CS6362 — Software Architecture and Design

Project 2: Meso-scopic System/Software Architectural Design

Due: 8:00pm Thursday April 1 (in class)

> *The design of complex systems must blend the art of architecture with the science of engineering.*
>
> — "The Art of Systems Architecting".

I. Summary

Recent surveys indicate that a war is breaking out, if not there already, a war which is going to change the way we live. A war of electronic commerce, for faster, more accurate, more convenient, more flexible, more mobile, more nomadic, cheaper, etc. Your team's task is to build a system/software architecture for an electronic order processing system for the next centry (hereafter, *EOPS'21*). The *IPS* can be considered as an important part of the EOPS'21, which in turn an important part of the architecture for electronic commerce.

For the project, you are to consider *five* architectural design alternatives, carry out a tradeoff analysis, and propose a particular architectural design as your final selection. Here, at least three (3) of the architectures should be extensions of the architecture you chose for the first part of the course project. This means you are required to submit at least the previous diagram of the chosen architecture along with tradeoff analysis.

II. EOPS'21 — Electronic Order Processing System for Century 21

A customer places an order (e.g., software/book/pizza/movie-on-demand) electronically by filling in an order entry form. The form is taken by the EOPS and results in the generation of a concrete order form, which is to be used for the purpose of accounting, ordering goods or services (from other agents), and shipping.

The process of generating an order form can involve matching the needs of the customer against the goods and services the company offers. This process will be based on the order entry form which is usually incomplete in the beginning, but becomes more concrete as more information is gathered at a later stage. The process can also involve informing the customer of the choices she has, possibly by displaying parts of the catalogue the company maintains which of course continuously changes. For each selected item, the customer can have a list of purchase options which can include, for example, an immediate delivery of high-quality goods or services at a high cost, a poor-quality goods or services whose delivery date is uncertain, but cheaper, a one-year warranty plan, a five-year free upgrade plan, etc. It is strongly recommended that as a software agent, EOPS should also be able to negotiate with both *the customer and suppliers* concerning the type, the price and the delivery date.

When the customer is satisfied with the result of the process, EOPS should log the order to generate the shipping addresses, shipping dates and shipping lists. Based on the shipping addresses, each (virtual or physical) mailing label is generated; based on shipping lists, each invoice is generated, and (hopefully) the customer pays.

Each customer can place more than one order at a time, where each order can involve several copies (or quantities). The customer can also add to her previous order(s), cancel them, or change them within certain pre-set date from the time the order is place.

The activity of filling an order is completed when mailing labels and shipping invoices are used for composing (virtual or physical) packing slips. The activity of processing an order, in turn, is completed when each order is shipped back to customer either electronically or physically using packing slips. As with *IPS*, the system shall issue invoices to customers, receive payments, issue receipts for these payments and reminders for unpaid invoices (This mode of operation could be preferable to the current mode in practise, namely pre-payment). EOPS should carry out all these activities electronically.

III. The Deliverable

Your description should be elegant and comprehensible.

1. **The Process Architecture — Methodology for Your Team Work** Describe briefly how your team members were divided up in carrying out your own design tasks, and why each took the particular roles. In other words, describe the essential tasks/team-members as components of your own process architecture, their essential relationships as interactions, while taking into consideration other architectural concerns.

2. **Architectural Design Alternatives** Describe **five** different architectural design alternatives you have considered. As described earlier, at least three (3) of the architectures should be extensions of the architecture you chose for the first part of the course project. This means you are required to submit at least the previous diagram of the chosen architecture along with tradeoff analysis. For each of the alternatives, explain its architectural style, components/elements, interactions/connections between them, and any constraints on the components and their interactions.

3. **Trade-off Analysis** Discuss what types of NFRs you used as the criteria and why. Discuss relative advantages and disadvantages of the architectural design alternatives in **2**. It is recommended, although not mandatory, that you also consider scenarios.

4. **The Selected Architectural Design** Give a concise summary of justification as to why you have made the particular selection.