**School of Engineering and Computer of Science**

**ASSIGNMENT BRIEFING SHEET (2019/20 Academic Year)**

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| --- | --- | --- | --- |
| **Assignment Title** | Project Proposal | **Submission Date** | 30/01/2019 |
|  |  |  |  |
| **Module Title** | Project Planning (COM) / Project Planning (SDL) | **Module**  **Code** | 6WCM0041 / 6WCM0042 |

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| **Tutor** | **Gani Nashi** | **GROUP or INDIVIDUAL Assignment** | **Individual** |

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| **FOR INDIVIDUAL ASSIGNMENTS – *STUDENT TO COMPLETE***   |  | | --- | | **(Comments on this assignment by students can be made on the back of the assignment briefing sheet).**  By completing **BOX A** below, I certify that thesubmitted work is entirely mine and that any material derived or quoted from the published or unpublished work of other persons has been duly acknowledged. **[ref. UPR AS12, section 7 and UPR AS14 (Appendix III)].** I also certify, that any work with human participants has been carried out under an approved ethics protocol in accordance with UPR RE01.  *Please print your forename and surname in capitals and provide your ID (srn) number.* |   **BOX A**   |  |  |  |  | | --- | --- | --- | --- | | **Student Forename**  *(in CAPS please)* | **Student Surname**  *(in CAPS please)* | **Student ID Number (SRN)** | **Signature of Student** | | **TRAVIS** | **EDWARD** |  |  | |

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| **FOR GROUP ASSIGNMENTS - *STUDENTS TO COMPLETE***   |  |  |  | | --- | --- | --- | | ***Group Name/Number (if allocated by module team****)* | **18050879** |  |  |  | | --- | | **(Student comments on this assignment can be made on the back of the assignment briefing sheet)**  By completing **BOX B** below, we certify that the submission is entirely ours and that any material derived or quoted from the published or unpublished work of other persons has been duly acknowledged. **[ref. UPR AS/C/6.1, section 7 and UPR AS/C/5 (Appendix III)].****)].** We also certify, that any work with human participants has been carried out under an approved ethics protocol in accordance with UPR RE01  *Please print your forenames and surnames in capitals, provide your; - ID numbers, actual time spent on the assignment and your signatures. By signing the submission, you certify that this work represents equal contributions from all team members.* *If this is not the case, the module leader* ***must*** *be informed before submission.* | |

**This sheet must be submitted with the assignment, signed and either BOX A filled in.**

**LATE SUBMISSION WILL ATTRACT A STANDARD LATENESS PENALTY.**

1. For undergraduate modules, a score of 40% or above represents a pass mark.
2. For postgraduate modules, a score of 50% or above represents a pass mark.
3. For work submitted up to 5 working days late marked is capped to a bare pass (40% for undergraduate and 50% for postgraduate).
4. For work submitted more than 5 working days a mark of zero will be awarded for the assignment.

**MUSIC LEARNING MANAGEMENT SYSTEM**

BSC Information Technology

University of Hertfordshire

Project Proposal

ID: 18050879

Travis Edward

Level 6

Academic Year: 2019

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# 1.0 Background of Online Music Learning

## 1.1 Project AIM

*The purpose of this project is to develop, design and evaluate an online music learning management system (LMS) to develop playing techniques of individual musicians and increase playing confidence using learning analytics, gamification and e-assessment techniques, to capture the students’ learning progress and provide feedback and controlled course guidance in a blended learning environment.*

## 1.2 Introduction

While internet technologies are being developed, online courses are being considered more in the music industry (Mckavanagh et al., 2002). Though online learning has not replaced standard school-based training programs, some e-learning programs guarantee online music instrument learning, for example, classic-guitar.com or wholenote.com as well as online platforms such as Yousician and GuitarHero. Bond (2002) discusses how students enter learning systems with different levels of knowledge and skills previously learned that can impact their current study. In contrast, online students are learning at a different pace, having little or no direct contact with a teacher to provide feedback on their playing technique. Musicians also face common difficulties in online learning, such as computer illiteracy and low comfort levels with technology (Ssekakubo, 2002). In addition, students place work and social commitments above their learning program (Bond, 2002). Kumar (2015) also mentions time management and lack of self-control or motivation as common issues faced in LMS.

(213Words)

# 2.0 Learning Management System Features

## 2.1 Advanced System Features

This project proposes to complete these difficulties using advanced features such as user experience and design aesthetics to ensure user-friendliness of the system. E-assessment is used to test interactive quizzes and produce the guidance necessary to improve the students' practice habits. Blended learning and gamification techniques are applied to encourage students and provide an incentive for learning. SCORM compliance is included to add existing material to the LMS to improve the support and knowledge of students.

## 2.2 Fundamental System Features

Fundamental system features are mandatory, and it is the foundation on which the LMS is built on. This includes features such as course authoring used to incorporate courses into the LMS to ensure that content is up to date also user profiling and modeling to customize the experience for users. (see Appendix A, for a full list of requirements).

