XJCO2011 Web Application Development

Design Document

Coursework 1

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Abstract

This design document is divided into three sections. The first part is the introduction of this project and its main functions which includes the description of the design and architecture. Then, the second part is the replies to the required questions. After that, the third part is the self-evaluation.

Catalogue

1. Introduction of the project and man functions

This project is to use Web technology to build a web page with the function of managing to-do lists. The front end of the web page, based on the Flask structure, is built according to HTML5, CSS3 standards and the use of Bootstrap to style the website. JAVA database and mysql are used for data storage and use in the background of web pages. The wireframed model of the web pages is shown below.
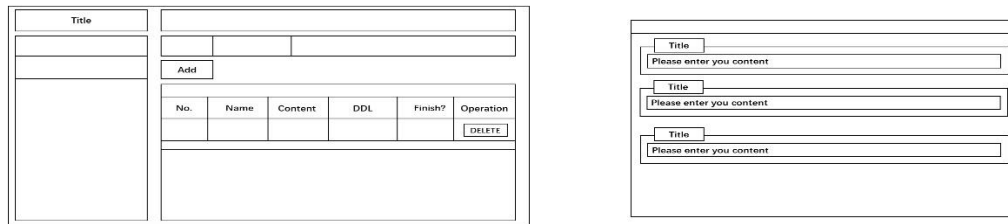

2. Replies to the required questions

## 2.1 Main features of HHTP protocol
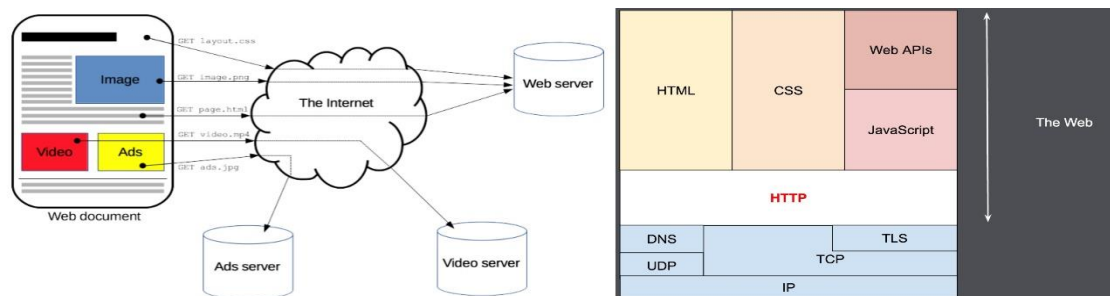
HTTP is a protocol for fetching resources such as HTML documents. It is the foundation of any data exchange on the Web, and it is a client-server protocol, which means requests are sent by one entity, the user-agent. Most of the time the user-agent is a Web browser, but it can be anything. Each individual request is sent to a server, which handles it and provides an answer called the response.
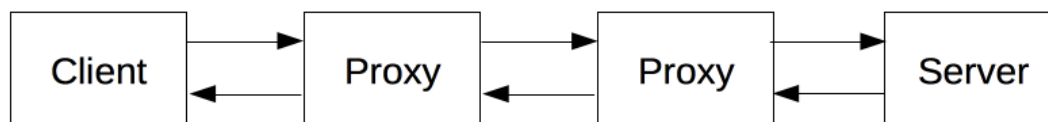
Between the client and the server there are numerous entities, collectively called proxies, which perform different operations and act as gateways or caches, for example. A complete document is reconstructed from the different sub-documents fetched, for instance, text, layout description, images, videos, scripts, and more.

