Principles of Software Architectures

**Sales System of a retail chain using a loyalty card point system**

Assignment 1

**Goals:**

The goal of assignment 1 is to practice

* thinking about business context and the impact it has on the architectural drivers for a software intensive system
* identifying and classifying architectural drivers
* developing quality attribute scenarios
* using this information to drive the selection of a development strategy and see how this may affect the design of a system

**System description:**

Company A, a retail chain, has decided to develop a sales system (hereinafter, the system) in conjunction with its launch of a point service.

The system consists of a head office server, located at the head office, and the POS terminals placed at store cashiers. The head office server and the POS terminals are connected to each other via a network. Products sold at stores have bar codes attached which indicate the product codes. These bar codes can be read with bar code readers of POS terminals.

Customer who have become point service members are issued point cards, which bear bar codes indicating their member numbers, and when they purchase products with cash, they are awarded points based on the amount of their purchase. The point award rate is fixed, and stored in the system as constant.

Point are recorded in the system, and not on the point card. The awarded points become valid for use the following day, and can be used by the member who accrued the points in place of cash when making a purchase. Points can be used in all stores.

In the sales operation at the POS terminals, first the member number is read from the point card, and then the number of points accrued by the member is displayed. Next, the bar codes of the products being purchased are scanned, and the total amount is determined. The member the either pays with cash, points, or a combination of the two, and the sales data, including the number of points earned and the number of points used, is recorded. When the points are used, the number of points used is immediately subtracted from the number of points accrued by the member.

For each product, its standard price, common to all stores, is set as a part of the product data. Each store, however, can set and use its own actual retail price instead of the standard price during the limited period specified be each store. The actual retail price must be set in advance, and it cannot be charged in the middle of the specified period.

Products are classified into product types such as food, general merchandise, etc. Not all stores carry every product type, and the range of product types carried is designated for each store.

Everyday, in the morning before business hour starts, the system executes a batch process which post-processes the sales operations from previous day, and prepares for the daily sales operations.

Moreover, in addition to the sales operation, the system is also capable of performing the statistical analysis on the sales records of all stores in near real-time manner.

Both the head office server and the POS terminals are equipped with a Database, and both the head office server Database and the POS terminal Database can be accessed during the sales operation.

The response time of the sales operations must be fast and the availability must be high in the event of temporary failure of the head office server or the network, the POS terminal will be still working securely. The POST terminals can carry out the sales operation efficiently using locally stored data as much as possible.

The statistical analysis of the sales records is performed using the sales data stored at the head office server.

Since no bar code reader, user can enter these codes by using computer keyboard. System will use SQL Server Database.

**Task 1:** Your first task should be to carefully read, identify, and discuss the architectural drivers that your team can find in the virtual POST product description. Recall that the architecture drivers include the high level functional requirements, constraints (technical and business), and quality attributes that are important to the stakeholders of the system. Identify and classify requirements you find as one of these architectural drivers (functional requirement, technical or business constraint, or quality attribute).

Initially create a rough draft of the architectural drivers. Once the team agrees to this rough

draft, then:

1. Create at least one functional use case that describes some key systemic functionality.

2. Select the top two most important qualities attribute requirements (as agreed to by the team)

and describe them as a well formed quality attribute scenario using the full six part scenario

framework described in class:

1. Source of the stimulus – The entity that generated the stimulus.
2. Stimulus – A condition that affects the system.
3. Environment – The condition under which the stimulus occurred.
4. Artifact stimulated – The artifact that was stimulated by the stimulus.
5. Response – The activity that results because of the stimulus.
6. Response measure – The measure by which the system’s response will be evaluated.

**Task 2:** Identifying Scope.

Assume that your team has been assigned to design, develop, and deploy the system described above in 6 weeks, identify the scope of the project. In particular:

* What functionality will you be able to deliver with the given schedule?
* What functionality will you defer – if any and why?
* Based on the overall requirements and business context, what overall development strategy will you adopt and how will it affect your design of the system.