

Cloud Security



 <http://slides.dfirmatt.com>



Matt Scheurer

and Other Assorted Cautionary Tales

About Me

I work for a big well-known organization...



As Vice President (VP) of Computer Security and Incident Response (IR). However, I have many years of hands-on technical experience, including Digital Forensics & Incident Response (DFIR).

I am also a Podcast Host for

ThreatReel

<https://threatreel.com>

Connect / Contact / Follow Matt:



<https://www.linkedin.com/in/mattscheurer>



<https://x.com/c3rkah>

Where I volunteer...

I am an Official



Advocate

<https://www.hackingisnotacrime.org>



Advisory Board: Information
Technology and Cybersecurity

<https://www.mywccc.org/>



Women's Security Alliance
(WomSA) Technical Mentor

<https://www.womsa.org>

Disclaimer!

Yes, I have a day job.
However...

Opinions expressed are based solely on my own independent security research and do not express or reflect the views or opinions of my employer.



Agenda

- Review some major cloud security problems

Agenda

- Review some major cloud security problems
- Cover some cloud-specific security strategies

Agenda

- Review some major cloud security problems
- Cover some cloud-specific security strategies
 - To help reduce the attack surface

Agenda

- Review some major cloud security problems
- Cover some cloud-specific security strategies
 - To help reduce the attack surface
- Then laugh at my pain...

Agenda

- Review some major cloud security problems
- Cover some cloud-specific security strategies
 - To help reduce the attack surface
- Then laugh at my pain...
 - And have a heck of a good time doing so!

Some Cloud Security Issues

- Mostly preventable, but scary!

Some Cloud Security Issues

- Mostly preventable, but scary!
 - Accidental Exposure

Some Cloud Security Issues

- Mostly preventable, but scary!
 - Accidental Exposure
 - Shared Secret leaks

Some Cloud Security Issues

- Mostly preventable, but scary!
 - Accidental Exposure
 - Shared Secret leaks
 - Lack of Visibility (Assets Management)

Some Cloud Security Issues

- Mostly preventable, but scary!
 - Accidental Exposure
 - Shared Secret leaks
 - Lack of Visibility (Assets Management)
 - Shadow & Vulnerable APIs

Some Cloud Security Issues

- Mostly preventable, but scary!
 - Accidental Exposure
 - Shared Secret leaks
 - Lack of Visibility (Assets Management)
 - Shadow & Vulnerable APIs
 - Inadequate Logging

Specific Security Tips



aws



Azure



GCP

AWS Security Components



- GuardDuty
 - Monitoring, detection, and alerting
- CloudTrail
 - Activity and event logging
- CloudWatch
 - Performance monitoring & analysis

AWS Attack Surface Reduction

Typical of AWS, there are plenty of ways to do things...
Most of which are not particularly straightforward!

Great Article:

“Find public Amazon S3 buckets in your AWS account”

<https://aws.amazon.com/blogs/storage/find-public-s3-buckets-in-your-aws-account/>

AWS Security Training



- flAWS
 - <https://flaws.cloud>
- flAWS2
 - <https://flaws2.cloud>

Azure Security Components



- Microsoft Defender for Cloud
 - Security Alerts, Cloud Explorer, Azure Workbooks and more
- Microsoft Sentinel
 - Full-service SIEM
 - Though you'll pay extra for storage used
- Identity & Access Control
 - Microsoft Entra ID, Microsoft Entra ID Security, and more


Azure Attack Surface Reduction



Cloud Security Explorer


- Build cool queries
- Hunt for, and find bad stuff before the threat actors do!

Cloud Security Explorer

 Microsoft Azure

Search resources, services, and docs (G+)

Home > Microsoft Defender for Cloud

 **Microsoft Defender for Cloud | Cloud Security Explorer** ...

Showing 111 subscriptions

Search

Share query link

Download CSV report

Guides & Feedback

General

Overview

Getting started

Recommendations

Attack path analysis

Security alerts

Inventory

Cloud Security Explorer

Workbooks

Community

Diagnose and solve problems

What would you like to search?

Azure Virtual machines

+

That

Exposed to the internet

+

Remove

Scope : All

Search

Azure Security Training



- Kusto Detective Agency
 - <https://detective.kusto.io/>
- SC-200 Training
- Microsoft Security Academy
 - Links to “Ninja” Trainings

GCP Attack Surface Reduction



Security Command Center

- **Findings Query:**

```
state="ACTIVE"  
AND NOT mute="MUTED"  
AND category="PUBLIC_IP_ADDRESS"
```


GCP, Automated IR



- CAFIR
 - By [Matt Coons](#) (a.k.a. [ArborBytes](#))
 - Cloud Automated Forensics & Incident Response
 - <https://github.com/ArborBytes/CAFIR>

