Session: *2024-2025*	Semester: **2**
Module number:	*4525CSQR*
Module title:	Introduction to Web Development
Coursework Type	*Report-Design a Web Application* *AS1 –* ***Movie Recommendation System Design***
Module Leader:	*Dr. Hafeez Ur Rehman*

Coursework Title: **Assignment 1 of 2: Design of a Web Application**

Module Name: Introduction to Web Development
Module Code: **4525CSQR**
Level: **4**
Credit Rating: 20

Weighting: **50%**
Maximum mark available: **100**

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Hand-out Date: **February 06, 2025 at 12:00 PM**
Hand-in Date: **March 23, 2025 at 12:00 PM**
Hand-in Method: Online Submission via Canvas

Feedback Method: Summative Feedback via electronic document to student's e-mail.

Programs:

BSc (Hons) – Level 4 – Core Module

Introduction

You are required to design and document the development of a server-side web application which will be using a PHP back-end with a modern HTML5/CSS3 and JavaScript front-end, targeting the current version of the Google Chrome web browser.

This work is to be completed individually.

Learning Outcomes to be assessed

1. Evaluate client-side technologies for use in developing a website.
2. Explain server-side processing in relation to the development of a website.
5. Compare common internet communication protocols used by websites.

Detail of the task

In this assignment, you are required to write a technical design report which documents the design of a dynamic web application.

The technological and functional requirements relate to the development of a Movie/TV Show recommendation web application. Your application should present information for **ONE particular online streaming service,** this should be based on a real-world service (e.g. Netflix, Amazon Prime Video, etc.) that provides useful information about the streaming service system itself and a set of recommended movies/TV shows. You should also present additional content that is relevant to each movie/TV show, such as providing a personal recommendation score.

Your application is expected to provide content on **at least THREE individual movies/TV shows** available on the online streaming service.

The specification for the application you are designing is detailed in the **Application Requirements** section later in this specification.

You are not allowed to use generative AI to do any part of this coursework.

Detail of the Submission

There is ONE PART to this assignment:

PART 1: TECHNICAL DESIGN REPORT.

This task involves the documentation of the design of a web application that will fulfil the functional requirements specified in the *Detail of the Task* section above. The document itself should be written in Microsoft Word and supported by diagrams and screenshots.

In particular, you are expected to use Computer-Aided Software Engineering (CASE) tools such as Microsoft Visio to construct industry-standard diagrams that describe:

- The interactions between the client and server.
- The data requirements of the application.
- The structure of the web application as a interacting set of server-side web pages.
- The layout of the pages which the application comprises.

It is suggested that you use a combination of Unified Modelling Language (UML) Diagrams and Web Design Diagram Types such as Wireframes and Site Maps to support your answer.

You are also expected to do background research into the Internet Protocol Suite that underpins the technologies used to develop the application (as described in Assignment 1 and in the Application Requirements section below) and to research PHP techniques that are used in web development.

Section 1: Background Research

In this section you are asked to write a technical review of one client-side and one network technology:

- **1.1: Analysis of the TCP protocol and the TCP/IP model:** In this section, you should provide a technical summation of the TCP protocol and the 4-layer TCP/IP

model in client/server applications. In particular, you should cover the following topics for a complete answer:

- Definition of the TCP protocol acronym and associated layer in the internet architecture hourglass.
- Explain how does the TCP protocol work.
- Analysis of the main characteristics and advantages of the TCP protocol.
- A comparison of the TCP protocol with the UDP protocol
- Typical application examples in which the TCP protocol is used.
- Presentation of the layers of the 4-layer TCP/IP model with an explanation for each of those.
- A comparison of the 4-layer TCP/IP model with the OSI model.
- *Any other technical details that you feel are important to providing a detailed overview of the protocol.*

