Introduction to AWS Identity and Access Management

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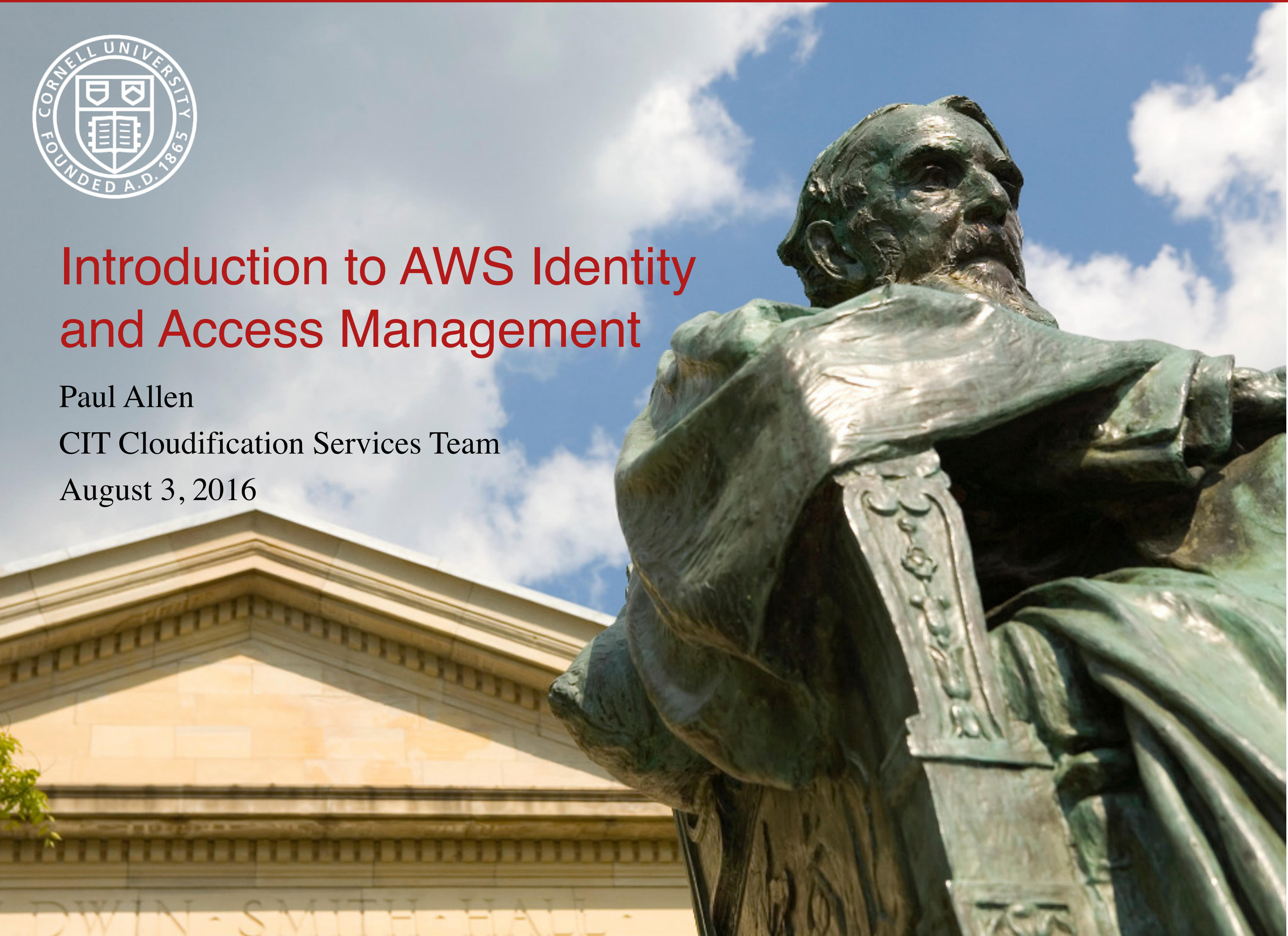


Agenda

- Basics
  - What is IAM?
  - IAM concepts
- Shibboleth Integration
- Cornell Policy and IAM Best Practices
- AWS Security Outside IAM

What is IAM?