## 2.3 System Life Development Cycle - Objectives

To fully implement this project, these functionalities will be structured using five (5) objectives from the System Life Development Cycle (SLDC), These objectives are:

1. **Background and requirements research** is performedto retrievesecondary based information from published books and peer-reviewed articles and journals on existing learning management systems (LMS) and reviewing the requirements for building a fully functional system to understand the functions and learn the software needed by **18 December 2020.**
2. To **design** the front-end using wireframes, flowcharts and free and open-source tools to build the content and design back-end database sketch tables to front-end to ensure that the application design is stable and makes sense by **5 January 2020**
3. To **Implement** the front and back end of the LMS using selected open-source software and integrating existing codes and advance functionality in ASP.NET and/or Moodle to ensure that the system is tailored to music learning by **15 February 2020.**
4. The system will be **tested** by performing supervised tests based on online standards as well as a thorough student and tutor test to ensure that the application functions work as intended and **evaluated** to remove bugs, compliance, etc., following a heuristic analysis for a full evaluation of the system to ensure proper system operation and security **by 5 March 2020.**
5. In the **final project completion** plan, the work done is documented and an academic report with recommendations is documented by April 16, 2020 actual deadline being **April 28, 2020.**

(394 Words)

# 3.0 Review of associated literature

This literature review focuses on the information that is essential to constructing a learning management system (LMS) Academic research is required to help broaden the understanding of the strengths and drawbacks of the systems’ functionalities to ensure that the project is manageable at minimum risk. Ruokonen and Ruismäki (2016) and Salavuo (2008) mentions how most music students today are impacted by social networking platforms and online communities. This supports the reason this literature review acknowledges three (3) of the most important advance features which are linked to the topic of this research “Guided learning and user engagement in Learning Management systems”. (see appendix A. for additional features).

* **Community and Collaboration**: learners can be engaged more by an exchange of ideas and knowledge, using their personalized community. This research will focus on the design and implementation of a social networking platform with the option to filter or share their content to everyone, school Discussion board, and virtual chats to enable user engagement and interaction.
* **Learning Analytics:** Given students learn differently, understanding the student’s actions that lead to success or failure is crucial and helps with providing online and traditional feedback. This research reports the tools required along with the data that can be analyzed and how users can receive feedback from the system.
* **Gamification**: This technique intends to encourage user participation and engagement in the course while reducing boredom and fatigue. This research will explore the use of gamification in other LMS systems and the resources required as well as an analysis of created game effects.

Most research will be conducted and documented using secondary books, articles, and peer-reviewed sources from Tutorials point, google-scholar, Google.com and UH online library. Approval from the UH ethics committee will be necessary to conduct primary research as it requires the use of a questionnaire, observations, and surveys to gain more insight into the usage of functionalities in LMS. Some examples of the resources used to complete primary research can be seen in Appendix B. The Literature review will be completed using some of the following secondary sources below, however, Appendix C contains a full list of secondary sources.

* Big Data Analytics (Tutorialspoint, 2017).
* Learning Analytics: Definitions, Processes, and Potential (Elias, 2011).
* MoodleREC: A recommendation system for creating courses using the Moodle e-learning platform (De Medio et al., 2019).
* Design to Thrive: Creating Social Networks and Online Communities that Last (Howard, 2010).
* Social network analysis of a gamified e-learning course (De-Marcos et al., 2016).
* A social gamification framework for a K-6 learning platform (Simões et al., 2013).

(415-420Words)

# 4.0 Resources and Skills Management

Resources are the essential software, hardware, and access required to usefully achieve the goals of a project (Dawson, 2009). Selaru (2012) mentions how some plans can surpass their initial estimated time, resources can become unsupported, inaccessible or damaged and project scope can change which can lead to incorporation or removal of programs. Below is a list of resources recorded to help guide the project, in the form of software, hardware, and research. software section covers the programs required to begin the project such as Operating system software, project management, reference management, system development, course development, database development, source code management, design management, word processing software, game development environment and video streaming management, see Appendix A. The hardware section includes workstation and server platform used, visual media capture devices, audio capture interface, and music and sound instruments, see Appendix B. The Research section includes online resources that contain all the information and is accessible, see Appendix C.

## 4.1 Skills Requirements and Analysis

Various technical skills are required to accomplish this project along with their skill levels. This generates awareness of the skills which require attention in order to produce a successful sophisticated and complex artifact within the time frame. The table below reviews the various skills required to complete the project with a level rating from (1-5) of the current skills and the desired skill level in order to achieve a successful project.

Table 1. Skill requirements and Analysis where yellow is medium score and red are very low.

|  |  |  |  |
| --- | --- | --- | --- |
| **Area** | **Skills Required** | **Current Level** | **Desired Level** |
| Research and Reference | Information Gathering | 3 | 8 |
| Literature reviewing | 4 | 5 |
| Harvard Referencing | 2 | 5 |
| Analytics | Data Collection and evaluation | 3 | 5 |
| Critical Thinking | 3 | 4 |
| Problem Solving | 3.5 | 5 |
| Project Management | Time Management | 2 | 5 |
| Risk management | 4 | 5 |
| Communication and Leadership | 4 | 5 |
| Planning and Scheduling | 3 | 4 |
| Programming Language | PHP | 1 | 5 |
| HTML | 1 | 3 |
| CSS | 1 | 3 |
| SQL | 1 | 4 |
| Software Development | Visual Studio Code | 1.5 | 3 |
| GitHub | 2 | 4 |
| Invasion Studio | 1 | 3 |
| OBS studio | 4.5 | 5 |
| Microsoft SQL server | 1 | 3 |
| PowerPoint and ISpring free | 3 | 5 |
| GameSalad | 1.5 | 5 |
| Academic Writing | Grammar and sentence structure | 4 | 5 |
| Report presentation | 4 | 5 |
| Microsoft Word | 4 | 5 |
| Music Teaching | Guitar | 3.5 | 5 |
| Keyboard/Piano | 3 | 4 |
| Theory | 4 | 5 |

# 5.0 Project Plan

## 5.1 Action Plan and Gantt Chart

In this project, there are several different project objectives that all require extensive resource allocation, in addition to the necessary software and programming skills that are at a high-risk level according to table 1 and extremely recommended for the development of the project. In order to maintain the complexity and sophistication of a project, a project plan is necessary. A project plans to identify the desired objectives, helps mitigate risks, avoids late submissions, and provides a guide for time management (Dawson, 2009).