GCP Security Training



Google Cloud Skills Boost

- Security Engineer Learning Path

<https://www.cloudskillsboost.google/paths/15>

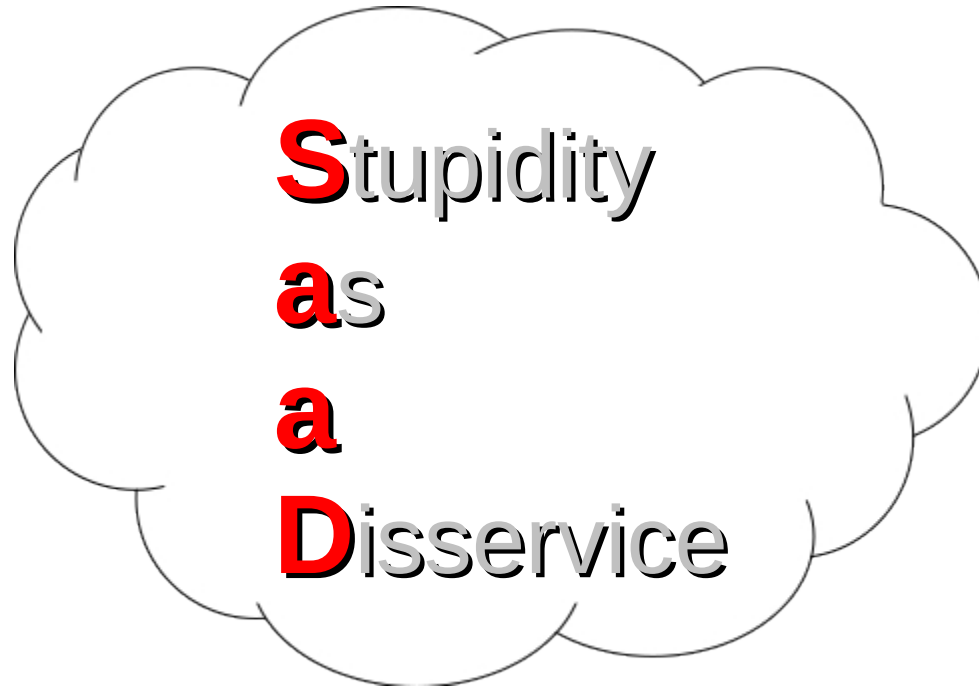
Introducing: SaaD

Introducing: SaaD

What is “SaaD” you ask?

Introducing: SaaD

What is “SaaD” you ask?



Bonus: SaaD Story

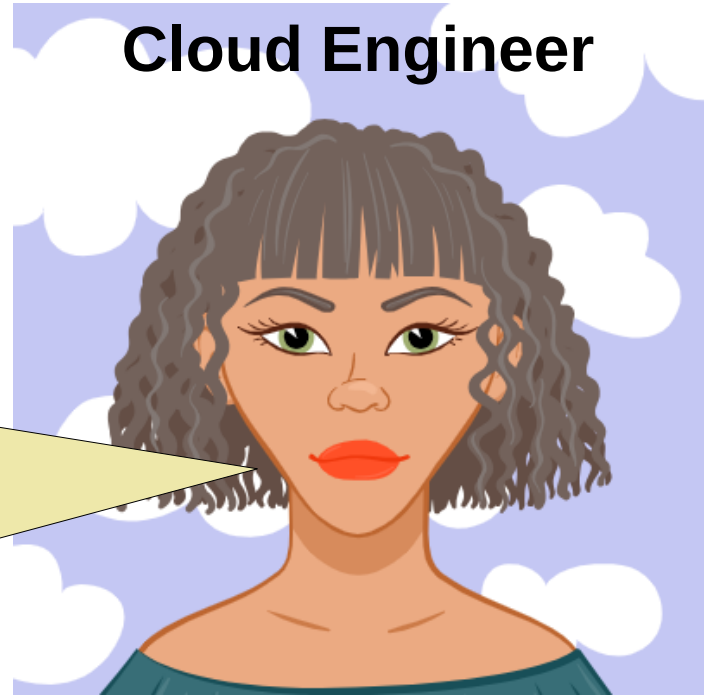


Hit with a frying PAN!

In the Beginning

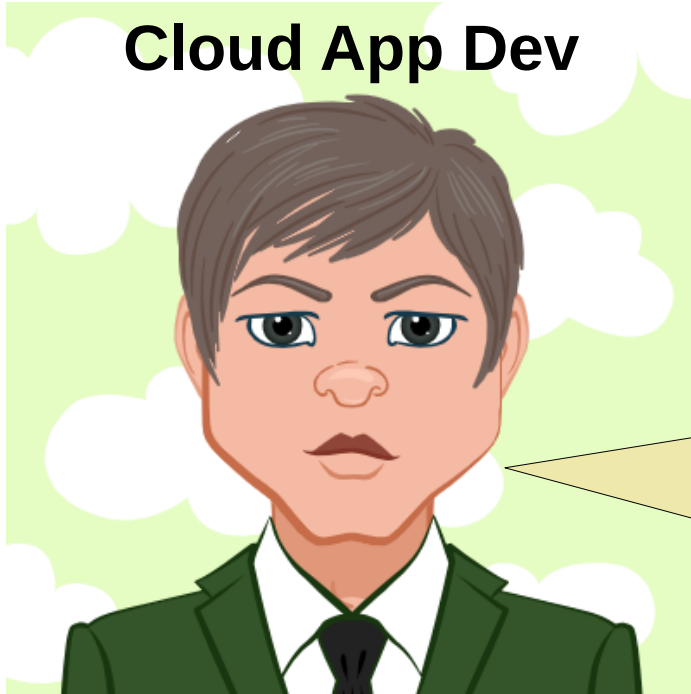
Isn't that red warning triangle telling us that the cloud storage shouldn't be *publicly readable*, concerning?

Cloud Engineer



False Sense of Confidence

Cloud App Dev



Nah, the cloud application won't permit anything bad. Users must login to upload or access the data.

