Identity Access Management and S3 storage Bucket

Class 25

23/8/2025

Acknowledgement

The series of the IT & Japanese language course is Supported by AOTS and OEC.

Ministry of Economy, Trade and Industry

Overseas Employment Corporation

What you have Learnt Last Week

We were focused on following points.

- Usage of control and loop flow statement
- Performing Linear Algebra in Numpy
- Software development Life cycle
- Importance of Security compliance
- Introduction of Bash Scripting, Ansible, docker and docker compose
- API testing with Postman and Introduction of Jira

What you will Learn Today

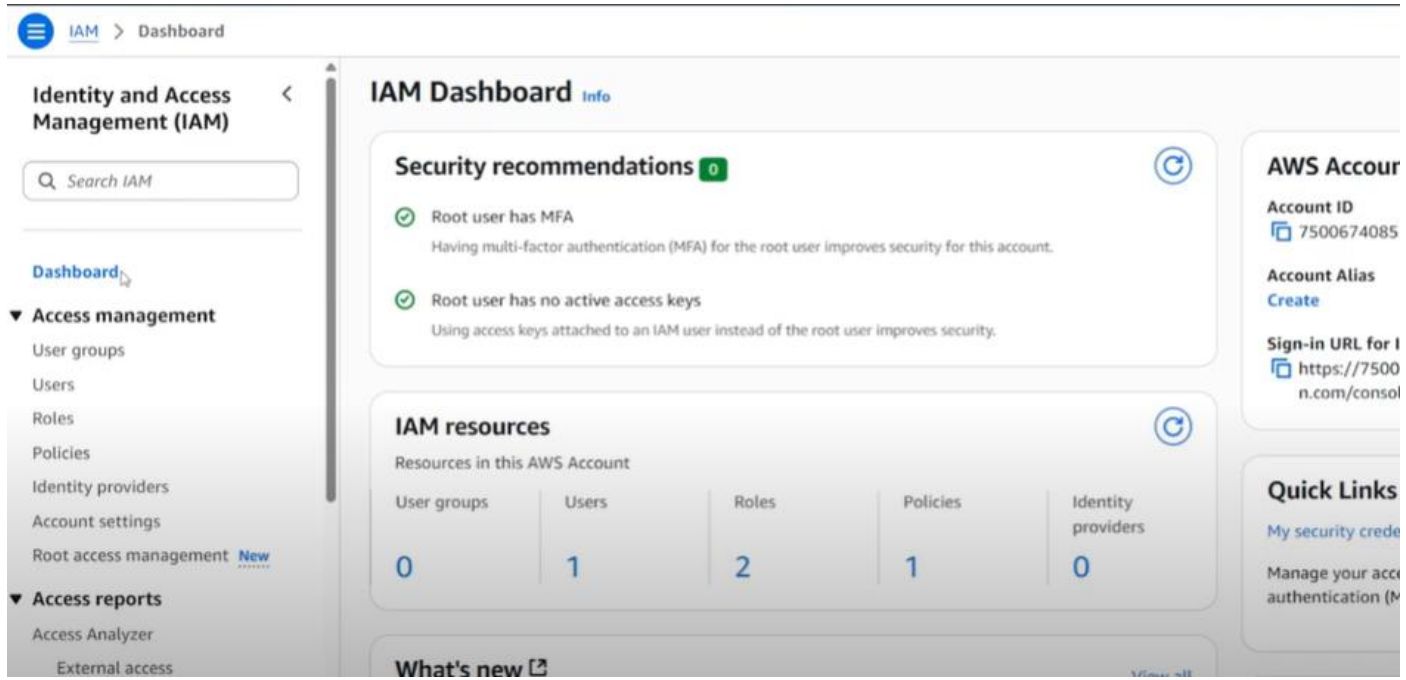
We will focus on following points.

1. Introduction to Identity Access Management (IAM) in AWS
2. Setting Up and Configuring S3 Storage Buckets
5. Q&A Session

