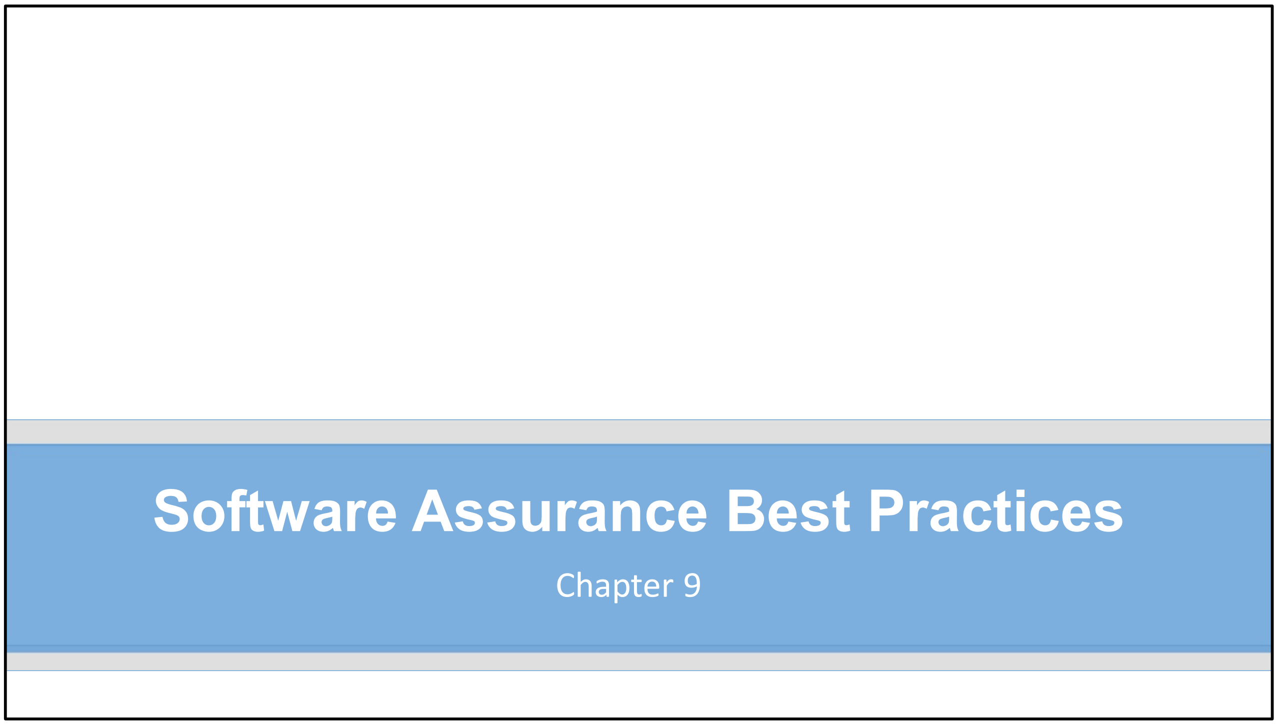


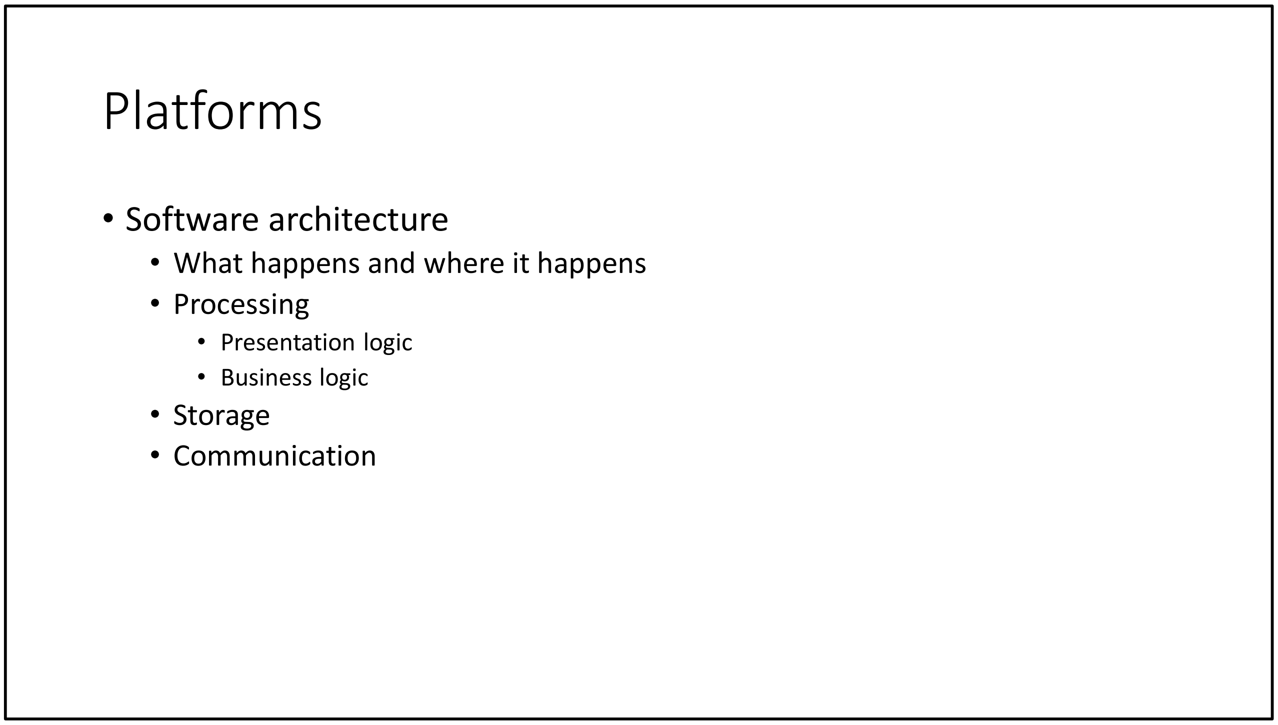
Software Assurance Best Practices

Chapter 9

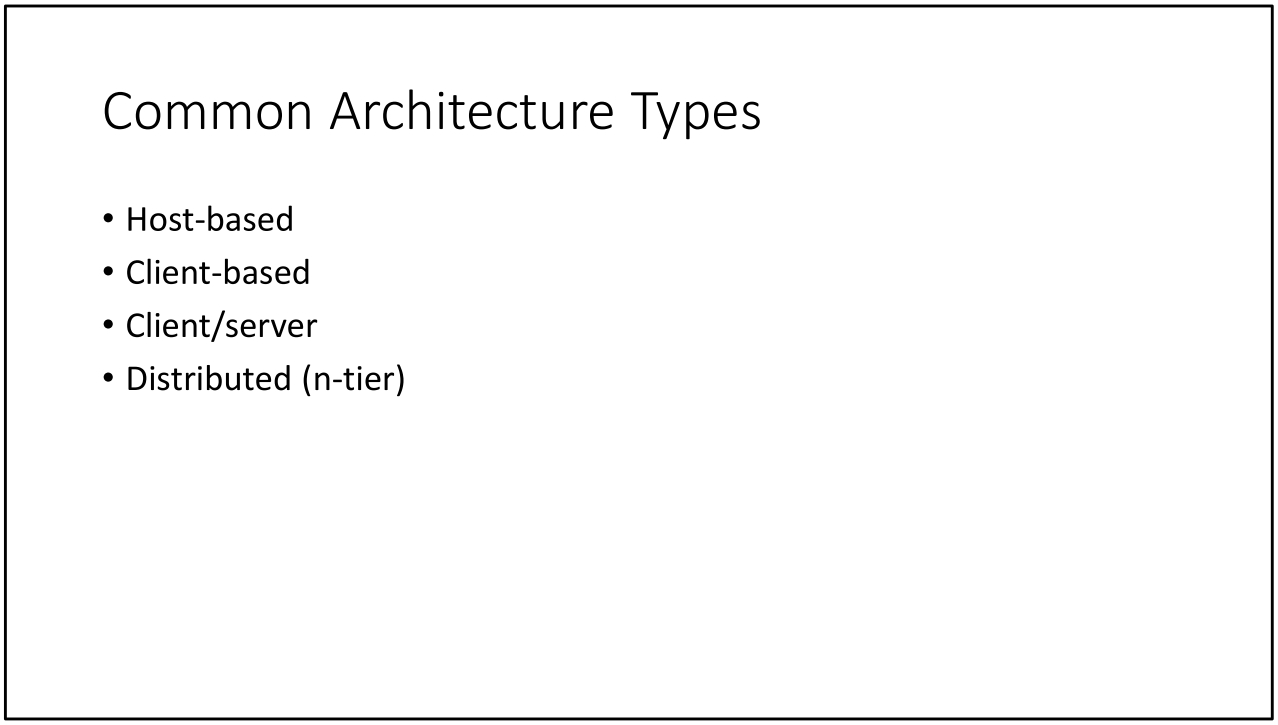
Episode 9.01

Platforms

Objective 2.2 Explain software assurance best practices.
• Platforms
- Mobile
- Web application
- Client/server
- Embedded
- System-on-chip (SoC)
- Firmware