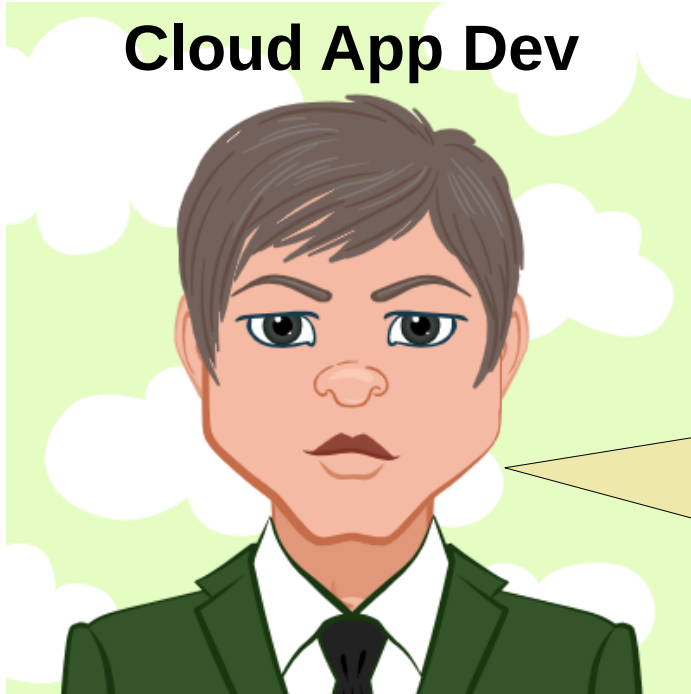
Months Later...

Hey, we just got hit with a data extortion email. What's going on here?



False Sense of Security

Cloud App Dev



Not to worry, the cloud application won't permit anything bad. Users must login to upload or access the data.

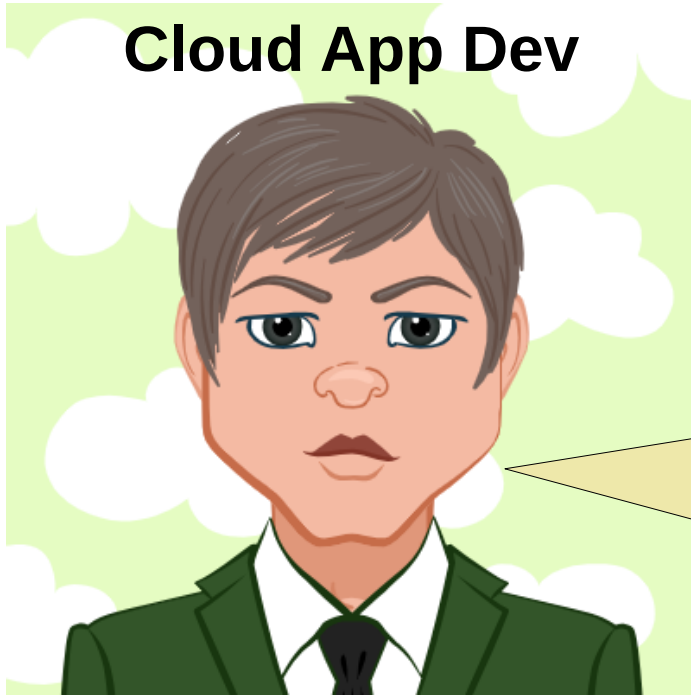
That's not how I see it!

But it's configured as
publicly accessible...
Vulnerable to web
crawling and web
spidering. What is
inside the data?



Clueless about Bad User OpSec

Cloud App Dev



Oh, nothing much...
Just some receipt
image files and
receipt documents.

This just got harder!

Hey, guess what?
Reviewing this leaked
data, some customers
had uploaded full
credit card details
into the system!



From Bad to Worse

...Now, it's not just data exfiltration, and an attempted extortion. This also became a "Data Privacy Incident".



SaaS Story: Advice



- Avoid allowing public access to cloud storage
- Know what details are in your data
- Protect the users from themselves

SaaD: Story #1

Of course, we did. (NOT!)

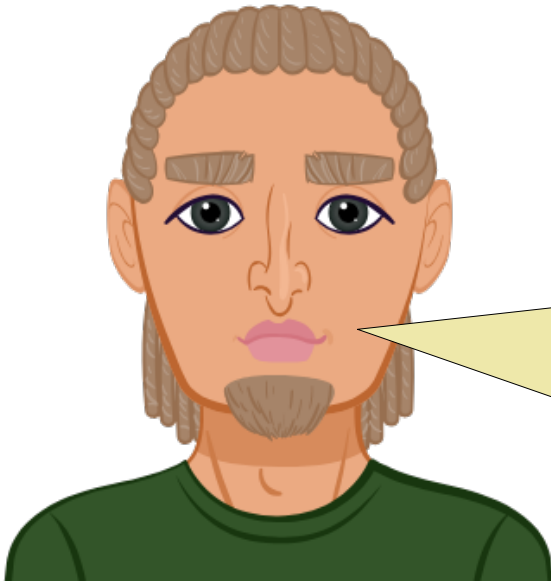
SaaD: Story #1

Hey <app owner>, I just got a pen test alert that they found and were able to sign into the cloud-hosted web <app> portal. Did you ever change the default admin account?



SaaD: Story #1

Application Owner



Definitely! We always change default account usernames, where possible, and change the default passwords, each time we deploy an application.

SaaD: Story #1

Minutes later...

Hey, I just tested myself, and got right in using the default creds. All the data, accounts, configs, settings, ability to add new accounts to the platform...



SaaD: Story #1

Application Owner



Oops! Guess we should get that changed right away!

SaaD: Story #1

Yes, that's an immediate need! Now we need to look and make sure there aren't unauthorized accounts in here. Analyze the level of data exposure. And look for unauthorized access.



