

# Attacking and Defending Serverless Applications Workshop



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# Agenda (1/2)

- Workshop Pre-Requisites
- Evidence-App Overview
  - **Exercise 1: Deploying the Serverless Application**
- Serverless ATT&CK Techniques
  - **Exercise 2: Reconnaissance of Evidence-App**
  - **Exercise 3: Discovering Evidence-App Vulnerability**
  - **Exercise 4: Exploiting Evidence-App and Pivoting to Cloud Account**



# Agenda (2/2)

- Investigating Serverless ATT&CK techniques
  - **Exercise 5: Identifying Reconnaissance**
  - **Exercise 6: Identifying Vulnerability Discovery**
  - **Exercise 7: Identifying Exploitation and Pivot**
- Conclusion
  - **Exercise 8: Tearing Down Serverless Application**



# Pre-Requisites For This Workshop

- AWS Account with `root` or `AdministratorAccess` privileges
- Supported Web Browser
  - Preferably Chrome or Firefox
- Exercise Instructions
  - <https://attack-defend-serverless.sanscloudwars.com>
- Have watched Sherlock (the good one...)
  - Just kidding 😊



# Evidence-App Overview

- This serverless web application is used by Sherlock's blue team to import evidence data, generate MD5 and SHA1 hashes of the uploaded files, and save the files in a safe location.*

## Evidence

File name	MD5Sum	SHA1Sum
EICAR.txt	44d88612fea8a8f36de82e1278abb02f	3395856ce81f2b7382dee72602f798b642f14140

