The principle of least privilege

AWS SECURITY AND COST MANAGEMENT CONCEPTS

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What is the principle of least privilege?

- Separate access to employees by department and capabilities
- Grant the narrowest set of privileges
- Do not grant more privileges than necessary to perform job responsibilities

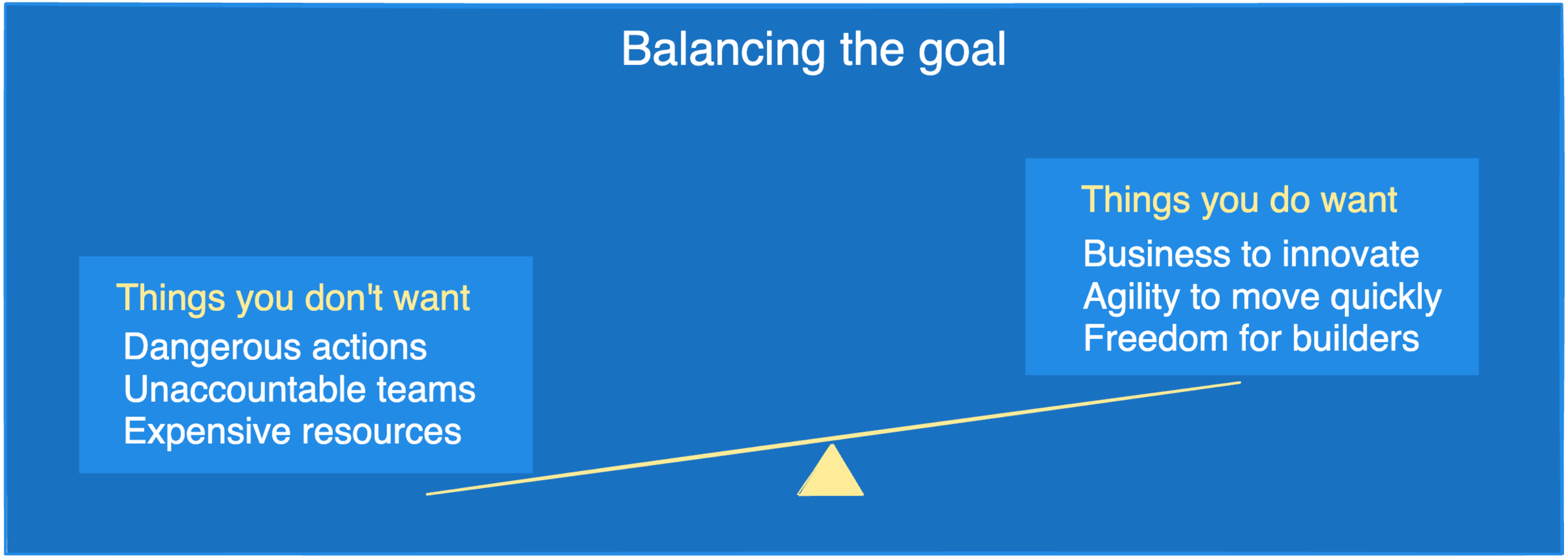
Accounting Department

Can read/write balance sheet data

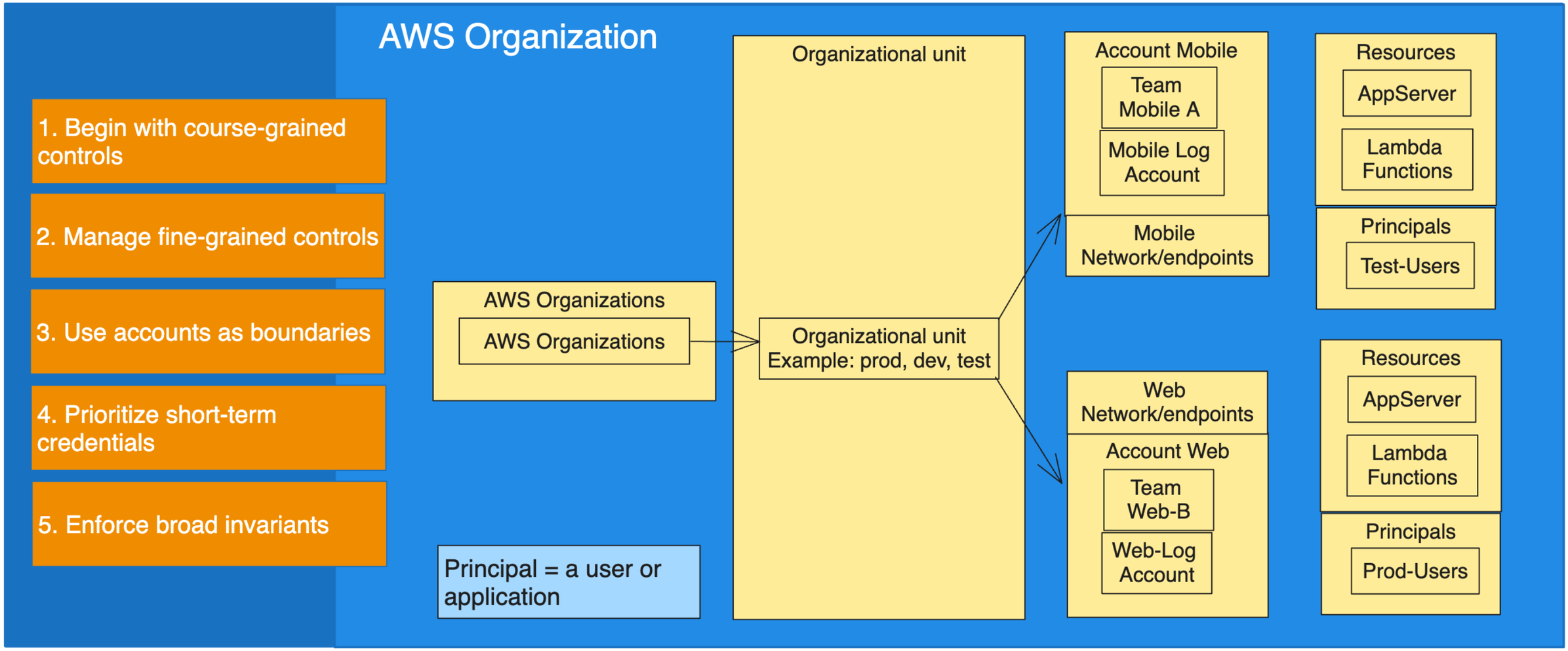
Finance Department

Read-only access to balance sheet