SaaS Story #1: Advice



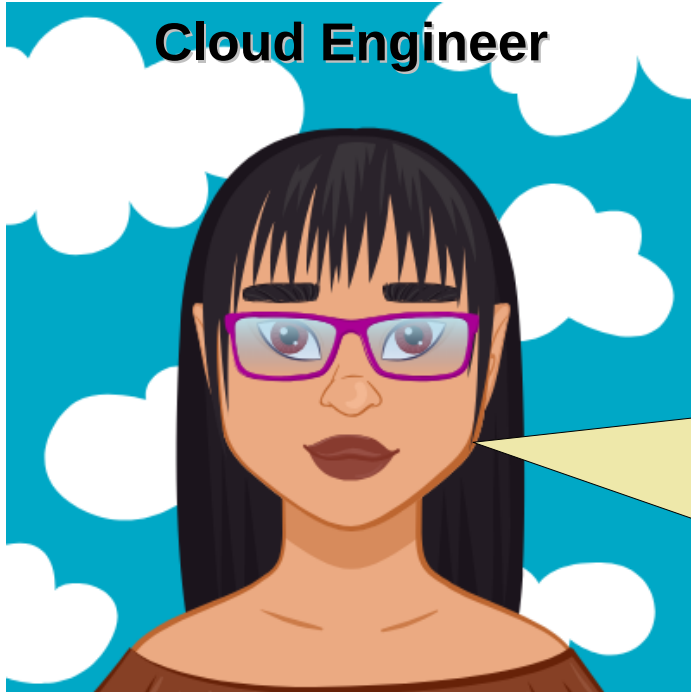
- Always change all your application default credentials
- Also, actively test for default credentials

SaaS: Story #2

Is that a data lake or a data leak?

SaaD: Story #2

Cloud Engineer



Hey <app owner>, before we migrate this application over to our primary cloud environment, does the database contain any PII data that we need to be concerned about?

SaaD: Story #2

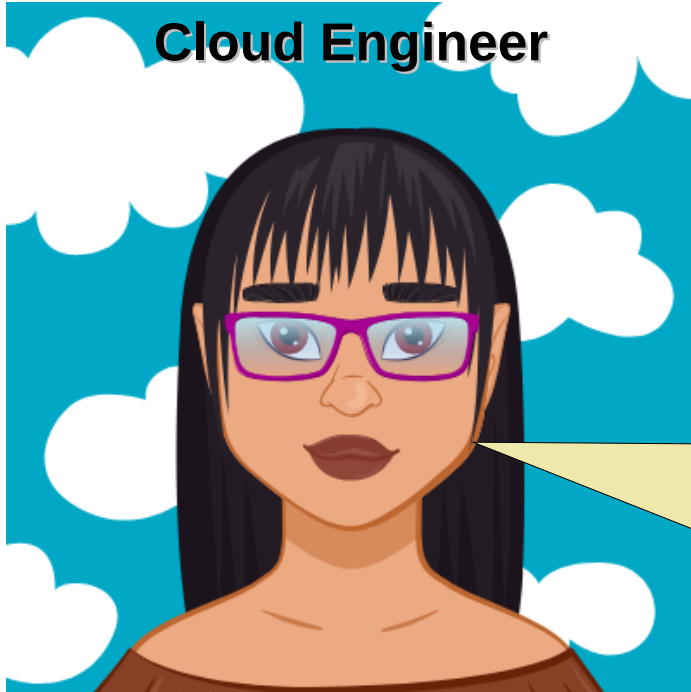
Application Owner

No, our database doesn't contain any PII or any other sensitive data that we need to be concerned about.



SaaD: Story #2

Cloud Engineer



A couple of Months later...

Hey <incident response> our data classification scan found the database from this <app>, which was just migrated to the cloud, contains PII data...

SaaS: Story #2

Well, my day just got busier... We'll get it shut it down now! Then analyze the level of data exposure. And look for any indicators of unauthorized access or data leakage right away!



SaaS Story #2: Advice



- Data governance is very important
- Know what is in your data, before migrating it to the cloud!

SaaD: Story #3

Must be a bad connection.

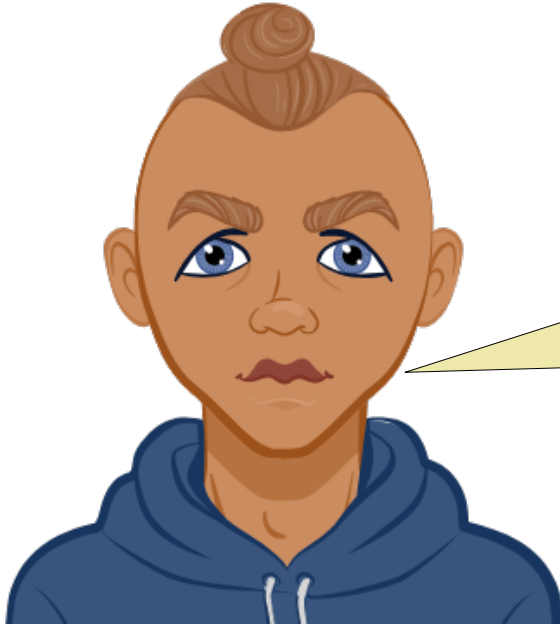
SaaD: Story #3

Hey <dev lead>, we just got a security alert that one of our cloud hosts is communicating with known <hostile country> crypto-miner IP addresses!



SaaD: Story #3

Dev Team Lead



Not to worry, that is only our dev/test environment. Those resources don't have any access to the Internet.

SaaS: Story #3

That answer just doesn't make any sense to me. If that is true, then how in the World could this be talking to any known-bad crypto-miner IP addresses?