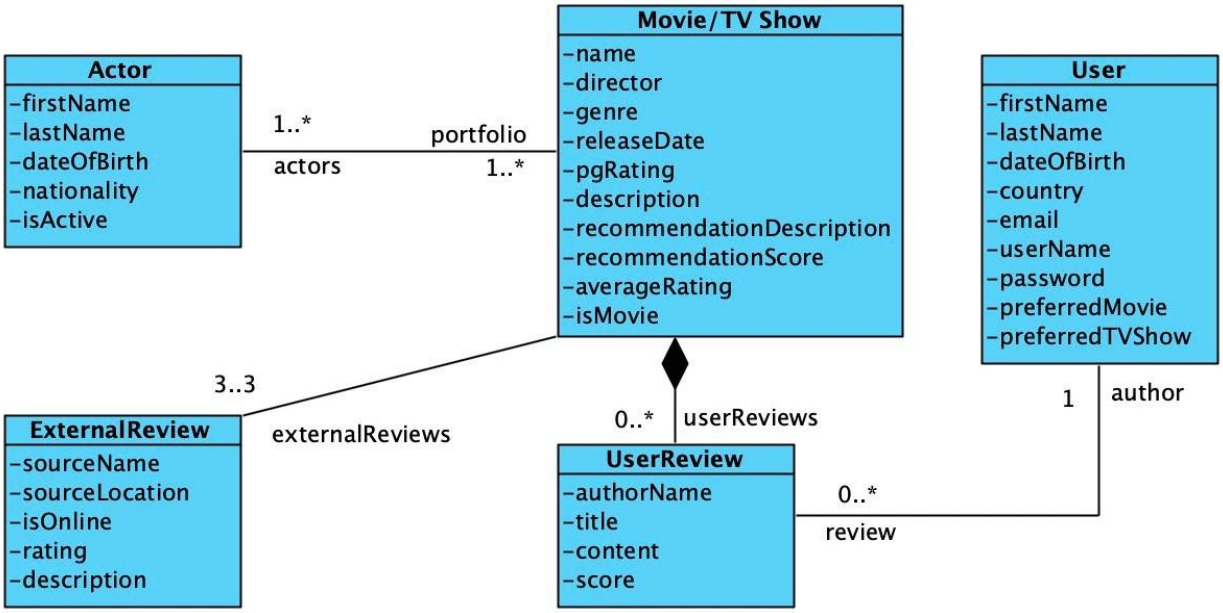
- **1.2: Existing Site Analysis:** This section, you should provide a critique of **ONE existing** movies/TV shows recommendation web application (e.g., www.imdb.com, www.themoviedb.org, www.metacritic.com, etc.).You should describe:
  - the key functionality offered by the site
  - critique the usability of the site itself in terms of
    - the responsiveness of the layout,
    - the navigation of the site and
  - the use of client-side technologies such as CSS and JavaScript
  - the search functionality
  - the review and rating facilities it offers

This section of the report is expected to be around 1000-1500 words in length; however, this is neither a strict upper nor lower bound.

Both technical report sections should be supported with appropriate diagrams and data/code samples to illustrate the concepts.

Section 2: Server-side Design

- **2.1: Examples of the Class Data:** Below you will find a partial class diagram for the system under development. Although attribute/field names are provided, their datatypes are omitted. For **EACH** of the attributes of the 5 classes provided in the class diagram, you are asked to
  - provide their **datatypes**
  - illustrate examples of data held in each field, by a typical instance of **EACH** class. You should provide at least **TWO examples** in each case. A common way of doing this to use a table, where the fields of the classes make up the columns, and the instances represent the rows.



A short description of each field is provided below

- **Actor**
  - firstName is the first name of the actor
  - lastName is the last name of the actor
  - dateOfBirth is the date of birth of the actor
  - nationality is the nationality of the actor
  - isActive is a flag that allows the system to identify if an actor is still active (i.e., plans to participate in new movies/TV Shows in the future) or has retired
- **Movie/TV Show**
  - name is the title of the movie/TV show
  - director is the name(s) of director(s)
  - genre represents the genre of the movie/TV Show
  - releaseDate stores the date when this item was released
  - pgRating represents the age rating
  - description is a short summary of the movie
  - recommendationDescription is the content of the recommendation system's review (your own review)
  - recommendationScore is the rating of your own review
  - averageRating is the average rating from all the user reviews
  - isMovie represents a flag to identify if this item is a movie or a TV show
- **User**
  - firstName is the first name of the user
  - lastName is the last name of the user
  - dateOfBirth is the date of birth of the user
  - country is the country this user is based
  - email is the email of the ser
  - userName is the username the user used to register

    - password is the selected password from the user
    - preferredMovie is the favourite movie the user has selected
    - preferredTVShow is the favourite TV show the user has selected
- **UserReview**
    - authorName is the name of the author of the review
    - title is the title of the review
    - content is the content of the review
    - score is the rating assigned by the user for the movie/TV show
- **ExternalReview**
    - sourceName is the name of the resource where the review is located (e.g., IMDB, Cinema Magazine, etc.)
    - sourceLocation is either the URL (if online) or the physical location (if paper) of the source
    - isOnline is a flag to show if the source is hosted online or it is a hardcopy (e.g., magazine, newspaper)
    - rating is the score of the review
    - description is the content of the review

- **2.2: Server-Side Logic Activity Diagram:** Use an activity diagram to show the workflow for how the server generates and renders the following page:
    - Presenting the individual movie/TV show details view (including key facts, user/external reviews, scores, etc.) of the highest scoring movie/TV show.

