Introduction to the
OWASP Top Ten

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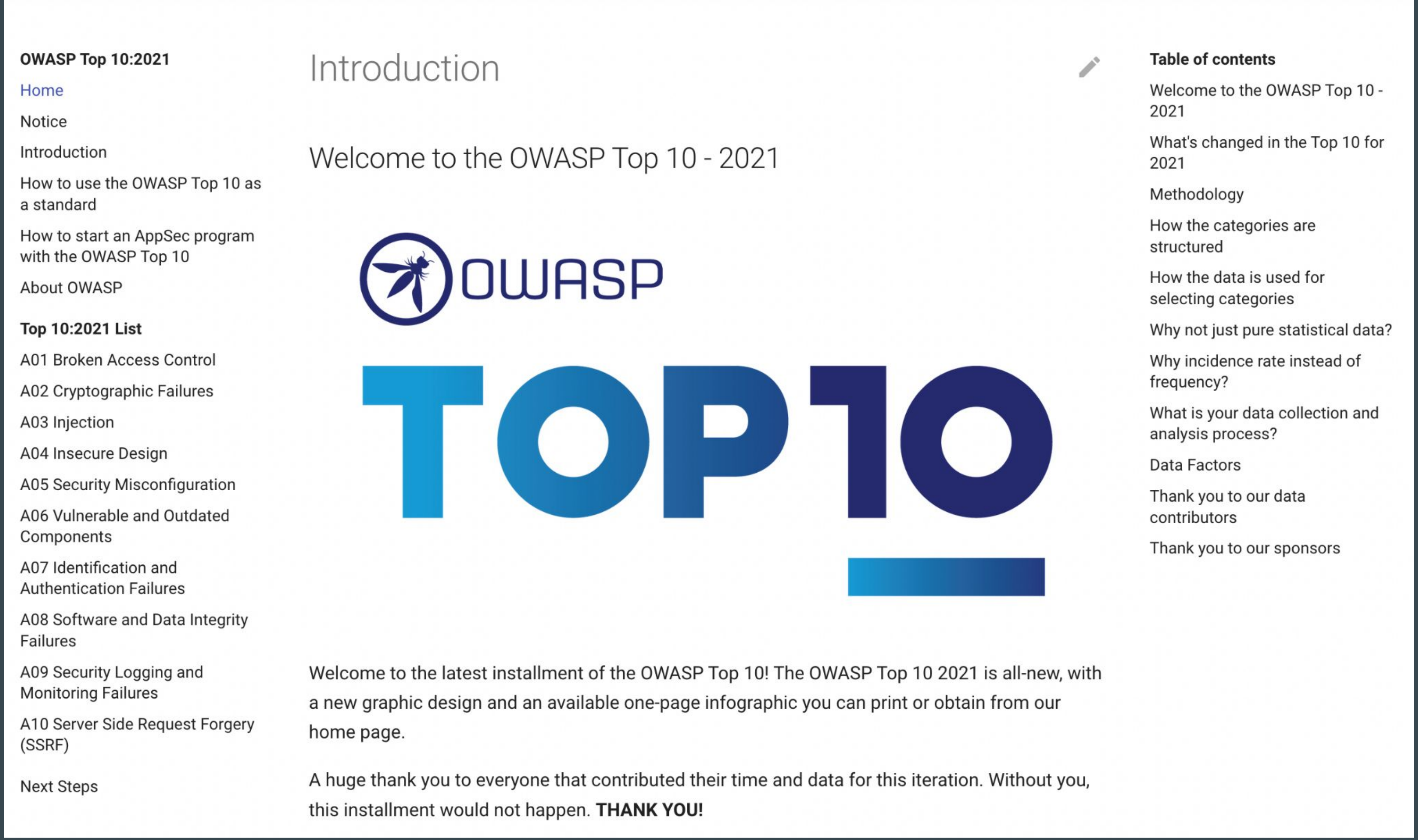


Introduction

Welcome to the OWASP Top 10 - 2021

Welcome to the latest installment of the OWASP Top 10! The OWASP Top 10 2021 is all-new, with a new graphic design and an available one-page infographic you can print or obtain from our home page.

A huge thank you to everyone that contributed their time and data for this iteration. Without you, this installment would not happen. **THANK YOU!**

Table of contents

https://owasp.org/Top10/

OWASP Top Ten

Globally recognized by developers as the first step towards more secure coding.

The *most critical* security risks to web applications.

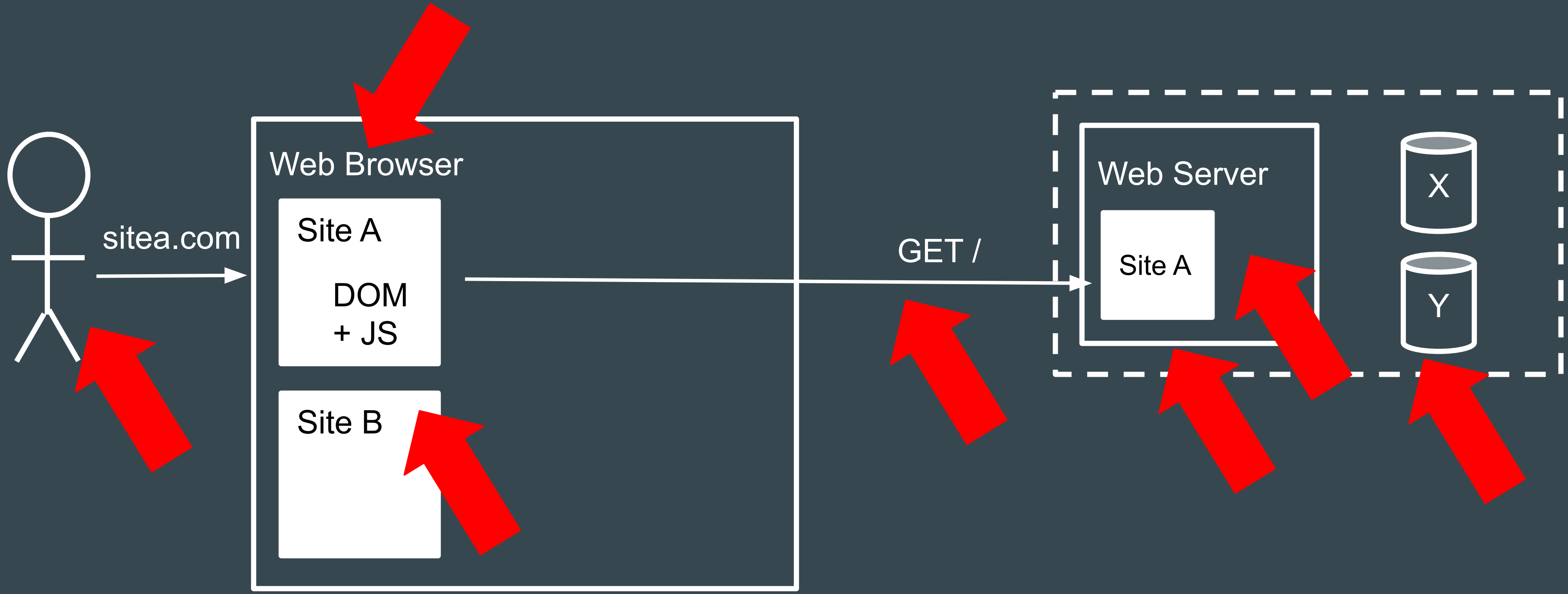
Updated every 2-3 years from 2003 to 2021

