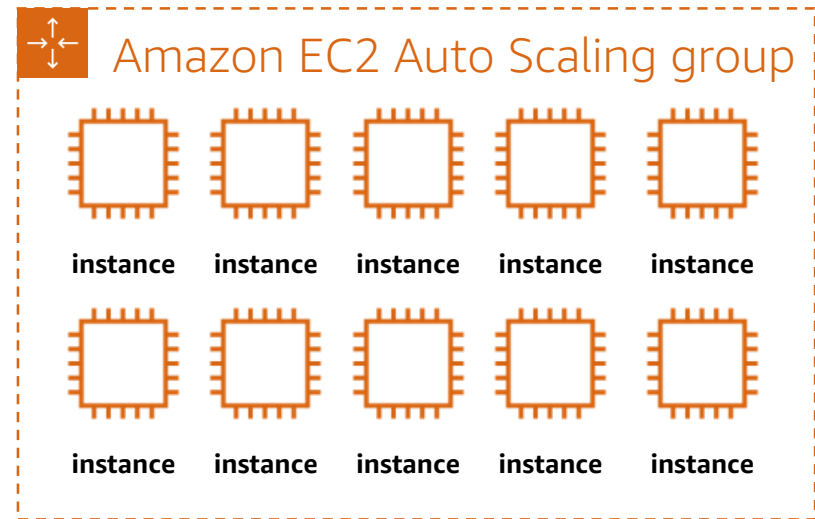


Dynamic scaling with Amazon EC2 Auto Scaling

Follow the demand curve for your applications

- Select a load metric for your application
- Set as conditional and/or scheduled
- Use with CloudWatch, optionally

Max	10
Min	2
Desired	10



High demand

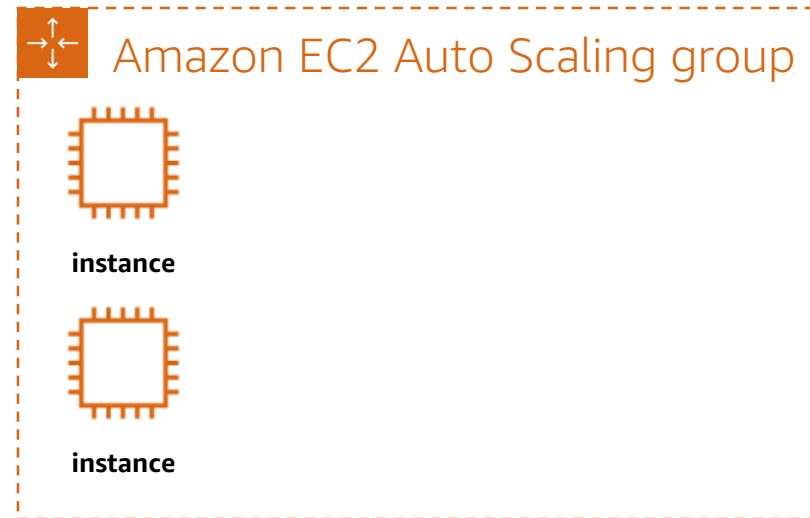


Dynamic scaling with Amazon EC2 Auto Scaling

Follow the demand curve for your applications

- Select a load metric for your application
- Set as conditional and/or scheduled
- Use with CloudWatch, optionally

Max	10
Min	2
Desired	2



Low demand

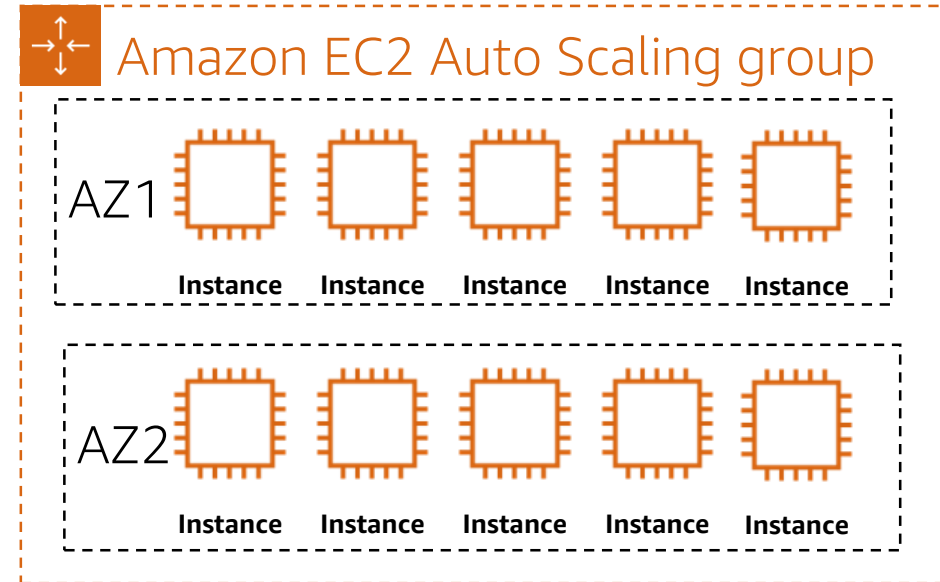


Fleet management with Amazon EC2 Auto Scaling

Replace impaired Amazon EC2 instances without intervention

- Monitor the health of running instances
- Replace impaired instances automatically
- Balance capacity across Availability Zones

Max	10
Min	2
Desired	10

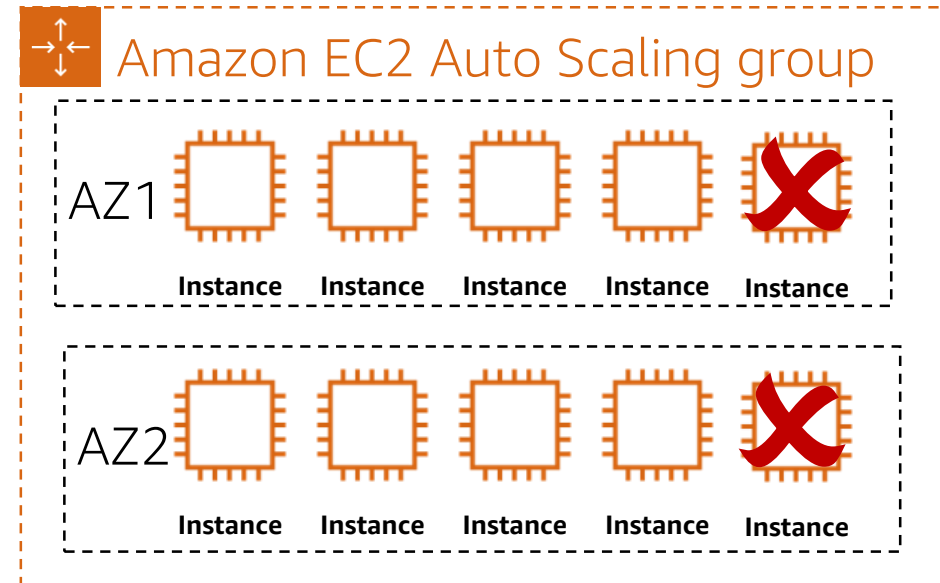


Fleet management with Amazon EC2 Auto Scaling

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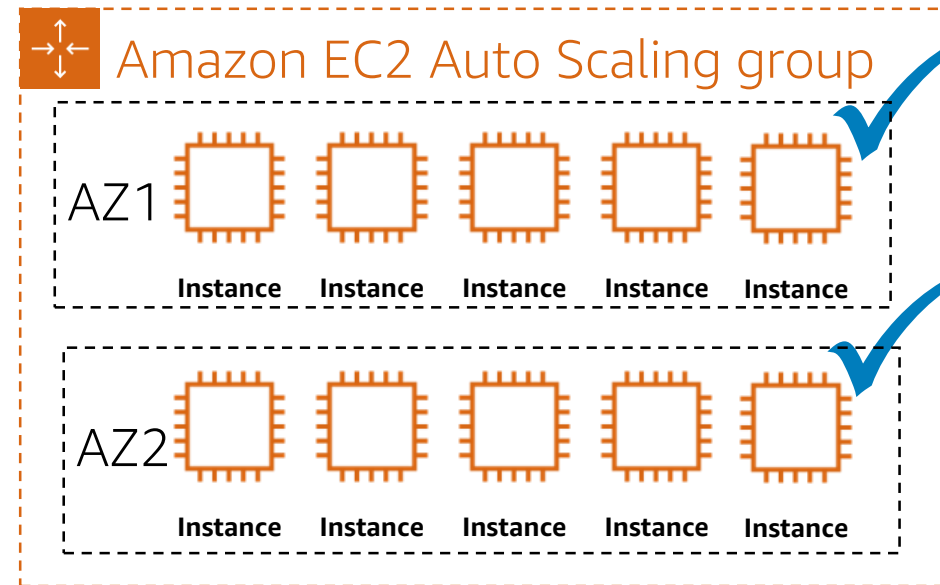


