POS SYSTEM – ARCHITECTURE DRIVERS



HIT Team

Consulting

Sales

Staffing

Support

Information of document

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# Introduction

## Purpose

This document will be used to record, communicate and refine the architectural drivers for the project. This document will act as the main repository of requirements for the length of the project.

The intended audiences for this document are:

* Project Manager and Architect to manage and evaluate if POS system meets function requirements and quality requirements or not.
* Developers to make coding
* Lecturer who want to check the documentation about the architectures and design of POS systems.

## Definitions, Acronyms and Abbreviations

|  |  |
| --- | --- |
| ACDM | Architecture Centric Design Method |
| Mapping | A mapping is created either between different views or between elements or relationships and groups of elements and relationships. A mapping can be hierarchical, or on the same level. Mappings between elements or relationships and groups of elements and relationships can span across views. |
| Entity | The ACDM definition for an actor which could be a person or a system. |
| Relationship Type | A relationship type is a connector in the palette, which is used to create a relationship in the canvas. |
| Relationship | A relationship is an instance of a relationship type, and used to connect element(s) on the canvas. |
| Perspective | 3 perspectives prescribed by ACDM; static, dynamic and physical. |
| View | A view is a drawing in a perspective. There can be multiple views in a perspective. |
| Design | This is the drawing the architect does in the tool. The term design is used in this document because architecture is used in many other ways which might confuse the reader. |
| Architecture | All of the diagrams including their elements and relationships as a representation of a software system. The architecture also includes the architectural drivers which are assigned to the elements and relationships. |
| Architectural drivers | These consist of functional requirements, quality attributes, business constraints and technical constraints. Can be assigned to elements, relationships and mappings. |
|  |  |

## Change Process

When making changes to the document, the date, name of person making the change and brief description of the change must be added to the *revision history* table of this document.

# Project Overview

## Project Context

It is Final project that requires HIT Team to develop POS System with the following constrains:

* Team size: 6 members
* The time for completing: 3 months
* Software Development Model assigned: Water fall
* Tools assigned: ASP .NET Framework, MS SQL 2008, Visual studio 2010.
* Hardware: Laptops

## System Context

The project team will develop a sale system on websites with the purpose bring the convenience and helpful in the sale for Company A, a retail chain (hereinafter, the system). POS system will contain a number of functions that help manage product as well as sale process.

* Administrator can do following function:
* Add New User
* Search/ View User List
* View User Detail Information
* Update User Information, Assign Authorize
* Add New POST
* Search/ View POST List
* View POST Detail Information
* Update POST Information
* Staff can do following function:
* Add New Product
* Search/ View Product List
* View Product Detail Information
* Update Product Information
* Add New Type
* Search/ View Type List
* View Type Detail Information
* Add New Member
* Search/ View Member List
* View Member Detail Information
* Update Member Information
* View Member Point Log
* Cashier can do following function:
* Add New Store
* Search/ View Store List
* View Store Detail Information
* Update Store Information
* Analysis Statistic
* Cashier can do following function:
* Add New Bill
* Search/ View Bill List
* View Bill Detail Information
* Print Bill
* Member can do following function:
* View point

## Relate documents

Use case description

Quality attributes scenarios

# Architectural Drivers Overview

The architectural drivers presented in this document include:

* **Functional Requirements:** These requirements are presented in the form of specifications and use cases. These are a refinement of the requirements documented in the raw requirements specification document of step 1 ACDM.
* **Quality Attribute Requirements:** These requirements are presented in the form of quality attribute scenarios. These scenarios are based on the quality attributes documented in the raw requirements specification document of step 1 ACDM.
* **Business Constraints:** These are the business constraints documented in the raw requirements specification document of step 1 ACDM.
* **Technical Constraints:** These are the technical constraints documented in the raw requirements specification document of step 1 ACDM.

These architectural drivers will influence the architectural design and implementation of the project. Additionally, they will impact the schedule and quality of the project. As a whole these architectural drivers define the scope of the project.

