

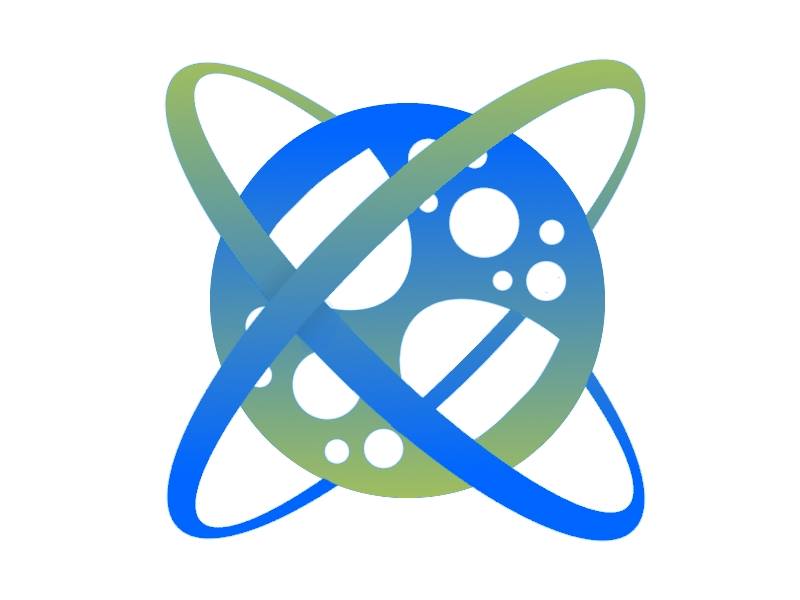
**Software Process, SOEN 341/4 S, Winter 2016**

Dr. Shang

Dr. Fancott

Mr. Morse

**TimeTurner** by team YAWD

****

**Project Scope and Plan Document – Deliverable 1**

|  |  |
| --- | --- |
| **Team members information** | |
| **Name** | **SID** |
| **Daniel Di Corpo** | **26331602** |
| **Dimitri Topaloglou** | **29358269** |
| **Claudia Della Serra** | **26766048** |
| **Philip Lim** | **27485506** |
| **Aline Koftikian** | **27764162** |
| **Ryan Lee** | **27752504** |
| **Erin Benderoff** | **27768478** |
| **Ideawin-Bunthy Koun** | **26314155** |
| **Kevin Yasmine** | **27195346** |
| **Marc-Andre Leclair** | **27754876** |
| **Lori Dalkin** | **27738293** |
| **Bryce Drewery-Schoeler** | **27283199** |

**Grading Sheet**

|  |  |  |
| --- | --- | --- |
| **Section** | **Evaluation criteria (see instructions in the template for details)** | **Grading** |
| all | 10 marks are allocated for excellence, professionalism and quality of work above and beyond the correct meeting of specifications.. | /10 |
| 1 | Presentation of this document | /5 |
| 2 | Completeness and accuracy with regard to initial project description | /1 |
| 3.1 .  .  3.2  3.3 | Completeness and accuracy of the project functional requirements expressed as formal use cases, including difficulty and importance indicators  completeness and accuracy of the diagram and description of the domain model  completeness and accuracy with regard to initial project description accuracy with regard to initial project description, difficulty and importance ratings | /15  .  /3 .  /1 |
| 4.1 | Description of all team members’ capacities and schedule restrictions | /1 |
| 5 | List of goals removed from the project.  For each goal removed, give justifications in light of the resources available | /`1 |
| 6.1 .  6.2 | Clarity of textual description, validity of rationale, clarity and appropriateness of diagram, list of modules responsibilities  List of technologies used, validity of rationale | /2 .  /1 |
| 7.1 .  7.2 .  7.3 .  7.4  7.5  7.6 | Completeness of list of activities, clarity of their stated purpose, as well as statement of what artifacts they are producing  Completeness of list of artifacts to be produced during the project, validity of roles description of each artifact  Cost estimation of each individual artifact, validity of explanation of cost estimation, total cost estimate  Mapping of activities to individual project members  Accurate and complete presentation of milestones  *Assessment of risks `* | /1 .  /2 .  /2 .  /1  /1  /1 |
| 8 | Early Prototyping | /2 |
| Total |  | /50 |

**DO NOT REMOVE THIS PAGE WHEN SUBMITTING YOUR DOCUMENT**

**TABLE OF CONTENTS**

[1. Introduction 6](#_Toc442630415)

[2. Project Description 6](#_Toc442630416)

[3. Goals and Constraints 7](#_Toc442630417)

[3.1 Functional Requirements 7](#_Toc442630418)

[3.2 Domain Model 7](#_Toc442630419)

[3.3 Constraints and Qualities 8](#_Toc442630420)

[**3.3.1** **Security** 8](#_Toc442630421)

[**3.3.2** **Performance** 8](#_Toc442630422)

[**3.3.3** **Cross-Browser Compatibility** 9](#_Toc442630423)

[**3.3.4** **Ease of Use** 9](#_Toc442630424)

[4. Resource Evaluation 9](#_Toc442630425)

[4.1 Human Resources 9](#_Toc442630426)

[4.2 Technical Resources 14](#_Toc442630427)

[5. Scoping 14](#_Toc442630428)

[6. Solution Sketch 15](#_Toc442630429)

[6.1 Architecture 15](#_Toc442630430)

[6.2 Technologies in Use 15](#_Toc442630431)

[**6.2.1** **Programming Languages** 15](#_Toc442630432)

[6.2.1.1 Server-side 15](#_Toc442630433)

[***6.2.1.2*** ***Client Side*** 15](#_Toc442630434)

[6.2.2 IDEs 16](#_Toc442630435)

[***6.2.2.1*** ***PhpStorm 10*** 16](#_Toc442630436)

[**6.2.3** **Database Management System** 16](#_Toc442630437)

[***6.2.3.1*** ***MySQL*** 16](#_Toc442630438)

[**6.2.4** **Web Server** 16](#_Toc442630439)