2021: Focus on the root cause, rather than the symptom

See: The How and Why of the OWASP Top Ten 2021 - Brian Glas

Setting the scene
crapgpt.online

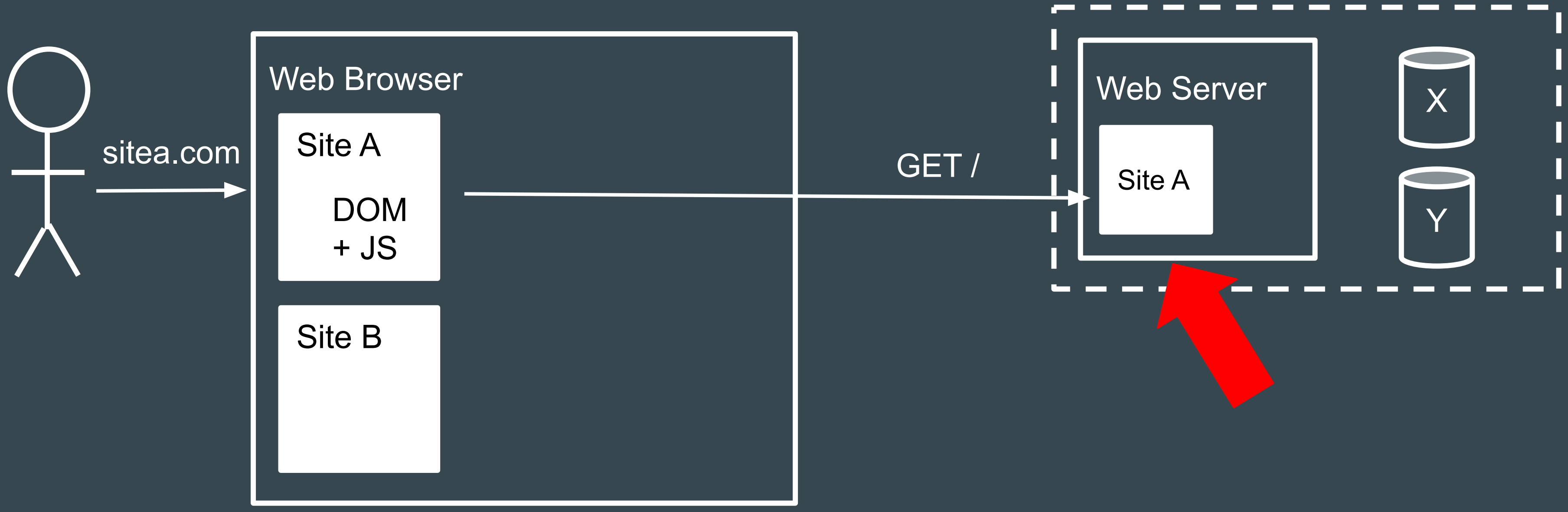
Securing the user



OWASP Top Ten 2021

A01	Broken Access Control
A02	Cryptographic Failures
A03	Injection
A04	Insecure Design
A05	Security Misconfiguration
A06	Vulnerable and Outdated Components
A07	Identification and Authentication Failures
A08	Software and Data Integrity Failures
A09	Security Logging and Monitoring Failures
A10	Server-Side Request Forgery

A01 Broken Access Control

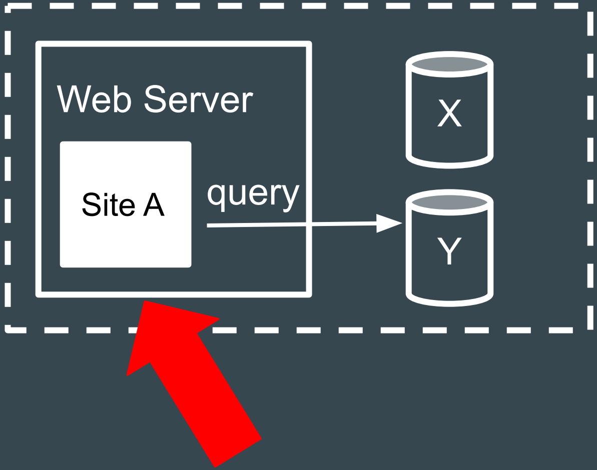


A01 Broken Access Control

- Access hidden pages

  `http://site.com/admin/user-management`
- Elevate to an administrative account
- View other people's data

