

AWS Certified Solutions Architect – Professional Exam Guide (SAP-C02)

Preface:

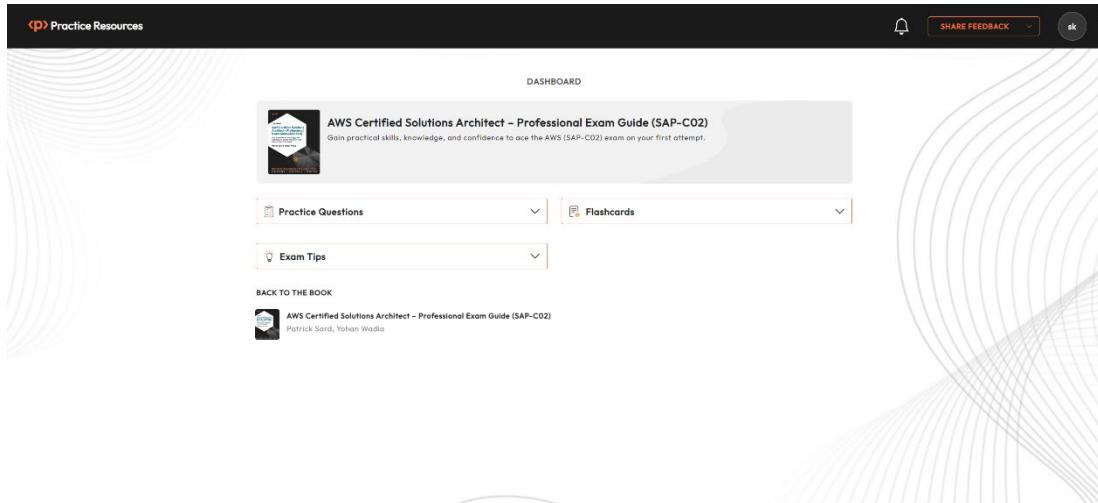


Figure 0.1: Online exam-prep platform on a desktop device

Chapter 1: Determining an Authentication and Access Control Strategy for Complex Organizations

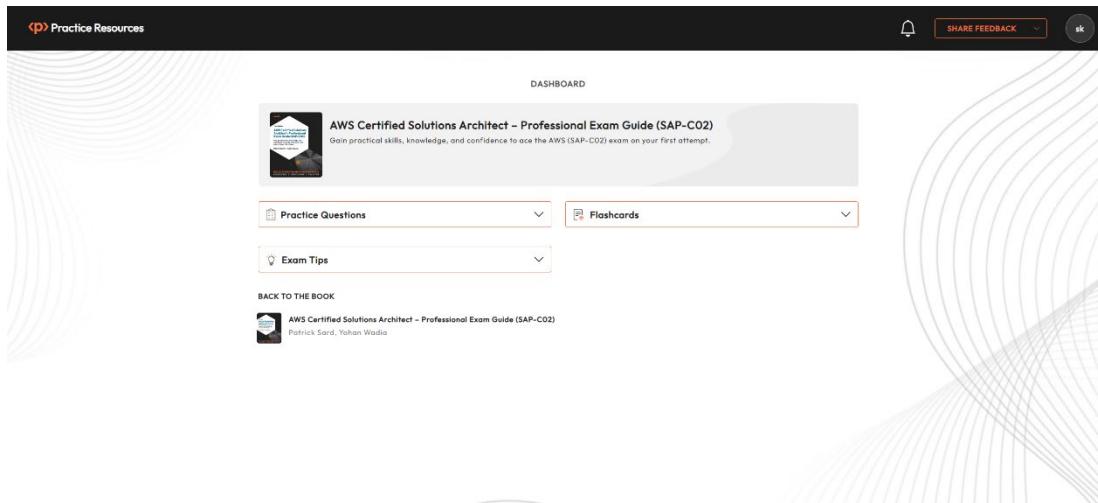


Figure 1.1: Dashboard interface of the online practice resources

Chapter 2: Designing Networks for Complex Organizations

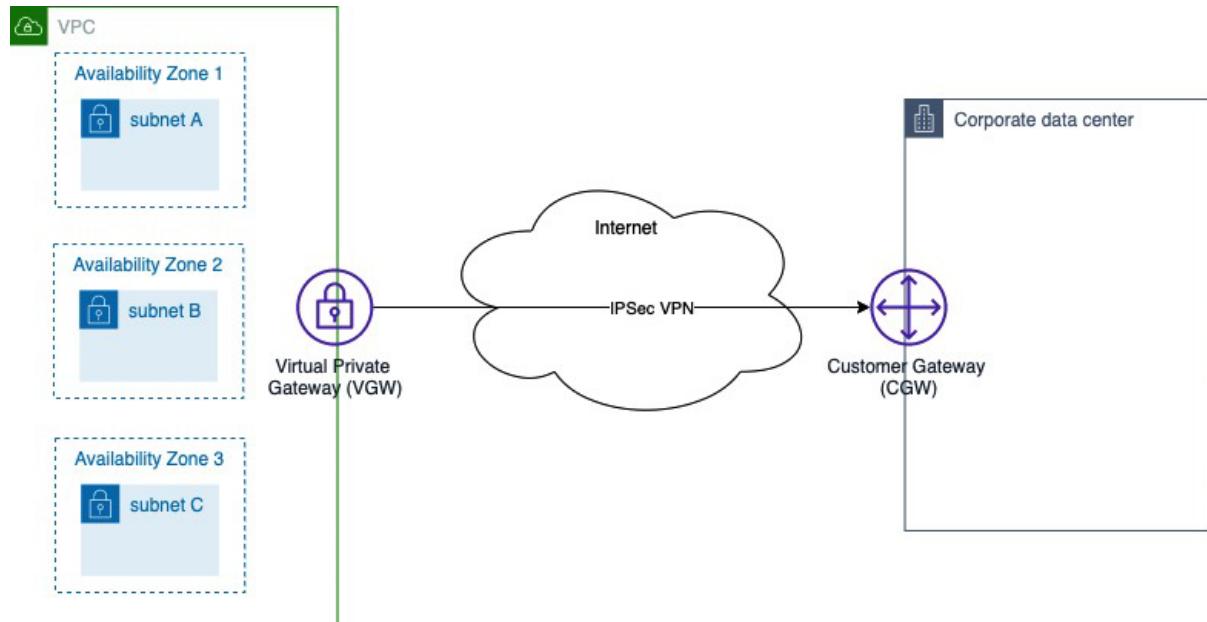


Figure 2.1: VPN connection between single VPC and on-premises equipment

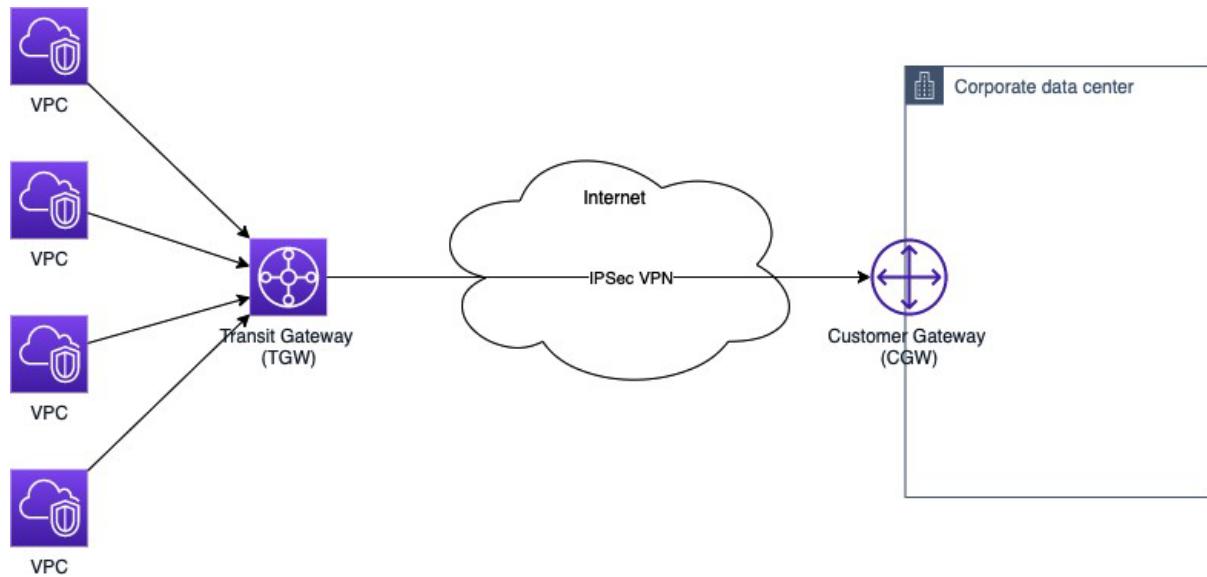


Figure 2.2: VPN connection between TGW and on-premises equipment

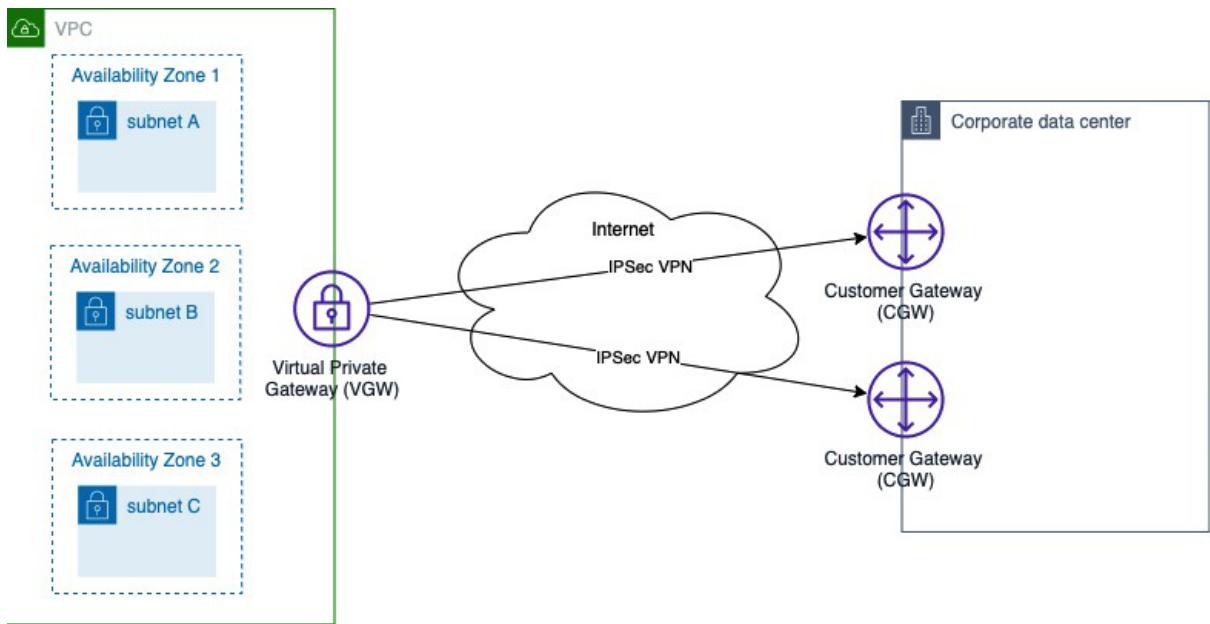


Figure 2.3: VPN connection redundancy for failover

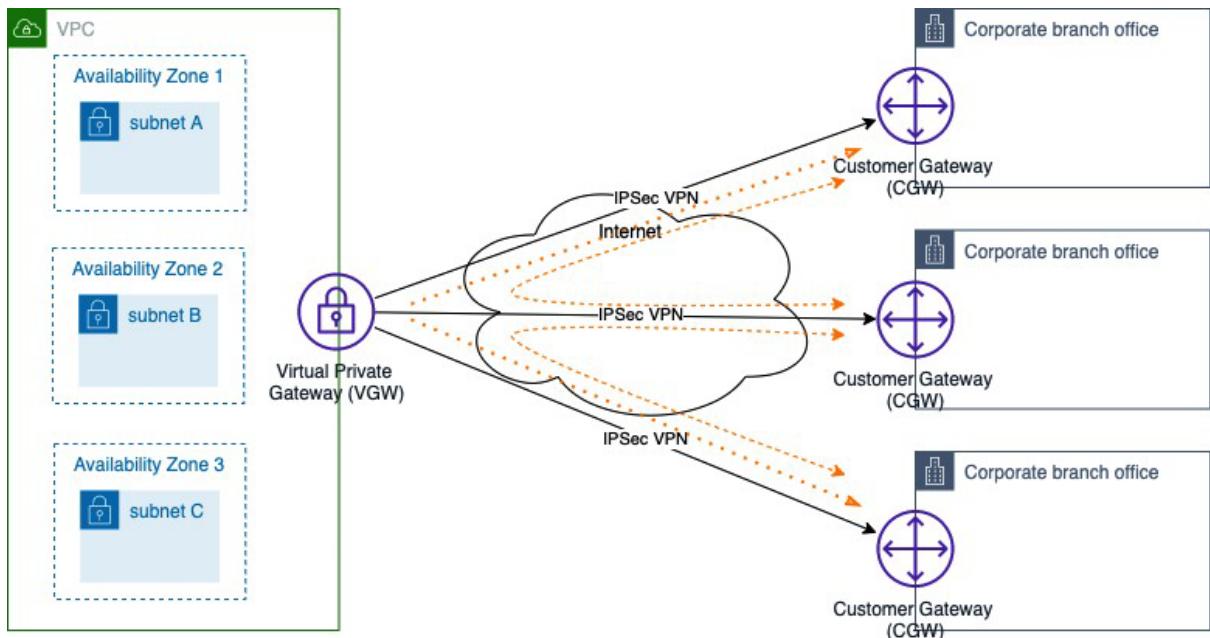


Figure 2.4: Hub-and-spoke VPN

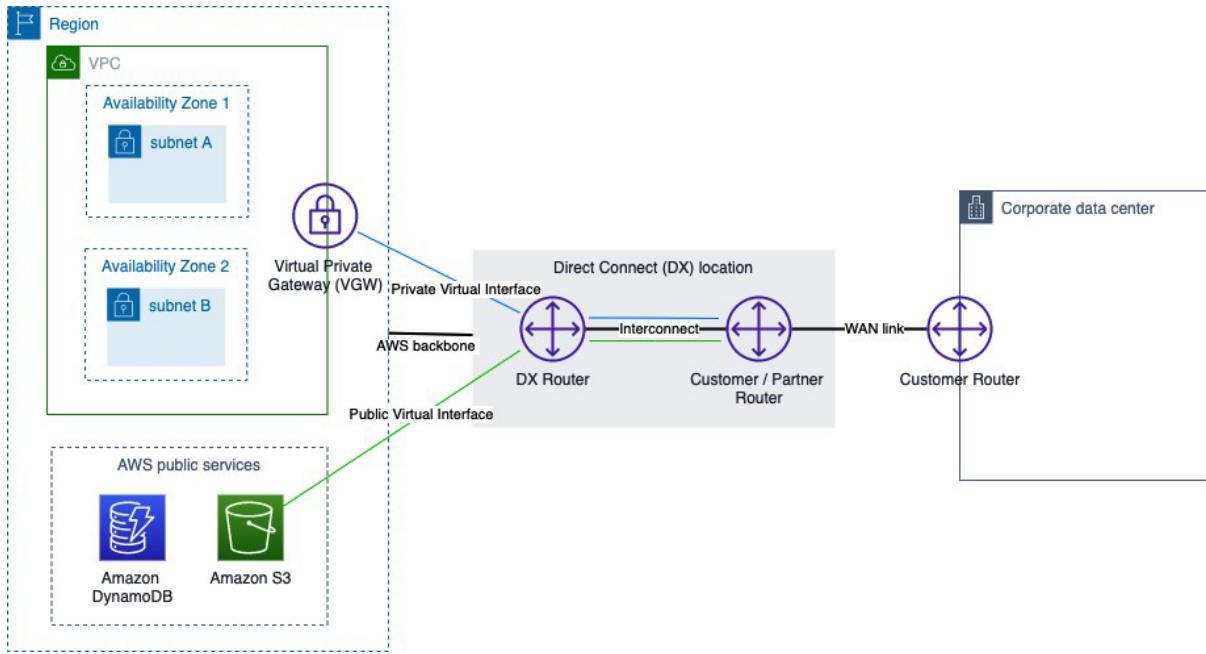


Figure 2.5: Public and private VIFs

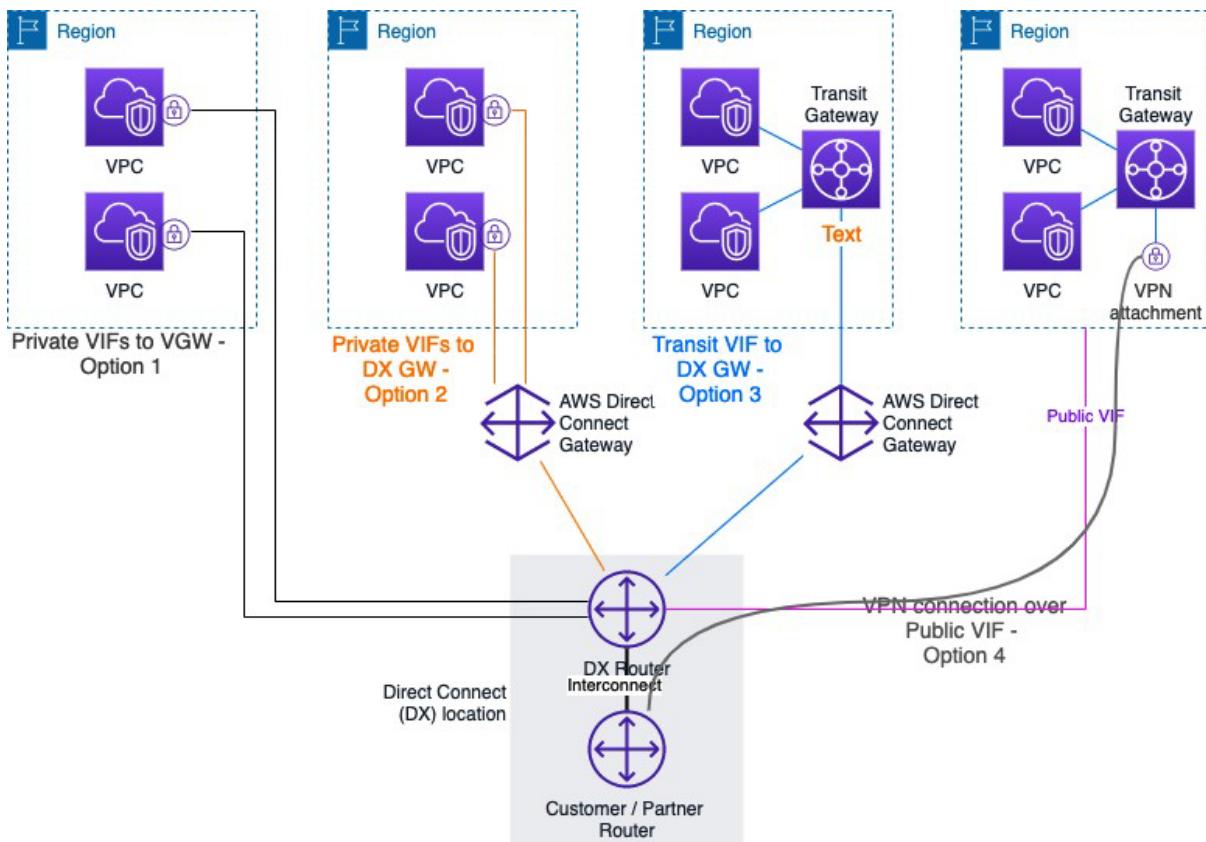


Figure 2.6: DX options summary

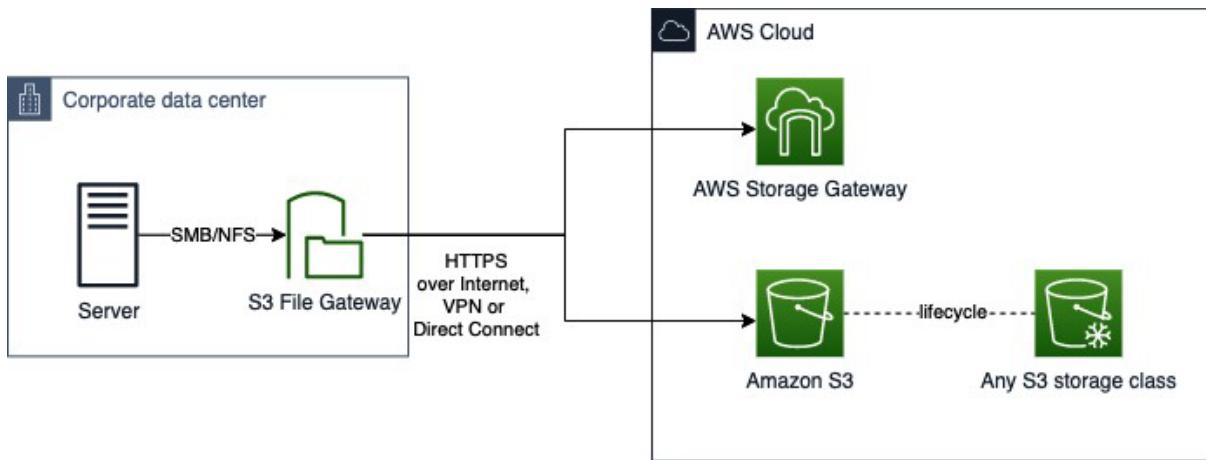


Figure 2.7: Amazon S3 File Gateway

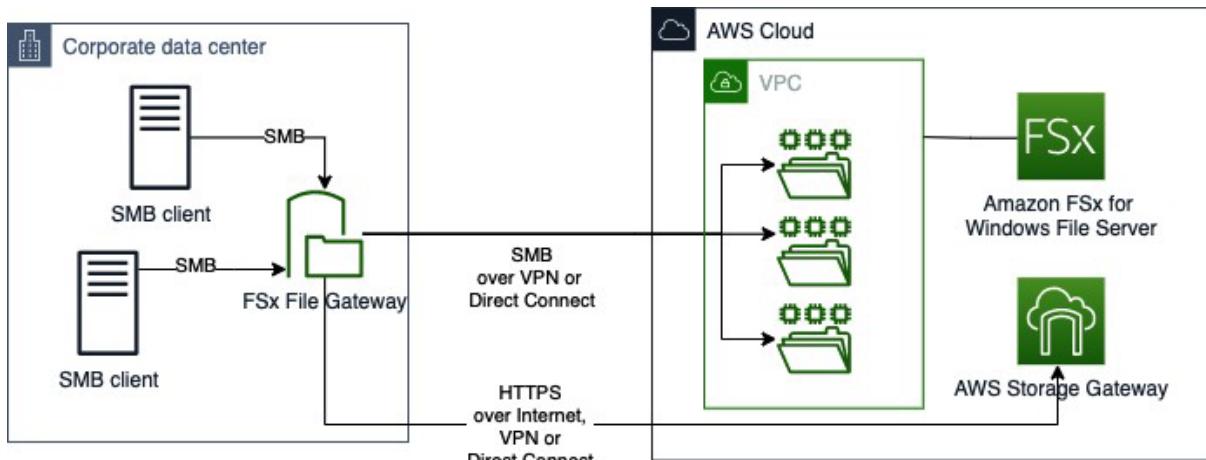


Figure 2.8: FSx File Gateway

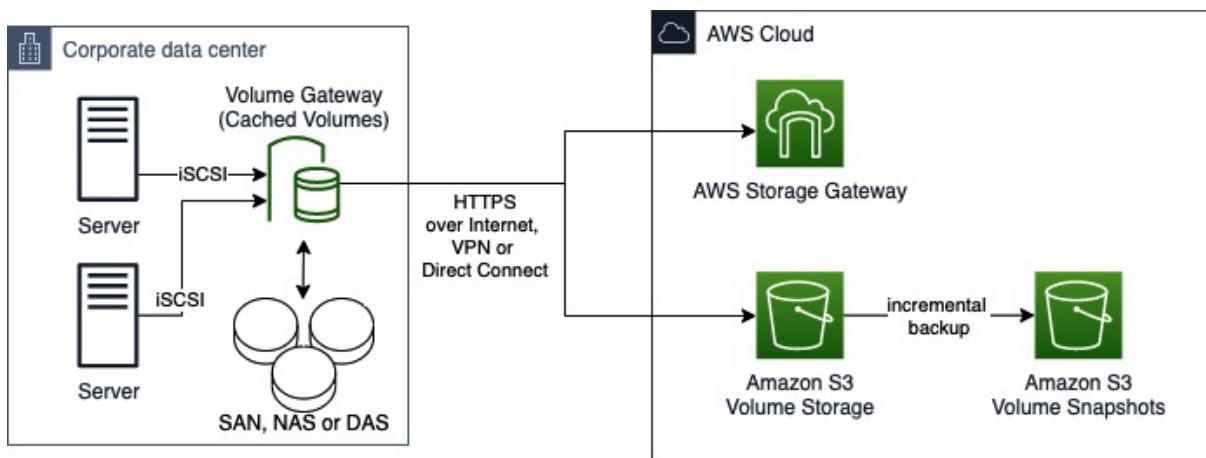


Figure 2.9: Volume Gateway (cached volumes)