Balancing the goal

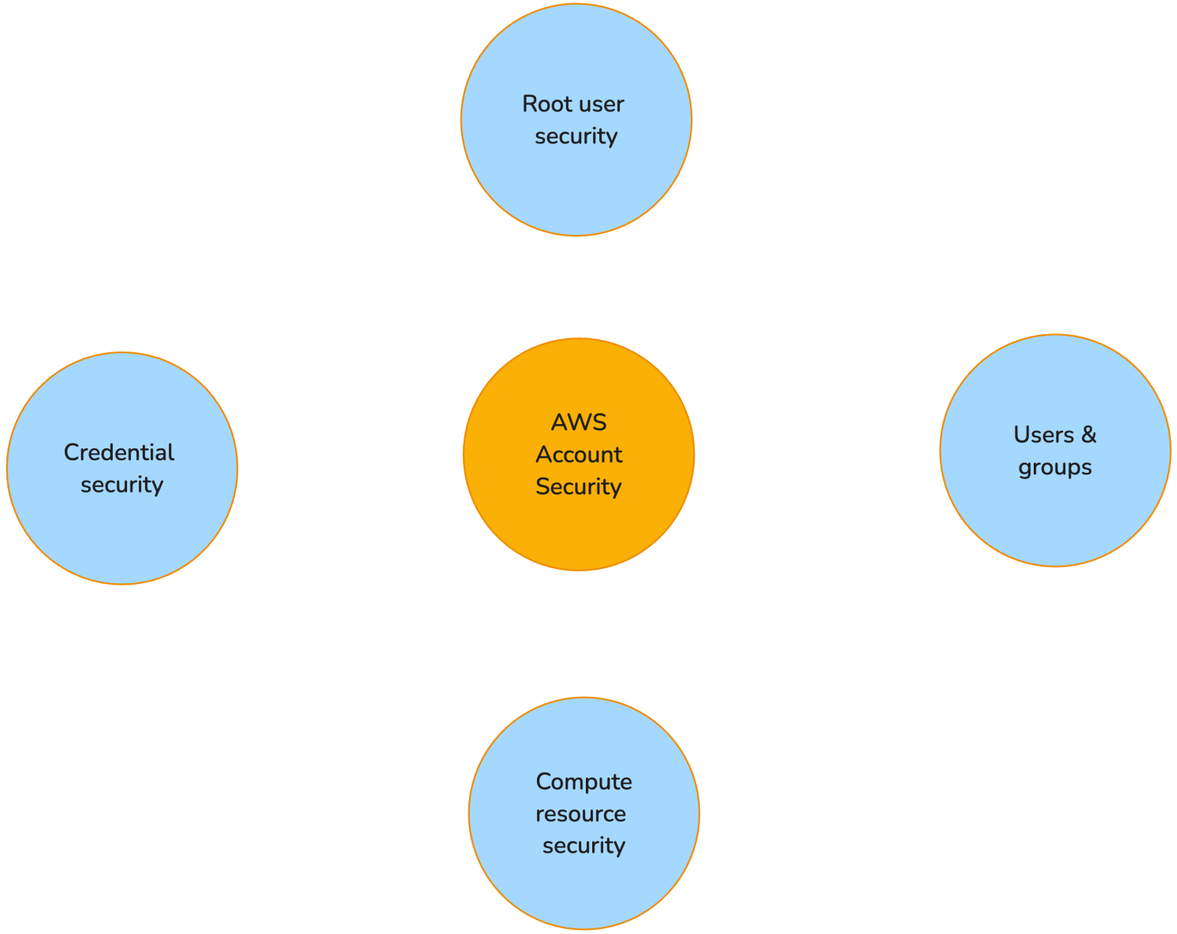


Strategies for least privilege



Account security framework

- Root user security is critical
- grant least necessary privileges to users, groups, and computing resources
- Develop a process for credential sharing



Root user security

Password strength - %$#%$csnafkajhf!!#

MFA

Access keys

Group email

IAM

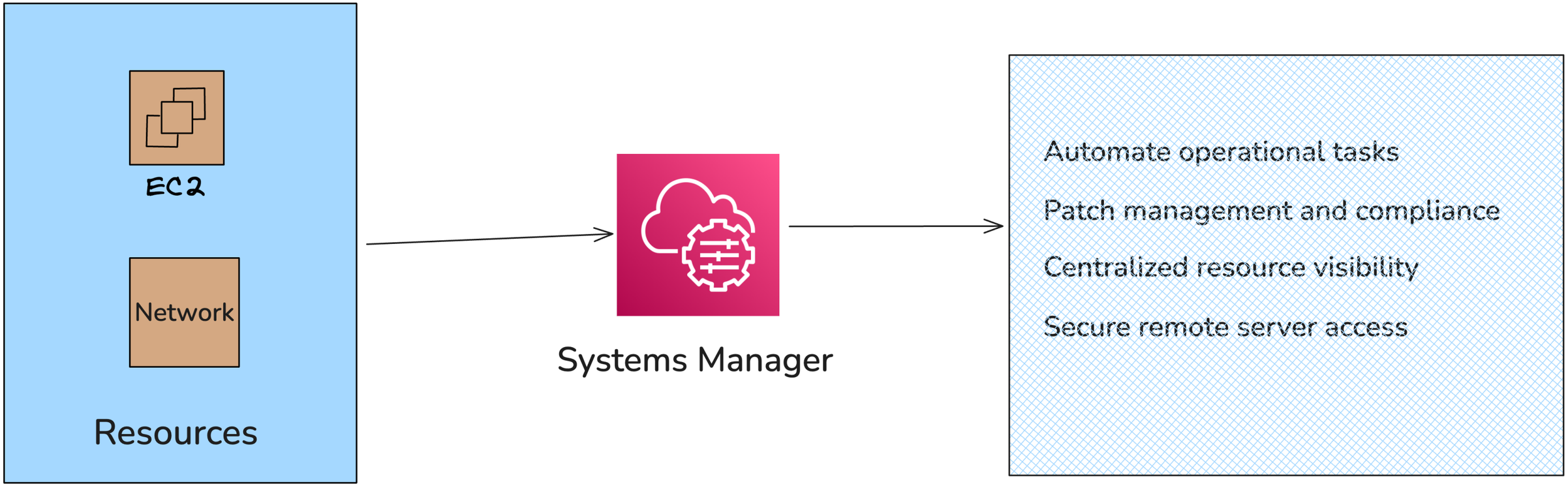
- Use a strong root user password
- Use multi-factor authentication
- Don't create access keys
- Use multi-person approval and group email