- Fine-grained control of who can do what
  - direct interaction
    - user Bob can launch new EC2 instances
  - delegation
    - EC2 instance i-123456 can read S3 buckets

IAM Characteristics

- free
- centralized AWS service
- default scope is AWS account
- deny by default

IAM Concepts – Users

- Root User
  - the identity used to create AWS account
  - complete access
- Best practices
  - don’t use this account for the everyday
  - setup physical MFA and lock it away
  - connect to a Cornell EGA, not an individual
  - don’t use your Amazon.com shopping account

IAM Concepts – Users

- IAM Users
  - an identity with assigned permissions (via policies or groups)
  - can have username/password access to AWS console
  - can have (secret) key-based access to AWS APIs
- Best Practices
  - rotate credentials (keys, passwords)
  - MFA
  - password policy

IAM Concepts – Groups

- collection of IAM users
- operates like you'd think
- Best practices
  - manage permissions with groups
    - i.e., assign policies to groups instead of users

IAM Concepts – Policies

- set of permissions to be granted or denied
- JSON documents
- can be assigned directly to IAM users

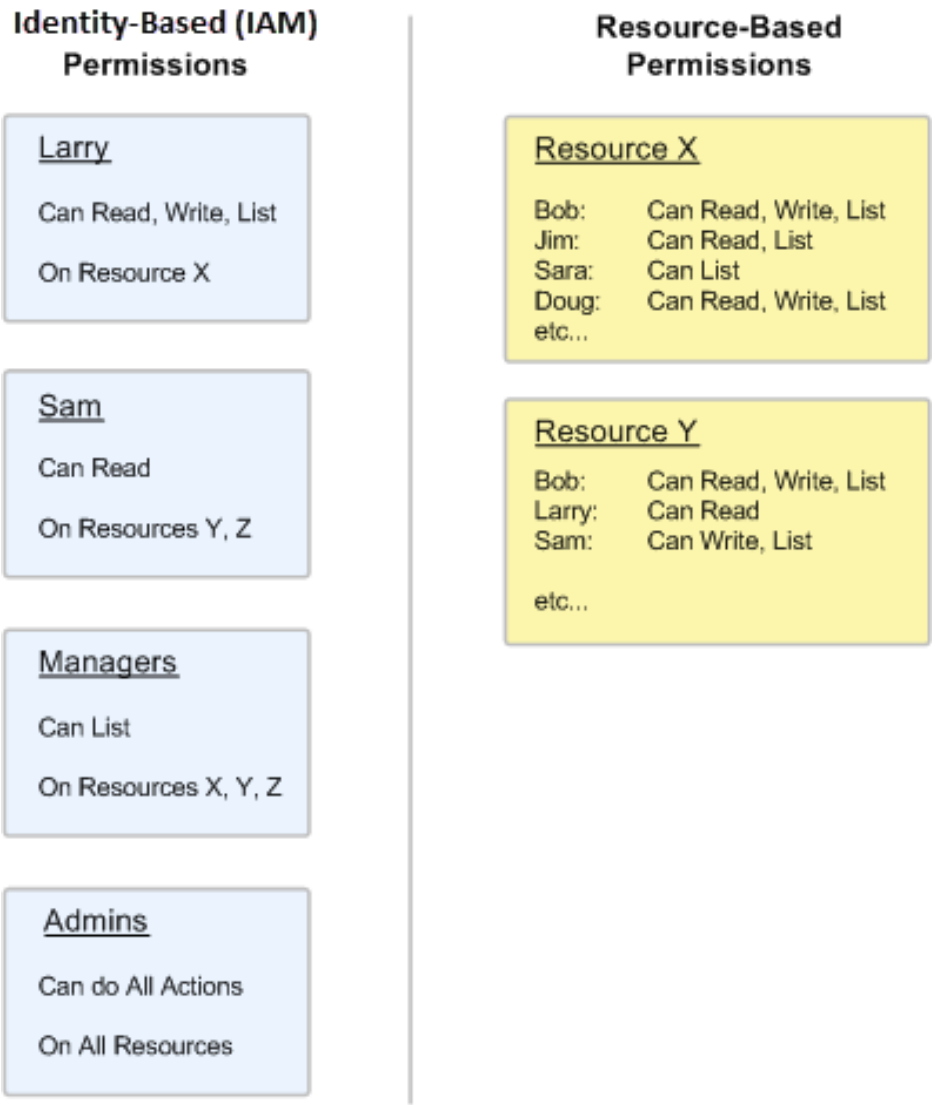
```
{
  "Version": "2012-10-17",
  "Statement": [ {
    "Effect": "Allow",
    "Action": "s3:ListAllMyBuckets",
    "Resource": "arn:aws:s3:::*"
  }, {
    "Effect": "Allow",
    "Action": [
      "s3:ListBucket",
      "s3:GetBucketLocation"],
    "Resource":
     "arn:aws:s3:::EXAMPLE-BUCKET-NAME”
  }, {
    "Effect": "Allow",
    "Action": [
      "s3:PutObject",
      "s3:GetObject",
      "s3:DeleteObject" ],
    "Resource":
      "arn:aws:s3:::EXAMPLE-BUCKET-NAME/*"
  } ] }
```