The project plan was developed with Microsoft Excel since it provides templates and charts can be inserted into Microsoft Word easily. The high-level tasks were the objectives from the systems development life cycle (SDLC) in Dawson (2009) book showing the conventional water model which includes requirements Analysis, Design, Implementation, Testing, and Evaluation. This was considered the most suitable model for this project plan with the addition of research, risk analysis, and LSEP research, as documentation and time management are crucial. The deadline date of the SDLC objectives listed in this portfolio was used to create the schedule. According to Kaur et al. (2018), According to Dawson (2009), when a project is broken down into multiple subsequent tasks it is much easier to estimate the project time period. Therefore, gradual subtasks were added under each high-level task. The timeline was estimated using the semesters’ starting and end dates. Setting a submission deadline before the actual deadline was considered as a form of managing risk. Therefore, the final submission date was set for a week before the deadline date to allow for more changes. Additionally, the requirements analysis phase was given the most time, to develop an understanding of the project and to avoid changes. Even though changes are being avoided there are some aspects of the plan that should be slightly adaptable, for example, the early submission time mentioned. Furthermore, project milestones were determined by evaluating the Module Guide in the Information Technology Project and by analyzing other students’ submissions. All the objectives ending were set as milestones along with the final report being the last milestone. Deadline dates were added to show when the milestones will be due.

## 5.2 Action Plan

To achieve the large scope of this project the high-level task is broken down into subtasks. Table1 (below) shows a breakdown of those tasks using SDLC. The skills scale used to assess the categories. Low, medium and high level from (1 to 5) is used to measure the risk impact. Skill level criteria are identified for the assessment of my current level and desired level outlined. The actionable areas each have deadlines in which to allow room for implementation.

(444 Words)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Area** | **Skills Required** | **Current Level** | **Desired Level** | **Success Criteria** | **Action required** | **Submission Deadline** |
| **Research and Reference** | Information Gathering | 3 | 5 | Ability to prevent all plagiarism and properly reference and cite other writers' work. | Collect important information and document it. | 1st Jan 2020 |
| Literature reviewing | 4 | 5 | Identify research questions and review resources to conduct research |
| Harvard Referencing | 2 | 5 | Follow the Harvard Referencing guide from the university and use a referencing assistant. |
| **Analytics** | Data Collection and evaluation | 3 | 5 | The ability to use cause and effect to resolve issues that can arise in the Software Development Life Cycle. | Research for strategies on logical thinking | 5th Jan 2020 |
| Critical Thinking | 3 | 4 | Research what is required for critical thinking |
| Problem Solving | 3.5 | 5 | Read peer-reviewed sources to learn their problem-solving skills |
| **Project Management** | Management of time | 2 | 5 | Ability to successfully manage a project plan while mitigating potential risks and producing proper documentation. | Review similar projects to set realistic timelines to ensure deadlines are met | 15th Jan 2020 |
| Accurate risk mitigation | 4 | 5 | Review risk management to understand how to mitigate risk |
| Communication and Leadership | 4 | 5 | Read articles to appreciate the writing styles of others and watch YouTube videos |
| Planning and Scheduling | 3 | 4 | Learn how to use the Gantt chart effectively |
| **Programming Language** | PHP | 1 | 5 | Ability to successfully execute programming code and complexity to the project. | Take online free courses and review and practice with videos and build on existing Github codes. | 29th Feb 2020 |
| HTML | 1 | 3 |
| CSS | 1 | 3 |
| SQL | 1 | 4 |
| **Software Development** | Visual Studio Code | 1.5 | 3 | Ability to implement all the features with good quality. | Download and read the user guide as well as download learning books and articles and watch how-to videos for specific objectives. | 15th Mar 2020 |
| GitHub | 2 | 4 |
| Invasion Studio | 1 | 3 |
| OBS studio | 4.5 | 5 |
| Microsoft SQL server | 1 | 3 |
| PowerPoint and ISpring free | 3 | 5 |
| GameSalad | 1.5 | 5 |
| **Academic Writing** | Grammar and sentence structure | 4 | 5 | Ability to deliver an outstanding final report, that can be reviewed by professionals. | Read articles and books and learn their grammar styles and use Grammarly in MS Word | 1st Jan 2020 |
| Report presentation | 4 | 5 | Watch standards to learn how to present work professionally |
| Microsoft Word | 4 | 5 | Learn how to use the new features to make work simpler and use the autosave function. |
| **Music Teaching** | Guitar | 3.5 | 5 | Ability to play and teach at a professional level to ensure proper learning content is provided. | Practice often and  Read books to ensure that music theory being taught is standard | 29th December 2019 |
| Keyboard/Piano | 3 | 4 |
| Theory | 4 | 5 |