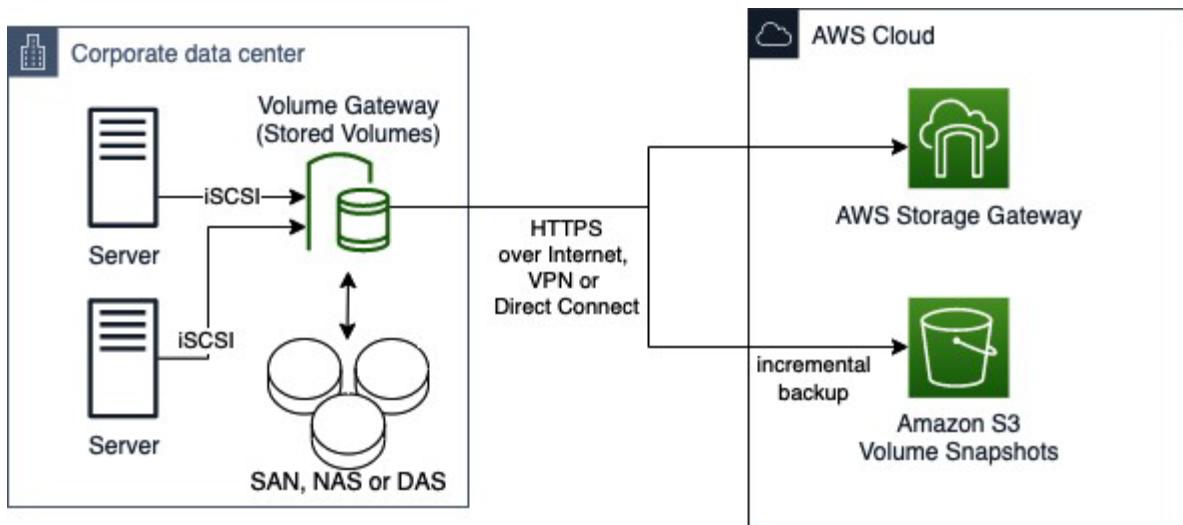


Figure 2.10: Volume Gateway (stored volumes)

