# ASSIGNMENT COVER SHEET

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course: BSc Computing (SE)** | | | | **Year: 2** | | 1. CSY2027 | | |
| Group Project | | **Title: The Design and Development of a Course Management Software System** | | | | | | |
| Date due out: | Date due in: | | Extension date: | | | | | Extension agreed by: |
| **Student Names (List each member of the group)**  **Zenish Shrestha**  **Mausham Karmacharya**  **Simran Thapa**  **Aaryan Chaudhary** | | | | | | | **Tutor: Mark Johnson** | |
| Student comment, specific request for feedback etc. | | | | | Marker’s General View of the work | | | |

**ASSESSMENT FEEDBACK:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **RATING SCALE** | **Excellent** | | **Good** | | **Satisfactory** | **Needs some more work** | | **Needs much more work** |
| Elicitation Plan/ Interview(s)/Findings (10%) |  | |  | |  |  | |  |
| Requirement Specifications Documentation  (10%) |  | |  | |  |  | |  |
| System Design Documentation  (25%) |  | |  | |  |  | |  |
| Prototype Functionality and Quality of Application Code (35%) |  | |  | |  |  | |  |
| Test/Evaluation Strategy  (10%) |  | |  | |  |  | |  |
| Group Cohesion, Teamwork and Project Management/ System Presentation (10%) |  | |  | |  |  | |  |
| Specific aspects of your assignment that the marker likes: | | | | Specific aspects of your assignment that need more work: | | | | |
| Tutor’s Signature: | | Date: | | | | | Grade: | |

# ACKNOWLEDGEMENT

The completion of this project is the outcome of the countless efforts and hard work of our team members.

We would like to thank our module leader, Mark Johnson for providing us this opportunity to grasp the concept of the industry oriented working environment. Additionally, we would like to thank our Group Project module tutors, Mr. Himalaya Kakshapati and Miss. Shubham Dhungana for assisting us with our project.

The report consists of all the methodologies, research and activities we executed in order to design a user friendly and an efficient online college management system. The purpose of this report is to acknowledge the reader on the overall approach of the methodologies we applied. However, all the methodologies listed on the report are based for the pilot system (testing).

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### Abstract

A simplified management system is a substantial prerequisite to maintain the backbone of any institution. A multi-user online management system which is simple, easy-to-use and efficient, enhances the productivity of the institution’s employees as well as their users. Hereby, the goal of our company is to develop a similar platform for a college / university that can withstand the university’s potential. To cope up with this complication, different solutions such as elicitation activities, interface design and development, testing etc. has been carried out. Hence, if successful, the final build should be able to perform a series of trivial tasks on its own and allow the users to do their work more efficiently. As a result, this would boost the productivity of the employees as well as significantly save their time from their redundant workflow.

1. Introduction

1.1 Project Background

Woodlands University College (WUC) is an educational institution providing a wide range of courses and degrees. However, the university is reported to have been facing a series of complications regarding an obsolete paper based system.

To solve this, the university’s computing course leader, Dr. Simon White has appointed our software company to incorporate a robust, flexible and efficient yet, simplified pilot – system. Hence, this system could eventually lead to a bigger full-fledged system provided the Pilot meets all the required functionalities and is easier to grasp and does not harm the user’s workflow whatsoever.

1.1 Project Aims and Objectives

Our aim is to incorporate a new system that should be able to meet all the functional requirements plus include a few more additional functionalities to make the system more robust, reliable and user-friendly. In addition, the system is to be more focused on the usability part and easily accessible to all the students, tutors and other employees of the university.

The following objectives has been placed in order to meet these requirements:

* Effective elicitation techniques to investigate the problem domain,
* Proper research on the different legal acts as well as other system similar to this,
* Getting acquainted with the required functionality and all the necessary performance requirements,
* Assimilating the collection of well-developed and effective static and dynamic system designs including the designs for system database.
* A well designed user friendly interface, with reference to the draft interface designs (wireframes, mock-ups etc.)
* Real-time testing of the system (trials, usability evaluation, feedbacks), removing unnecessary bugs and overcoming the faced limitations.

1.2 Project Development Methodology

1. Requirements Engineering

2.1 Elicitation activities

2.1.1 Interview plans

Before building the system, it is essential to have an in-depth view of how the system should work. And, the users know it better than anyone.

Hence, arranging a private meeting to the key stakeholders seemed to be the perfect way to explore the difficulties of the current system and come up with solutions later to fix it. The goal was to conduct an interview with one stakeholder at a time. Therefore, we selected a couple of key stakeholders and took an appointment for the meeting. The key stakeholders were:

1. Dr. Simon White (Computing course leader)

2. Adam Blake (Computing department administrator)

3. Dr. Raj Singh (Module tutor)

4. Mr. Mark Williams (A currently enrolled student)

The appointment was confirmed to be on 7th of September 2016.