- **2.3: Site Map:** In this section, you should describe how the functionality of the application is split across a set of PHP pages and the purpose of each page. You should also illustrate the **link structure of your site** (*how the pages are connected to each other, **with examples of the data that is transmitted in the HTTP GET/POST Requests from one page to another (if any)**).* *The Conceptual Web Site template in Visio, with some annotation on connectors, is suitable for this purpose.*

Section 3: Client-side Design

In this section, you are to use Wireframe design (*using the tools specified in the Required Resources section below*) to present your design for the client-side of your web application.

- **3.1: Application Master Page:** In this section, you should present the layout of the common interface elements that are shared between the pages that comprise your application. You should demonstrate both the mobile and desktop view.

- **3.2: Navigation Systems:** In this section, you should present the navigation systems that will be used within your application. The navigation system should also show which pages the UI controls point to.
- **3.3: Example Application Page Designs:** In this section, you should present the layout and structure of the:
    - The *individual movie/TV show details* view
    - The movie/TV shows *ranking* view.

Again, you are expected to use annotated wireframes for this design element.

Sections 2 and 3 is expected to consist of between 10-15 pages, but this is neither a strict upper or lower limit.

Supporting Information: Application Requirements / Specification

The web application you are writing the design specification for should provide the following **functionality to the user**: You MUST produce: **ONE technical design document (stated above)** that describes how this specification can be implemented as a dynamic web application.

Application Pages

The application should provide at least the following **application views (a view can be considered as either a page, or an aspect of a page)**:

- The **home page view** should provide a summary view of at least **THREE** of the movies/TV Shows available on the site AND links to the description page (see below: streaming service overview page) of your chosen streaming service AND links to the individual page for each individual movie/TV Show (see below: individual movie/TV show view).
- An **individual movie/TV Show view** for each of the recommended movies/TV Shows which presents information on the movie/TV Show (e.g. name, director, cast, release date, age rating etc). This view also displays ALL the user contributed reviews associated with the movie/TV Show.
- A **ranking view** which presents a table of all the movies/TV Shows, with key information, including your review score and average user score.
- A **streaming service overview page**, which presents important information about your chosen streaming service.
- Each of the views/pages should be hyperlinked together with some form of **master page/common layout** containing content that is present **across all pages of the application**, such as a global navigation scheme – the layout of this navigation is up to you.

Functional Requirements:

Your web application should provide the following **functionality to the user**:

- *Provide a description, recommendation and supporting information on at least **THREE MOVIES/TV SHOWS.** They can be any movie/TV show that was been released before the hand-in deadline but it should be PG-13 or lower.*
- *Each movie/TV Show should have the FOLLOWING CONTENT with it:*
  - An editorial recommendation (your own review) - this does not need to be more than a couple of paragraphs.
  - A recommendation score (out of 10) – the score you award is up to you – scores DO NOT need to be unique across the movies/TV Shows.
  - A key facts section which provides details about the Movie/TV Show (e.g., director, release date, cast, duration, age rating, genre, etc.). **It is for you to determine the key facts.**
  - Links to **THREE OFFICIAL** reviews from an external review source (e.g. a magazine review, newspaper review or movie/TV shows review site such as IMDB, Metacritic, etc).
  - The site should also support **USER REVIEWS**; these are reviews posted by users of the site. If there are no user reviews for a given movie/TV show, this should be made clear to the user. The site should not support anonymous reviews. This data should be gathered from logged in user (see profile system) stored in a JSON file.
  - The user reviews should provide a rating for the movie/TV show out of 10.

- *The application should have a user profile system*:
  - As a minimum, the user should have to specify their username and password to log in.
  - Users do not have to log in to view the content of the site, **only to post reviews on movies/TV shows.**
  - How the users post a review is up to you (could be a separate page or incorporated into one of the other required pages).
  - When logged in, the user's name should be displayed. This should be present the whole time they are logged in, regardless of what part of the site they are on.
  - ADDITIONAL MARKS will be awarded for:
    - Storing information on the user (e-mail address, etc)
    - Profile Specific information (e.g. allowing them to pick a favourite movie/TV show from the list of movies/TV shows or showing reviews they have made).
    -
- *The application should have a ranking system, which displays all movies/TV shows as a table:*
  - You will also be awarded marks based on how informative and concise the table is (e.g. your choice of columns) – as a minimum, it should include your Recommendation Score.
  - Higher marks for being able to sort this table of information based on these categories and their rating.
  - It is up to you how you determine the overall rating of a movie/TV show based on the reviews.