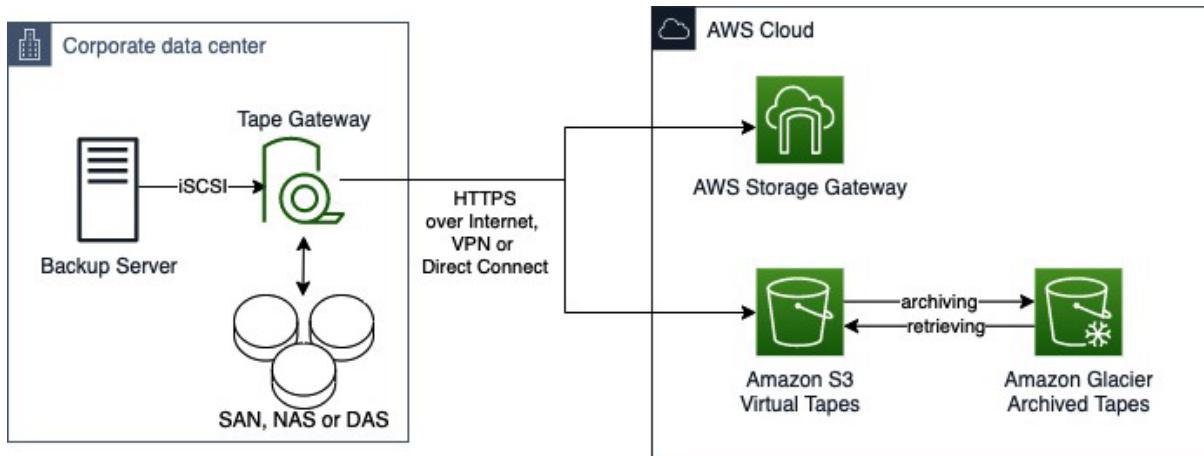


Figure 2.11: Tape gateway

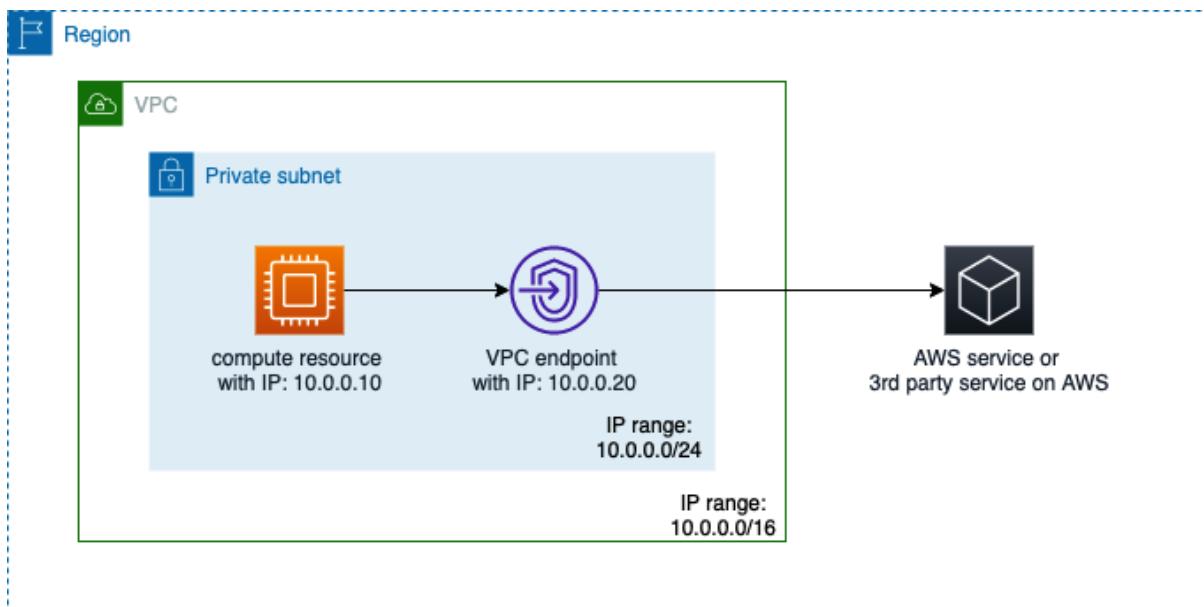


Figure 2.12: VPC endpoint

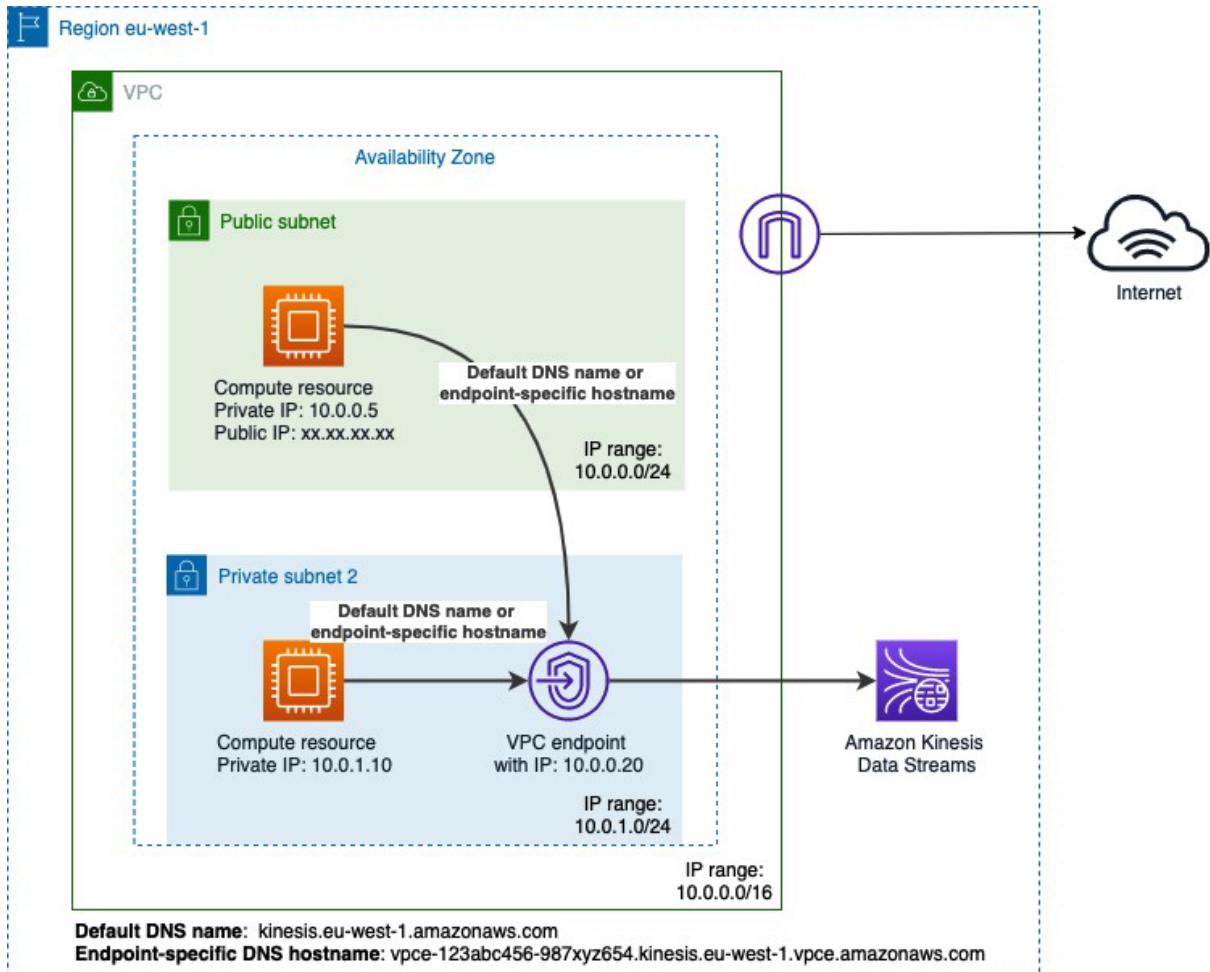


Figure 2.13: VPC interface endpoints and DNS names

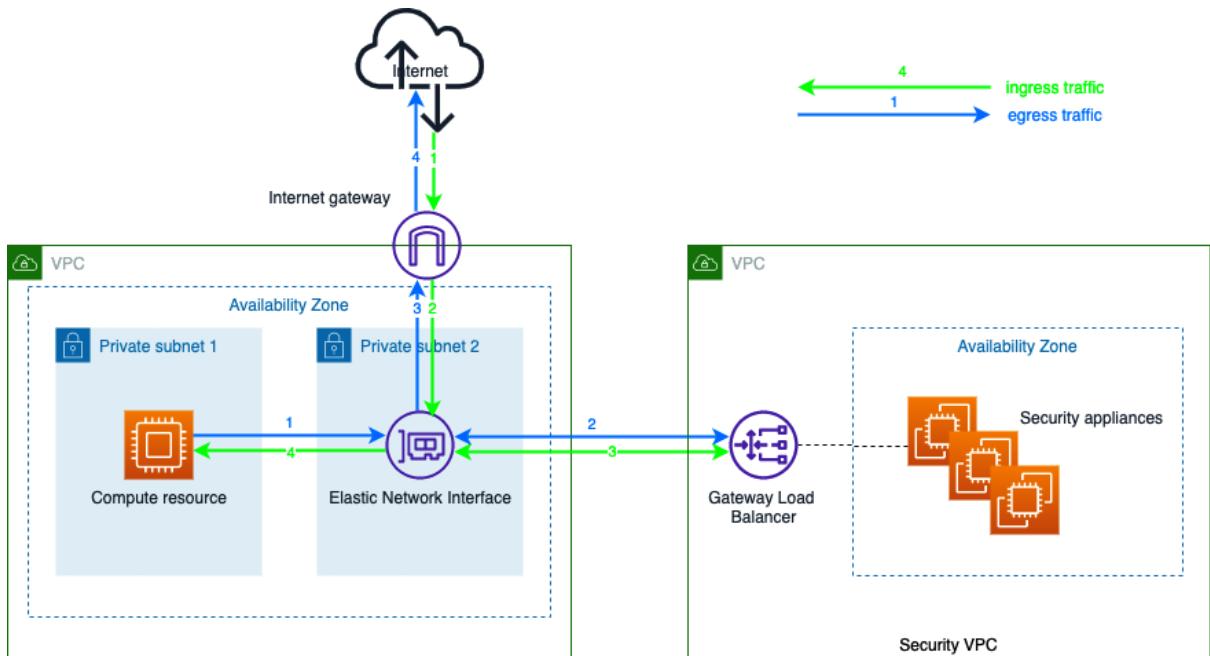


Figure 2.14: GWLB endpoint

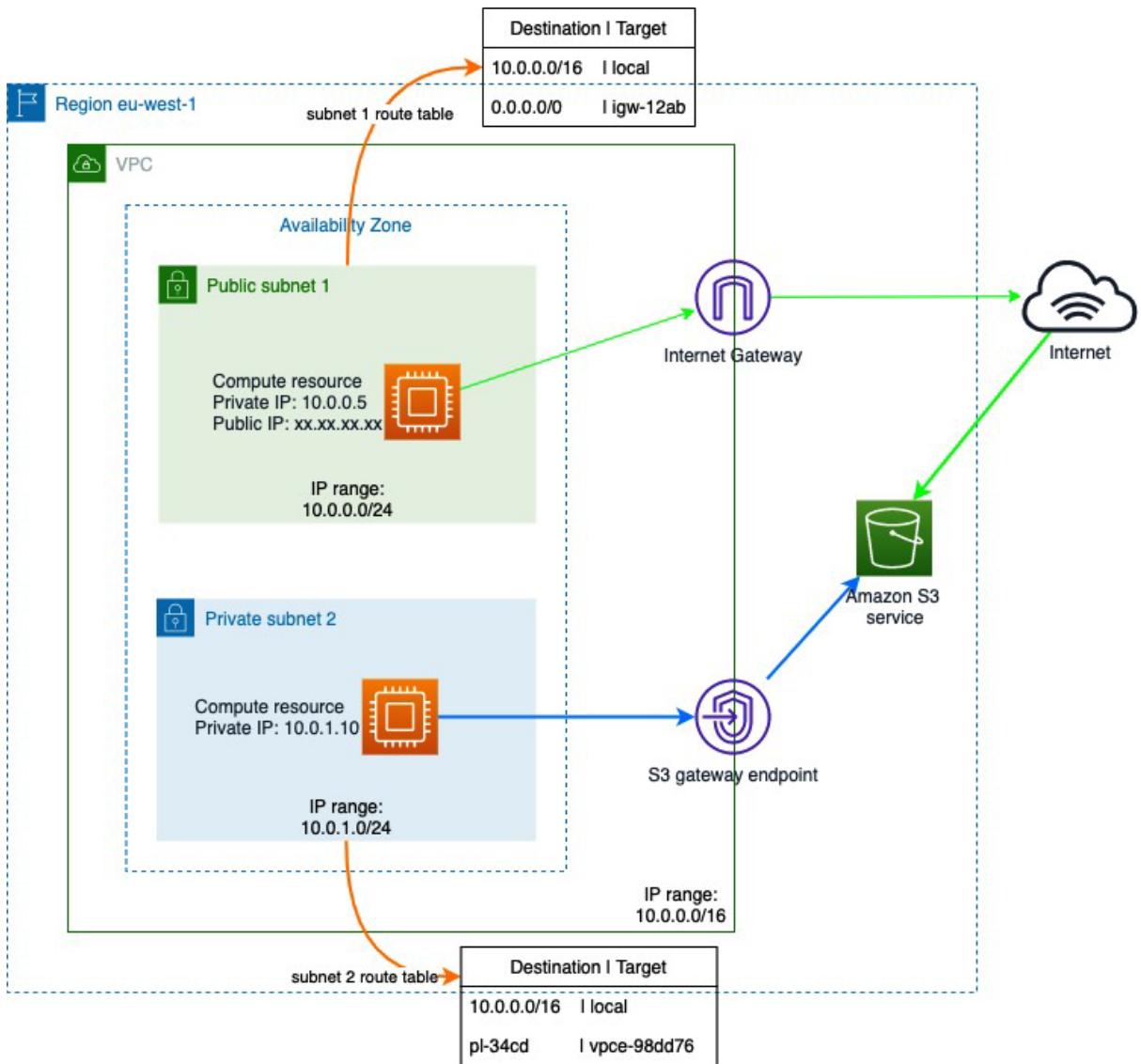


Figure 2.15: VPC gateway endpoint

Chapter 3: Designing a Multi-Account AWS Environment for Complex Organizations

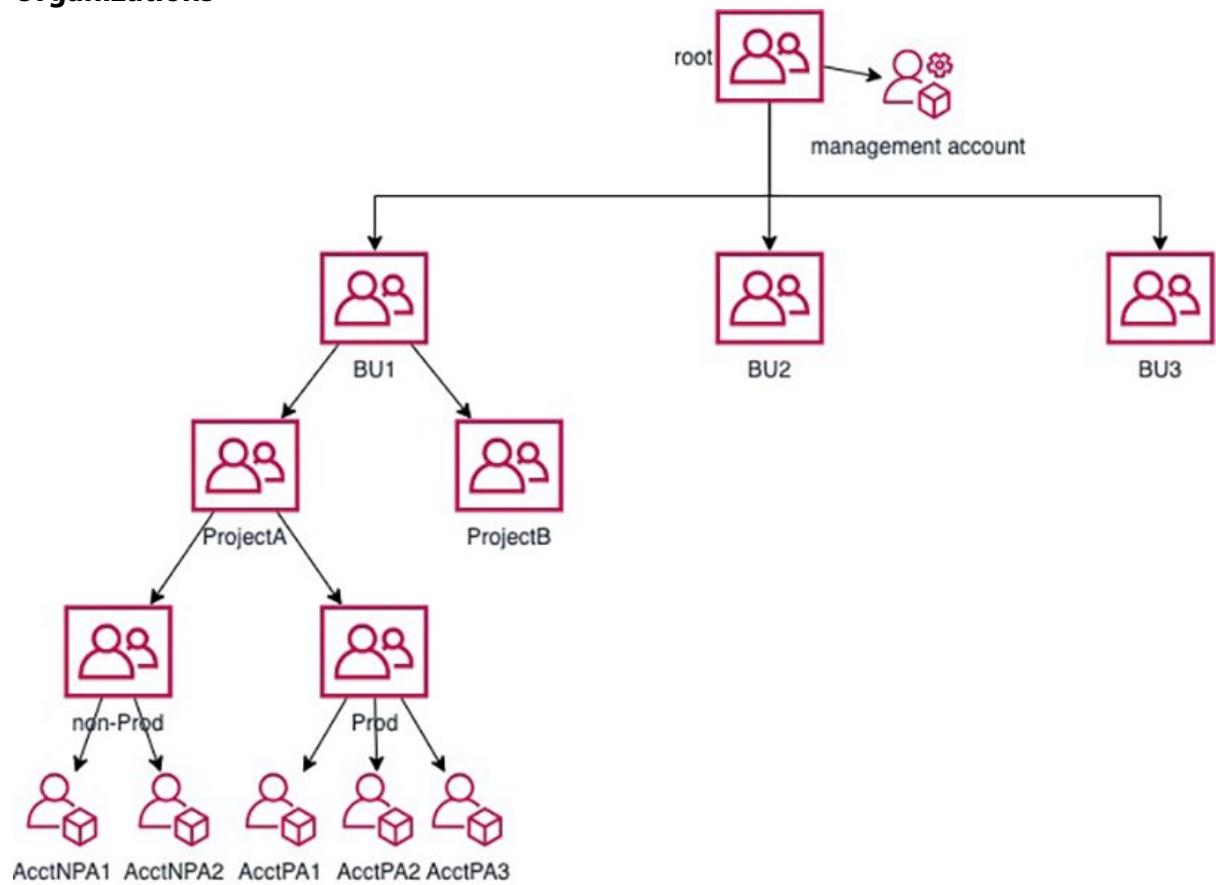


Figure 3.1: Example of account structure

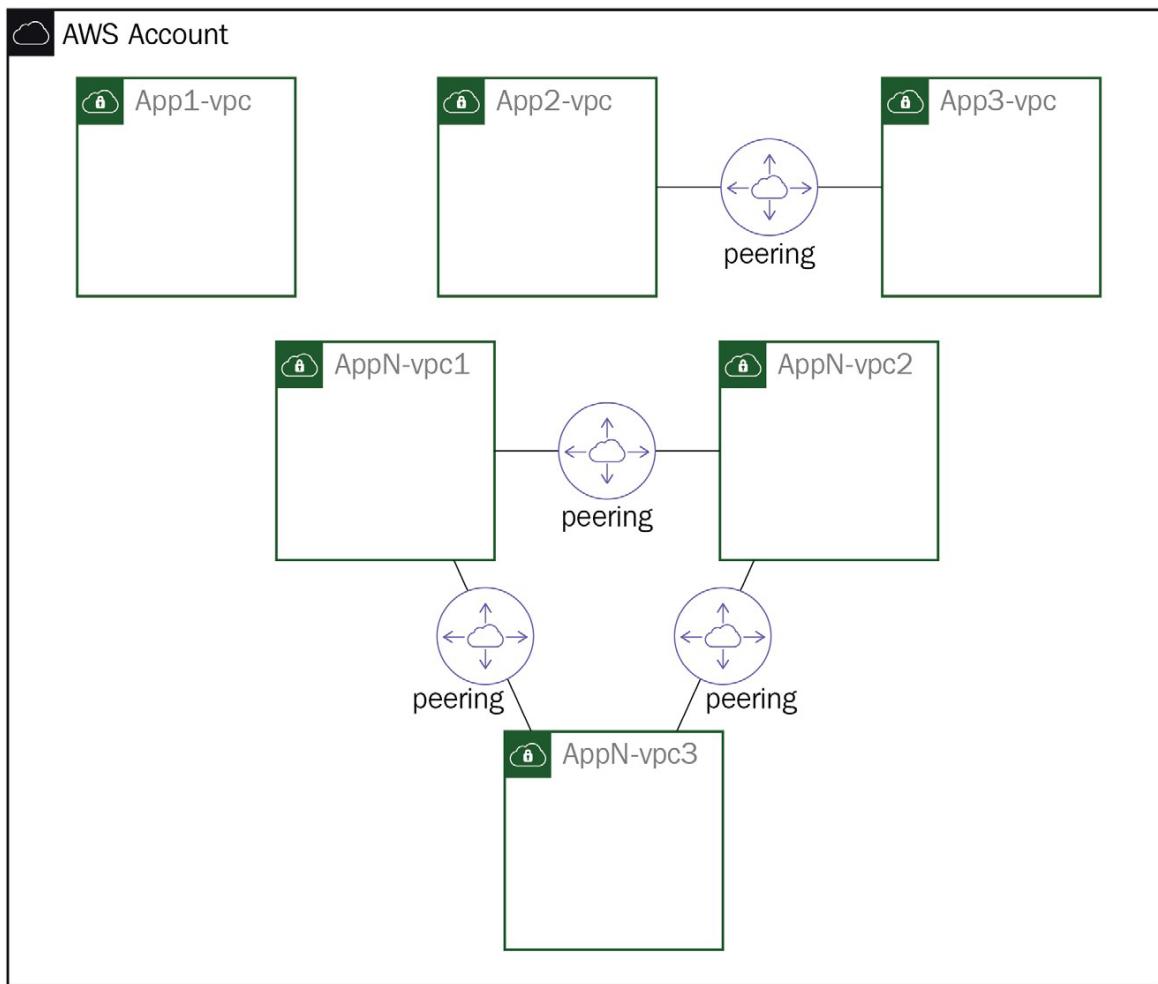


Figure 3.2: Example of VPC organization

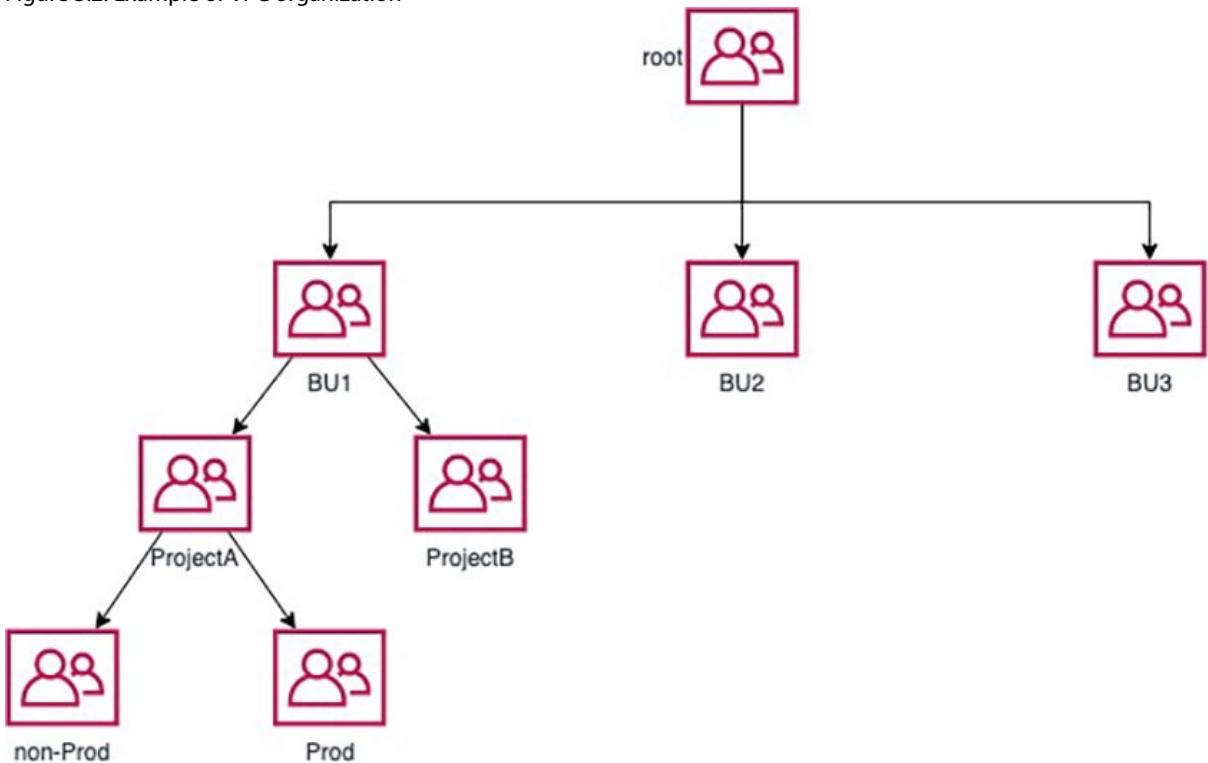


Figure 3.3: BU style

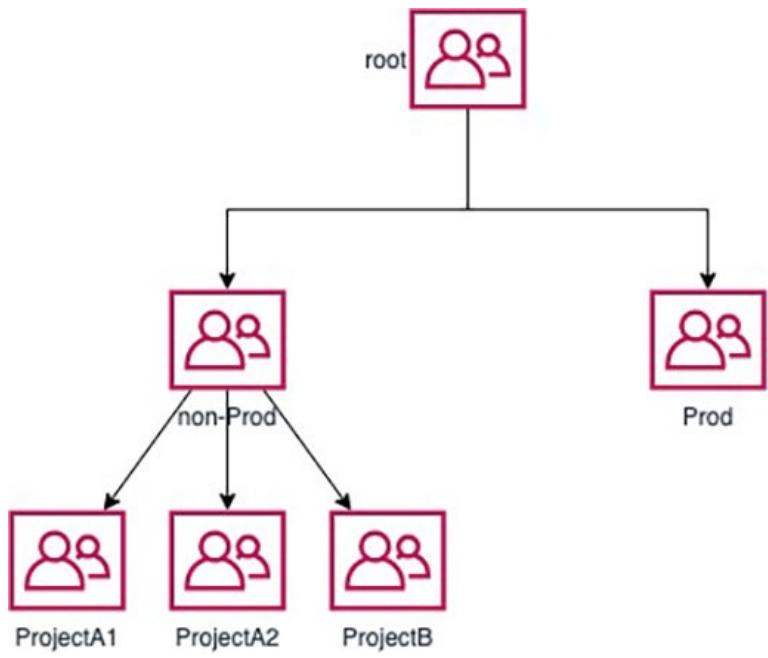


Figure 3.4: Environment style

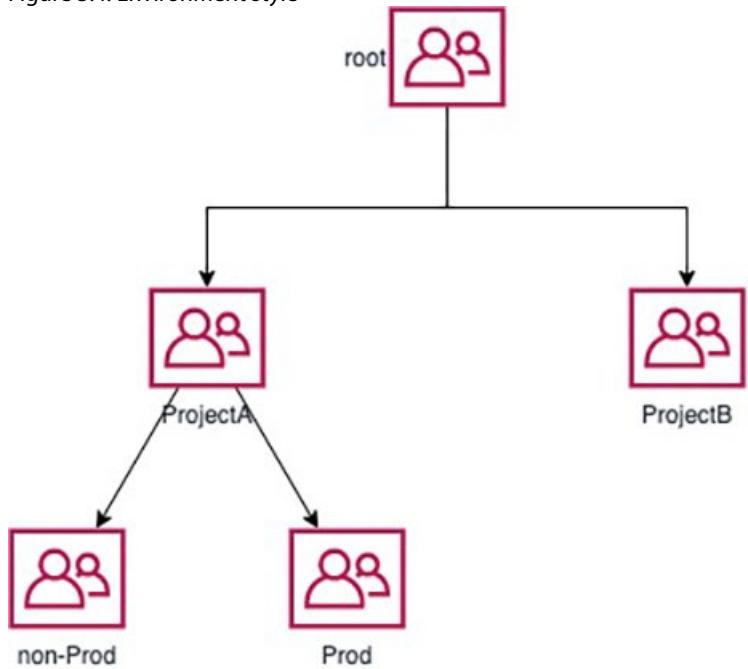


Figure 3.5: Project style

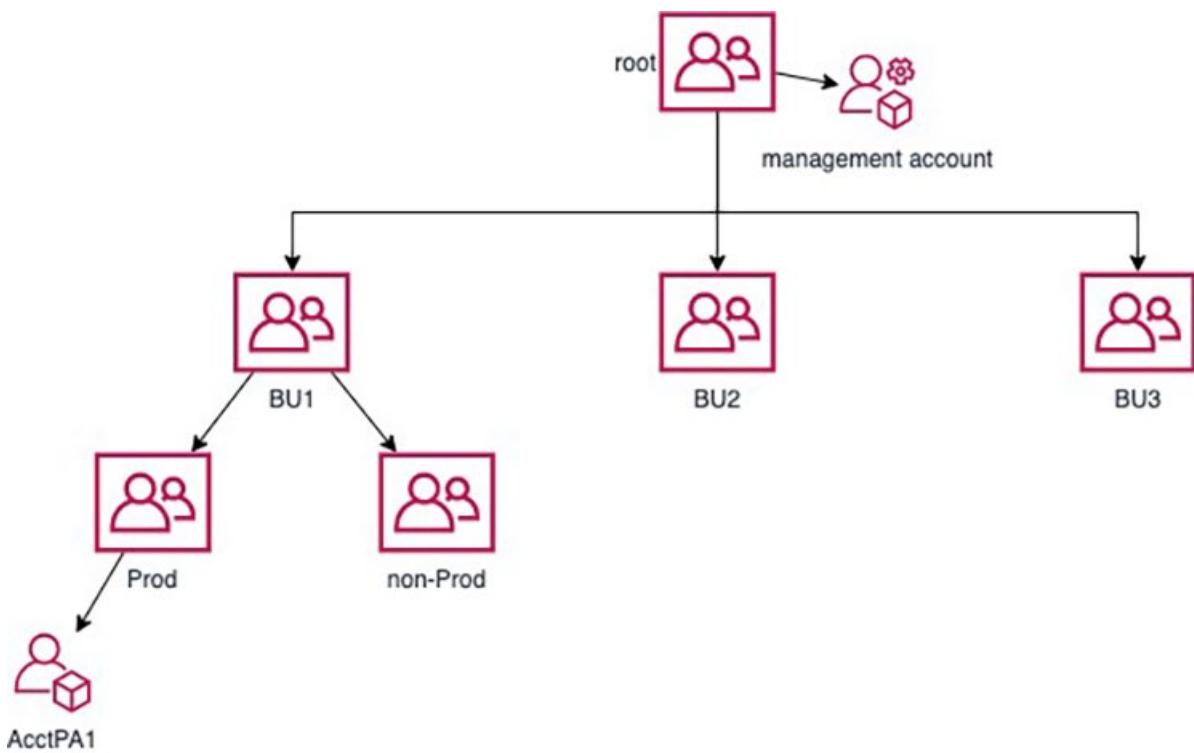


Figure 3.6 – Example organizational structure

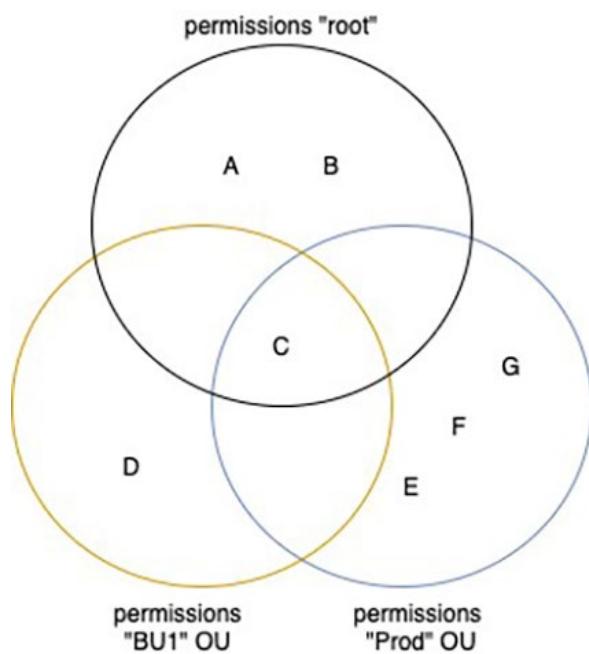


Figure 3.7: OU permissions intersection

Chapter 4: Ensuring Cost Optimization

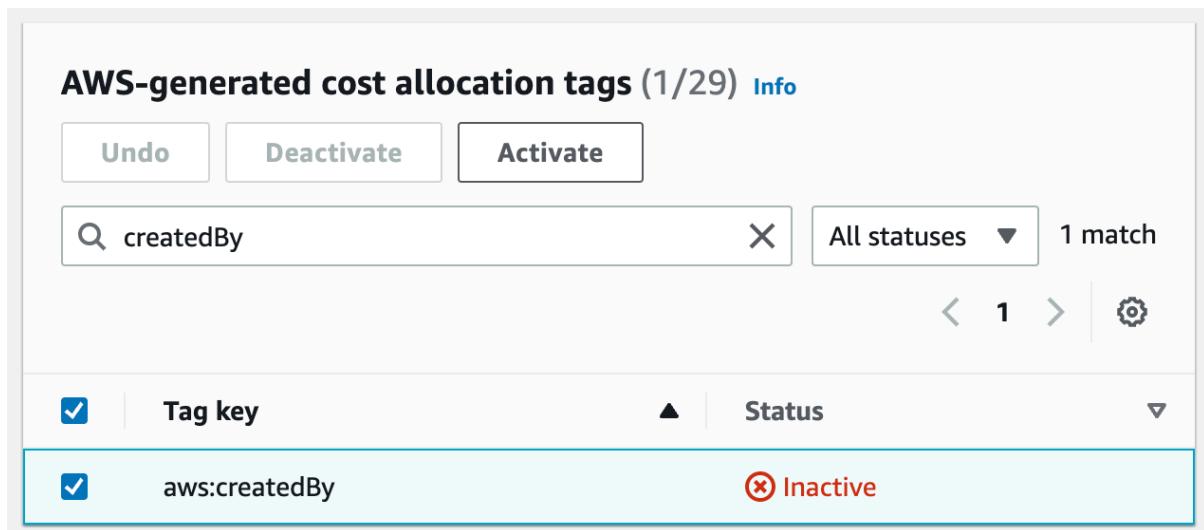


Figure 4.1: AWS-generated cost allocation tag enablement

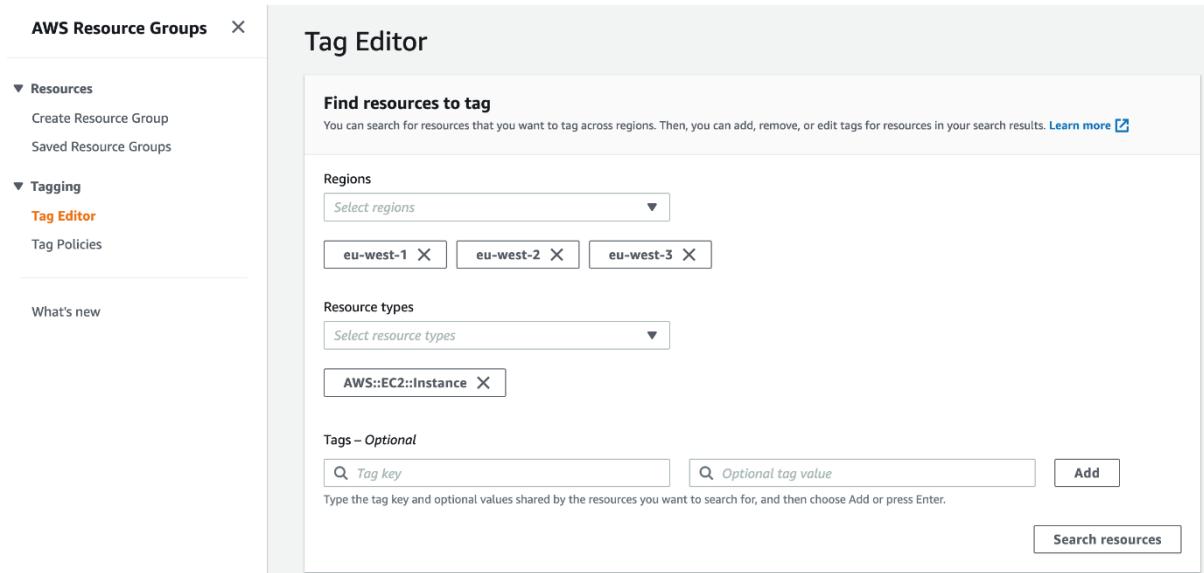


Figure 4.2: AWS Tag Editor dashboard

Edit tags of all selected resources

Overwrite existing tags or add new tags to the editable resources that you selected.

Tag key	Tag value - optional	
Name	wickr-enterprise	Remove tag
Patch Group	AccountGuardian-PatchGroup-DO-NOT-DELETE	Remove tag
Environment	Production	Remove tag
Department	DEV01	Remove tag
Cost Center	2345	Remove tag

Add tag

Cancel **Previous** **Review and apply tag changes**

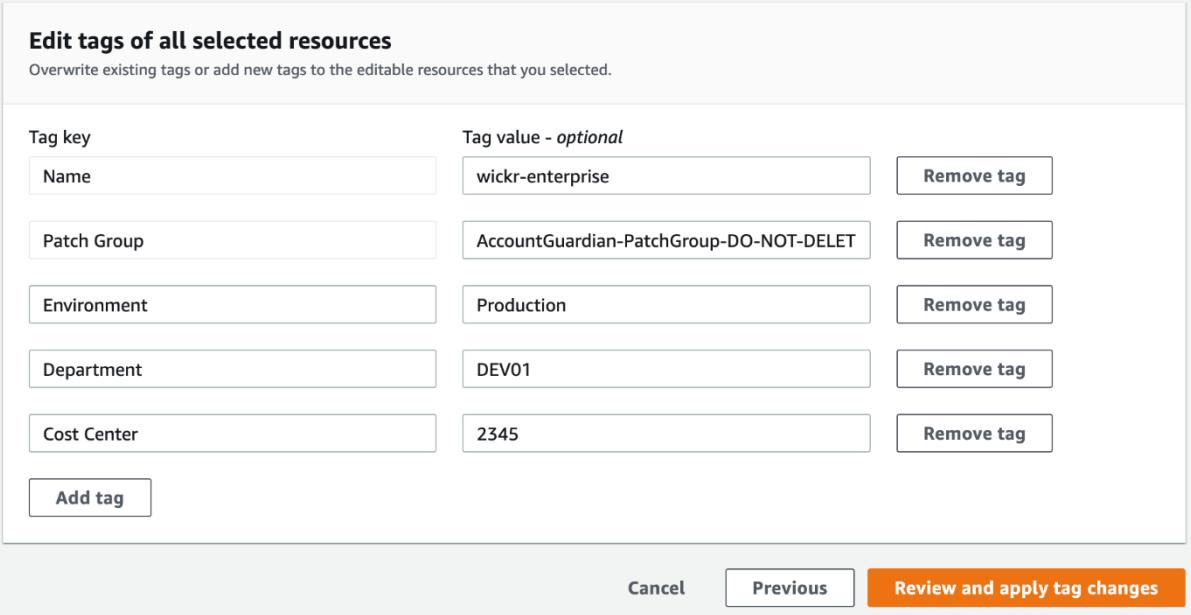


Figure 4.3: Applying tags to resources

Receive Billing Alerts

Turn on this feature to monitor your AWS usage charges and recurring fees automatically, making it easier to track and manage your spending on AWS. You can set up billing alerts to receive email notifications when your charges reach a specified threshold. Once enabled, this preference cannot be disabled. [Manage Billing Alerts](#) or [try the new budgets feature!](#)

► **Detailed Billing Reports [Legacy]**

Save preferences

Figure 4.4: Enabling billing alerts using the AWS Billing dashboard

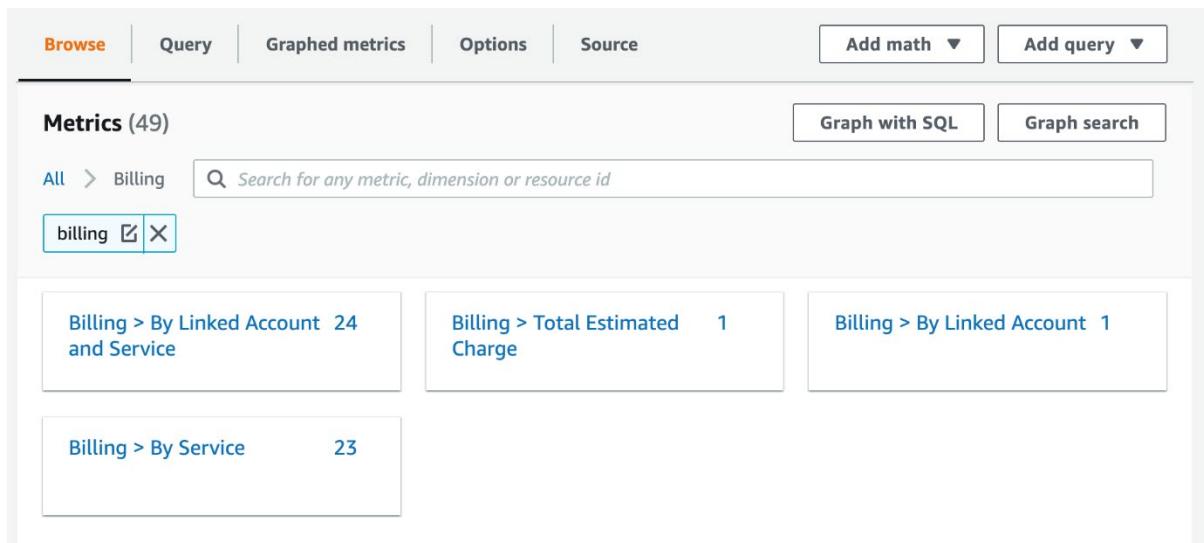


Figure 4.5: Total estimate billing alarm configuration

Create subscription

Details

Topic ARN
arn:aws:sns:us-east-1:930252226678:billing

Protocol
The type of endpoint to subscribe
Email

Endpoint
An email address that can receive notifications from Amazon SNS.
finops@example.com

Info After your subscription is created, you must confirm it. [Info](#)