Fleet management with Amazon EC2 Auto Scaling

Replace impaired Amazon EC2 instances without intervention

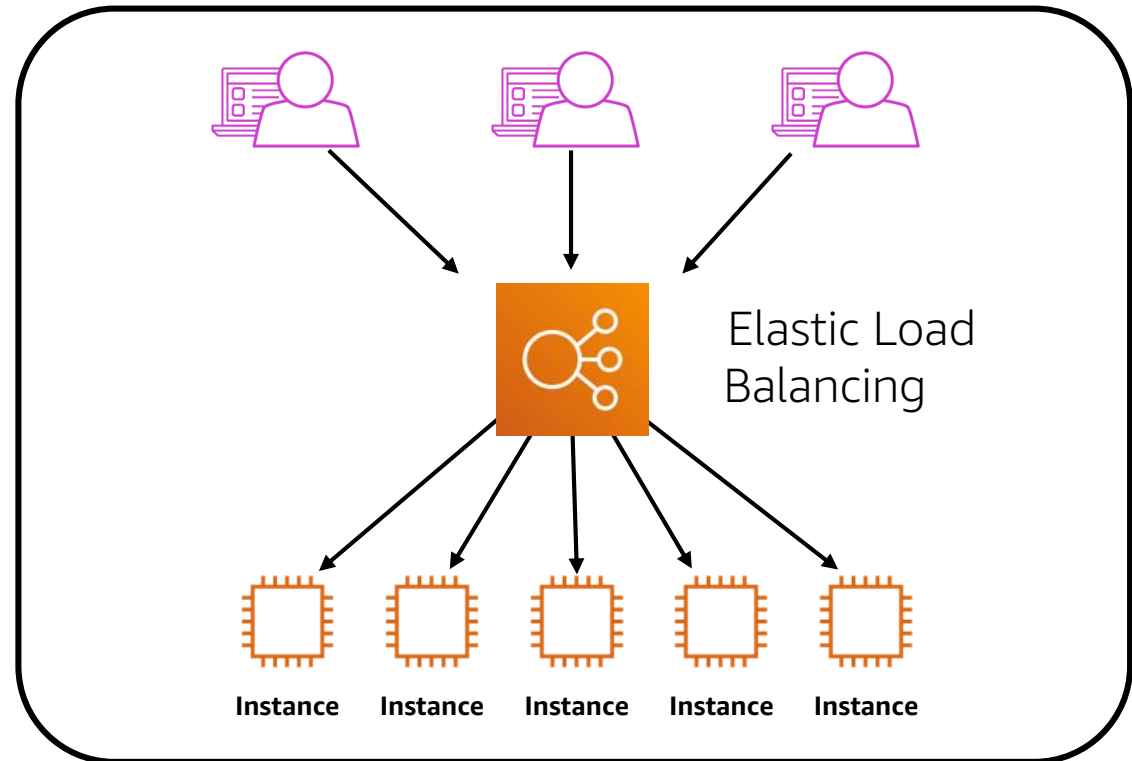
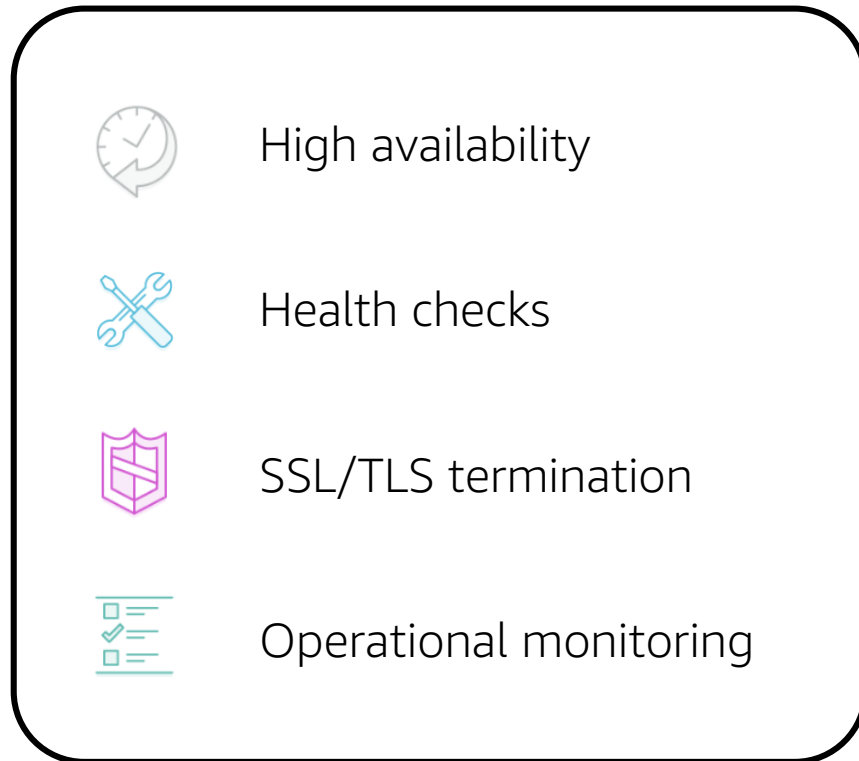
- Monitor the health of running instances
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Max	10
Min	2
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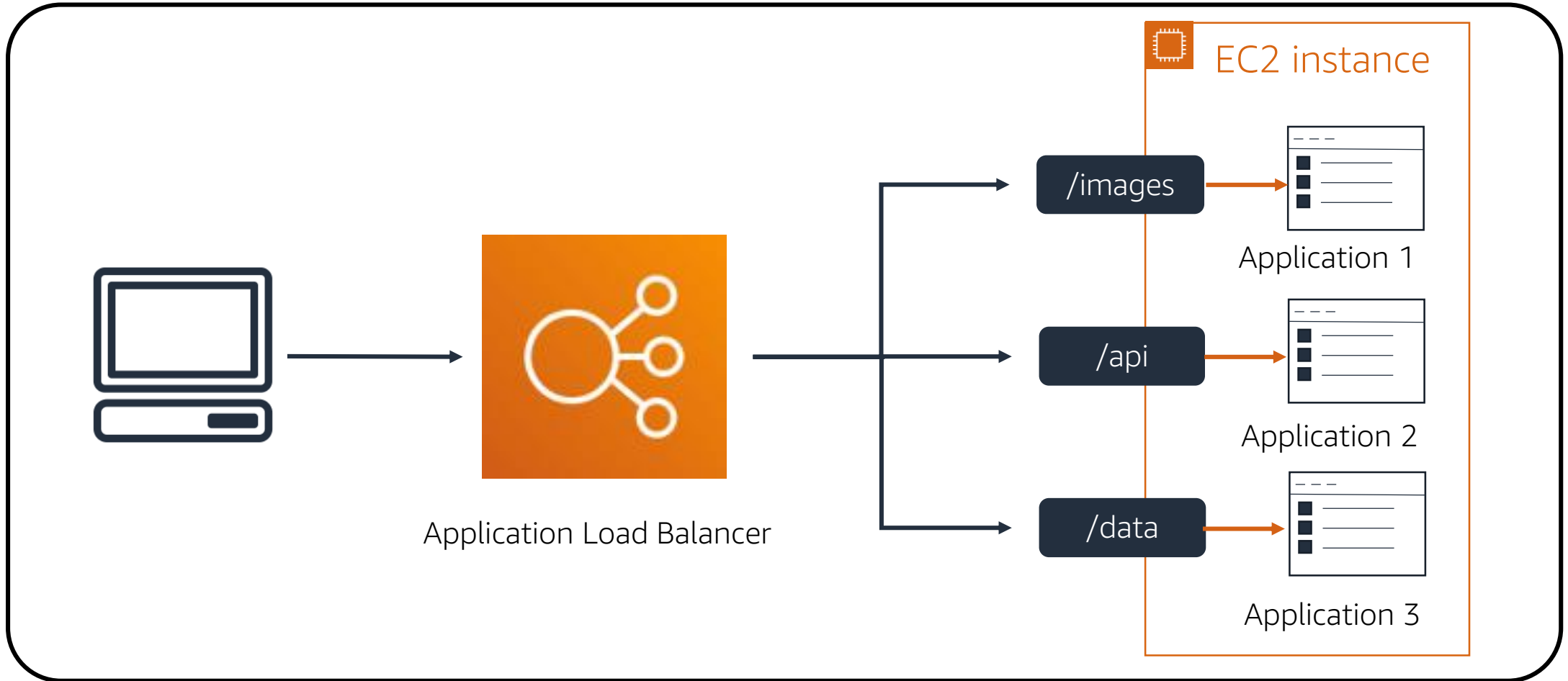


Elastic Load Balancing

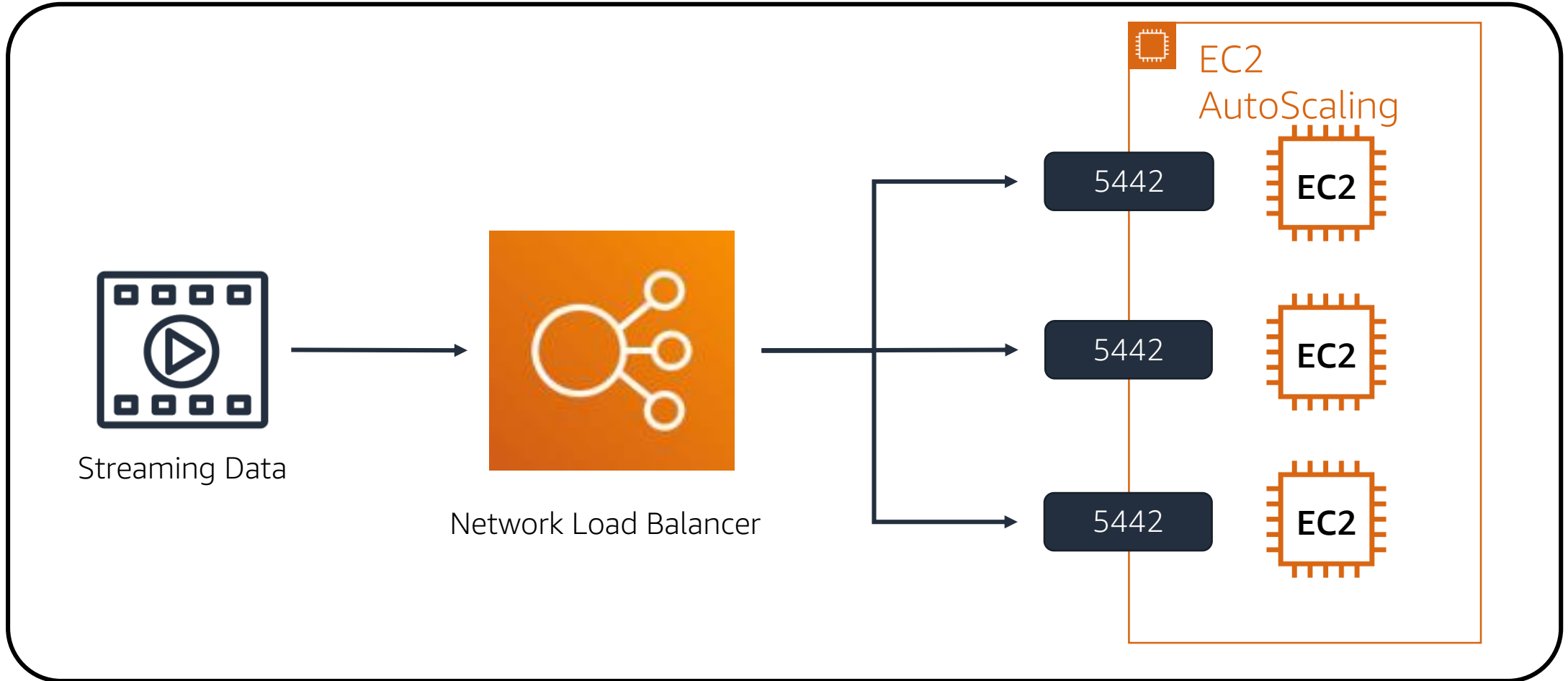
Automatically distribute traffic across multiple targets



Application Load Balancer example

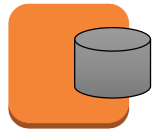


Network Load Balancer example



Deploy database services

DIY vs. AWS database services



Databases on Amazon EC2

- Operating system access
- Need features of specific application



AWS Database Services

- Easy to set up, manage, maintain
- Push-button high availability
- Focus on performance
- Managed infrastructure



What is Amazon Relational Database Service?

