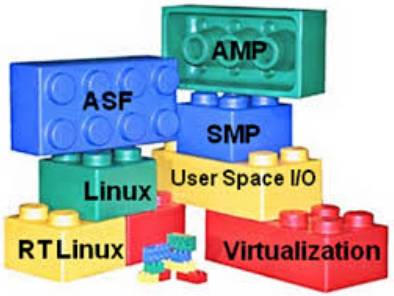


How to Perform a Rapid Assessment of any Software Architecture

Tim Kertis, Principal Software Engineer, Raytheon
3 May 2017

SATURN 2017

Who Am I?

- Tim Kertis, Principal Software Engineer/Software Architect
- Chief Software Architect, Raytheon IIS, Indianapolis
- Master of Science, Computer & Information Science, Purdue
- Software Architecture Professional through the Software Engineering Institute (SEI), Carnegie-Mellon University (CMU)
- Over 30 years of diverse Software Engineering experience
- Currently working in the V-22 Avionics department

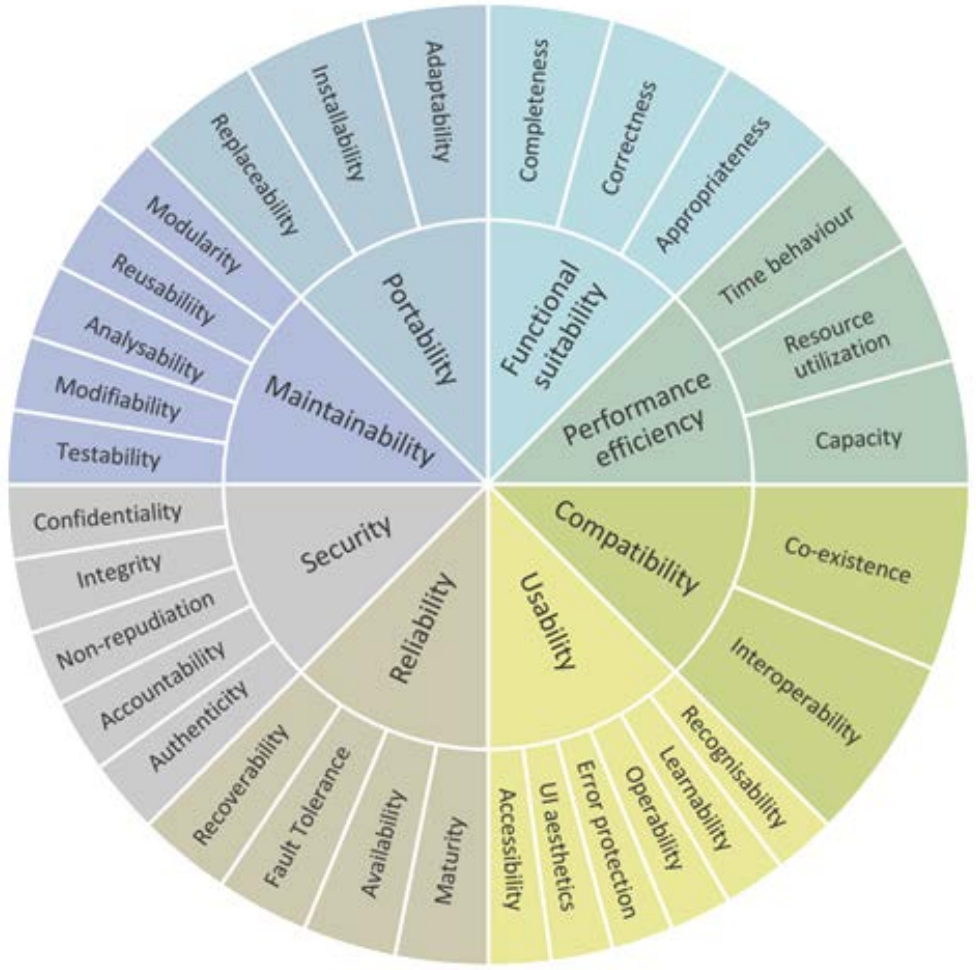
Schedule

- Day 1:
  - Interview Software Technical Lead
  - Complete the Form/Checklist and Capture:
    - Software Quality Attributes
    - Key Architectural Decisions
    - References to Architectural Design Artifacts
- Day 2:
  - Verify Software Design Artifacts
  - Analyze the Captured SWA Information
  - Produce an Opinion/Report
  - Distribute Report to Stakeholders, Managers, SW Technical Lead