Introduction to IAM in AWS

Foundation of AWS Security

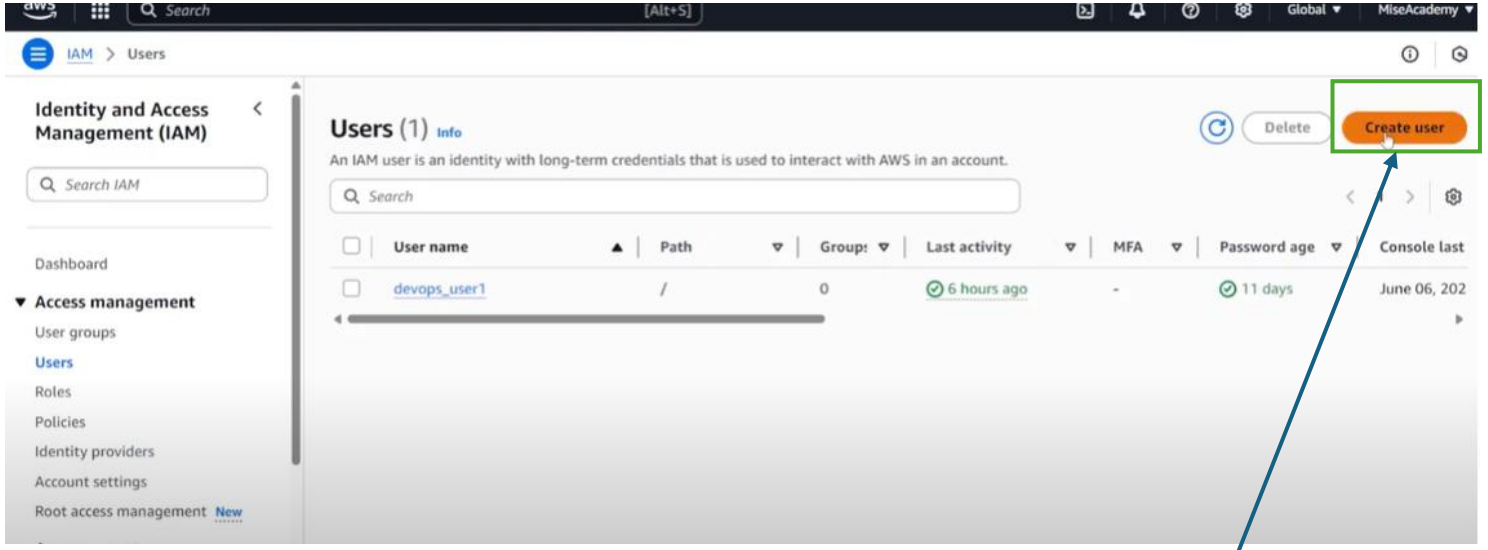
- IAM = Identity and Access Management
- Controls who can access AWS resources and what actions they can perform.
- Central to AWS security model for authentication & authorization.



IAM Users

Individual Access Accounts

- Created for real people or applications that need AWS access.
- Each user has unique credentials (password, access keys).
- Best practice: Assign minimum required permissions.



IAM Groups

Manage Permissions for Multiple Users

- A group is a collection of IAM users.
- Permissions assigned to a group apply to all its members.
- Example: Developers, Admins, Support.

IAM Roles

Temporary Access Without Credentials

- Used by AWS services or federated users.
- No username/password — uses temporary security tokens.
- Examples: EC2 instance accessing S3, cross-account roles.

IAM Policies

Permission Blueprints in JSON

- JSON documents that define allow/deny rules.
- Key elements: Version, Statement, Effect, Action, Resource.
- **Example:** Allow s3:GetObject for a specific bucket.

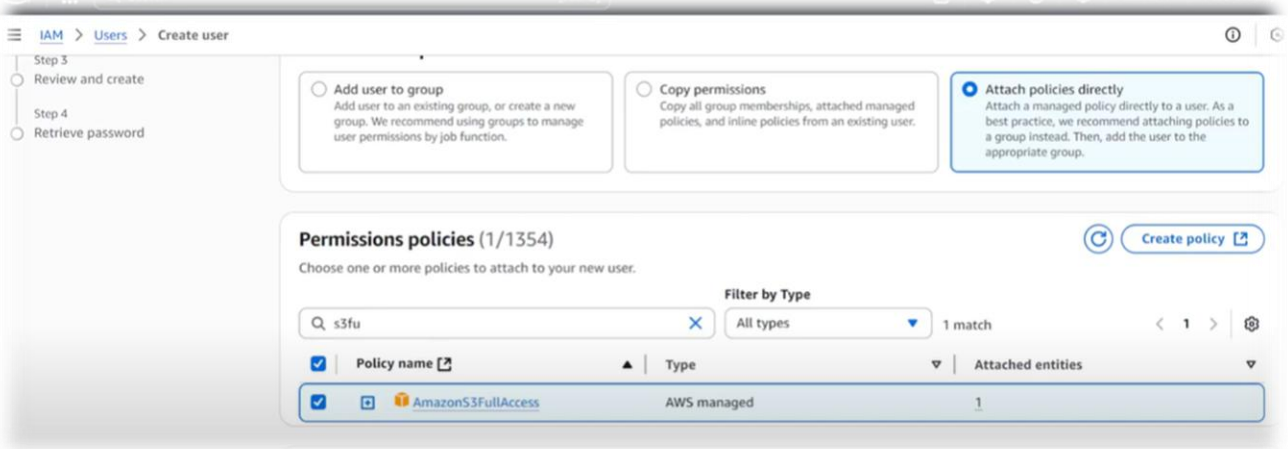
AWS Managed vs. Customer Managed Policies

Choosing the Right Policy Type

- **AWS Managed**: Pre-built by AWS, maintained automatically.

- **Customer Managed**: Created & fully controlled by you.

- Best practice: Start with AWS managed → refine into custom.



Principle of Least Privilege

Give Only What’s Needed

- Start with no permissions → add only necessary ones.
- Regularly review & remove unused permissions.
- Prevents accidental or malicious misuse.