# Functional Requirements

## Template



## Specifications

We just describe the most important function that we will demo on the presentation day

|  |  |
| --- | --- |
| Allow cashiers to creating bill, print bill, view list… to sale products for customers | **ID:** FR1 |
| **Priority:** 1 |
| **Version:** 3.2 |
| **Last Changed:** 5/7/2012 |
| Cashiers add the product code by typing or scanning into the software. If customers have a member ID, they will add it to the bill then they choose the type of payment (point and cash, or only point, or only cash). After finish creating new bill they will print the bill for customer.  The purpose of this feature is to have users make a bill about sale products for customers. Thus the interface and features for this requirement must allow them to perform the basic tasks (sale product) of adding and editing products to bill and also take into account other functions (search bill, view list, print bill…) that they might need.  More detail about usage of this function in Use-case “Bill Management” | |
| **Open Issues** | |

## Use Case Modeling

### Domain Model

|  |  |
| --- | --- |
| Domain Object | Description |
| Use case | A collection of information that the end user will enter into the tool. This collection will include: Title, ID, Description, Entities Involved, Preconditions, Primary use case flow of events, Primary use case post conditions, Alternate user case flow of events, Alternate use case post conditions. |
| Entity | A collection of information that the end user will enter into the tool. This collection will include: Name, ID, Description, Provides Assumptions, Requires Assumptions, Identified user cases. |
| Quality attribute | A collection of information that the end user will enter into the tool. This collection will include: Title of scenario, ID, Quality attribute, Description of stakeholder’s role, Source of the stimulus, Stimulus, Relevant environmental conditions, Architectural elements, System response, and Response measure. |
| Business constraint | A collection of information that the end user will enter into the tool. This collection will include: ID, Title, and Consideration. |
| Technical constraints | A collection of information that the end user will enter into the tool. This collection will include: ID, Title, and Consideration. |
| Element type | A collection of information that the end user will enter into the tool. This collection will include: Type, Name, Description, and Perspective. |
| Relationship type | A collection of information that the end user will enter into the tool. This collection will include: Type, Name, Description, and Perspective. |

### Entities

#### List of Entities

|  |  |
| --- | --- |
| ID | Name |
| E01 | Administrator |
| E02 | Head Office Manager |
| E03 | Staff |
| E04 | Cashier |
| E05 | Member |

#### Entity Scenarios

|  |  |
| --- | --- |
| **Entity name: Administrator** | **Entity ID: E01** |
| **Description:**  Administrator who is responsible for manage user account of the system and POS terminal. He can create new, view list, update information and assign authorize user. Managing POS terminal means he will add MAC address of the POST to the system, that cashier and staff cannot access the web application outside the store. Administrator is adept at using computers | |
| **Provides assumptions:**  The administrator will provide user information for the system to managing  The administrator will provide POST information for the system to managing | |
| **Requires assumptions:**  Administrator expects no interruptions from the POS WEB Application.  An environment to manage user account by create new, search, update, authorize user information  An environment to manage POST by create new, search, update…. | |
| **Identified use cases:**  Use-case “User management”  Use-case “POST management” | |

|  |  |
| --- | --- |
| **Entity name: Head Office Manager** | **Entity ID: E02** |
| **Description:**  Head Office Manager who is responsible for manage store of the system and have sale reports by using analysis and statistic function. He can create new, view list, update store information and set type of product that store will sale. It also include that he can set prizes for each product of the stores. The sale report can be chosen in a specific time (weekly, monthly, yearly…). He can access the web application outside the store. Head Office Manager is adept at using computers | |
| Provides assumptions:  Head Office Manager will provide store information for the system to managing  Head Office Manager will provide criterion for analysis and statistics sale’s figure | |
| **Requires assumptions:**  Head Office Manager expects no interruptions from the POS WEB Application.  An environment to manage store by create new, search, update, choose type of product  An ability to have sale report with a chosen specific time | |
| **Identified use cases:**  Use-case “User management”  Use-case “POST management” | |

