Attack technique report

Demo

AWS EC2 (AttachVolume, DetachVolume) Take Over

Technique description

An attacker who compromises an AWS identity that has the right permissions can detach a volume from an EC2 instance, attach it to the attacker's instance, add new SSH keys to the instance, then reattach it to the first instance, and in this way take control of the EC2 instance.

MITRE technique alignment

T1078 ,T1078.004

AWS EC2 (AttachVolume, DetachVolume) Take Over

An attacker with a stolen AWS Identity that possesses the required permissions 'ec2:RunInstances', 'ec2:DetachVolume', 'ec2:AttachVolume', 'ec2:StopInstances', and 'ec2:StartInstances' can take control of an EC2 instance.

Steps taken by an attacker are:

- Stop execution of the target instance
- Detach the volume and attach it to a new running instance under the attacker's control, and mount it
- Add new SSH keys to the instance
- Stop the instance, detach the volume, and re-attach it to the original instance
- Log into the instance using the new SSH keys

•••

Remediations

Limit principal permissions for reading and writing EC2 instance volumes.

Protect the users or roles that can manage EC2 instances.

Use boundary-set to reduce the permissions users/roles have.

Limit principal permissions for reading and writing EC2 instance volumes.

Remediation (1 of 3)

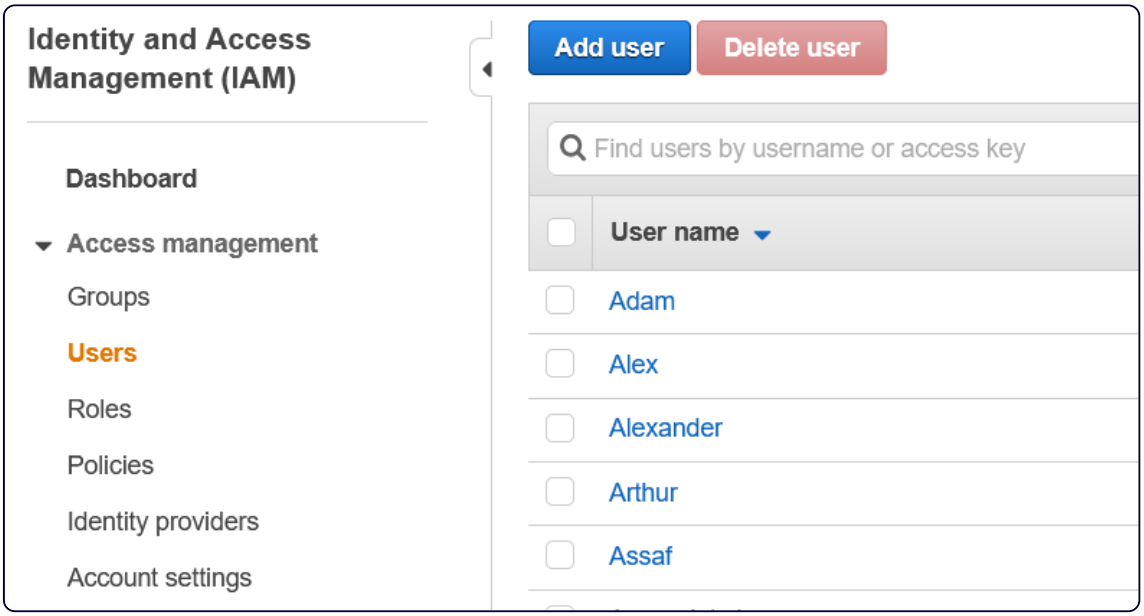
Access Controls on AWS

On AWS, access is mainly controlled by policies, either at the IAM level or at the resource level.