[***6.2.4.1*** ***XAMPP (v1.8.1)*** 16](#_Toc442630440)

[6.2.5 Source Code Revision Management 16](#_Toc442630441)

[***6.2.5.1*** ***GitHub*** 16](#_Toc442630442)

[6.2.6 Deployment Software 17](#_Toc442630443)

[***6.2.6.1*** ***DeployHQ*** 17](#_Toc442630444)

[6.2.7 Team Collaboration 17](#_Toc442630445)

[6.2.7.1 Trello 17](#_Toc442630446)

[6.2.8 Framework 17](#_Toc442630447)

[6.2.8.1 Yii 17](#_Toc442630448)

[7. Plan 17](#_Toc442630449)

[7.1 Activities 17](#_Toc442630450)

[7.2 Artifacts 22](#_Toc442630451)

[7.2.1 1.2. Project Description 22](#_Toc442630452)

[7.2.2 1.3.1 Functional Requirements 22](#_Toc442630453)

[7.2.3 1.3.2. Domain Model 23](#_Toc442630454)

[7.2.4 1.3.3. Constraints and Qualities 23](#_Toc442630455)

[7.2.5 1.4.1. Human Resources 23](#_Toc442630456)

[7.2.6 1.4.2. Technical Resources 23](#_Toc442630457)

[7.2.7 1.5. Scoping 24](#_Toc442630458)

[7.2.8 1.6.1. Architecture 24](#_Toc442630459)

[7.2.9 1.6.2. Technologies in Use 24](#_Toc442630460)

[7.2.10 1.7.1. Activities 24](#_Toc442630461)

[7.2.11 1.7.2. Artifacts 24](#_Toc442630462)

[7.2.12 1.7.3. Project Estimates 25](#_Toc442630463)

[7.2.13 1.7.4. Activities Assignments 25](#_Toc442630464)

[7.2.14 1.7.5. Schedule 25](#_Toc442630465)

[7.2.15 1.7.6. Risk 25](#_Toc442630466)

[7.2.16 1.8. Prototyping 25](#_Toc442630467)

[7.2.17 2.2. Introduction to Part 2 26](#_Toc442630468)

[7.2.18 2.3.1. Architecture Diagram 26](#_Toc442630469)

[7.2.19 2.3.2. Subsystem Interfaces Specification 26](#_Toc442630470)

[7.2.20 2.4.1. Detailed Design Diagram 26](#_Toc442630471)

[7.2.21 2.4.2. Unit Description 26](#_Toc442630472)

[7.2.22 2.5. Dynamic Design Scenario 27](#_Toc442630473)

[7.2.23 2.6. Estimation 27](#_Toc442630474)

[7.2.24 2.7. Rapid Prototyping and Risk 27](#_Toc442630475)

[7.2.25 3.2. Introduction to Part 3 27](#_Toc442630476)

[7.2.26 3.3.1.1. Tested Items 27](#_Toc442630477)

[7.2.27 3.3.1.2. Untested Items 27](#_Toc442630478)

[7.2.28 3.3.2.1. Unit Testing 28](#_Toc442630479)

[7.2.29 3.3.2.2. Requirements Testing 28](#_Toc442630480)

[7.2.30 3.3.2.3. Stress Testing 28](#_Toc442630481)

[7.2.31 3.3.2.4. Security Testing 28](#_Toc442630482)

[7.2.32 3.4.1. Installation Manual 28](#_Toc442630483)

[7.2.33 3.4.2. User’s Manual 28](#_Toc442630484)

[7.2.34 3.5. Final Cost Estimate 29](#_Toc442630485)

[7.3 Project Estimates 29](#_Toc442630486)

[7.4 Activities Assignments 29](#_Toc442630487)

[7.5 Schedule 32](#_Toc442630488)

[7.6 Risk 32](#_Toc442630489)

[8. Prototyping 33](#_Toc442630490)

# Introduction

Every year, newly admitted students at Concordia University are delegated a course sequence based on their matriculated program. Students are required create a schedule for themselves based on this course sequence and follow it thoroughly until the end of their degree. New students doing this on their own for the first time, and even experienced students, may encounter a number of difficulties when making schedules to fit this sequence, such as struggling to meet proper course prerequisites and managing time conflicts amongst multiple courses. This process is often long, tedious, and takes away from valuable time students may instead spend studying, working, or engaged in extracurricular activities. The following project, developed by a group of 12 undergraduate Software Engineering students at Concordia University, was created to simplify this process.

TimeTurner will be a web application implemented by Concordia University in order to aid students in planning and creating a schedule of courses for the duration of their degrees. Important factors to be kept in mind throughout the creation of this software system are ease of use, efficiency, speed, and overall effectiveness of the application in making scheduling of classes quick, easy, and personalized to students’ needs. Students will be given a sequence of classes recommended to them by their faculty, much the same as current students in the Faculty of Engineering and Computer Science are given at the start of their degrees. Based on this sequence and each student’s preferences, personalized schedules will be generated for the students’ entire degree, thus saving the students much time and energy.

# Project Description

The proposed and outlined web application, known as TimeTurner, is designed to auto-generate a student’s course sequence from their first semester up until the end of their degree. It takes into account user input preferences and and any previously completed courses or course prerequisites before creating this sequence. Preferences can be made by the student and include options such as night classes or having particular days off. The application will notify the user if a certain preference suggested results in an impossibility or conflict in the sequence. This sequence generator will be able to create a sequence at any point throughout the user’s degree, if sudden change in circumstances were to arise.

The goal of this application is to simplify the method with which students may decide and schedule their courses. If a course must be redone, the generator can decide what other courses should move where in regards to the remaining courses to be completed, which can be done in seconds, rather than hours. It saves the time of the user, in a simple and efficient manner. Ultimately, the system’s end goal will be to simplify a student’s task of creating their own course schedule in order to allow students to redirect their time to other more important activities, thus making course registration much simpler, quicker, and easier.

# Goals and Constraints

## Functional Requirements

This section should describe the requirements that the software shall have. It should define the fundamental actions that must take place in the software in accepting and processing the inputs and in processing and generating the outputs.

