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Demystifying Security in the Cloud

AWS Scout

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Quick Introduction

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Agenda

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- Motivation
- Elastic Compute Cloud (EC2)
- Simple Storage Service (S3)
- Identity Access Management (IAM)

Brief Introduction of EC2

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- EC2 is an Amazon Web Service that allows users to rent virtual machines.
  - The process is extremely easy:
    - Select an Amazon Machine Image (AMI)
      - E.g. Ubuntu x64
    - Specify some instance details (like what zone or kernel)
    - Select a key pair
    - Place instance in a security group
      - E.g. web-prod

AMI Security Concerns

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- Sharing your AMI? At a minimum you should:
  - Securely delete credentials, certificates, and key material
- Using a community AMI? Check for:
  - SSH Authorized Keys
  - Active connections to unknown hosts (ncat backdoor, etc)

EC2 Key Pairs

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- The use of key pairs allow you to securely and remotely connect to your instance.
  - Amazon will help you generate and prompt you to save your private key.
- And what of shared environments?
  - Employee Turnover
  - How do you monitor access?

EC2 Security Groups

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- User defined access rules that specify what traffic may be delivered to your instance(s).

- Anyone want to take a shot at deciphering the security group below?

```
GROUP    sg-2eac845a    111122223333    WebServers    web
PERMISSION       111122223333    WebServers ALLOWS  tcp      80       80
FROM     CIDR     0.0.0.0/0       ingress
```

Misconfigured Security Groups

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Security Bulletin

Possible Insecure memcached Configuration

August 10, 2010

Memcached is a popular tool used by many customers to accelerate the delivery of web content. Some recent research has revealed vulnerabilities in memcached that allow attackers to use published exploits for locating interesting servers, extracting information from caches, and inserting data into the caches. Usually this occurs because the servers running memcached are open to the Internet and have exposed the common port 11211/tcp.

The most effective way to avoid exploit is to ensure that none of your memcached servers can be reached via the Internet. They should be placed in dedicated security groups that allow inbound connections only from your web server security group (see this AWS blog post for further information on using security groups to isolate instances and direct traffic). If you're using memcached in production, we recommend auditing your security groups and, if necessary, taking the appropriate steps to prevent direct Internet access to your memcached servers.

- AWS response to SensePost's BlackHat research on Memcached
  http://www.sensepost.com/blog/4873.html

Managing Security Groups

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- There can be up to 500 security groups.
  - Containing up to 100 rules per group.

- These are then applied to instances…
  - Production, Staging, Development, Management, etc.

Meet The Scout

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https://github.com/iSECPartners/scout

Image Source: http://youtu.be/geNMzoJ9TEQ

Scout and Security Groups

- Manual Analysis:
  - List-instances: list all instances and their security groups
  - List-groups: list all security groups and their instances

Instance: observer01
Security Group:
rdp

Instance: staging
Security Groups:
jmp-server
staging
rdp

Scout and Security Groups

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- Automated Analysis:
  - Audit-groups: highlight dangerous ingress permissions
    - Based on **port ratings** provided by user and the **source**.
    - Security Group with port 3389 open to 0.0.0.0/0
  - Compare-groups: compare "known good" with reality

Brief Introduction of S3

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- Simply put – it's an online storage service
  - Variety of uses

- Access objects through:
  - REST
  - SOAP
  - BitTorrent

S3 Security Functionality

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- Security features:
  - Access Controls
    - ACLs
    - Bucket Policy
    - IAM Policy
  - Access Logs
  - Encryption
    - Client Side vs Server Side

S3 Access Controls: ACLs

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- Coarse-grained permission model
  - So either READ, WRITE, READ_ACP, WRITE_ACP, FULL_CONTROL
  - E.g. Grant AllUsers permission to Read to PublicPhotos
- Grantee can be:
  - An AWS Account
  - Predefined Group
    - Authenticated Users
    - All Users
    - Log Delivery

Typical Instagram User

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S3 Access Controls: Bucket Policy

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- Fine-grained permission model

  Grant * permission to **GetObjectTorrent** to **PreviewReleases**, if DateGreaterThan 2012-10-25T15:00:00

  DateLessThan 2012-10-25T16:00:00

- Amazon Policy Generator can be used to assist administrator.
  - Uses their JSON access policy language.

Obligatory Justin Bieber Slide

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S3 Access Controls: IAM Policy

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- Fine
  - C s to it.

Brief Introduction of IAM

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- Identity Access Management
  - Allows you to create and manage users/groups
  - Allows you to grant access to AWS resources
    - E.g. EC2 or S3
  - Identity Federation

S3 Access Controls: IAM Policy

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- Fine-grained permission model
  - Create IAM principal and attach IAM policies to it.
    - Create Various Department Groups & Buckets
    - Create IAM Policy for the Specific Buckets
    - Attach the Policies to the Groups

How should they be used?