2.2 The three-tier architecture of the Web
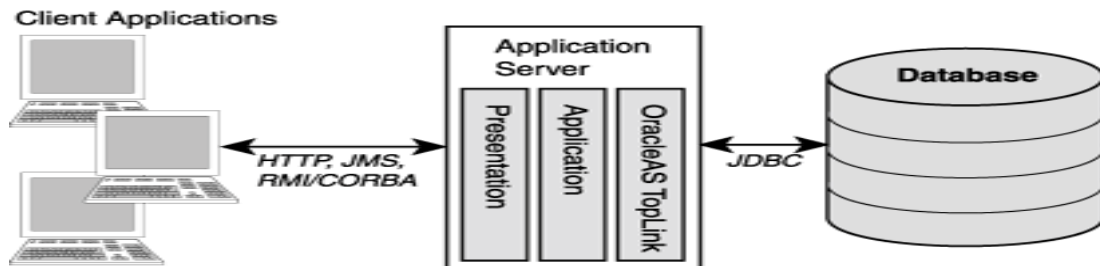
Three-tier architecture is a well-established software application architecture that organizes applications into three logical and physical computing tiers: the presentation tier, the application tier, and the data tier.

- The presentation tier is the user interface and communication layer of the application, where the end user interacts with the application. Its main purpose is to display information to and collect information from the user.

- The application tier is the heart of the application. In this tier, information collected in the presentation tier is processed.

```
Public Class LoginManager
    '登陆函数
    Public Function UserLogin(ByVal user As Model.user) As Model.user '此函数中的参数为user实体

        Dim user_da As DAL.user_DA = New DAL.user_DA()      '实例化DAL层的user_DA类
        Dim user1 As Model.user                              '定义变量user1，类型为实体类user

        user1 = user_da.SelectUser(user)                     '利用user_da对象调用DAL层user_DA类中的SelectUser()方法，验证用户。将返回的值赋给变量user1

        If (Not IsDBNull(user)) Then
            Dim wr_da As DAL.workRecord_DA = New DAL.workRecord_DA()      '实例化DAL层的另一个类workRecord_DA

            wr_da.UpWorkRecord(user)                         '用到UpWorkRecord()方法，最终更新用户登陆信息表

        End If
        Return user1

    End Function
End Class
```

- The data tier, sometimes called database tier, data access tier or back-end, is where the information processed by the application is stored and managed. This can be a relational database management system.

```
Public Class user_DA
    '验证用户名、密码
    Public Function SelectUser(ByVal user_md As Model.user) As Model.user

        Dim cn As SqlConnection = DbUtil.GetConnection()
        Dim sql As String = "select UserName,PassWord from UserInfo where UserName=@UserName And PassWord=@PassWord"
        Dim cmd As SqlCommand = New SqlCommand(sql, cn)

        cmd.Parameters.Add(New SqlParameter("@UserName", user_md.UserName))
        cmd.Parameters.Add(New SqlParameter("@PassWord", user_md.PassWord))

        cn.Open()

        Dim reader As SqlDataReader = cmd.ExecuteReader()
        Dim user As Model.user = New Model.user()
        While (reader.Read())
            If (IsDBNull(user)) Then

                user = New Model.user()

            End If
            user.UserName = reader.GetString(1)
            user.PassWord = reader(2)
        End While

        Return user

    End Function
End Class
```

