

Software Architecture and Techniques

Architecture Documentation

Lecture Content

- *Why Agile Architecture and Design?*
- *Evolution of Software Architecture over the last Decades*
- *What is Agile Architecture?*
- *Agile Approaches with Scrum, XP, LeSS*
- *Refactoring*
- *Errors, Vulnerabilities, Smells in Source Code*
- *Architecture of Components and Subsystems*
- *Verify Functional Features*
- *Validate Quality Attributes of Software Architecture*
- **Architecture Documentation**
- **Architecture Trends I**
- **Architecture Trends II**
- **Domain Driven Design Workshop**
- **Team and Technical Excellence for Architects**

Truths (1/2)

- **Source code** is the architecture
- It is **expensive**, error prone and **cumbersome** to synchronize documentation with source code
- Agile is about **people, interactions**, stories, discussions, not about processes or tools
- ATAM, TOGAF, IEEE-SW standards are **obsolete**
- **Hermes**, **Prince2**, **PMI** are archeology subjects

Truths (2/2)

- **Never** use Microsoft Word – it is proprietary, and cannot be put under version control. You cannot easily search a set of Word documents.
- The more text documentation you have, the more synchronization errors you will have.
- Nobody reads a user manual. You open a user manual when you are desperate.
- Paper is useless.

What does an Architect?

- Understand requirements *and document them*
- Create collaboratively architecture *and document it*
- Advocate and promote architecture *in oral and written form*
- Evaluate architecture *and document the findings*

Why Should You Document?

Good architectural documentation

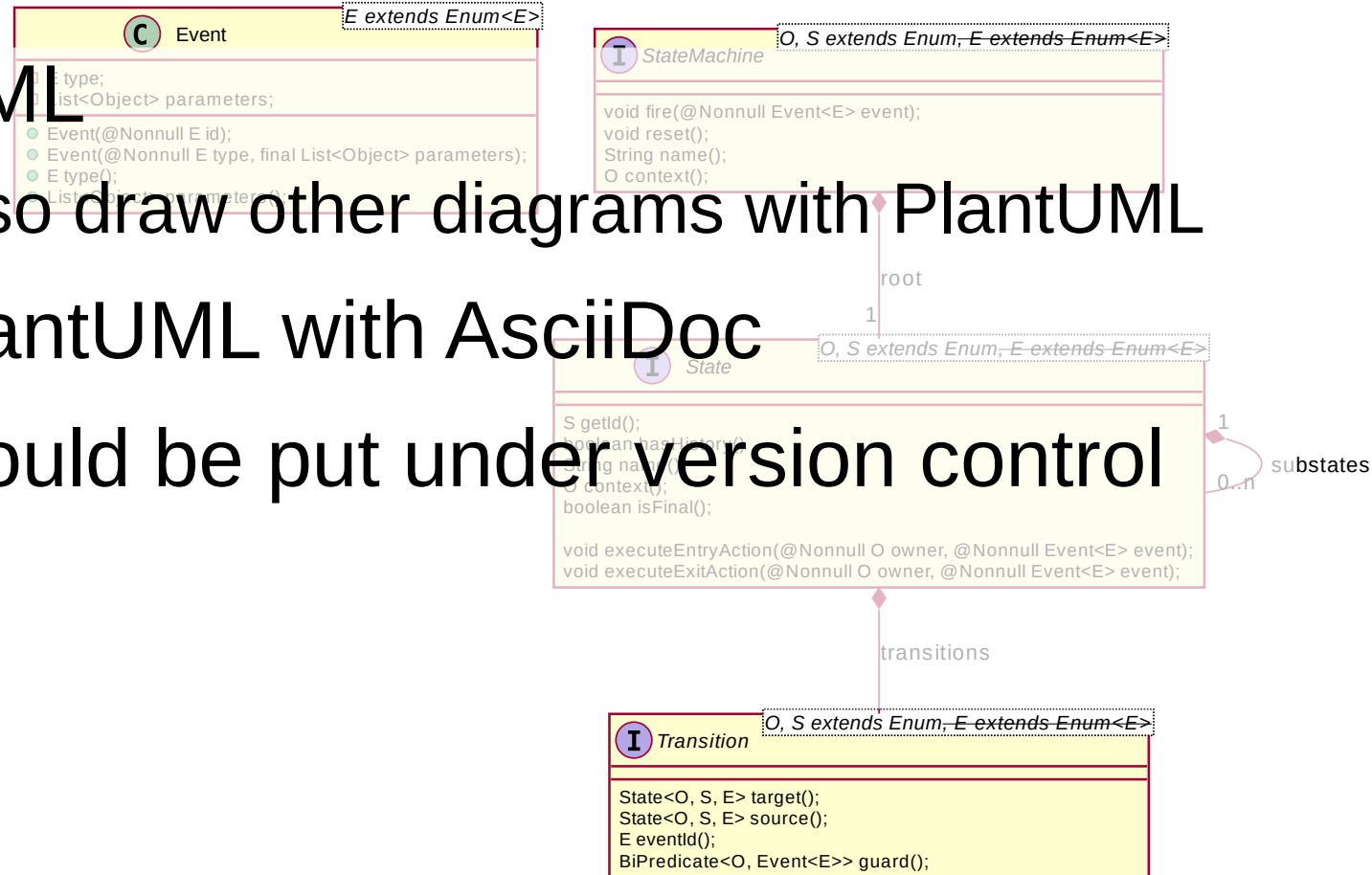
- is communicative and informative to its audience
- relies on **explanation** over notation
- meaningfully constrains the system
- conveys **critical information**
- chooses **simplicity** over sophistication
 - choose established solutions over novel solutions
 - must be a provable solution → code