Multi-Factor Authentication (MFA)

Extra Layer of Security

- Requires password + one-time code from device/app.
- Types: Virtual MFA (Google Authenticator), Hardware MFA, SMS MFA.
- Best practice: Enable MFA for all IAM users with console access.

IAM Password Policy

Enforcing Strong Passwords

- Configure length, complexity, rotation.

- Enforce password expiration & prevent reuse.

- **Example:** Set password policy to 12 chars, require uppercase /lowercase/numbers.

IAM Access Keys

Secure Programmatic Access

- For AWS CLI/SDK/API access.
- Rotate regularly and never hardcode in code.
- Use AWS Secrets Manager or environment variables.
- **Example:** Create an access key, show how to configure in AWS CLI.

IAM Roles for EC2

Secure Resource-to-Resource Access

- Assign a role to EC2 → allows it to access AWS services without keys.
- Example: EC2 → S3 backup service.
- **Example:** Attach S3 Read-Only role to an EC2 instance.

Cross-Account Access with IAM Roles

Cross-Account Access with IAM Roles

- Create a **trust policy** to allow another AWS account to assume the role.

- Useful for multi-account organizations.

- **Example:** Show trust relationship JSON.

Monitoring IAM with AWS CloudTrail

Track All IAM Activity

- CloudTrail logs every API call (who, when, what).
- Helps detect suspicious activity & audit compliance.
- **Example:** Open CloudTrail logs and search for “CreateUser” events.

IAM Security Best Practices

Keep Your AWS Secure

- Enable MFA for all users.
- Rotate keys & passwords regularly.
- Apply least privilege.
- Use IAM roles over access keys whenever possible.
- Monitor with CloudTrail & AWS Config.

Introduction to Amazon S3

Scalable Object Storage in AWS

S3 (Simple Storage Service):

Stores data as objects in buckets.
Global service, accessible via AWS Console, CLI, SDK.
Common use cases: backups, websites, big data storage, media hosting.

Storage Classes:

- **S3 Standard** – High availability, low latency.
- **S3 Intelligent-Tiering** – Moves objects between storage tiers automatically.
- **S3 Standard-IA** – Lower cost for infrequently accessed data.
- **S3 Glacier / Deep Archive** – Long-term archival storage.

Creating an S3 Bucket

Step-by-Step Setup

Naming Rules:

Globally unique name.

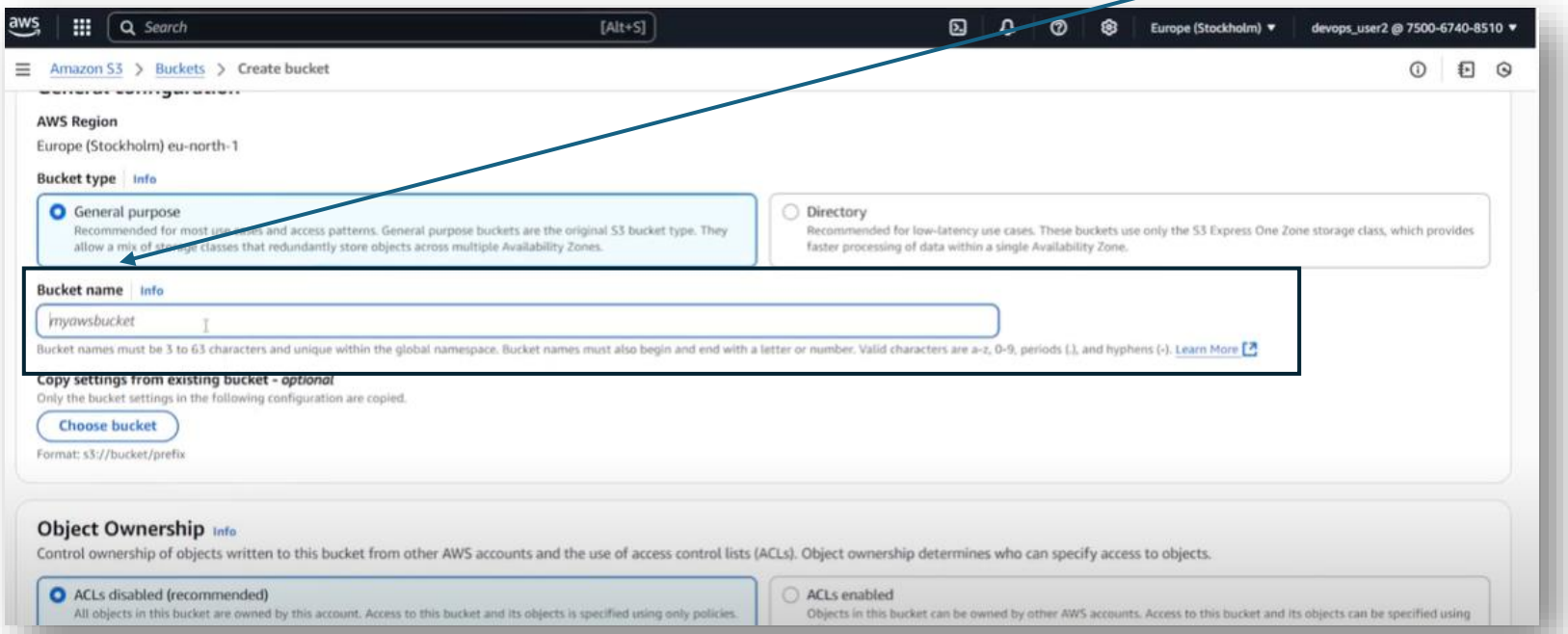
Lowercase letters, numbers, hyphens only.