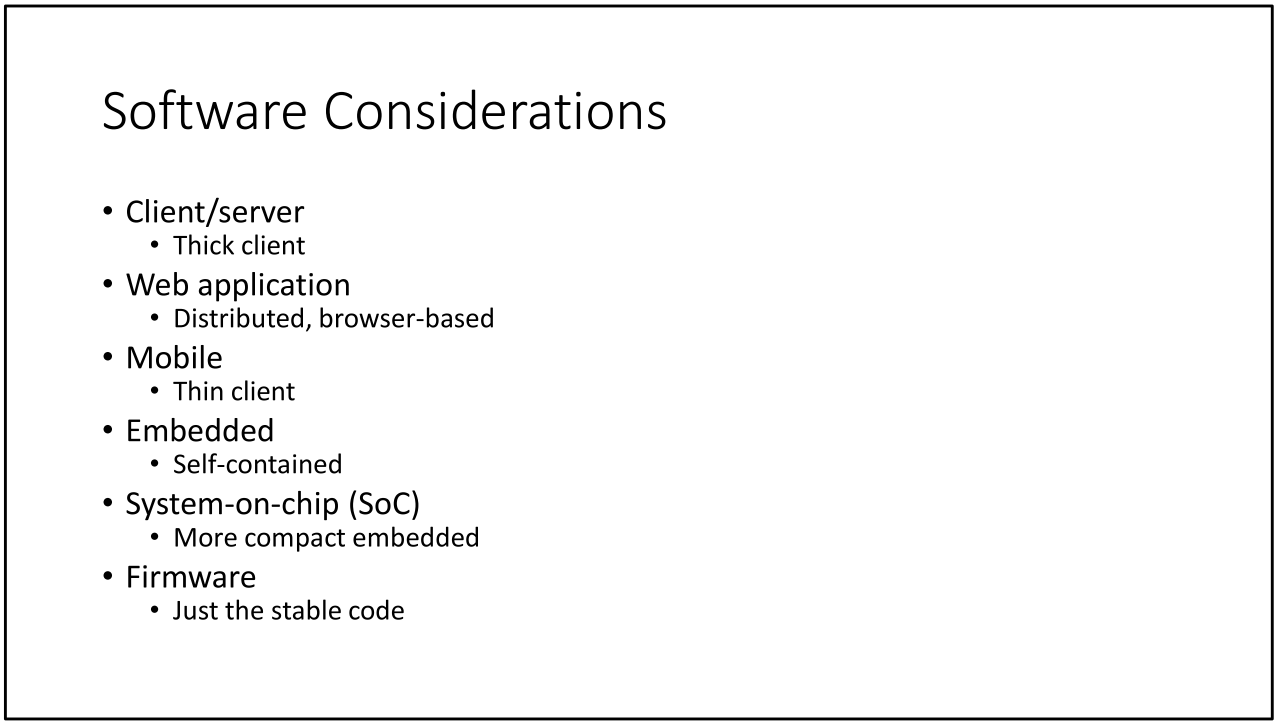

Platforms

- Software architecture
  - What happens and where it happens
  - Processing
    - Presentation logic
    - Business logic
  - Storage
  - Communication



Common Architecture Types

- Host-based
- Client-based
- Client/server
- Distributed (n-tier)



Software Considerations

- Client/server
  - Thick client
- Web application
  - Distributed, browser-based
- Mobile
  - Thin client
- Embedded
  - Self-contained
- System-on-chip (SoC)
  - More compact embedded
- Firmware
  - Just the stable code

Episode 9.02

SOA and DevSecOps

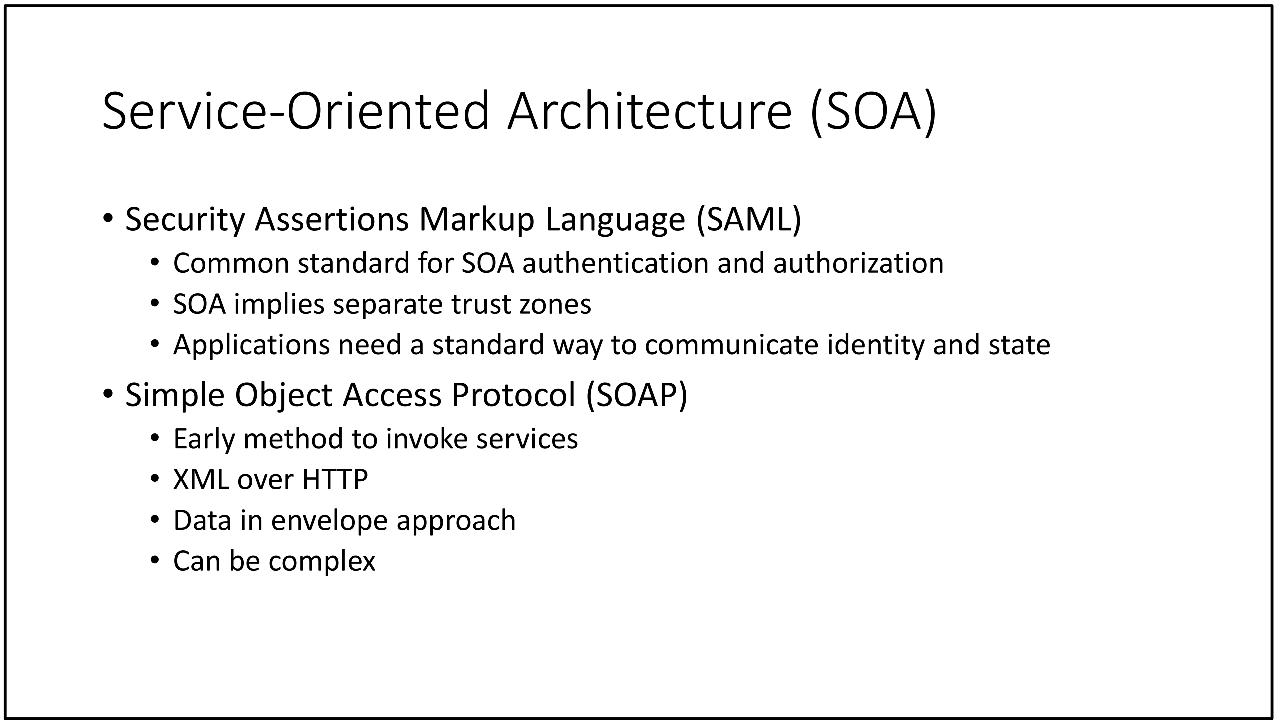
Objective 2.2 Explain software assurance best practices.

- DevSecOps
- Service-oriented architecture

- Security Assertions Markup Language (SAML)
- Simple Object Access Protocol (SOAP)
- Representational State Transfer (REST)
- Microservices