  `http://site.com/user?id=7`
- Modifying cookies or JWT tokens



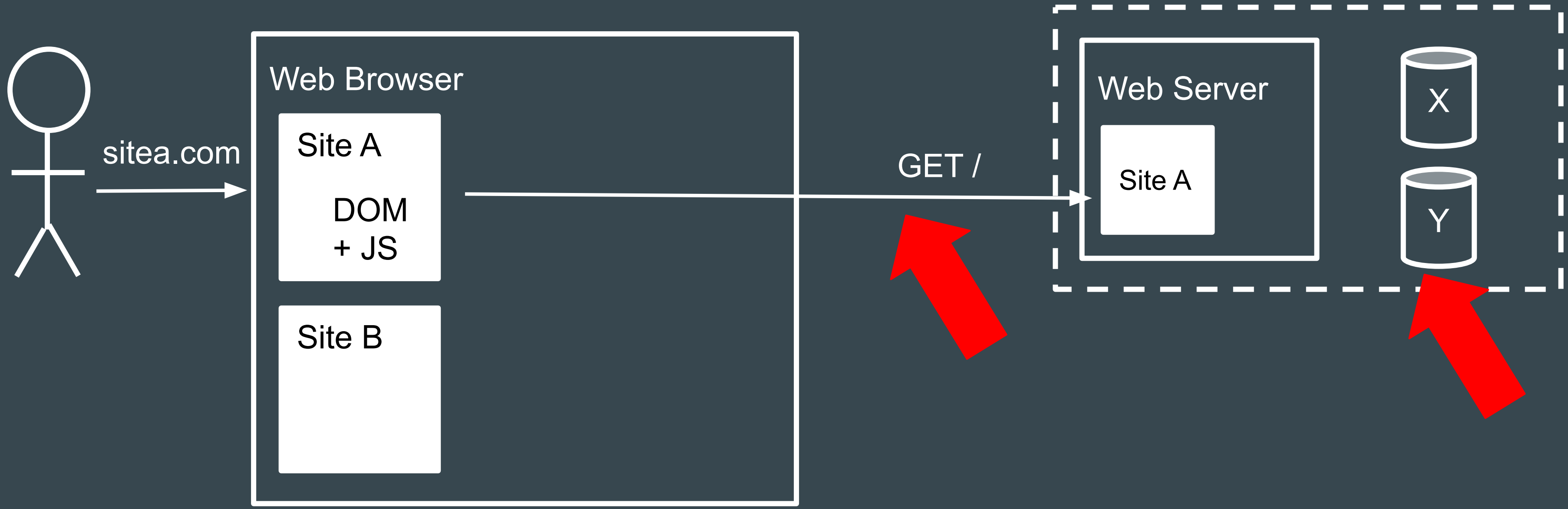
A01 Broken Access Control

Prevention:

- Implement access control measures centrally
- Use proven code or libraries
- Deny access by default
- Log failures and alert
- Rate limit access to resources

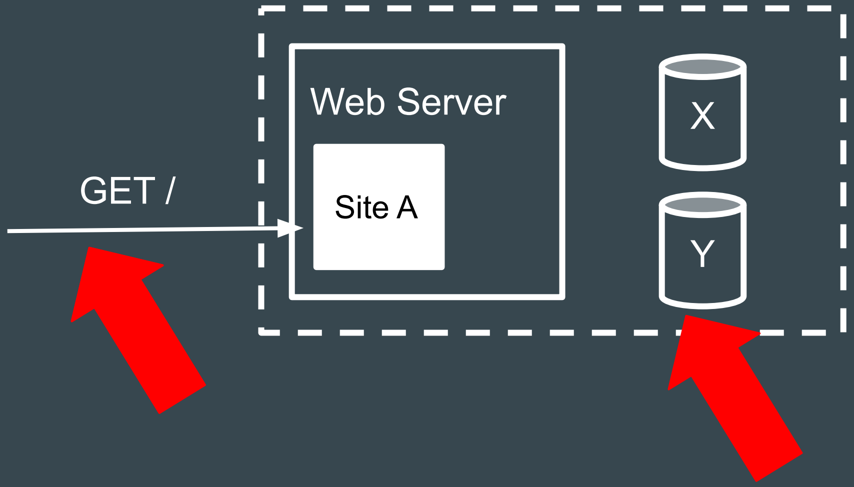
Securing REST API Endpoints (or, How to avoid another Optus), James Cooper
Track One - Thursday, 13:30

A02 Cryptographic Failure



A02 Cryptographic Failure

- Clear-text data transfer
- Unencrypted storage
- Weak crypto or keys
- Certificates not validated
- Exposing PII or Credit Cards



A02 Cryptographic Failure

Prevention:

- Don’t store data unless you need to!
- Encrypt at rest and in transit
- Use strong crypto

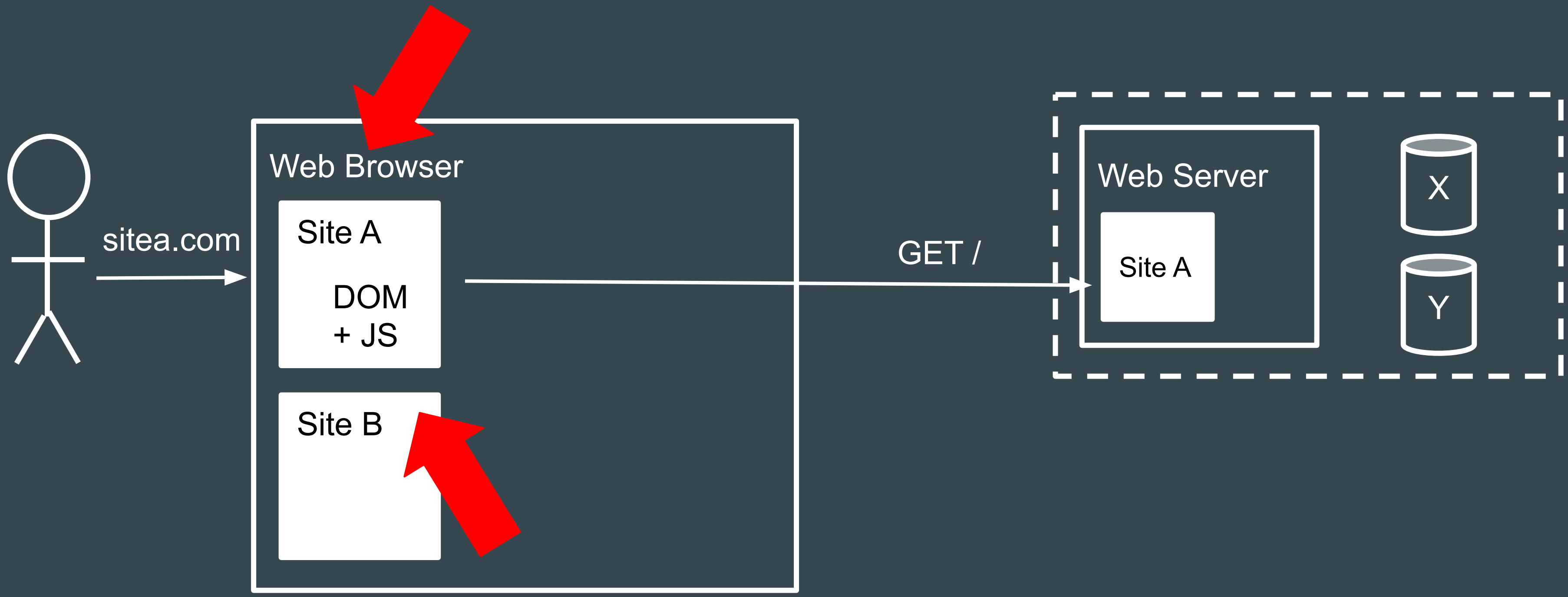
A03 Injection

Injecting attacker-controlled *data* into the *code* you intend to run

Examples:

- Cross-Site Scripting (XSS)
- SQL Injection (SQLi)

A03 Injection - Cross-Site Scripting (XSS)