Domain Driven Models

- Code is documentation
- Small models with explanation
- Event diagrams
- Acceptance test reports
- Traceability between code, acceptance tests and associated requirements

UML for Small Models

- Use PlantUML
 - You can also draw other diagrams with PlantUML
- Integrate PlantUML with AsciiDoc
- Can and should be put under version control



C4 Model for System

SOFTWARE ARCHITECTURE FOR DEVELOPERS

SIMON BROWN
@simonbrown

@developer-week
#dwx17

@arsenizer

UE

1 SOFTWARE ARCHITECTURE
IS NOT ABOUT
BIG DESIGN UP-FRONT



IS THAT WHAT WE'RE GOING TO BUILD?
WILL IT WORK?



FIRM & SUFFICIENT
FOUNDATION

2 EVERY TEAM NEEDS TO
CONSIDER
SOFTWARE ARCHITECTURE

EVERY TEAM NEEDS
TECHNICAL LEADERSHIP

3 THE SOFTWARE ARCHITECTURE
ROLE IS ABOUT
CODING, COACHING
AND COLLABORATION



CONTINUOUS TECHNICAL
LEADERSHIP

SOFT SKILLS

SOFTWARE ARCHITECTS
SHOULD BE
MASTER BUILDERS

4 YOU DON'T NEED
TO USE UML

COMMON SET OF ABSTRACTIONS
IS MORE IMPORTANT

5 A GOOD SOFTWARE