A database service that makes it easy to set up, operate, and scale a relational database in the cloud

Amazon RDS Engines

Amazon
Aurora



ORACLE



- Easily scalable
- Automatic software patching
- Automated backups
- Database snapshots
- Multi-AZ deployments
- Automatic host replacement
- Encryption at rest and in transit



What is Amazon Aurora?

- Enterprise-class relational database
- MySQL- or PostgreSQL-compatible
- Up to 5X faster than standard MySQL databases
- Up to 3X faster than standard PostgreSQL databases
- Continuous backup to Amazon S3
- Up to 15 low-latency read replicas



Relational vs key-value databases

	Relational (SQL)	Key-value (NoSQL)												
Data storage	Rows and columns	Key-value, document, graph												
Schemas	Fixed	Dynamic												
Querying	Using SQL	Focused on collection of documents												
Scalability	Vertical	Horizontal												
Example	<table border="1"><thead><tr><th>ISBN</th><th>Title</th><th>Author</th><th>Format</th></tr></thead><tbody><tr><td>3111111223439</td><td>Withering Depths</td><td>Tark, Frank</td><td>Paperback</td></tr><tr><td>312222223439</td><td>Wily Willy</td><td>Felton, Maria</td><td>eBook</td></tr></tbody></table>	ISBN	Title	Author	Format	3111111223439	Withering Depths	Tark, Frank	Paperback	312222223439	Wily Willy	Felton, Maria	eBook	<pre>{ ISBN: 3111111223439, Title: "Withering Depths", Author: "Tark, Frank", Format: "Paperback" }</pre>
ISBN	Title	Author	Format											
3111111223439	Withering Depths	Tark, Frank	Paperback											
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What is Amazon DynamoDB?

Fast and flexible NoSQL database service for any scale

- Fully managed
- Low-latency queries
- Fine-grained access control
- Regional and global options



Amazon DynamoDB use cases

- Serverless web applications
- Microservices data store
- Mobile backends
- Ad tech
- Gaming
- Internet of Things (IoT)



Other purpose-built database services



Amazon Redshift

Fast, scalable
data warehouse



Amazon DocumentDB

MongoDB-compatible
database



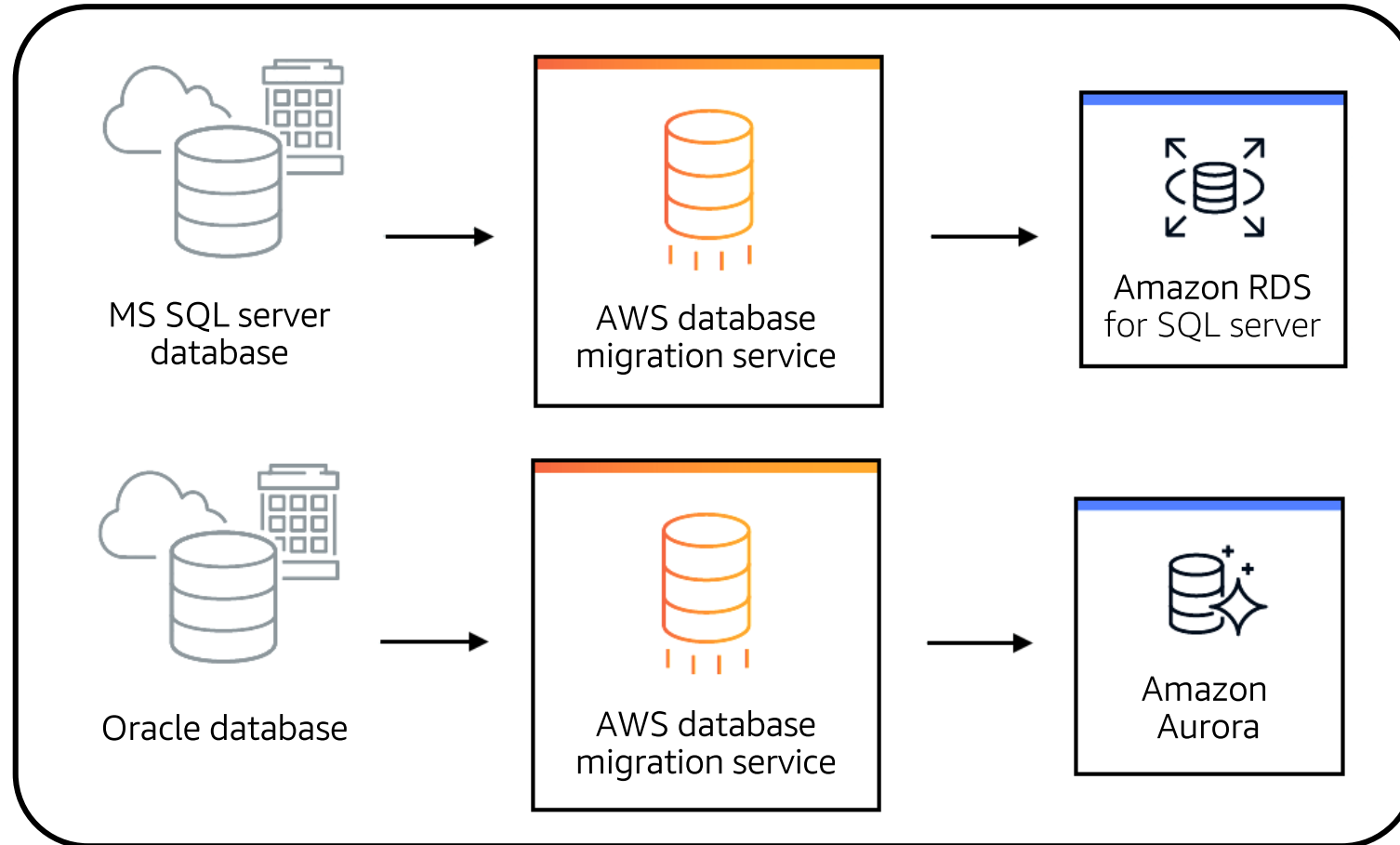
Amazon Neptune

Graph database



What is AWS Database Migration Service?

Migrate databases to AWS quickly and securely



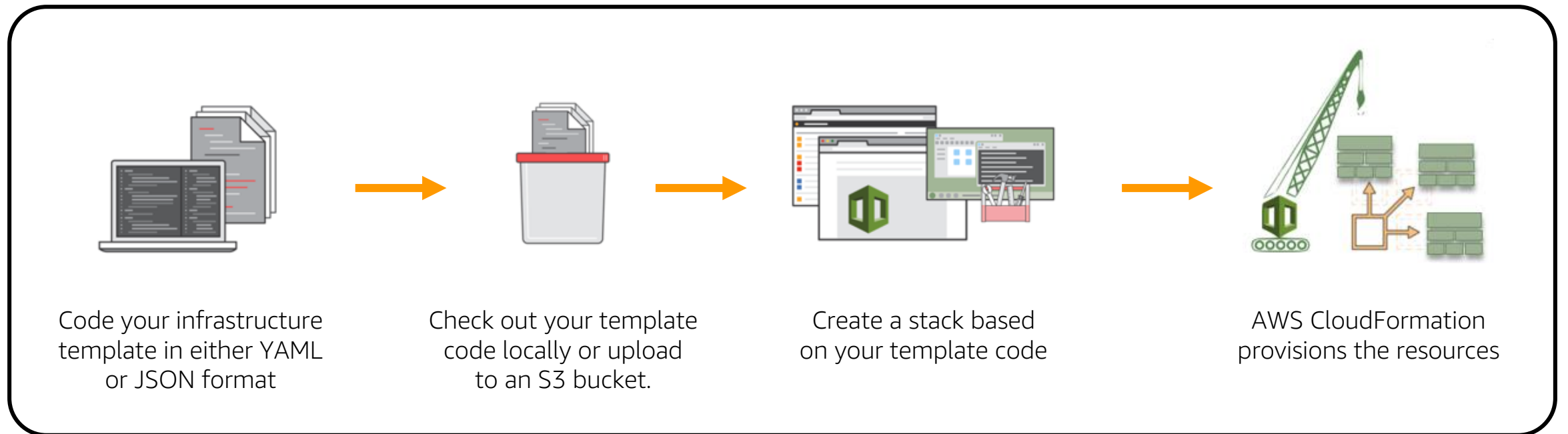
The right tool for the right job

What are my requirements?	
Enterprise class relational database	Amazon Relational Database Service (Amazon RDS)
Fast and flexible NoSQL database service for any scale	Amazon DynamoDB
Operating system access or application features not supported by AWS database services	Databases on EC2
Specific case-driven requirements (Machine learning, data warehouse, graphs)	AWS purpose-built database services

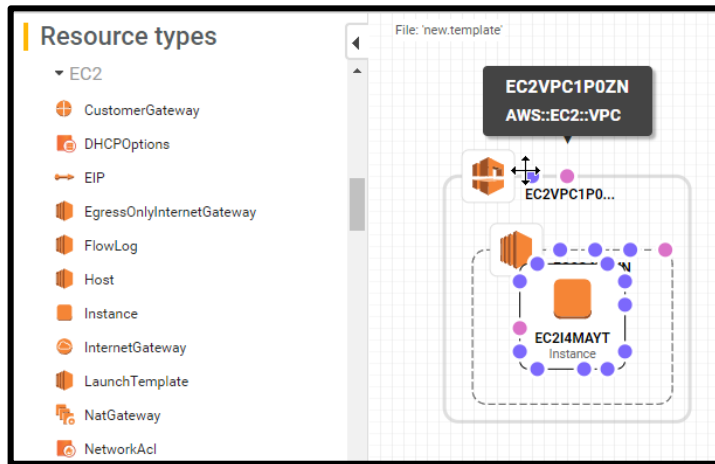
Automate deployment

What is AWS CloudFormation?