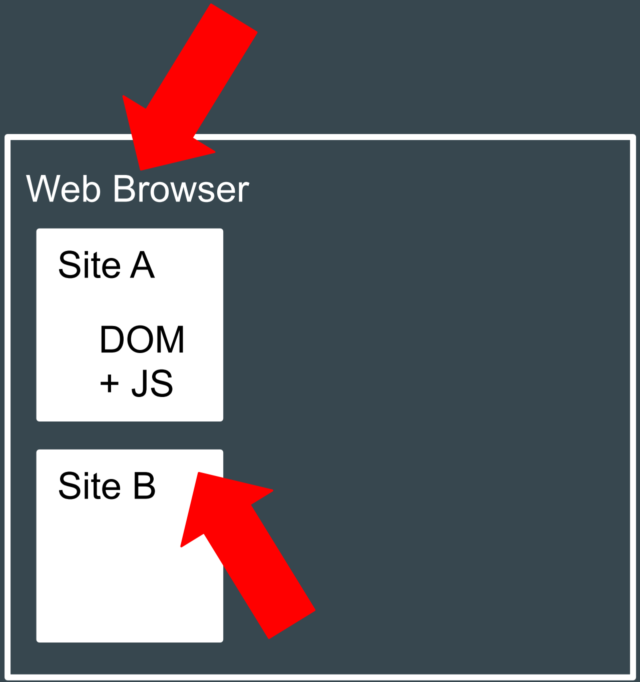


A03 Injection - Cross-Site Scripting (XSS)

HTML mixes content, presentation and code into one string (HTML+CSS+JS)

If an attacker can alter the DOM, they can do *anything* that the user can do.

XSS can be found using automated tools.



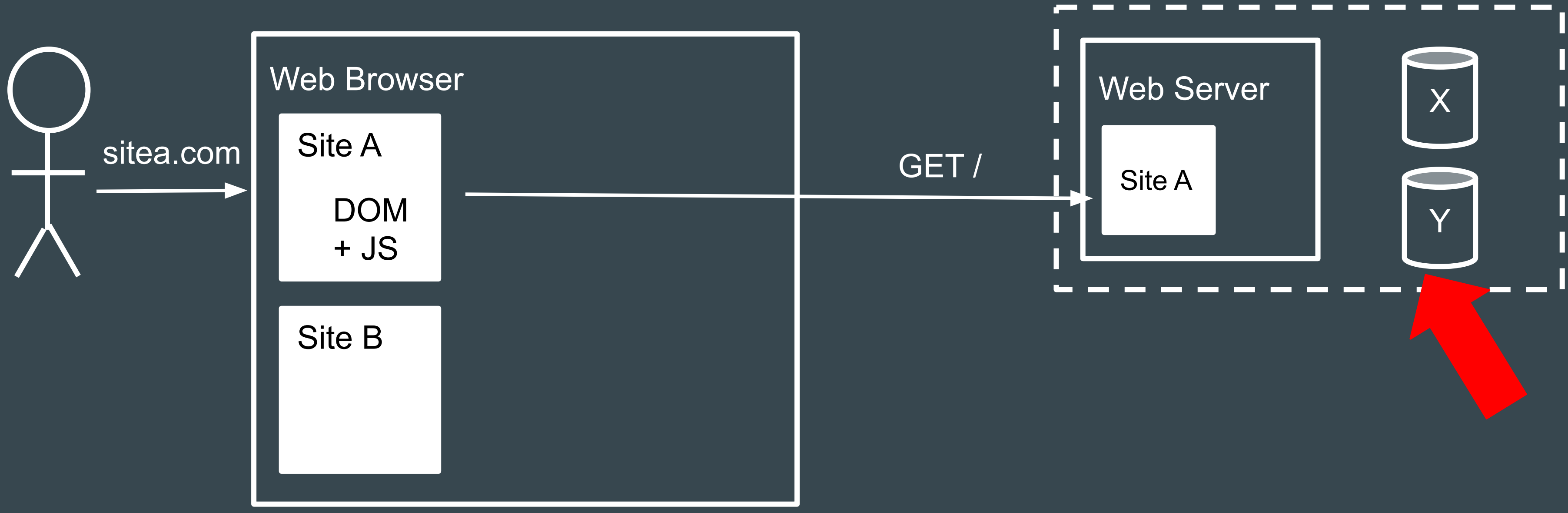
A03 Injection - Cross-Site Scripting (XSS)

Prevention:

- Encode all user-supplied data to render it safe
  `Kirk <script> => Kirk &lt;script&gt;`
- Use appropriate encoding for the context
- Use templating frameworks that assemble HTML safely
- Use Content Security Policy

A03 Injection - SQLi

Sending hostile data to an interpreter
(e.g. SQL, LDAP, command line)



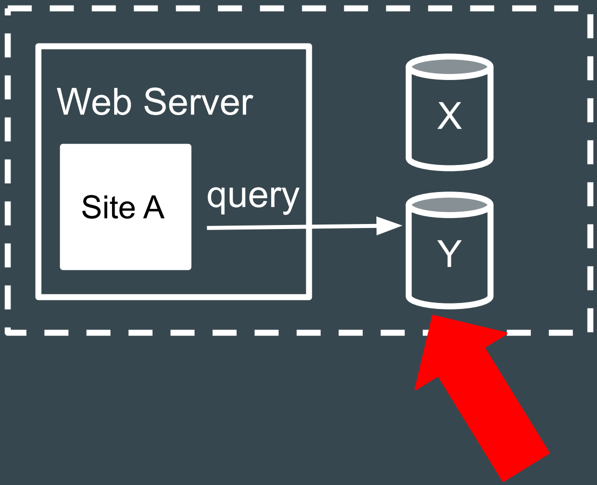
A03 Injection - SQLi

Sending hostile data to an interpreter (e.g. SQL, LDAP, command line)

```
String query = "SELECT * FROM accounts WHERE
custID='" + request.getParameter("id") + "'";

id = " '; drop table accounts -- "
```

SQL statements combine *code* and *data*



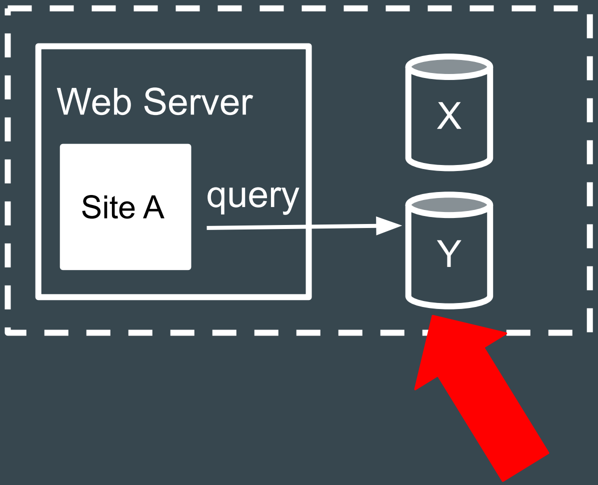
A03 Injection - SQLi

Prevention:

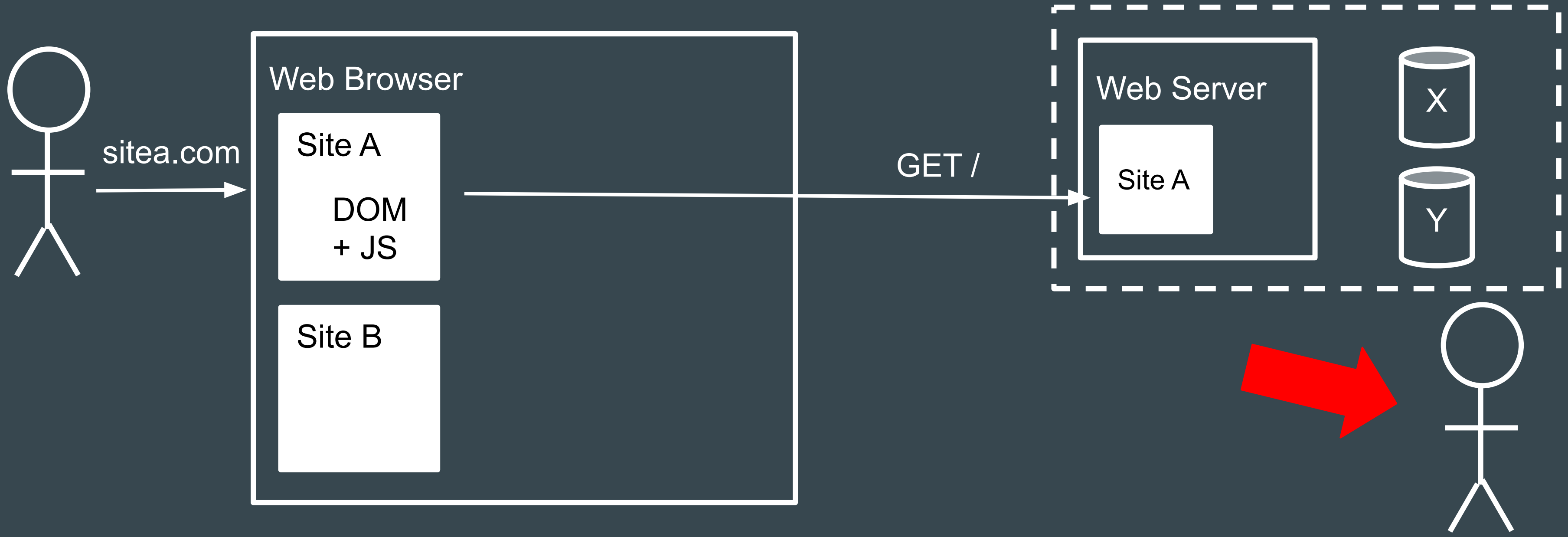
SQL statements combine *code* and *data*

=> Separate code and data

- Parameterise your queries
- Validate which data can be entered
- Escape special characters



A04 Insecure Design



A04 Insecure Design

Risks related to design and architectural flaws

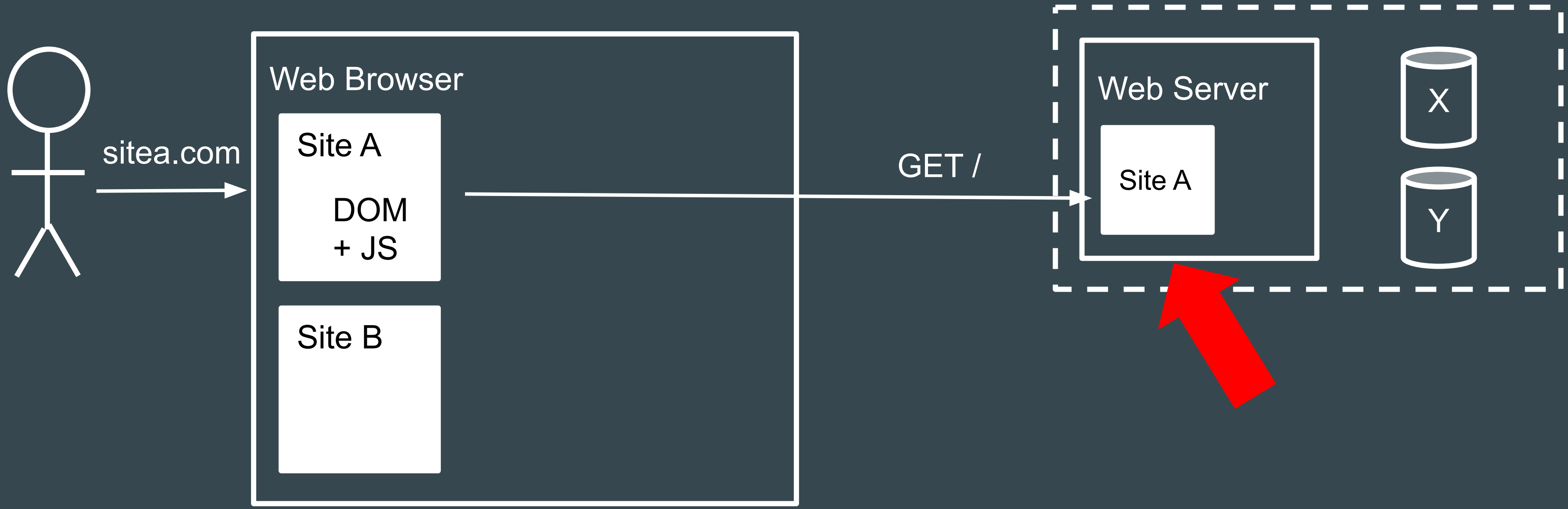
Cannot be fixed by rock-solid implementation

Use:

- Threat modeling
- Secure design patterns
- Reference architectures

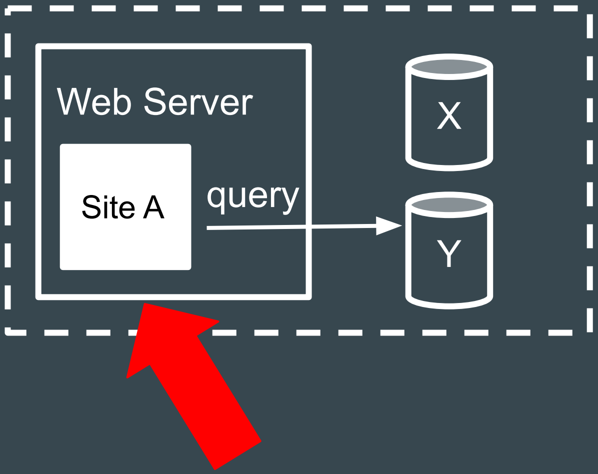
Privacy by Design: A standard approach in software development?, Chris Esther, Track Two - Friday, 10:00
Thoughts on Threat Modelling, John DiLeo, Track One - Friday 14:25