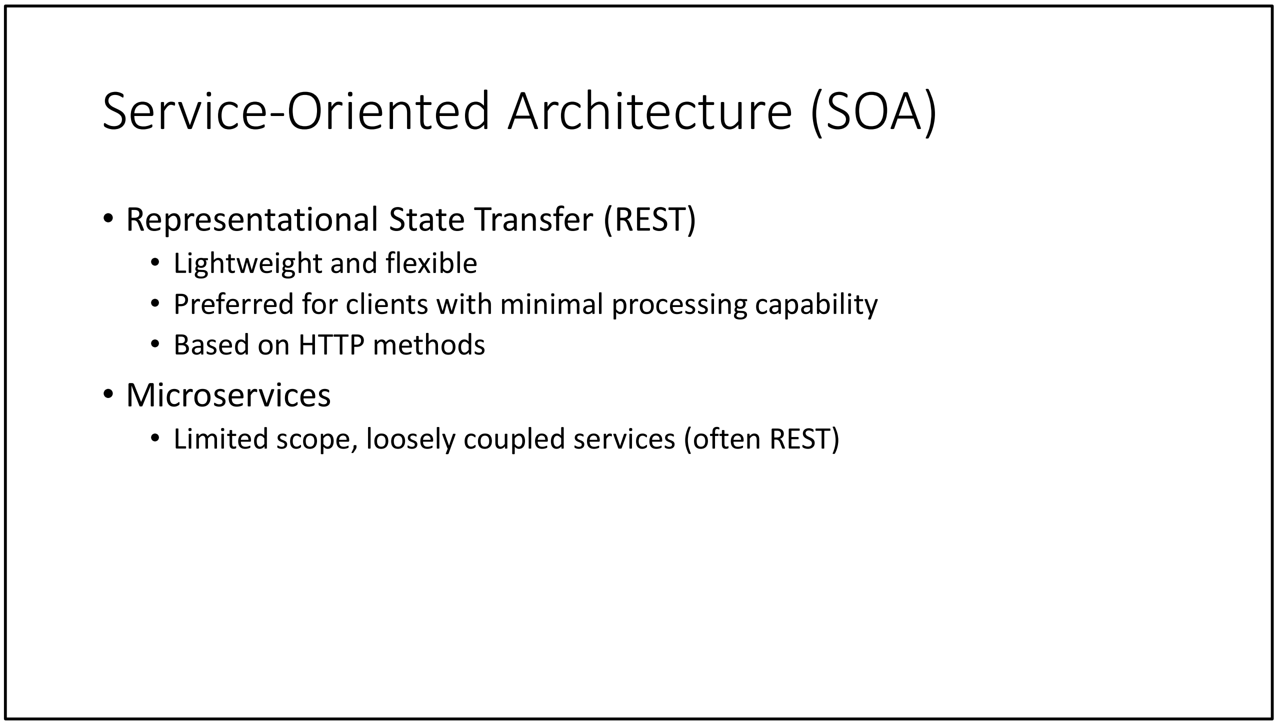
Service-Oriented Architecture (SOA)

- SOA clients consume services via APIs
- Usually based on web approach
  - Loosely-coupled connection between client and server
- Two types of connections
  - Persistent
  - Non-persistent
- SOAs can be open or closed
- Cloud computing makes SOA far easier to scale



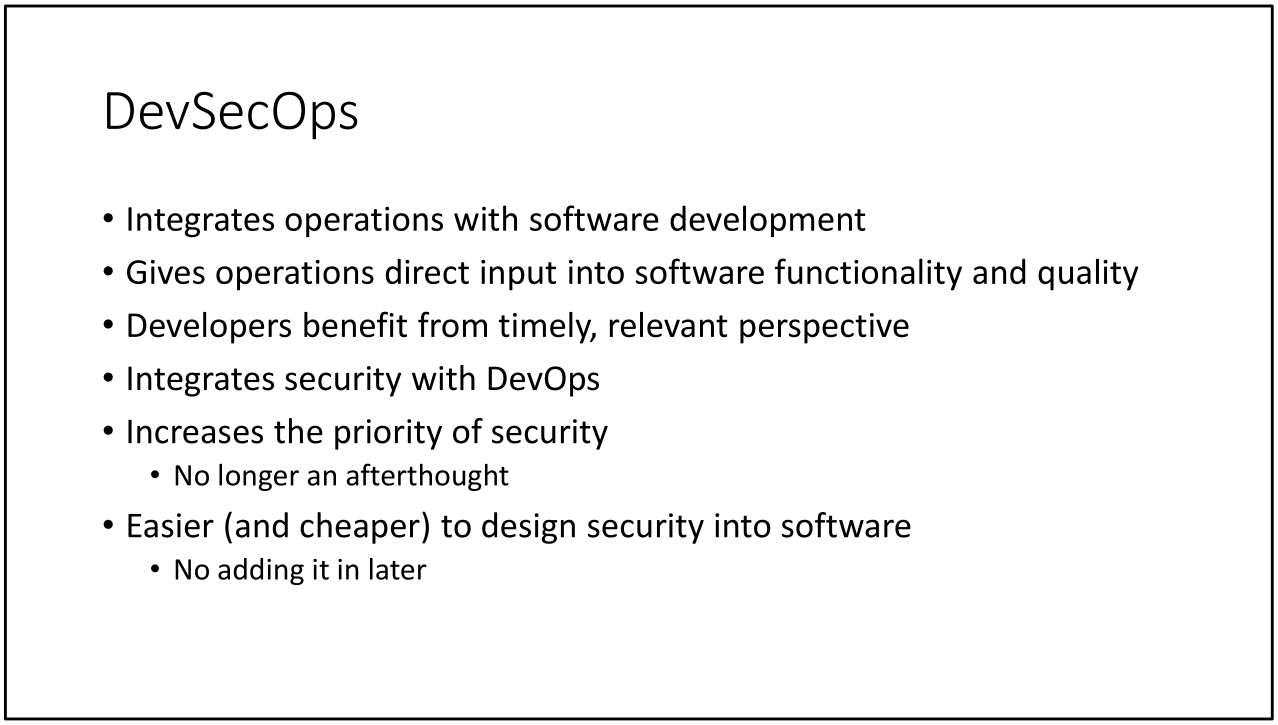
Service-Oriented Architecture (SOA)

- Security Assertions Markup Language (SAML)
  - Common standard for SOA authentication and authorization
  - SOA implies separate trust zones
  - Applications need a standard way to communicate identity and state
- Simple Object Access Protocol (SOAP)
  - Early method to invoke services
  - XML over HTTP
  - Data in envelope approach
  - Can be complex



Service-Oriented Architecture (SOA)

- Representational State Transfer (REST)
  - Lightweight and flexible
  - Preferred for clients with minimal processing capability
  - Based on HTTP methods
- Microservices
  - Limited scope, loosely coupled services (often REST)