No spaces or uppercase letters.

Region Selection:

Choose region closest to your users.

Reduces latency & cost.



Bucket Permissions & ACLs

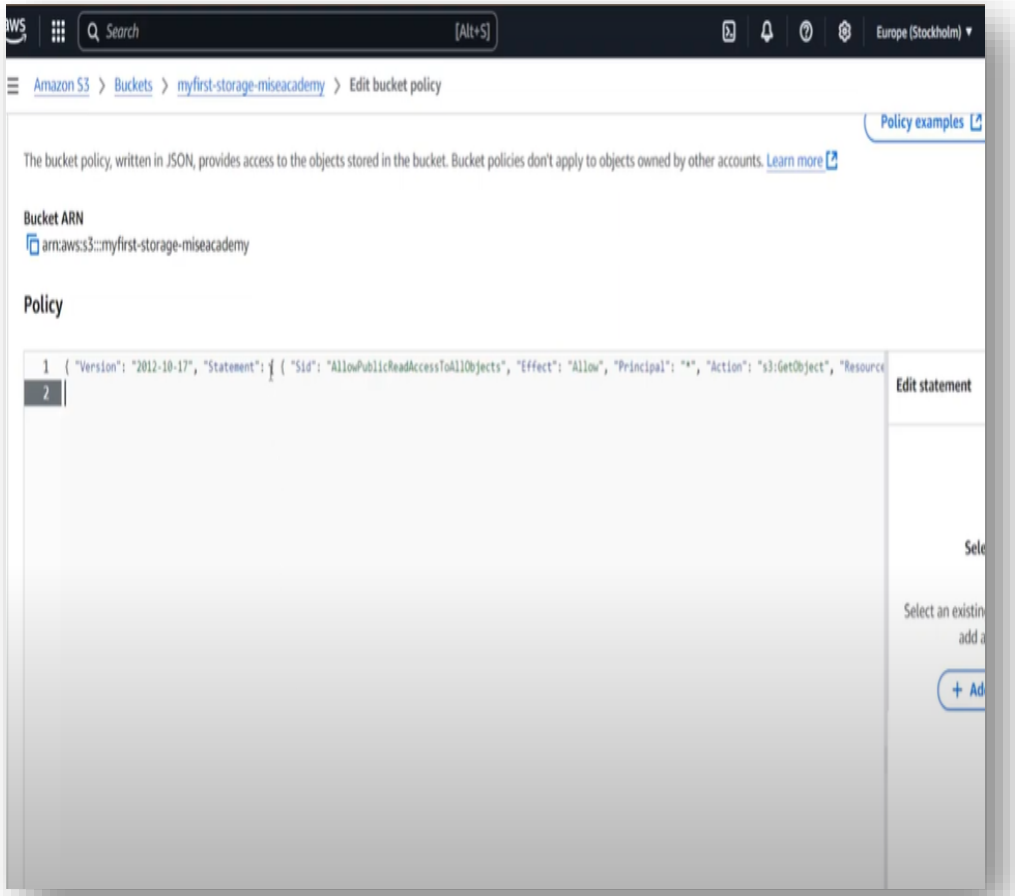
Controlling Who Can Access Your Data

ACLs (Access Control Lists):

- Set object/bucket-level permissions.
- Legacy method use policies instead where possible.

Permissions can be granted to:

- Specific AWS accounts.
- Public (not recommended unless needed).



Bucket Policies vs. IAM Policies

Understanding the Difference

Bucket Policy → Attached to a bucket (resource-based).

IAM Policy → Attached to users, groups, or roles (identity-based).

Example:

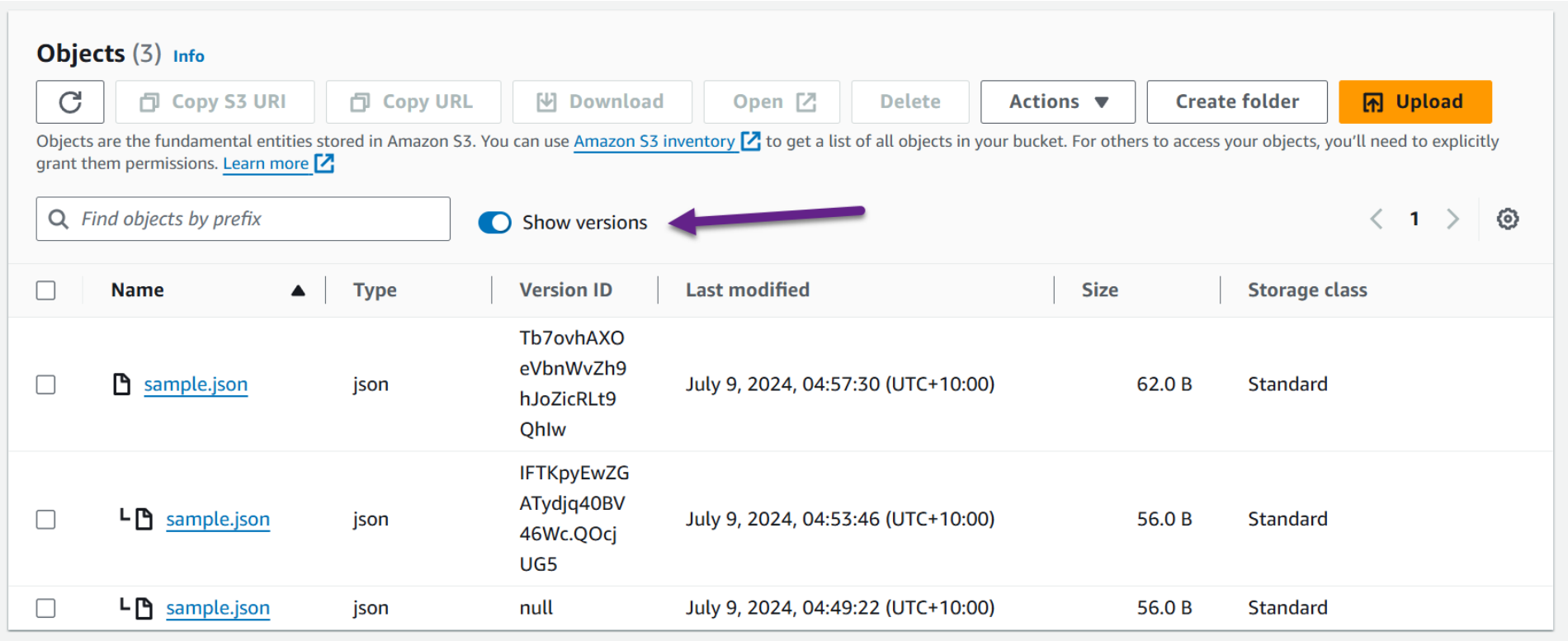
Bucket Policy: Allow public read to a bucket.

IAM Policy: Allow a user to read from S3 buckets.

Enabling Versioning

Backup & Recovery of Objects

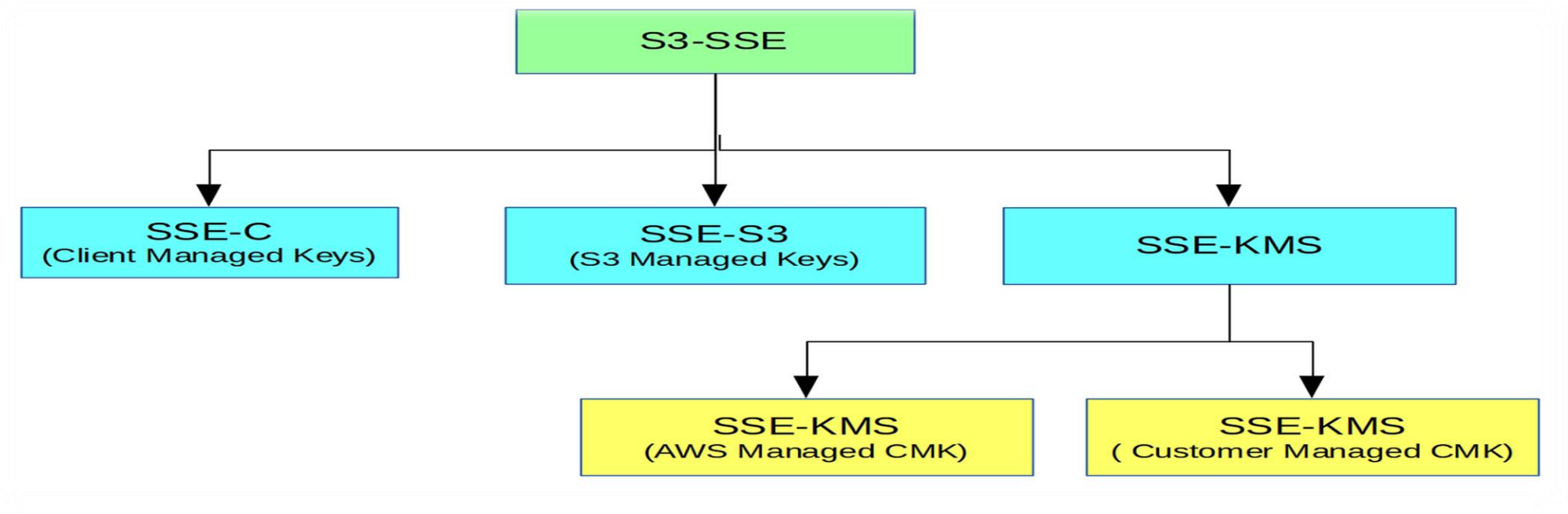
- Keeps multiple versions of an object.
- Protects against accidental deletion/overwriting.
- Can increase costs use lifecycle rules to delete old versions.