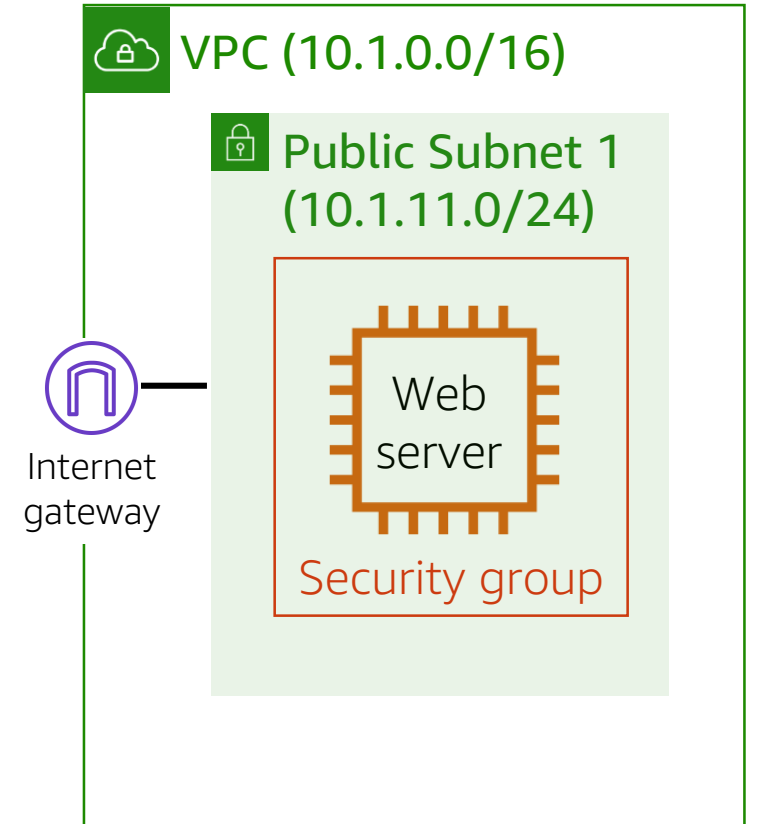
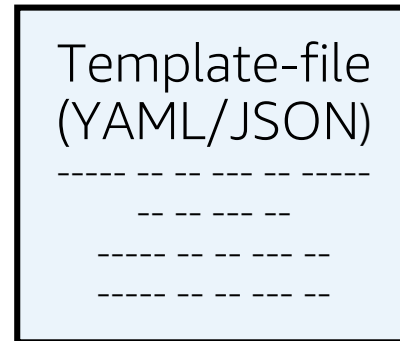
Model and provision all your cloud infrastructure resources



