PA1453 Programvaruarkitektur och kvalitet (Software Architectures and Quality)

HT 2022

Assignment - 02: Software Architecture Document

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Due Date and Time	Dec 18, 2022, at 23:59 hrs
Submission thru	Canvas
Submission file type	pdf
Assignment Type	Group
Credit	3.0 ECTS

1. Introduction

The assignment requires students to learn skills to design and document software architecture and make a documentation package for multiple stakeholders. Assignment two is a continuation of assignment one. You are required to work with the same group members to make a Software Architecture Document (SAD) as described in Attribute Driven Design (ADD) process for the given system. Your previous report (assignment 1) is the primary input for designing the architecture. You must also share an updated version of previous report as a separate PDF.

2. Assignment 2: Software Architecture Document

The group is now required to use architectural drivers elicited earlier, select one view from each structure and provide motivation behind choosing that view. You must design the architecture and document one view for Module structures and one view for Component and Connector (C&C) structures.

Group members should use the given template for documenting the selected views in the software architecture document. The document should have following sections:

- Part A: Overview (See Section 2.1)
- Part B: View documentation
  - Module view
  - C&C view

    (for each view, use the view template described in Section 2.2)

2.1. Part A Overview

This part provides the readers with an overview of the architectural documentation and architecture. Part A should have the following sections:

Section 1: Documentation roadmap

This section gives a brief and precise description explaining how the document is organised. This part should clarify to readers which information is available and where to find it.

Section 2: Views overview

This section gives a brief overview and describes the selected views, and the justifications for including them are clearly described.

Section 3: Design Decisions and Rationale

In this section, document those architectural decisions and their rationale for selecting the applied architectural pattern/style/reference architecture and justify why the selected pattern is appropriate for the problem. Do list the apparent advantages of your choice, mapping these advantages to your prioritised QAs.

Section 4: Directory

In this section, provide reference material that may help the readers find more information quickly. (i.e., Index of terms, Glossary, Acronym list).

2.2. Part B: View documentation

In Part B, the group must document each view using the given view template (written twice for each Module and C&C structure). The template for documenting each view consists of the following sections:

Section 1: Primary presentation (the view)

The primary graphical presentation shows the view's elements, relations, and key that explains the notations.

Section 2: Element catalogue

- Section 2a: Elements and their properties
- Section 2b: Relations and their properties
- Section 2c: Element interfaces
- Section 2d: Element behaviour

The element catalogue should provide detail of those elements depicted in the primary presentation. Elements' properties and the relations between the elements both should be clearly described here. The element interfaces sub-section should show/discuss elements' externally visible properties/interfaces.

UML sequence diagrams (or UML activity diagrams) should be used to show the element behaviour. Draw one diagram for each primary use case.

Section 3: Context diagram

The context diagram should show the system or portion of the system concerning its environment (humans, other systems, sensors, devices etc.) and represented in this view.

Section 4: Variability guide:

Variation points are specific instances of flexibility built into the architecture by its designers. A variability guide shows variation points in parts of the architecture shown in this view. Identify modules/ Components where you have added variation points.

Section 5: Rationale

The section should:

- List specific tactics selected and justification for their selection (Do identify modules/components where these are planned to be implemented).
- List other architectural decisions your group had made and shown in this view.
- Architectural drivers (mainly the use cases and quality attribute scenarios mapped/linked to the decisions taken to address them).

3. Suggested reading material

Reading and understanding the material on your own beyond the lectures/seminars would help in enhancing your understanding of the assignment and subject. The following chapters/cases studies and material can help in completing Assignment 2.

i. Chapter 20 for ADD & Chapter 22 Documenting architecture. Course Textbook T1: Bass, Len, Paul Clements, and Rick Kazman, "Software Architecture in Practice" 4th Edition.

   Chapter 20 explains ADD & Chapter 22 would help in writing Part A' sections.

ii. Chapter 4, 5 & 6 Course Textbook T2: Cervantes and Kazman, "Designing Software Architectures, A Practical Approach."

   Chapter 4 describes ADD process and Chapters 5-6 has three ADD case studies.

iii. *To write the "Section 5: Rationale", you should read the case studies described in chapters 5 and 6 of the course Book T2.*

Chapter 10 and Appendixes, Reference Book: Documenting Software Architectures, Views and Beyond, by Paul Clements et al. Addison-Wesley, 2010. **This book is also available as an e-book.** *Chapter 10 is a primer on UML Diagramming.*

iv. Software Architecture Documentation Template is available here by SEI. They have explained part of the SAD template: https://wiki.sei.cmu.edu/confluence/display/SAD/Software+Architecture+Documentation+Template

4. Formatting

Formatting specifications for the submitted document are:

- The first page should be a cover page and should have group member's full names (last name, first name), Swedish ID and email addresses.
- Text should be single column with Times (or Times New Roman) font in 12-point size. The pages should have regular margins (maximum 1" on all sides).
- There is no page limit but avoid repetition in the text.
- All pages must be numbered.
- Tables and figures: Number and label the tables and figures consistently and refer/cite them in the text.
- References and citations: If you use any text/material from other resources, you must cite and give references in a Reference list. IEEE referencing and citation style is recommended.
- Sections and subsections: Use the section and subsection numbering style consistently throughout the document.
- The report must be submitted on/before the due date as a pdf file on Canvas. It is strongly recommended to proofread and review your work before submission.

5. Marking

The assignment evaluator will use the given rubric to grade this assignment. Please note that the instructor will check the report for plagiarism. If plagiarism is detected, the instructor will report the matter to University authorities for punitive action. Grading would be on A-F scale defined in course PM.

Part	Task	Max Points
Beyond Views (20 marks)	Documentation Roadmap	2
	How are the views documented?	3
	Design Decisions and Rationale	15
	Directory	-
View Documentation (2 x 40 marks)		
Module View (40 marks)		
	Primary Presentation	10
	Element catalogue	
	Section 2a: Elements and their properties	5
	Section 2b: Relations and their properties	2
	Section 2c: Element interfaces	2
	Section 2d: Element behaviour	6
	Context Diagram	-
	Variability Guide	5
	Rationale	10
Component & Connector View (40 marks)		
	Primary Presentation	10
	Element catalogue	
	Section 2a: Elements and their properties	5
	Section 2b: Relations and their properties	2
	Section 2c: Element interfaces	2
	Section 2d: Element behaviour	6
	Context Diagram	-
	Variability Guide	5
	Rationale	10
	Total	100