Server-Side Encryption (SSE)

Keeping Data Secure at Rest

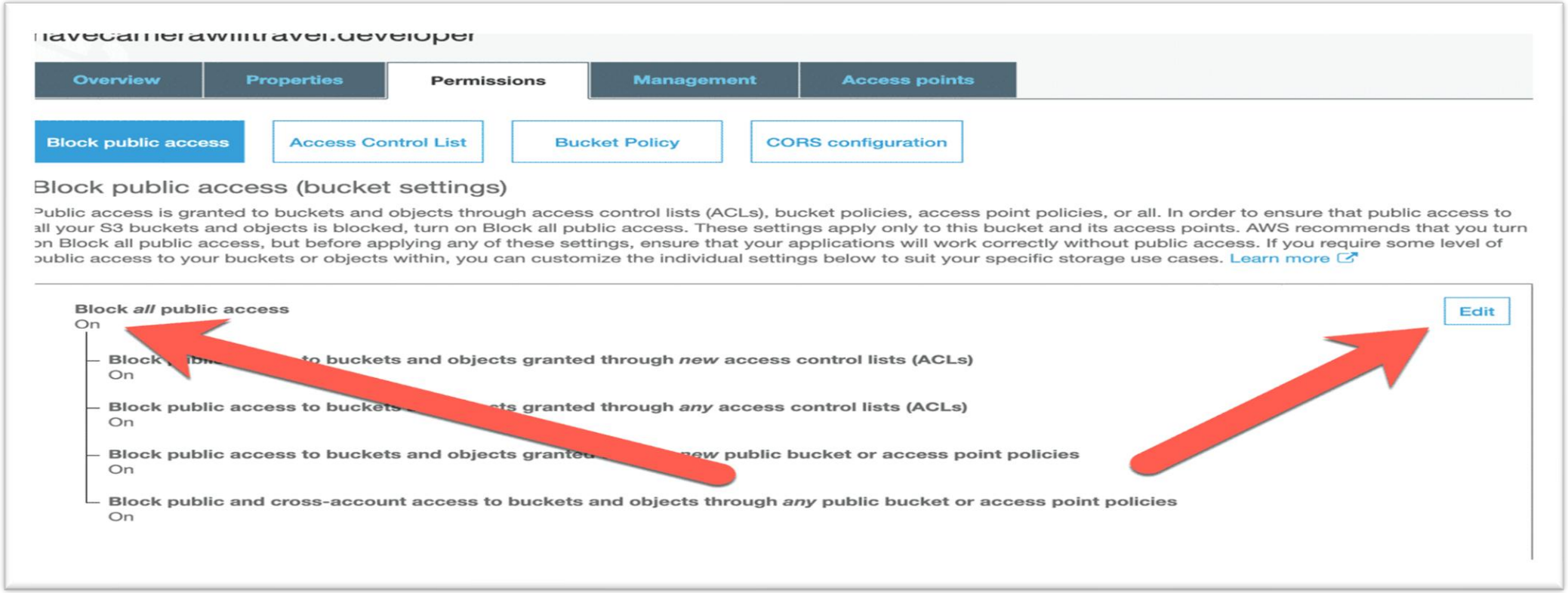
- **SSE-S3:** Managed keys by AWS.
- **SSE-KMS:** Customer managed keys in KMS.
- **SSE-C:** Customer-provided keys (rarely used).



Public Access Settings

Controlling Internet Access to Buckets

- Block public access (recommended).
- If public, risk of data leaks.
- Common use case: hosting public static website files.

