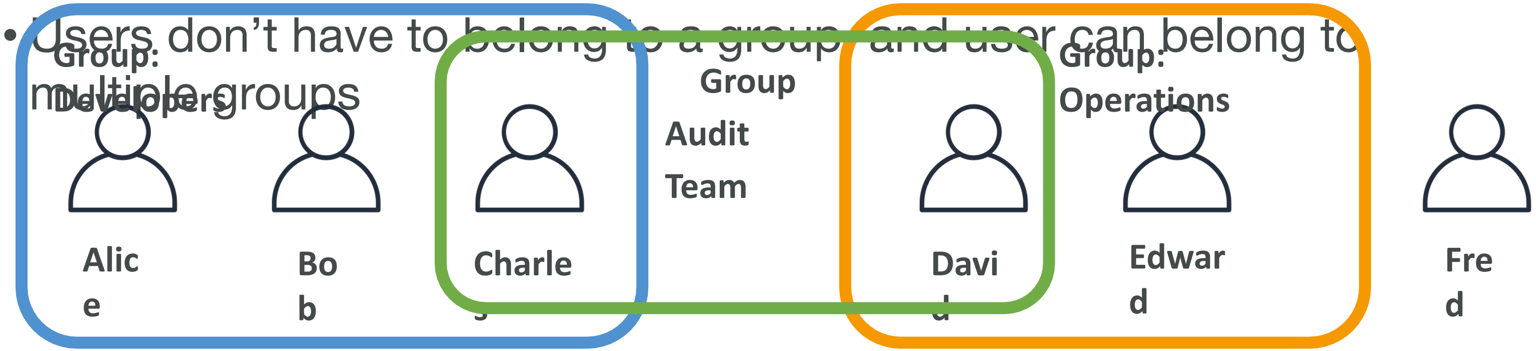
IAM
Section

IAM: Users & Groups

- IAM = Identity and Access Management, Global service
- Root account created by default, shouldn't be used or shared
- Users are people within your organization, and can be grouped
- Groups only contain users, not other groups
- Users don't have to belong to a group, and user can belong to multiple groups

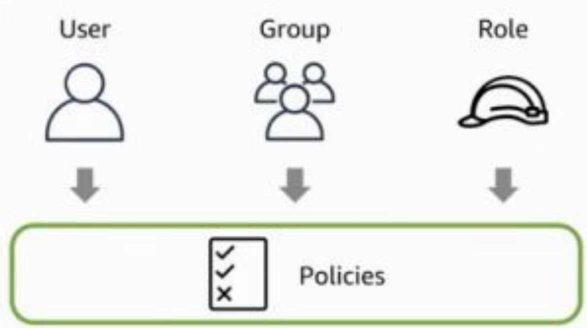


AWS Identity and Access Management (IAM)

- **Authentication** (is it the right user?) and
- **Authorization** (do they have the right access?)
- **Identities** can be
  - AWS users or
  - Federated users (externally authenticated users)
- Provides very **granular** control
  - Limit a single user:
    - to perform single action
    - on a specific AWS resource
    - from a specific IP address
    - during a specific time window