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- ACLs
  - Can scale with your application
  - Limited in functionality – simple reads/writes
- Bucket Policy
  - Specific Actions & Conditionals
  - Size Limit of 20kb
- IAM Policy
  - Identity Federation

How does S3 evaluate these?

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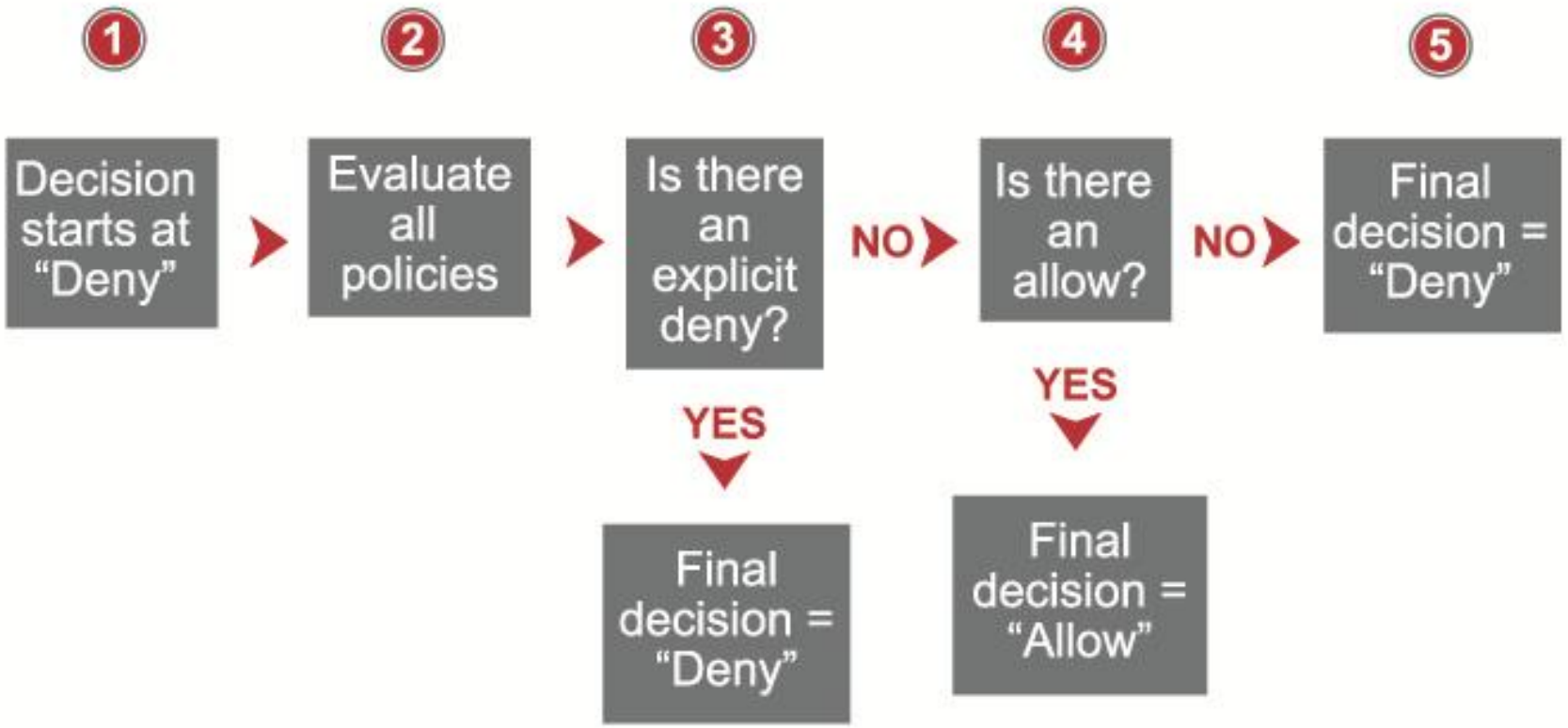

S3: Server Side Encryption

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- Server Side Encryption
  - Amazon manages keys with AES-256 bit
  - Objects are encrypted, *not* buckets

- Benefits:
  - No need to manage keys
  - Risk transfer

S3: Client Side Encryption

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- Client Side Encryption
  - You take ownership of managing your keys
  - AWS SDK can make this process very easy
    - Uses Envelope Encryption
- Benefits:
  - More control
  - Master Key compromise simplified

Scout and S3

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- Access Controls
  - ACLs
    - Costs money to review the ACL for every object/bucket
  - Bucket Policy
  - IAM Policy
    - IAM policies are attached to IAM users – so chances are you are aware of them already.
- Enforcing Encryption

References

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  - http://aws.amazon.com/documentation/
- Jeff Jarmoc – "Get Off My Cloud"
  - https://cloudsecurityalliance.org/wp-content/uploads/2012/02/3.Conference-Presentation.Jarmoc.Updated.pdf
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Thank You

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Questions?

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