A05 Security Misconfiguration



A05 Security Misconfiguration

- Security features not configured properly
- Unnecessary features enabled
- Default accounts not removed
- Error messages expose sensitive information



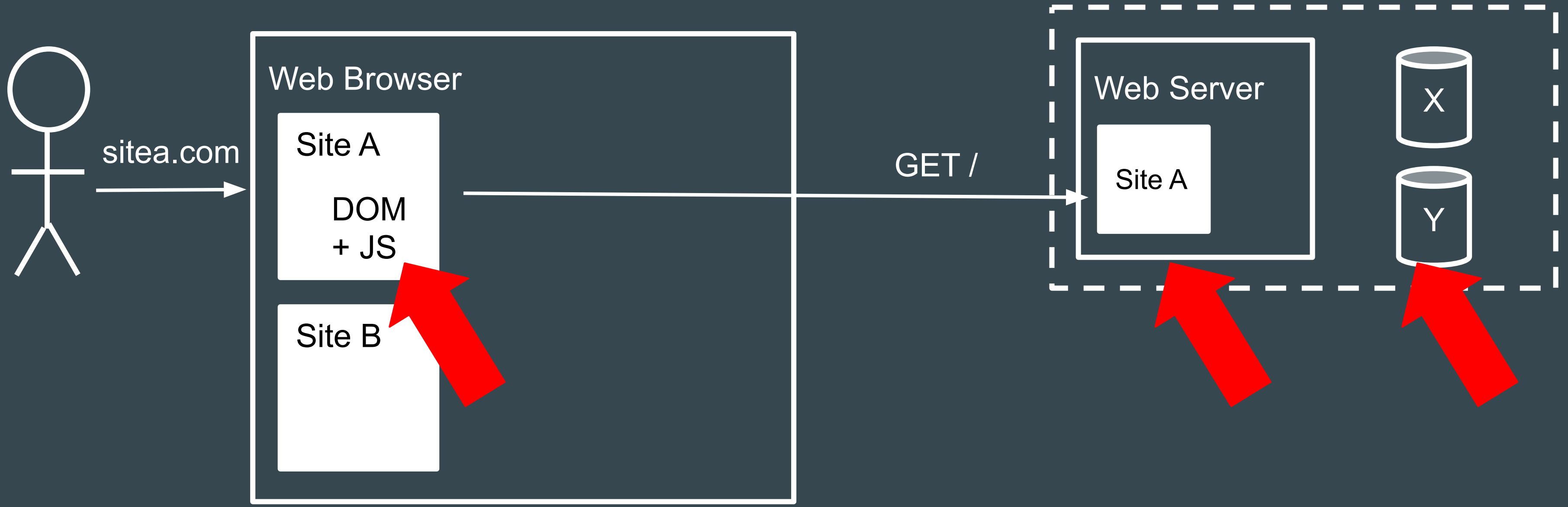
A05 Security Misconfiguration

Prevention:

- Have a repeatable build process or “gold master”
- Disable all unused services
- Use tools to review settings

Fantastic Cloud Security Mistakes and How to Find Them, Sarah Young
Track One - Next!

A06 Vulnerable and Outdated Components



A06 Vulnerable and Outdated Components

Modern applications contain a *lot* of third-party code.

It’s hard to keep it all up to date.

Attackers can enumerate the libraries you use, and develop exploits.

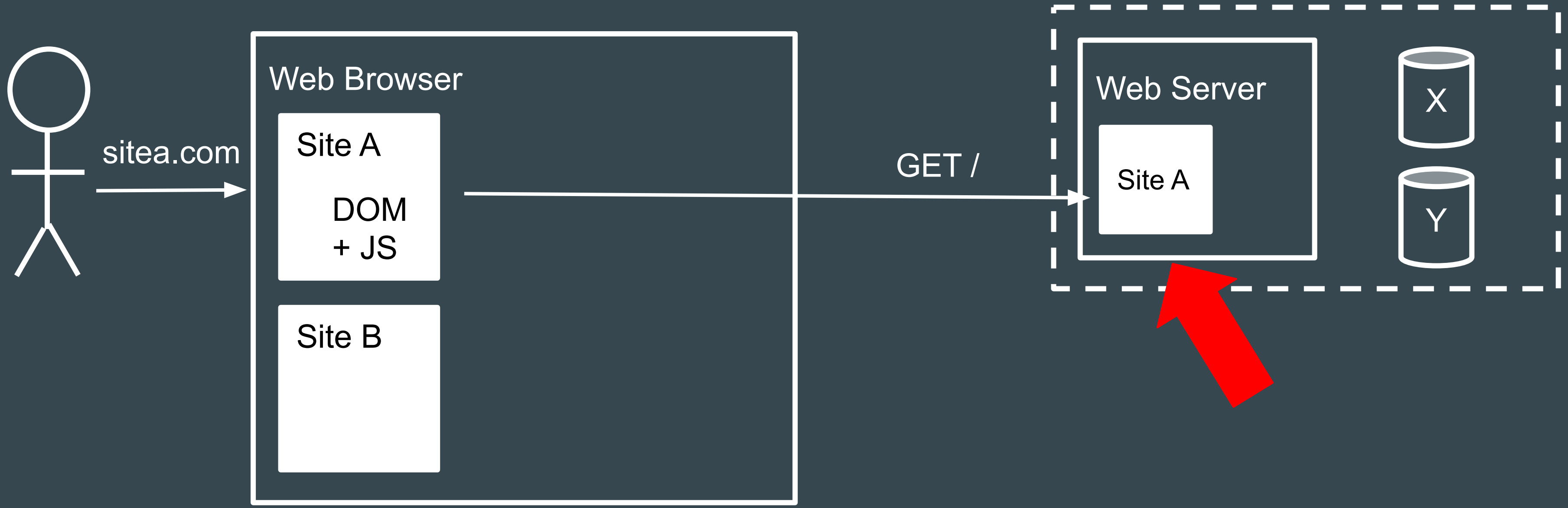
A06 Vulnerable and Outdated Components

Prevention:

- Inventory management
- Reduce dependencies
- Patch management
- Scan for out-of-date components
- Budget for ongoing maintenance for all software projects