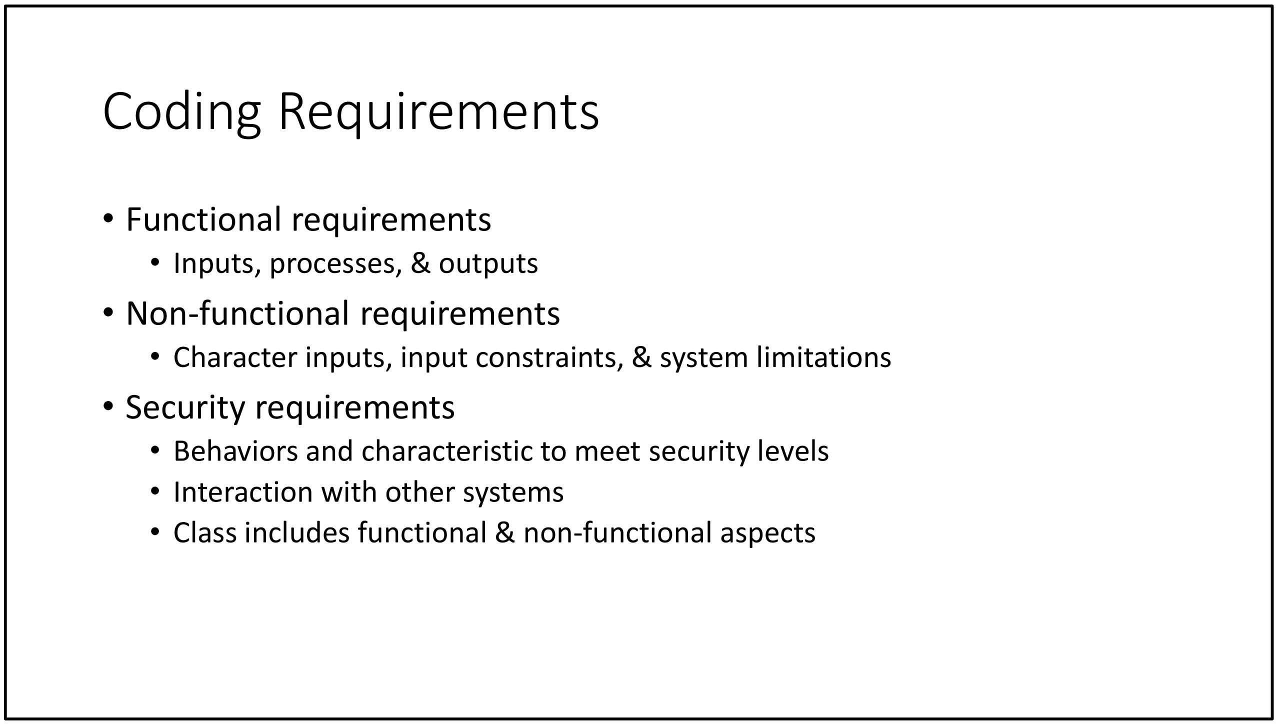
DevSecOps

- Integrates operations with software development
- Gives operations direct input into software functionality and quality
- Developers benefit from timely, relevant perspective
- Integrates security with DevOps
- Increases the priority of security
  - No longer an afterthought
- Easier (and cheaper) to design security into software
  - No adding it in later

