Project 2 – Design of Software Architecture

Presentation due: Thursday 10 December 2009

Professor Ho-Jin Choi Report due: Saturday 12 December 2009

Project Description

This project aims to give you an opportunity to design and describe the architecture of a software system. You will work in the same teams as with Project 1, and with the same requirements for the system to design (see [Eas98]). In Project 2, each team is required to propose and document an architectural design, and analyze the relative merits of that design. In this process, you shall use techniques of the ATAM approach to assess your architectural design against the quality attributes that you have identified.

The objective in this project is to foster deeper thinking and more comprehensive documentation regarding why architectures will or will not meet the quality attribute goals that they are intended to satisfy. ATAM should help you provide more explicit arguments about the strengths and weaknesses of an architectural design. (For ATAM, see [KKC00] or chapter 11 of [BCK98].)

When using ATAM, we will mostly use the ATAM's notion of a utility tree and prioritized scenarios as a way to converge on an adequate architectural design, rather than as a way to debug or evaluate an existing architectural design. That is, your architecture should be designed to satisfy the requirements as portrayed in the prioritized utility tree and scenarios. Also, the notion of sensitivity points will be used to focus in on the critical architectural decisions, and motivate an analysis of alternative choices for those key decisions.

Project Presentation (In the class on Thursday, December 10)

Each team is expected to give a 15-min EOSP (end of semester presentation) on Project 2 in the class on 10th December. The presentation should be prepared in PowerPoint, and should contain the output of the ATAM process. It should also include problem statement, driving functional/architectural requirements, candidate architectures, and analysis/comparison of designs. The presentation should follow the guidelines of architectural documentation suggested in the course materials and readings during the semester.

Project Report (Due: Saturday, December 12)

The project report is a 20-30 page Word document containing the description of the project and ATAM output including: objectives, context, technical constraints, business constraints; driving functional requirements; driving architectural requirements; architectural designs; analysis/comparison of designs. The project report should contain at least the following parts:

1. A brief description of the context and business case for the system.
2. A prioritized utility tree, down to the level of scenarios, each of which has a stimulus, a response, and (if appropriate) an environment.
3. A description of your proposed architecture (using any architectural views that you deem appropriate to supporting your documentation and analysis).
4. An analysis of the architectural approach that applies to the ranked utility tree leaves and shows how the approach fares with respect to the desired quality attributes response(s).
5. A discussion of risks, non-risks, sensitivity points, and tradeoff points. As part of this discussion, you should list your key architectural decisions and evaluate a set of possible alternatives.

References

[BCK98] L. Bass, P. Clements, R. Kazman, *Software Architecture in Practice (2nd ed.)*, Addison-Wesley, 2003.

[Eas98] Steve Easterbrook, and et al., "Experiences Using Lightweight Formal Methods for Requirements Modeling," *IEEE Transactions on Software Engineering, Vol. 24, No. 1*, January 1998.

[KKC00] R. Kazman, M. Klein, P. Clements, *ATAM: A Method for Architecture Evaluation*, CMU/SEI-2000-TR-004, Software Engineering Institute, Carnegie Mellon University, 2000.

[SG96] M. Shaw and D. Garlan, *Software Architectures – Perspectives on an Emerging Discipline*, Prentice Hall, 1996.