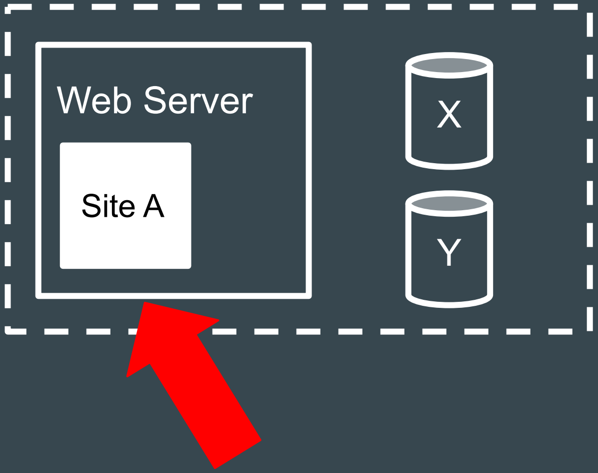
Waiter, There's a CVE in My SOUP, Kevin Alcock
Track One - Thurs 16:05

A07 Identification and Authentication Failures



A07 Identification and Authentication Failures

- Weak session management
- Credential stuffing
- Brute force
- Forgotten password
- No multi-factor authentication
- Sessions don’t expire

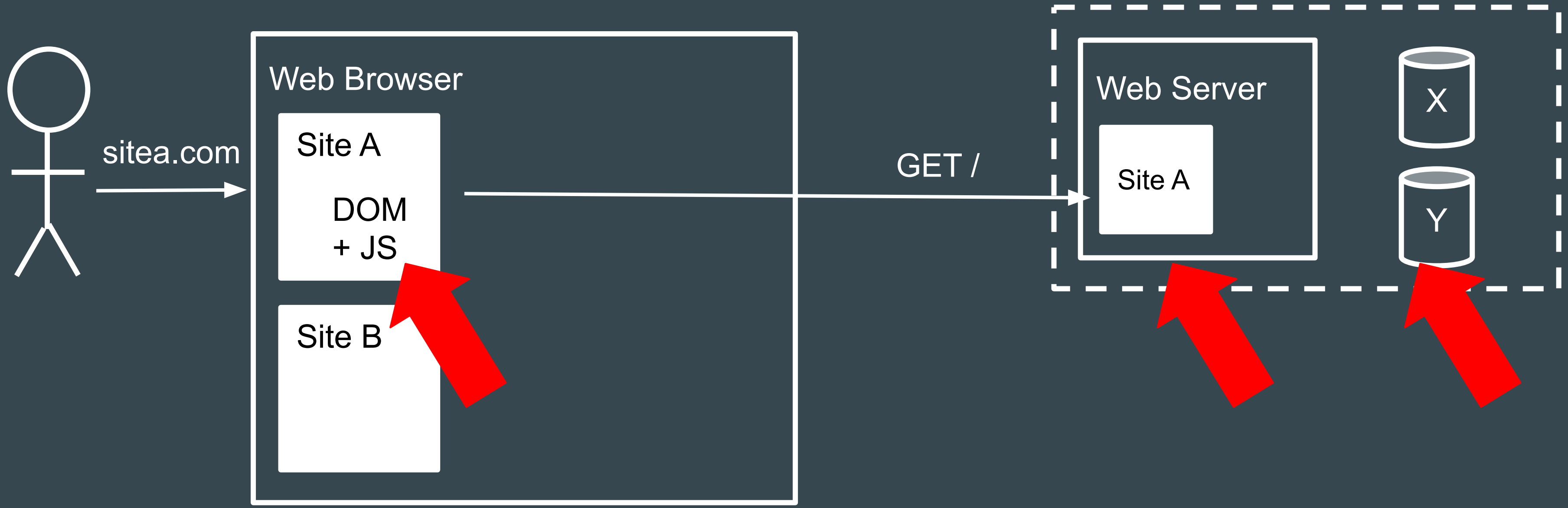


A07 Identification and Authentication Failures

Prevention:

- Use good authentication libraries
- Use MFA
- Enforce strong passwords
- Detect and prevent brute force or stuffing attacks

A08 Software and Data Integrity Failures



A08 Software and Data Integrity Failures

Software integrity:

- Downloading code from untrustworthy sources
- No integrity checks
- Insecure CI/CD pipeline

Data integrity:

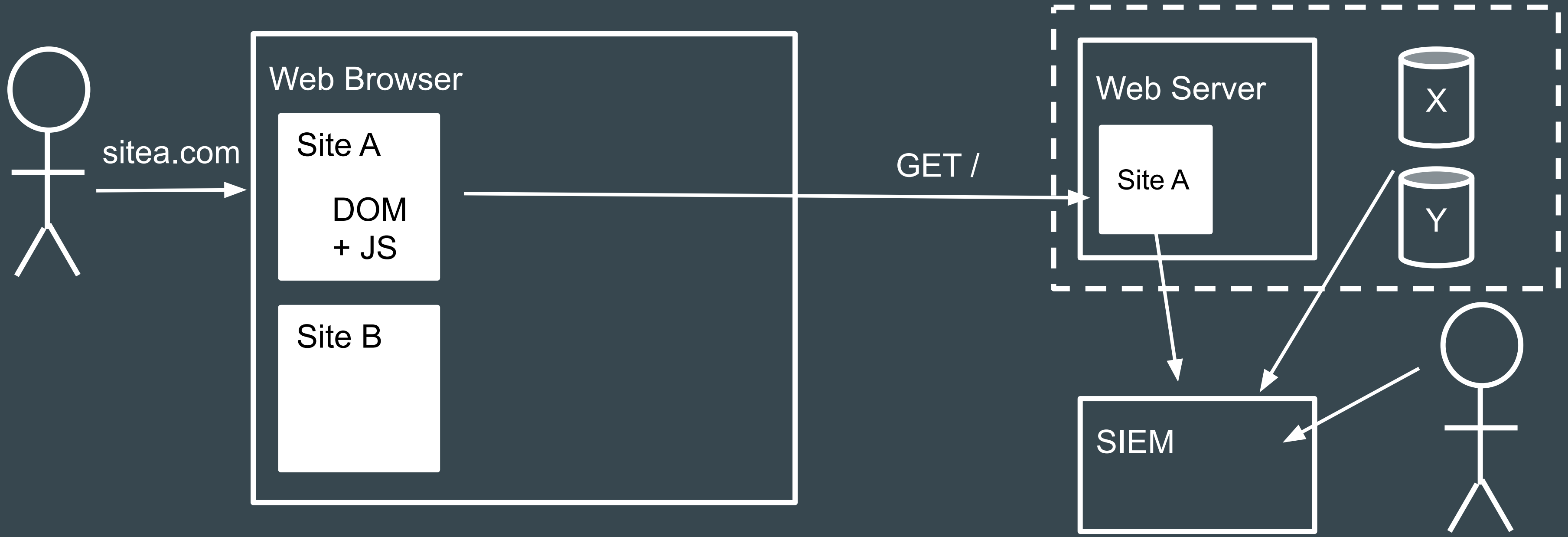
- Data may be modified for deserialisation attack