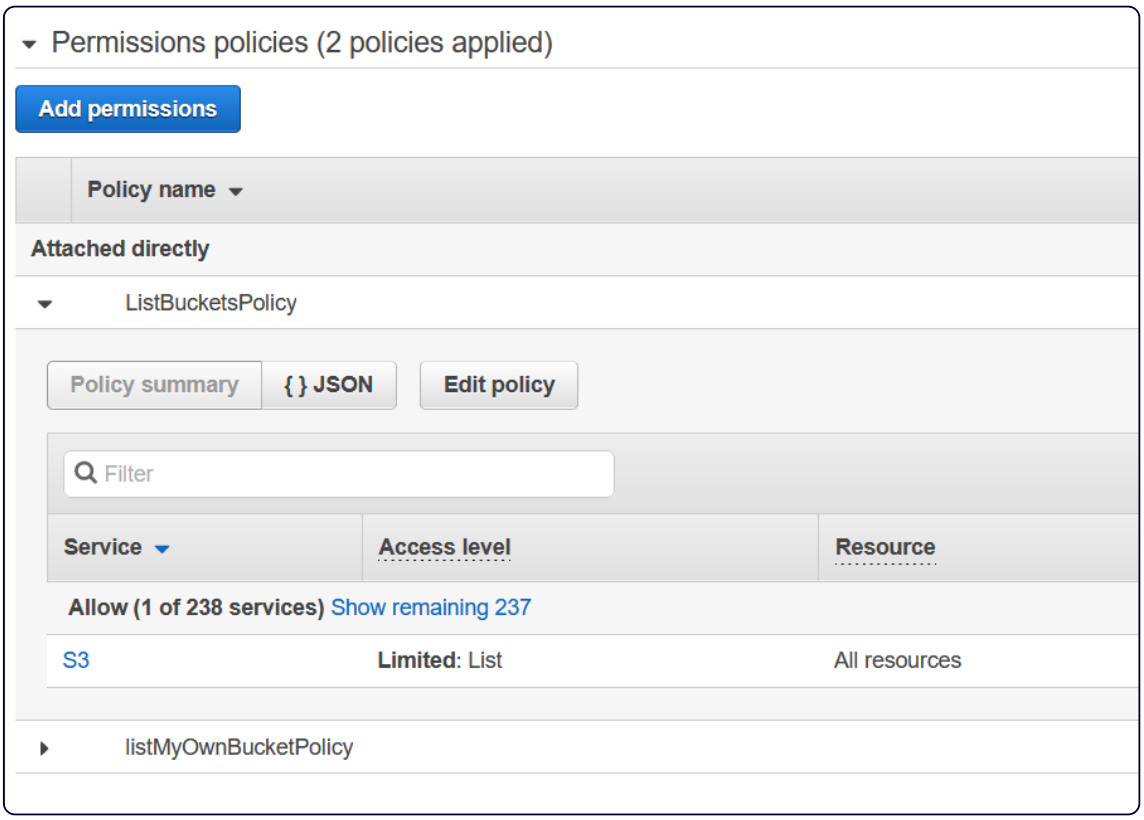
Identity-Based Policies

IAM is a service that provides granular access controls to AWS resources.

You can view all of the users in an account from the IAM panel.



User profiles can be inspected to view attached policies, and the permission associated with each policy.



Groups

Permissions may be granted to many users at the same time using groups. Groups are a convenient way to grant permissions based on job functions or team membership.

Identity and Access Management (IAM)

Dashboard

Access management

Groups

Users

Roles

Policies

Create New Group | Group Actions

XMCyber

Group Name
XMCyber_Group

IAM > Groups > **XMCyber_Group**

Summary

Group ARN:	arn:aws:iam[redacted]group/XMCyber_Group
Users (in this group):	4
Path:	/
Creation Time:	2020-10-18 10:00 UTC+0300

Users | Permissions | Access Advisor

This view shows all users in this group: **4 Users**

User	Actions
Noah	Remove User from Group
Isabella	Remove User from Group
Adam	Remove User from Group
Inbar	Remove User from Group

IAM > Groups > **XMCyber_Group**

Summary

Group ARN:	arn:aws:ia[redacted]group/XMCyber_Group
Users (in this group):	4
Path:	/
Creation Time:	2020-10-18 10:00 UTC+0300