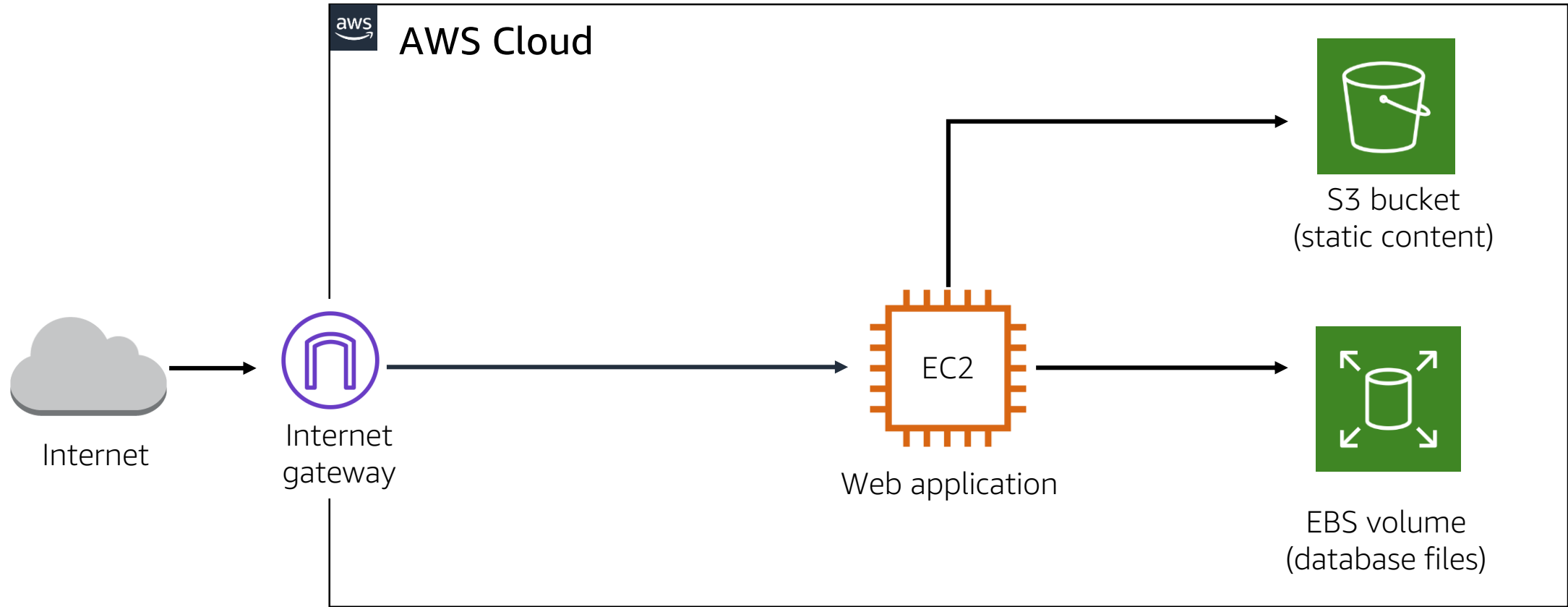
AWS CloudFormation example



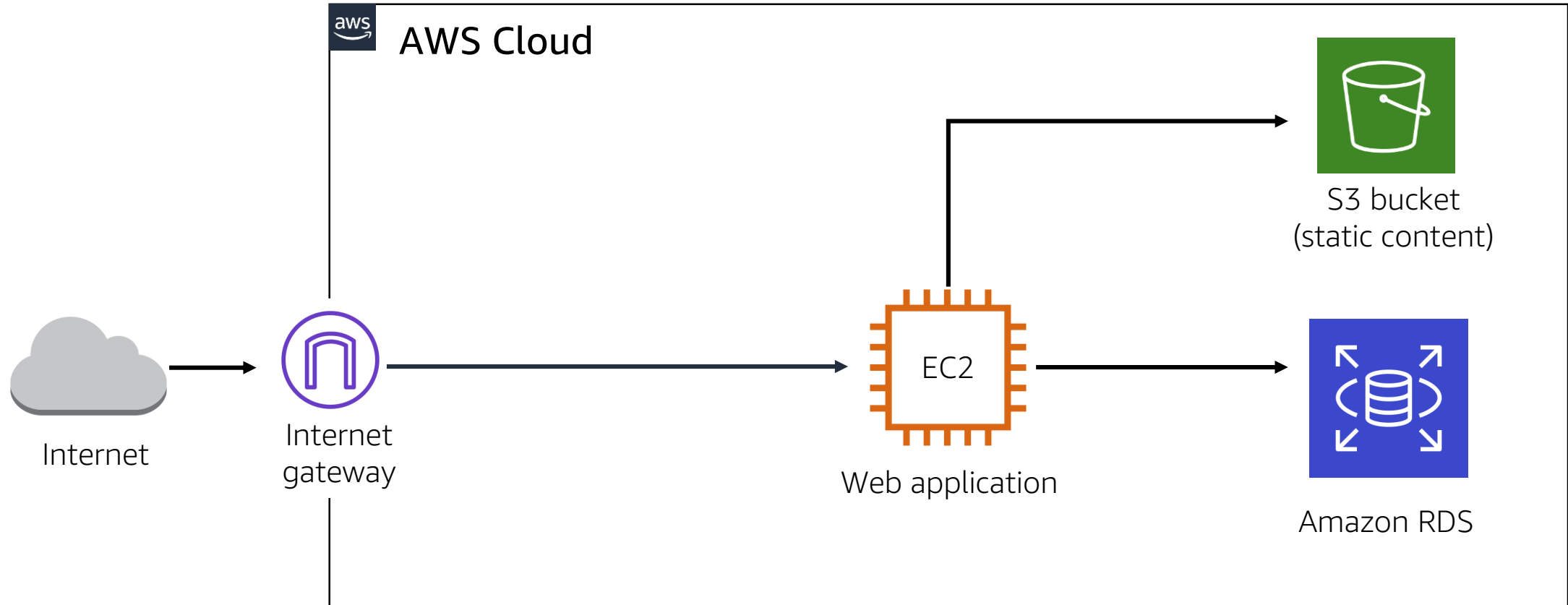
CloudFormation Designer



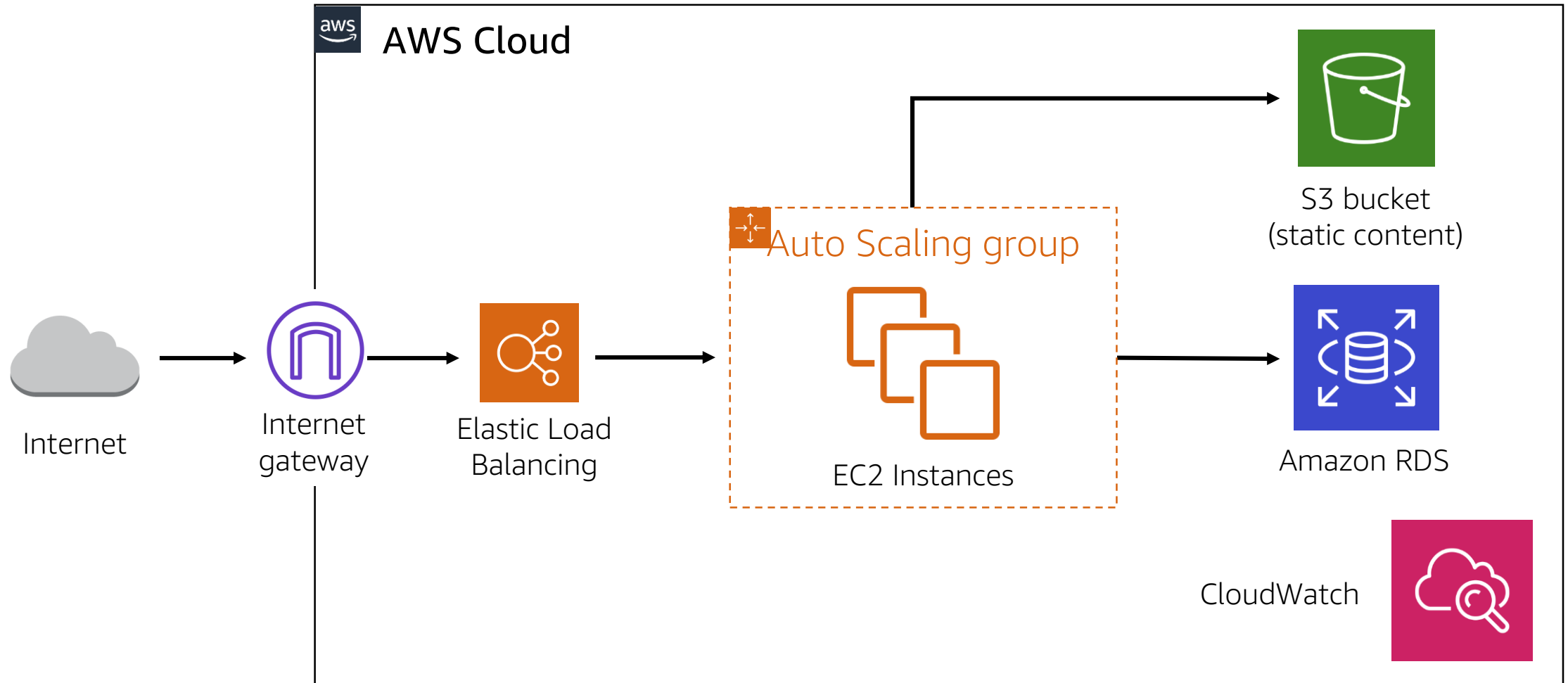
Putting it all together (1 of 4)



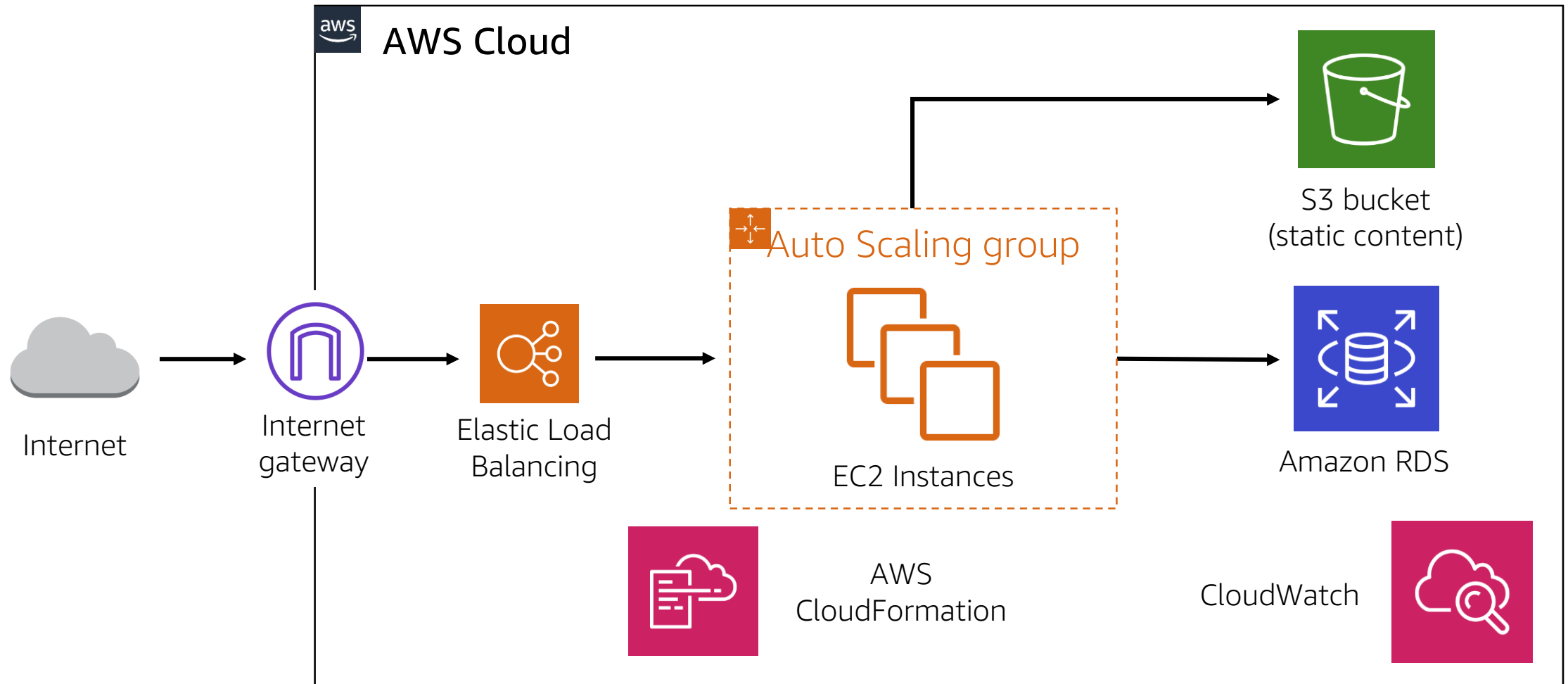
Putting it all together (2 of 4)



Putting it all together (3 of 4)



Putting it all together (4 of 4)



How can I deploy without managing infrastructure?

Quickly deploy and manage applications with AWS Elastic Beanstalk


- Upload your application code
- The service handles:
 - ✓ Resource provisioning
 - ✓ Load balancing
 - ✓ Automatic scaling
 - ✓ Monitoring
- Support applications that scale to serve millions of users

Application code

Sample application
Get started right away with sample code.

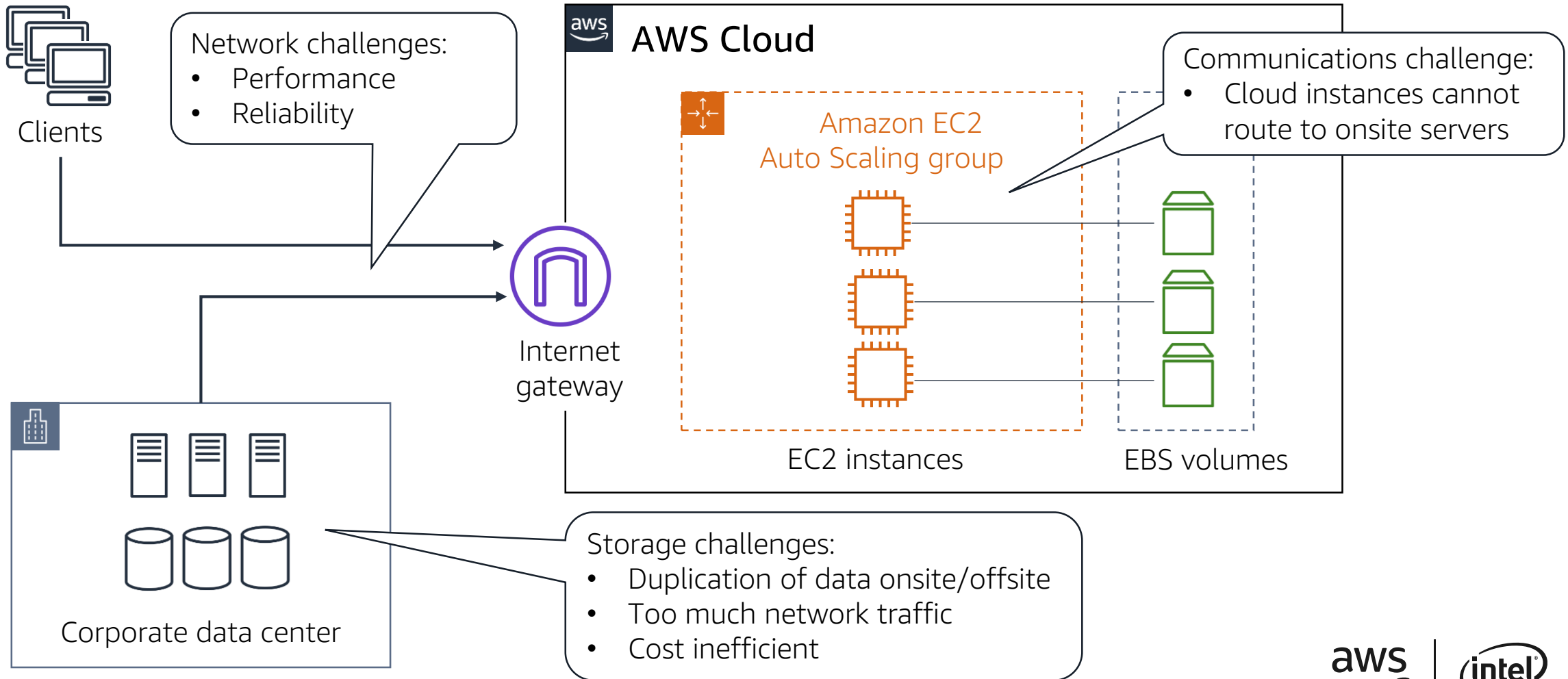
Upload your code
Upload a source bundle from your computer or copy one from Amazon S3.