|  |  |
| --- | --- |
| **Entity name: Staff** | **Entity ID: E03** |
| **Description:**  Staffs who are responsible for manage product, type of the product and member of the system. They can create new, view list, update store information. Especially, they have to set the basic prize for each product. He cannot access the web application with other computers outside the store. Staffs are adept at using computers | |
| **Provides assumptions:**  Staffs will provide product information for the system to managing: create new, update, view list, set image…  Staffs will provide type information for the system to managing: create new, update, view list, set image…  Staffs will provide member information for the system to managing: create new, update, view list… | |
| **Requires assumptions:**  Staffs expect no interruptions from the POS WEB Application.  An environment to manage products by create new, search, update, choose type of product  An environment to manage types by create new, search, update, choose type of product  An environment to manage members by create new, search, update, choose type of product | |
| **Identified use cases:**  Use-case “Product management”  Use-case “Type management”  Use-case “Member management” | |

|  |  |
| --- | --- |
| **Entity name: Cashier** | **Entity ID: E04** |
| **Description:**  Cashiers who are responsible for manage bill of the system. They add the product code by typing or scanning into the software. If customers have a member ID, they will add it to the bill then they choose the type of payment (point and cash, or only point, or only cash). After finish creating new bill they will print the bill for customer. They cannot access the web application with other computers outside the store. Cashiers are adept at using computers | |
| **Provides assumptions:**  Cashiers will provide product information for the system to managing: create new, update, view list, print bill | |
| **Requires assumptions:**  Cashiers expect no interruptions from the POS WEB Application.  An environment to manage bill by create new, search, update, choose type of product | |
| **Identified use cases:**  Use-case “Bill management” | |

|  |  |
| --- | --- |
| **Entity name: Member** | **Entity ID: E05** |
| **Description:**  Members who are customers having a member ID with loyalty point for manage bill of the system. They can view their current point by accessing the web application everywhere. | |
| **Provides assumptions:**  Members will provide member ID information for the system to managing: create new, update, view list, print bill | |
| **Requires assumptions:**  Members expect no interruptions from the POS WEB Application.  An ability to view member points bill by using their member ID | |
| **Identified use cases:**  Use-case View Point | |

### Use Case List

|  |  |  |
| --- | --- | --- |
| Use Case ID | Use Case Name | Descriptions |
| UC\_SM01 | Add New User | Allow Admin to add new user into the system |
| UC\_SM02 | Search/ View User List | Allow Admin to search user of the system with name, job… and the system will display in the user list |
| UC\_SM03 | View User Detail Information | Allow Admin to View User Detail Information |
| UC\_SM04 | Update User Information, Assign Authorize | Allow Admin to Update User Information and Assign Authorize |
| UC\_PM01 | Add New Product | Allow Staff to add new product into the system |
| UC\_PM02 | Search/ View Product List | Allow Staff to search product of the system with name, type… and the system will display in the product list |
| UC\_PM03 | View Product Detail Information | Allow Staff to View Product Detail Information |
| UC\_PM05 | Update Product Information | Allow Staff to Update Product Information |
| UC\_RM01 | Add New Bill | Allow Cashier to add new bill into the system |
| UC\_RM02 | Search/ View Bill List | Allow Cashier to search bill of the system with date, customer name… and the system will display in the product list |
| UC\_RM03 | View Bill Detail Information | Allow Cashier to View Bill Detail Information |
| UC\_RM04 | Print Bill | Allow Cashier to Print Bill |
| UC\_RSM01 | Add New Store | Allow Manager to add new retail store into the system. They may configure what types will be sold in that store |
| UC\_RSM02 | Search/ View Store List | Allow Manager to search store of the system with name… and the system will display in the product list |
| UC\_RSM03 | View Store Detail Information | Allow Manager to View Store Detail Information |
| UC\_RSM04 | Update Store Information | Allow Manager to Update Store Information |
| UC\_CM01 | Add New Type | Allow Staff to add new type of product into the system |
| UC\_CM02 | Search/ View Type List | Allow Staff to search product of the system with name… and the system will display in the type list |
| UC\_CM03 | View Type Detail Information | Allow Staff to View Type Detail Information |
| UC\_CM04 | Update Type Information | Allow Staff to Update Type Information |
| UC\_C01 | Add New Member | Allow Staff to add new member into the system |
| UC\_C02 | Search/ View Member List | Allow Staff to search Member of the system with name, ID… and the system will display in the type list |
| UC\_C03 | View Member Detail Information | Allow Staff to View Member Detail Information |
| UC\_C04 | Update Member Information | Allow Staff to Update Member Information |
| UC\_C05 | View Member Point Log | Allow Staff View Member Point Log |
| UC\_S01 | Analysis Statistic | Allow Manager to have the Analysis Statistic from sale of month, year… |
| UC\_P01 | Add New POST | Allow Admin to add new POST into the system |
| UC\_P02 | Search/ View POST List | Allow Admin to search POST of the system with name, store… and the system will display in the type list |
| UC\_P03 | View POST Detail Information | Allow Admin to View POST Detail Information |
| UC\_P04 | Update POST Information | Allow Admin to Update POST Information |
| UC\_VP | View Point | Allow member to access on website of the system with their ID, and the system will show their current point |