The overall functional requirements shall be presented graphically as a use case model.

Each individual requirement shall be presented as a use case. Also, each requirement should be rated in terms of difficulty and importance in order to provide useful discrimination factors for the project scoping presented in section 5.

## Domain Model

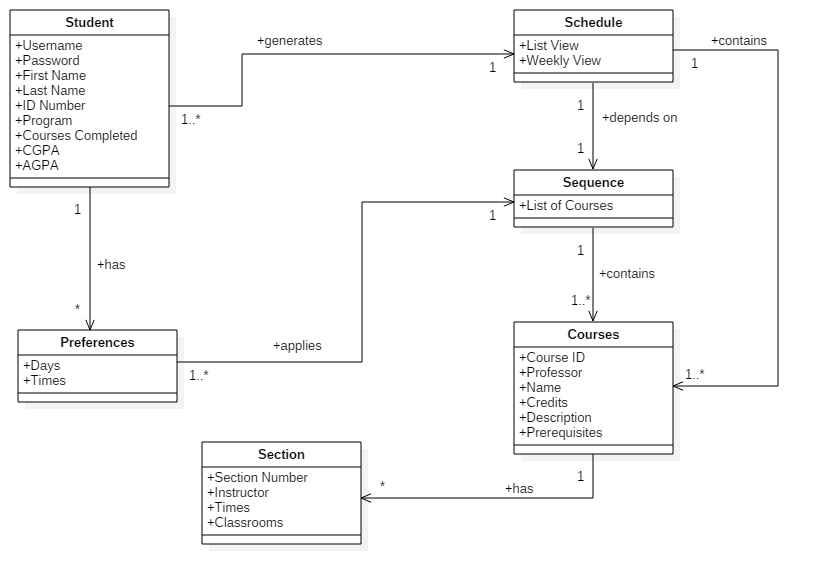


Figure 2. Domain Model

## Constraints and Qualities

### **Security**

Security is a crucial aspect of any software. One of the most important security requirements is to make sure there are no SQL injections that could breach and break our database. In order to assist in preventing SQL injections, we will be using prepared statements prior to query executing which is provided by PHP’s internal libraries. The possibility of having the database breached could potentially expose user personal user information or perhaps destroy content. The exposure of passwords is a concern in case of breach as they should be hashed and salted upon entry by using hashing algorithms such as *sha512* and *bcrypt*. This would essentially diminish any chance hackers have to brute force password entries.

### **Performance**

Performance is important especially when working with large data sets. The user must be able to navigate and use the site without having to wait for data generation. The application shall also ensure that database design is robust with the use of proper table indexing and storage engines and cache sizes. This will essentially allow for quicker SQL query executions that are expected to return data within 100 nanoseconds. The performance shall also account for larger data execution, such as the schedule generator with a performance factor speed of no more than 5 seconds.

### **Cross-Browser Compatibility**

There are cases where web applications do not necessarily comply with all possible web browsers. For example, certain aspects of CSS and HTML might work for one browser but break in another. This application shall ensure that the CSS and HTML model will be compliant with the browser’s boundaries. Ensuring browser compliance, the application shall be able to run on virtually any operating system that has any of the following browsers: Safari, Opera, Internet Explorer, Firefox and Chrome.

### **Ease of Use**

The application shall be straightforward and lightweight in order to ensure that students can start working on their schedule planner immediately. The use of Ajax technology will also minimize content and page refreshes thereby allowing users to navigate without losing the scope of the data they were working on.

# Resource Evaluation

## Human Resources

Our team of Undergraduate Students is a strong team of 12 individuals with varying skills and strengths. Our team has a diverse background, both socially and in terms of past work experiences. We also possess a good gender ratio of 7 males and 5 females. With both knowledgeable leaders and dedicated team players, we work efficiently together while also complementing each other’s strengths and weaknesses. Each member of our team brings their own outlook towards the project that will ultimately create a well-rounded project that can fit the needs of many. Below are the names of the 12 members along with the following information:

* The different skills and knowledge of languages they possess.
* Their experiences with past occupations, school projects and personal projects. Other relevant experiences that can add insight towards the project.
* Their primary role during the project.
* Their strengths that will help towards the success of the project.
* Their approximate availability per week, including both group meetings and personal work time.

