VehicleRentingSystem

System Design

SYSTEM DESIGN DOCUMENT[1]

15.12.2019

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Prepared for

SE301 Software Engineering



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# Introduction

In the process of designing the VehicleRentingSystem, we worked on defining the design goals which includes the concepts ease to use, well defined interface, user-friendliness, end-user, performance and security.

In ease to use goal, we stated that SystemUser must be able to perform renting in short amount of time,

In well-defined interface goal, we stated that the interface components on page and page’s layout design must be responsive and attention-drawing to SystemUser

In User-Friendliness goal, we stated that the webpage must be visual, support images and include text based info which made/displayed in a way that is aesthetically pleasing to SystemUser.

In end-user goal, the SystemUser must not allowed to display unavailable vehicles.

In performance goal, the system must respond to SystemUser and give feedback in ashort amount of time

In security goal, SystemUser must not be allowed to access other SystemUser’s personal information.

We also selected and designed an architecture pattern to be followed in the implementation process, this architecture pattern is called 3-Tier Architecture. In 3-Tier Architecture, the presentation tier is used for providing interface elements such as forms, pages to the SystemUser. Application tier is where the request by SystemUser through WebBrowser is received and corresponding function is processed and the query belongs this function is called from data tier and as a result, corresponding dynamic HTML page is displayed to presentation tier.

## Purpose of the System

In this document what we aim is to present a detailed description of the design process of VehicleRentingSystem. And this design process consisted of architectural features such as subsystem decompositions, hardware/software mapping, database management etc. to show the developers how the functional, non-functional requirements defined on previous RAD documents should be implemented and which architectural decisions taken by architects to create a consistent and responsive web-based car renting system of VehicleRentingSystem which its users are categorized as Visitor and RegisteredUsers. This system is designed to allow both users to search and view information about rentable vehicles with providing an easy to use, user-friendly web-site.

## Design Goals

The system is designed to any kind of users including a visitor to view the available, rentable cars by selecting corresponding filtering options and

* Ease of Use:

A person which is never use any vehicle renting system before, must be able to learn how to the system by simply renting a vehicle from VehicleRentingSystem in a short amount of time which is considered about 15 minutes.

* Well-defined interfaces:

The system should be implemented as a responsive website in terms of its layout design, the auto-scaled pages, visibility of the various interface elements on page should be achieved in a way to draw user’s attention quickly, eg. The search panel should be placed on the main page (non func req Usability 4)

* User-friendliness

The search result must be displayed with corresponding images of vehicles which will make the whole system as aesthetically pleasing to user.

Search results should be displayed up to 10 results per page and displayed with textual vehicle information such as baggage capacity, the number of seats etc alongside with visual representative images. This way, user can recognize and identify the vehicles easily and it’ll help to reduce the time in making decisions for user.

* End-User:

After searching, the unavailable vehicles such as vehicles with “damaged” physical status must not be displayed in advance to prevent user to rent this type of vehicles.

* Performance:

The search function in the system must be display a result at most 30 seconds to the user.

VehicleRentingSystem must send e-mails to the users in 1 minutes after user completed the renting process.

* Security:

The credit card/payment information belong to users are not stored the company’s database and users personal information is not shared through any company or cooperation or whatsoever and cannot be viewed by any end-user or visitors to protect the user’s information.

## Definitions, Acronyms, and Abbreviations

## References

# Current Software Architecture

We designed the VehicleRentingSystem based on 3-Tier Architecture which consists of presentation tier, application tier and database tier. 3-Tier Architecture works when client, in this case SystemUser, access to PresentationTier, which works as an User Interface and responsible for providing front-end such as web forms, web pages by sending a request using web services such as HTTP protocol to Web Browser. Web Browser access to Application Tier with the HTTP Protocol and application contains the system’s functions (the code part behind the development of web pages) which is written in java. Web Browser sends request to Web Server and the information/ given command by browser is processed by this tier through server and it basically performs the corresponding query by accessing/fetching the data from SQLDatabase on Data Tier and resturns the query’s result back to application tier. Following, Application Tier display the corresponding HTML page to Presentation Tier and this way SystemUser is able to view the Page result.

The 3-Tier architecture is commonly used when it comes to develop website applications.

The reason why is because of the layered structure of tiers, the updates can be easily managed without affecting any other tier’s, it gives opportunity to work on desired tiers so that developers can work separate and effectively and by designing the presentation and application tier separately allows the system to be easily manageable since the interface and code-based functions are not in the same group.

# Proposed Software Architecture

3-tier architecture

## Overview

Present a bird’s-eye view of the software architecture and briefly describes the assignment of functionality to each subsystem.

## System Decomposition

Describe the decomposition into **subsystems and the responsibilities** of each. **This is the main product of system design.**

## Hardware Software Mapping

Describe how subsystems are assigned to hardware and off-the-shelf components. It also lists the issues introduced by multiple nodes and software reuse.

## Persistent Data Management

Describe the persistent data stored by the system and the data management infrastructure required for it. This section typically includes the description of **data schemes, the selection of a database, and the description of the encapsulation of the database**.

## Access Control and Security

Describe the user model of the system in terms of an access matrix. This section also describes security issues, such as the selection of an authentication mechanism, the use of encryption, and the management of keys.

## Global Software Control

Describe how the global software control is implemented. In particular, this section should describe how requests are initiated and how subsystems synchronize. This section should list and address synchronization and concurrency issues.

## Boundary Conditions

Describe the start-up, shutdown, and error behavior of the system. (If new use cases are discovered for system administration, these should be included in the requirements analysis document, not in this section.)

# Subsystem Services

Describe the **services provided by each subsystem**. Although this section is usually empty or incomplete in the first versions of the SDD, this section serves as a reference for teams for the boundaries between their subsystems. The interface of each subsystem is derived from this section and detailed in the Object Design Document.

# References

The following is an example of listing a book in this section. Check the text to see how it is cross referenced (The whole document is based on [1]).

1. Bruegge B. & Dutoit A.H.. (2010). *Object-Oriented Software Engineering Using UML, Patterns, and Java*, Prentice Hall, 3rd ed.