Episode 9.03

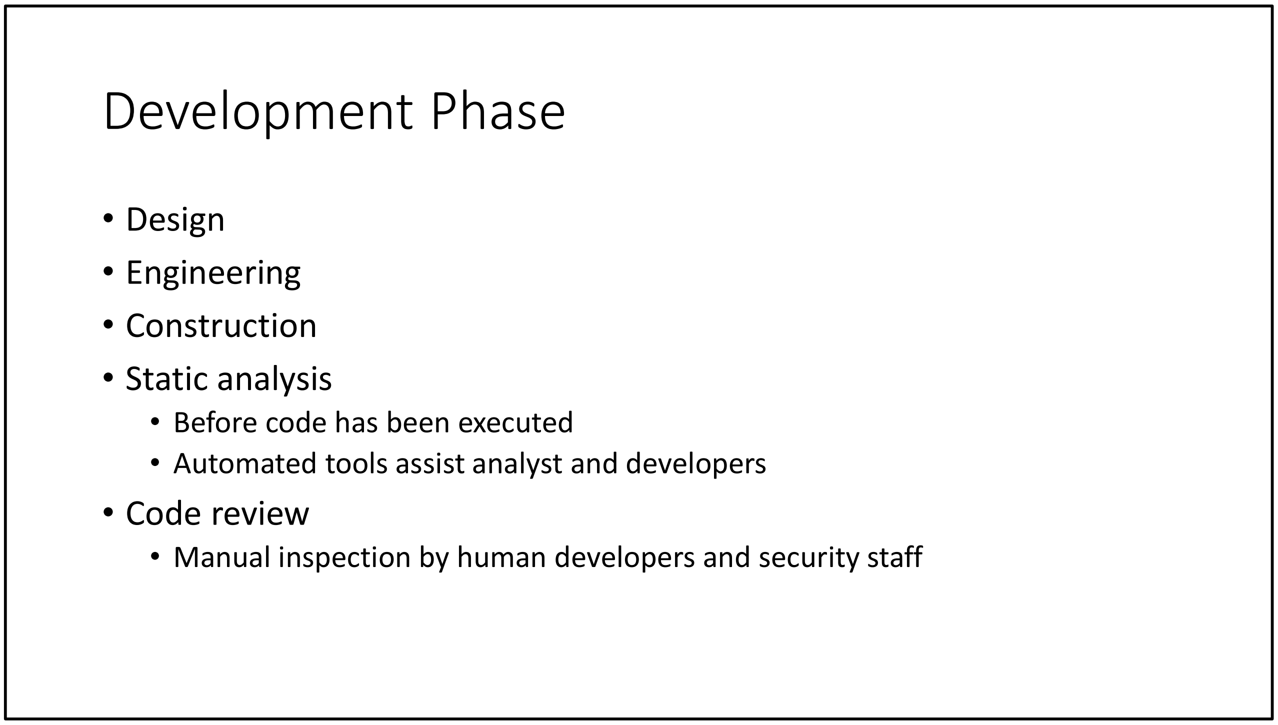
Secure Software Development

Given a scenario, analyze the output from common vulnerability assessment tools.
• Software assessment tools and techniques
- Static analysis
- Fuzzing
Objective 2.2 Explain software assurance best practices.
• Software development life cycle (SDLC) integration
• Software assessment methods
- User acceptance testing
- Stress test application
- Security regression testing
- Code review
• Static analysis tools



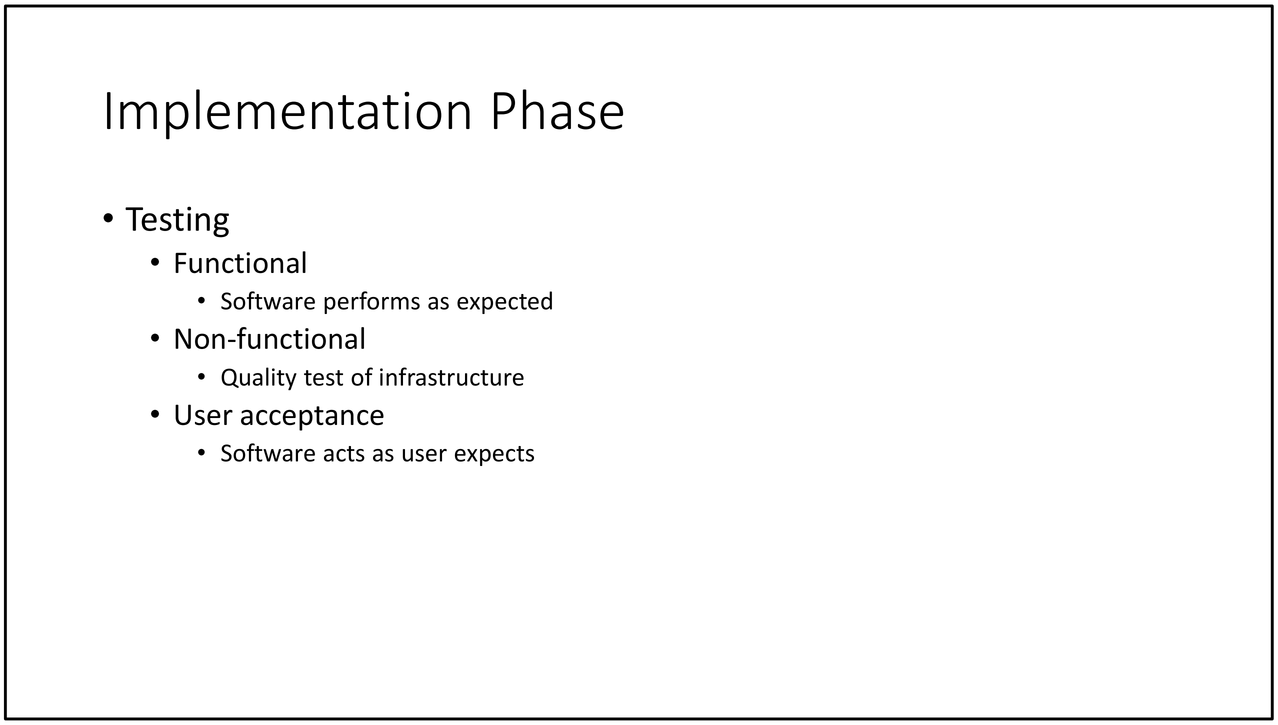
Coding Requirements

- Functional requirements
  - Inputs, processes, & outputs
- Non-functional requirements
  - Character inputs, input constraints, & system limitations
- Security requirements
  - Behaviors and characteristic to meet security levels
  - Interaction with other systems
  - Class includes functional & non-functional aspects