- Source Code: <https://github.com/bluemountaincyber/evidence-app>

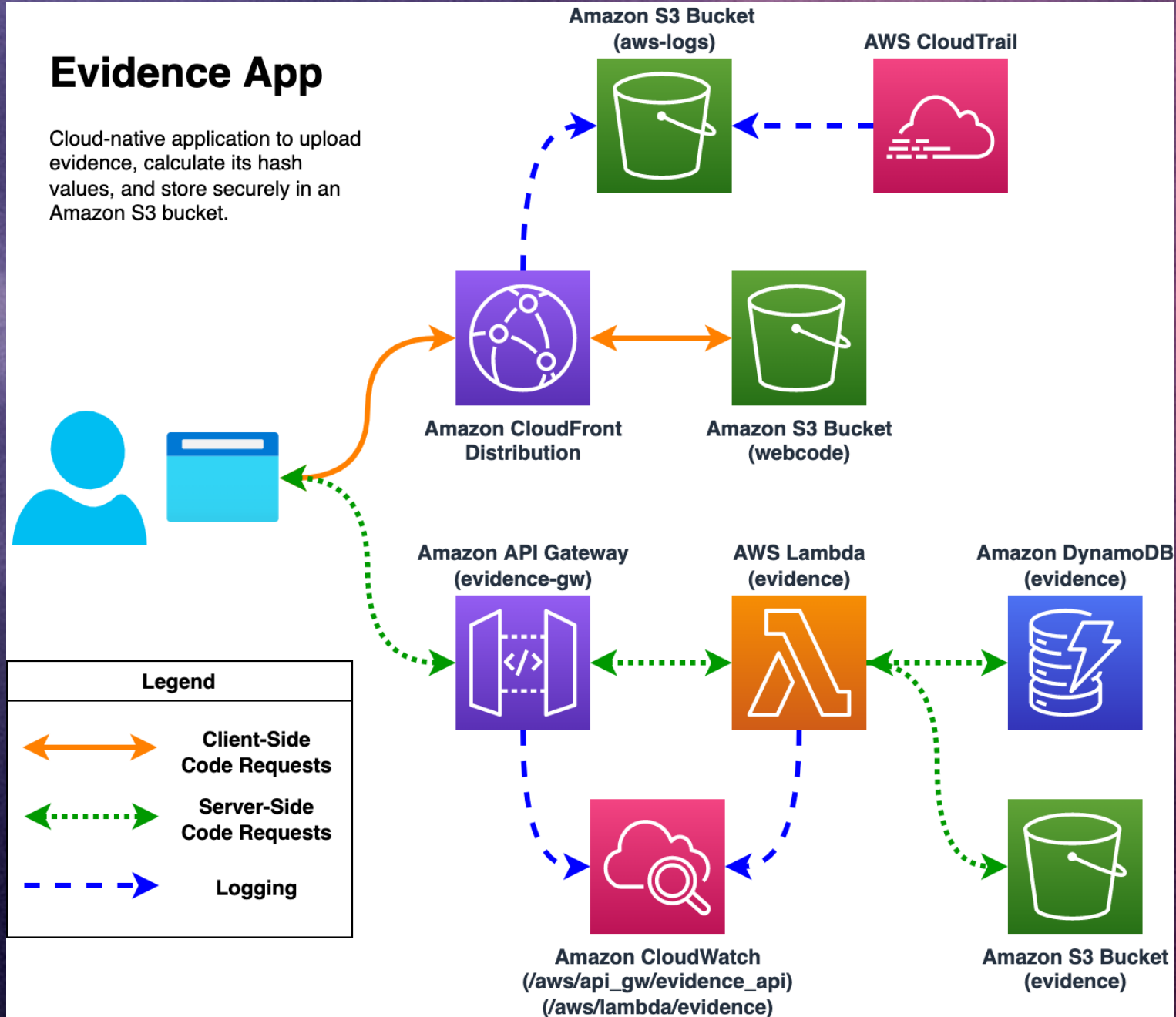


# So... what's in that repo?

- **EVERYTHING** as Code
  - Application **Source Code** ( `HTML`, `CSS`, `JavaScript`, and `Python 3` )
  - **Infrastructure as Code (IaC)** to build cloud resources and deploy application ( `Terraform` and `CloudFormation` )
  - **Exercise documentation** for this workshop ( `mkdocs` )
    - In case you want to work on this afterwards or share with your friends/co-workers
  - This presentation ( `marp` )
- **LOTS** of opportunity for a coding mistake...

# Evidence App

Cloud-native application to upload evidence, calculate its hash values, and store securely in an Amazon S3 bucket.





# DevSecOps





# Deploying the Evidence-App

From **AWS CloudShell**:

- Download Source Code:

```
git clone https://github.com/bluemountaincyber/evidence-app.git  
cd /home/cloudshell-user/evidence-app
```

- Execute `cloudformation-deploy.sh` :

```
./cloudformation-deploy.sh
```

- Sit back and relax for ~5 mins



# Now It's Your Turn!

<https://attack-defend-serverless.sanscloudwars.com>

Complete *Exercise 1* and then STOP!





# MITRE | ATT&CK®

- *MITRE ATT&CK® is a globally-accessible knowledge base of adversary tactics and techniques based on real-world observations*
- Tactics include:

Reconnaissance

Privilege Escalation

Collection

Resource Development

Defense Evasion

Command and Control

Initial Access

Credential Access

Exfiltration

Execution

Discovery

Impact

Persistence

Lateral Movement



# MITRE | ATT&CK®

You will leverage and analyze common ATT&CK techniques

- **Active Scanning (T1595)**
- **Cloud Infrastructure Discovery (T1580)**
- **Exploit Public-Facing Application (T1190)**
- **Command and Scripting Interpreter: Unix Shell (T1059.003)**
- **Unsecured Credentials (T1552)**
- **Data Destruction (T1485)**
- **Defacement: External Defacement (T1491.002)**





# Custom Tooling

- Custom Python script to **fuzz** this application
  - `/home/cloudshell-user/evidence-app/scripts/fuzz_evidence_app.py`
- Tests popular command injection payloads
  - <https://github.com/payloadbox/command-injection-payload-list>

```
$ /home/cloudshell-user/evidence-app/scripts/fuzz_evidence_app.py --target $TARGET/api/  
;id; worked as command injection for the file_name parameter!  
Here is a curl command:  
curl -X POST https://djm72vhitom0v.cloudfront.net/api/ -H 'Content-Type: application/x-www-  
form-urlencoded; charset=UTF-8' -d '{"file_name":"","id;","file_data":"dGVzdAo="}'
```



# Attack Sequence

1. Use application as a *normal* user would
2. **Spider** web application
3. **Interact** with and learn more about newly-discovered endpoints
4. **Fuzz** the application to discover **command injection**
5. Use **remote code execution** to uncover cloud credentials
6. **Pivot** to cloud account and perform **discovery**
7. Be extra evil by **destroying data** and **defacing** the application