User and group security

- Enable MFA for all IAM users
- Use groups to assign permissions, not individuals
- Apply the principle of least privilege to all accounts
- Regularly rotate passwords and access keys

Resource security

- Improve visibility and control
- Maintain instance compliance against your patch, configuration, and custom policies
- Automate configuration and ongoing management of your applications



Credential security

- Manage database credentials securely
- Rotate secrets automatically
- Encrypt API keys
- Integrate with AWS services

Secrets Manager

Let's practice!

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Identity and Access Management (IAM)

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Why IAM?

Dee
A new data scientist
Sales department - North America

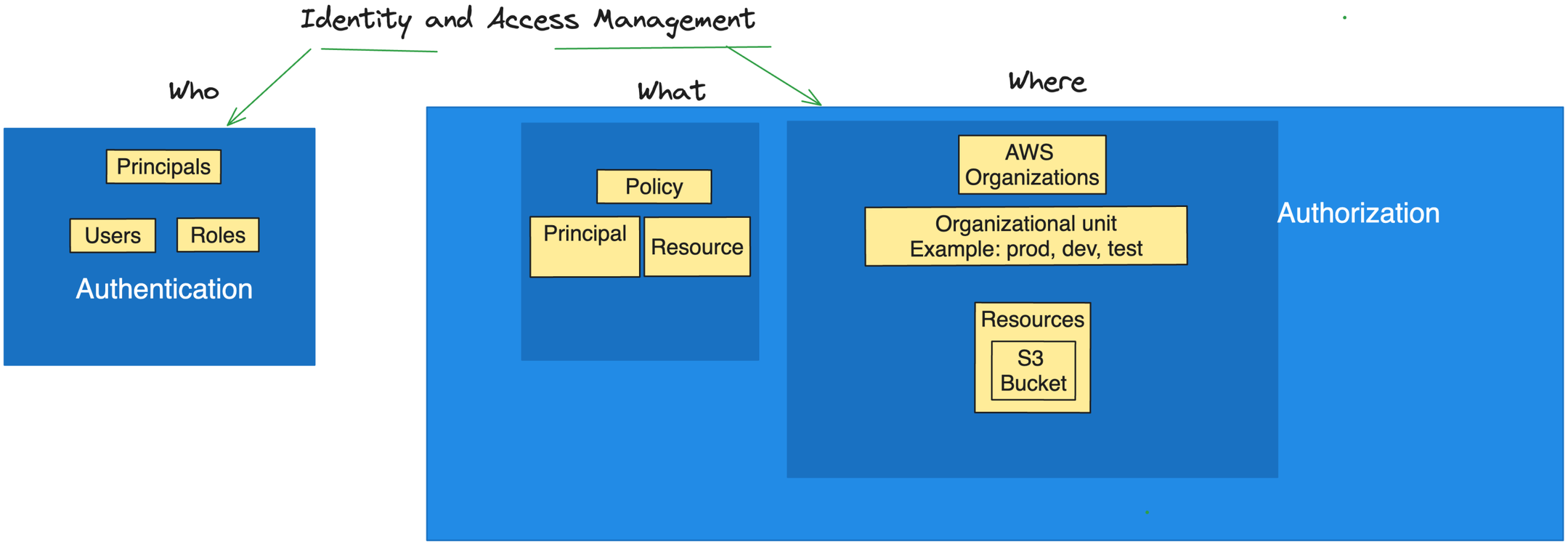
Simplified access management with organizational hierarchy

North America → CRM View, Tableau/Power BI public reports view

Sales → Sales database

Data science team → Data lake bucket, AWS Sagemaker, DWH Read/Write

Who, what, and where?



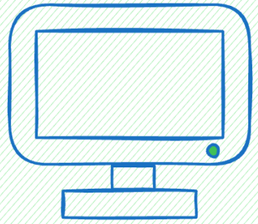
Users vs. Roles

Users

Use long-term credentials

A user group is a collection of users

Roles



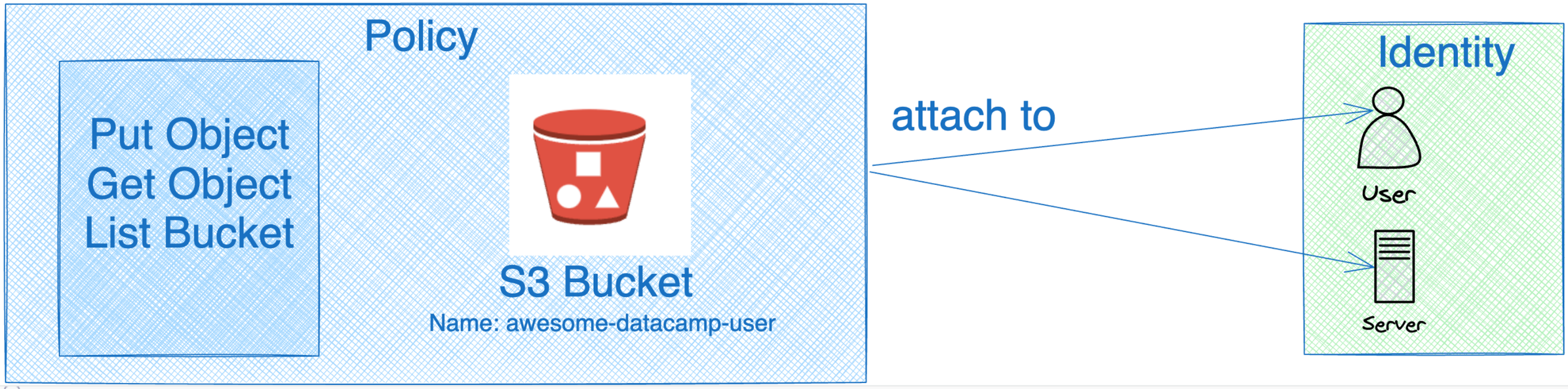
STS

Short-term credentials

Roles cannot be grouped

Assigned to machine

Policy




```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "VisualEditor1",
            "Effect": "Allow",
            "Action": "s3:*",
            "Resource": "arn:aws:s3:::awesome-datacamp-user"
        }
    ]
}
```

Identity Center

AWS Identity Center

- One tool to manage user access
- Create new account
- Connect to existing work accounts (e.g. Office 365, Google Apps)
- Grant access to multiple AWS accounts

Let's practice!