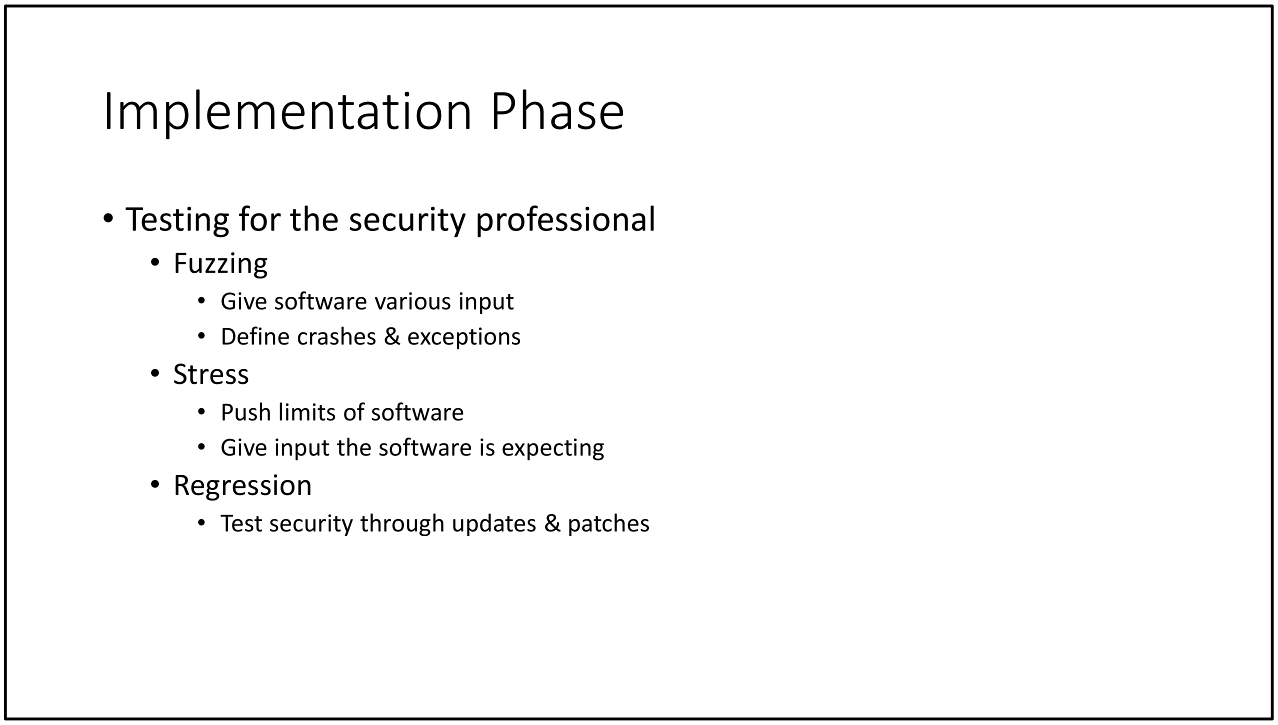
Development Phase

- Design
- Engineering
- Construction
- Static analysis
  - Before code has been executed
  - Automated tools assist analyst and developers
- Code review
  - Manual inspection by human developers and security staff



Implementation Phase

- Testing
  - Functional
    - Software performs as expected
  - Non-functional
    - Quality test of infrastructure
  - User acceptance
    - Software acts as user expects



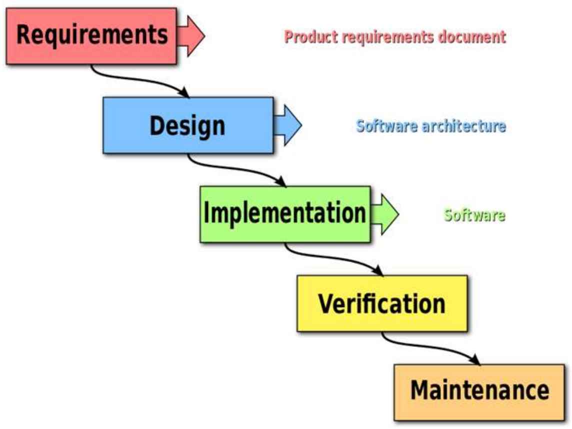
Implementation Phase

- Testing for the security professional
  - Fuzzing
    - Give software various input
    - Define crashes & exceptions
  - Stress
    - Push limits of software
    - Give input the software is expecting
  - Regression
    - Test security through updates & patches

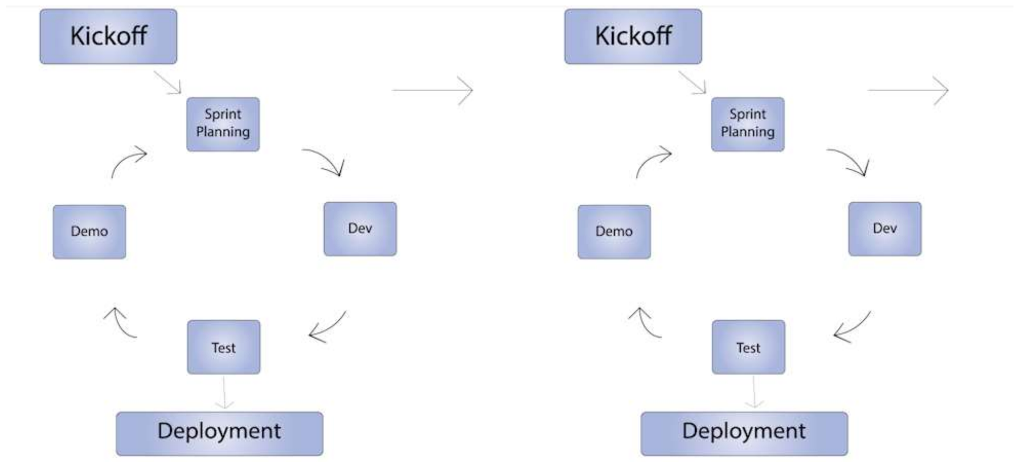
Operations & Maintenance Phase

- Maintenance responsibility
  - Outline software security requirements for developers & implementers
  - Patches – how often, under what conditions, who is responsible
- Maintenance phase length
  - All software eventually gets retired
  - Define end-of-life

