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SESSION ID: SPO3-W04

Secure Apache Web Server with HTML5 and HTTP/2

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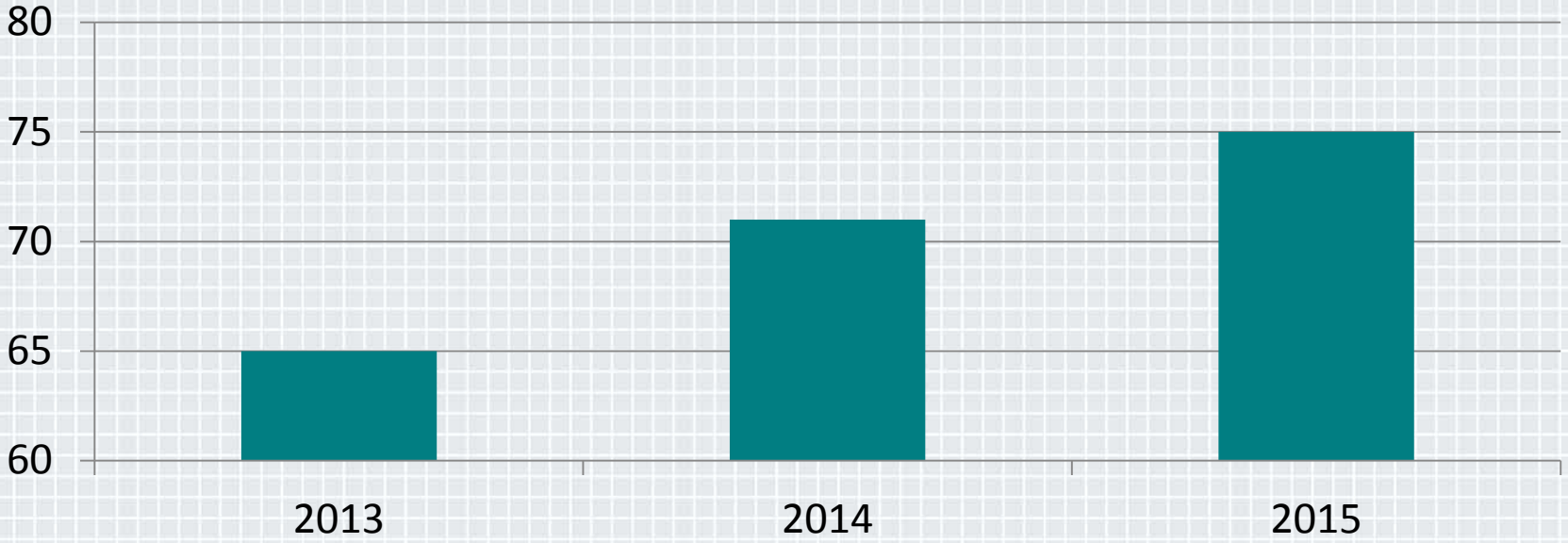
"The only truly secure system is one that is powered off, cast in a block of concrete and sealed in a lead-lined room with armed guards."

- Eugene Spafford

The Importance of Security

- Cyber attacks
- Mobile devices/apps
- Critical infrastructure
- Information security
- X internet users

Information Security Spending (in $)



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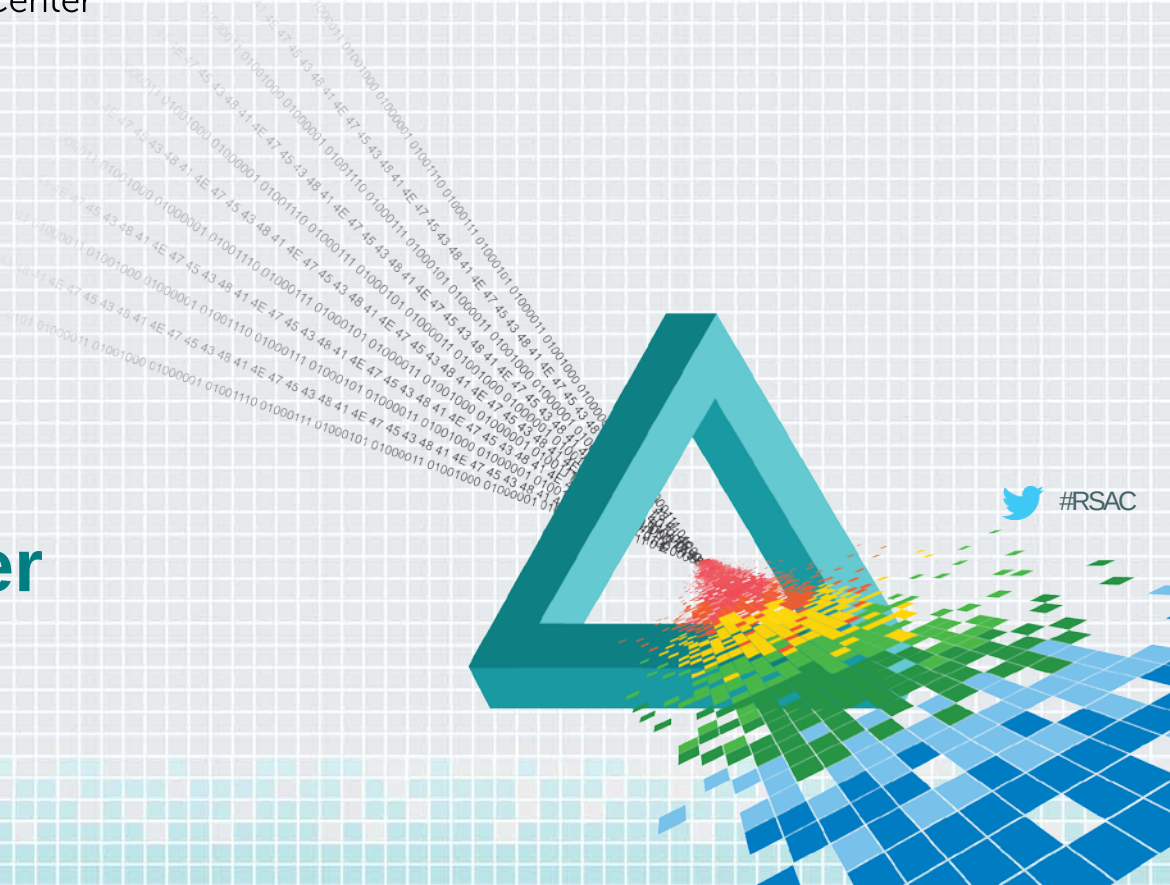
Apache Web Server



