1. Introduction

Contents

For medium to large organizations, information systems play an important role for information storage and retrieval. They are used to support business processes such as decision-making. In information systems, huge amounts of data need to be manipulated and visualized. One way to handle this complexity is to use Enterprise JavaBeans (EJB) in a J2EE architecture [PRL07]. Since EJB are not designed to work in the Presentation Layer, suitable Presentation Layer Development frameworks are introduced to enhanced the presentation layer of the information systems. The MeDIC (Metric Definition Integration Calculation) system [MeDIC] and XAM (eXam Assignment and Management) system [XAM] are typical representatives of such information system.

In the proposed architecture, the Data Layer and Business Logic Layer are managed by EJB. The Presentation Layer communicates to the Business Logic Layer via Application Facade. The Presentation Layer is currently implemented using JSP/Servlet technology. However, the current design still has several defects, for instance: code redundancy, huge amount of classes, and low reusability. In consequence, J2EE presentation development frameworks minimize those defects and improve the efficiency of the system, which shared the similarities with the proposed architecture.

1.1. Objectives

The goal of this research paper is to evaluate frameworks for the Presentation Layer based on the proposed architecture, including the current solution (JSP/Servlet). The steps to achieve the goal of this master thesis include requirements gathering and analysis, multiple rounds of frameworks selection with different criteria, prototype implementations, and results evaluation. The chosen frameworks for prototype development should fulfill most of the requirement and the prototypes implementation should reflect the solution for each requirement clearly, and must be able to work with the existing system's environment:

the back-end is managed by EJB 3.0, and IBM Websphere Application Server 7.0.

1.2. Tasks

In order to achieve the goal of this master thesis, these following steps [Figure 1.1] must be approached:

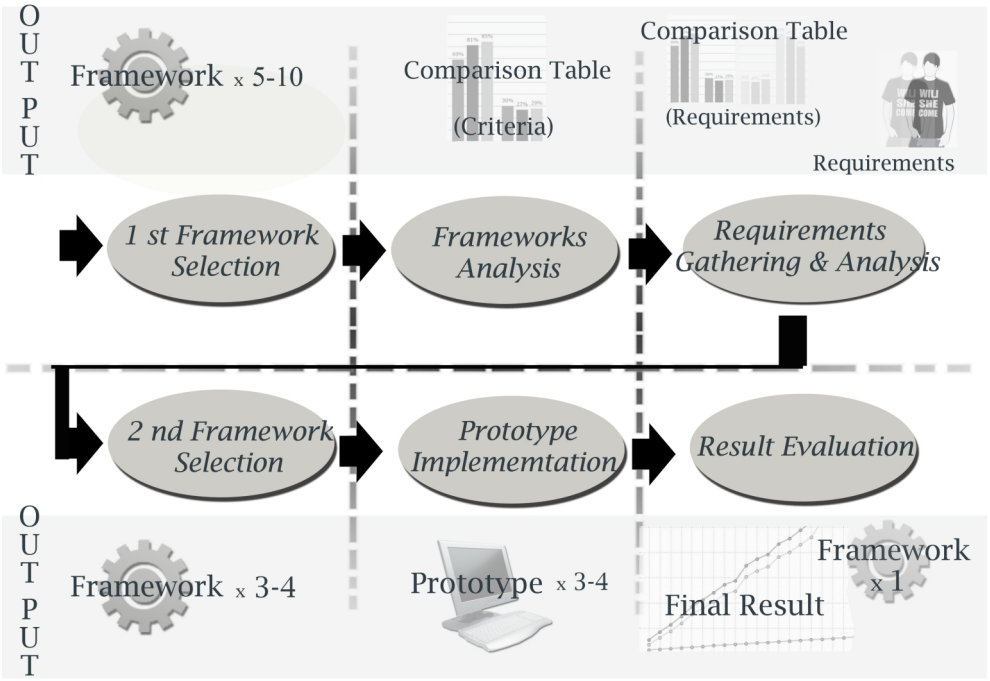

Figure 1.1.: Project Phases and Outputs

(1) First frameworks selection
First step was to narrow-down the scope of the focused framework based mainly on framework popularity. Other factors were general web framework criteria [Rai11a], such as, learning curve, testability, configuration complexity, amount of artifact produced, architecture and pattern, tools and IDE, and supports from community. This first selection aimed for 5-10 frameworks as an output.

(2) Frameworks analysis
The outputs from the first framework selection were analyzed at this step. The selected frameworks were compared to each other under five general web framework criteria: configuration complexity, learning curve, testability, community and support, tools and IDE.

(3) Requirements gathering and analysis
All attendances were developers, who experienced using the system based on

the proposed architecture. Also requirements prioritization was used to identify the important factor of each requirement.

(4) Second frameworks selection
In the previous step, 3-4 frameworks were aimed to be selected as an output. The main factor of the selection is the requirements, the general web framework criteria were also affected, but less because the requirements represent the characteristics of the solution itself. In contradiction, even a framework fulfills most of the requirements, it should not fail on the general web framework criteria, which represent the characteristic of high quality, efficient, productive web framework.

(5) Prototypes implementation
The selected frameworks were implemented for a proof of concept. For each prototype, there were five aspects need to be mentioned: working environment and tools, framework's basic concepts, complete architecture after the integration of framework, project structure and artifacts produced, and steps to migrate from the existing system.

(3) Requirements gathering and analysis
All attendances were developers, who experienced using the system based on the proposed architecture. Also requirements prioritization was used to identify the important factor of each requirement.

(6) Results evaluation
All implemented frameworks were analyzed against the requirements. The result from the comparison against general web framework criteria in step 2 also affects the evaluation at this point.

These important steps were demonstrated and explained in detail in the following chapters of this report.

1.3. Structure of Thesis

The outline of thesis is divided into five chapters: introduction, background, implementation, result and evaluation, and conclusion. Each chapters can be shortly explained as below.

Chapter 1 (Introduction)
begins with the brief overview of work, motivation, and gives problem statement for the master thesis.

Chapter 2 (Background)
presents the necessary background information, steps, and guidance through the framework selection. This chapter divided into three parts: introduction to existing system and related technology, framework selection and comparison process, chosen frameworks and reasons. The first part is about the current architecture and environment of the existing system. The related technology and methodology will also mentioned, for instances, Enterprise Java Bean (EJB), Gang of Four's Command and Facade design patterns [LL07], and Model-View-Controller pattern (MVC). The second part is about the process of framework selection. The different criteria are introduced to narrow-down the scope and compare between each frameworks. The third part shows the result of the selection and reason.

Chapter 3 (Implementation)
explains the method of the prototype implementation. It starts with the brief description of the existing prototype of the proposed architecture. The further explanation is to clarify the purpose, user interface components, flow, and the input/output of the prototype. The description of the architecture after the integration of each framework, required working environment/tools, framework basic concept, project structure, artifacts produced , and etcetera, are all described in this chapter also.

Chapter 4 (Result and Evaluation)
contains result from the analysis of the previous chapter and explanation of the evaluation method. The prototypes are analyzed and compared to each other based on the requirements mentioned in chapter 2. The most suitable framework is concluded in this chapter.

Chapter 5 (Conclusion) . is the conclusion of this master thesis. The results from first chapter until the fourth chapter are briefly summed up for specify the most suitable solution of the thesis. Also, the further research and improvements are suggested at the end of this chapter.