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Network Security in AWS

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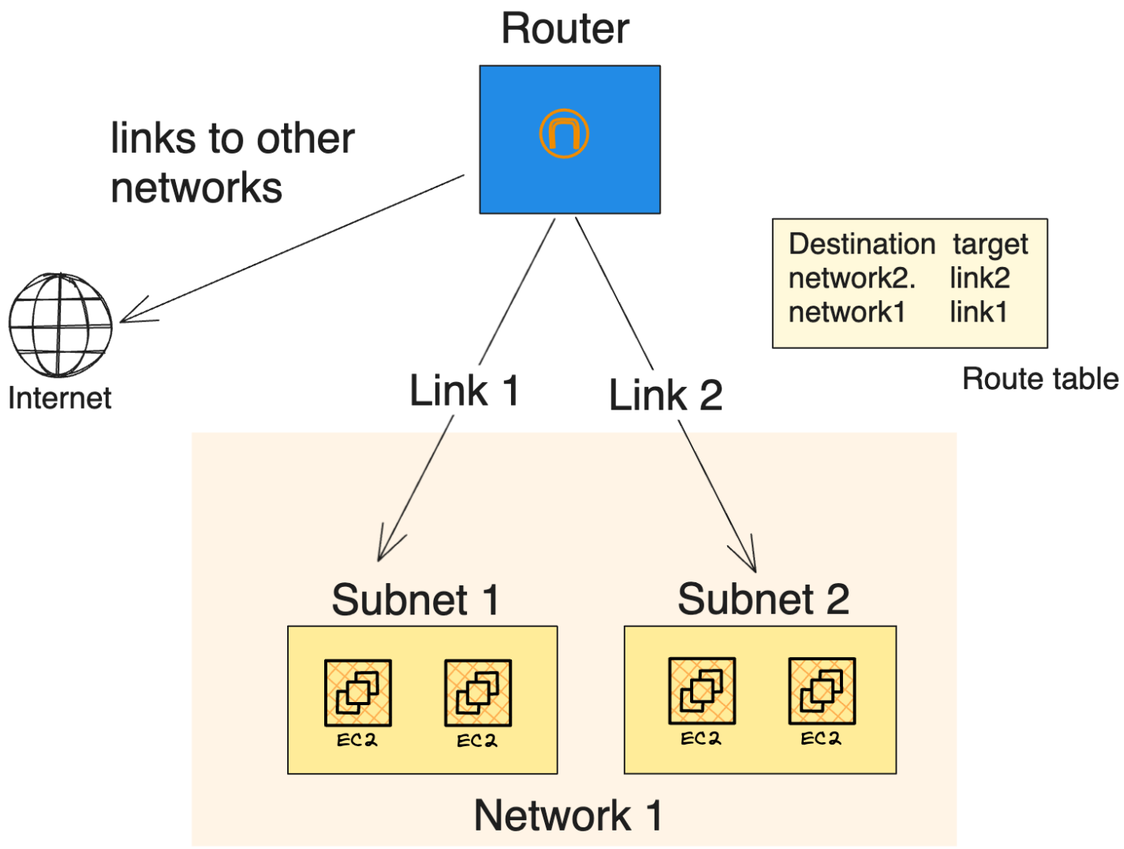
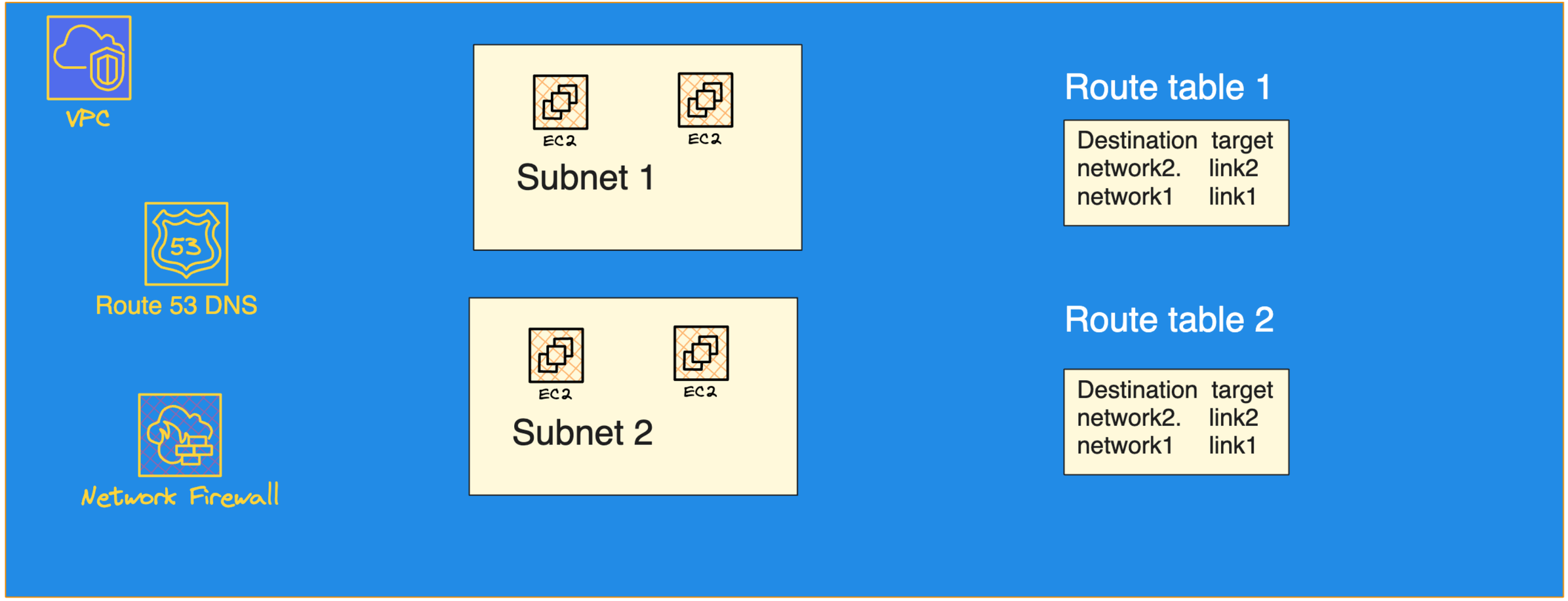
Networking basics