|  |  |
| --- | --- |
| **Name** | **Daniel Di Corpo** |
| **Skills** | C++, JAVA, PROLOGUE, LISP, PHP, HTML |
| **Experience** | Technical DEC in Comp. Sci., Image Programing Specialist at Matrox |
| **Role** | Project Team Lead, System Architecture and Distribution of Tasks |
| **Strengths** | Leadership, Team Player, Management skills, Communication |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Dimitri Topaloglou** |
| **Skills** | PHP, CSS, C++, C#, HTML, SQL, JAVASCRIPT, JQUERY, JAVA, PROLOGUE, CLOS, ASP.NET |
| **Experience** | Seven years of experience in web application development. |
| **Role** | Coding team Technical Lead, system designer, frontend + backend developer |
| **Strengths** | Advanced coder, quick learner, opened to new ideas |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Claudia Della Serra** |
| **Skills** | HTML, CSS, JAVA,  JAVASCRIPT, PROLOGUE, LISP, CLOS, ASPECTJ, PYTHON |
| **Experience** | Developed 2 Android applications, certified tutor in English reading and writing, multiple years of experience in document editing. |
| **Role** | Documentation Team Lead, writing, editing and consolidation of documents |
| **Strengths** | Quick learner, team player, leadership and management skills |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Aline Koftikian** |
| **Skills** | JAVA, HTML5, CSS3, JAVASCRIPT, C#, PROLOG, ASPECTJ, COMMON LISP, PYTHON |
| **Experience** | Developed two mobile (Android) applications w/ teams. |
| **Role** | Documentation team member, in charge of diagrams + logo |
| **Strengths** | Team player, open minded, organized |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Kevin Yasmine** |
| **Skills** | JAVA, HTML5, CSS3, JAVASCRIPT, PROLOG, ASPECTJ, COMMON LISP, CLOS, Photoshop/Paint.Net |
| **Experience** | Class projects/assignments, extracurricular Android App Development using Android Studio. |
| **Role** | Documentation team member |
| **Strengths** | Team player, ability to see the big picture in large projects |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Ideawin-Bunthy Koun** |
| **Skills** | JAVA, HTML5, CSS3, PHP, JAVASCRIPT, PROLOG, ASPECTJ, COMMON LISP |
| **Experience** | Academic projects/assignments, attended two hackathons where Android Studio was used, developed Android applications. |
| **Role** | Coding team member as a Front-End developer |
| **Strengths** | Fast learner, eager to learn new technologies, team player |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Philip Lim** |
| **Skills** | JAVA, HTML5, CSS3, JAVASCRIPT, PHP, MYSQL, PROLOG, COMMON LISP |
| **Experience** | Completed an internship as a programmer analyst: involved Java programming using IntelliJ IDEA and documenting the code  Developed an apartment renting website (academic project)  Completed various academic assignments/projects in Java |
| **Role** | Documentation team member |
| **Strengths** | Flexible, active listener, team player |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Ryan Lee** |
| **Skills** | JAVA, HTML, CSS, JAVASCRIPT, PHP, PROLOG, LISP, C#, PYTHON, RUBY |
| **Experience** | Competed in 2 hackathon and made applications using java and android studio, implementing APIs provided by companies. |
| **Role** | Documentation team member |
| **Strengths** | Team player, Communicative abilities, problem solving |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Lori Dalkin** |
| **Skills** | PHP, CSS, HTML,  JAVASCRIPT,  JAVA, PROLOGUE, CLOS, ASPECTJ, PYTHON(basic), C#(basic) |
| **Experience** | Attended two hackathons where two android apps using java and android studio were developed. |
| **Role** | Coding team member. Back end and front end developer. |
| **Strengths** | Quick learner, enthusiasm for learning new languages, creative. |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Bryce Drewery Schoeler** |
| **Skills** | PHP, CSS, HTML,  JAVASCRIPT,  JAVA, PROLOGUE, ASPECTJ, PYTHON, C++, C# |
| **Experience** | Developed android apps at hackathons. |
| **Role** | Coding team member. Back end and database developer. |
| **Strengths** | Enthusiastic learner, Good grasp of theoretical computer science. Excellent at solving logical problems. |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Erin Benderoff** |
| **Skills** | PHP, CSS, HTML, JAVASCRIPT, JAVA, PROLOG, CLOS, ASPECTJ, PYTHON (beginner), MySQL |
| **Experience** | Made two Android applications at hackathons |
| **Role** | Coding team member. Mainly front end but will also do a bit of back end. |
| **Strengths** | Detail-oriented, motivated, fast learner, easy to get along with |
| **Availability** | 7 hours/week |

|  |  |
| --- | --- |
| **Name** | **Marc-Andre Leclair** |
| **Skills** | PHP, CSS, HTML, JAVASCRIPT, JAVA, PROLOG, RUBY, C#, Visual Basic.net, MySQL |
| **Experience** | Created two android app at two different hackathons |
| **Role** | Coding team member. Mostly back end attending to php and the database but also some front-end |
| **Strengths** | Love to learn, strong team player, fast learner |
| **Availability** | 8 hours/week |

## Technical Resources

Each developer’s computer must have the same XAMPP version installed in order to align the Apache and PHP version as found in the production environment. This is to avoid any conflicts and bugs which can be caused due to incompatible versions of PHP or Apache’s server core files.

XAMPP (64-bit environment) includes the following pre-installed software packages:

* Database: MySQL 5
* Web Server: Apache HTTP Server 2.0
* Primary language: PHP 6.0 and Python 2.7
* Database User Interface: phpMyAdmin

The production environment in question has the following infrastructure:

* CPU: Intel i7
* OS: Windows Server 2012
* RAM: 16GB
* DISK DRIVE: 500 GB (Solid State)
* Network Speed: 10 Mbps

The production environment is hosted on a team member’s own computer. This decision was made in order to have a better overlook of the server and have complete control of the environment.

Main software packages used in the project include:

* Languages: HTML, CSS, PHP, JQuery, JavaScript, SQL
* IDE: PhpStorm 10
* Framework: Yii 1.1.16
* Version Control Systems: GitHub, Gitbash, GitHub Desktop
* Team Collaboration Tools: GitHub, Facebook Chat, Trello
* OS: Windows, Linux
* UML and Diagrams: StarUML
* Documentation tools: Google Drive, Microsoft Word
* Graphical Design Tool: Photoshop

# Scoping

With regard to the cost/time necessary to meet all the goal presented in section 3, and given the resources available presented in section 4, give here the scope of the solution that you will implement in the project.

List all features/goals/qualities that will be left out because of lack of time/resources.

# Solution Sketch

## Architecture

Explain the high-level system architecture that you plan for the project, giving explanations as to why you chose such an approach, e.g. a design rationale. Include a high-level architecture diagram (e,g, a high-level UML class diagram). For each module presented in the architecture, also give its rationale, as well as list their individual responsibilities.

## Technologies in Use

### ProgrammingLanguages

Server-side

6.2.1.1.1 PHP

PHP is the main server-side language that will be handling business logic and SQL database queries. PHP was chosen due to the syntax similarities of other major Object-Oriented programming languages, allowing for a quicker learning experience.

#### ***Client Side***

6.2.1.2.1 JavaScript

JavaScript a multi-paradigm scripting language that is supported and natively embedded by all major browsers including Internet Explorer, Firefox, Safari and Chrome. It is mainly used for dynamic client side manipulation of the DOM and allows for a dynamic browsing experience.

6.2.1.2.2 jQuery

jQuery is essentially a JavaScript script library that allows programmers to write less lines of code in order to perform the same functionality in the native JavaScript environment. It allows for quick DOM manipulation with very few lines of code, animations, client side validation, form input handling and quick Ajax calls.