Users | Permissions | Access Advisor

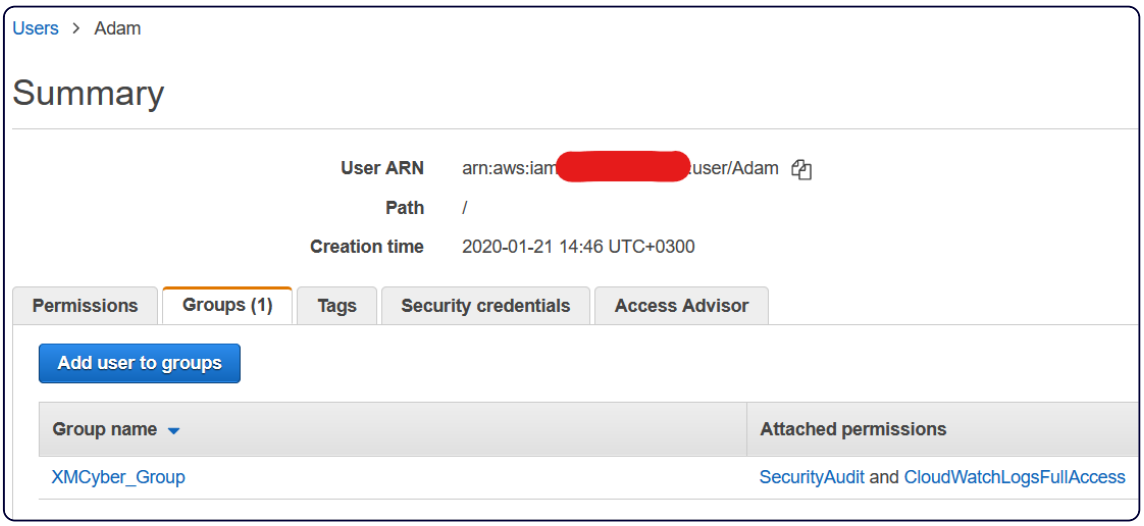
Managed Policies

The following managed policies are attached to this group. You can attach up to 10 managed policies.

Attach Policy

Policy Name	Actions
SecurityAudit	Show Policy | Detach Policy | Simulate Policy

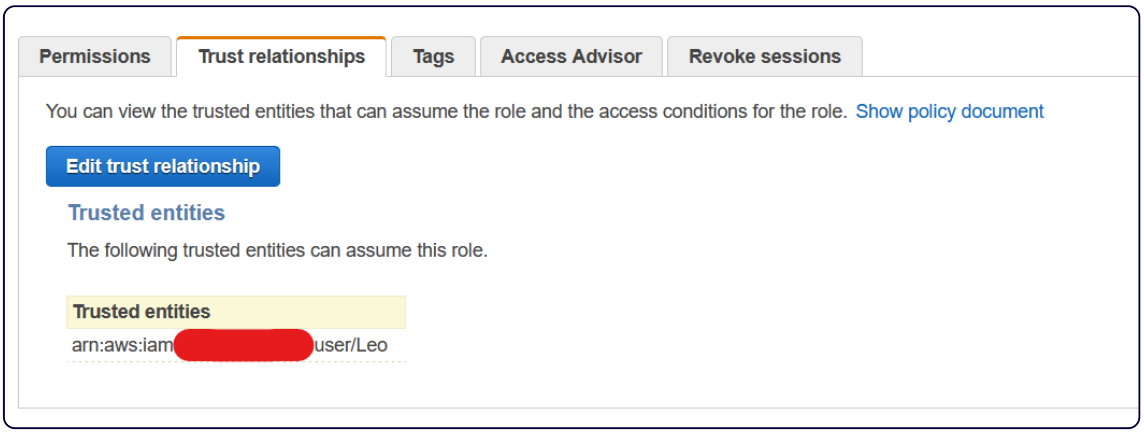
Group membership is also listed in every user's IAM page.



Additionally, IAM provides roles. A role is a way to grant permissions to many different AWS entities:

- An IAM user from another account or from the same account
- Application code running in another AWS service
- An AWS service that needs to perform actions on your behalf
- Security Assertion Markup Language (SAML) Users

Roles include associated policies, like users. Moreover, roles also feature an additional (innate) Trust Policy that specifies which users or services can assume which roles.