Waterfall Model



Agile Model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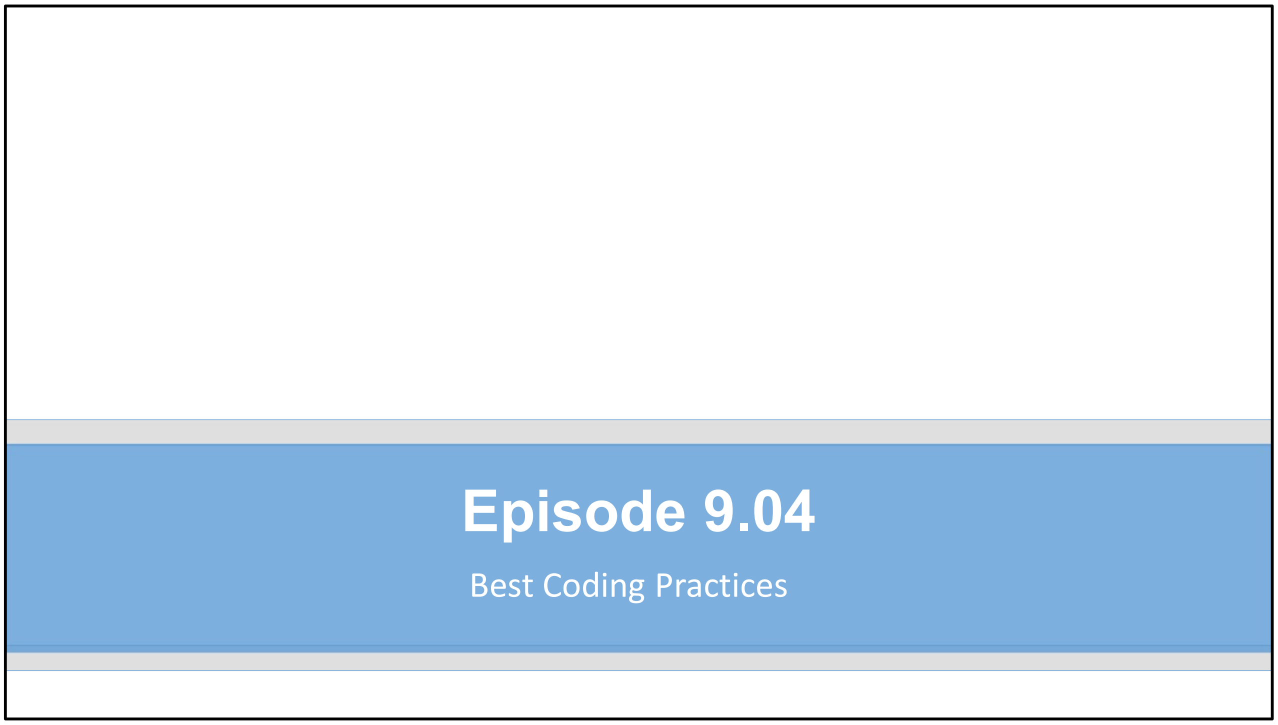
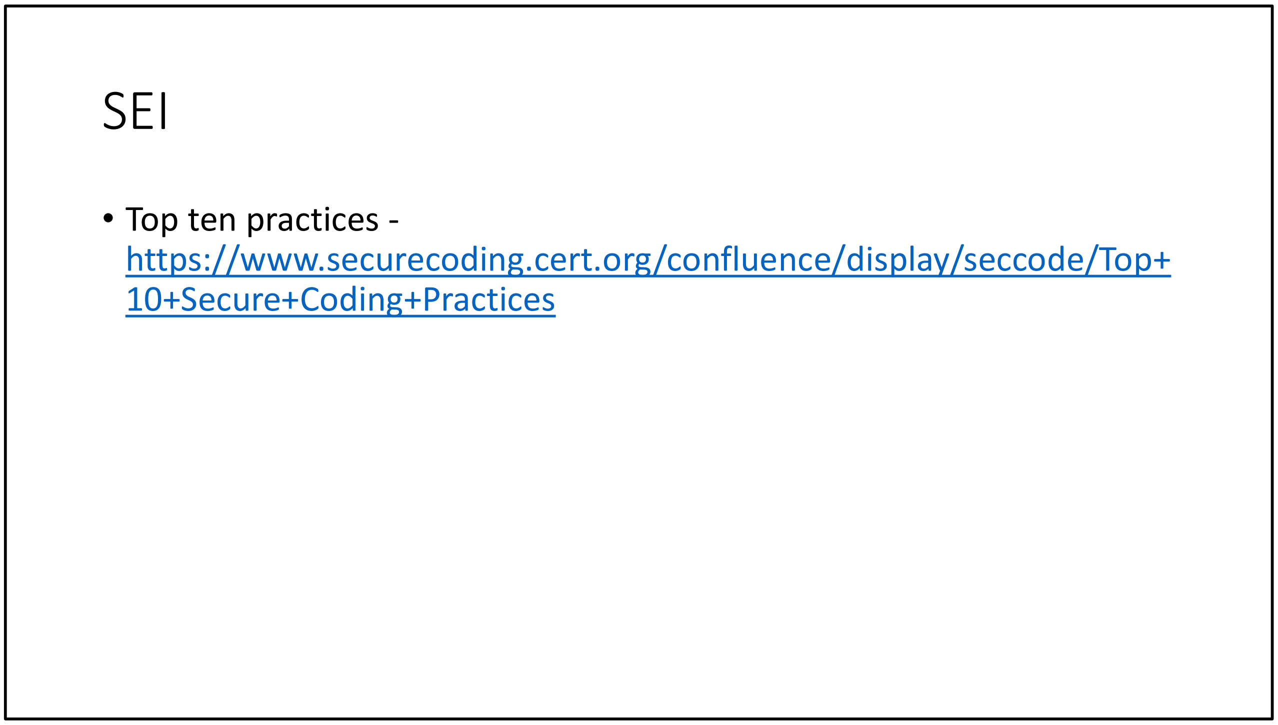
Sprint Planning
Dev
Test
Demo
Deployment
Kickoff
Sprint Planning
Dev
Test
Demo
Deployment



Episode 9.04

Best Coding Practices

Objective 2.2 Explain software assurance best practices.
- • Secure coding best practices
- - Input validation
- - Output encoding
- - Session management
- - Authentication
- - Data protection
- - Parameterized queries
- • Formal methods for verification of critical software



SEI

- Top ten practices - https://www.securecoding.cert.org/confluence/display/seccode/Top+10+Secure+Coding+Practices

OWASP

- https://www.owasp.org/images/0/08/OWASP_SCP_Quick_Reference_Guide_v2.pdf
- TOC
- Input validation section