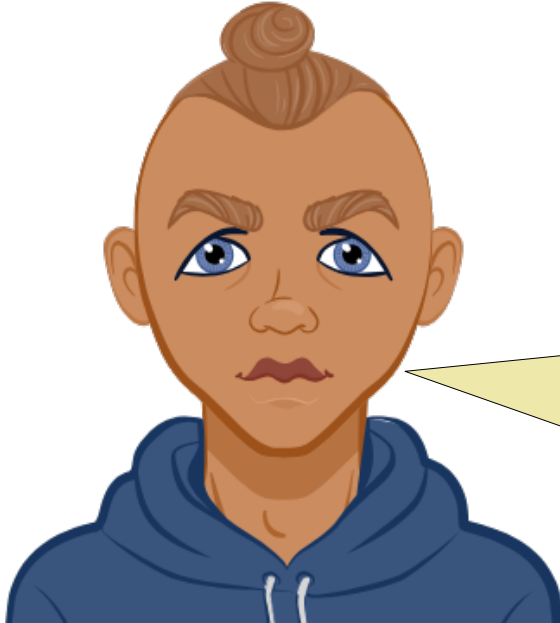
SaaS: Story #3

Well, the container logs aren't available in the SIEM for some reason. Can we please get the native container logs to investigate this further?



SaaD: Story #3

Dev Team Lead



Unfortunately, no. The logs are all gone. The application has a memory leak problem. So until we fix that, we temporarily purge and recreate those containers every day as a workaround.

SaaD: Story #3

You have got to be kidding me! That is so horrible on so many different levels!



SaaD: Story #3

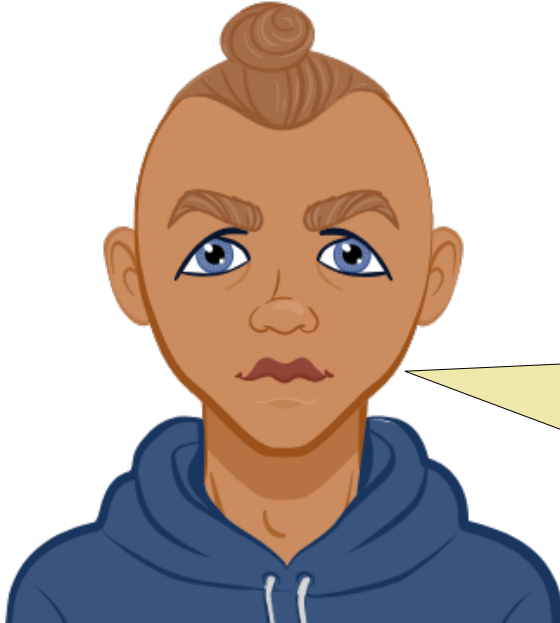
The following Day...

Hey <dev lead>, that same alert is firing again. We need to investigate this right now!



SaaD: Story #3

Dev Team Lead



Oh wait. Looks like those containers are sitting behind our load balancer after all! We had no idea, but we can get you the logs right away now.

SaaD: Story #3

You have got to be kidding me! That is so horrible on so many different levels!



SaaS Story #3: Advice

[illegible]

- Retain your log files!
- Understand your environment
 - Even if it's “just” a dev/test environment

SaaD: Story #4

Sorry (not sorry) to interrupt your vacation...

SaaD: Story #4

Hey <dev manager>, we just got a pen tester finding of RDP listening on a cloud host. The resource owner is currently offline. We need to get this disabled ASAP!



SaaD: Story #4

Dev Manager



Understood! That developer is currently out on vacation, but I'll reach out to them and have them to join the ongoing investigation call right away.

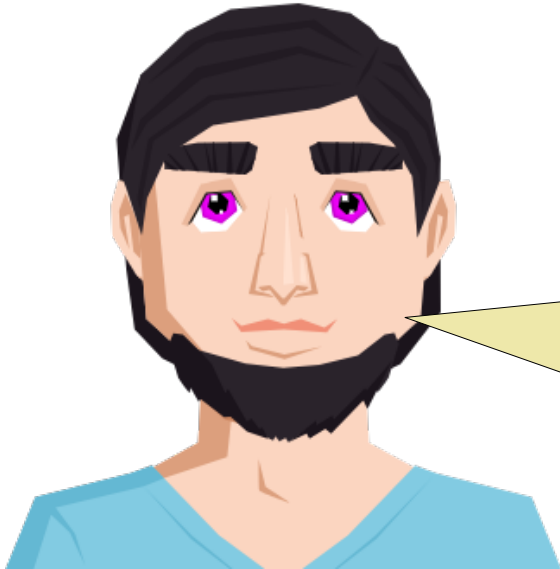
SaaD: Story #4

Hey <developer>, thank you for joining our phone bridge. We have a host actively allowing RDP access, which is a security risk. We need to get this disabled right away!



SaaD: Story #4

Developer



Uh, yeah. Sorry about that. I was having VPN problems, and so I just created a temporary jump host to get into to the environment, while I was out on vacation this week.

SaaS Story #4: Advice



- Don't circumvent security for convenience
 - Temporary solutions are easily forgotten!
 - No good excuse for bad OpSec!

SaaD: Story #5

Heavy metal, with a large composition of Irony!

SaaD Story #5: (Sorry!)

DFIR Matt



[REDACTED]

Instead, let's talk about this...