What is Apache Web Server?

- Open source
- Originally designed for Unix environments in 1995
- Large public library of add-ons
- Most widely used Web server

Key features of Apache Web Server

- Highly adaptable
- Configurable error messages
- Content negotiation
- TLS support
- Open source

Apache Web Server Hardening

Information leakage

Hide version, disable directory listing

Unnecessary modules

Disable modules, update regularly

Lack of authorization

Separate user/group, restrict access

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Apache Web Server and HTML5

What is HTML5?

- Markup language
- Living standard (2014)
- Structuring and presenting content
- Support for latest multimedia types

How does it work?

Client

HTTP Request: WebSocket Upgrade

HTTP Response: Switching Protocols

WebSocket Frame

WebSocket Frames

WebSocket Frame

WebSocket Close

WebSocket Close

Server

Features of HTML5

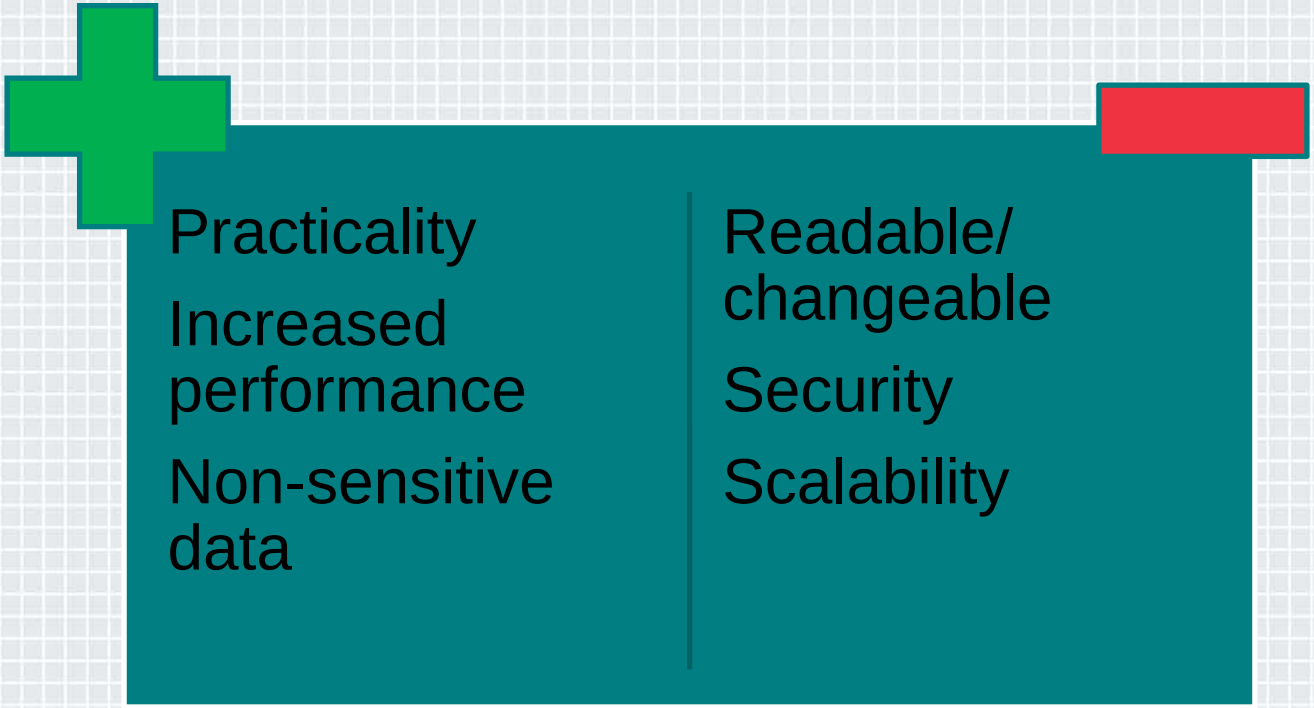
- Audio/video support
- Content editable
- Placeholders
- LocalStorage and sessionStorage

Web(HTML5) Storage

localStorage

sessionStorage

WebStorage – good or bad?