Plan a Two (2) Day Event

Software Quality Attributes

- List of Stakeholders
- Stakeholder Views and Opinions
- Prioritized Set of SW Quality Attributes
  - Elicited
  - Recorded
  - Analyzed
- Software Quality Attributes Workshop (documentation)
  - For large projects



Capture the Software Quality Attributes

Key Architectural Decisions

- Computing Platform
- Software Technology
- Software Development Tools
- Software Reuse Strategy

Capture the Decisions and the Reasons Why

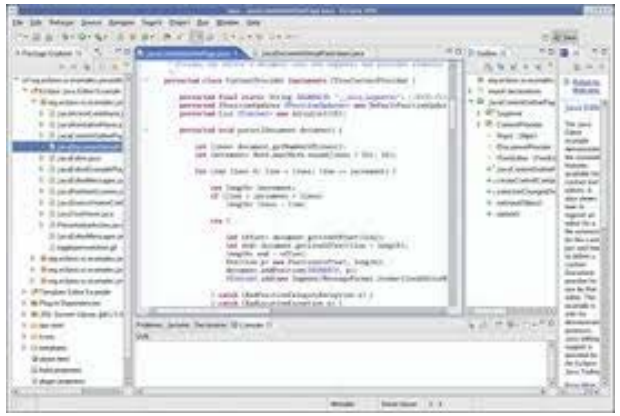
Computing Platform

- Hardware/Processor
- Operating System
- Graphics Cards/Drivers
- Database Application Interface (API) Drivers
- Data Bus Communication Cards/Drivers
- Real-Time Operating System (RTOS), Board Support Packages (BSPs) and Hypervisor

Capture the Computing Platform Selected

Software Development Tools

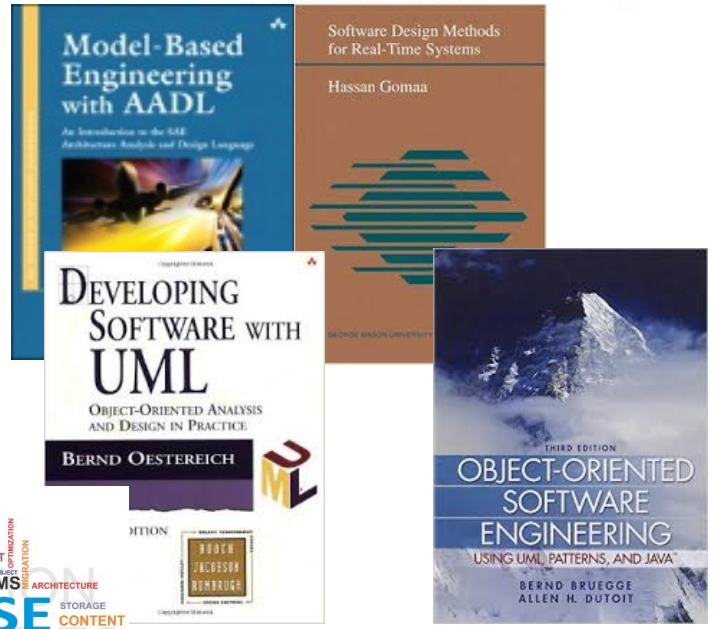
- Software Development Design Tools
- Software Development Graphics Implementation Tools
- Graphics Development Tools
- Database/Persistence Frameworks
- Bus Communications Development Tools
- IPC Development Tools



Capture the Software Development Tools Selected

Software Technology

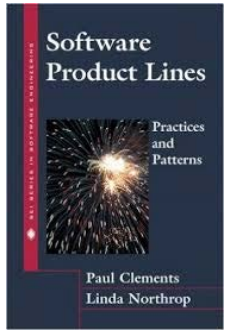
- Software Design Methodology
- Programming Languages and Mixed Technology
- Graphics Technology
- Persistence Technology
- Bus Communication Protocols
- Inter-Process Communications (IPC) Mechanisms