A08 Software and Data Integrity Failures

Prevention:

- Digital signatures for libraries and executables
- Use trustworthy repositories
- Supply chain dependency check
- Encrypt data, and check integrity

A09 Security Logging and Monitoring Failures

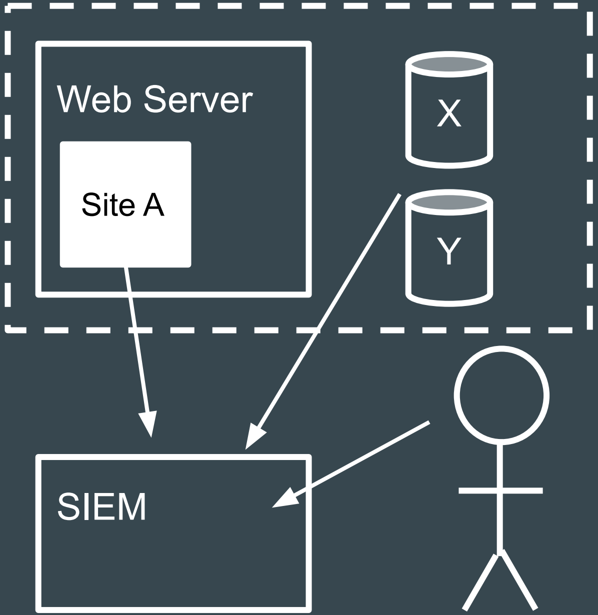


A09 Security Logging and Monitoring Failures

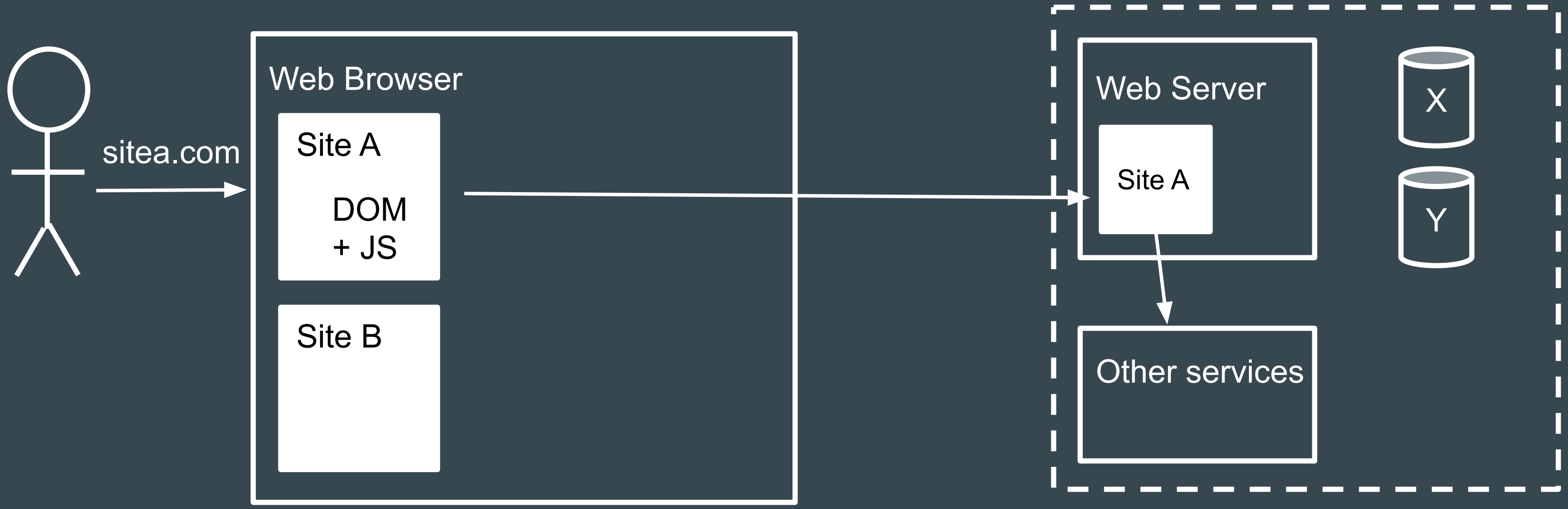
You can’t react to attacks that you don’t know about.

Logs are important for:

- Detecting incidents
- Understanding what happened
- Proving who did something



A10 Server-Side Request Forgery

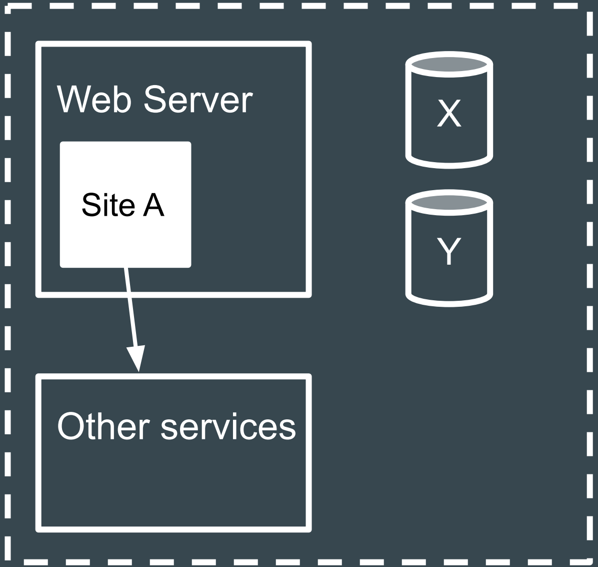


A10 Server-Side Request Forgery

Tricking an application to fetch something by url

E.g.

- Access an internal service
- Port-scan a network
- Access cloud metadata service
- Proxy attacks to other targets



A10 Server-Side Request Forgery

Prevention:

- Segment networks, firewall restrictions
- Don’t trust input data
- Do not display raw HTTP responses to clients
- Don’t follow redirects

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Next Steps

- Attend OWASP events
- Search for OWASP Top Ten category names and your framework
  E.g. “C# XSS protection”
- Watch youtube or Pluralsight videos
- Use the terms when discussing bugs with colleagues
- Keep track of which issues affect you the most
- Go beyond the Top Ten

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