- *The application should have a streaming service overview page, presenting useful information about your chosen streaming service.*
  - This could be information about the streaming service, *different subscription plans and prices, description of the service, availability of application for different platforms (e.g., mobile app, browser app, Smart TV app, etc.).*
  - You can use content from other sites and multi-media sources to help present this information.
  - This page should be creatively presented and make use of different types of media (Text, Images, Videos, Web APIs etc).

Required Resources

You will be expected to use the following software packages to create your report:

- Microsoft Word
- Microsoft Visio
- A Wireframing Design Tool; such as
  - the freely-available Pencil (http://pencil.evolus.vn/) or
  - Free Trial of Balsamiq Desktop (https://balsamiq.com/)
- Google Chrome Developer Tools.

LJMU Students have free access to Microsoft Office 365 and Department of Computer Science students have free access to Microsoft Visio
(https://canvas.ljmu.ac.uk/courses/43115/pages/home-use-software)

What you should hand in
This assignment has ONE deliverable that forms your complete submission.

DELIVERABLE 1: **TECHNICAL DESIGN REPORT**

Your design report should be submitted via the Canvas Assignment Handler found under the assignments section of the module's site. The document should be uploaded in Word (.docx) format. Diagrams and screenshots should be inserted into the report document in PNG/JPEG format.

Marking Scheme/Assessment Criteria
Your submission will be summatively assessed using the following marking scheme:

Assessment Criteria	% weighting for each problem part
Technical Design Report	**100**
Section 1: Background Research	**30**
1.1 Analysis of the TCP protocol and the TCP/IP model	(15)
1.2 Existing Site Analysis	(15)
Section 2: Server-Side Design	**30**
2.1 Examples of the Class Data	(10)
2.2 Server-Side Logic Activity Diagram	(10)
2.3 Site Map	(10)
Section 3: Client-Side Design	**30**
3.1 Application Master Page Wireframe	(10)
3.2 Navigation System Wireframe	(10)
3.3 Example Application Page Designs	(10)
Document Presentation	**(10)**
TOTAL	**100**

Your overall mark is the sum of the weighted marks for each section.

Recommended reading
The following resources are recommended to assist you in the completion of the report
Many of the below are available as e-book resources which can be accessed for free – see the module reading list for more details:

- Computer Networking: A Top-Down Approach (5th Edition); Kurose, James; Ross, Keith, Pearson, 2009.
- Tatroe, Kevin, Lerdorf, Rasmus, & MacIntyre, Peter. (2013). Programming PHP (3rd ed.). Sebastopol, CA: O'Reilly Media.
- Using UML: Software Engineering with objects and components; Stevens, Perdita; Pooley, Rob, Addison-Wesley, 2006.
- https://webdesign.tutsplus.com/articles/a-beginners-guide-to-wireframing--webdesign-7399

The weekly laboratory sessions will cover design tasks that will help you understand the software engineering practices you will have to perform in order to produce your design.

Extenuating Circumstances

If something serious happens that means that you will not be able to complete this assignment,

you need to contact the module leader as soon as possible. There are a number of things that can be done to help, such as extensions, waivers and alternative assessments, but we can only arrange this if you tell us. To ensure that the system is not abused, you will need to provide some evidence of the problem.

More guidance is available at https://www.ljmu.ac.uk/about-us/public-information/student-regulations/guidance-policy-and-process

Academic Misconduct

The University defines Academic Misconduct as 'any case of deliberate, premeditated cheating, collusion, plagiarism or falsification of information, in an attempt to deceive and gain an unfair advantage in assessment'. This includes attempting to gain marks as part of a team without making a contribution. The Faculty takes Academic Misconduct very seriously and any suspected cases will be investigated through the University's standard policy (https://www.ljmu.ac.uk/about-us/public-information/student-regulations). If you are found guilty, you may be expelled from the University with no award.

It is your responsibility to ensure that you understand what constitutes Academic Misconduct and to ensure that you do not break the rules. If you are unclear about what is required, please ask.

For more information you are directed to following the University web pages:

- Information regarding ***academic misconduct***: (https://www.ljmu.ac.uk/about-us/public-information/student-regulations/academic-misconduct).
- Information on ***study skills***: https://www.ljmu.ac.uk/microsites/library/skills-ljmu/academic-study-skills
- Information regarding ***referencing***: https://www.ljmu.ac.uk/microsites/library/skills-ljmu/referencing-and-endnote