Table 2. Action Plan

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WBS** | **TASK** | **PREDECESSOR TASK (WBS)** | **PROGRESS** | **START DATE** | **END DATE** | **Working Days** |  | Dec 2, 2019 | | | | | Dec 9, 2019 | | | | | | Dec 16, 2019 | | | | | Dec 23, 2019 | | | | | | Dec 30, 2019 | | | |
| **1** | **Background research & Learning** |  | 17% | 12/2/19 | 1/1/20 | **42** |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **1.1** | Conduct Secondary Research |  | 50% | 12/2/19 | 12/7/19 | 5 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **1.2** | Conduct Primary Research |  | 0% | 12/7/19 | 12/14/19 | 7 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **1.3** | Learn Programming Language |  | 0% | 12/2/19 | 1/1/20 | 30 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **2** | **Requirements Analysis** |  | 50% | 12/2/19 | 12/18/19 | **15** |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **2.1** | Core Functional Requirements |  | 50% | 12/2/19 | 12/7/19 | 5 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **2.2** | Advanced Functional Requirements |  | 50% | 12/8/19 | 12/18/19 | 10 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **3** | **Design** | 2 | 0% | 12/19/19 | 1/5/20 | **17** |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **3.1** | Design Database (back-end) |  | 0% | 12/19/19 | 12/29/19 | 10 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **3.2** | Design User Interface (front-end) |  | 0% | 12/29/19 | 1/5/20 | 7 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **4** | **Implementation** | 3 | 0% | 1/6/20 | 2/25/20 | **75** |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **4.1** | Implement Fundamental Features |  | 0% | 1/6/20 | 2/10/20 | 35 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **4.2** | Implement Advanced Features |  | 0% | 1/16/20 | 2/25/20 | 40 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **5** | **Testing** | 4 | 0% | 2/25/20 | 3/12/20 | **9** |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **5.1** | Test code |  | 0% | 2/25/20 | 3/6/20 | 3 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **5.2** | Test usability |  | 0% | 3/6/20 | 3/9/20 | 3 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **5.3** | Test Security |  | 0% | 3/9/20 | 3/12/20 | 3 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **6** | **Evaluation** | 5.1 | 0% | 2/26/20 | 3/26/20 | **19** |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **6.1** | Evaluation of code |  | 0% | 2/26/20 | 3/9/20 | 5 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **6.2** | Debug and fix errors |  | 0% | 3/12/20 | 3/26/20 | 14 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **7** | **Final Report (Milestone)** | 3 | 0% | 3/28/20 | 4/19/20 | **38** |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **7.1** | Create final Report |  | 0% | 3/28/20 | 4/4/20 | 15 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **7.2** | Submit Draft for Review |  | 0% | 4/4/20 | 4/11/20 | 0 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **7.3** | Create and submit Script |  | 0% | 4/11/20 | 4/14/20 | 3 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |
| **7.4** | Submit Final Report |  | 0% | 4/14/20 | 4/19/20 | 20 |  |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  |  |  |

Figure 1. Project Gantt Chart

# 6.0 Project Risks

## 6.1 Risk Management

Risk is the possible problem that can occur in a given project which can impact the project (Cervone, 2006; Surcel & Reveiu, 2009). Risk management, therefore, helps in avoiding any disasters and late alterations by preventing or lessening the problems before time, reducing the chance of occurrence as well as enabling better use of the software. Cervone (2006) mentions three (3) stages of risk management; risk identification, risk polarization, and risk control and resolution. Brainstorming and guessing were used to gain a list of sources for Risk identification (Taylor, 2004). Risk prioritization is an analysis and evaluation of risk, to properly monitor the risk that is likely to occur and the consequences of their impact.

### 6.1.1 Risk Identification

The possible risks that may occur in the project, are identified below:

* Hardware breakdown, freezing and slowness or unavailability
* Software support unavailability or software incompatibility
* Learning Curve due to complexity of codes and UI
* Scope Creep for underestimation of the project scope.
* Design is not as intended
* External factors issues such as illness or distractions
* Data and information Loss
* Use of open-source software

### 6.1.2 Risk polarization

The likelihood of each risk occurring shows the level of likelihood and consequence and was measured on a scale of (1 to 3) as shown in figure1 with one (1) being a risk that is unlikely to happen and 3 being a risk that is highly likely. If the risk occurs, the consequences are measured from (1 to 5). Dawson (2009) recommends using the following formula to calculate the impact of the risk: Tables5 and 6 below show the scale use measure the level from Dawson (2009). *Impact = Risk Likelihood x* Risk Consequence.