### Use Cases

Use case: Level 1

Note Table:







Use case level 2 and Use case description are refer to “Use case description” file

# Quality Attribute Requirements

Quality attributes are the benchmarks that describe a system’s intended behavior within the environment for which it was built. They provide the means for measuring the fitness and suitability of a product. These requirements will have an effect on the architectural design and implementation of the product.

## Template

The following template will be used to present the quality attribute scenarios for this project.



## Quality Attribute Scenarios

The following quality attribute scenarios will be refined during the design stage, as the team gets a clearer idea of the architecture and detail design and the implications they have on these scenarios. It is most likely that new quality attribute scenarios will be added during the design phase.

|  |  |  |  |
| --- | --- | --- | --- |
| **Title of scenario:** Crashdatabase at Head Office | | **ID:** QAS1 | **Version:** 1.1 |
| **Last Changed:** 04/07/2012 |
| **Quality attribute:** Availability | | **Characterization ID:** QA2 | |
| **Describe stakeholder role proposing the description:** Cashier | | | |
| Source(s) of the stimulus | Internal – External | | |
| Stimulus | Server Crash | | |
| Relevant environmental conditions | System operation normally | | |
| Architectural elements | System and the information in the system | | |
| System response | The system use information in backup database and response to admin | | |
| Response measure(s) | Response to admin within 10 seconds, response to client within 5s | | |
| Use-case related | **UC\_SM03, UC\_PM03, UC\_RM03, UC\_C03** | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Title of scenario:** SaveBill | | **ID:** QAS2 | **Version:** 1.1 |
| **Last Changed:** 04/07/2012 |
| **Quality attribute:** Performance | | **Characterization ID:** QA1 | |
| **Describe stakeholder role proposing the description:** Cashier | | | |
| Source(s) of the stimulus | End user | | |
| Stimulus | Send a request to save bill to the system | | |
| Relevant environmental conditions | When the system operation normally. | | |
| Architectural elements | System and the information in the system | | |
| System response | The system save information in primary database and response to client save bill success | | |
| Response measure(s) | Response within 5 seconds | | |
| Associated risks |  | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Title of scenario:** Displays statistical reports | | **ID:** QAS3 | **Version:** 1.1 |
| **Last Changed:** 04/07/2012 |
| **Quality attribute:** Performance | | **Characterization ID:** QA2 | |
| **Describe stakeholder role proposing the description:** Manager | | | |
| Source(s) of the stimulus | End user | | |
| Stimulus | Send a request to Statistics | | |
| Relevant environmental conditions | When the system operation normally. | | |
| Architectural elements | System and the information in the system | | |
| System response | The system get information in primary database and response to client | | |
| Response measure(s) | Response within 5 seconds | | |
| Associated risks |  | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Title of scenario:** Scan customer | | **ID:** QAS4 | **Version:** 1.1 |
| **Last Changed:** 04/07/2012 |
| **Quality attribute:** Performance | | **Characterization ID:** QA2 | |
| **Describe stakeholder role proposing the description:** Cashier | | | |
| Source(s) of the stimulus | End user | | |
| Stimulus | Send a request to get customer information | | |
| Relevant environmental conditions | When the system operation normally. | | |
| Architectural elements | System and the information in the system | | |
| System response | The system get information in primary database and response to client | | |
| Response measure(s) | Response within 3 seconds | | |
| Associated risks |  | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Title of scenario:** Block unauthorized access | | **ID:** QAS5 | **Version:** 1.1 |
| **Last Changed:** 04/07/2012 |
| **Quality attribute:** Security | | **Characterization ID:** QA1 | |
| **Describe stakeholder role proposing the description:** Cashier, manager, staff | | | |
| Source(s) of the stimulus | unknown identity | | |
| Stimulus | Try to access the system illegitimacy | | |
| Relevant environmental conditions | When the system operation normally. | | |
| Architectural elements | System and the information in the system | | |
| System response | The system block this request | | |
| Response measure(s) |  | | |
| Associated risks |  | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Title of scenario:** Authority | | **ID:** QAS6 | **Version:** 1.1 |
| **Last Changed:** 04/07/2012 |
| **Quality attribute:** Security | | **Characterization ID:** QA1 | |
| **Describe stakeholder role proposing the description:** Cashier, manager, staff | | | |
| Source(s) of the stimulus | End user | | |
| Stimulus | Login in to the system | | |
| Relevant environmental conditions | When the system operation normally. | | |
| Architectural elements | System and the information in the system | | |
| System response | The system authorize for users by account type | | |
| Response measure(s) |  | | |
| Associated risks |  | | |