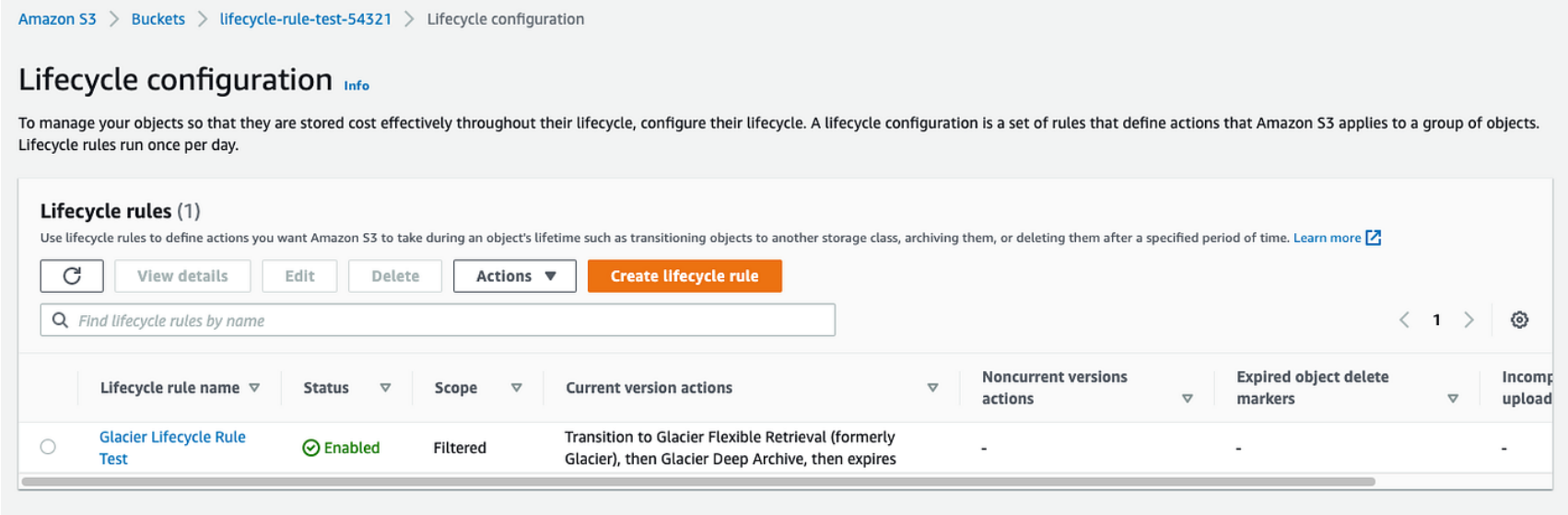


Lifecycle Rules

Automating Storage Cost Optimization

Move objects between storage classes automatically.

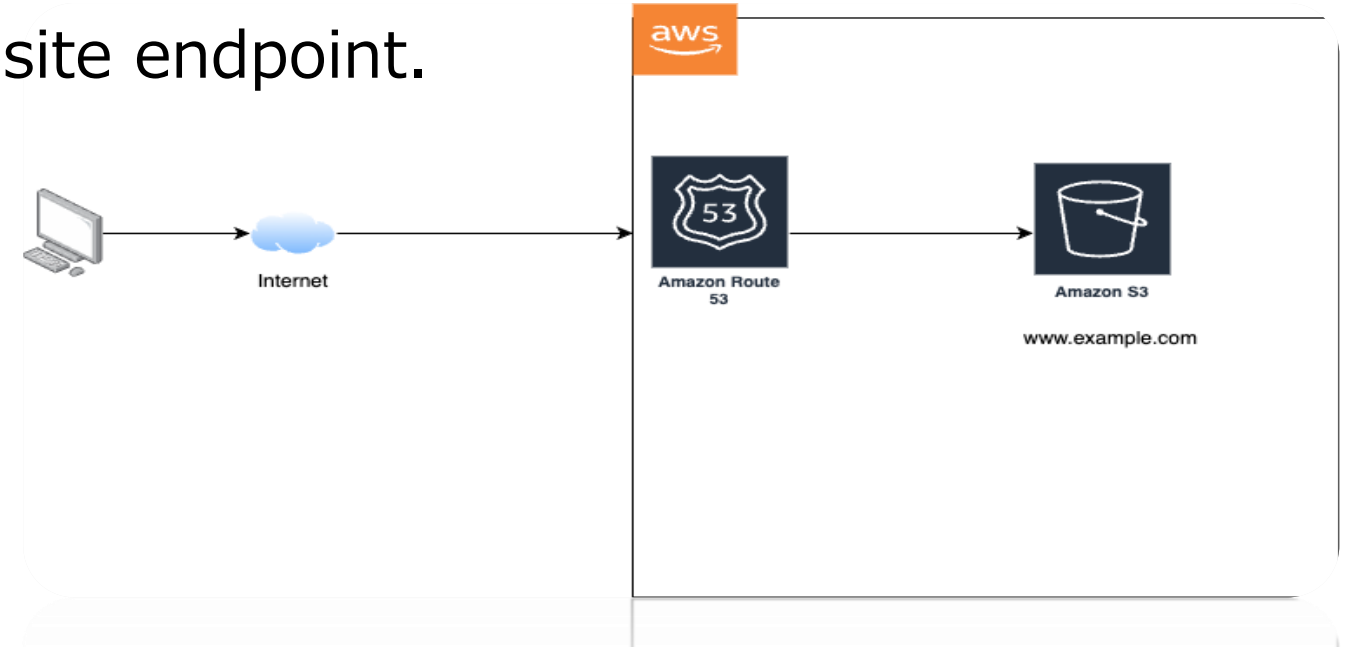
Common rule:
After 30 days → move to Standard-IA.
After 180 days → move to Glacier.
Also delete old versions/expired files automatically.



Hosting a Static Website on S3

Turn S3 Into a Simple Web Host

- Enable “Static Website Hosting” in bucket properties.
- Upload index.html & error.html.
- Public read access required.
- Access site via provided S3 website endpoint.