ARCHITECTURE
ENABLES AGILITY

CONTINUOUS
IMPROVEMENT

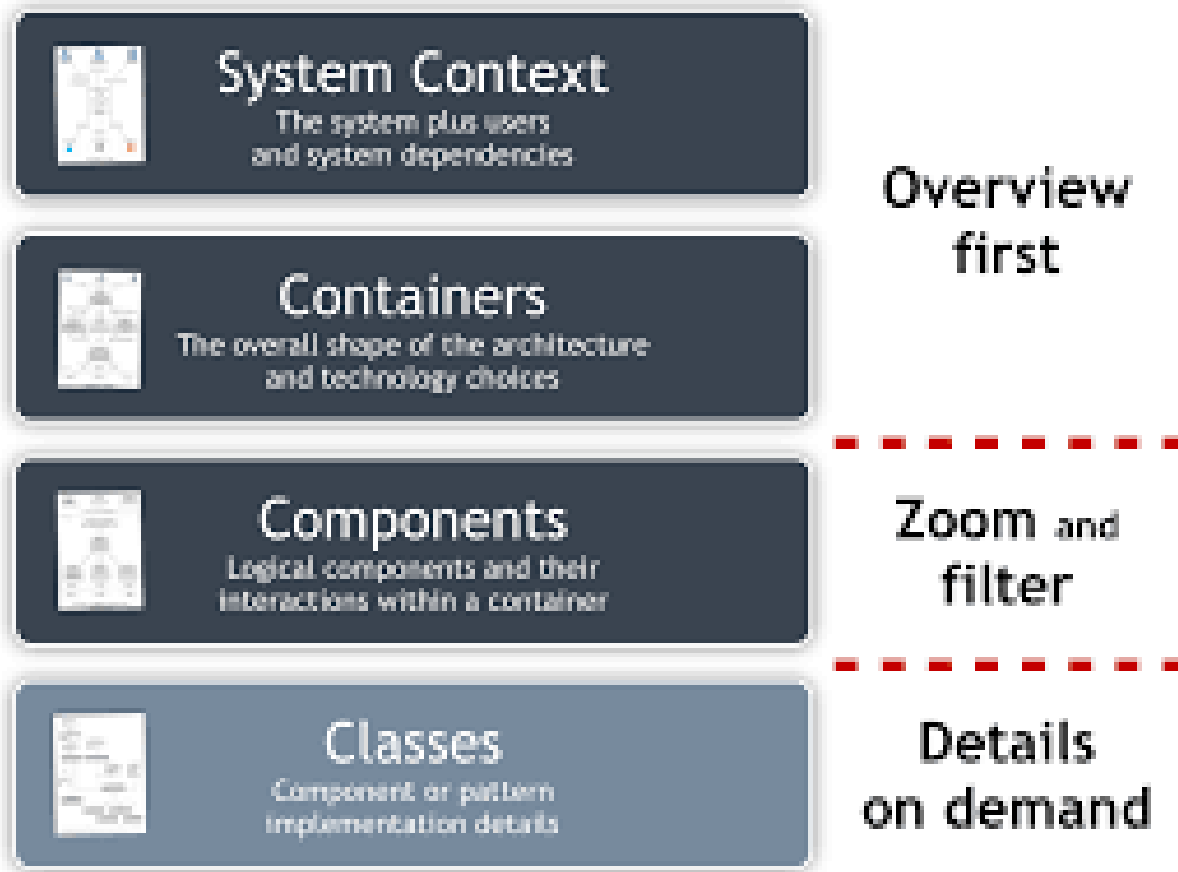


RUNTIME
DEPLOYMENT
...

SOFTWARE SYSTEM
CONTAINER
COMPONENT
CLASS

C4

C4 Model for System

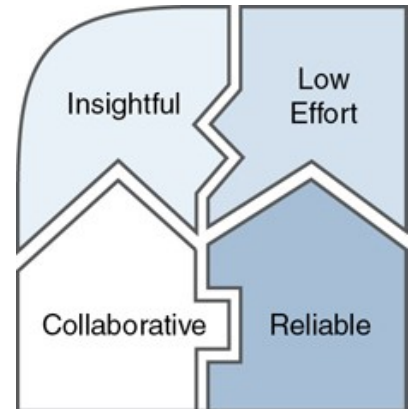


Architectural Design Record

- Document decisions with context, rationale and history as ADR
- History is part of the model
- Can and should be put under version control

Rules for Documentation

- Document stable concepts, not speculative ideas
- **Living documentation** is insightful, collaborative, reliable and requires low effort
 - JavaDoc (see also javadoc.io)
- Keep documentation just simple enough, not too simple
- Write the fewest documents with the least overlap
- **Display information publicly**
- *It should be searchable*



AsciiDoc (1/3)

- Write your **short** Software Architecture Document *SAD* in AsciiDoc
- Map your code examples with explanation
- AsciiDoc is text and is under version control
- AsciiDoc has the expression power of DocBook