HTML5 Hardening

Cross-origin resource sharing

Validate URLs, discard requests

Offline Web application

Clear UA cache, only trusted sites

Web messaging

State origin, assign data value properly

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Apache Web Server and HTTP/2

What is HTTP/2?

- Foundation of data communication for the World Wide Web
- Based on SPDY
- To become standard 2015
- Supports TLS – not required!

HTTP/2 – Key Improvements

server push

header compression

multiplexing

TLS

How does HTTP/2 work?

HTTP Request Message

HTTP Response Message

HTTP Client
(Web Browser)

HTTP over TCP/IP

HTTP Server
(Web Server)

HTTP/2 Hardening

POODLE

Disable SSL 2.0 and SSL 3.0

CRIME

Disable TLS 1.0

Heartbleed

Upgrade OpenSSL, disable TLS Heartbeat

What is TLS?

- Cryptographic protocol designed to provide communication security and data integrity between client/server applications communicating over a computer network
- Supported by all major web browsers
- Made up of two layers

Basic TLS Handshake

Client

ClientHello

ServerHello

(Certificate) / ServerKeyExchange

ServerHelloDone

ClientKeyExchange

ChangeCipherSpec

Finished

ChangeCipherSpec

Finished

Server

Advantages of TLS

- Strong authentication
- Interoperability
- Algorithm flexibility
- Easy to deploy
- Easy to use

Disadvantages - the Cost of TLS (& PKI)

- Computational / scalability
- PKI
- Operational

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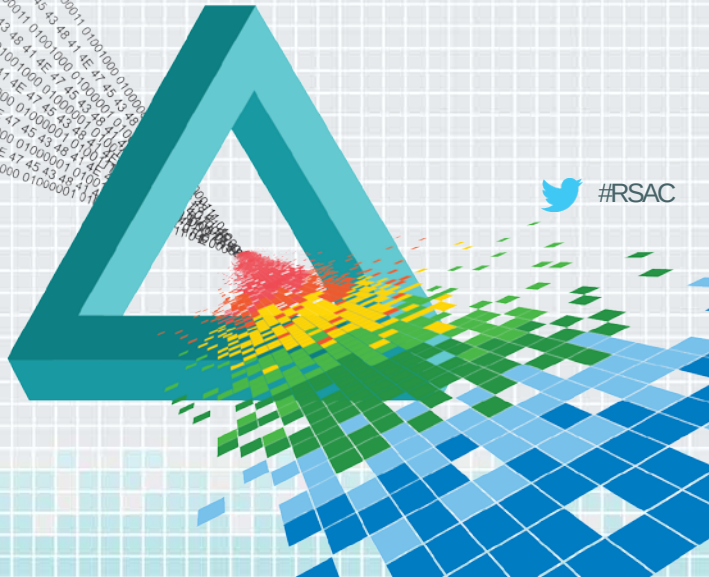
Apache Web Server
+ HTML5
+ HTTP/2
= ?



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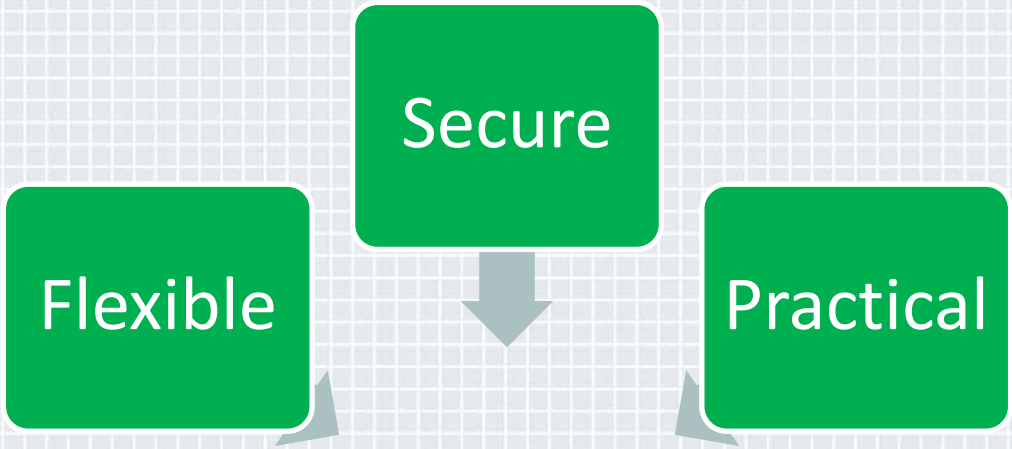
Apache Web Server + HTML5 + HTTP/2 = ?



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What now?

- Threat assessment – test,test,test!
- Solution feasibility
- Invest

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Questions?