6.2.1.2.3 HTML (Hyper Text Markup Language)

HTML is the primary markup language used to create web layout and provide structure to web content. Of course, it is also natively supported in every major web browser.

6.2.1.2.4 CSS (Cascading Style Sheet)

CSS is used primarily for styling purposes that is supported by all major browsers with some detailed exceptions in portability. The essence of CSS is to separate styling from the markup language, such as HTML.

IDEs

#### ***PhpStorm 10***

PhpStorm is a powerful IDE provided by JetBrains that is integrated with an extensive Git support system and provides direct database management without the use of any other third party application.

### DatabaseManagementSystem

#### ***MySQL***

MySQL is an open-source database management system that provides more than enough features required to for the scope of the web application. It also provides InnoDB storage engine access which supports transactions, enabling to undo database query commits.

### WebServer

#### ***XAMPP (v1.8.1)***

XAMPP 1.8.1 is a free open-source, cross-platform web server solution package which includes Apache HTTP Server, MySQL and PHP functionalities.

Source Code Revision Management

#### ***GitHub***

GitHub is a popular source code revision management system that allows for developers to clone source code repositories and provide a non-destructive means of working in isolation from the original repository. In turn, this provides a better overview of which developer is working on which portion of the code, thereby providing a flexible version control workflow.

Deployment Software

#### ***DeployHQ***

DeployHQ is an online service that allows automatic and manual deployment of sources code from any type of repository service such as GitHub. It is used to automatically deploy source code directly to the main hosting server from a selected GitHub branch of your choice in a seamless manner. The service is installed via a webhook service, integrated within GitHub and source code deployment occurs upon a commit done in the master branch. It also provides rollback options.

Team Collaboration

Trello

Trello is a free team collaboration tool that organizes task into board spaces. It provides an overview of what tasks need to be done, tracks due dates and assigns tasks to collaborators. It also provides a mobile app version which allows to push notifications to users’ mobile when the project board was updated, allowing collaborators to respond to tasks accordingly.

Framework

Yii

Yii is a highly extensible, open source framework designed for web applications and is based on an MVC architecture. It shortens development time with the use of Gii, an incorporated tool that quickly creates on-the-fly templates for models, controllers, forms, modules, extensions and CRUD control actions and views. This allows developers to minimize repetitive tasks and enforces the MVC architecture according to Yii’s specifications. It also comes with a pre-built web template to allow unfamiliar developers to get a quick start in learning how to properly create models, views and controllers.

# Plan

## Activities

|  |  |  |
| --- | --- | --- |
| Activity | Purpose/Description | Artifact(s) produced |
| 7.1.1  Form and divide team | Forming a team allows the project to start. Dividing the team into a coding and documentation sub-teams allows members to focus on particular tasks. Such division requires the evaluation of the strengths and weaknesses of all members to determine their role. | 1.4.1 Human Resources |
| 7.1.2  Complete the system overview | The system overview consists of finding a name for the system, determining the main purposes and elements involved in it, and drawing a domain model of the system along with the description of each entity found in the domain model. | Deliverable 0  1.3.2 Domain Model |
| 7.1.3  Write a project description | The project description introduces the entire document. It informs the reader about its goals, the information to be found in it, as well as the purposes and objectives of the project. | 1.2 Project Description |
| 7.1.4  Determine the functional requirements and draw use case diagrams accordingly | Determine the requirements that the system should have, including those that may later be scoped out, their relative importance and relative difficulty. Define the actions that must take place in the software and illustrate each requirement by the mean of a use case diagram. | 1.3.1 Functional Requirements |
| 7.1.5  Review and correct domain model | Make any necessary changes according to the feedbacks of Deliverable 0. | 1.3.2 Domain Model |
| 7.1.6  Find and describe constraints and qualities | Describe any design constraints, qualities and non-functional requirements that the system should meet. | 1.3.3 Constraints and Qualities |
| 7.1.7  Review and format human resources document | After the profile of each team member has been determined, the document should be revised and formatted correctly. | 1.4.1 Human Resources |
| 7.1.8  Determine technical resources | List the computer resources and tools available to complete the project. | 1.4.2 Technical Resources |
| 7.1.9  Reduce the amount of features to be realistic according to time and resources | Outline the scope of the software. List all features, goals and qualities that are scoped out, and provide an explanation for each element that is scoped out. | 1.5 Scoping |
| 7.1.10  Choose the architecture of the system | Explain the high-level architecture of the system, and give a design rationale. A diagram should accompany the explanation. | 1.6.1 Architecture |
| 7.1.11  Decide which technologies are relevant to the project development | List technologies that will be used in the project and give a rationale for each of them. | 1.6.2 Technologies in Use |
| 7.1.12  List and describe the main activities involved in the project | List all activities that produce at least one artifact and include a description for each activity. | 1.7.1 Activities |
| 7.1.13  List all artifacts | List and describe all artifacts that need to be produced for the project. | 1.7.2 Artifacts |
| 7.1.14  Estimate the cost and time of production | Estimate the cost and time of production of each artifact and sum them up. | 1.7.3 Project Estimates |
| 7.1.15  Delegate activities to different team members | Assign each activities of the project to a team member or to a group of team members. | 1.7.4 Activities Assignments |
| 7.1.16  Produce a schedule for the project | Create a schedule/timeline of all activities for the project using a Gantt chart. Start dates, due dates, names of activities, and participants are all information to be included in the schedule. | 1.7.5 Schedule |
| 7.1.17  Determine the risks of the project | Outline and explain the risks associated and presented by this project. | 1.7.6 Risk |
| 7.1.18  Produce a prototype report | Describe the work done in the development of the prototype. Explain how the chosen technologies are appropriate, and how the team members are comfortable using such technologies. | 1.8 Prototyping |
| 7.1.19  Ensure professionalism of the document | Assemble all parts of deliverable 1. Ensure the document is professional looking and well-organized. | Deliverable 1 |
| 7.1.20  Update the introduction for Deliverable 2 | Update the introduction to give the reader an overview of the content found in Deliverable 2: Architecture and Design | 2.2 Introduction to Part 2 |
| 7.1.21  Produce an architecture diagram | Produce a 4+1 Architectural View. Include a rationale for the design. Explain any differences between the old design and this one. | 2.3.1 Architecture Diagram |
| 7.1.22  Specify the interactions between the components of the software | Describe the interactions between the components of the software through their interfaces. Include the function calls, the description of the parameters and the range of accepted values of those parameters. | 2.3.2 Subsystem Interfaces Specifications |
| 7.1.23  Illustrate the internal structure of the system | Provide a graphical representation of the structure of each subsystem by means of a UML class diagram. A description of each class should be included. | 2.4.1 Detailed Design Diagram |
| 7.1.24  Describe each class in the subsystem | Provide the programmers with the descriptions of each class in the UML diagram along with any necessary detailed relevant to the development. | 2.4.2 Unit Description |
| 7.1.25  Produce dynamic design scenarios | Draw the dynamic design of two use cases. | 2.5 Dynamic Design Scenario |
| 7.1.26  Update project estimates | Update the cost of the project for each module and include the cost of integration, testing and documentation. | 2.6 Estimation |
| 7.1.27  Produce a report about the prototype and risk | List and describe all elements that have been implemented and describe the effect that those implementations had on the design decisions, risks, estimate and scope. | 2.7 Rapid Prototyping and Risk |
| 7.1.28  Ensure professionalism of the document | Assemble all parts of deliverable 2. Ensure the document is professional looking and well-organized. | Deliverable 2 |
| 7.1.29  Update introduction | Update the introduction so that it includes an overview of the content presented in deliverable 3. | 3.2 Introduction |
| 7.1.30  List all tested items | Create a list of all items that have been tested, the test cases that were used, and a rationale for the test. | 3.3.1.1 Tested Items |
| 7.1.31  List all untested items | Create a list of items that are to be tested, an explanation of why those items should be tested, and how they could be tested. | 3.3.1.2 Untested Items |
| 7.1.32  Unit testing report | Describe the test cases, the technique used, the code used and the result of the testing for two units. | 3.3.2.1 Unit Testing |
| 7.1.33  Requirements testing report | Provide a list of test cases for all tested requirements by means of scenario of system usage and system reaction. | 3.3.2.2 Requirements Testing |
| 7.1.34  Stress testing report | Describe situations of extreme system usage, the tests designed to evaluate the performance of the system under such condition, and the test results. | 3.3.2.3 Stress Testing |
| 7.1.35  Security testing report | Describe tests performed to protect the system against security threats such as SQL injections and automated tools. | 3.3.2.4 Security Testing |
| 7.1.36  Installation manual redaction | Guide any administrators to install and execute the software. | 3.4.1 Installation Manual |
| 7.1.37  User’s manual redaction | Guide any users to use the system with all of its features. | 3.4.2 User’s Manual |
| 7.1.38  Update cost estimate | Update the table of costs with all components of all phases. | 3.5 Final Cost Estimate |
| 7.1.39  Ensure professionalism of the document | Assemble all parts of deliverable 2. Ensure the document is professional looking and well-organized. | Deliverable 3 |
| 7.1.40  Correction of various part of the deliverables | Make all necessary changes in the deliverables for the final report. | Corrected deliverables |
| 7.1.41  Assemble all deliverables | Put all corrected/updated deliverables together for the final report. Ensure professionalism of the document. | Final report |