- A subnet contains multiple devices
- A network consists of multiple subnets
- A router routes traffic between networks using routing tables



Virtual private cloud

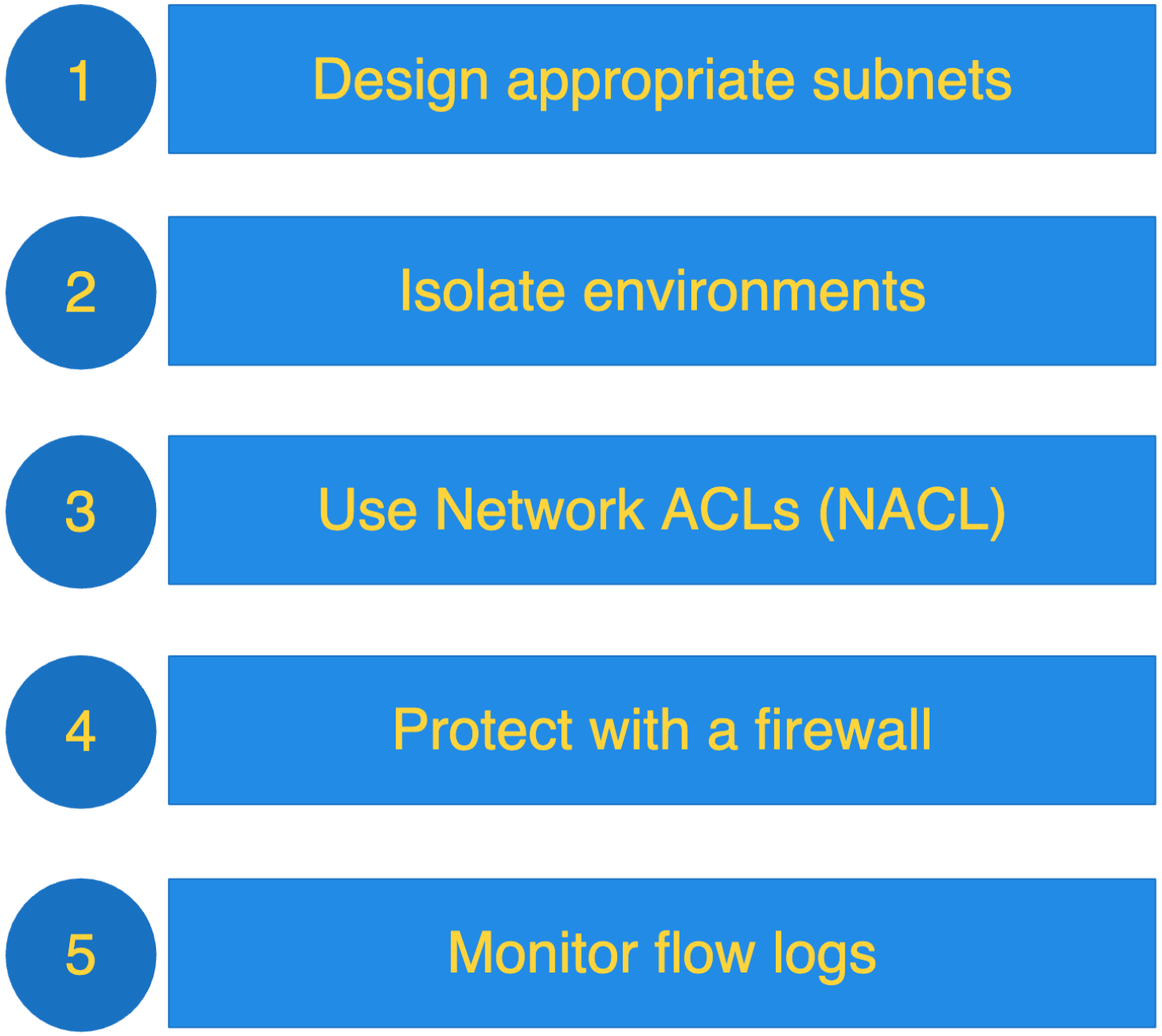
Components of a basic VPC



VPC security

Five steps to securing networks in AWS

- Subnet design
- Network Access Control Lists
- Firewall and WAF
- Security software



NACL, firewall, and WAF

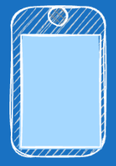
Feature	AWS Firewall	NACL	AWS WAF
Scope	Regional or VPC-level	Subnet-level	Application-level
Statefulness	Stateful	Stateless	Stateful
Default Rules	Managed rules available	Deny unless allowed	Allow, block, or count based on rules
Cost	Charged per usage	No additional cost	Charged per request & rules
Best for	High-level security control	Broad network control	Protecting web applications

AWS Marketplace

What is AWS Marketplace?

Find, subscribe to, deploy, and govern - Software, data, and professional services

Broad product selection



Fast, flexible procurement

Easy deployment

Centralized governance

Let's practice!