Figure 4.6: Billing notification configuration using Amazon SNS

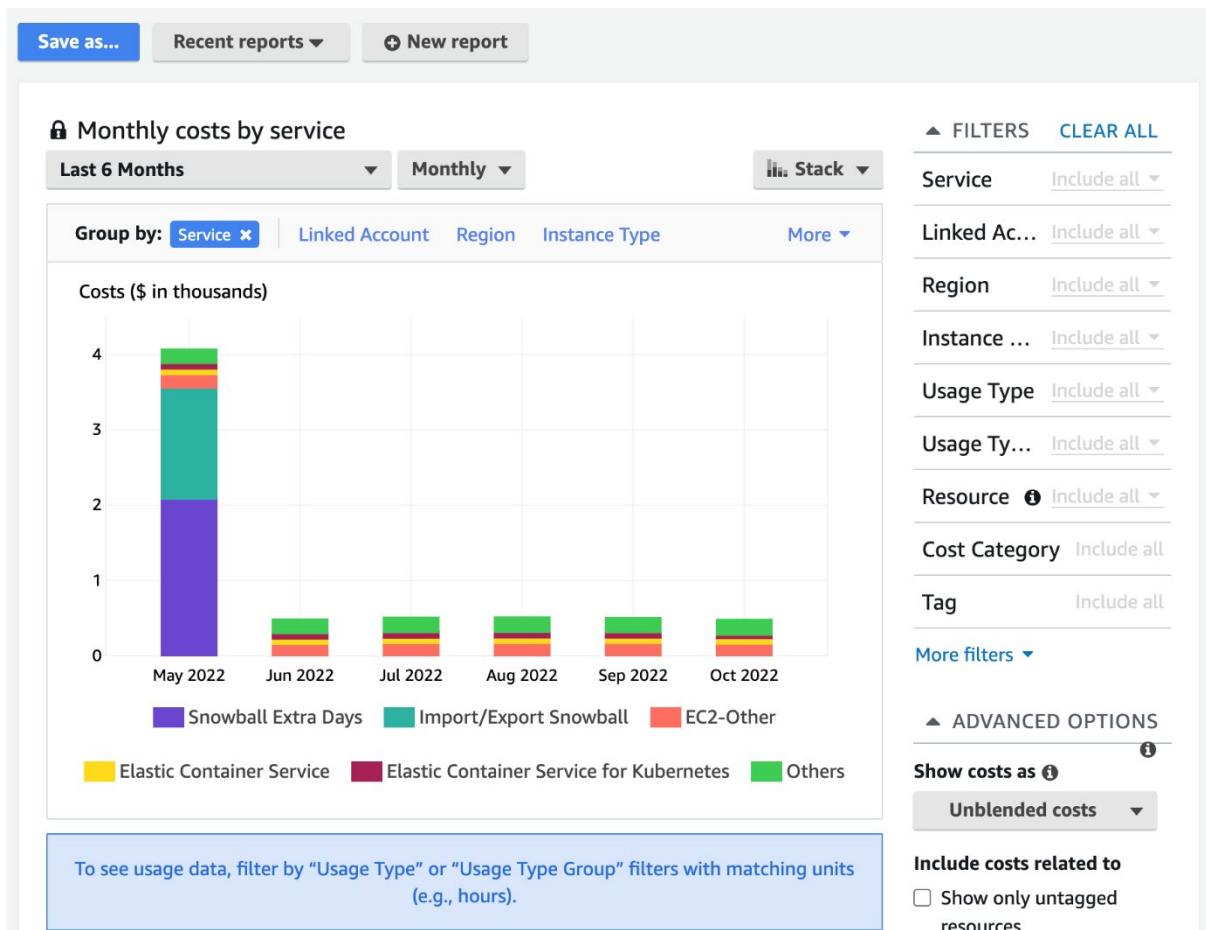


Figure 4.7: Cost Explorer “Monthly costs by service” view

Chapter 5: Determining Security Requirements and Controls

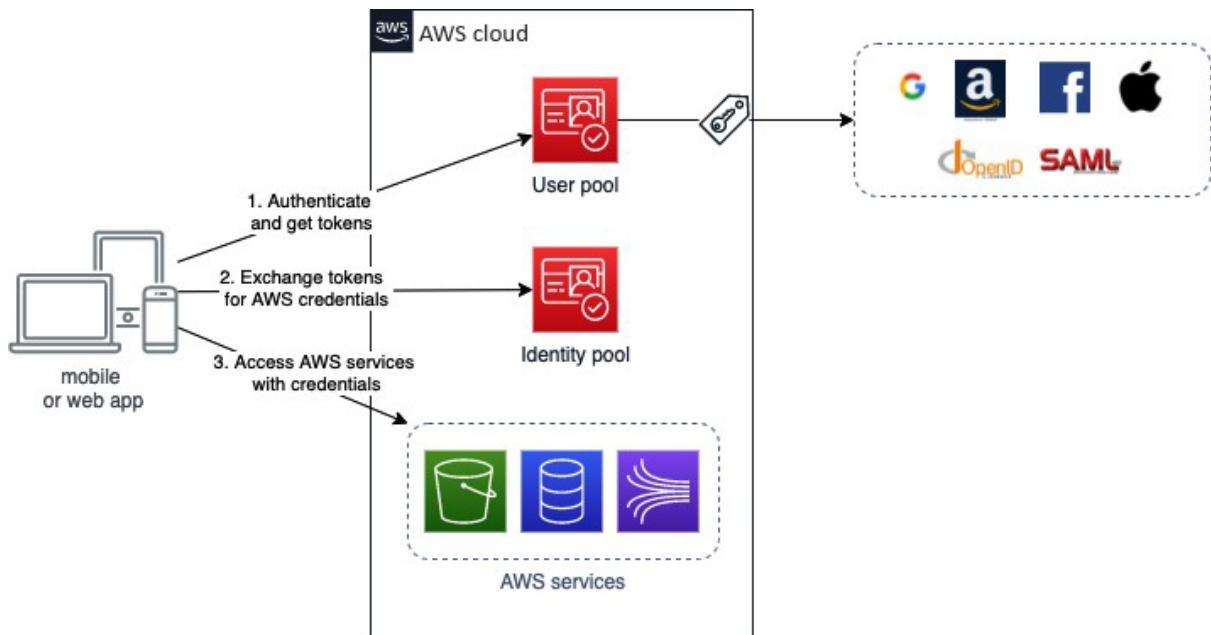


Figure 5.1: Amazon Cognito concepts overview

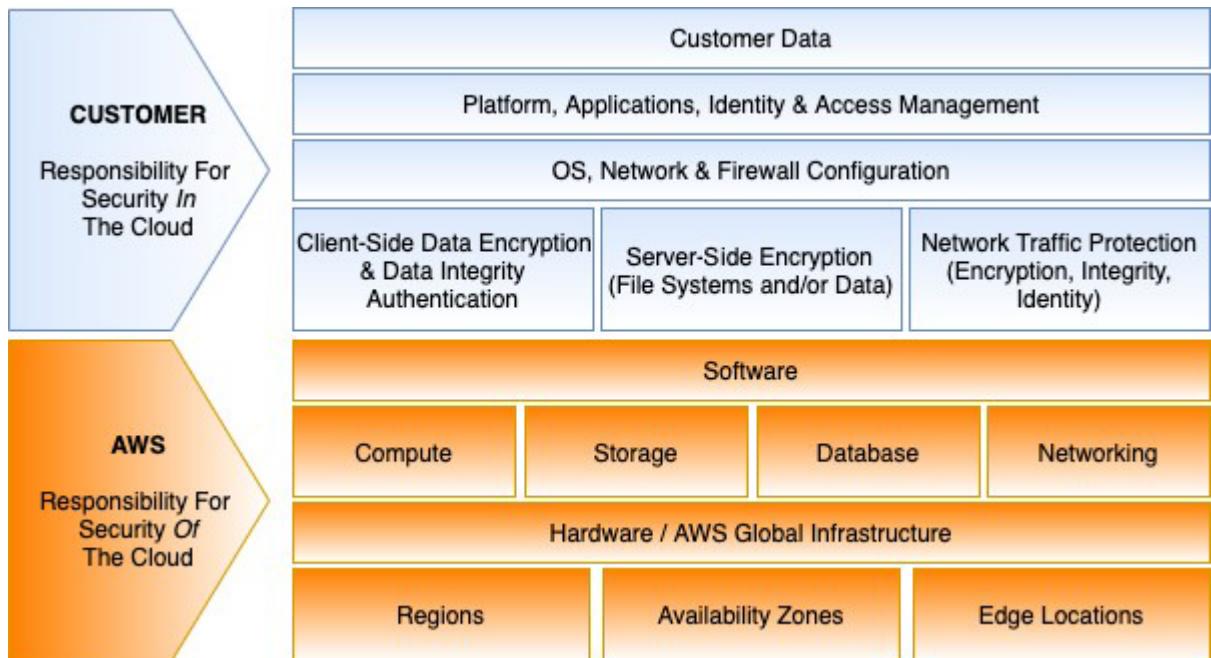


Figure 5.2: AWS shared responsibility model

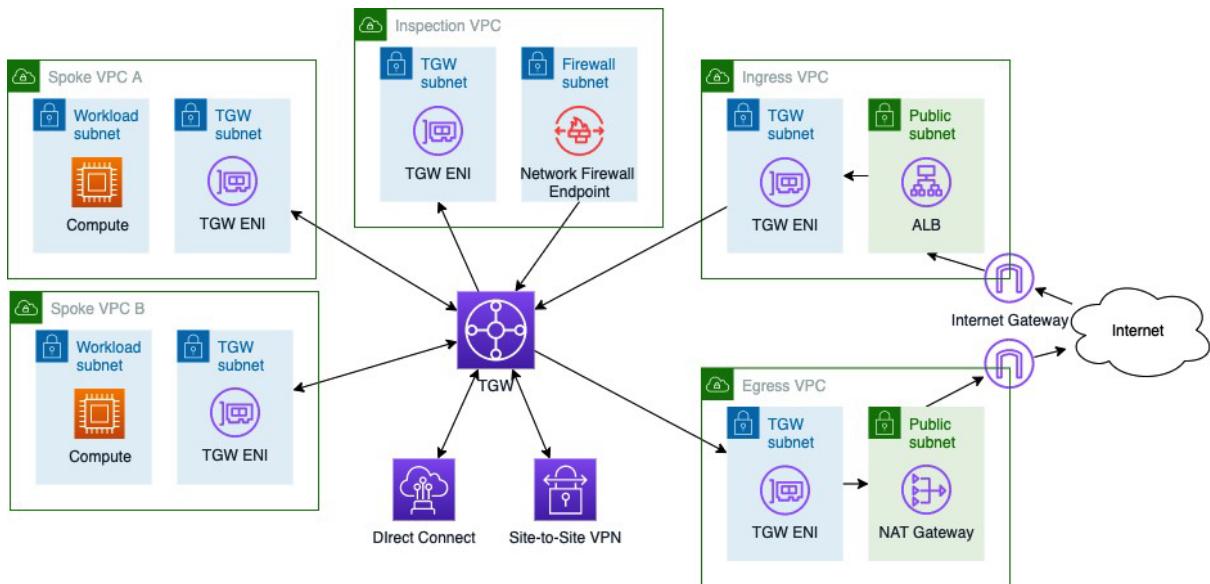


Figure 5.3: Illustration of a centralized setup with TGW and inspection via Network Firewall (NFW)

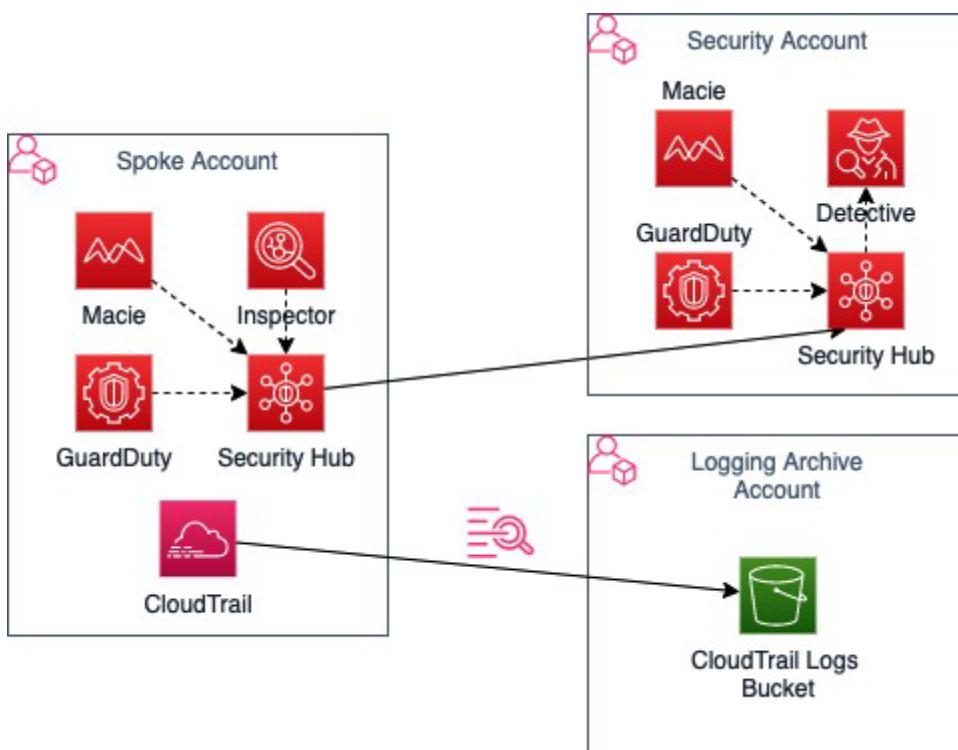


Figure 5.4: Incident detection and centralized CloudTrail logs

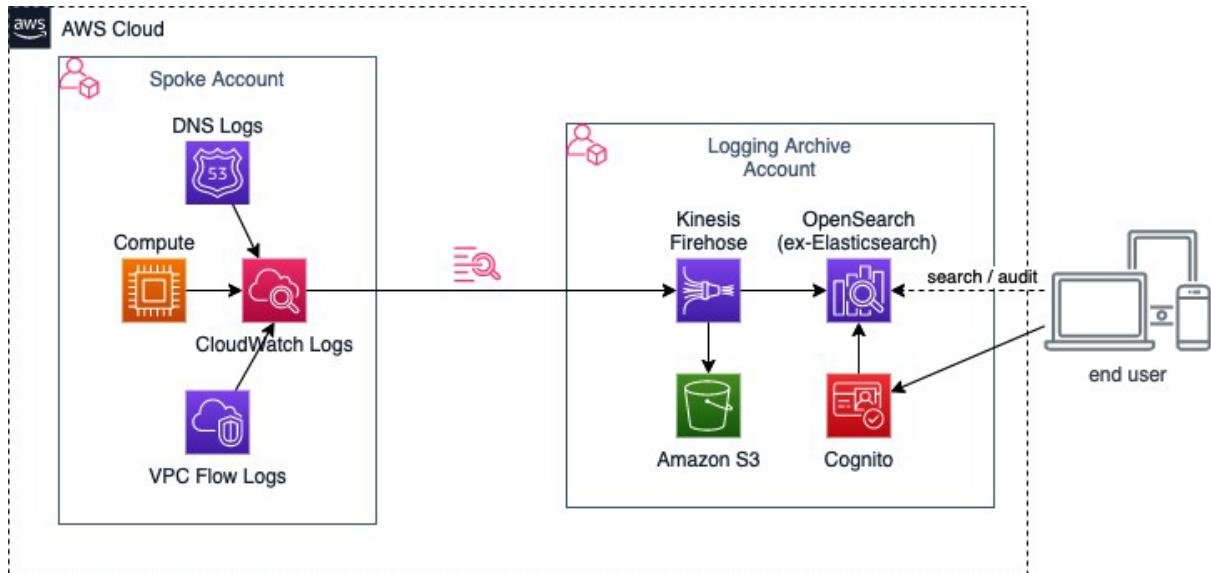


Figure 5.5 – Centralized logging and log indexing for search and audit

Chapter 6: Meeting Reliability Requirements

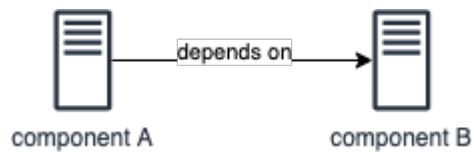


Figure 6.1: Tight coupling

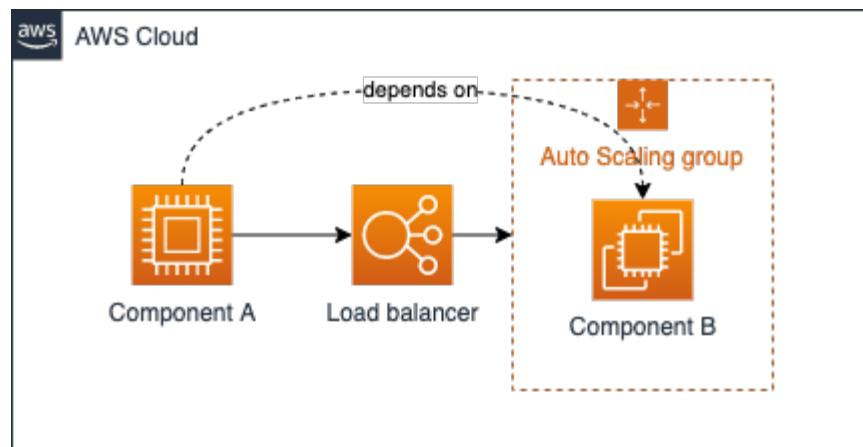


Figure 6.2: Loose coupling (synchronous communication)

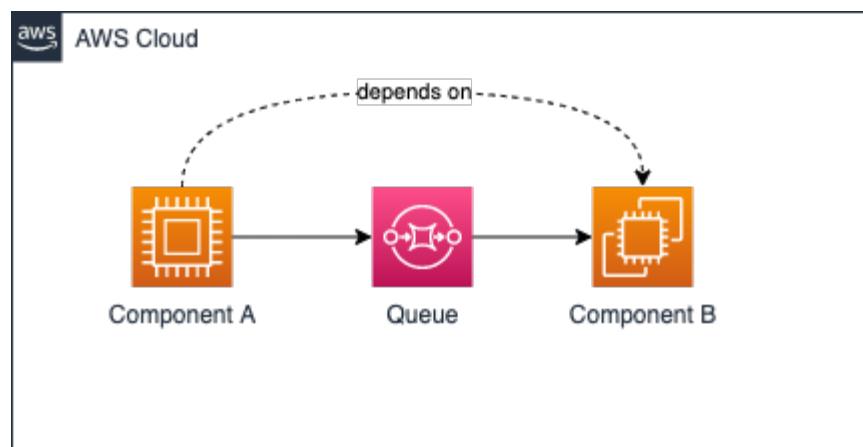


Figure 6.3: Loose coupling (asynchronous communication)