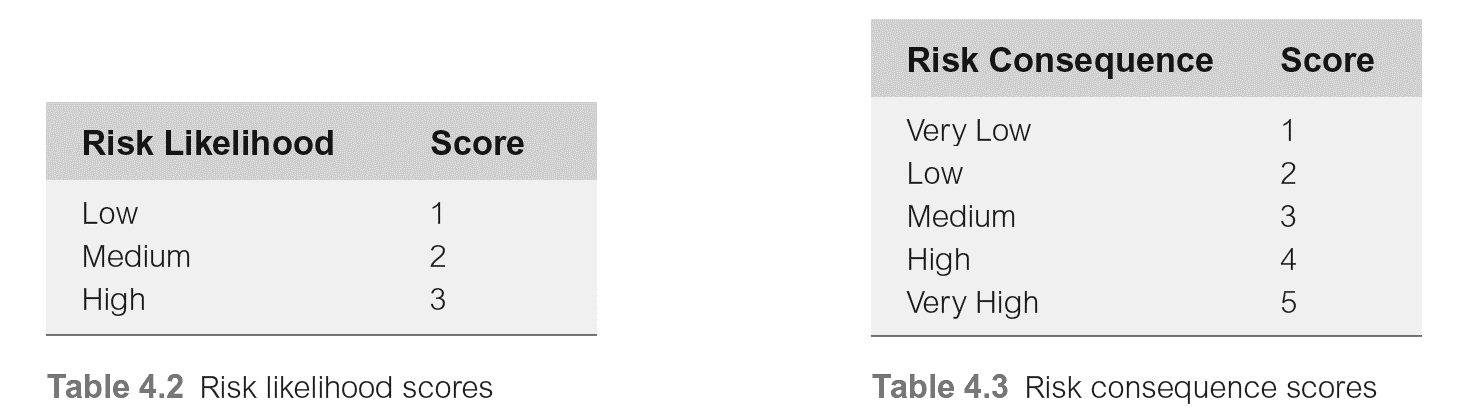


Table 3. Risks consequences scores

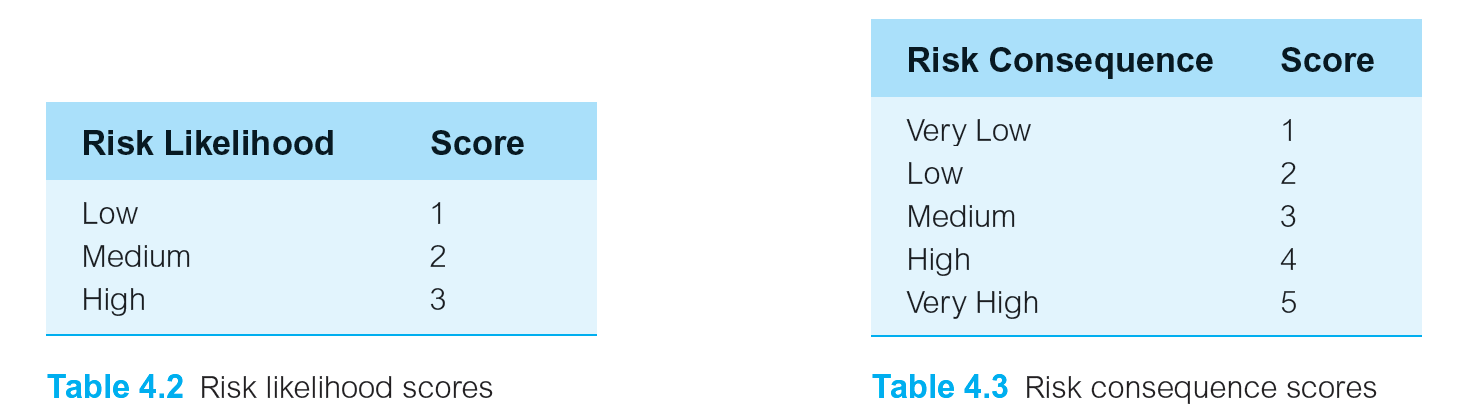


Table 4. Risk Likelihood Scores

### 6.1.3 Risk Control and Resolution

There are three main strategies that are used to control and resolve risks of this project:

* Risk Avoidance: Eliminating the likelihood of the risk from occurring.
* Risk Minimization: decreasing the impact of the risk if they are to occur
* Contingency Planning: These are the procedures taken in the event a risk occurs.

Table3 below shows the risk impact and score for the mitigation strategies involved, Score (1) being a very low impact and (15) means that risk can have a very high impact on the project. As well as table4 showing all the risk and their consequences:

(370 Words)

Table 5. Classification of Risk Impact Scores

|  |  |
| --- | --- |
| **Calculation: Risk Impact = Risk Likelihood x Risk Consequence** | |
| **Risk Impact total Score** | **Overall Risk Impact** |
| 1-3 | Very Low |
| 4-6 | Low |
| 7-9 | Medium |
| 10-12 | High |
| 13-15 | Very High |

Table 6. Risk Assessment and Risk Mitigation strategy

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | **Impact (Likelihood X Consequence)** | | |  |
| **Risk** | **Description of Risk Impact** | **Risk Likelihood** | **Risk Consequence** | **Risk Impact** | **Risk Mitigation Strategies** |
| Hardware breakdown, freezing and slowness or unavailability | Hardware issues can cause loss of data as well as prolong the project's time and increase the cost of having to purchase new hardware. | 2  Medium | 2  Low | 4  Low | Using the other choice identified in the Resources section, for example, if GitHub no longer works move the repository to Azure DevOps. |
| Software support unavailability or software incompatibility | The software can become unsupported on the way or unavailable online as well as one software can be incompatible with the other. | 2  Medium | 4  High | 8  Medium | Research and Test software beforehand to review their capabilities and functionalities to ensure that they perform as expected. |
| Learning Curve due to complexity of codes and UI | Some of the software and codes are complex and can become risky to learn them in a short time. | 3  High | 4  High | **12**  **High** | The software will be intensely researched and studying code will begin beforehand to reduce the time taken to learn the software and programming language. |
| Scope Creep for underestimation of the project scope. | Underestimating the scope of the project as requirements keep growing which allows the project to become continuously more complex | 3  High | 5  Very High | **15**  **Very High** | strictly adhering to the documentation of requirements analysis and performing additional reading. |
| Design is not as intended | Ideas and designs may be developed with limited functionality resulting in a project with poor quality | 2  Medium | 3  Medium | 6  Low | Research and ensure that the correct software is being used, test different software to achieve the design. |
| External factors | Sicknesses or illnesses from late working hours or accidents can cause major downtime | 1  Low | 4  High | 4  Low | proper eating habits and sleeping habits and complying with deadlines to allow for recovery in the event of any incidents. |
| Data and information Loss | Loss of Local Storage will require the project to be restarted if backups are absent, internet connection failure may cause the project to delay. | 2  Medium | 4  High | 8  Medium | Backup data consistently to both the cloud and ensure that duplicate of data is recorded after each work session. |
| use of open source and free software | Free software may not include all the components and the quality of the project may not be as expected and project quality decreased. | 1  Low | 2  Low | 2  Low | Test the selected software to review their functionalities to ensure that they are up to standard and change to other listed software in resources if necessary. |

# 7.0 Legal, Social, Ethical and Professional Issues

## 7.1 Legal Issues

In the IT profession, technical knowledge and awareness of legal issues cover the majority of the misuse issues of computers to create a safe environment for users. Several areas of legalization were considered for the purpose of this project. These include the General Data Regulation (GDPR), Data Protection Act 2018, Computer Misuse Act, Copyright, Equality Act 2010 and the Intellectual Property Rights. To ensure safety for users and protection against scammers.

## 7.2 Social Issues

Social issues are covered in areas such as privacy policy and Weak passwords. Users often construct a weak password that is tied to their date of birth or username and open themselves to the risk of hackers invading their profiles. This system will rectify this by incorporate strong passwords that will consist of 8 characters with a mixture of special characters and numbers, lowercase and uppercase letters and at least one digit.