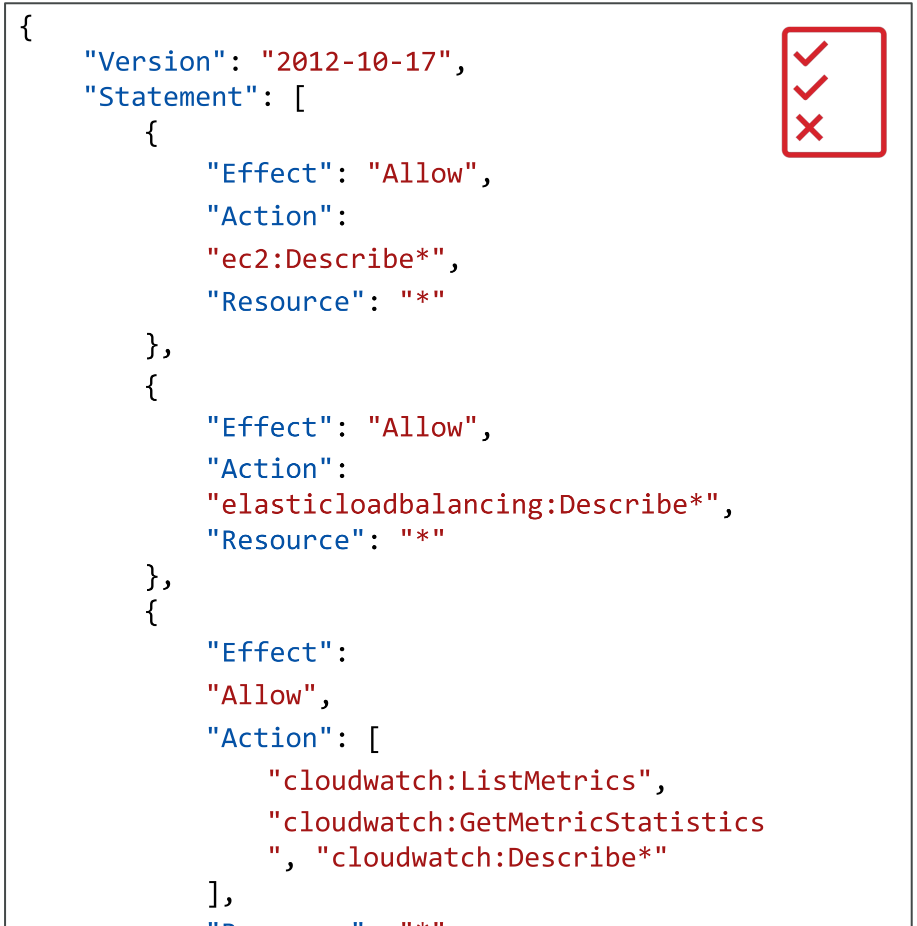
Important IAM Concepts

- **IAM users:** Users created in an AWS account
  - Has credentials attached (name/password or access keys)
- **IAM groups:** Collection of IAM users
- **Roles:** Temporary identities
  - Does NOT have credentials attached
  - (Advantage) Expire after a set period of time
- **Policies:** Define permissions
  - **AWS managed policies** - Standalone policy predefined by AWS
  - **Customer managed policies** - Standalone policy created by you
  - **Inline policies** - Directly embedded into a user, group or role



