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Securing Apache Tomcat

Dennis Jacob

THE APACHE® SOFTWARE FOUNDATION

Biography

Dennis Jacob, CISSP

- Senior Consultant @ Leading Payment Industry organization
- Part of Middleware Engineering Group
- Interests
  - Application Server Technologies
  - Cloud Native Technologies
  - Web application security

https://www.linkedin.com/in/dennis-jacob

https://github.com/dennisjacob

This session and the opinions expressed are made on my personal capacity, and do not reflect the official policy or position of the company I work for.

Agenda

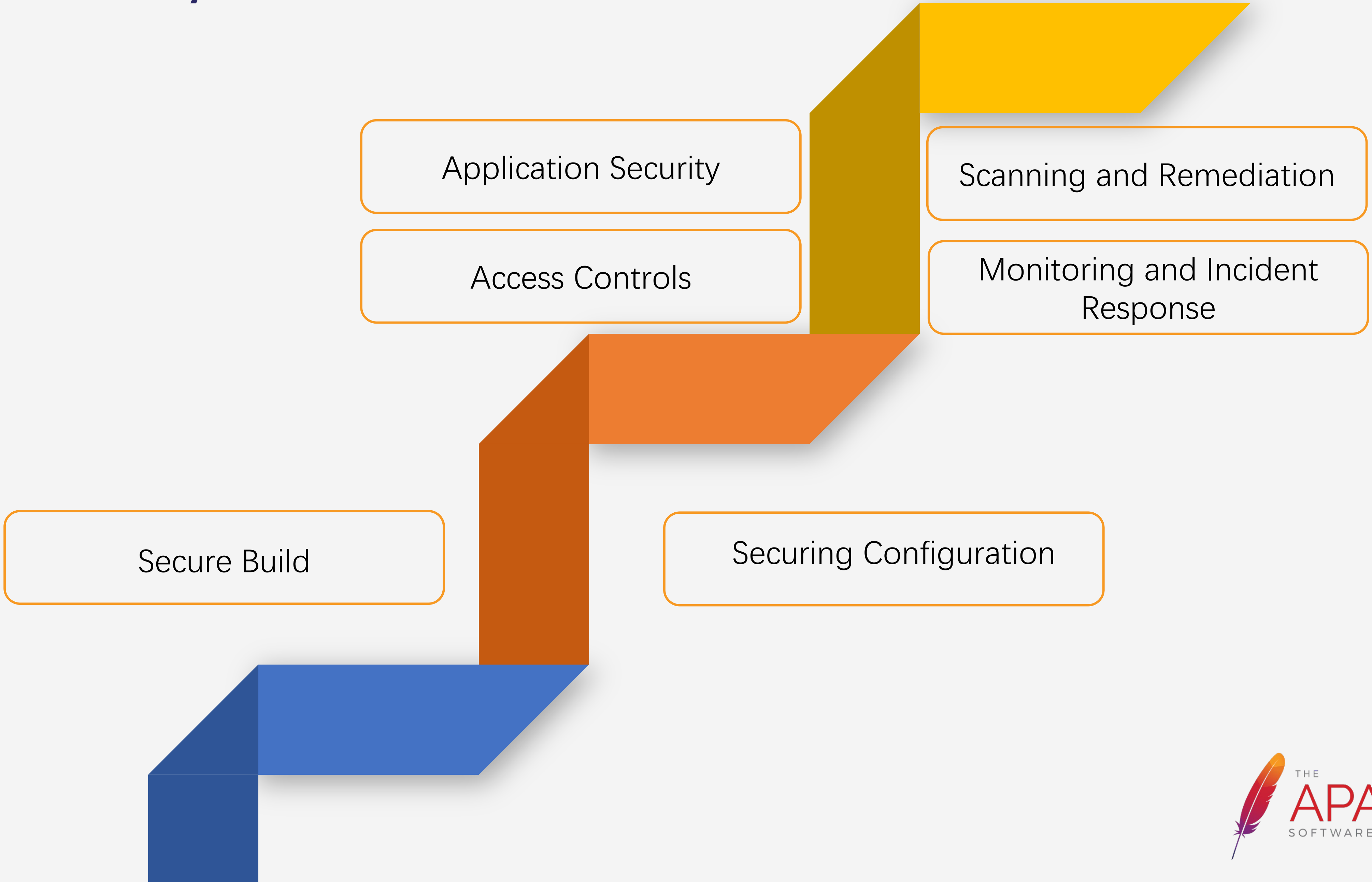
- Introduction to Securing Tomcat
- Key Security Considerations for Tomcat
- Securing Configurations in Tomcat
- Transport Layer Security
- Secure Authentication/Authorization
- Secure Request Processing
- Secure Session Management
- Secure Logging and Auditing
- Vulnerability Management

Introduction to Securing Tomcat

Why security is important for Tomcat?