2.1.2 Interview findings

The tabular structure of the overall review of the interview with each stakeholder:

|  |  |  |
| --- | --- | --- |
| Topic Area | Motivation and Client Constraints |  |
| Interviewee | S.N | Question -> Client Response |
| **Dr. Simon White** | 1. | **Explain your role. What are the biggest challenges in your role?**   * He described he leaded the academic team. Then, he discussed about the problems he was facing. Like, performing tasks such as attendances, entering grades etc. were all paper based whereby the admin department handled the papers to the tutors when requested. “The overall process is too lengthy. This would really slow us down and sometimes these files were even lost / misplaced.” – he added. The tutors would not be able to check how their students were doing i.e. their student’s academic performance. * For students, if they wanted to change their simple basic information for instance, their address, they had to file in the change of approval form. All these handling of hundreds of paper works would take days, even weeks and there occurred a few instances where the student’s form were not even received. * Any new notice / updates occurring would be displayed on the physical notice board. “Everyone had to walk up to the board and see what’s going to happen the other day / any new notice or changes. So basically, improving all these in any way possible are the challenges of my role.” – he remarked. |
|  | 2. | **What do you expect from the new system? How should it help your team?**   * He described – “There could be a portal where tutors / students could log in to the system. The tutors could be able to upload module materials, assignments, download student’s assignments, review them and record any information relevant to their module. Whereas, students could be able to download the files the tutor has uploaded and submit the assignments electronically. Also, the tutors should be able to monitor the student’s academic status.” * He showed enthusiast in transforming the physical notice board to electronic where everyone could reach out to them and never miss a thing. * Dr. White marked the **EFFICIENY** part of the system to be of the prime importance. (Faster data retrieval, prevent loss of data, secure etc.) |
|  | 3. | **Who would be using the new system and what would be their roles?**   * He said that there would be different academic staffs, tutors, admins as well as students who would be using the new system. * He categorized all their roles in terms of **LEVELS:**  1. **LEVEL 1 (Course leaders & admin):** They should have full privilege to the system and could modify any data within the system. 2. **LEVEL 2 (Academic staff members):** They should be able to record information in the system relevant to their module. Additionally, they should be able to monitor the student’s academic status (view their grades / attendance etc.) 3. **LEVEL 3 (Students):** They should be able to log in to the system, view their personal details, edit it (with the permission of the admin), see notifications, grades, upload assignments etc. |
|  | 4. | **How many staffs will be using the new system?**  Response: He informed us that the university added new staff numbers every now and then. Currently, they are 20 in numbers. However, he wanted the system to be able to handle any numbers thrown at it. |
|  | 5. | **Would the system hold confidential information?**  Response: According to him, every data put on the system were confidential. They ranged from students’ data to the staff’s and tutor’s data. Therefore, he added that our system had to be secure and abide by all the laws of data / network security to make that possible. |
|  | 6. | **Would you opt for a cloud / physical storage for data storage?**  Response:   * “What do you recommend?” – he asked. We were in favor of cloud as they were easily accessible and there wouldn’t be an issue in terms of data loss as those would be backed up over the air. * He added that the cloud were not much secure and some person somehow around the world could be able to access the confidential information. * He chose to opt for a physical data center within the university. However, he was interested in terms of hybrid cloud concept where the non-confidential data could be stored in the cloud provided the pilot system was a success. |
|  | 6. | **Would you want to be able to communicate with other fellow tutors within the system?**  Response:  He said that, the feature was an additional feature. “This would not affect the workflow of the tutors / students.” – he said. He also added that the system should be more efficient and requested us to focus more on the core functionalities of the pilot. Later, this new feature could be discussed and added after the succession of the pilot system i.e. in the full-fledged system. |
|  | 7. | **What part of your profile would you want to be visible publicly?**  Response:  Dr. White did not want any of his profile to visible publicly. Although, if some students or a visitor wanted to contact him, there could be a certain separate section for contact page where all the contact information of all the tutors were made available. |
|  | 8. | **How are you planning to check plagiarisms? Would you want the feature to be available on the system?**  Response:  Dr. White didn’t want the pilot system to feature this. However, he described that they would use a third party software (Turn It in) which could be added onto the fully fledged system later on. |
|  | 9. | **Would you want to make online studies available on the system for those students who were unable to attend the real classes?**  Response:  “No, we wouldn’t want online studies to be available. However, it could be a part of the bigger system. We could discuss it later on if the pilot system is effective.” – he said. |
|  | 10. | **Would you restrict file upload sizes?**  Response:  Dr. White left this answer for us to decide. He wanted the students to upload a reasonable amount of size of file. “If the student can only upload a size of 1 MB, then there will be a problem” – he grinned. He also left an assumption to be at about 20 megabytes. |
|  | 11. | **Do you favor for a separate section for online community and forums?**  Response:  Dr. White gave a positive feedback that this area would really help out the students. However, considering the system to be in its initial stage, he was a bit skeptical about it. Although, he gave a thumbs up for this feature to be included if the core functionalities were properly incorporated. |
|  | 12. | **Do you find it beneficial to be mobile compatible?**  Response:  “Yes, of course.” – he said. He gave his thoughts about the general norm of technology which everyone was abided by it. Also, he wanted the system to be as easy as accessibility could get. |