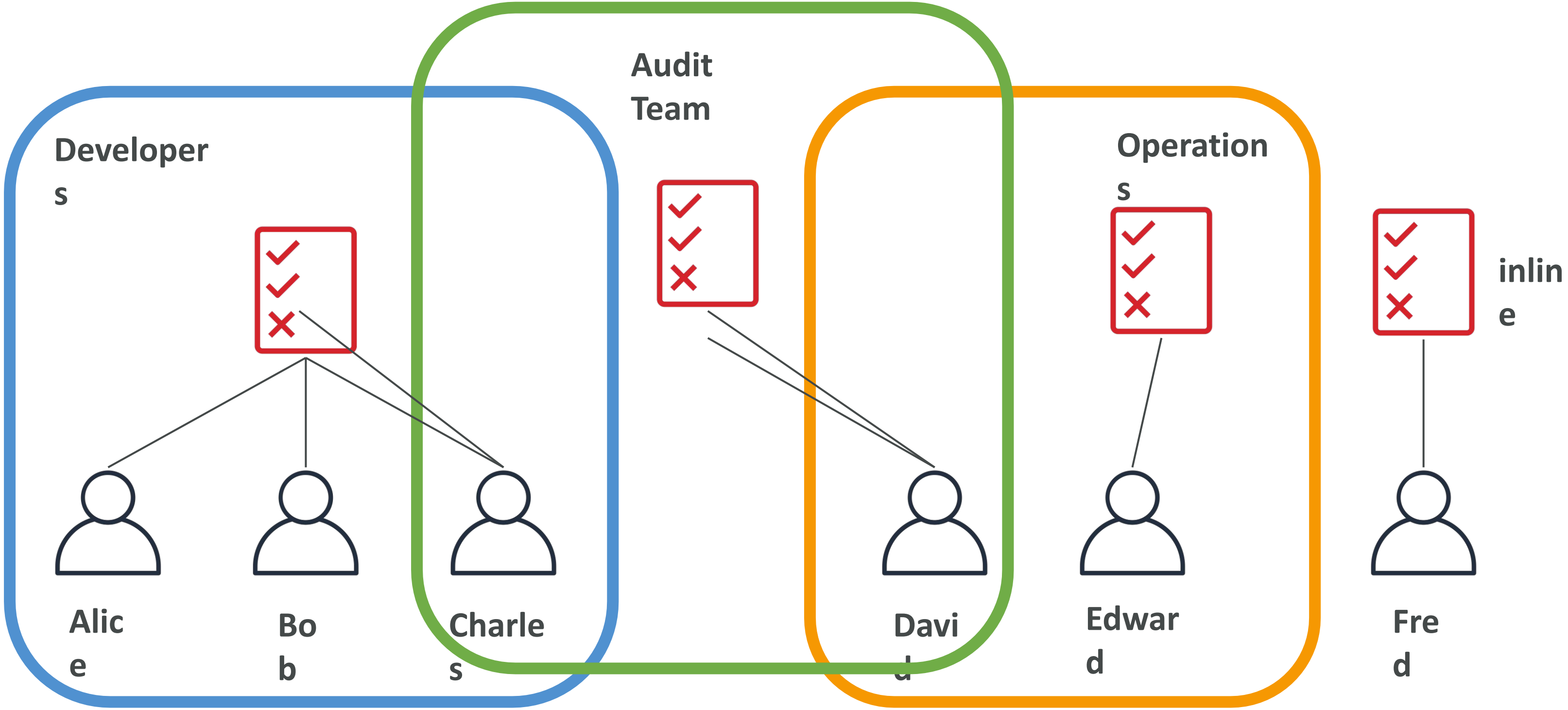
IAM: Permissions

- Users or Groups can be assigned JSON documents called policies
- These policies define the permissions of the users
- In AWS you apply the least privilege principle: don’t give more permissions than a user needs



```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action":
            "ec2:Describe*",
            "Resource": "*"
        },
        {
            "Effect": "Allow",
            "Action":
            "elasticloadbalancing:Describe*",
            "Resource": "*"
        },
        {
            "Effect":
            "Allow",
            "Action": [
                "cloudwatch:ListMetrics",
                "cloudwatch:GetMetricStatistics
                ", "cloudwatch:Describe*"
            ],
            "Resource": "*"
```

IAM Policies inheritance



IAM – Password Policy

- Strong passwords = higher security for your account
- In AWS, you can setup a password policy:
  - Set a minimum password length
  - Require specific character types:
    - including uppercase letters
    - lowercase letters
    - numbers
    - non-alphanumeric characters
  - Allow all IAM users to change their own passwords
  - Require users to change their password after some time (password expiration)
  - Prevent password re-use

Multi Factor Authentication - MFA

- Users have access to your account and can possibly change configurations or delete resources in your AWS account
- You want to protect your Root Accounts and IAM users
- MFA = password *you know* + security device *you own*

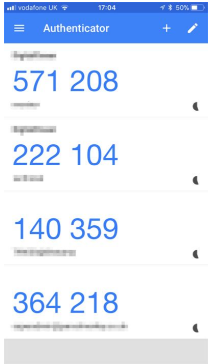
Alice
Password
+
MFA
=>
Successful login

- Main benefit of MFA:

  <u>if a password is stolen or hacked, the account is not compromised</u>

MFA devices options in AWS

Virtual MFA device



571 208

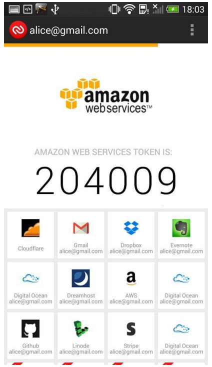
222 104

140 359

364 218

Google Authenticator

(phone only)