Chapter 7: Ensuring Business Continuity

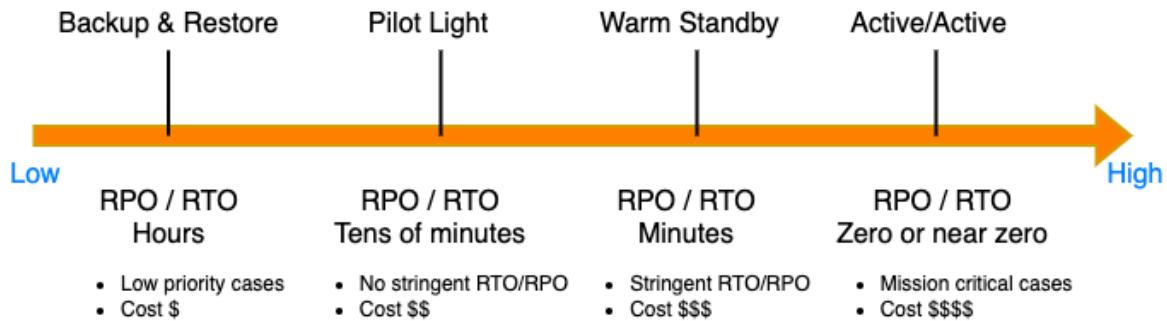


Figure 7.1: DR strategies cost and complexity

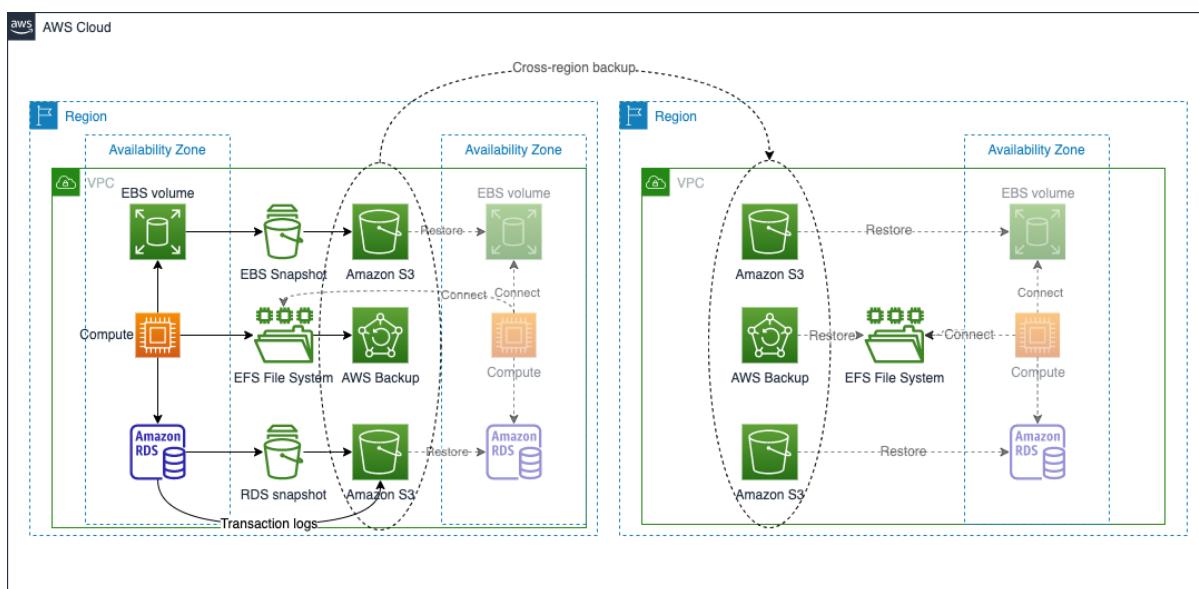


Figure 7.2: Backup and restore approach

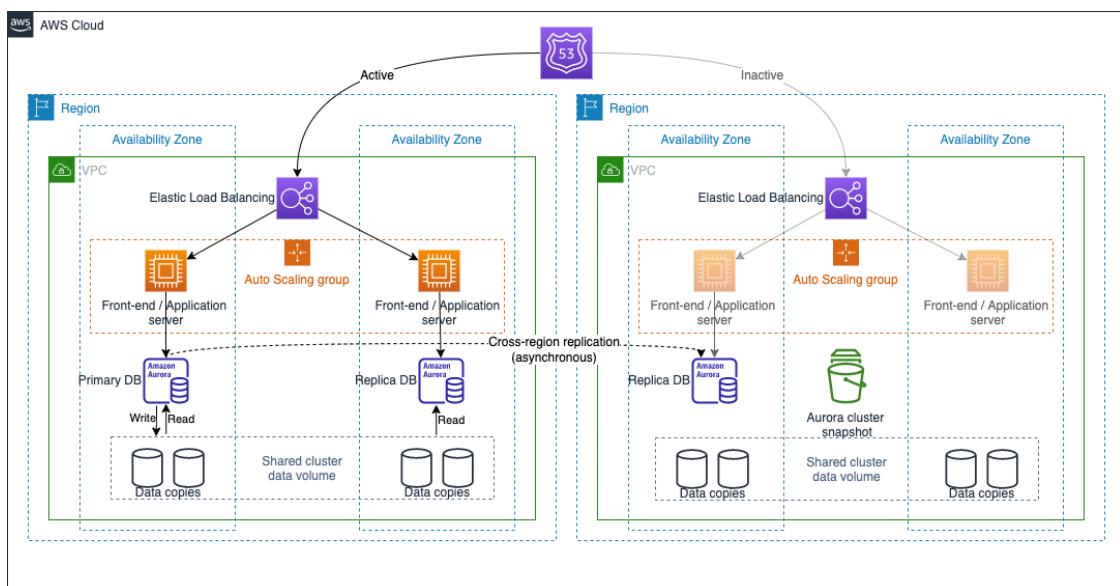


Figure 7.3: Pilot light approach

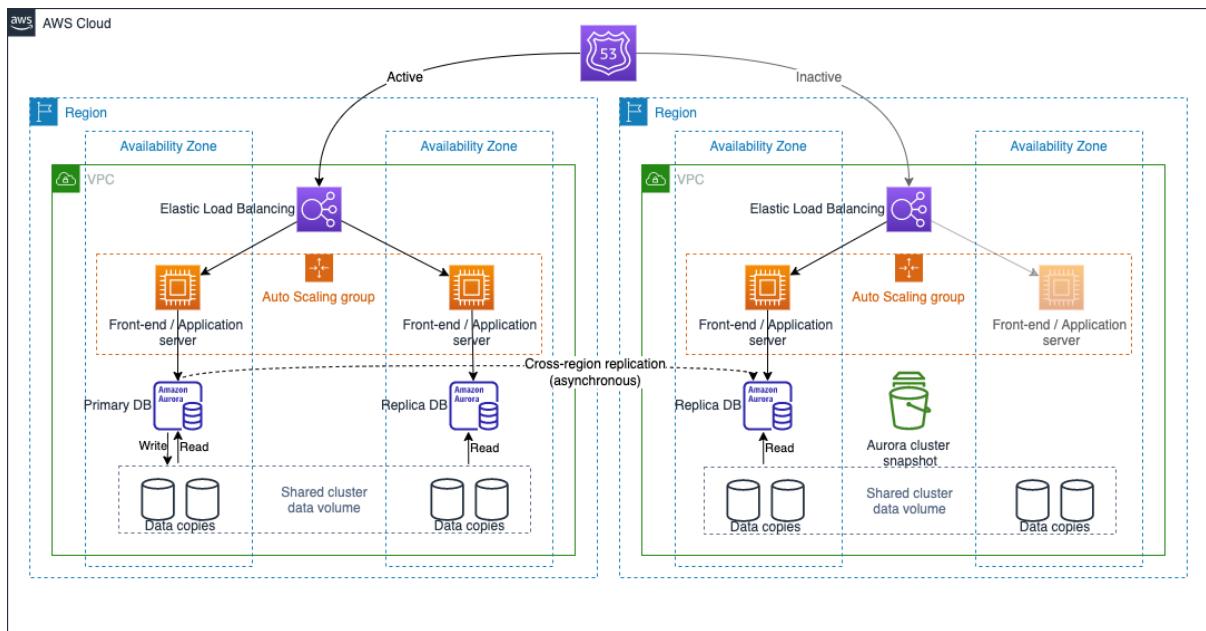


Figure 7.4: Warm standby approach

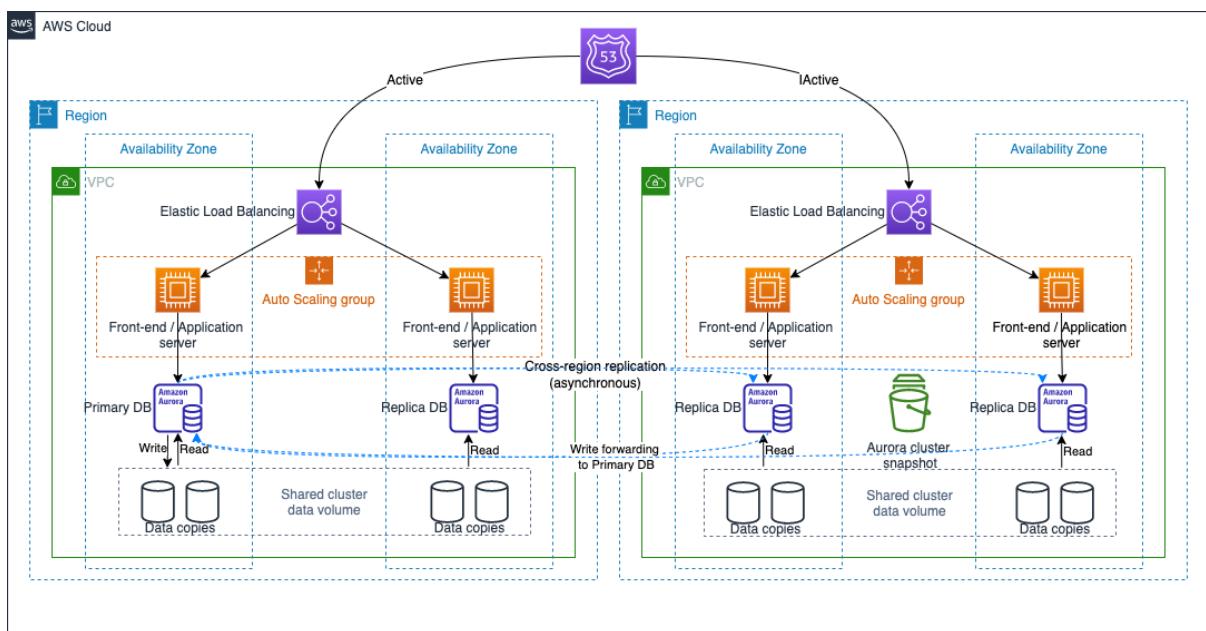


Figure 7.5: Active-active approach

Chapter 8: Meeting Performance Objectives

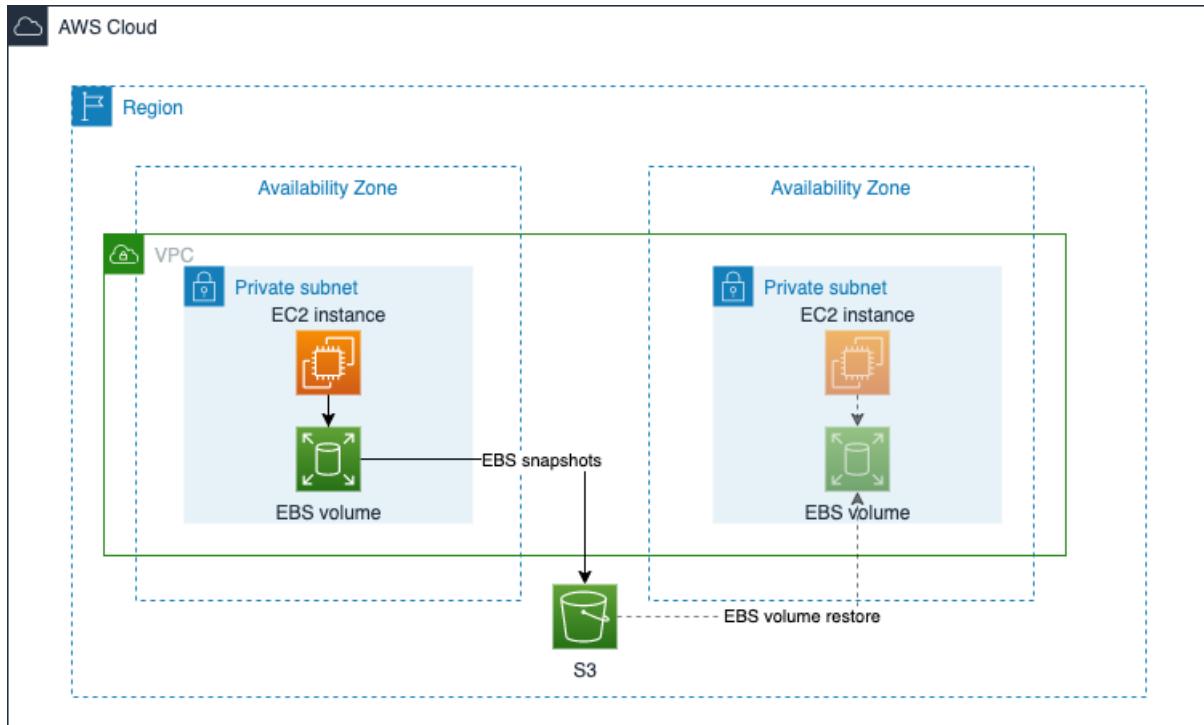


Figure 8.1: EBS volume attach, snapshot, and restore

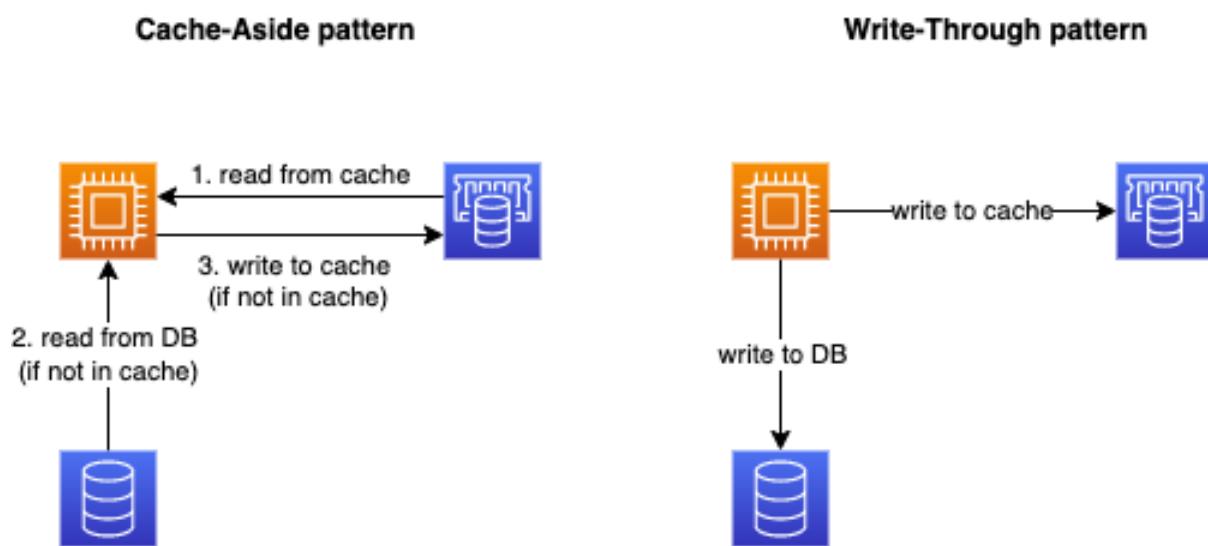


Figure 8.2: Cache patterns: cache-aside and write-through

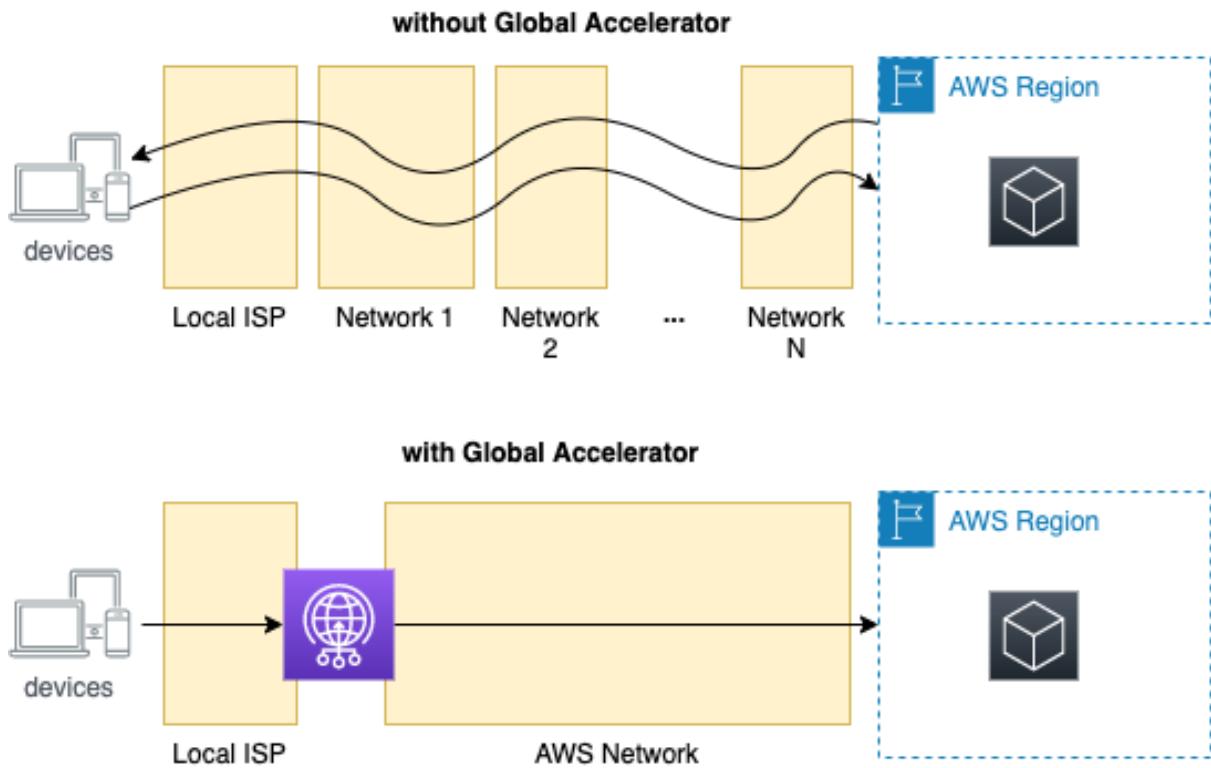


Figure 8.3: Side-by-side visualization: with and without AWS Global Accelerator

Chapter 10: Designing for Cost Efficiency

The screenshot shows the 'Select service' step of the AWS Pricing Calculator. A search bar at the top contains the query 'Amazon EC2'. Below the search bar are two service cards. The first card is for 'Amazon EC2', which offers the broadest and deepest compute platform. The second card is for 'Amazon EC2 Dedicated Hosts', which allows using eligible software licenses on Amazon EC2. Both cards have 'Product page' and 'Configure' buttons. The 'Configure' button for the Amazon EC2 card is highlighted with a red box.

Figure 10.1: Service selection using AWS Pricing Calculator

The screenshot shows the 'My Estimate' dashboard of the AWS Pricing Calculator. At the top, there's an 'Estimate summary' section showing Upfront cost (0.00 USD), Monthly cost (27,591.75 USD), and Total 12 months cost (331,100.98 USD, including upfront cost). To the right is a 'Getting Started with AWS' sidebar with 'Contact Sales' and 'Sign in to the Console' buttons. Below the summary is a table titled 'My Estimate' listing resources: 'Amazon EC2' (Upfront cost 0.00 USD, Monthly cost 434.26 USD) and 'Amazon RDS Custom for SQL Ser...' (Upfront cost 0.00 USD, Monthly cost 27,157.49 USD). Action buttons for 'Duplicate', 'Delete', 'Move to', 'Create group', 'Add support', and 'Add service' are available above the table. A search bar labeled 'Find resources' is also present.

Figure 10.2: The estimates dashboard

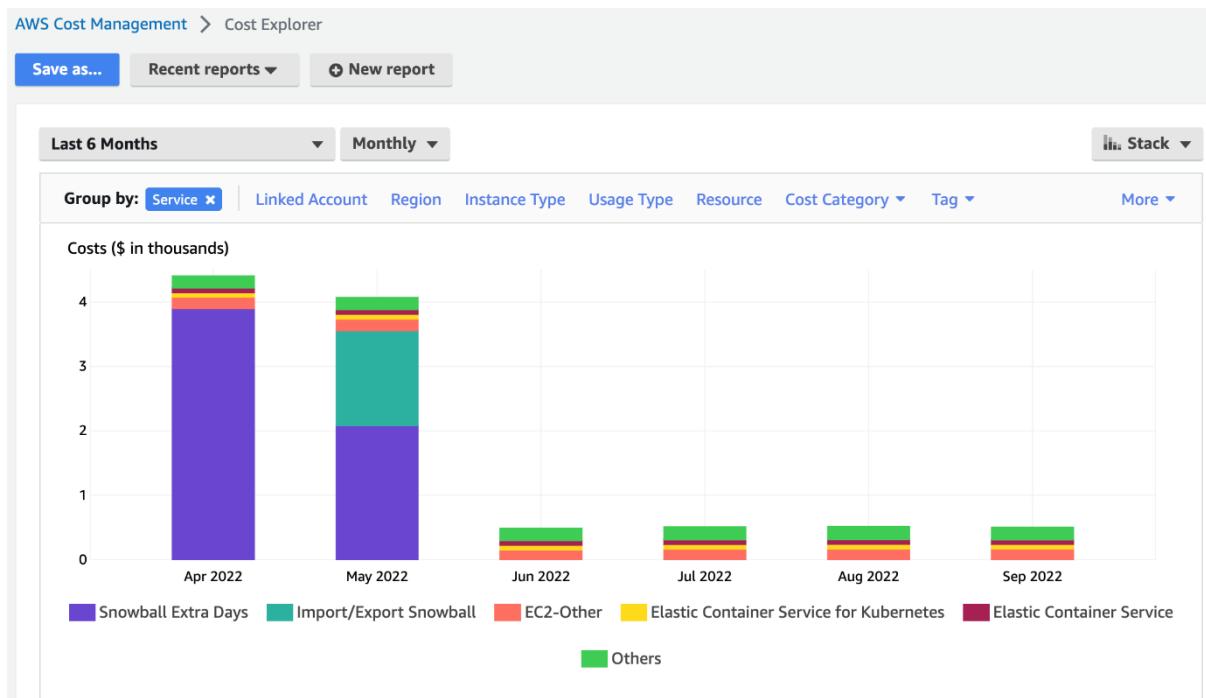


Figure 10.3: The AWS Cost Explorer dashboard

AWS Cost and Usage Reports

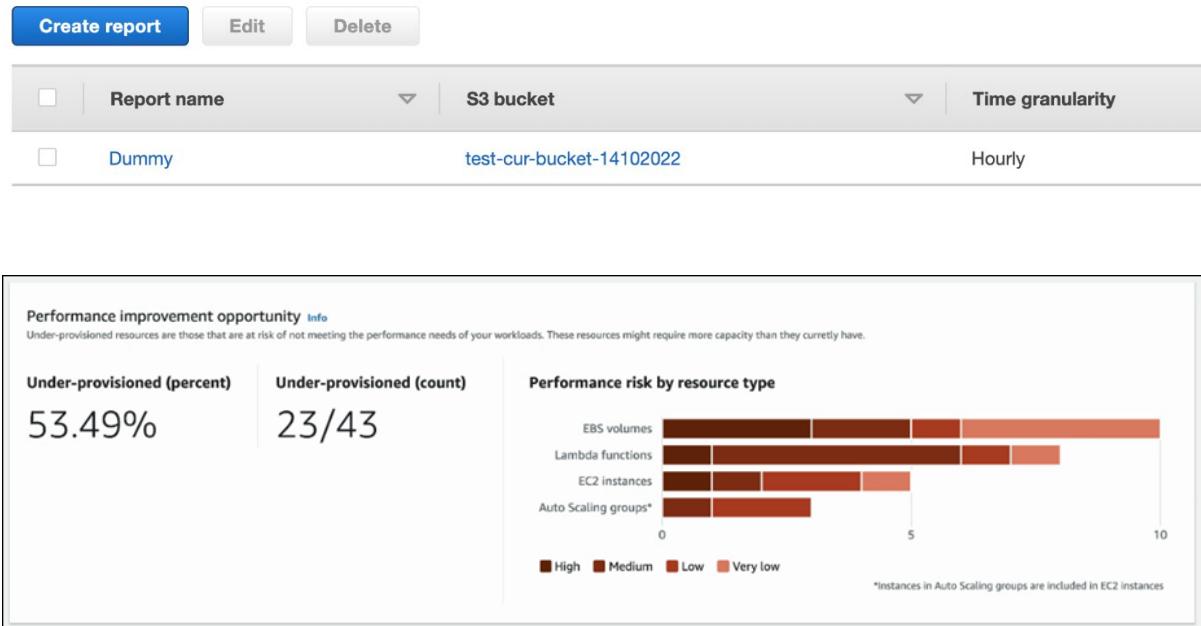


Figure 10.4: AWS CUR

Chapter 11: Improving the Operational Excellence

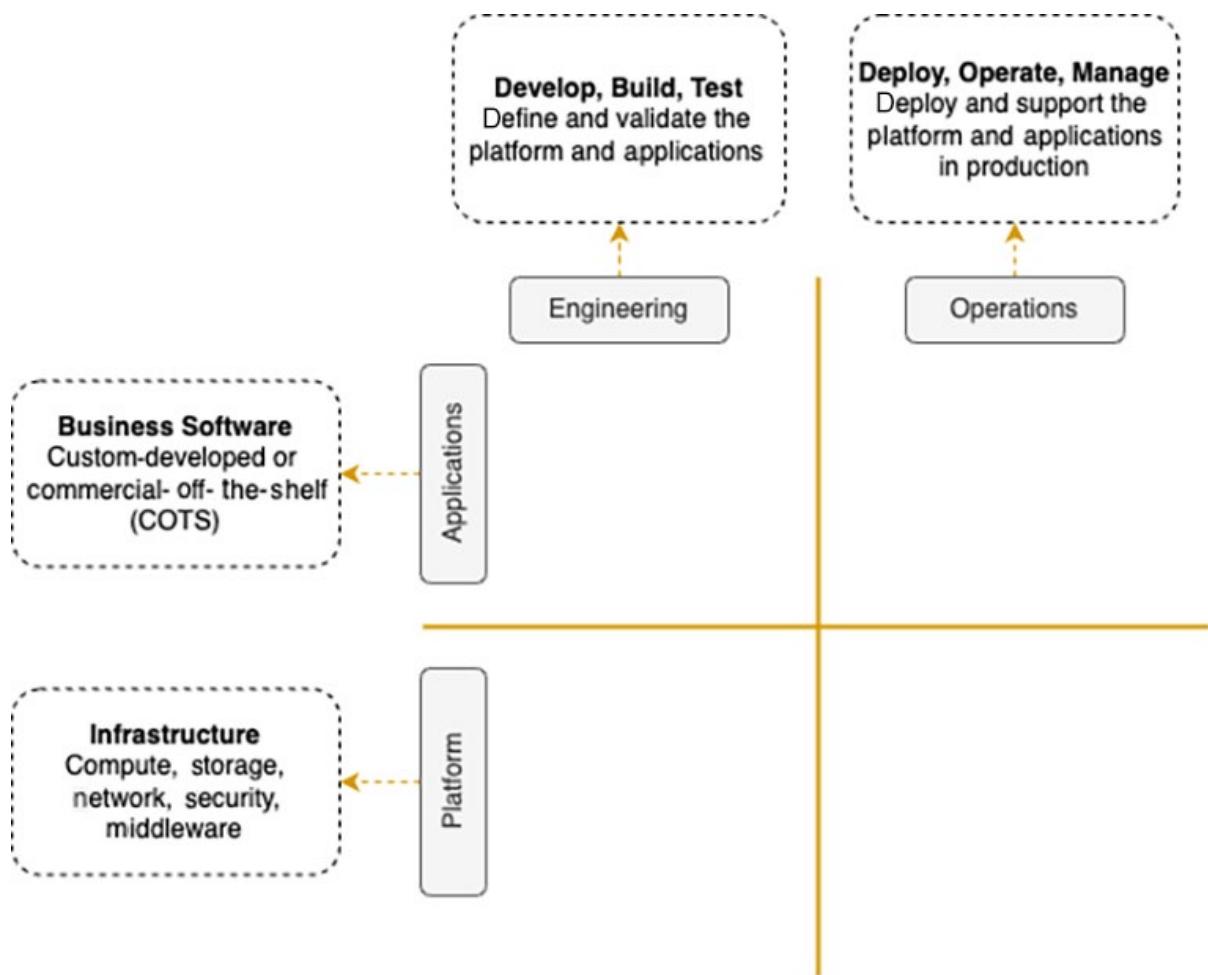


Figure 11.1: A 2x2 template representing an operating model graphical representation

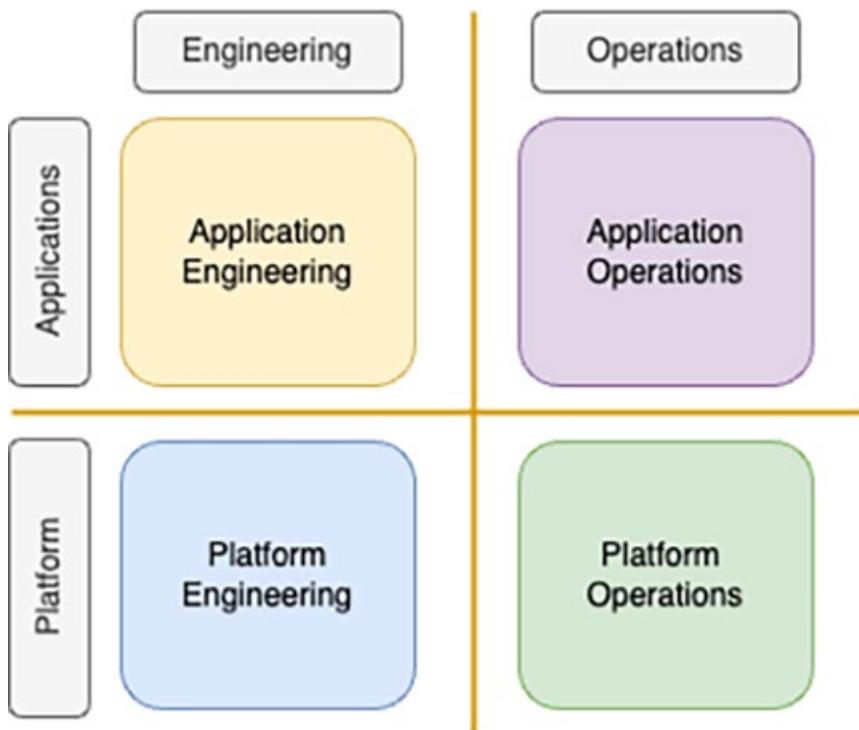


Figure 11.2: A fully separated operating model

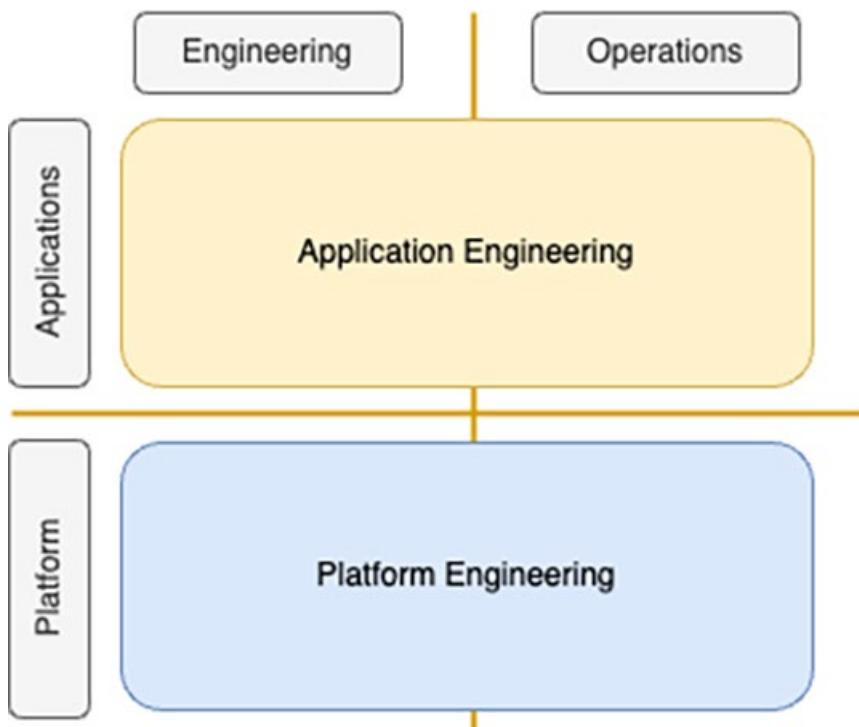


Figure 11.3: Separated AEO and PEO with centralized governance

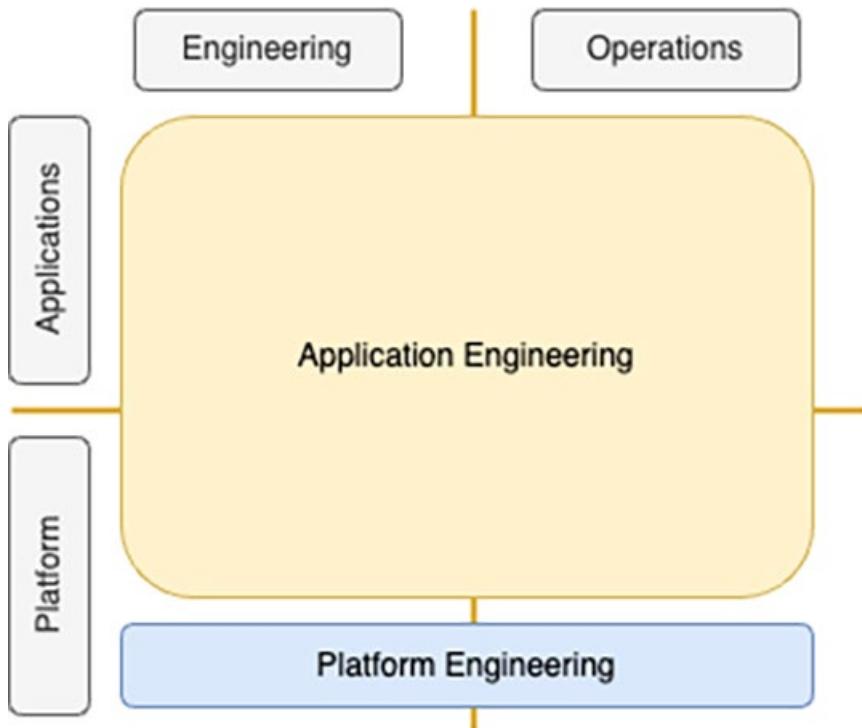


Figure 11.4: Separated AEO and PEO with decentralized governance

Chapter 12: Improving Reliability

Improvement plan

Improvement item summary

High risk: 10

Medium risk: 3

Pillar	High risk	Medium risk
Reliability	10	3
Security	0	0
Operational Excellence	0	0
Performance Efficiency	0	0
Cost Optimization	0	0
Sustainability	0	0

Figure 12.1: Example of a Well-Architected Review results overview

4. How do you design interactions in a distributed system to prevent failures?
<p><input checked="" type="checkbox"/> High risk</p> <p>Selected choice(s)</p> <ul style="list-style-type: none">Implement loosely coupled dependencies <p>Not selected choice(s)</p> <ul style="list-style-type: none">Identify which kind of distributed system is requiredDo constant workMake all responses idempotentNone of these <p>Best Practices marked as Not Applicable</p> <ul style="list-style-type: none">- <p>Notes</p> <ul style="list-style-type: none">- <p>Improvement plan</p> <ul style="list-style-type: none">Identify which kind of distributed system is requiredDo constant workMake all responses idempotent <p>Ask an expert</p>

Figure 12.2: Example of a high-risk issue

Chapter 14: Improving Security

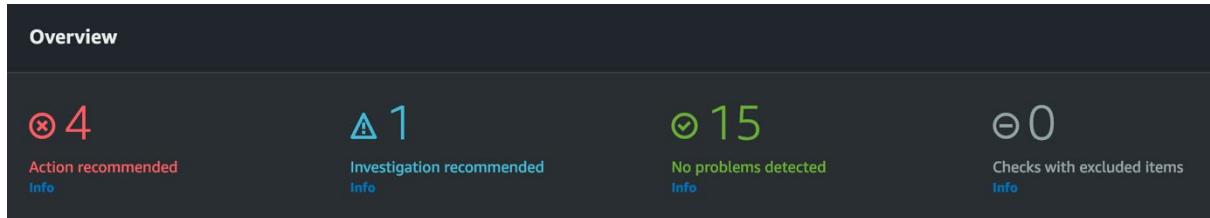


Figure 14.1: Summary of Trusted Advisor checks

The figure displays a sample list of checks from Trusted Advisor. It includes two main sections: 'AWS Lambda Functions Using Deprecated Runtimes' and 'AWS Well-Architected high risk issues for security'. Each section contains a brief description and a count of workloads.