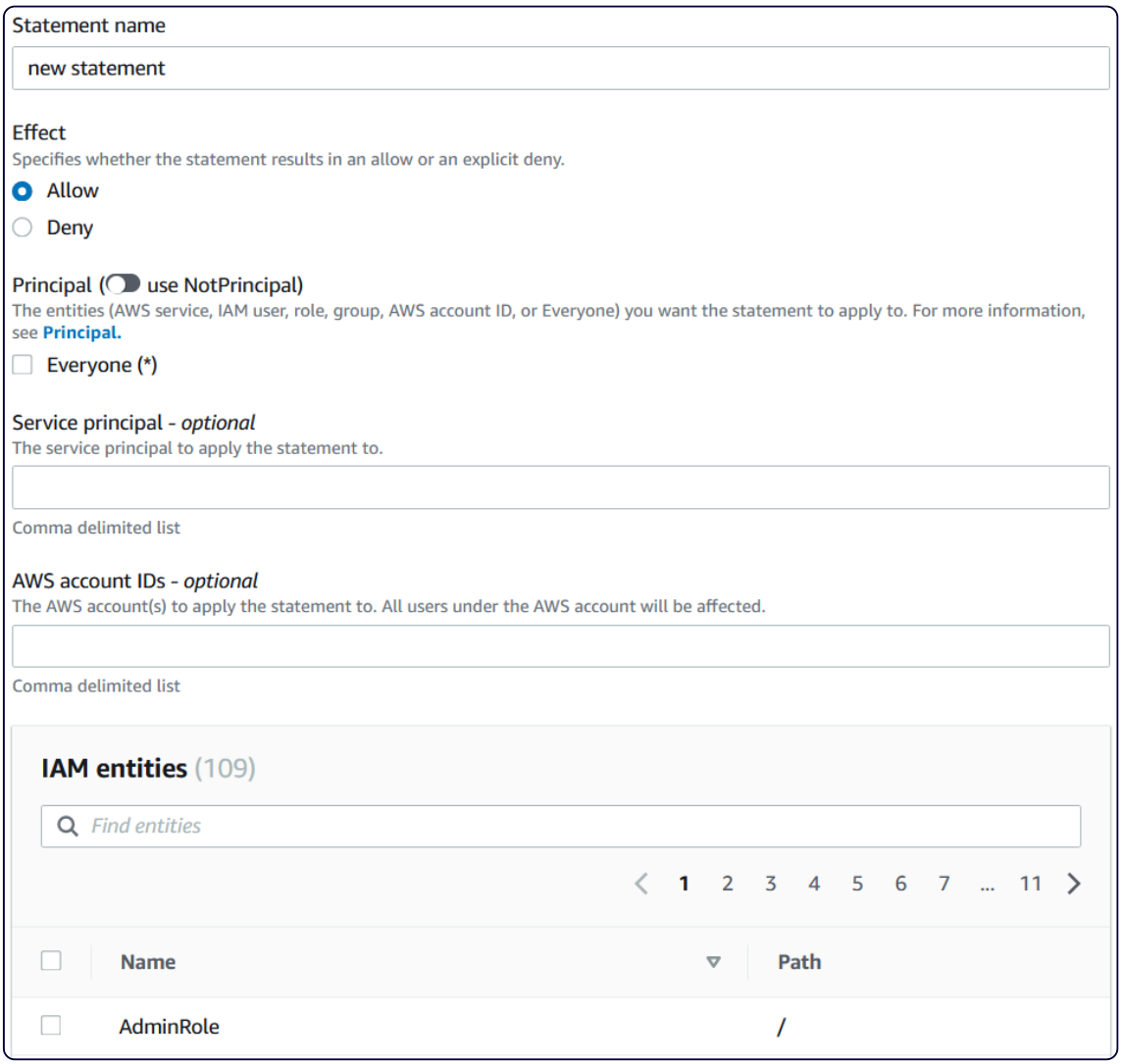


Resource-Based Policies

Resource based policies are policies that are attached to a specific resource, like an S3 bucket or an ECR repository. Resource-based policies can be used, coupled with an appropriate identity-based policy on the other account, to allow a principal from another account to perform actions on resources in the hosting account.