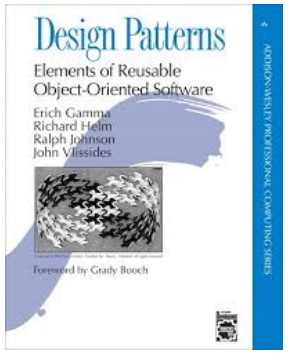


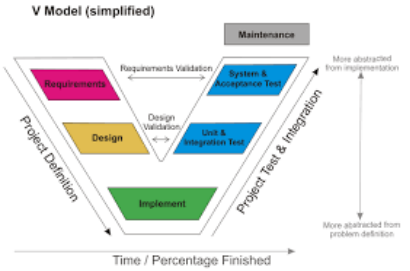
Capture the Software Technology Selected

Software Reuse Strategy

- Product Line Architecture
- Internal Software Components
- External Software Components
- Software Design Patterns
- Historical Productivity Cost Estimation Data
- Software Processes



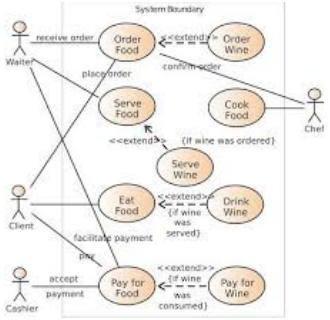


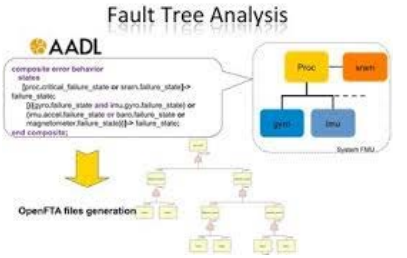


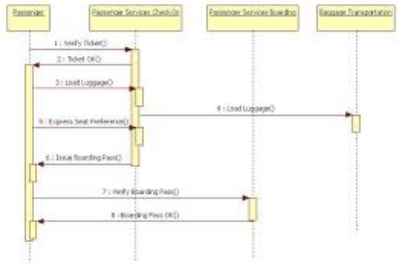
Capture the Software Reuse Strategy

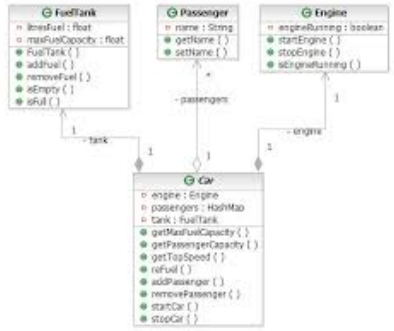
Architectural Design

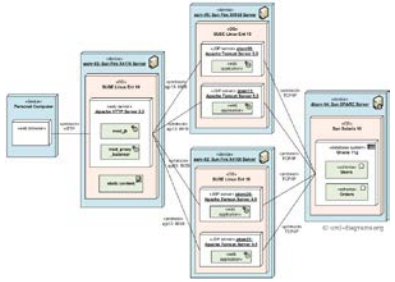
- UML Use Cases
  - Use Case Diagrams
- UML Software Components and Interfaces
  - Class Diagrams
  - Component-Connector Diagrams
  - Sequence Diagrams
  - Interface Definition Description
- UML Software Component Deployment
  - Deployment Diagrams
- Other Modeling Languages
  - AADL
  - SysML
  - etc.

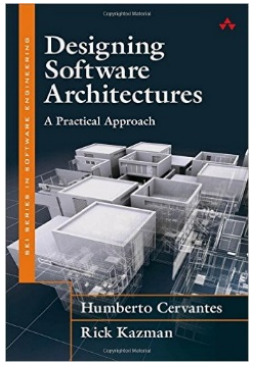












Capture the Architectural Design

Software Architecture Report

- Form/Checklist
- Report
- Distribution

Fill in the Forms, Create Report and Distribute to All

Review Form/Checklist page #1

Raytheon

Software Architecture Review:

Project Name: _____
Architect Name: _____
Project Engineer: _____
Customer : _____
Stakeholders: _____
_____
Reviewers: _____
_____

Review Date: _____/_____/_____
Estimated Code Size: _____ K ELOC

Capture the Project ‘s General Information

Review Form/Checklist page #2

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Software Quality Attributes:

[ ] Functional Suitability	[ ] Performance	[ ] Maintainability
[ ] Reliability	[ ] Portability	[ ] Usability
[ ] Modifiability	[ ] Modularity	[ ] Extensibility
[ ] Security	[ ] Safety	[ ] Integrity
[ ] Scalability	[ ] Availability	[ ] Interoperability

[ ] RASU (Reliability, Availability, Serviceability, Usability and Installability)
[ ] FURPS (Functionality, Usability, Reliability, Performance and Supportability)
[ ] RASR (Reliability, Availability, Scalability and Recoverability) [databases]
[ ] ACID (Atomicity, Consistency, Isolation (or Integrity) and Durability [databases]
[ ] RAMS (Reliability, Availability, Maintainability and Safety) [safety critical systems]
[ ] Agility (Debug Ability, Extensibility, Portability, Scalability, Securability, Testability & Understandability)
[ ] Dependability (Availability, Reliability, Safety, Integrity and Maintainability)
[ ] Other _____

Capture the Software Quality Attributes

Review Form/Checklist page #3

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Key Software Architecture Decisions:

Hardware/Driver/OS

[ ] RTOS/BSPs/Hypervisor: _____

[ ] Bus Communication Card/Drivers: _____

[ ] Database API Drivers: _____

[ ] Graphics Card/Drivers: _____

[ ] Operating Systems: _____

[ ] Hardware Platforms: _____

[ ] Other: _____

Capture the Hardware/Drivers/OS Selected

Review Form/Checklist page #4

Raytheon

Key Software Architecture Decisions (continued):

Software Technology

[ ] IPC Mechanisms: _____

[ ] Bus Communication Protocols: _____

[ ] Persistence Technology: _____

[ ] Graphics Technology: _____

[ ] Programming Languages: _____

[ ] Mixed Language Bindings: _____

[ ] Software Design Methodology: _____

[ ] Other: _____

Capture the Software Technology Used

Review Form/Checklist page #5

Raytheon

Key Software Architecture Decisions (continued):

Software Tools

[ ] IPC Development Tools: _____

[ ] Bus Communication Dev Tools: _____

[ ] Database/Persistence Frameworks: _____

[ ] Graphics Dev Tools: _____

[ ] Integrated Dev Environment: _____

[ ] Software Design Tools: _____

[ ] Other: _____

Capture the Software Tools Selected

Review Form/Checklist page #6

Raytheon

Key Software Architecture Decisions (continued):

Software Reuse Strategy

[ ] Software Processes: _____

[ ] Historical Productivity Data: _____

[ ] Software Design Patterns: _____

[ ] External Software Components: _____

[ ] Internal Software Components: _____

[ ] Software Product Line: _____

[ ] Other: _____

Capture the Software Reuse Strategy

Review Form/Checklist page #7

Raytheon

Architectural Design:

Use Cases

[ ] Use Case Diagrams: _____

Software Components and Interfaces

[ ] Class Diagrams: _____

[ ] Component-Connector Diagrams: _____

[ ] Sequence Diagrams: _____

[ ] Interface Definition Descriptions: _____

Software Component Deployment

[ ] Deployment Diagrams: _____

Capture the Design Artifacts by Reference

SWA Report

- Powerpoint Slides
- Word Document

The Report can be prepared in Word or Powerpoint

SWA Report Distribution

- Stakeholders
- Software Technical Lead
- Software Department Manager

Distribute the SWA Report to Stakeholders

Summary

- Day 1:
  - Interview the Software Technical Lead
  - Capture
    - Software Quality Attributes
    - Key Architectural Decisions
    - Architectural Design
- Day 2:
  - Verify and Document Design Documentation References
  - Analyze the Software Architecture
  - Produce a Completed Checklist and Report
  - Distribute the Report to Stakeholders, Managers, Software Technical Lead

Complete the Assessment in Two (2) Days

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