Trending API Risks

- **Accidentally/Publicly exposed APIs**
 - Allows for direct API access
 - Circumvents front-end web & web app security
- **Shadow APIs**
 - Deployed outside of standards and controls

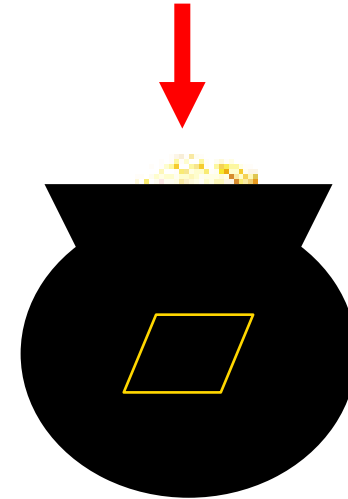
A new slide from “**Hacking Web APIs**”,
Cincinnati OWASP, 05/08/2024 meeting



Hypothetical Scenario

- Lets say you have a pot of gold that you want to protect
 - Or a pot of “**data**” if you prefer...

pot of gold/data



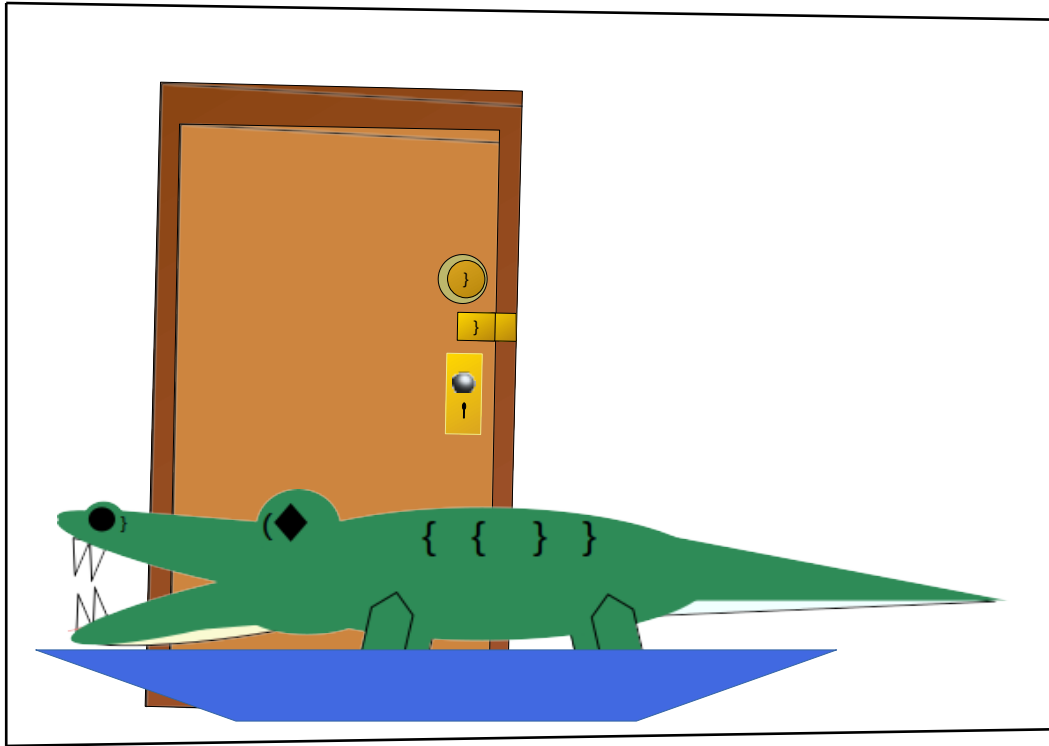
Perimeter Security



Post Orders

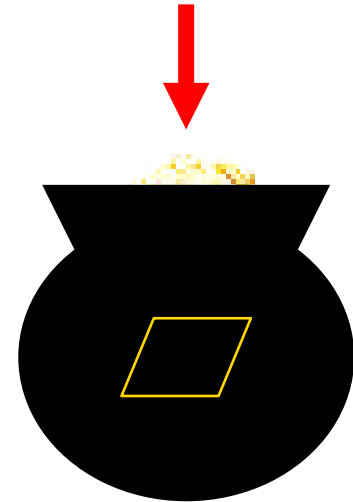
Guard's **only** duty is never allowing any unauthorized person(s) access through the door!

Interior Security

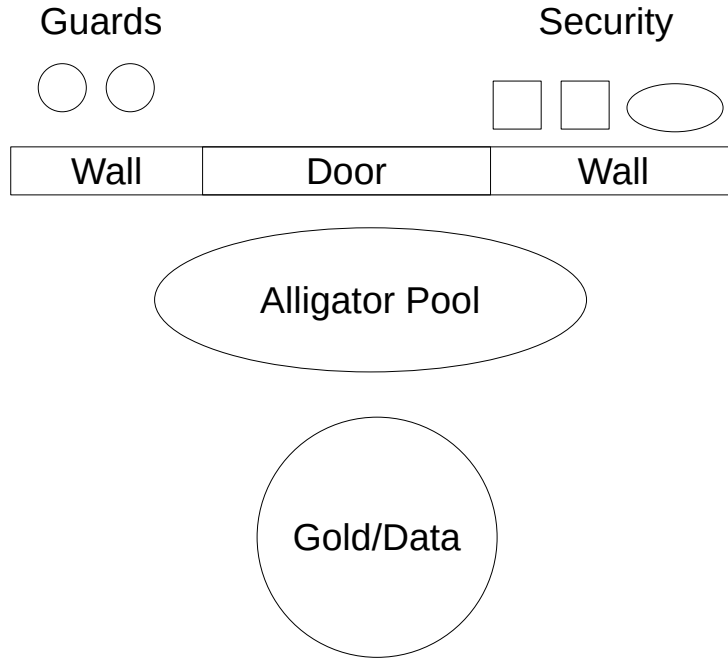


Behind the alligator...