# Constraints

Constraints on the system act as premade design decisions that the development team has to adhere to. Technical and business constraints for this project are provided below.

## Technical Constraints

|  |  |  |
| --- | --- | --- |
| Consideration. | ID | Technical Constraints |
| Commercial hardware or software products. | TC01 | Bar code readers  Computer  SQL Server Database |
| Tools and methods. | TC02 | Visual Studio 2010, SQL Server Management Studio 2008.  .Net Framework  ASP.Net MVC 3.0 |
| Protocols, interfaces, standards. | TC03 | TCP/IP protocol |
| Computer operating system(s) | TC04 | Window 7 |
| Computer languages(s) | TC05 | C# |
| POS software | TC06 | Software can run on any computer with an Internet connection and web browser, without additional software. |

## Business Constraints

|  |  |  |
| --- | --- | --- |
| Consideration | ID | Business Constraints. |
| Organizational restrictions and demands. | BC01 | One team with 6 members |
| Market restrictions and demands | BC02 | Produced only for ABC Company |
| Demo | BC03 | Demo function “Sale Products” |
| Time | BC04 | Begin at 2/4/2012 to 5/7/2012 |

# Prioritization

## Team priority (Difficulty ranking scale)

The difficulty scale has been defined on the basis of complexity and effort. Complexity is defined as how difficult the design of a solution is and whether the team has previous experience in designing or implementing such a design. Both measures, for complexity and effort, are relative to each other.

|  |  |
| --- | --- |
| Difficulty (numeric) | Description |
| 1 | High complexity and large amount of effort required |
| 2 | High complexity or large amount of effort required |
| 3 | Moderate complexity and medium amount of effort required |

## Stakeholder priority (Important scale)

The important scale has been defined on the basis of expectation and influence of stakeholder needs. It also describes the importance of quality attribute that follow in view of stakeholders.

|  |  |
| --- | --- |
| Important (numeric) | Description |
| 1 | High expectation and high influence |
| 2 | High expectation or high influence |
| 3 | Moderate expectation and medium influence |

## Priority scale

|  |  |  |
| --- | --- | --- |
| Priority (numeric) | Priority (name) | Description |
| 1 | Must Have | Must be present in the end product at all costs. |
| 2 | Nice to Have | Customer would greatly appreciate implementation of these features. |
| 3 | If There’s Time | Consider if customer deems them important enough. |