## 7.3 Ethical Issues

Ethical issues may impact LMS as it relates to privacy, system defects and system use of confidential information. For the purpose of this project special consideration was given to ethical code outlines by BCS and from personal knowledge of ethics to reduce the myriad of ethical challenges. The Learning Management System will be collecting personal information from students such as age, phone number, etc. The only information required by the system will be taken to reduce errors and negative risks. Information for their scorecard and certificates as well as options to keep certain information private. To ensure that all personal information is secure, user authentication with usernames and passwords will be used and prompted when personal data is being edited or monitored. The system will maintain honesty and keep the required information clearly and not hidden from students. The design, implementation, testing, and evaluation phases are properly checked to mitigate errors such as software defects and missing information. Dawson (2009) recommend feedback for any system that aims to achieve high standards in their system. Feedback from others will be undertaken, therefore, Ethics Approval from the University’s Ethics Committee is necessary to safeguards the self-respect, privileges, confidentiality, and well-being of contributors and third-party researchers (UH Ethics Approval, 2018). This procedure requires submission of an application form and supporting appendices for the investigator which will be submitted to the Ethics Committee with Delegated Authority (ECDA). The application can take about 10 working days or up to 6 weeks for review and approval by ECDA. Therefore, the form will be submitted as soon as possible for a review to account for delays.

## 7.4 Professional Issues

The UK IT practices are governed by the BCS; a professional body which sets out expectations of professionalism, The Code of Conduct and Practice consists of a list of accepted standards to encourage ethical judgment, communication, and behavior. These acts of Conduct and practice will be endorsed in this project by adhering to the criteria of BCS professional body; Seeking advice and ensuring that rules and regulations are followed, including being cautious with claims and being cautious in communication and decision making is carefully practiced for professionalism. (490-500Words)

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# 9.0 Appendices

## 9.1 Appendix A - Software Resource

### 9.1.1 System Software

OS Platforms usually don’t support all software. The OS platforms considered for this project are carefully selected Mac OS, Windows and Ubuntu Linux. Windows is preferred as it provides more control, additionally, programs on Windows can span across multiple screens for multitasking, and Windows platforms are compatible with all software selected. A Windows OS platform is owned therefore no cost ($0.00) associated.

### 9.1.2 Project management

This includes using a Gantt chart to track the progress of tasks and commit to deadlines. Microsoft Excel, Microsoft Project, and Britix24 online open source are considered, however, Microsoft Excel is easier to use and includes free templates for Gantt Charts, additionally, it can be accessed from the university’s repository at no cost ($0.00).

### 9.1.3 Reference Management

According to Neville (2010), referencing helps support arguments and avoid plagiarism and acknowledges the contribution of other authors and scholars in academic writing. The Referencing section keeps track of the sources cited to retrieve written material if further research is necessary. Harvard referencing is the suggested format for referencing by the university. Endnote, RefWorks, and MyBib(online reference manager) were considered, however, MyBib was chosen because of its ease of use and Downloadable Microsoft Word List and other preferred features, it is also free at no cost($0.00).

### 9.1.4 System Development

IDE tools place the debugger, code editor, compiler and the GUI or gamut of other facilities, all in a single window making the project easier to manage. HTML and CSS are the suggested code used to design the look and feel of the system. PHP and SQL code will be used for creating programs and running database related queries. Visual Studio (ASP.NET), Aptana studio and Eclipse were reviewed to build this system as they support the PHP. Visual Studio was preferred because of its easy coding structure and code extensions. Web servers XAMPP and WAMP stack were considered for this project however XAMPP stack has more software features and easier to setup. All the following software is distributed at no cost ($0.00).

### 9.1.5 Course Development

Course development is the software required for editing, creating the LMS Logo and background images, videos and course template. Photoshop and GIMP are considered for editing Logo and images, GIMP is selected as it offers similar functions as photoshop, easy to use and free at no cost $0.00. Shortcut and Davinci resolve were considered for video editing software, Davinci resolve is selected as it is more flexible and offers more features for free at no cost for building game-based videos. To create the courses IEasy, ISpring free and Course Lab was selected for comparison. Ispring free was chosen as it integrates with PowerPoint which is easier to use at no cost ($0.00).

### 9.1.6 Database Management

A database server is necessary as it stores all the data to support queries submitted from the request. The three databases examined were MySQL, MS SQL Server, and PostgreSQL. Microsoft SQL server is preferred to host the database since it’s recommended for ASP.net and setup is less complicated and available at no cost ($0.00).

### 9.1.7 Source Code management

Source code management includes software version control (SVC) which allows the writer to archive and track file changes, review previous versions of code, perform short experiments and create backups while developing the software. Commonly used the software are Azure DevOps, GitHub, and Mercurial. Preference is given to Github due to familiarity and a large support forum. This is a free service at no cost ($0.00) with unlimited functionalities.

### 9.1.8 Design management

Designing management tools are necessary to create a draft version of the project concept and design and provide a preview and examples of the project outcome. Wireframing tools such as Invision Studio, Axure have been reviewed noting that Invision Studio since it is a free version, no cost ($0.00) with capabilities to copy the dimensions and specifications to a CSS for Visual Studio.

### 9.1.9 Word Processing Software

The most common word processing program used in Microsoft Word (MS Word). Simple functions such as writing, editing, storing a report of the project, as well as using its auto-save functions to prevent loss of data from mishaps. Files are saved in an appropriate format Docx. And pdf. MS word is provided in the university’s repository at no cost ($0.00).