AMAZON WEB SERVICES TOKEN IS:

204009

Authy

(multi-device

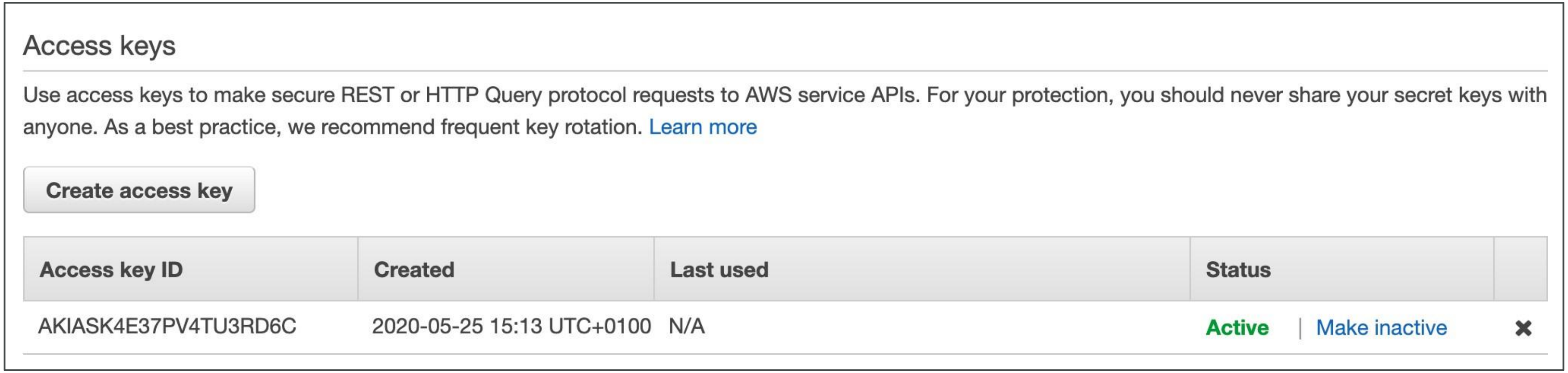
)

Support for multiple tokens on a single device.

How can users access AWS ?

- To access AWS, you have three options:
  - AWS Management Console (protected by password + MFA)
  - AWS Command Line Interface (CLI): protected by access keys
  - AWS Software Developer Kit (SDK) - for code: protected by access keys
- Access Keys are generated through the AWS Console
- Users manage their own access keys
- Access Keys are secret, just like a password. Don't share them
- Access Key ID ~= username

Example Access Keys



Access keys

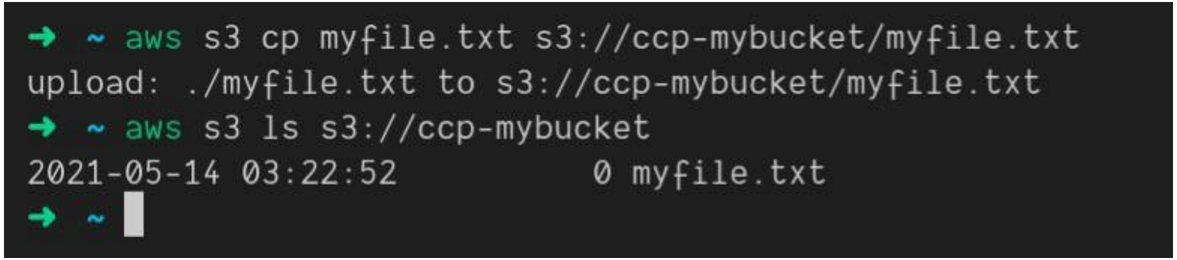
Use access keys to make secure REST or HTTP Query protocol requests to AWS service APIs. For your protection, you should never share your secret keys with anyone. As a best practice, we recommend frequent key rotation. Learn more

Access key ID	Created	Last used	Status	
AKIASK4E37PV4TU3RD6C	2020-05-25 15:13 UTC+0100	N/A	Active | Make inactive	✖

- Access key ID: AKIASK4E37PV4983d6C
- Secret Access Key: AZPN3zojWozWCndIjhB0Unh8239a1bzbzO5fqqkZq
- Remember: don’t share your access keys

What’s the AWS CLI?