Example - ECR

Navigate to the service page and open a specific repository, then click "Permissions", and create a new statement.



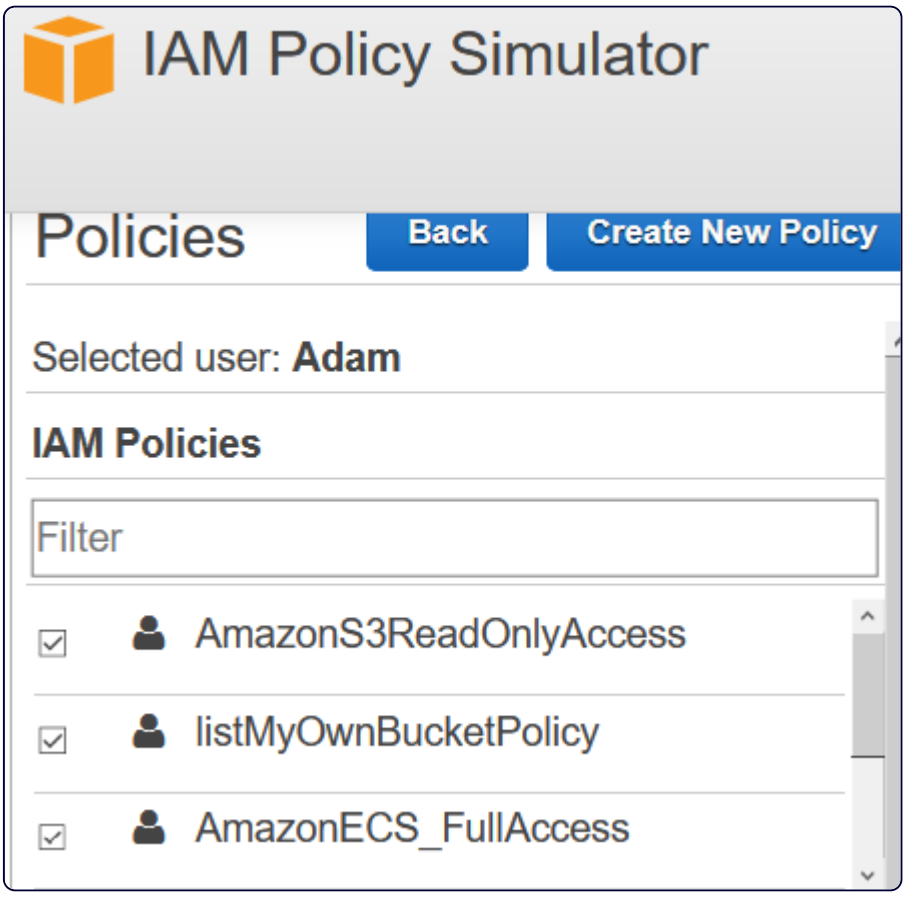
From here, you can deny or allow AWS entities access to the repository. Note that according to the AWS policy evaluation logic, if you deny access to a certain entity here, other relevant "Allow" policies will not take effect.

Additional information about resource-based policies for each service is available on the associated documentation page.

Simulating Policies

The IAM Policy Simulator can be used to simulate policies and quickly determine which policies grant which permissions.

First, a user is selected and their policies, whether they were attached directly or via a group, are presented.