ZIP or WAR



Connect and share data

Challenge: hybrid cloud



What is AWS Direct Connect?

A dedicated network connection from your premises to AWS



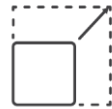
Reduces network costs



Creates consistent network performance



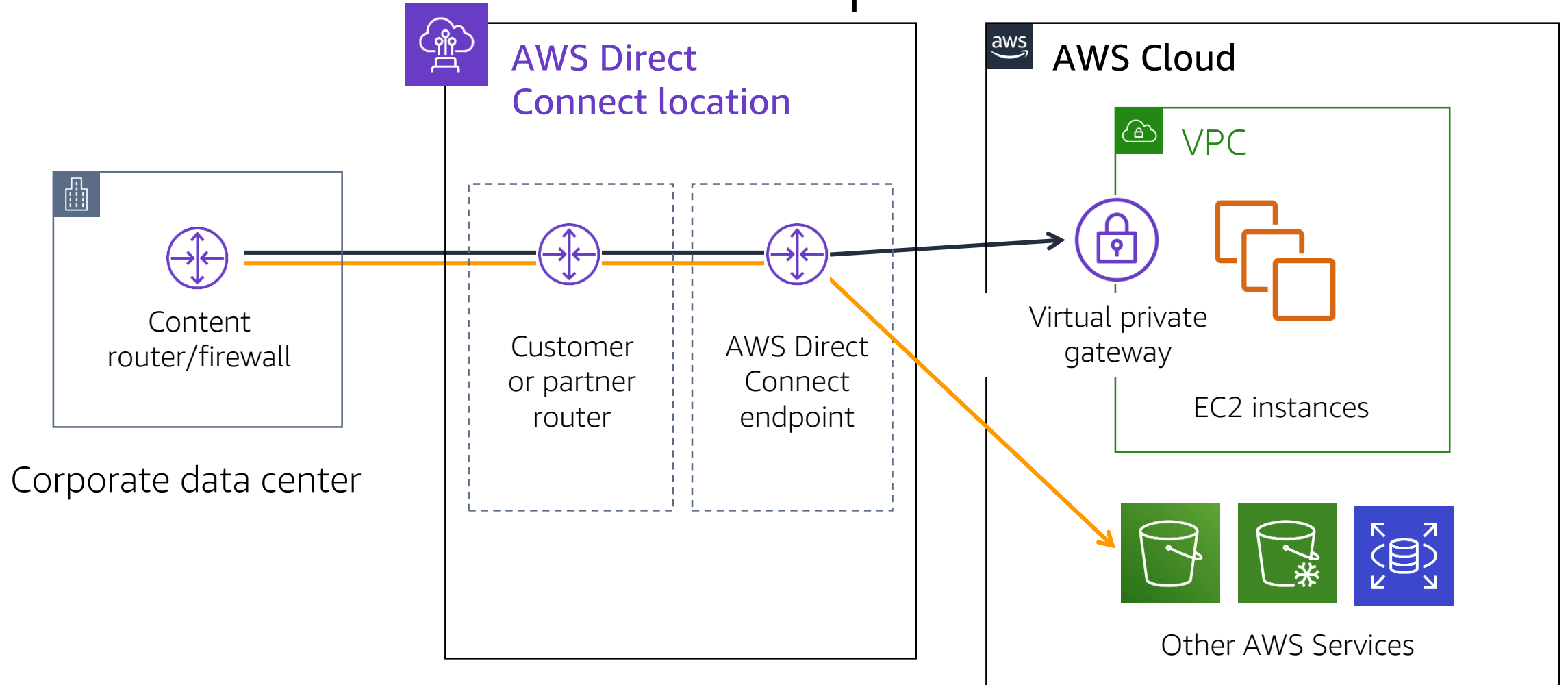
Provides private connectivity to your Amazon VPC



Scales easily



AWS Direct Connect example



What is Amazon Route 53?

A highly available and scalable Domain Name System (DNS) web service



Register domain names



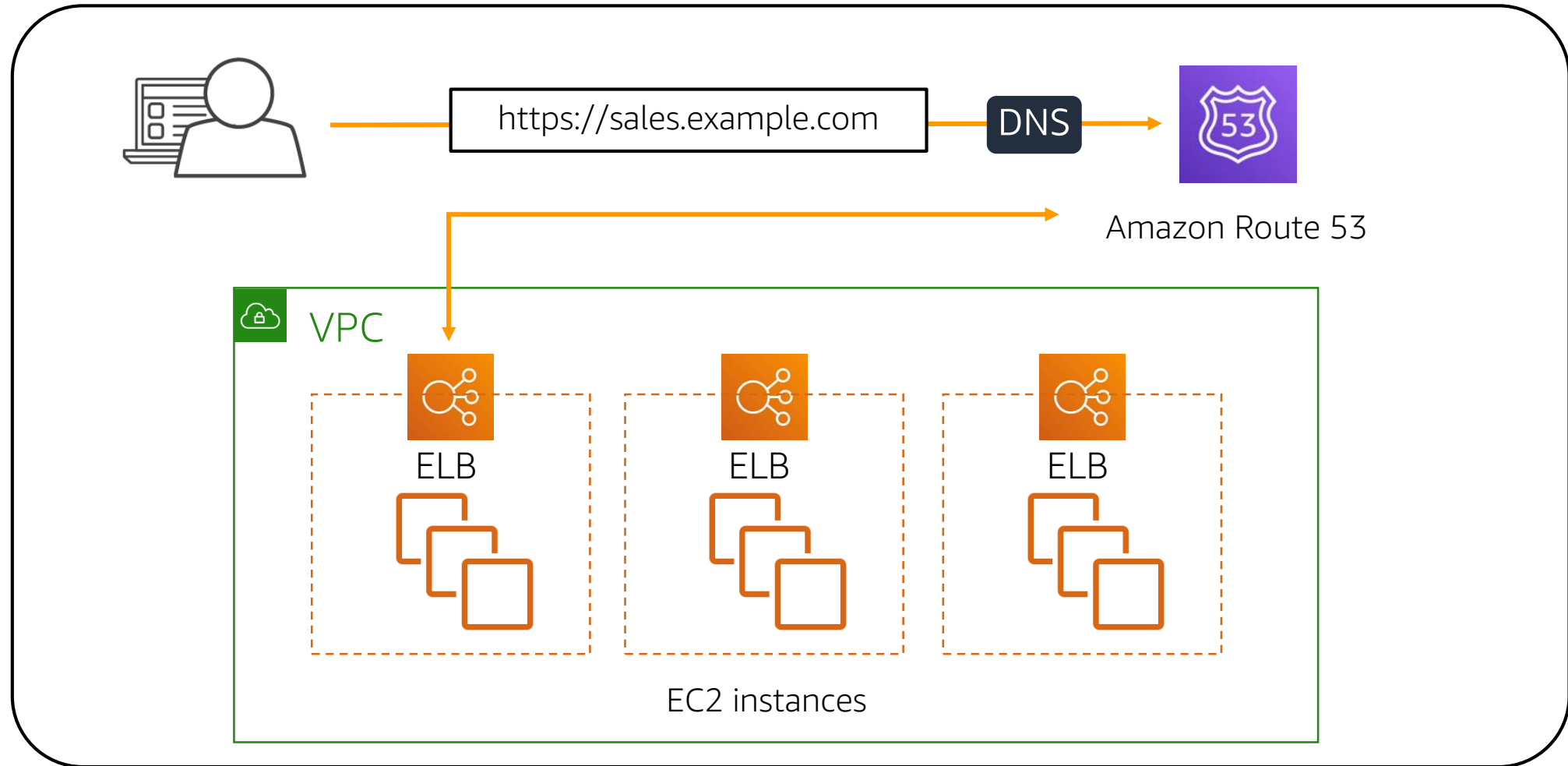
Route internet traffic to the resources for your domain



Check the health of your resources



Routing traffic



What is Amazon Elastic File System (Amazon EFS)?