Logging & Monitoring S3 Access

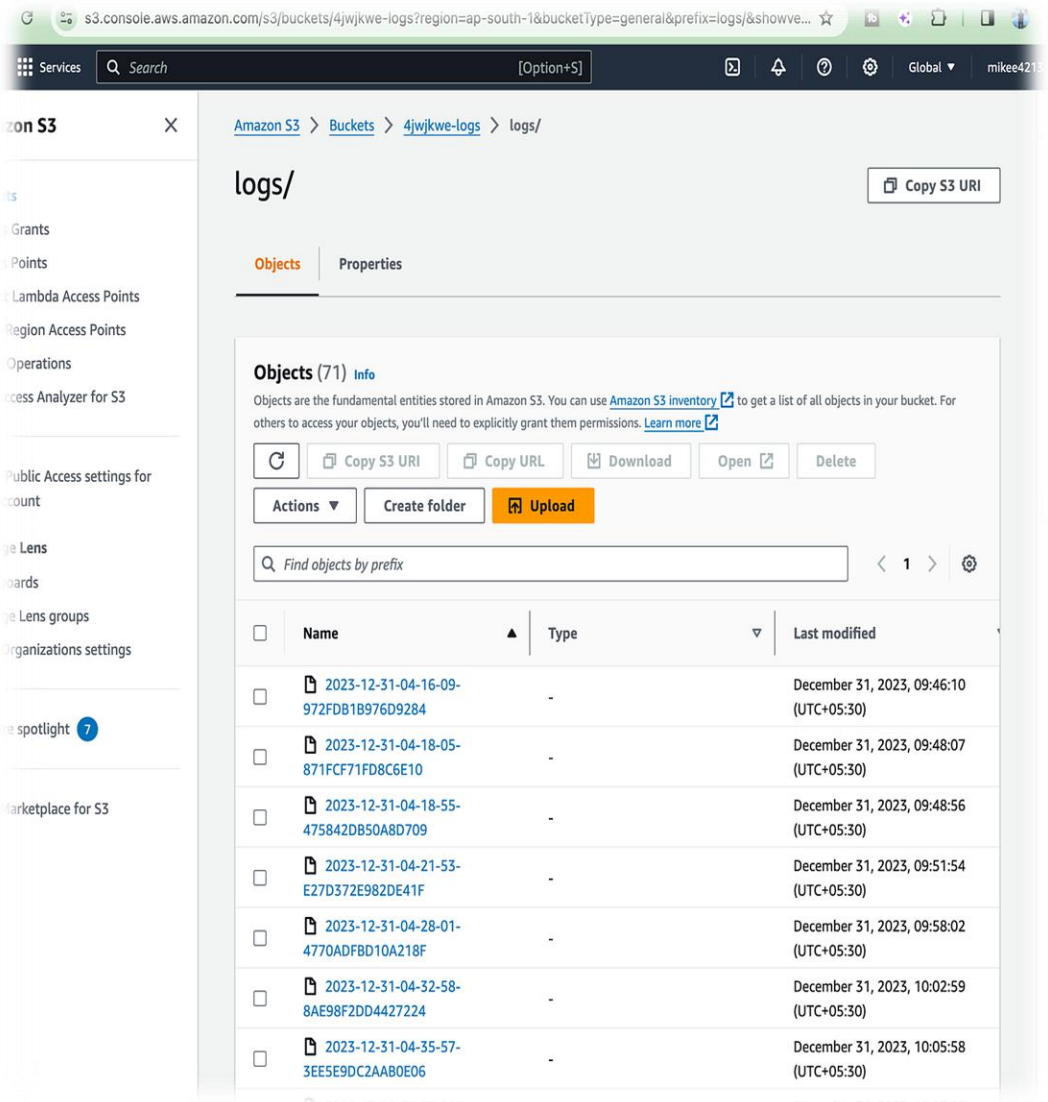
Tracking Who Accessed What

S3 Server Access Logs:

- Logs requests made to the bucket.
- Stored in another bucket.

AWS CloudTrail:

- Logs API calls to S3 (who, when, action).



Assignment

Assignment

1. Create an IAM user and then login into AWS with IAM user
2. Create a simple static website and deploy on S3 bucket

Quiz Section

Quiz

Everyone student should click on submit button before time ends otherwise MCQs will not be submitted

[Guidelines of MCQs]

1. There are 20 MCQs
2. Time duration will be 10 minutes
3. This link will be share on 12:25pm (Pakistan time)
4. MCQs will start from 12:30pm (Pakistan time)
5. This is exact time and this will not change
6. Everyone student should click on submit button otherwise MCQs will not be submitted after time will finish
7. Every student should submit Github profile and LinkedIn post link for every class. It include in your performance

Assignment

Assignment should be submit before the next class

[Assignments Requirements]

1. Create a post of today's lecture and post on LinkedIn.
2. Make sure to tag @Plus W @Pak-Japan Centre and instructors LinkedIn profile
3. Upload your code of assignment and lecture on GitHub and share your GitHub profile in respective your region group WhatsApp group
4. If you have any query regarding assignment, please share on your region WhatsApp group.
5. Students who already done assignment, please support other students

Q&A Session

ありがとうございます。
Thank you.
شكريا

For the World with Diverse Individualities