# Now It's Your Turn!

Complete *Exercise 2, 3, and 4* and then **STOP!**





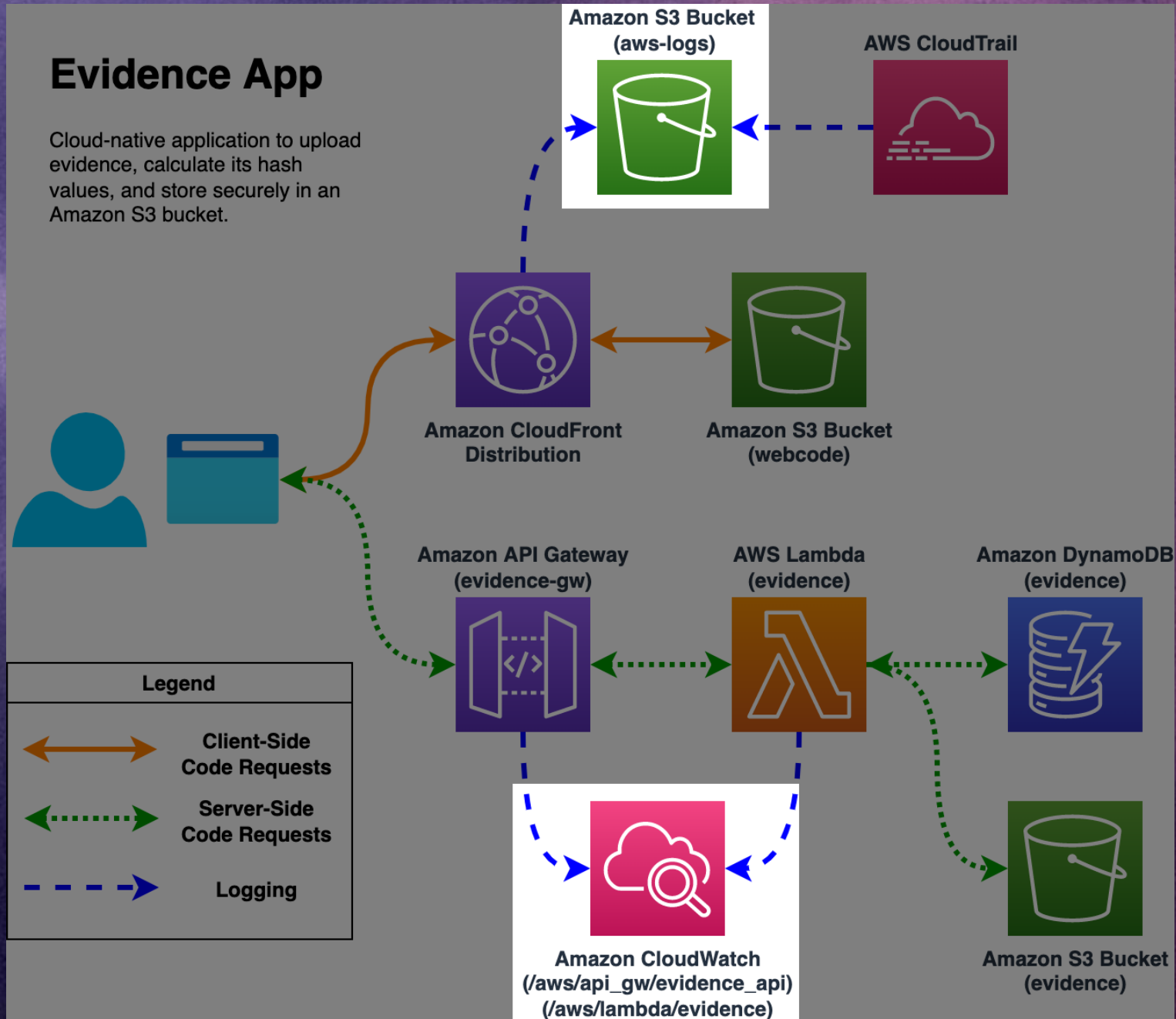
# Investigating the Attack

- **Web interactions** can be found in a few places:
  - **CloudFront** logs in `aws-logs` S3 bucket
  - **API Gateway** (requests to `/api`) logs in `/aws/api_gw/evidence_api` CloudWatch log group
- Server-side execution data (Lambda) found in `/aws/lambda/evidence` CloudWatch log group
- API calls by stolen credentials found in `aws-logs` S3 bucket
  - **S3 data events** also enabled and stored here
- **AWS CLI** and **Linux Kung-Fu** for the win!



# Evidence App

Cloud-native application to upload evidence, calculate its hash values, and store securely in an Amazon S3 bucket.





# Now It's Your Turn!

Complete Exercise *5, 6, and 7* and then **STOP!**





# Conclusion

You did a **LOT** in this workshop by attacking and detecting:

- **Active Scanning (T1595)**
- **Cloud Infrastructure Discovery (T1580)**
- **Exploit Public-Facing Application (T1190)**
- **Command and Scripting Interpreter: Unix Shell (T1059.003)**
- **Unsecured Credentials (T1552)**
- **Data Destruction (T1485)**
- **Defacement: External Defacement (T1491.002)**



# Now It's Your Turn!

## Complete *Exercise 8* and... you're done!

Thanks for attending and please feel free to ask any questions!