- AWS Lambda Functions Using Deprecated Runtimes**
Checks for Lambda functions that are configured to use a runtime that is approaching deprecation or is deprecated.
1 of 1 workloads have at least one high risk issue in the security pillar.
- AWS Well-Architected high risk issues for security**
Checks for high risk issues (HRIs) for your workloads in the security pillar.
1 of 1 workloads have at least one high risk issue in the security pillar.

Figure 14.2: Sample list of checks from Trusted Advisor

The figure provides detailed information about the 'AWS Lambda Functions Using Deprecated Runtimes' check. It includes sections for notes, alert criteria, recommended actions, and additional resources. A table at the bottom lists specific Lambda functions along with their ARNs, regions, runtimes, days to deprecation, depreciation dates, and average daily invokes.

AWS Lambda Functions Using Deprecated Runtimes

Checks for Lambda functions that are configured to use a runtime that is approaching deprecation or is deprecated. Deprecated runtimes are not eligible for security updates or technical support.

Notes:

Results for this check are automatically refreshed several times daily, and refresh requests are not allowed. It might take a few hours for changes to appear. Published Lambda function versions are immutable, which means they can be invoked but not updated. Only the \$LATEST version for a Lambda function can be updated. For more information, see [Lambda function versions](#).

Alert Criteria

Red: The function is running on a runtime that is already deprecated.
Yellow: The function is running on a runtime that will be deprecated within 120 days.

Recommended Action

If you have functions that are running on a runtime that is approaching deprecation, you should prepare for migration to a supported runtime. For more information, see [Runtime support policy](#). We recommend that you delete earlier function versions that you're no longer using.

Additional Resources

[Lambda runtimes](#)

AWS Lambda Functions Using Deprecated Runtimes (4)						
	Status	Region	Function ARN	Runtime	Days to Deprecation	Deprecation Date
<input type="checkbox"/>	✖	eu-west-1	arn:aws:lambda:eu-west-1:123456789012:function:my-lambda	\$LATEST	python36	-455
<input type="checkbox"/>	✖	us-east-1	arn:aws:lambda:us-east-1:123456789012:function:my-lambda	\$LATEST	python36	-454
<input type="checkbox"/>	✖	us-east-2	arn:aws:lambda:us-east-2:123456789012:function:my-lambda	\$LATEST	python36	-454
<input type="checkbox"/>	✖	us-west-2	arn:aws:lambda:us-west-2:123456789012:function:my-lambda	\$LATEST	python36	-454

Figure 14.3: Details of a sample check from Trusted Advisor

▼ ⓘ AWS Well-Architected high risk issues for security

Last updated: an hour ago

Checks for high risk issues (HRIs) for your workloads in the security pillar. This check is based on your AWS Well-Architected reviews. Your check results depend on whether you completed the workload evaluation with AWS Well-Architected.

Alert Criteria

Red: At least one active high risk issue was identified in the security pillar for AWS Well-Architected.
Green: No active high risk issues were detected in the security pillar for AWS Well-Architected.

Recommended Action

AWS Well-Architected detected high risk issues during your workload evaluation. These issues present opportunities to reduce risk and save money. Sign in to the [AWS Well-Architected](#) tool to review your answers and take action to resolve your active issues.

AWS Well-Architected high risk issues for security (1)

Exclude & Refresh | Included items ▾

1 of 1 workloads have at least one high risk issue in the security pillar.

Status	Region	Workload ARN	Workload Name
ⓘ	eu-west-1	arn:aws:wellarchitected:eu-west-1: !workload/	workload1

Figure 14.4: Details of a TrustedAdvisor check

Chapter 17: Selecting Existing Workloads and Processes to Migrate



Figure 17.1: The Cloud Adoption Framework's perspectives

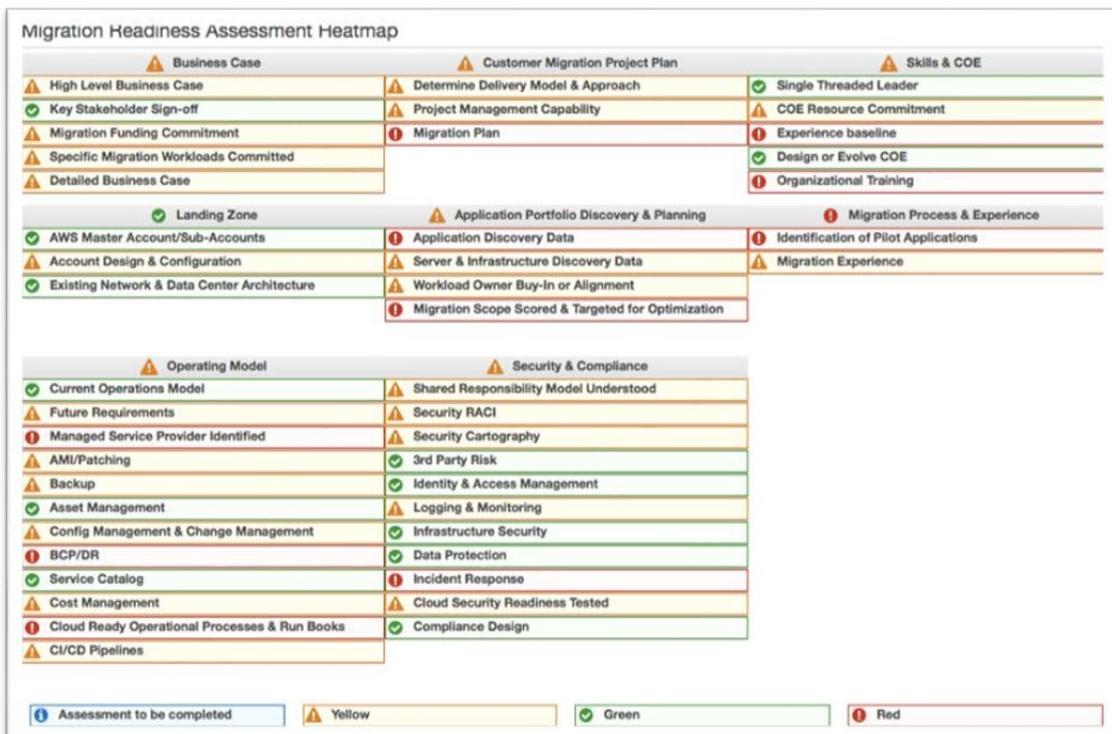


Figure 17.2: A sample migration readiness assessment output in the form of a heatmap

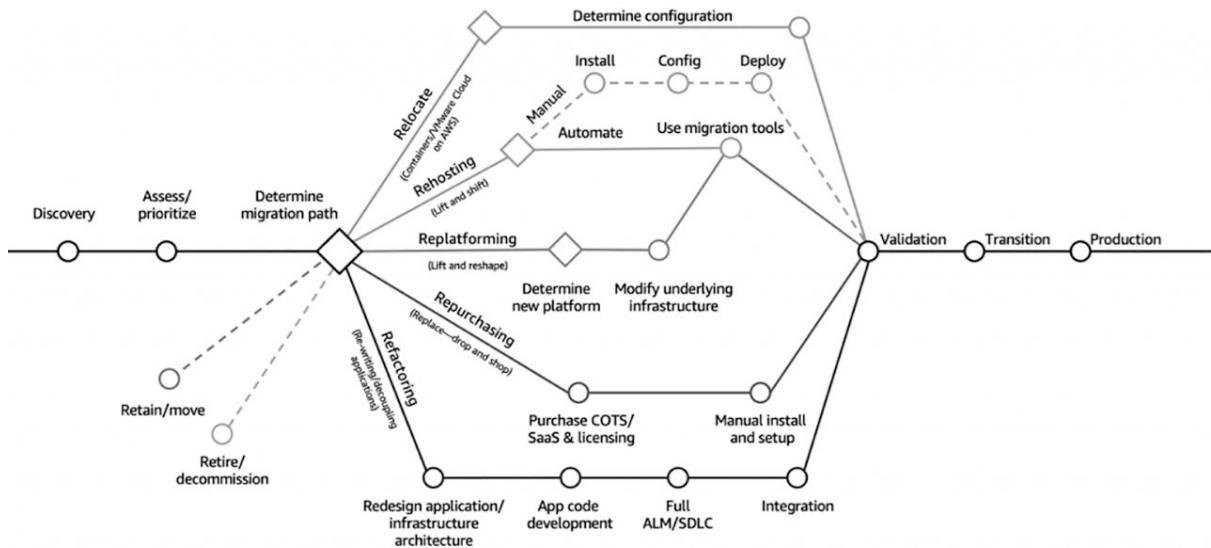


Figure 17.3: Application migration process



Figure 17.4: Cloud migration strategies and their complexities compared

Chapter 18: Selecting Migration Tools and Services

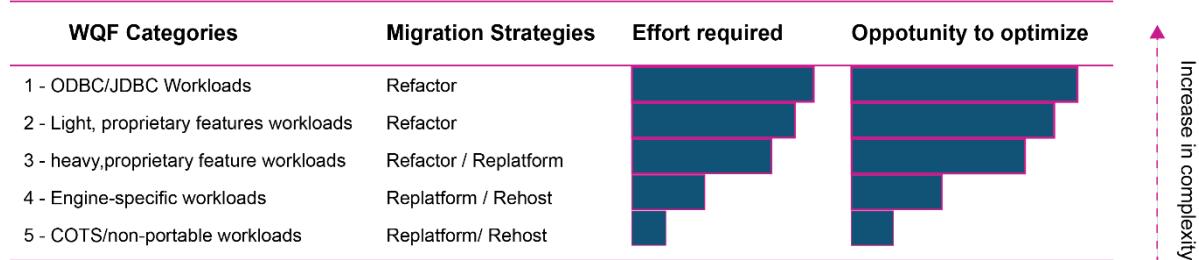


Figure 18.1: Migration and optimization effort calibration

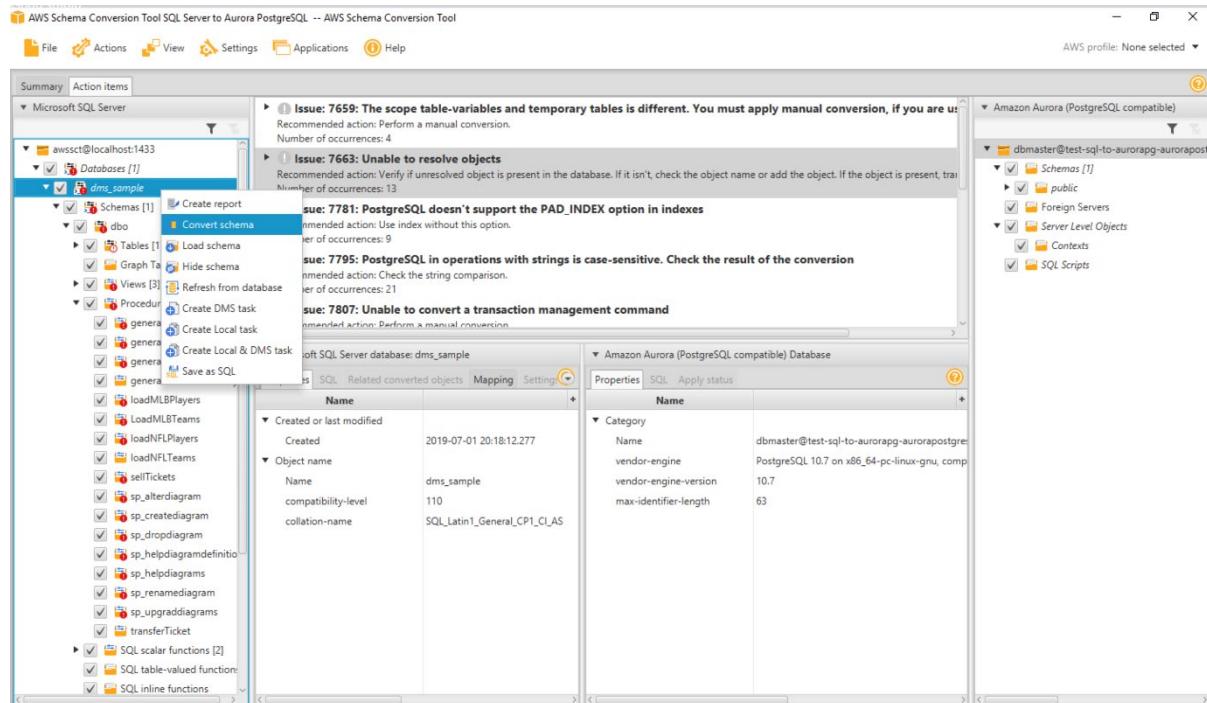


Figure 18.2: Schema conversion using SCT

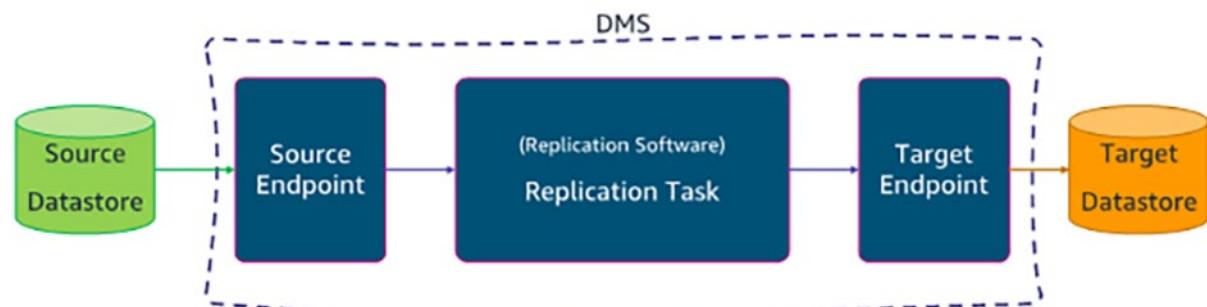


Figure 18.3: High-level overview of DMS

Create replication instance

Replication instance configuration

Name

The name must be unique among all of your replication instances in the current AWS region.

Replication instance name must not start with a numeric value

Descriptive Amazon Resource Name (ARN) - *optional*

A friendly name to override the default DMS ARN. You cannot modify it after creation.

Description

The description must only have unicode letters, digits, whitespace, or one of these symbols: _:/=-@. 1000 maximum character.

Instance class [Info](#)

Choose an appropriate instance class for your replication needs. Each instance class provides differing levels of compute, network and memory capacity. [DMS pricing](#)

48 vCPUs 96 GiB Memory

Figure 18.4: Creating a replication instance using the DMS management console

Endpoint configuration

Endpoint identifier [Info](#)

A label for the endpoint to help you identify it.

Descriptive Amazon Resource Name (ARN) - *optional*

A friendly name to override the default DMS ARN. You cannot modify it after creation.

Source engine

The type of database engine this endpoint is connected to. [Learn more](#)

Access to endpoint database

- AWS Secrets Manager
- Provide access information manually

Figure 18.5: Endpoint creation

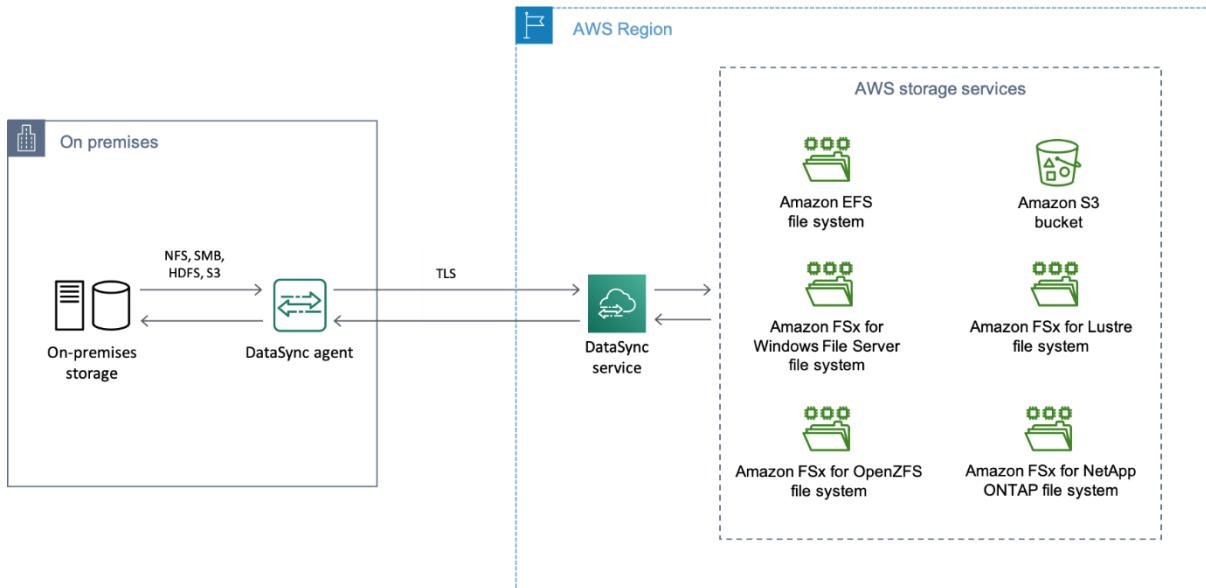


Figure 18.6: DataSync data migration from on-premises systems to AWS storage services



Figure 18.7: A Snowball Edge device

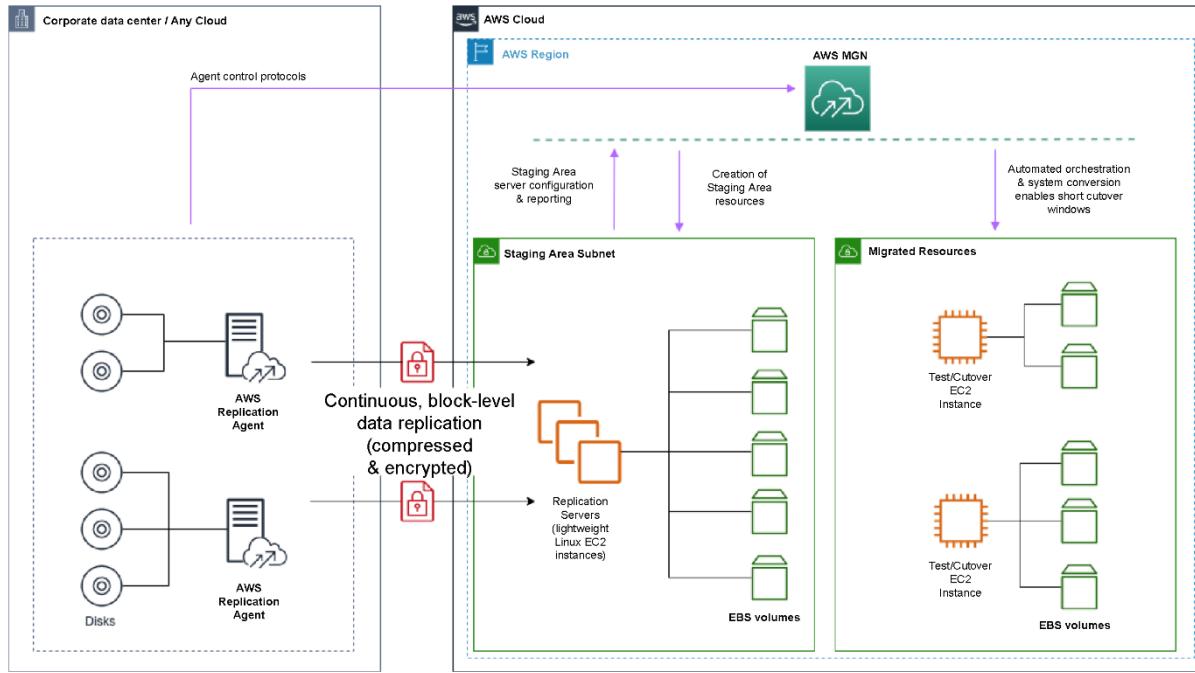


Figure 18.8: AWS Application Migration Service – under the hood

Chapter 19: Determining a New Architecture for Existing Workloads

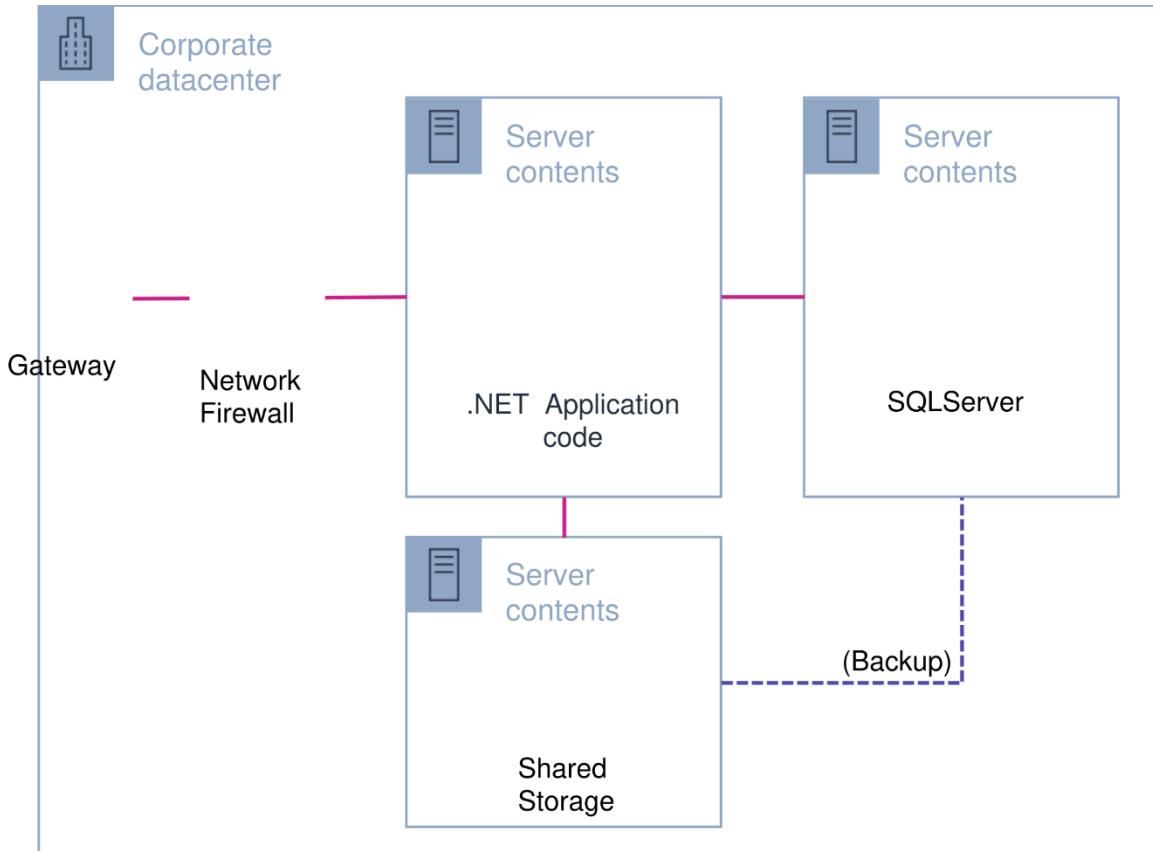


Figure 19.1: Typical legacy web application design hosted in a physical data center

