Secure Web Services Architecture

A Case Study

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Overview - Section 1

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- Web Services
  - What is it
  - Why is it
  - Who cares
- Traditional n-Tier Web Services
  - MultiTier Arches
- Network Security
  - Theory
  - Reality
  - n-Tier
  - General
  - Tips

Overview - Section 2

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Detailed Analysis of Case Study

- Systems
  - Multiple Secure Environments
  - Least Privilege
- Network
  - Protocols
- Management
  - Updates / Upgrades

Q & A

S2.1: Systems

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- Diagram shows standard physical n=3
  - Presentation – WWW
  - Application – Java
  - Data – DB
- Each system has common security
- Each system has unique security

S2.1.1: Traditional 3-Tier

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Presentation (WWW Server)

- Some studies refer to the “Client” tier
- Considering the Client as the “Presentation”
  - JavaScript, HTML, XML

Application (CGI, J2EE, Cobol)

- Not necessarily an independent server
- Best defined by Usage
  - Applications ~= Programs

Data (dBaseIV, SQL, Contacts.TXT)

- Should not imply a DataBase in the operational sense
- Best considered as referential

S2.1.1: Common Security

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Each system has common security

- IPTables
- SNORT
- OOB Logging
- Specialized user accounts

S2.1.1: Common Security .2

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- IPTables
  - No FORWARD allowed
  - Deny & LOG explicit
    - Sent to OOB
- SNORT
  - Phantom Interface
  - OOB Logging Output (syslog)
- OOB Logging
  - Serial syslog
- Specialized user accounts
  - Apache user
  - Tomcat user
  - Where possible – high level ports binding

S2.1.1: Unique Security

Each system has unique security

- IPTables
- SNORT
- OOB Logging
- Specialized user accounts
- Specialized logging

S2.1.1: Unique Security - .2

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- IPTables
  - Specific INPUT/OUPUT filters
- SNORT
  - Tuned rules specific to application
- OOB Logging
- Specialized user accounts
  - Lowest privilege possible
- Specialized logging
  - Per application using OOB where possible

S2.1.2: Multiple Security

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n-Tier Architecture

- Traditional separation of processing duty.
- Similar to the concept of an exploded mainframe

But since this is “ exploded” we can actually obtain access to the points in between

Even better we can slip in and reside within the middle or back systems

Each system must adhere to ISN (define a complete PoI structure)

S2.1.3: Least Privilege

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- Compromise of any specific system MUST NOT compromise any other system
- Again – ISN/PoI requirements
- Parallel audit trails
- OOB management / logging

S2.1.4: Presentation

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CIA – Confidentiality, Integrity, Accessibility

- Confidentiality
  - HTTPS / Basic Auth / Certificate structures
- Integrity
  - Protocol Independence / ECC
- Accessibility
  - Availability of system

Apache 2.x system with SSL

- Logging through OOB
  - Consider mod_log_sql
- IPTables only allow connections (INPUT/OUTPUT) to used ports
  - Independent tables filters for each interface

S2.1.4: Application

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CIA – Confidentiality, Integrity, Accessibility

- Confidentiality
  - HTTPS / Java Crypto / Certificate structures
- Integrity
  - ECC / JMI
- Accessibility
  - Availability of system

Tomcat 4.x system with SSL

- Logging through OOB
  - JMI / J4L
- IPTables only allow connections (INPUT/OUTPUT) to used ports
  - Independent tables filters for each interface

S2.1.4: Data

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CIA – Confidentiality, Integrity, Accessibility

- Confidentiality
  - SSL / mhash / mcrypt / Certificate structures
- Integrity
  - ECC
- Accessibility
  - Availability of system

MySQL 4.0.x system with SSL

- Logging through OOB
- OOB (Serial) management connection
- IPTables only allow connections (INPUT/OUTPUT) to used ports

S2.2: Networks

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Connections between each system using different RFC1918 network.

Presentation server had default route outbound only

Application and Data server had no default routes

Full Policy Routing structures

- ip rule limited accesses exiting localhost
- No IPv4 forwarding

S2.3: General Notes

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SNMP

- Use IPX where possible
- Use Version 3 with full authPriv and Inform traps
  - Separate passphrases for auth and Priv

Serial Logging

- AKA Out Of Band (OOB) Logging
- Consider two serial connections – one in & one out

Time Synchronisation

- Does not need to be accurate merely precise

Read Only DASD

- Especially useful for static content
- Works well with well behaved programs (Apache)

SSH / SSL

This is The