IAM Concepts – Policies

- can be extremely complex
- policy versioning supported
- polices effects can "deny" or "allow"
- policy scoping
  - by service, resource, region, AWS account, IAM users/groups/roles, federated users
- conditions
  - by dates, IP address, MFA presence, principal type, etc.

AWS Permissions

- IAM Policies
- Resource-based Permissions
  - S3 buckets
  - Glacier vaults
  - SNS topics
  - SQS queues
  - Key Management Service



Identity-Based (IAM) Permissions

Larry

Can Read, Write, List

On Resource X

Sam

Can Read

On Resources Y, Z

Managers

Can List

On Resources X, Y, Z

Admins

Can do All Actions

On All Resources

Resource-Based Permissions

Resource X

Bob:	Can Read, Write, List
Jim:	Can Read, List
Sara:	Can List
Doug:	Can Read, Write, List
etc...	

Resource Y

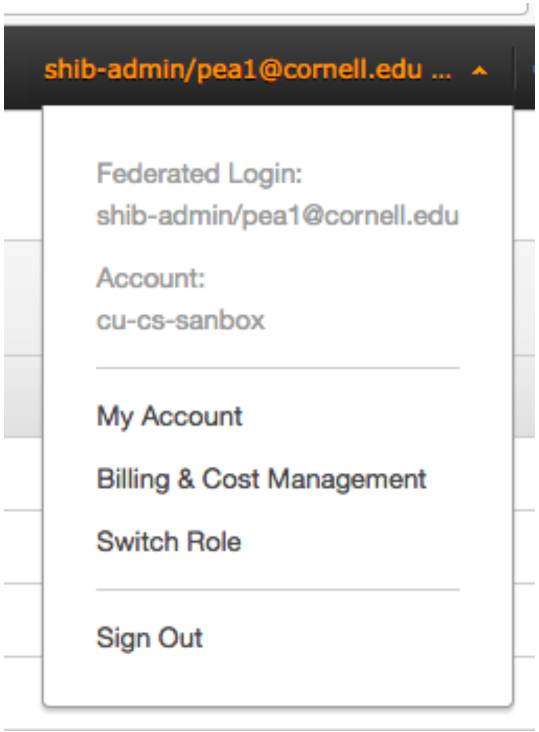
Bob:	Can Read, Write, List
Larry:	Can Read
Sam:	Can Write, List
etc...	

IAM Concepts – Roles

- a 2nd type of AWS identity
  - also has assigned permissions
  - similar to IAM users
- designed to be temporarily assumed
  - e.g. by an EC2 instance
  - e.g. by federated Shibboleth user
- no associated credentials
- Instance Profiles
  - assigned to EC2 instance
  - container for one or more IAM roles

Cornell Shibboleth Integration

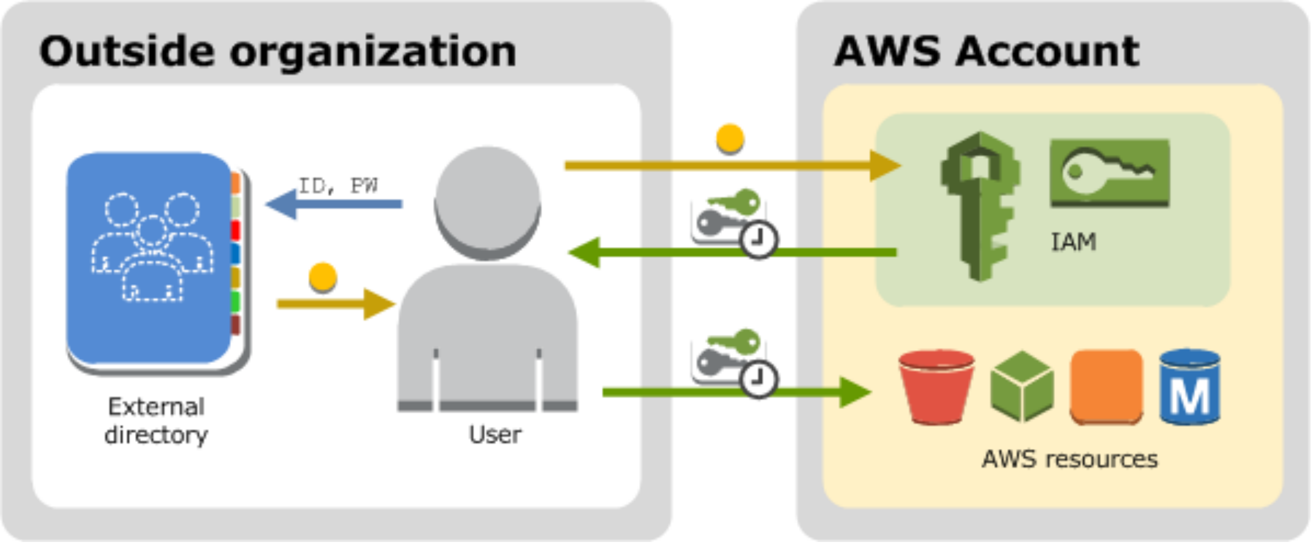
- SAML identity provider to AWS IAM
- per AWS account
  - setup by Cloudification Services Team
- maps Cornell identities to IAM role