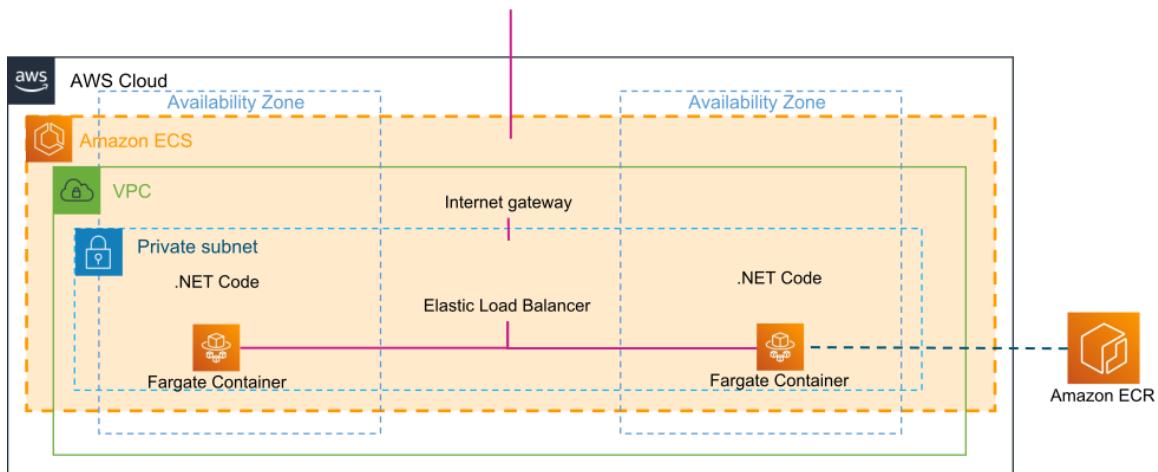


Figure 19.2: Containerized application hosting on AWS Fargate

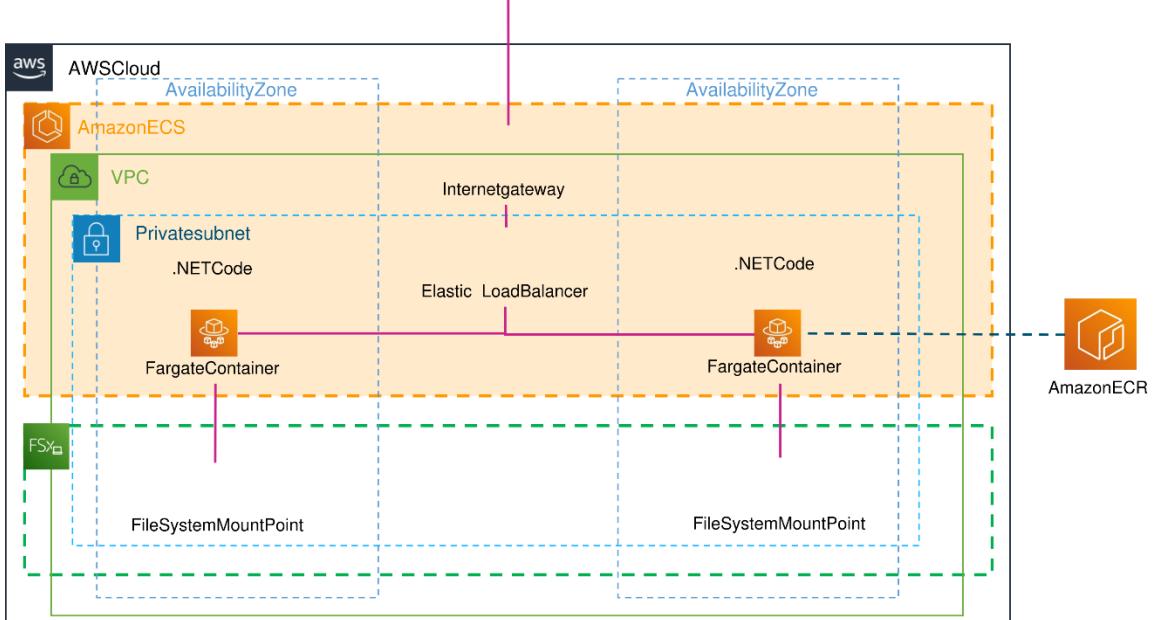


Figure 19.3: Containerized application with backend storage on Amazon FSx for Windows File Server

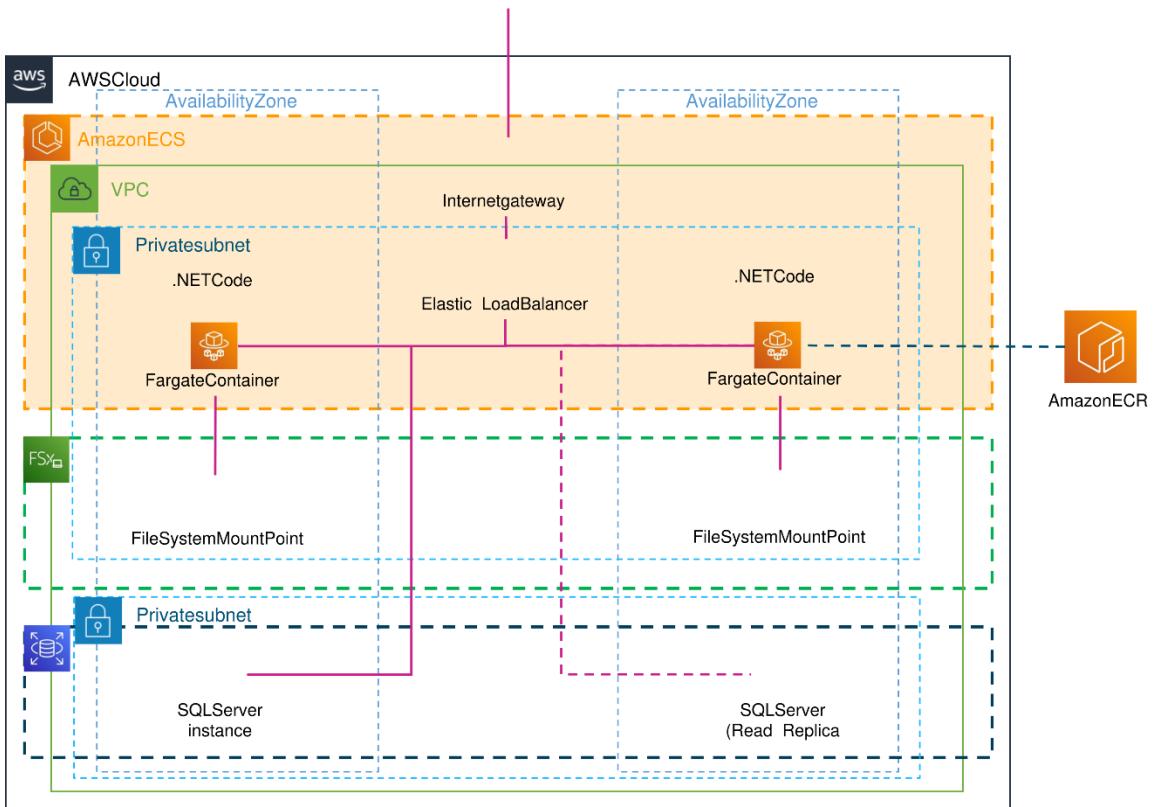


Figure 19.4: Managed SQL Server database using Amazon RDS

Chapter 20: Determining Opportunities for Modernization and Enhancements

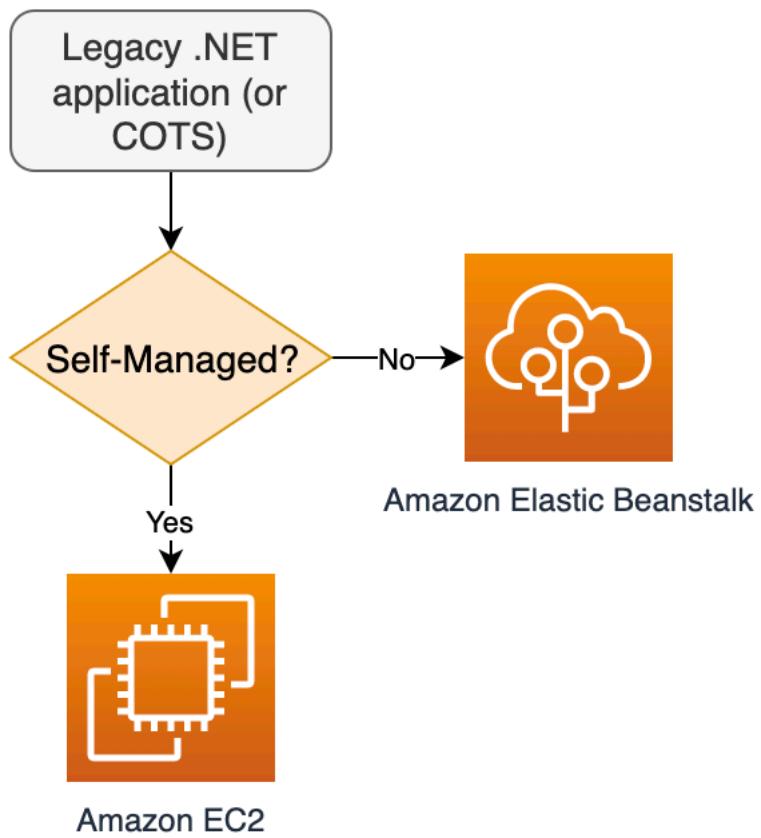


Figure 20.1: Rehosting pattern

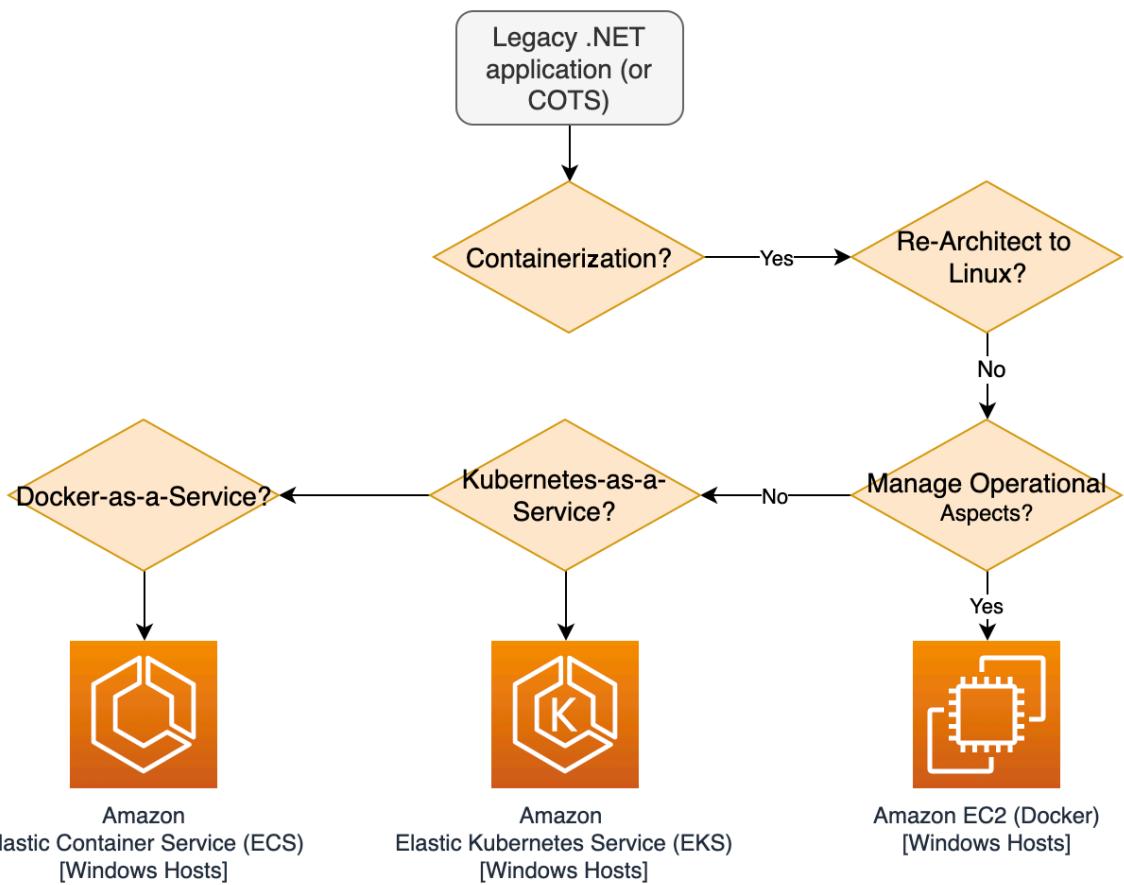


Figure 20.2: Replatform pattern

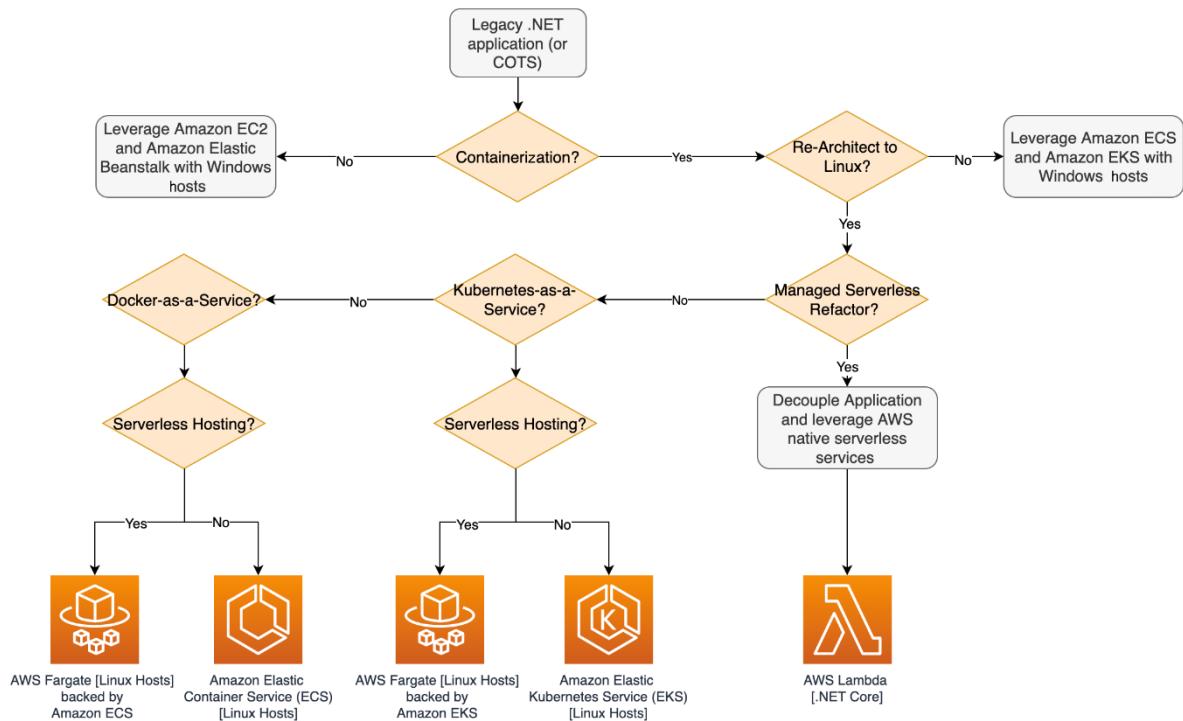


Figure 20.3: Refactoring pattern

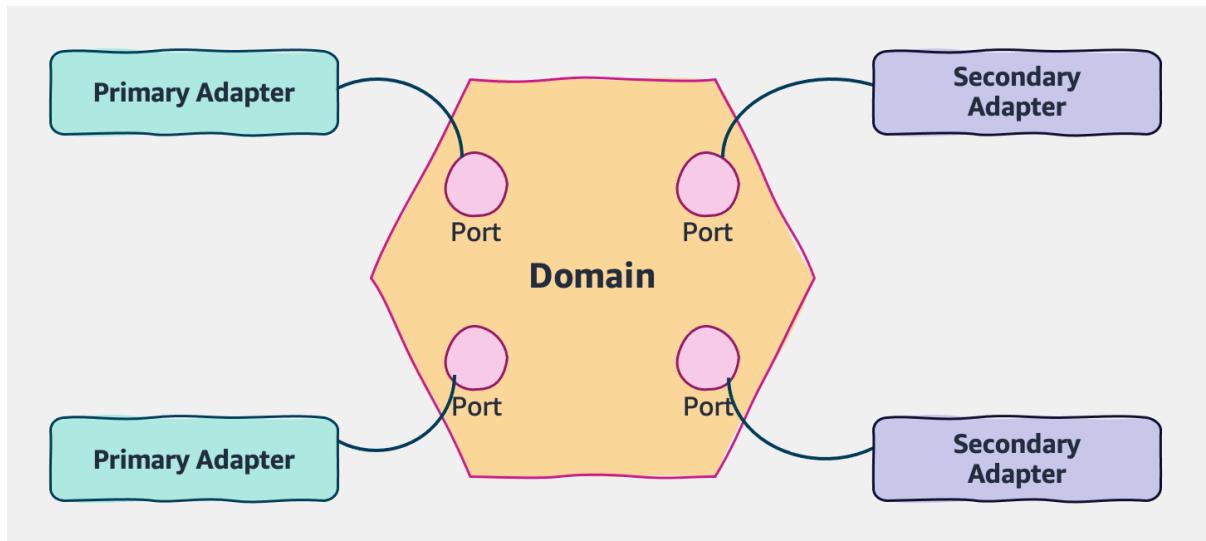


Figure 20.4: Anatomy of hexagonal architecture

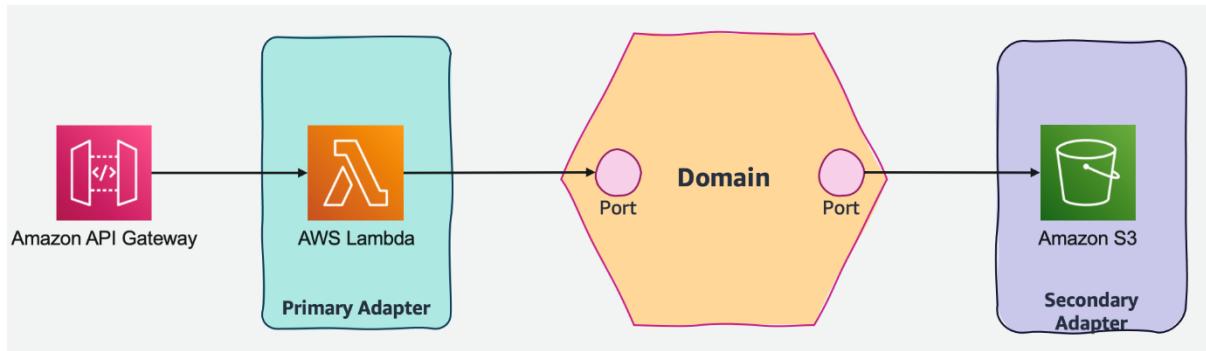


Figure 20.5: Starting out with a hexagonal architecture implementation for our sample application

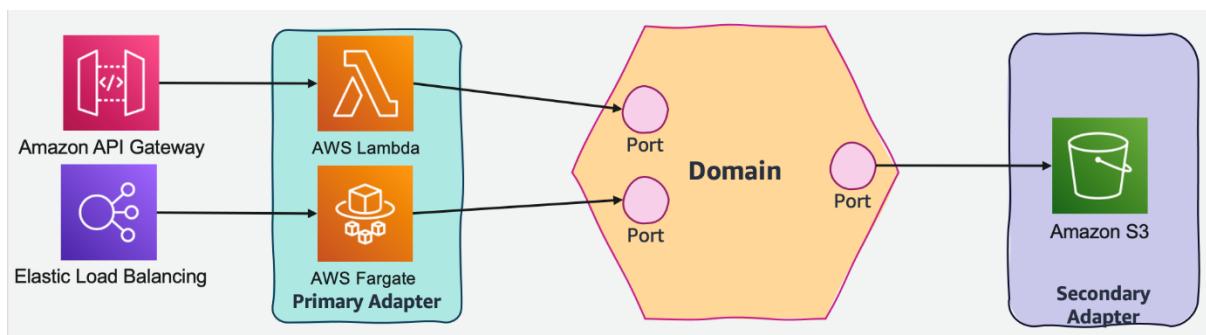


Figure 20.6: Adding more clients and adapters

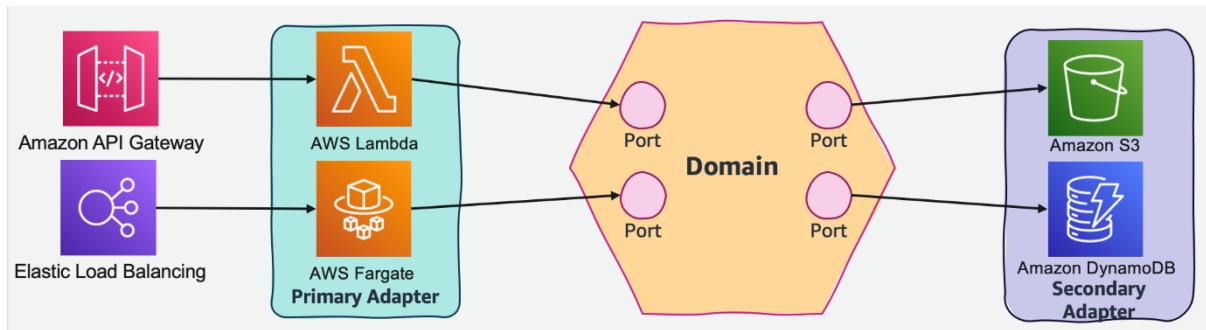


Figure 20.7: Adding new adapters and ports to extend the application's functionality