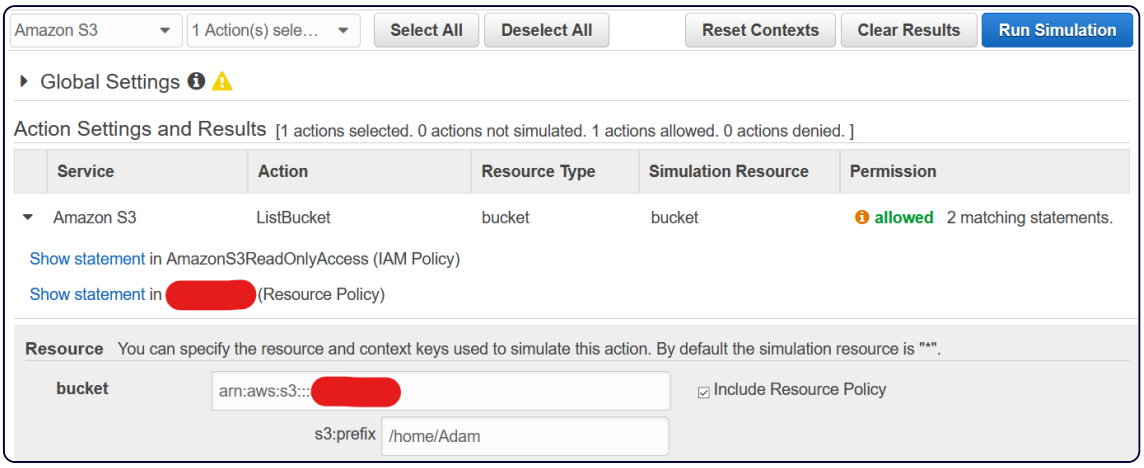
Then, an action can be simulated. In this example,

`Adam`

can list an S3 bucket because he has the

`AmazonS3ReadOnlyAccess`

policy, and the selected bucket has an appropriate resource policy.



References

- IAM Documentation - Access Management
- IAM Documentation - IAM groups
- IAM Documentation - Testing IAM policies with the IAM policy simulator

...

Protect the users or roles that can manage EC2 instances.

Remediation (2 of 3)

Protecting Users on AWS

There are many ways to protect users on AWS:

- Restrict access to AWS root account.
- Create individual IAM user accounts.
- Use groups to assign permissions to IAM users.
- Grant least privilege.
- Use permissions with AWS managed policies.
- Use customer managed policies instead of inline policies.
- Use access levels to review IAM permissions.
- Configure and enforce a strong user password policy.
- Enable MFA (Multi-Factor Authentication).
- Use roles for applications that run on Amazon EC2 instances.
- Use roles to delegate permissions.
- Do not share access keys.
- Rotate credentials regularly.
- Remove unnecessary credentials.
- Use policy conditions for extra security.
- Monitor activity in your AWS account.

References

- AWS - Security Best Practices in IAM

•••

Use boundary-set to reduce the permissions users/roles have.

Remediation (3 of 3)

AWS Boundary Set

AWS supports permissions boundaries for IAM entities (users or roles). A permissions boundary is an advanced feature for using a managed policy to set the maximum permissions that an identity-based policy can grant to an IAM entity. An entity's permissions boundary allows it to perform only the actions that are allowed by both its identity-based policies and its permissions boundaries.

You can use an AWS managed policy or a custom managed policy to set the boundary for an IAM entity (user or role). That policy limits the maximum permissions for the user or role.

For example, assume that the IAM user named ShirleyRodriguez should be allowed to manage only Amazon S3, Amazon CloudWatch, and Amazon EC2. To enforce this rule, you can use the following policy to set the permissions boundary for the ShirleyRodriguez user:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "s3:*",
                "cloudwatch:*",
                "ec2:*"
            ],
            "Resource": "*"
        }
    ]
}
```

When you use a policy to set the permissions boundary for a user, it limits the user's permissions but does not provide permissions on its own. In this example, the policy sets the maximum permissions of ShirleyRodriguez as all operations in Amazon S3, CloudWatch, and Amazon EC2. Shirley can never perform operations in any other service, including IAM, even if she has a permissions policy that allows it. For example, you can add the following policy to the ShirleyRodriguez user:

```
{
  "Version": "2012-10-17",
  "Statement": {
    "Effect": "Allow",
    "Action": "iam:CreateUser",
    "Resource": "*"
  }
}
```

This policy allows creating a user in IAM. If you attach this permissions policy to the ShirleyRodriguez user, and Shirley tries to create a user, the operation fails because the permissions boundary does not allow the iam:CreateUser operation.

References

Permissions boundaries for IAM entities