A scalable, elastic, cloud-native file system for Linux



Dynamic elasticity



Scalable performance



Shared file storage



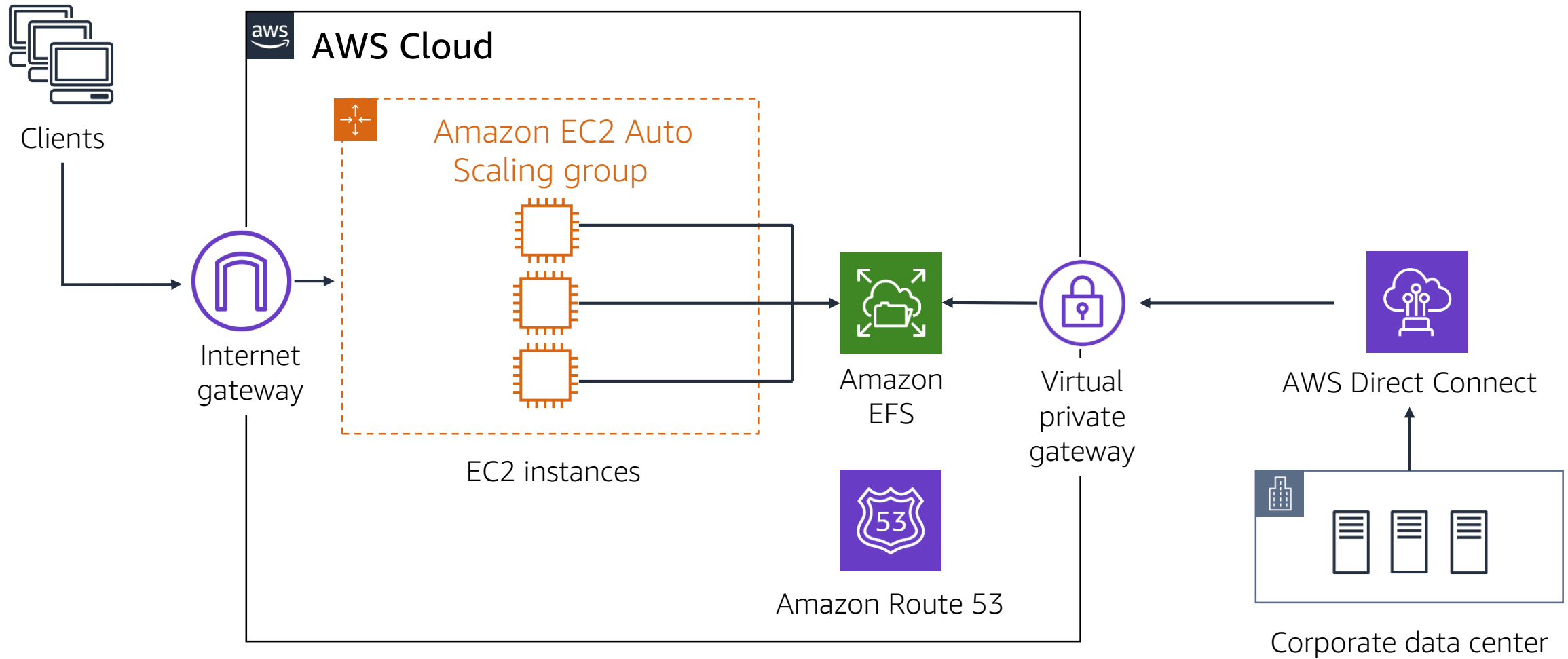
Fully managed



Cost-effective



Putting it all together



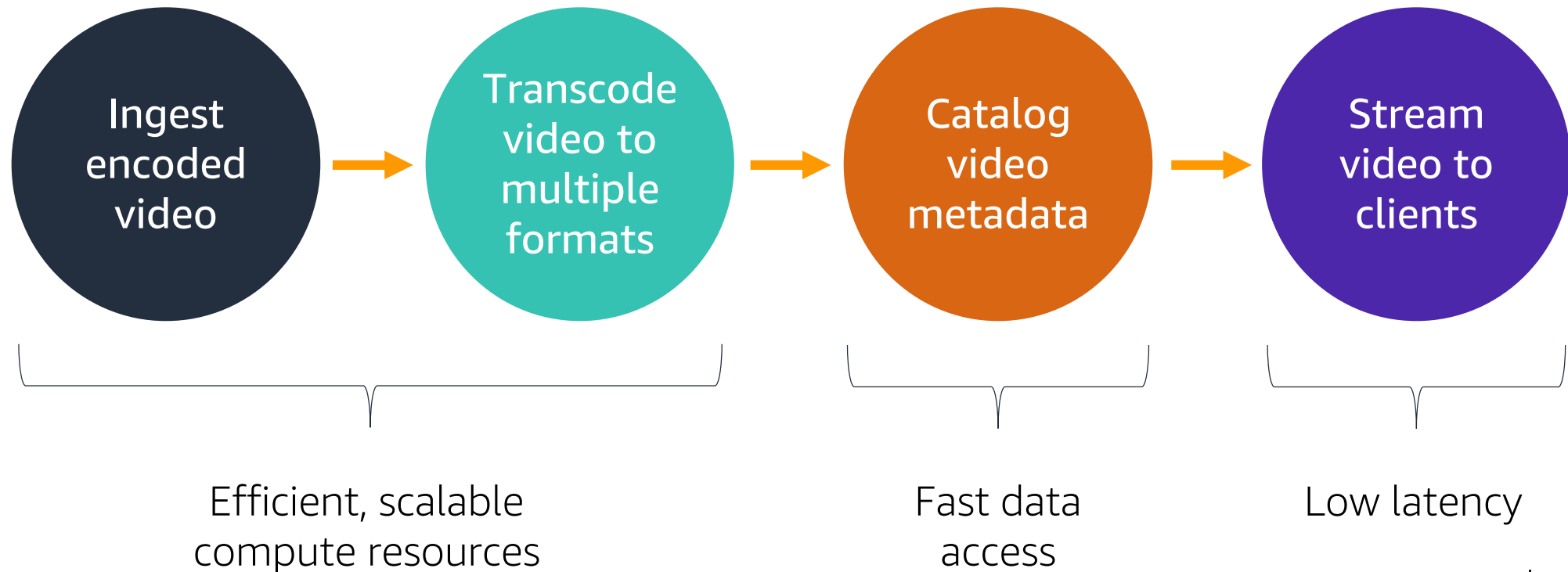
Deliver content faster

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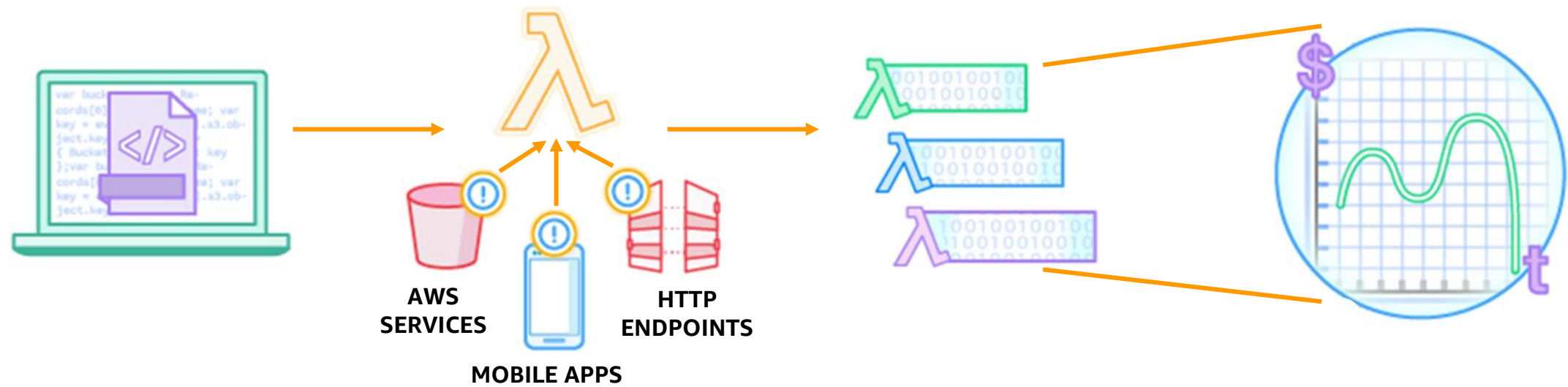
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Challenge: media streaming service

The architecture must meet the following requirements:



AWS Lambda: run code without servers



Upload your code to AWS Lambda

Set your code to trigger from an event source

Lambda runs your code only when triggered

Pay only for the compute time you use



Benefits of Lambda



Supports multiple programming languages



Completely automated administration



Built-in fault tolerance



Supports orchestration of multiple functions



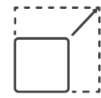
Pay per use pricing

What is Amazon Simple Notification Service (Amazon SNS)?