## Artifacts

1.2. Project Description

The project description is an introduction to the entire project. It’s a brief that allows the reader and the user of the system to understand the goal and purpose of the project. This document must be presented as an opening to the rest of the manual, and must include the idea, objective, background, approach, and result of the entire project.

1.3.1 Functional Requirements

Requirements are the tasks that are necessary for the completion of the system. They are the components of the system that must be documented, measured and tested in order to ensure the ideal conclusion to the project in question. The requirements that need to be specified for this system are functional and non-functional requirements. The functional requirements are the tasks that define what the system is trying to accomplish. These are the elementary actions that constitute the main goal of the system. They include the user viewing weekly schedule, adding classes, dropping classes, swapping, etc.

Each individual requirement must be presented as a use case. A use case is a description of the behavior of a system that explains the process and results obtained through interactions of the user with the system. The functional requirements must be known before writing use cases, because they are the details that compose the main actions and tasks of the system. The use cases are present in both list form and diagram form.

* List Use Cases: The list-based use cases are full formal documents that list all use cases of the system in detail, with each property of the use case explained in full detail. These include the name of the use case, the general description, the actors, preconditions, postconditions, etc.
* Diagram Use Cases: Use case diagrams are used to depict a visual representation of the use cases listed. The actors, which typically include the user or an external entity, are depicted using stick figures. The use cases themselves are drawn as circles with a name that describes the title of the action that can be initiated by the actors. There are lines connected from users to the use cases called connections, which describe the actor’s interactions with those use cases.

1.3.2. Domain Model

The Domain Model is the model that describes all core concepts and an overview of the system at hand. Its main purpose is to list the objects of interest that form the system, and presents their attributes, constraints, and relationships between them. The model is designed in UML format, with arrows describing relationships from one object to another, and ensuring that there are multiplicity values at both ends of the arrow denoting multiplicity factors of the relationship. The finalized domain model will come with a description that will provide a more detailed explanation of the model as well as each object present in the model.

1.3.3. Constraints and Qualities

The constraints and qualities segment describes the main standards of quality and non-functional requirements that are expected to be met by the system. The non-functional requirements are the general properties of the system. They are the constraints and qualities that will make up the system when in use. These include response times, maintenance times, security, etc. It’s important that the constraints and qualities are as specific as possible, which means they must have concrete metric specifications wherever possible.

1.4.1. Human Resources

The human resources of a project is the group of individuals who compose the main workforce of the project. They are the source of labor of a project, and in the case of large projects, are typically divided into smaller groups for more organized work.

1.4.2. Technical Resources

The technical resources of a project are the computer resources that will be used to complete the project. This includes the computer programs, software, libraries, and websites that are available for use.