AWS SECURITY AND COST MANAGEMENT CONCEPTS

Compute and data security

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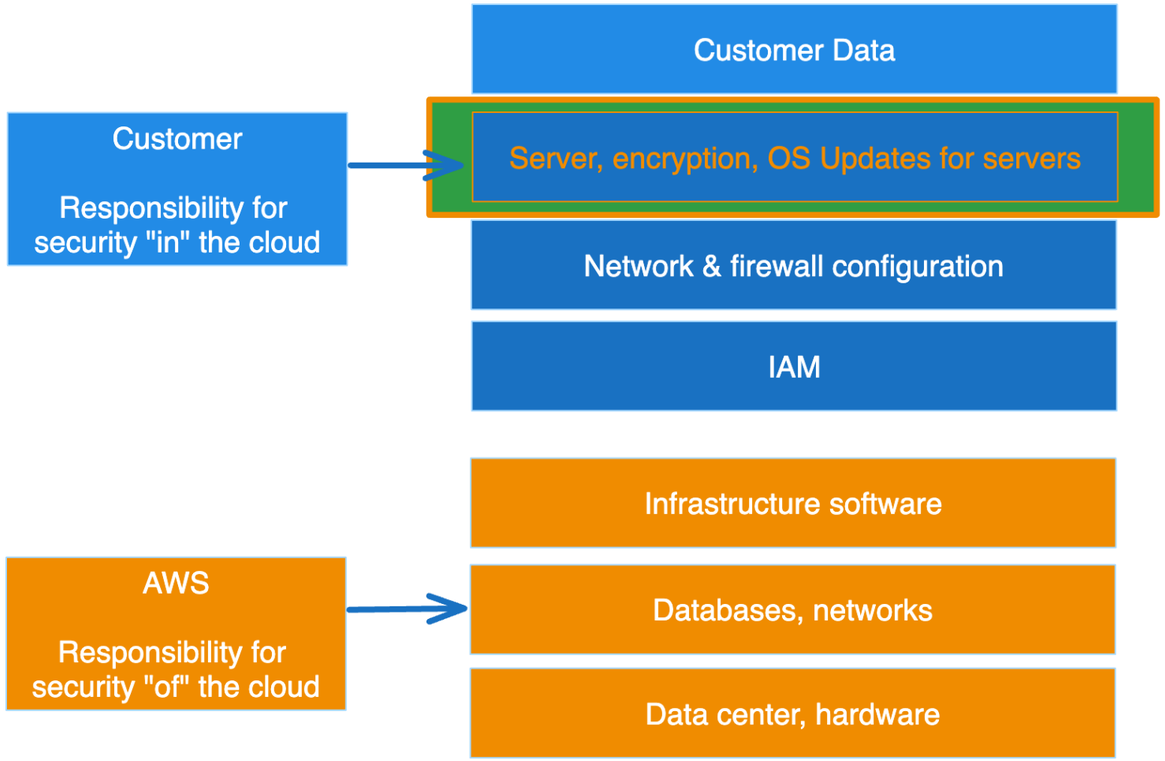
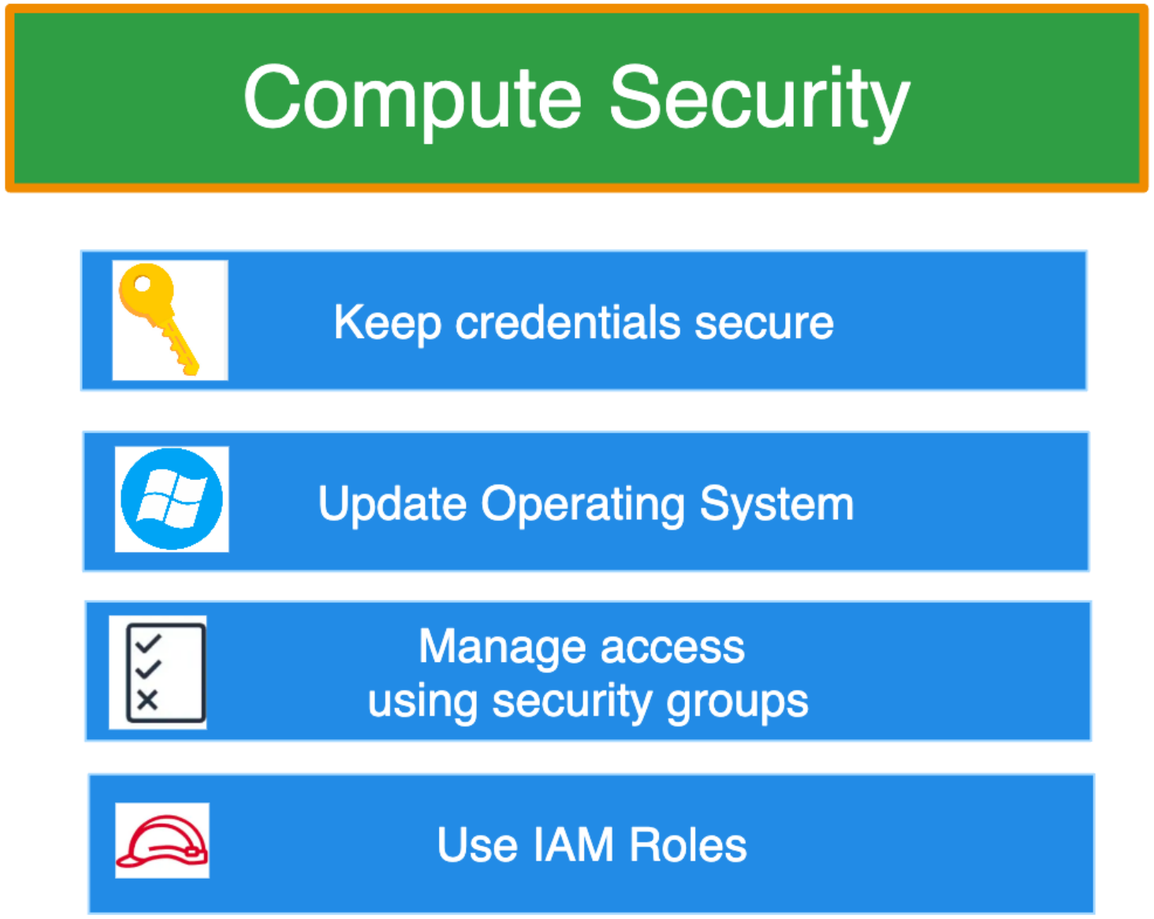
Securing customer data