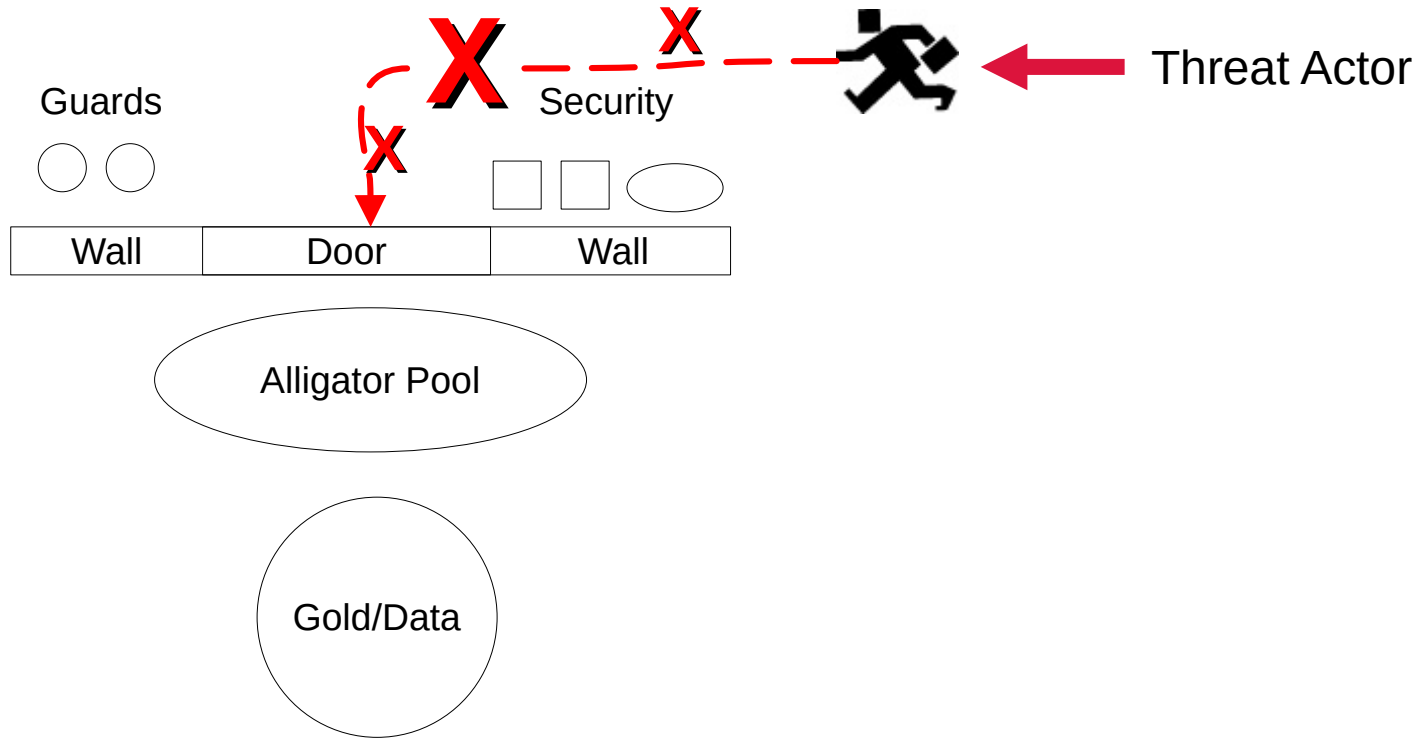
pot of gold/data



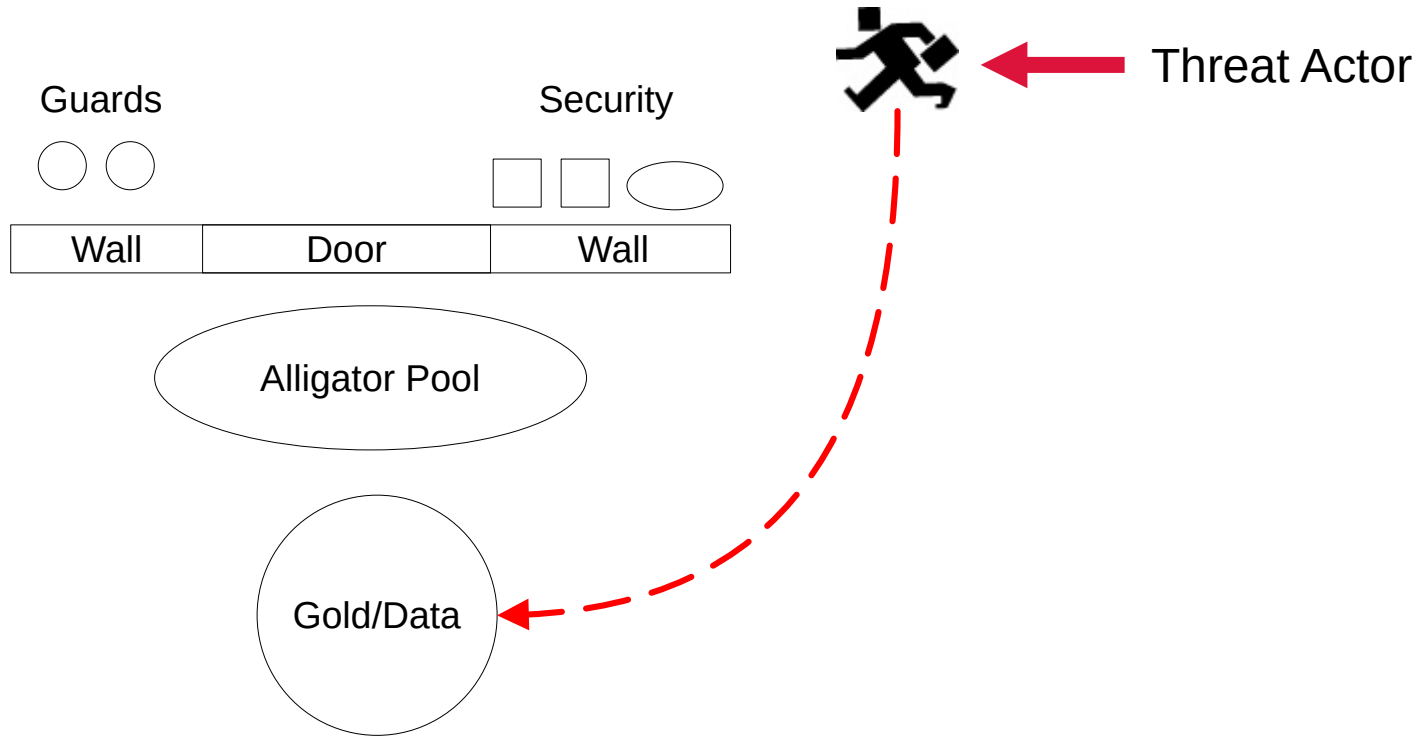
The Floor Plan



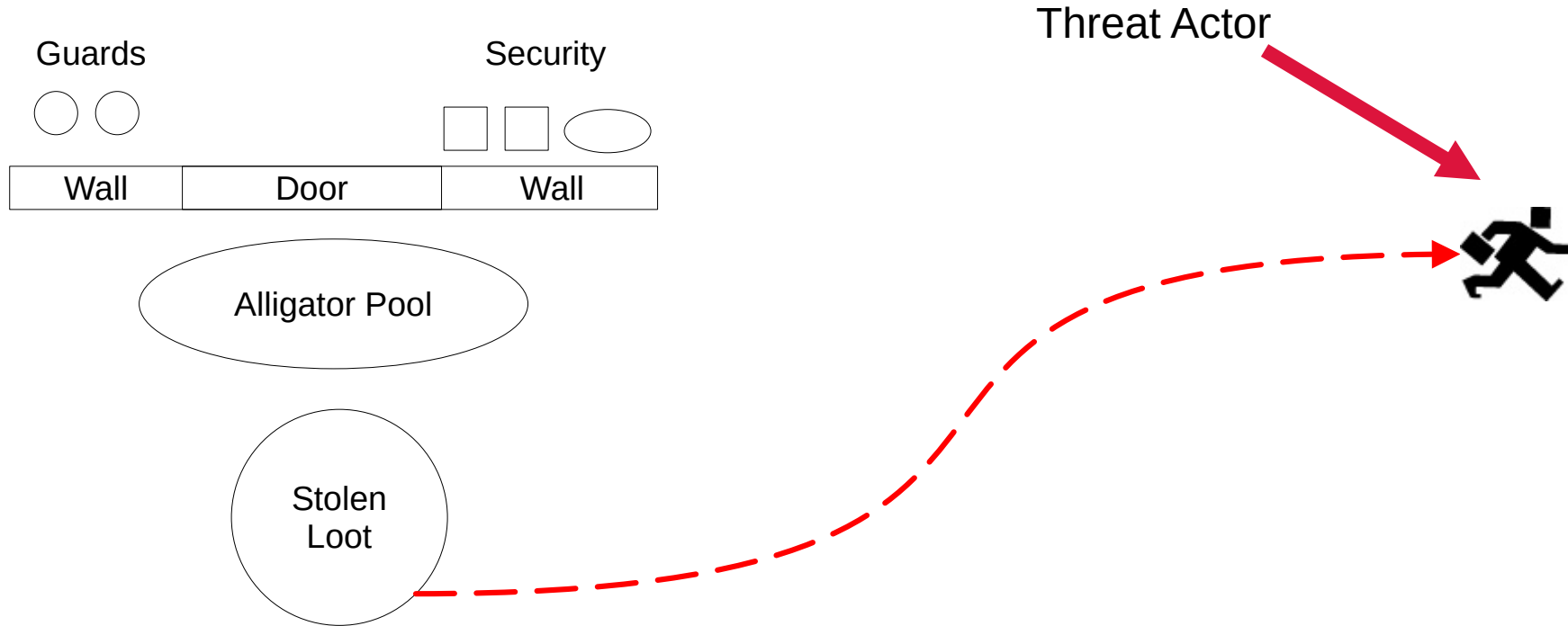
The Adversarial Plan



The (Data) Breach



Action on Objectives



Parting Advice

[illegible]

- Listen to that dude, Matt...

Parting Advice

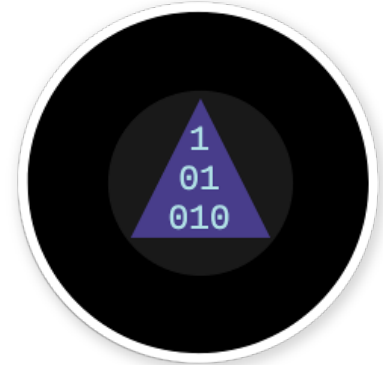
$$\begin{aligned} & \left(\frac{\partial}{\partial t} + \nabla_x \cdot \left(\frac{x}{|x|^2} \right) \cdot \nabla_x \right) u(x,t) = f(x,t), \\ & u(x,0) = g(x), \quad x \in \mathbb{R}^d, \quad t \geq 0, \\ & u(x,t) = O(|x|^{-\alpha}) \text{ as } |x| \rightarrow \infty, \end{aligned}$$

- Listen to that dude, Matt...
 - He knows what he's talking about!

Questions



Who?
What?
When?
Where?
Why?
How?



Cloud Security



 <http://slides.dfirmatt.com>



Matt Scheurer

and Other Assorted Cautionary Tales