1.5. Scoping

The scoping section describes all elements, features, qualities, and goals that have been scoped out from the end result. Each scoped element must come with a description of what it is, in addition to a paragraph that describes why it was chosen to be scoped out. These scoped elements have been typically scoped out in the early phases of a project, where the requirements are being planned and discussed in between team members.

1.6.1. Architecture

The architecture of a project is the high-level system architecture that is planned for the complete project. It must be presented with a UML class diagram that describes the details and relationships between different components of the system, along with a detailed description of the mindset behind the architecture (also known as a design rationale). In addition, each module of the architecture must be accompanied with its own design rationale and responsibilities.

1.6.2. Technologies in Use

This segment must provide a technical description of all the technologies that will be used to build the project. These include programming languages, libraries, servers, databases, IDE and compilers, etc. For each technology listed, there must be a short description that explains the rational for the choice and use of the specific tool.

1.7.1. Activities

The activities section is a section that will list a step-by-step process of how the separate artifacts of the project will be produced in order to reach the completion of the project. Each activity must be presented with a clear purpose, description, and must produce at least one artifact in consequence.

1.7.2. Artifacts

An artifact is a by-product that is produced as a consequence of the development of a software project. The artifacts segment will list each document that will be produced in the project. Each artifact listed must come with a description that provides details about the role of that specific document in the completion of the project.

1.7.3. Project Estimates

The project estimates section is for providing a realistic estimate for the cost, as well as the schedule for the length of the project. This is done by summing the evaluated cost of each artifact that’s produced throughout the conception of the project. Each cost must be backed up by a basis of the estimation.

1.7.4. Activities Assignments

The activities assignments are the specific assignments of tasks and activities that are made to each team member based on the members’ skills, requirements, capacities, limitations and schedules.

1.7.5. Schedule

The schedule section must present all the project’s deadlines, milestones, sprints, iterations and other target dates in the form of a diagram or table. A Gantt chart is the ideal way to present a schedule as it outlines the dates all important events from start to finish in a clean and organized fashion.

1.7.6. Risk

The risk section will present all elements of risk of the project, including both early factors and late factors of risk. Each risk must be accompanied by a description and a consequence should the risk occur. They may be presented in a table or list form.

1.8. Prototyping

The prototype section is a description of what work has been completed so far in terms of developing a prototype of the project. A prototype is an early model that is built before the final release of a system or device. The goal of this section is to decide whether the tools and technologies chosen for the completion of the project are appropriate for the final release.

2.2. Introduction to Part 2

The second introduction will introduce the user to the second large deliverable of the project. It is simply a brief description of what information is included in the entire document.

2.3.1. Architecture Diagram

The architecture diagram section is an improved and more detailed version of the architecture diagram presented in the previous deliverable. The system must be divided into at least two systems for this diagram. It must include a high-level description of the architecture of the system in addition to descriptions for each separate module included in the system, accompanied with the visual diagram.

2.3.2. Subsystem Interfaces Specification

The subsystem interfaces specification section is the section that will describe the specifications of the interactions between the software interfaces of the components of the project. These are most likely presented as the function calls and message passing that occur. They must be accompanied with descriptions of the parameters passed of the function calls, including possible valid and invalid ranges of values.

2.4.1. Detailed Design Diagram

The detailed design diagram is a diagram that describes the internal structure of the subsystems depicted in the project. This must be presented as a UML diagram, and must include descriptions that explain the rationale of the designs, in addition to any extra information that is not present in the diagram.

2.4.2. Unit Description

The unit description section is the section that lists each class that’s present in the subsystem and accompanies them with a description of the purpose and function of the class. In addition, they are accompanied by all attributes and methods of the class. They may also be notes and reminders that are there to give any extra information for the programmers who are implementing the classes.

2.5. Dynamic Design Scenario

The dynamic design scenario is a list of two vital and substantial use cases of the system. These use cases must have at least 3 system operations, and the scenarios listed must include system sequence diagrams and operational contracts.

2.6. Estimation

The estimation section is a list of all modules that have been identified so far, accompanied by a new estimate for each one. The revision must also include the newly estimated costs of integration, testing, and additional documentation.

2.7. Rapid Prototyping and Risk

The rapid prototyping and risk section lists the prototypes of the system completed so far. The list must be accompanied by all information pertaining to the models, including classes, modules, drivers, frameworks, database, and other technologies used. Each prototype has a description of the effect of its model, in addition to the effects on the risks previously mentioned, the effects on the estimate, and the changes made in the scope because of them.

3.2. Introduction to Part 3

The third introduction will introduce the user to the third large deliverable of the project. It is simply a brief description of what information is included in the entire document.

3.3.1.1. Tested Items

The tested items section is a list of all items and components that have been tested so far, including the test cases that were applied during the process. Each tested item is accompanied with a description that explains the test case along with why the testing was necessary.

3.3.1.2. Untested Items

The untested items section is a list of all items and components that have yet to be tested, but are deemed necessary to be tested. They are accompanied with an explanation that highlights why it should be tested, along with how it would be tested.

3.3.2.1. Unit Testing

The unit testing section includes two mid-level testable units of the system, which could be modules, classes, or subsystems. Each test unit is accompanied by a list of test cases and the code for the drivers used. In addition, an explanation of the techniques and description of the test are provided, along with the results of the testing.

3.3.2.2. Requirements Testing

The requirements testing section is a list of test cases that accompany each tested requirement of the system. This includes a realistic scenario of the system usage during the test, along with the expected reaction of the system under the conditions of the test.

3.3.2.3. Stress Testing

The stress testing section is a description of the potential extreme situations of system usage. This is necessary to view the behavior of the system in unlikely but extreme conditions to ensure stability of the system as a whole. A design of tests is provided along with the description that verifies how the system performs under those extreme conditions.

3.3.2.4. Security Testing

The security testing section is a description of the tests that have been undergone to ensure maximum security of the system. This includes SQL injection attack resistance to avoid breach of user information.