Fully managed pub/sub messaging for distributed or serverless applications



Reliably deliver messages with durability



Automatically scale your workload



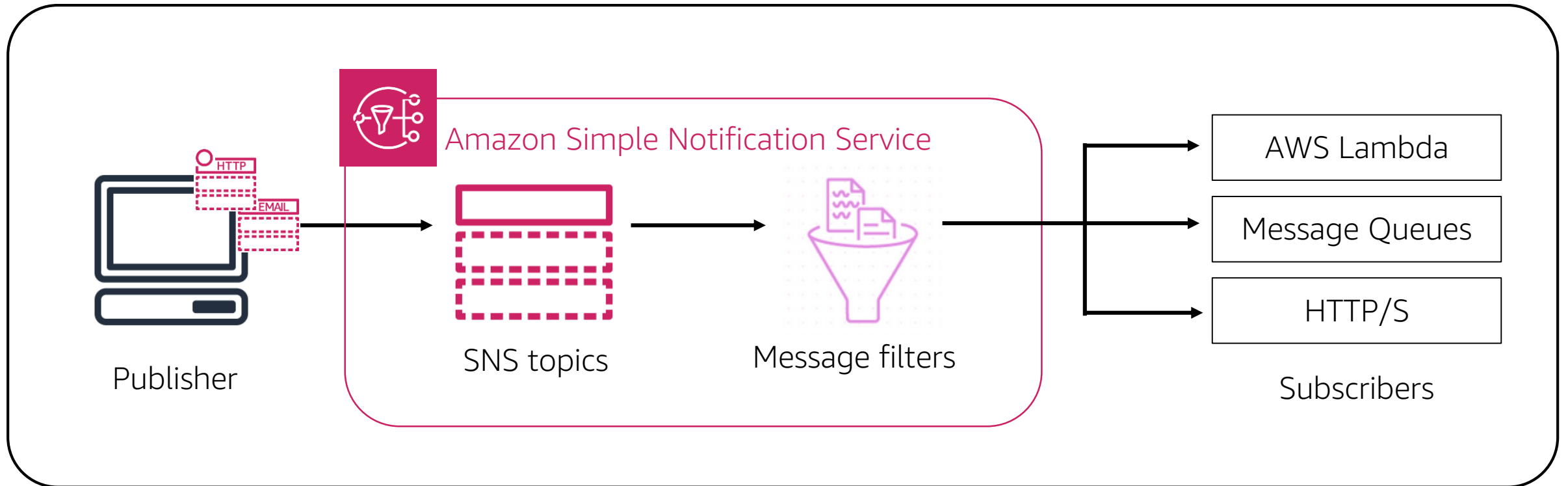
Simplify your architecture



Keep messages private and secure



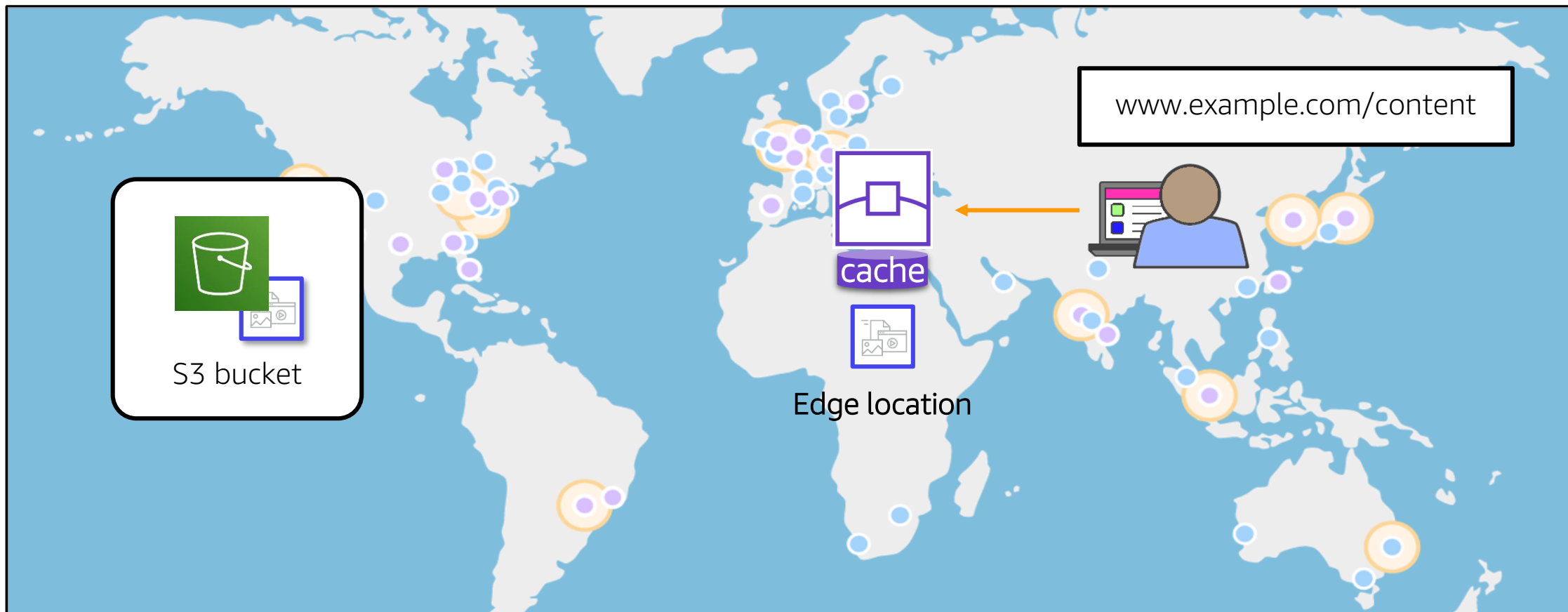
Amazon SNS overview



What is Amazon CloudFront?



How CloudFront delivers content to users



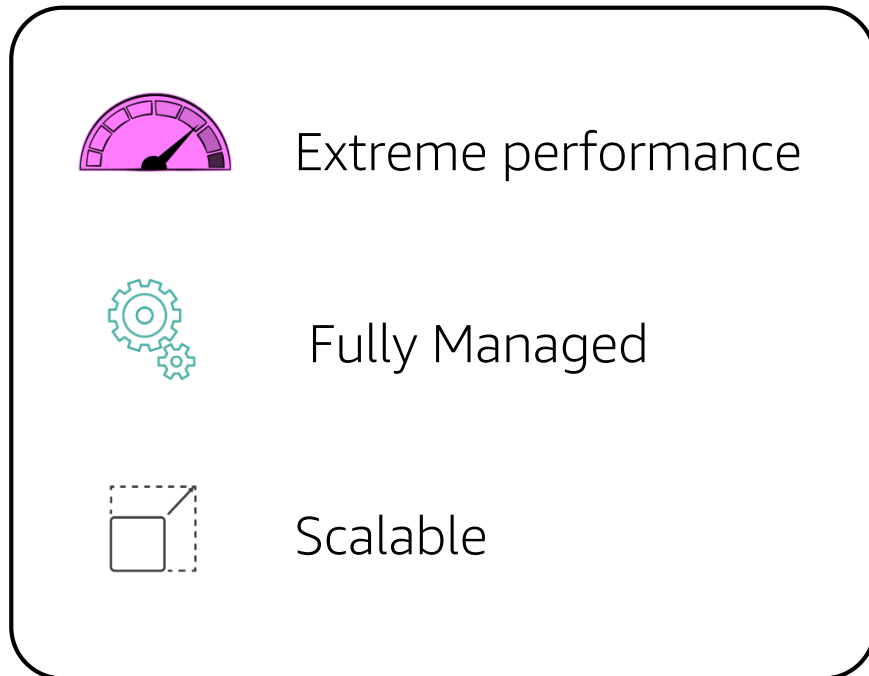
Demo




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What is Amazon ElastiCache?

Fully managed Redis or Memcached-compatible in-memory data store



-  Extreme performance
-  Fully Managed
-  Scalable



Amazon ElastiCache for Redis

Versatile in-memory data store

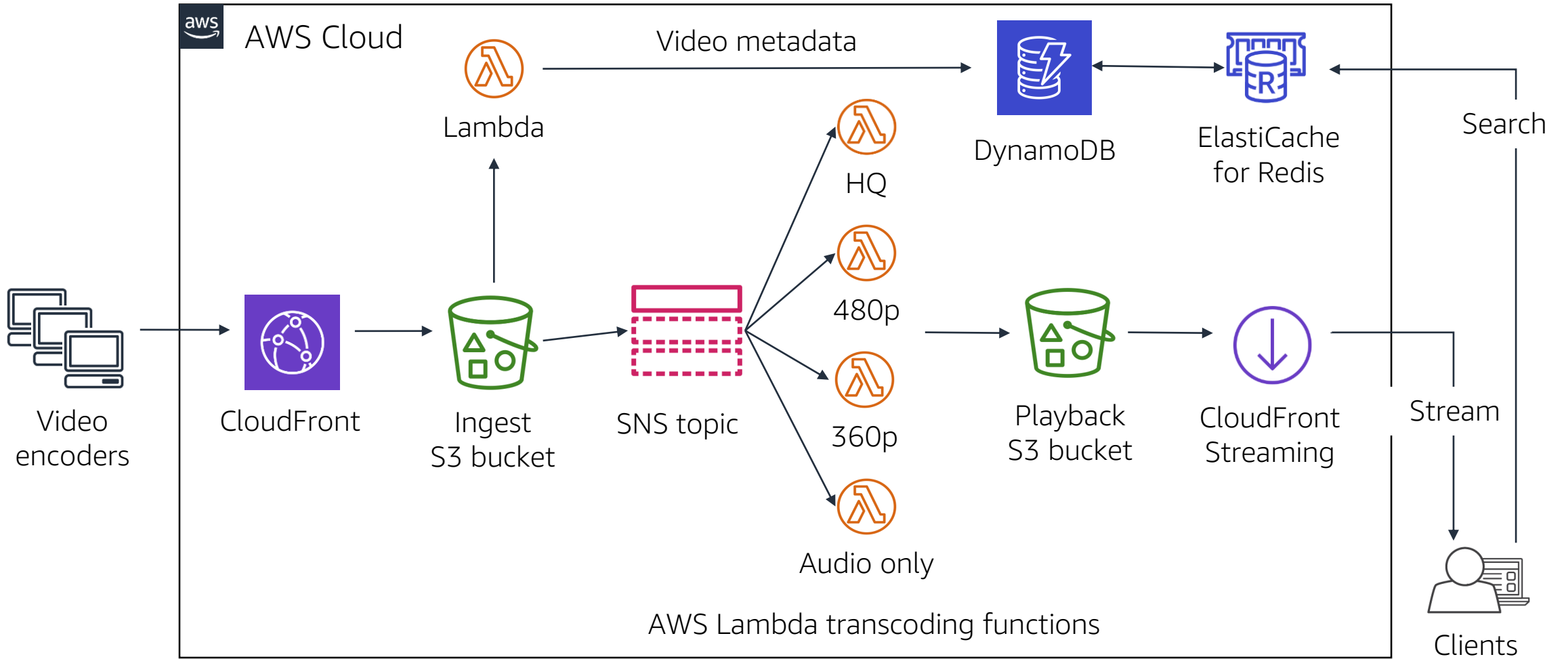


Amazon ElastiCache for Memcached

Scalable caching tier
for data-intensive apps



Challenge: Media streaming service



Key Takeaways

Amazon CloudWatch	Have complete visibility of your cloud resources and applications
Elastic Load Balancing Application Auto Scaling	Deploy highly available applications that scale with demand
AWS Database Services	Run SQL or NoSQL databases without the management overhead
AWS CloudFormation	Programmatically deploy repeatable infrastructure
AWS Elastic Beanstalk	Deploy your application in the simplest way possible
AWS Direct Connect	Provision a dedicated network connection from your premises to AWS
Amazon Route 53	Run a highly available and scalable Domain Name System (DNS) web service
AWS Lambda	Run code without managing servers
Amazon CloudFront	Deliver your content across a massively scaled and globally available network



End of Module 3

Test Your Knowledge

Thank you!