AsciiDoc (2/3)

- Combine AsciiDoc text, cross-reference and UML diagram
- Find out how to generate documents
- Explore GitHub, GitLab and Bitbucket offerings
 - static web sites are automatically generated and stored in git -

AsciiDoc (3/3)

- Living documentation means you see it in your browser and in your IDE
- Living documentation means you can link to it, or from it
- Living documentation means you can update it in minutes
- *Use **static sites** to publish documentation*

Acceptance Tests

- Each story or requirements shall have **acceptance criteria**
- Acceptance criteria are validated with **acceptance tests**
- Acceptance criteria is an executable specification and always up to date
- Traceability is implicit → *specification by example*

3 Verification Report

3.1 Summary

Number of test cases	passed	25
	failed	0
Total number of test cases performed		25

3.2 List of Test Results

TC ID	TC Name	Author	Reviewer	Date / Time	Result
UTC291	RunDailyAndWeeklyMaintenance	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC292	AddInstrument	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC293	ConnectAuto	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC294	DisconnectInstrument	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC295	ImplementInstrument	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC296	InstrumentInitializationMaintenanceRequired	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC297	InstrumentInitializationMaintenanceRequired	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC298	InstrumentInitializationMaintenanceRequired	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC299	InstrumentInitializationMaintenanceRequired	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC300	LogException	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED
UTC301	LogMethodError	Peter Rey / pr	n/a	4/24/2009 10:31:58 AM	PASSED

5.8 UTC298 - InstrumentInitializationMaintenanceRequired

ID	UTC298
Name	InstrumentInitializationMaintenanceRequired
Author	Peter Rey / pr
Reviewer	n/a
Description	If the ML_STAR instrument is switched on, the initialization of the ML_STAR instrument and the heater shaker was successful but there is outstanding maintenance, the instrument view shall be notified with the instrument status maintenance required
Test Methods	- Normal Case
Execution Date	4/24/2009 10:31:58 AM
Time	10:31:58 AM
Host ID	OLOS
User	peterrey
Environment	NUnit with TestRunner
Pre-Condition	None
Details	Description: SP Expected Outcome: Object Outcome: Object PASSED

USP742
Criticality: Low
UTC298 InstrumentInitializationMaintenanceRequired
USP743
Criticality: High
UTC310 UnexpectedErrorOnInstrument
USP744
Criticality: Low

Traceability

Fitness Functions

- Automatic tests for non-functional requirements
- Reports provides validation for all non functional requirements
- Traceability is implicit

Source Code

- Source code should be **legible**
- Source code is **never printed**
- History of source code is managed in git
- Tools provides traceability between requirements, validation and associated source code

API Documentation

- Coding and Naming Guidelines
- JavaDoc
- Code Snippets in Java API Documentation (JEP 413)
- Part of a static web site
- Integrated in modern IDE (e.g. IntelliJ IDEA)

Git Documentation

- Git **Commit Structured Comment**
 - <type> - <description>
 - Type → feat, fix, refactor, chore, docs, build
 - Use “BREAKING CHANGE” in description if semantic change
- Automatic change log
- Git commit contains number of closed PBI

Configuration as Code

- Any aspect of the system shall be handled as source code
- Source code is **always** under version control
- History is always available
- Traceability and audit-ability is implicit

Static Web Sites

- [Hugo](#), Jenkyl
- [Docsy](#) plugin for Hugo
- Pages for Github, Gitlab, Bitbucket
 - Updated through your CI pipeline
- JavaDoc as part of your static website
- Synchronized with your git repository
- Publish daily



Exercises (1/2)

- Write an **ADR** – *Architecture Design Record* -
- Create UML diagrams with PlantUML
- Refresh **Risk Management** - e.g. ALARP Matrix -
- Read **DaD Documentation Tips**

Exercises (2/2)

- Ideas to Discuss
 - Explore static web site generators and Pages
 - Why is JavaDoc still relevant?
 - Are unit tests part of the documentation?
 - Explore wiki as documentation – *advantages and disadvantages* -
 - How long are developers part of a specific development team?