shib-admin/pea1@cornell.edu ...

Federated Login:
shib-admin/pea1@cornell.edu

Account:
cu-cs-sanbox



Cornell Shibboleth Integration

- AWS account 123456789012
  - Cornell AD group: CIT-123456789012-admin
  - AWS role: shib-admin
    - assigned “AdministratorAccess” AWS policy

- Generically
  - Cornell AD group: CIT-123456789012-xyz
  - AWS role: shib-xyz
    - assigned any policy you wish

Cornell IAM-related Policies

- root account
  - MFA enabled
  - no access keys
  - no everyday use
- use of IAM users (extremely) limited
- use Shibboleth-mapped roles instead of IAM users
  - Two-Step Login (Duo) required
- strong IAM password policy
  - when IAM users cannot be avoided

Cornell IAM-related Ideals

- rotate access keys for IAM users
- use Shibboleth for temporary access keys
  - Using Shibboleth for AWS API and CLI access (Cornell Cloud Tech Blog)

likely to be policy soon

Security Outside of IAM

IAM controls access to create and manage resources

- does not control identity and access **within** those resources

- Elastic Compute Cloud (EC2)
  - access instances using key pairs (Linux) or password (Windows)
  - configure instance users separately
- Relational Database Service (RDS)
  - username/passwords tied to database
- Virtual Private Cloud
  - security groups, network ACLS, etc.
  - controls connectivity resources

https://github.com/CU-CloudCollab/aws-config-check

- script that checks if your AWS account is in compliance with Cornell policy
- covers IAM and many other points of AWS configuration

```
$ ./check-aws.rb
Checking IAM
Checking IAM account alias
           Alias is 'cu-commercial'.
Checking IAM root user
Checking IAM identity provider configuration
Checking IAM user passwords...
Checking IAM access keys
Checking IAM password policy
           Password policy should require minimum
password length of 14 or more.
           Password policy should require maximum
password age 90 days or less.
Checking AWS Config Service...
...us-east-1
...us-west-2
...eu-west-1
...eu-central-1
...ap-northeast-1
Checking AWS CloudTrail...
...ap-south-1
...eu-west-1
...ap-southeast-1
...ap-southeast-2
...
```

Top IAM Best Practices (from AWS)

- **Users** – Create individual users.
- **Permissions** – Grant least privilege.
- **Groups** – Manage permissions with groups.
- **Conditions** – Restrict privileged access further with conditions.
- **Auditing** – Enable AWS CloudTrail to get logs of API calls.
- **Password** – Configure a strong password policy.
- **Rotate** – Rotate security credentials regularly.
- **MFA** – Enable MFA for privileged users.
- **Sharing** – Use IAM roles to share access.
- **Roles** – Use IAM roles for Amazon EC2 instances.
- **Root** – Reduce or remove use of root.

IAM Advanced Topics

- Advanced Policies
- Policy Analysis
- Cross account-permissions
- Security Token Service - temporary credentials
- IAM server certificate management
- Related Services
  - AWS Key Management Service
  - AWS CloudTrail
  - AWS Config

Questions?

Resources

- AWS re:Invent 2015 Security presentations
- Cornell Standard AWS Account Configurations
- Cornell Cloudification Services Wiki
- Cornell Cloudification Tech Blog