3.4.1. Installation Manual

The installation manual is a report that is aimed for a competent administrator. It is a precise description of the steps to take to install (i.e. from a compressed file or disk) and execute the software. The reader is expected to install the system simply using the code and this manual provided.

3.4.2. User’s Manual

The installation manual is a document that is aimed for the general user. It is a precise description of how to use the system, and it provides guidelines for all usable components present. All features of the system must be included and described in this document.

3.5. Final Cost Estimate

The final cost estimate is a table that neatly lists all components that are and have been present in the completion of the project. These estimates include documentation, design, implementation, data acquisition, and testing costs.

## Project Estimates

Provide a realistic estimated cost and schedule for the project, as well as the basis for those estimates, and the points and circumstances in the project when re-estimation might occur.

Evaluate the cost of production of each artifact, as described in the previous section, and then adding up the numbers.

## Activities Assignments

|  |  |
| --- | --- |
| Activity | Assigned member(s) |
| 7.1.1  Form and divide team | Claudia Della Serra  Dimitri Topaloglou  Philip Lim  Ryan Lee  Daniel Di Corpo  Erin Benderoff  Aline Koftikian  Ideawin-Bunthy Koun  Kevin Yasmine  Marc-Andre Leclair  Lori Dalkin  Bryce Drewery-Schoeler |
| 7.1.2  Complete the system overview | Claudia Della Serra  Dimitri Topaloglou  Philip Lim  Ryan Lee  Daniel Di Corpo  Erin Benderoff  Aline Koftikian  Ideawin-Bunthy Koun  Kevin Yasmine  Marc-Andre Leclair  Lori Dalkin  Bryce Drewery-Schoeler |
| 7.1.3  Write a project description | Ryan Lee |
| 7.1.4  Determine the functional requirements and draw use case diagrams accordingly | Dimitri Topaloglou  Bryce Drewery-Schoeler  Ideawin-Bunthy Koun  Erin Benderoff  Lori Dalkin  Marc Leclair  Claudia Della Serra  Daniel Di Corpo |
| 7.1.5  Review and correct domain model | Aline Koftikian |
| 7.1.6  Find and describe constraints and qualities | Dimitri Topaloglou |
| 7.1.7  Review and format human resources document | Lori Dalkin |
| 7.1.8  Determine technical resources | Dimitri Topaloglou |
| 7.1.9  Reduce the amount of features to be realistic according to time and resources | Kevin Yasmine |
| 7.1.10  Choose the architecture of the system | Daniel Di Corpo |
| 7.1.11  Decide which technologies are relevant to the project development | Dimitri Topaloglou |
| 7.1.12  List and describe the main activities involved in the project | Philip Lim |
| 7.1.13  List all artifacts | Aline Koftikian |
| 7.1.14  Estimate the cost and time of production | Daniel Di Corpo |
| 7.1.15  Delegate activities to different team members | Philip Lim |
| 7.1.16  Produce a schedule for the project | Ryan Lee |
| 7.1.17  Determine the risks of the project | Dimitri Topaloglou  Kevin Yasmine |
| 7.1.18  Produce a prototype report | Lori Dalkin |
| 7.1.19  Ensure professionalism of the document | Claudia Della Serra |
| 7.1.20  Update the introduction for Deliverable 2 | Ryan Lee |
| 7.1.21  Produce an architecture diagram | Aline Koftikian  Dimitri Topaloglou  Daniel Di Corpo |
| 7.1.22  Specify the interactions between the components of the software | Ideawin-Bunthy Koun  Marc-Andre Leclair  Philip Lim |
| 7.1.23  Illustrate the internal structure of the system | Erin Benderoff  Aline Koftikian |
| 7.1.24  Describe each class in the subsystem | Kevin Yasmine  Lori Dalkin  Bryce Drewery-Schoeler |
| 7.1.25  Produce dynamic design scenarios | Ryan Lee  Claudia Della Serra |
| 7.1.26  Update project estimates | Daniel Di Corpo |
| 7.1.27  Produce a report about the prototype and risk | Dimitri Topaloglou |
| 7.1.28  Ensure professionalism of the document | Claudia Della Serra |
| 7.1.29  Update introduction | Ryan Lee |
| 7.1.30  List all tested items | Claudia Della Serra |
| 7.1.31  List all untested items | Ryan Lee |
| 7.1.32  Unit testing report | Lori Dalkin  Aline Koftikian |
| 7.1.33  Requirements testing report | Erin Benderoff  Philip Lim |
| 7.1.34  Stress testing report | Ideawin-Bunthy Koun  Kevin Yasmine |
| 7.1.35  Security testing report | Bryce Drewery-Schoeler  Marc-Andre Leclair |
| 7.1.36  Installation manual redaction | Claudia Della Serra  Dimitri Topaloglou  Philip Lim  Ryan Lee  Aline Koftikian  Kevin Yasmine |
| 7.1.37  User’s manual redaction | Daniel Di Corpo  Claudia Della Serra  Philip Lim  Ryan Lee  Aline Koftikian  Kevin Yasmine |
| 7.1.38  Update cost estimate | Daniel Di Corpo |
| 7.1.39  Ensure professionalism of the document | Claudia Della Serra |
| 7.1.40  Correction of various part of the deliverables | Claudia Della Serra  Dimitri Topaloglou  Philip Lim  Ryan Lee  Daniel Di Corpo  Erin Benderoff  Aline Koftikian  Ideawin-Bunthy Koun  Kevin Yasmine  Marc-Andre Leclair  Lori Dalkin  Bryce Drewery-Schoeler |
| 7.1.41  Assemble all deliverables | Claudia Della Serra |

## Schedule

Diagrams or tables showing target dates for completion of iterations and phases, release points, demos, and other milestones, e.g. a Gantt chart.

## Risk

List and comment all the elements of the project that present a risk. Explain why they represent a risk.

# Prototyping

*Describe any work undertaken in development of a prototype. A prototype should be developed during this phase both to prove the technologies used are appropriate to the task and to assess the competence of the team to work with the selected technologies.*