### 9.1.10 Game development environment

Although many RAD and simulation tools are used to create complex game-based learning materials, tools in this category are specific to the gamification of learning as a central feature. GameStudio, GameSalad, and KnowledgeGuru were considered for game-based learning implementation. GameSalad is preferred as it allows for the addition of complex features into LMS. This is all at no cost ($0.00).

### 9 .1.11 Video Streaming Management

A video broadcasting software is required to stream live music video lessons on the LMS. OBS Studio, Nvidia Shadowplay, and Wirecast were reviewed and OBS studio was chosen for video streaming as it is easy to learn and free at no cost ($0.00).

## 9.2 Appendix B - Hardware Resources

### 9.2.1 Workstation and *Server* Platform

The platform will be hosting a local server for active directory and software and web server for database table queries and development software, therefore, a high-end Computer will be necessary with minimum 500TB SSD to run Windows OS and store high-end software, 8GB RAM suitable for processing the memory with at least 3Ghz. A Laptop and Desktop were the options considered. The Laptop is preferred as it is cheaper. The existing laptop does not meet the min requirements, therefore a new Laptop costing ($400USD) the monitor and screen cable are already available.

### 9.2.2 Visual Media Capture Devices

This equipment is required to capture the training videos and pictures. A camera is required to take videos and proper pictures for the LMS. A phone camera, HD Webcam and a Canon Camera are researched for the best option. The Webcam was selected for video capture since it must connect to OBS studio, and the phone was used for pictures ($0.00).

### 9.2.3 Audio capture Interface

Audio capture is important as the sound from the musical instruments being played for course material needs to be clear. Behringer UM2, PreSonus AudioBox, and Focusrite Scarlett 2i2 Bundles were reviewed. PreSonus AudioBox Bundle is preferred as it offers more features and has connections and unlimited software, available at a cost of ($260USD)

### 9.2.4 Music and Sound Instruments

The musical instruments are needed to record all the sounds and for training and feedback. Guitar Keyboard and Drums are considered for the training courses however Guitar and Keyboard and Drums are selected as they are the most learned instruments. Guitar and Keyboard is selected since they are available at no cost ($0.00)

## 9.3 Appendix C – Research Recourses

### 9.3.1 Internet

A high level of background research is required for academic reports. Conducting background research in an online environment requires the internet to access resources such an eBook, articles and google.com. Universities’ library, Google scholar, YouTube, Computer science Journals were will be used to find relevant knowledge to undertake the project at no cost ($0.00). There is no additional cost for internet access as it is readily available at home and school.

Table 7. Multiple tables showing a list of all the books and their resources.

|  |  |  |
| --- | --- | --- |
| 9.4 Appendix D – Secondary Resources | | |
| **Purpose** | | **Secondary Resources** |
| **Learning Management System** | Educators can create and incorporate music training materials into LMS, effectively communicate learning goals using an extensive number of features, evaluate the content and provide cumulative feedback, track improvement, and create custom student assessments. | Learning Management System CATS. Available at: <https://doaj.org/article/8f17e8f152e84848956bf1c3195684f6> |
| MoodleREC: A recommendation system for creating courses using the Moodle e-learning platform. Available at: <http://www.elsevier.com/locate/comphumbeh> |
| Usability issues while building a new LMS. Available at: [<https://ieeexplore.ieee.org/document/5196101>](https://ieeexplore-ieee-org.ezproxy.herts.ac.uk/stamp/stamp.jsp?tp=&arnumber=5196101) |
| Book: Beginning ASP.NET 4: in C# and VB |

|  |  |  |  |
| --- | --- | --- | --- |
| 9.5 Appendix E - Advanced Features Checklist | | | |
| **Blended Learning** | Blended learning seeks to combine the advantages of traditional and online learning methods to offer learners a more interactive learning experience. | Blended learning effectiveness: the relationship between student characteristics, design features, and outcomes. Available at: <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-017-0043-4> |
| **Learning Analytics** | The purpose is to collect reports of students' activity to help tutor improve students’ understanding and playing skills. This optimizes the learning potential of students while improving teaching methods and content delivery. | Using Learning Analytics to Predict (and Improve) Student Success: A Faculty Perspective. Available at: <http://www.ncolr.org/jiol/issues/pdf/12.1.2.pdf> |
| **Community and Collaboration** | The goal is to generate positive results from student performance by team activities that promote active learning, sharing of ideas, and encourage social interaction and an online community of support. | Social network analysis of a gamified e-learning course: Small-world phenomenon and network metrics as predictors of academic performance. Available at: <http://tinyurl.com/svjws75> |
| An Analysis of Social Collaboration and Networking Tools in eLearning. Available at: <https://link.springer.com/book/10.1007/978-3-319-39483-1> |
| **Responsive Web Design (RWD)** | RWD is necessary as it provides flexibility to be able to play the instruments while watching a video course on their device as well as users are able to continuously learn music on the go. | Book: Instant responsive web design: learn the important components of responsive web design and make your websites mobile-friendly. |
| **SCORM compliance** | This makes it possible for the tutor to reuse material that was generated on other LMS frameworks without having to recreate the entire curriculum or customized interfaces. In a short period, units could be restored and running. | Creating the first SCORM object. *Computers & Education*. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0360131508000547> |
| **Push Notifications** | Push notifications will be used to produces reminders for class time, due-dates and conferences. It allows for the program to interacts with students. Once enabled students can receive email or LMS notifications with feedback from questions posted in discussions or forums. | A Notification Manager to support collaborative learning in LMS Moodle Available at: <https://ieeexplore.ieee.org/document/6826137> |
| Push Notifications and ASP.NET Core - Part 1 (Push API*)*. Available at: <https://www.tpeczek.com/2017/12/push-notifications-and-aspnet-core-part.html> |
| User Experience & Design | This is important as it provides easily accessible content for students and also encourages a simpler design for better understanding and quicker navigation as well as easy to read content and a warm environment. | Evaluation of user Interface Design for Learning Management System (LMS): Investigating Student's Eye Tracking Pattern and Experiences. Available at: <https://www.sciencedirect.com/science/article/pii/S1877042812053438?via%3Dihub> |
| Game-Based Learning | Game-Based Learning plays an important role in teaching in LMS by adding collaborative, communicative and interactive games to help the students retain knowledge and skills acquired from playing their instruments. | Technology-Enhanced Learning: Game-Based Learning in e-Learning Environments. Available at: <http://www.cepis.org/files/cepisupgrade/2008-III-manjon.pdf> |
| Easing assessment of game-based learning with <e-adventure> and LAMS. Available at: <https://www.researchgate.net/publication/228941120_Easing_Assessment_of_Game-based_Learning_with_e-Adventure_and_LAMS> |
| Gamification | The students' engagement and learning experience are increased using fun and interactive game components such as points, badges, and leaderboards, as well as course walkthrough and course guidance game elements. | A social gamification framework for a K-6 learning platform. *Computers in Human Behavior*. Available at: <https://www-sciencedirect-com.ezproxy.herts.ac.uk/science/article/pii/S0747563212001574> |
| The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0360131519302829> |
| e-assessment strategies | E-assessment includes a summary of the students’ level or status, marking and grading tools. Exam courses, and music audio assignments. This allows tutors to provide personal feedback if necessary. The feature will allow tutors to monitor students through online material (which includes instrument practice games, quizzes & test) and in classroom assessments (where the teacher gathers information about students’ current level), to provide timely responses in the form of a score or comments via email, video conferences or through a social network. | Fifth International Workshop on Adaptive Learning via Interactive, Collaborative and Emotional Approaches (ALICE 2015).  Available at: <https://online-journals.org/index.php/i-jet/article/view/6054> |
| Characteristics and Forms of the Electronic Assessment of the Knowledge. Available at: <http://conf.uni-ruse.bg/bg/docs/cp12/6.2/6.2-15.pdf> |
| Self-paced learning | The system can adapt and provide feedback based on the student’s response, by means of a course being edited or curriculum or practical tutorials. | A guide for designing and developing e-learning courses. Available at: <http://www.fao.org/3/i2516e/i2516e.pdf> |