2.3 Handling request in the Web

Based on an understanding of how handling request works on the Web, I draw the following diagram to illustrate how an application processes a request.
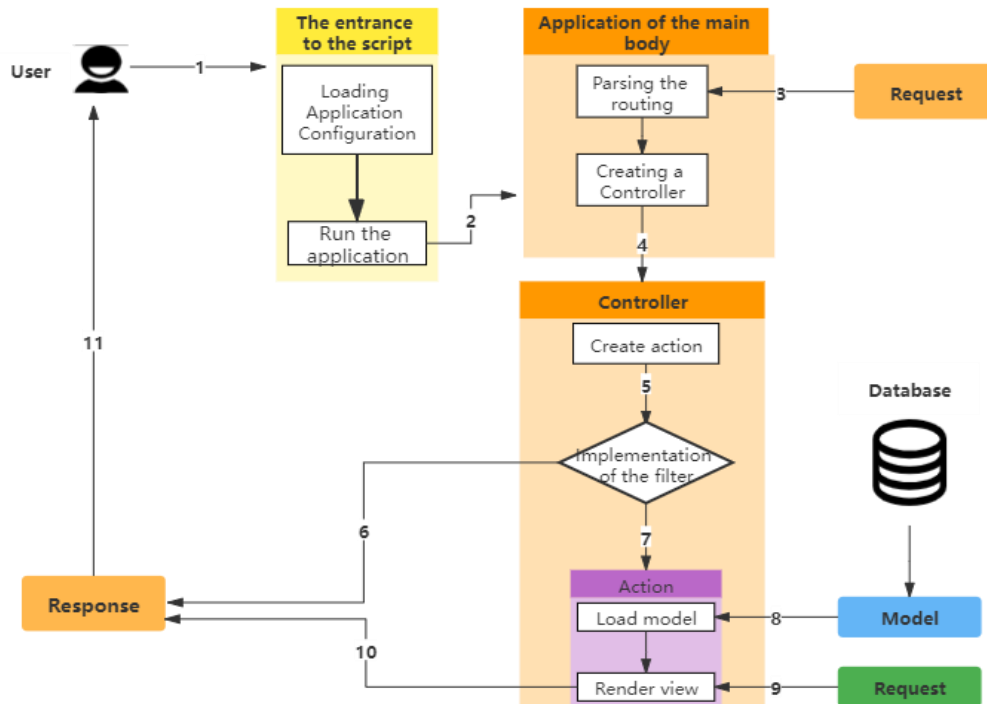
2.5 Web Security

Web security basically means protecting a website or web application by detecting, preventing, and responding to cyber threats. There are different types of technologies available for maintaining the best security standards which includes Black box testing tools, Fuzzing tools, White box testing tools, Web application firewalls (WAF), Security or vulnerability scanners and Password cracking tools. The website's security depends on the level of protection tools that have been equipped and tested on it. There are a few major threats to security which are the most common ways in which a website or web application becomes hacked. They are SQL injection, Password breach, Cross-site scripting, Data breach, Remote file inclusion and Code injection

2.4 Testing

Standard testing is a necessary process to ensure the quality of website construction. The following shows five different ways to test a website.

- Functional testing is to test whether the website function has been realized.

- Compatibility test, the purpose of the test is the website in different browsers, different operating systems, different browsing platform website front-end performance is consistent.

- The security test, that is, under the simulated attack environment, the website can still be accessed normally.

- Multi-person testing, which requires different people to test the website to comprehensively discover the problems existing on the website.

In this assignment, I used three methods: functional testing, compatibility testing and multiplayer testing. The first is functional testing. Based on the requirements of the project, I tested the design of the site to see if it had all the features. The second was compatibility testing, which I checked by opening the site in a different browser.

Browser	Google Chrome	Microsoft Edge	Firefox	360	QQ	Sougou	UC	IE	Opera
Result	√	√	√	√	√	√	√	√	√

3. Self-Evaluation

In this project, the main problem I encountered was that I was not clear about the relationship between the three layers. So, I didn't know how to connect the front end and back end of the website in the early stage of the project. Later, I learned that in the three-layer structure, each layer is not independent of each other, but closely related to each other. At the same time, the data transfer between each layer is one-way transmission by variables or entities as parameters, to achieve the realization of the function.

What I did well in this project is that have a more comprehensive understanding of the three-layer architecture and flask architecture is obtained. Second, understand how data is transferred in a three-tier structure and implements specific functions. What I can improve in the future is to strengthen the use of templating and try different testing methods. Additionally, during the development process, consider the security of the website.

4. Reference

GoodFirms. *What is Web Security and Details of Web Security*. [Online]. [Accessed 11 October 2021]. Available from: https://www.goodfirms.co/glossary/web-security/#:~:text=What%20is%20Web%20Security%3F%20Web%20security%20is%20also,breaches%20as%20physical%20homes%2C%20stores%2C%20and%20government%20locations.

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