- Critical component in the web application stack
- Building trusted application services
- Preventing unauthorized access to application and data
- Protection against web attacks
- Maintain availability of web applications
- Compliance and regulatory requirements
- Incident Response Preparedness

Key Security Considerations for Tomcat



Secure Build

Securing Configuration

Access Controls

Application Security

Scanning and Remediation

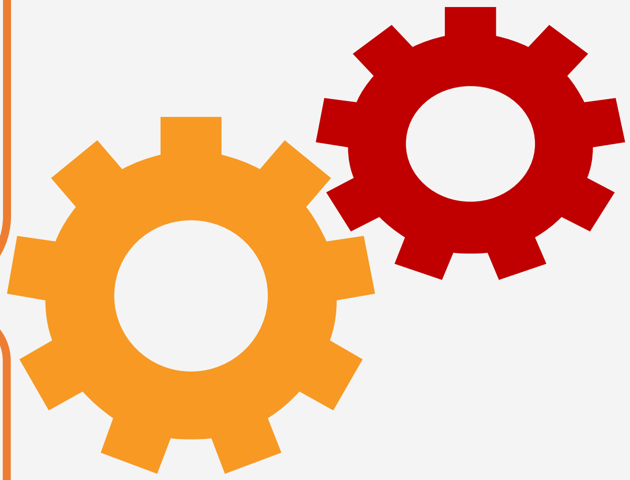
Monitoring and Incident Response

Secure Configurations in Tomcat

- Release Integrity
  - Package File checksums and PGP Signature Verification
- Using custom targets in ANT for building Tomcat from source
- Removal of default packaged applications
- Modification of default configurations and properties
- Securing Manager Applications

- Separate CATALINA_HOME, CATALINA_BASE and logs
- Implement proper file/directory ownership and permissions
- Enabling SELinux

- Remove default passwords
- Securing sensitive passwords in Secure Vaults or custom Encryption utilities
- Modify the default advertised server information



Transport Layer Security

- Securing Connectors
  - Removal of unused connectors
  - Certificate configurations
- Transport Layer Security
  - TLS Protocols (TLS 1.2 / TLS 1.3)
  - Cipher suites (Perfect Forward Secrecy Cipher Suites)
  - Implementing perfect forward secrecy
- Securing JMX or any exposed end points
- Enabling 2-way TLS for API Endpoints

Secure Authentication/Authorization

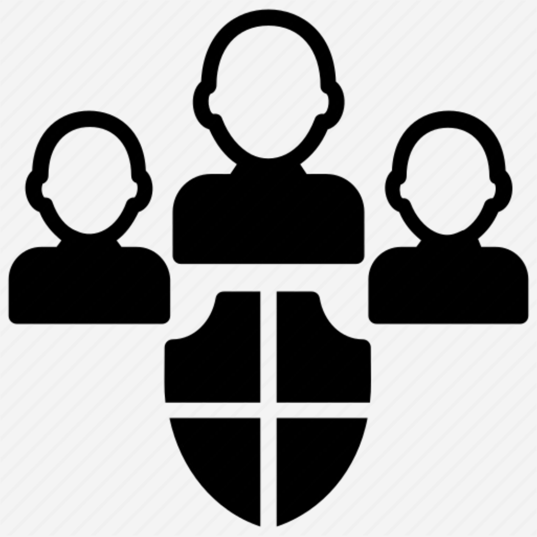
- Default Credentials provided with Host Managed in Tomcat package
- Basic Authentication Vs Digest Authentication
- Form Based Authentication
- Single Sign-On
- Realms and External Authentication
- Custom Valves
    - mTLS Authentication and certificate pinning

Secure Request Processing in Tomcat

- Tomcat Filters
  - CORS Filter
  - CSRF Prevention Filter
  - HTTP Header Security Filter
  - Remote Address Filter
  - Remote CIDR Filter
  - Remote Host Filter
  - Remote IP Filter

- Tomcat Valves
  - Remote Address Valve
  - Remote Host Valve
  - Remote CIDR valve
  - Error Report Valve
  - Custom mTLS Valve
  - Rate Limiter Valves

Secure Session Management in Tomcat



- HTTP-Only and Secure session cookies
- Session Timeout
- Custom Session Listeners
  - Session Validation
  - Proper Session invalidation
- Session Monitoring and Auditing

Secure Logging and Auditing in Tomcat

- Importance of a “balanced” logging
    - What is essential to be logged ?
    - Performance implications
- Securing Log and archived Locations.
    - Access restricted
    - Tamper proofing
- Implementing Log Rotation and Retention.
- Masking and Redaction of sensitive information.
- Custom Log Valves to feed to stream processing systems.
    - Kafka | Flink | Elastic Search
- Log Integrity and Tampering Detection.
- Integration of Logs with SIEM solutions.

Vulnerability Management

- Patch Management.
- Tomcat Release updates.
- Application Security Scans (SAST and DAST)
- Vulnerability scans and Software Composition Analysis (SCA).
- Configuration Management
  - Version controlled
  - Securely stored

MBean Attributes for configuration management

- CIS Benchmarking (https://www.cisecurity.org/cis-benchmarks)
- Monitoring large number of Tomcat instance configurations
- Capturing MBean Attribute values for properties picked up by Tomcat

```
// Create an instance of MBeanServer
MBeanServer mBeanServer = ManagementFactory.getPlatformMBeanServer();

// Define the object name for Tomcat's MBean
ObjectName objectName = new ObjectName("Catalina:type=Server");

// Get the MBean attribute value
Object attributeValue = mBeanServer.getAttribute(objectName, "serverInfo");

// Print the attribute value
System.out.println("Tomcat Server Info: " + attributeValue);
```

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Thank You

Dennis Jacob

in https://www.linkedin.com/in/dennis-jacob

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