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| 9.6 Appendix F - Fundamental Features Checklist | | |
| Database Design | The database used to manage this LMS is MySQL where relationship tables and all student and tutor data are stored. | *Book: Database Design: Know it All*. |
| Data Security | User security focuses on the integrity of data, allowing certain users to access private data as well as different levels of authorization for tutors and students. | Securing e-learning platforms. Available at: <https://ieeexplore.ieee.org/document/7009237> |
| Web Accessibility | LMS is adjusted to suit the students' disabilities such as hearing or visual impairments and dyslexia by creating a Personal Learning environment aided through the course of registration to enable keyboard navigation for web design, Prioritize clarity of text, Speech to text and Speech-enabling. | Accessibility barriers for users of screen readers in the Moodle learning content management system. Available at: <https://link.springer.com/article/10.1007%2Fs10209-013-0314-3> |
| An Evaluation of accessibility in online learning management systems. Available at: <https://www.emerald.com/insight/content/doi/10.1108/07378830210452640/full/html> |
| User Profiling and modeling | The user is given a personalized profile, this allows for the student learning patterns to be assessed separately as students will have unique cognitive skills, and individual preference, learning styles, disabilities, and levels. | User modeling and user profiling in adaptive e-learning systems*.*  Available at: <https://pdfs.semanticscholar.org/c2fd/c475e1001a3eca0a76335cba8bac8533f934.pdf> |
| Customizable Dashboard | A flexible dashboard is provided for students to view their progress and also navigate through the site. The dashboard has mandatory tabs however widgets and additional tabs can be added by students. The dashboard also has interaction to guide students and demo videos. | Give me a customizable dashboard: Personalized learning analytics dashboards in higher education. Available at: <https://link.springer.com/article/10.1007/s10758-017-9316-1> |
| Course Authoring Capabilities | This function is important for an LMS as it offers the material that will be used as the foundation for all learning. This allows for the creation of courses, addition of material to the courses (in different formats including audio, videos, and text) and to separate the content into smaller units which consist of different sessions. Depending on the conditions the content can be locked or unlocked (to promote self-paced learning feature). | Towards a competence-based Course Authoring Tool supporting learning management systems. Available at: <https://online-journals.org/index.php/i-jet/article/view/7300> |
| User Authentication | In order to gain access to certain features and material users have to sign-up for an account to securely log in to the system. User authentication is required as not all features are available to the public. | Towards the construction of a user unique authentication mechanism on LMS platforms through model-driven engineering (MDE). Available at: <https://www.hindawi.com/journals/sp/2019/9313571/> |
| Certificates | Upon successful of completion of a program, students can receive a pdf copy of a certificate with their name and signed by admin. | Bade, D., Nüssel, G. & Wilts, G. (2004) ‘Online feedback by tests and reporting for elearning and certification programs’. *Proceedings of the 13th international World Wide Web conference on Alternate track papers & posters - WWW Alt. ’04*. [online] Available at: <https://dl.acm.org/citation.cfm?id=1013511> [Accessed Nov 27 2019]. |
| Course Registration | LMS will entail several programs or courses, when applying students should be able to choose what course they want to undertake. A brief summary of each course or program and video of what to expect should be available. | Boroson, E. (2003) ‘*Course registration system: The on-line registrar’.the on-line registrar.* Available at: <http://www.cs.brown.edu/courses/cs190/old.dhl2003/asgns/2-7/tmp/eboroson_specs.pdf> [Accessed Mar 4 2008] |