## Use Cases

|  |  |  |  |
| --- | --- | --- | --- |
| ID & Title | Stakeholder priority | Difficulty ranking | Priority |
| UC\_SM01: Add New User Information | 1 | 1 | 1 |
| UC\_SM02: Search/ View User List | 2 | 3 | 2 |
| UC\_SM03: View User Detail | 2 | 3 | 2 |
| UC\_SM04: Update User Information, Assign Authorize | 1 | 1 | 1 |
| UC\_PM01: Add New Product | 1 | 1 | 1 |
| UC\_PM02: Search/ View Product List | 2 | 3 | 2 |
| UC\_PM03: View Product Detail Information | 2 | 3 | 2 |
| UC\_PM05: Update Product Information | 2 | 2 | 2 |
| UC\_RM01: Add New Bill | 1 | 1 | 1 |
| UC\_RM02: Search/ View Bill List | 1 | 2 | 1 |
| UC\_RM03: View Bill Detail Information | 1 | 2 | 1 |
| UC\_RM04: Print Bill | 1 | 1 | 1 |
| UC\_RSM01: Add New Store | 1 | 1 | 1 |
| UC\_RSM02: Search/ View Store List | 2 | 3 | 2 |
| UC\_RSM03: View Store Detail Information | 2 | 3 | 2 |
| UC\_RSM04: Update Store Information | 2 | 2 | 2 |
| UC\_CM01: Add New Type | 1 | 1 | 1 |
| UC\_CM02: Search/ View Type List | 2 | 3 | 2 |
| UC\_CM03: View Type Detail Information | 2 | 3 | 2 |
| UC\_CM04: Update Type Information | 2 | 2 | 2 |
| UC\_C01: Add New Member | 1 | 2 | 1 |
| UC\_C02: Search/ View Member List | 2 | 3 | 2 |
| UC\_C03: View Member Detail Information | 2 | 3 | 2 |
| UC\_C04: Update Member Information | 2 | 2 | 2 |
| UC\_C05: View Member Point Log  Statistic | 1 | 2 | 1 |
| UC\_S01: Analysis Statistic | 1 | 1 | 1 |
| UC\_P01: Add New POST | 1 | 2 | 1 |
| UC\_P02: Search/ View POST List | 2 | 3 | 2 |
| UC\_P03: View POST Detail Information | 2 | 3 | 2 |
| UC\_P04: Update POST Information | 2 | 2 | 2 |
| UC\_VP: View Point | 1 | 1 | 1 |

## Quality Attribute Scenarios

|  |  |  |  |
| --- | --- | --- | --- |
| ID & Title | Stakeholder priority | Difficulty ranking | Priority |
| QAS1 Sale product when database at Head Office crash | 3 | 3 | 3 |
| QAS2 Save Bill to the database | 1 | 2 | 1 |
| QAS3 Statistic bill | 2 | 2 | 2 |
| QAS4 Scan member Loyal | 1 | 2 | 1 |
| QAS5 Block unauthorized access | 1 | 1 | 1 |
| QAS6 Authority | 1 | 1 | 1 |

## Constraints

Constraints have not been prioritized in terms of importance because by definition they are of the highest priority. We have however prioritized them by difficulty, as judged by the development team.

### Technical Constraints

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Stakeholder priority | Difficulty ranking | Priority |
| TC01 | 1 | 1 | 1 |
| TC02 | 1 | 1 | 1 |
| TC03 | 2 | 2 | 2 |
| TC04 | 1 | 1 | 1 |
| TC05 | 1 | 1 | 1 |
| TC06 | 1 | 1 | 1 |

### Business Constraints

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Stakeholder priority | Difficulty ranking | Priority |
| BC01 | 2 | 3 | 2 |
| BC02 | 1 | 1 | 1 |
| BC03 | 1 | 2 | 1 |
| BC04 | 2 | 2 | 2 |

# References

[Sandcastle] - Architectural Drivers Specification

[Lat08] Lattanze, A. *Architecting Software Intensive Systems: A Practitioners Handbook*, New York, NY: Auerbach, 2008

-- The End --