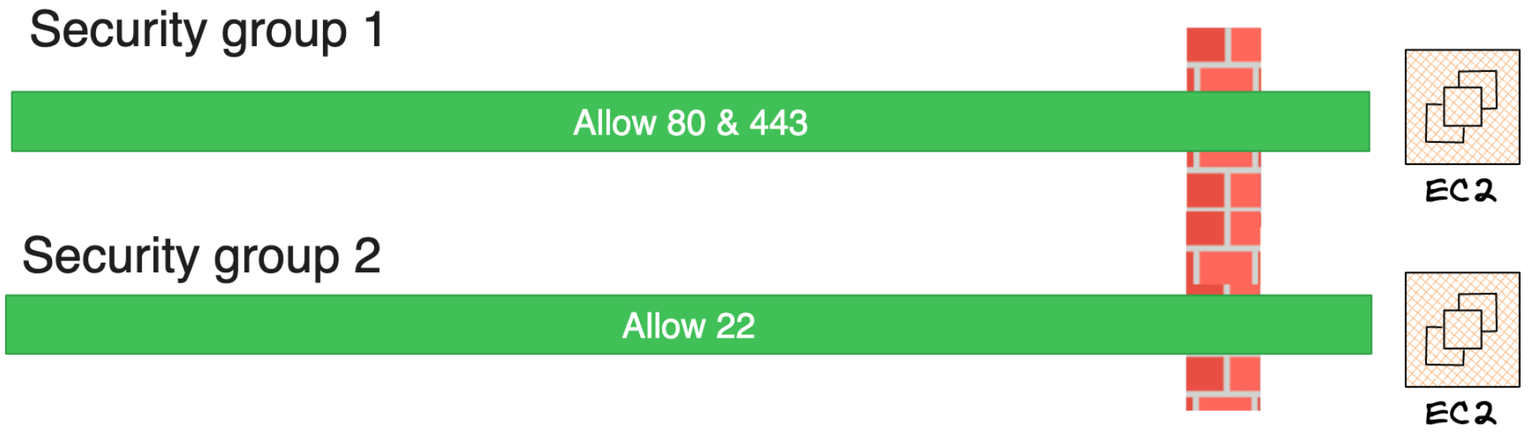
- Protection of customer data is a customer responsibility
- It is necessary to secure compute, network, and storage

Compute security strategies

- Use SSH keys instead of passwords
- Update OS with latest patches
- Control access to servers using security groups
- Use IAM roles instead of stored credentials
- Use security groups