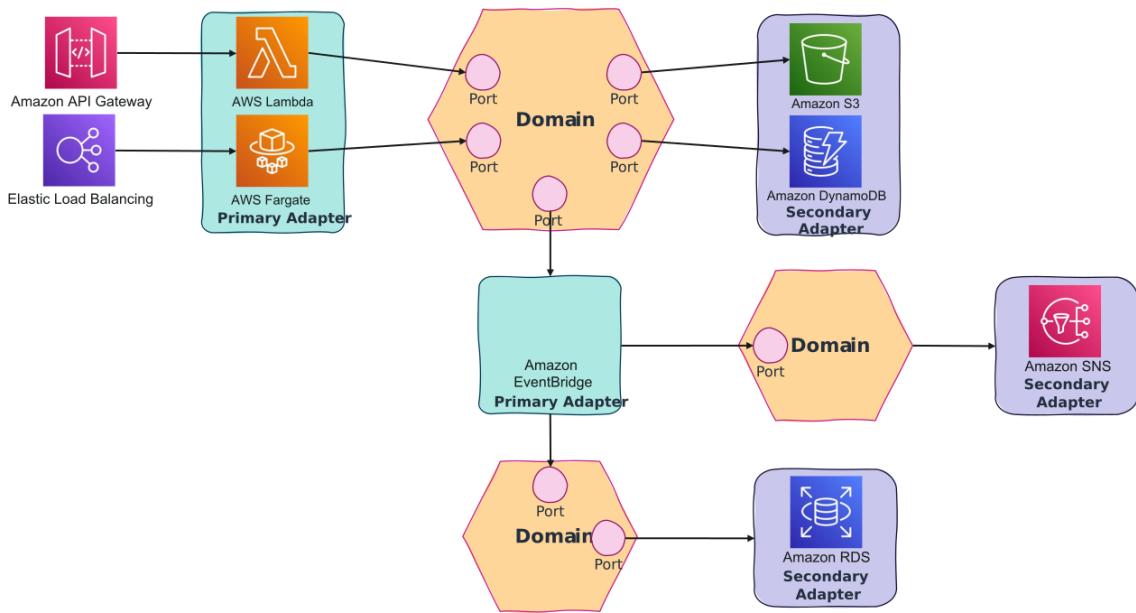


Figure 20.8: Expanding domains as per application requirements

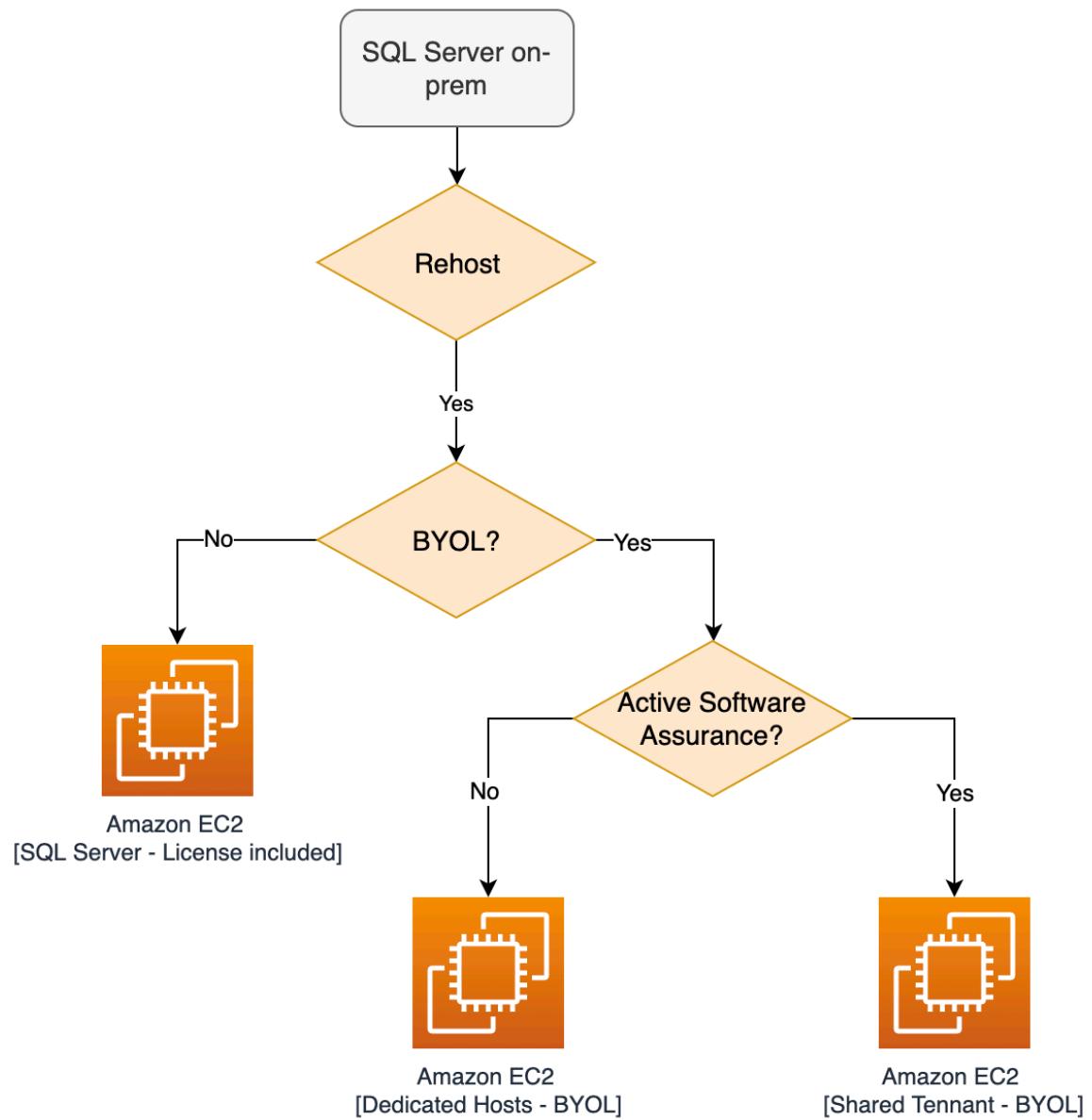


Figure 20.9: Rehosting opportunity for SQL Server

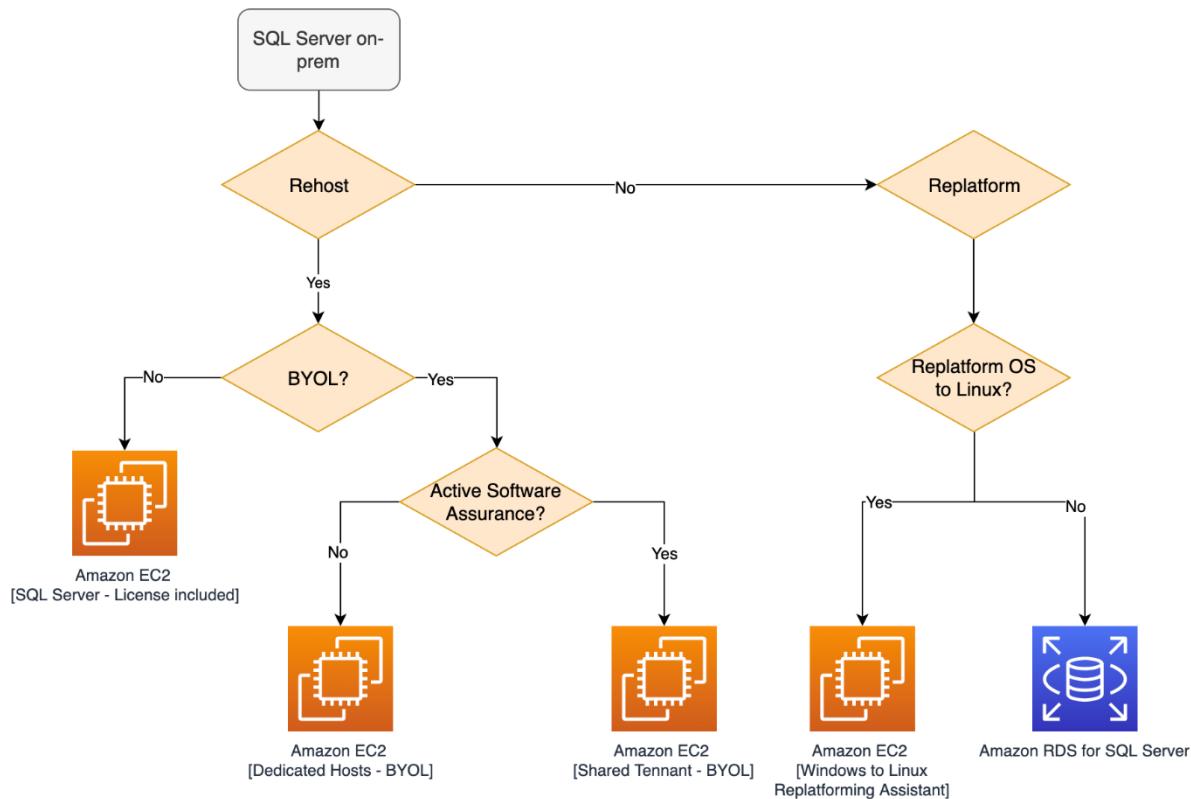


Figure 20.10: Replatforming opportunity for SQL Server

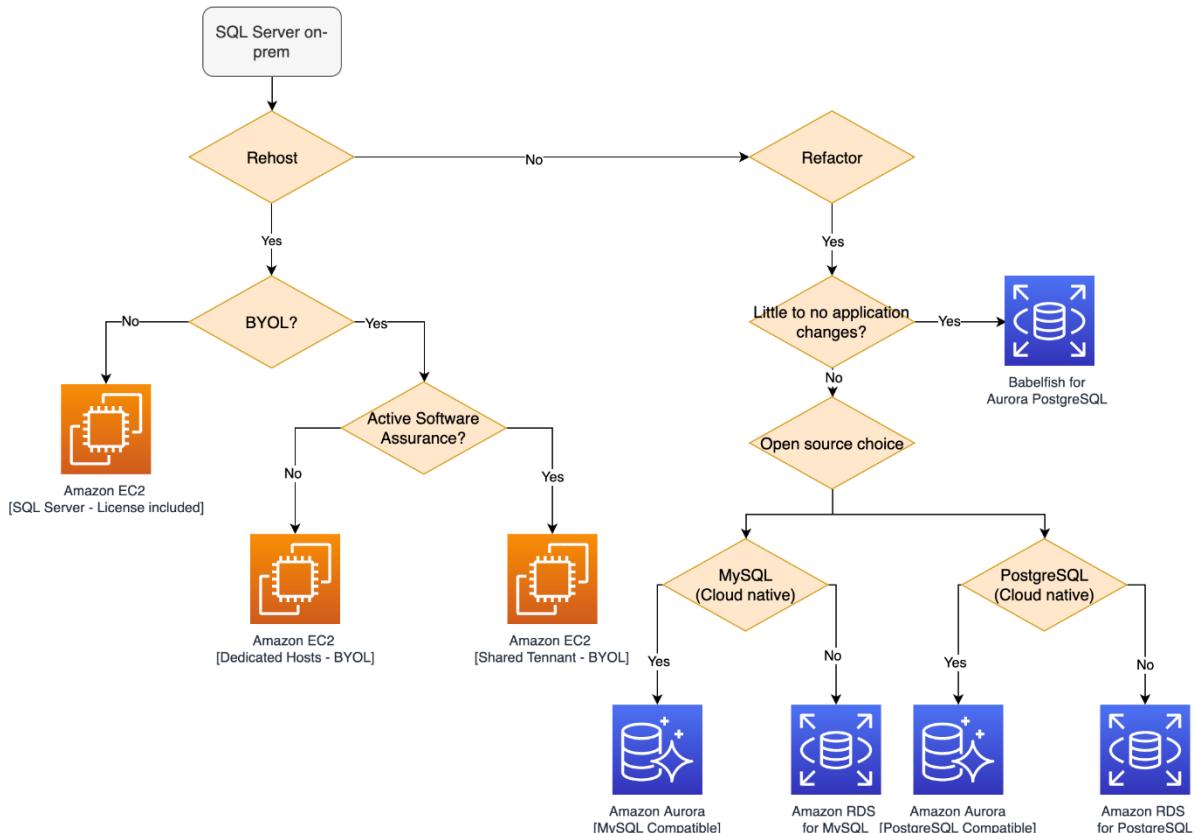


Figure 20.11: Refactoring opportunities for SQL Server on AWS

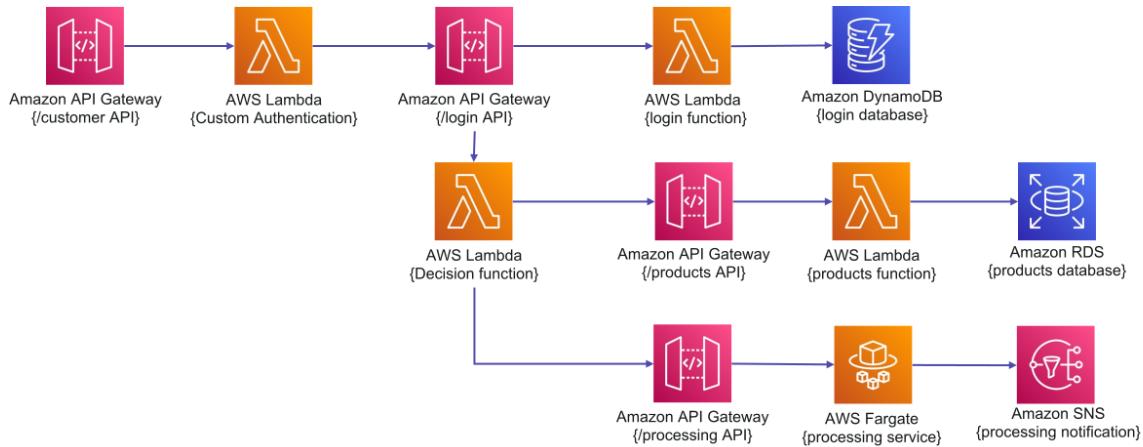


Figure 20.12: API Gateway pattern with single and multiple API gateways implemented within the same architecture

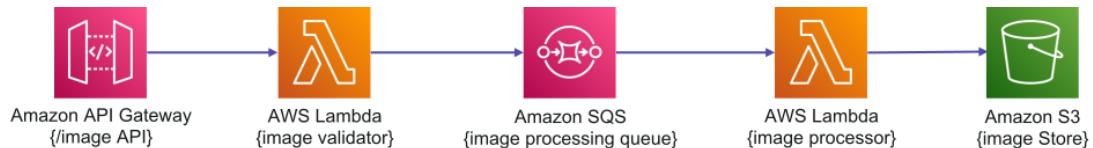


Figure 20.13: Messaging pattern implementation using Amazon SQS

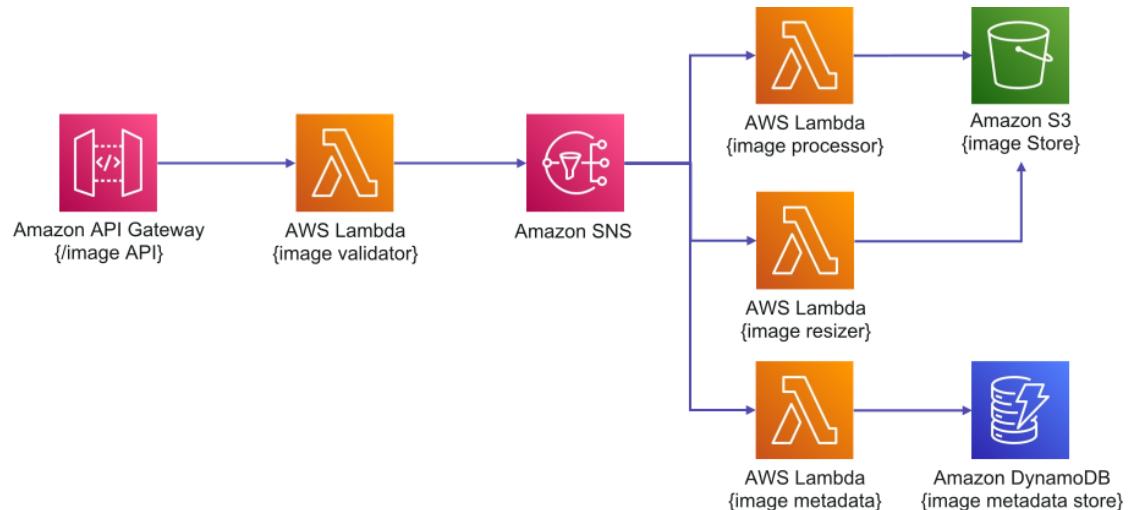


Figure 20.14: Pub/Sub pattern implementation using Amazon SNS

Chapter 21: Accessing the Online Practice Resources



Figure 21.2 – Unlock page for the online practice resources

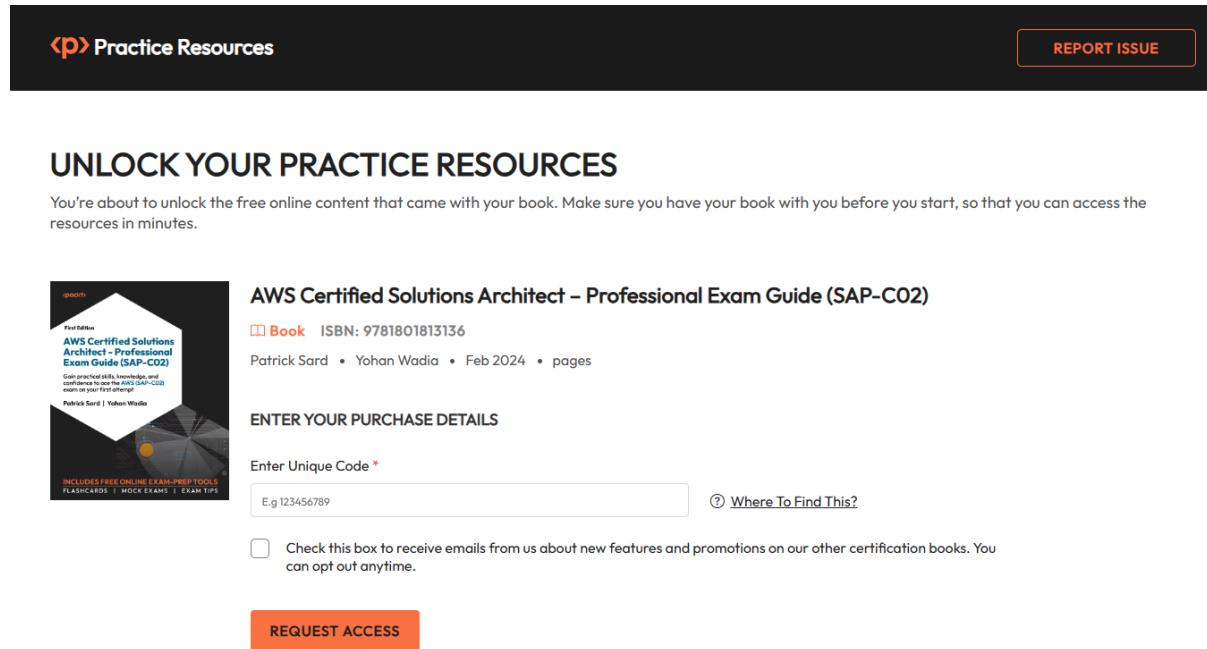
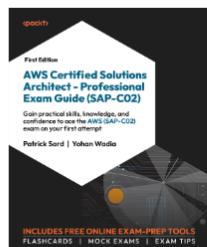


Figure 21.3 – Enter your unique sign-up code to unlock the resources

PACKT PRACTICE RESOURCES

You've just unlocked the free online content that came with your book.



AWS Certified Solutions Architect – Professional Exam Guide (SAP-C02)

 Book ISBN: 9781801813136

Patrick Sard • Yohan Wadia • Feb 2024 • pages

 **Unlock Successful**

Click the following link to access your practice resources at any time.

Pro Tip: You can switch seamlessly between the ebook version of the book and the practice resources. You'll find the ebook version of this title in your [Owned Content](#)

[OPEN PRACTICE RESOURCES](#) 

Figure 21.4 – Page that shows up after a successful unlock

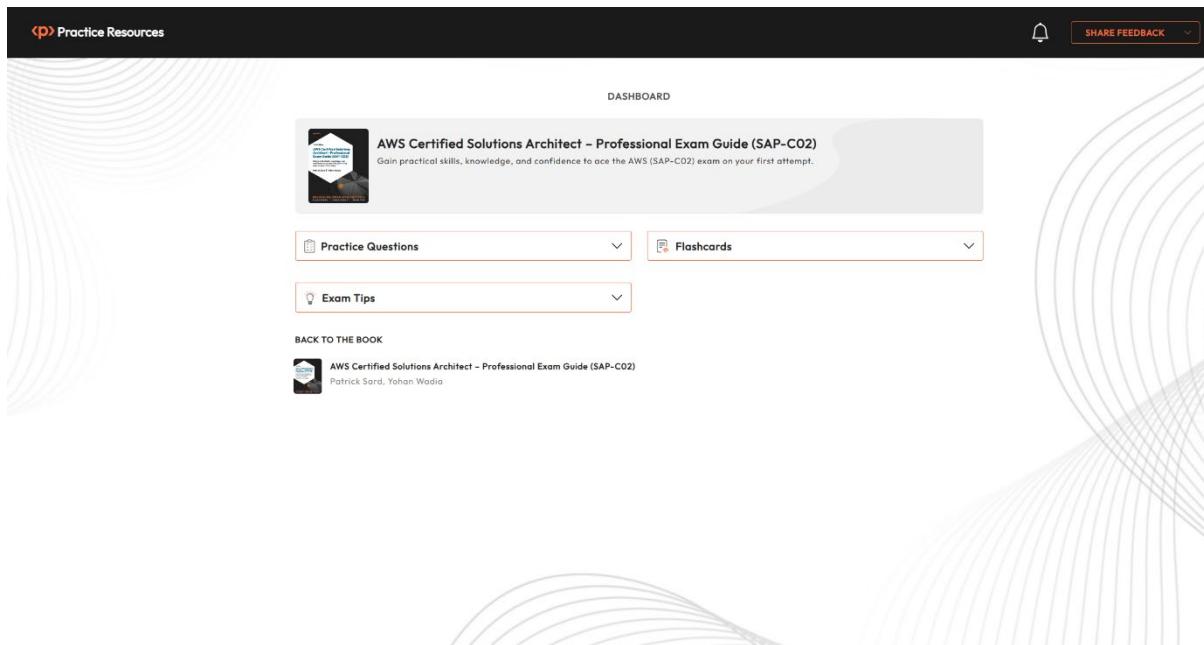


Figure 21.5 – Dashboard page for AWS (SAP-C02) practice resources

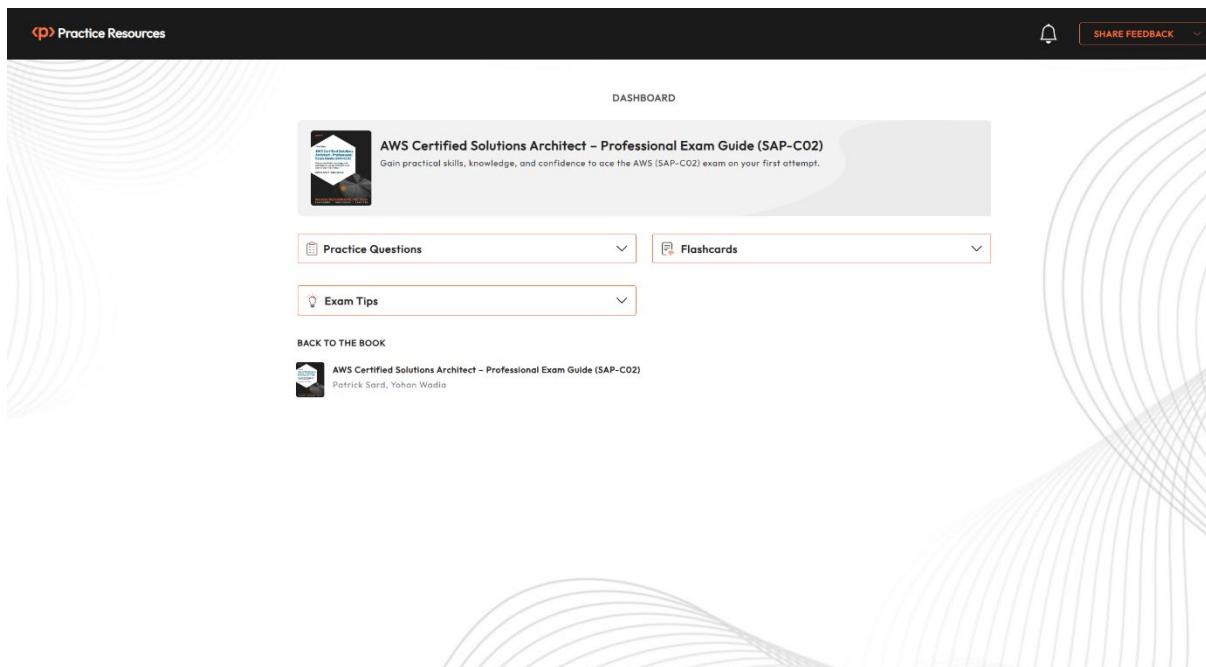


Figure 21.7 – Dashboard interface on a desktop device

The screenshot shows a practice question page. At the top, it has the 'Practice Resources' header with a bell icon and a 'SHARE FEEDBACK' button. Below the header, it says 'DASHBOARD > QUIZ 1'. On the left, it displays 'Question 1 of 1'. On the right, it shows a timer 'Time Left 0 hr 35 mins 43 secs' and an 'END QUIZ' button. The main content area contains a question: 'A company is building a VPC for their web application. The VPC should be designed to ensure security, scalability, and cost-effectiveness as the application experiences a large number of requests. Which of the following options would be the best choice for the company's VPC design? (Choose three)'. Below the question are five options, each with a checkbox: 'NAT gateway', 'Bastion host for providing SSH access to instances in private subnets', 'Network ACL for controlling traffic between subnets', 'Security group for controlling traffic to instances', and 'VPN connection for connecting the VPC to on-premises resources'. At the bottom, there are three buttons: 'PREVIOUS', 'SUBMIT', and 'SKIP QUESTION'.

Figure 21.8: Practice questions interface on a desktop device



END QUIZ

DASHBOARD > QUIZ 1

Question 1 of 1



Time Left 0 hr 35 mins 30 secs

A company is building a VPC for their web application. The VPC should be designed to ensure security, scalability, and cost-effectiveness as the application experiences a large number of requests.

Which of the following options would be the best choice for the company's VPC design? (Choose three)

NAT gateway

Bastion host for providing SSH access to instances in private subnets

Network ACL for controlling traffic between subnets

Security group for controlling traffic to instances

VPN connection for connecting the VPC to

[PREVIOUS](#)[SUBMIT](#)[SKIP QUESTION](#)

Figure 21.9: Quiz interface on a mobile device

The screenshot shows a dark-themed web application for AWS Practice Resources. At the top, there's a navigation bar with the 'Practice Resources' logo, a bell icon for notifications, and a 'SHARE FEEDBACK' button. Below the navigation, the path 'DASHBOARD > FLASHCARDS SET 1' is visible. The main title 'Flashcard Stack 1' is displayed in large, bold, white font. Underneath, it says 'Flashcards memorized so far: 0' and 'Flashcards not memorized yet: 1'. A single flashcard is shown, asking 'How does Amazon CloudFront handle content caching and distribution?'. There's a checkbox labeled 'Mark as memorized'. Navigation buttons 'PREVIOUS' and 'FINISH' are at the bottom left, and a page number '1/1' is at the bottom right.

Figure 21.10: Flashcards interface

The screenshot shows a dark-themed web application for AWS Practice Resources. At the top, there's a navigation bar with the 'Practice Resources' logo, a bell icon for notifications, and a 'SHARE FEEDBACK' button. Below the navigation, the path 'DASHBOARD > EXAM TIPS' is visible. The main title 'Explore the Environment (1/1)' is displayed in large, bold, white font. A text box contains the tip: 'The first time you create an AWS account with your email ID, you will get a free-tier option which allows you to try out most of the AWS services free of cost for 12 months. Utilize this feature to familiarize yourself with the AWS environment and interface. Most of the services that you will require to practice for the Solutions Architect professional exam will be available under the free-tier plan. Additionally, you can set up a budget based on your limit so that you do not cross your target expense.' Navigation buttons '← PREVIOUS' and 'NEXT →' are at the bottom left, and a checkbox labeled 'Mark as Helpful (0 users found this tip helpful)' is at the bottom right. Below the tip, there's a section titled 'Comments' with a text input field for adding a comment.

Figure 21.11 – Exam Tips Interface