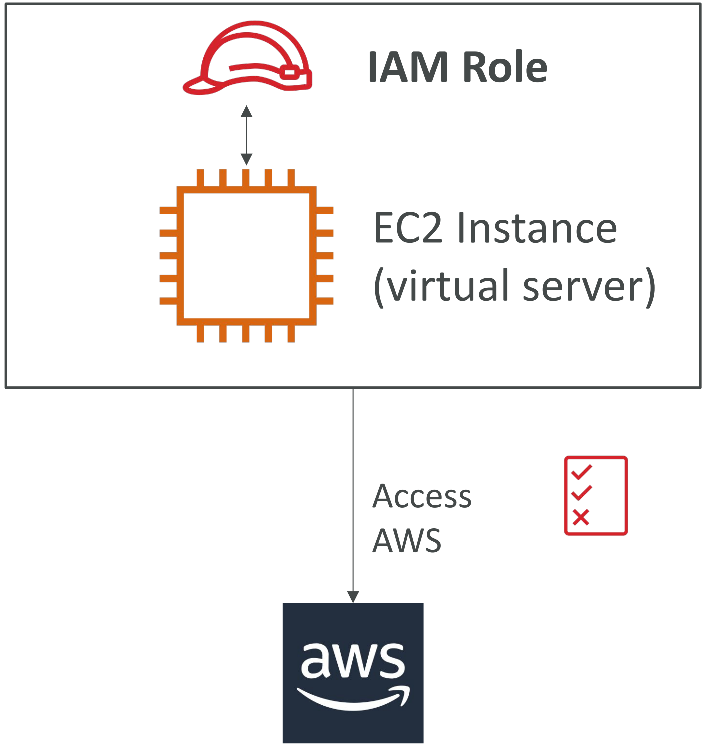
- A tool that enables you to interact with AWS services using commands in your command-line shell
- Direct access to the public APIs of AWS services
- You can develop scripts to manage your resources
- It’s open-source https://github.com/aws/aws-cli
- Alternative to using AWS Management Console



```
➜  ~ aws s3 cp myfile.txt s3://ccp-mybucket/myfile.txt
upload: ./myfile.txt to s3://ccp-mybucket/myfile.txt
➜  ~ aws s3 ls s3://ccp-mybucket
2021-05-14 03:22:52          0 myfile.txt
➜  ~ █
```

IAM Roles for Services

- Some AWS service will need to perform actions on your behalf
- To do so, we will assign permissions to AWS services with IAM Roles
- Common roles:
  - EC2 Instance Roles
  - Lambda Function Roles
  - Roles for CloudFormation



IAM Security Tools

- IAM Credentials Report (account-level)
  - a report that lists all your account's users and the status of their various credentials

- IAM Access Advisor (user-level)
  - Access advisor shows the service permissions granted to a user and when those services were last accessed.
  - You can use this information to revise your policies.

IAM Guidelines & Best Practices

- Don’t use the root account except for AWS account setup
- One physical user = One AWS user
- Assign users to groups and assign permissions to groups
- Create a strong password policy
- Use and enforce the use of Multi Factor Authentication (MFA)
- Create and use Roles for giving permissions to AWS services
- Use Access Keys for Programmatic Access (CLI / SDK)

Shared Responsibility Model for IAM

- Infrastructure (global network security)
- Configuration and vulnerability analysis
- Compliance validation

You

- Users, Groups, Roles, Policies management and monitoring
- Enable MFA on all accounts
- Rotate all your keys often
- Use IAM tools to apply appropriate permissions
- Analyze access

IAM Section – Summary

- Users: mapped to a physical user, has a password for AWS Console
- Groups: contains users only
- Policies: JSON document that outlines permissions for users or groups
- Roles: for EC2 instances or AWS services
- Security: MFA + Password Policy
- AWS CLI: manage your AWS services using the command-line
- AWS SDK