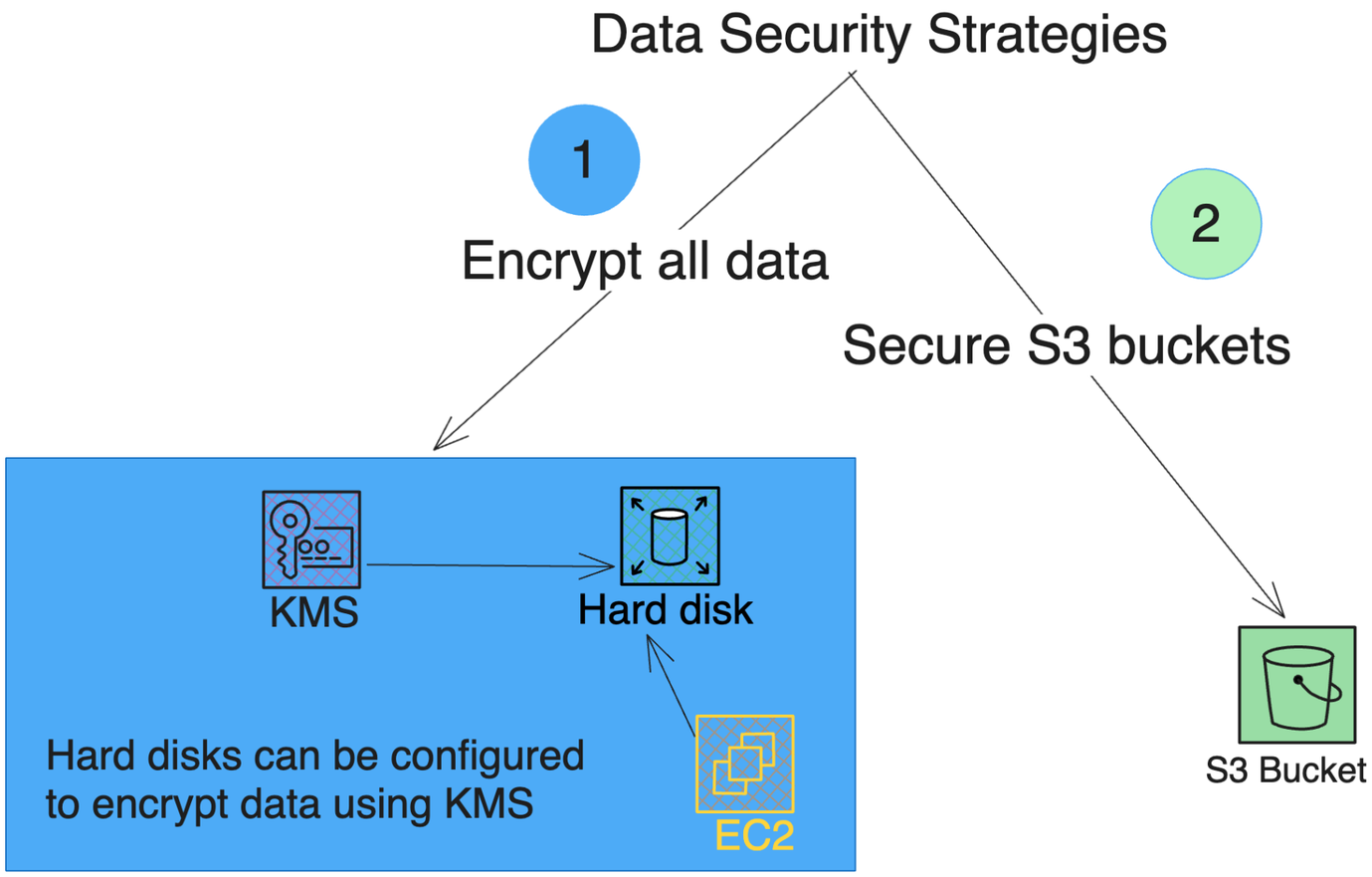


Security groups

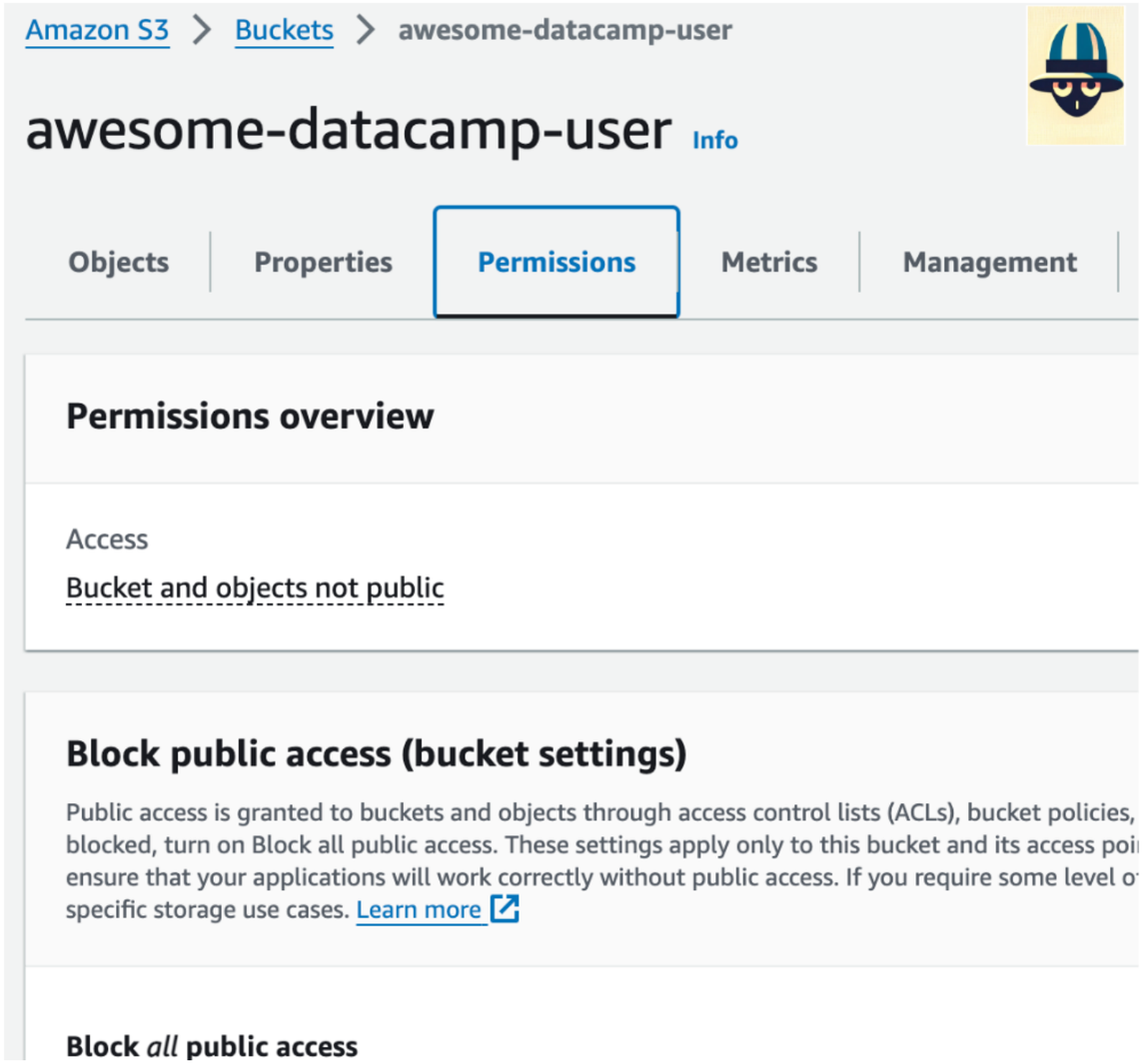


Feature	NACL (Network Access Control List)	Security Groups
Scope	Subnet-level	Instance-level
Statefulness	Stateless	Stateful
Default Rules	Denies all unless allowed	Allows outbound
Best for	Broad network layer control	Granular instance

Data security strategies



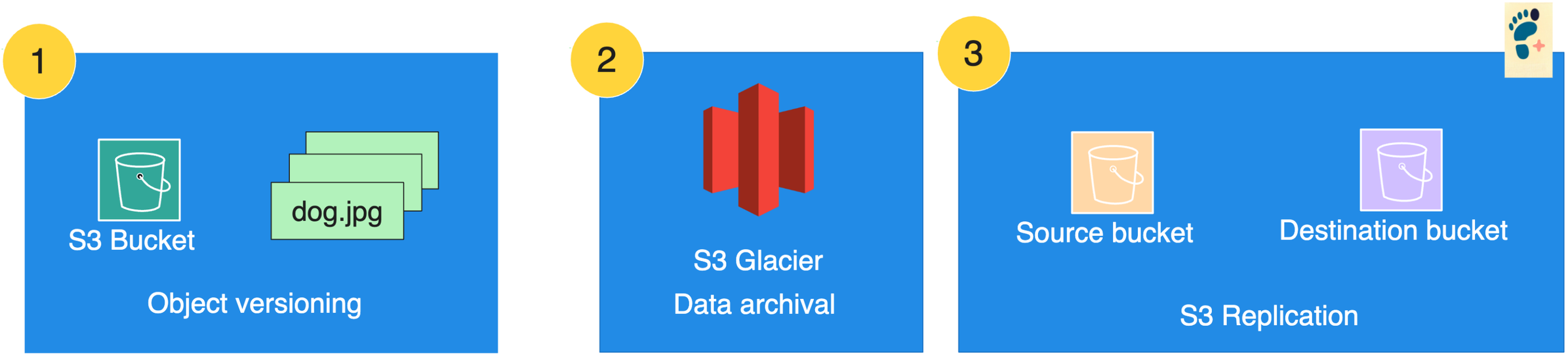
S3 public access and recovery



- S3 public access enables anyone to read data
- Public access can be turned off using a setting

Encryption at-rest

- Automatic Encryption
- Customer-Controlled Keys
- Compliance & Security



Security resources

Security Resources

Knowledge Center
Articles and videos covering the most frequent questions and requests from AWS customers

Security blog
Deep-dive on security best practices, how-to guides, and customer stories

Documentation
User guides, code samples, SDKs & toolkits, tutorials, API & CLI references

Security Hub
Collects security data across accounts, services, and supported third-party products and helps you analyze your security trends

Let's practice!

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