|  | 13. | **How would you / tutors would like to monitor the students’ data?**  Response:  Dr. White’s decision about this were bar charts or some kind of figures on the grades / attendances. “This would make us easier to acknowledge how academically sound a student is.” – he added. |
|  | 14. | **Any additional features you would like to conclude upon?**  Response:  He took a walk down the memory lane and gave us some new feedbacks.   * The programming languages could be anyone of which we would see fit. * Student records were the top priority of all. So he requested us to make sure those were secure and no security laws were broken whatsoever. * All the student / staff data should be easy to access with a simple search.   **“With this, the meeting with Dr. White concluded. The next meetup was made to be notified via email to the related stake holders.”** |
|  |  |  |
| **Adam Blake** | 1. | **Can you briefly explain your role in this university?**  Response:  He introduced himself as Adam Blake, the course administrator from the computing course program support team. He explained that he was responsible for academic operations related to the university. For instance, the admission part. |
|  | 2. | **What difficulties are you facing with the current system?**  Response:  He responded that the university currently had an obsolete paper based system. If somebody needed a simple information, they needed to make a request to the admin and the admin has to search for the particular information. Since, all of these information were paper based, the overall process would take days, he explained. |
|  | 3. | **How much budget are you willing to allocate for the new system?**  Response:  He told us that the budget was negotiable. |
|  | 4. | **Would everyone agree with the new system?**  Response: Yes, he said. According to him, most of the staffs were enthusiastic about the new system. Those workers whose job would be replaced by the system were promised a different role instead of expulsion, he added. |
|  | 5. | **Will the students be able to use the new system?**  Response:  According to Mr. Blake, the system should be able to provide a user manual or some kind of tutorial to assist the students on working with the new system. |
|  | 6. | **For the first time users, should a tutorial be placed in the system?**  Response:  Mr. Blake agreed to the question and added that there could be a video or some other kind of tutorials that would make it easier for the first time users to get familiar with their working environment. |
|  | 7. | **How would you like the system interface to be designed? Any recommended color scheme?** Response:  According to Mr. Blake, the interface should be similar to the theme of the university i.e. as per the logos provided. The same would go for the color scheme as well, he added.  “Also, I’ve explained all the problems we have faced in the university. So, it’s up to your creativity to design a user friendly interface” – he added. |
|  | 8. | **What are the admission procedures in your institute?**  Response**:**  He explained the process as follows:  “  **First Stage:**  In terms of admissions, students apply to our university through UCAS. UCAS takes in applications for other universities as well in UK. Those applications which are for our university are sent to us by UCAS and we check their qualifications whatever information they have provided based on that we provide provisional case papers to them along with the letter and offers .If they have provided the basic qualifications and all the details required then we send them unconditional offer but if something is missing in the application we send them conditional offer which can be changed to unconditional if they provided the missing data. After that case papers are created. We create 8-digit ID no. which are unique for each individual. Those ID’s are recorded in the case paper along with the student’s status (either provided with conditional or unconditional offer) and we keep all those case papers together for that year. The approximate case papers held per year are 20 thousand to 30 thousand however we take only 10 thousand case papers among them. After that whoever got the offer has to show up in the welcome week. Who don’t show up in the welcome week and has got the offer their case papers are converted into dormant and stored separately. Those dormant papers are kept for 10 years however provisional case papers are kept for only 3 years.  **Second stage:**  In the welcome week student, must bring their qualifications, certificates which are checked and if everything is correct they are enrolled and their status is converted to live. If some student doesn’t come with the necessary certificates then a notification is sent informing that they have 2 weeks to submit those necessary documents and again some students don’t submit, we add 2 more weeks. If students don’t submit within 4-weeks ‘period, they are withdrawn and their case paper are made dormant.  ” |
|  | 8. | **So, what happens to the student’s records when they pass out from the institution?**  Response:  Mr. Blake said that, the records were kept even if the students passed out from the institution. He added by saying that, the system should also be able to store student’s records even if they pass out from the institution. Furthermore, the system had to provide the essential documents required with the simple click of a button. |
|  | 9. | **Would you want to make the online payment available on the system? (For admission purpose)**  Response:  Mr. Blake insisted on sticking to the basic functionalities for the pilot system. He explained that there would be security issues with the online payment system. |
|  | 10. | **Should a query section for visitors / students be included in the system?**  Response:  “Yes, a separate contact us section could be made providing the contact details of the university or FA/Qs section can also be included” – he said. |
|  | 11. | **Should the system provide online studies / help for the students?**  Response:  He passed on the question to Mr. White as the question was out of his role. |
|  | 12. | **Who would be the admin of the new system? How many in numbers?**  Response:  “Me myself along with the other staff. We would like to have 10 admins for now.” – he said. |
|  | 13. | **How many staffs of tech-expertise are currently there in your institution to maintain the new system?**  Response:  He said that there were some people of tech-expertise but as of the pilot system, they would not be included. |
|  | 14. | **Do you want a separate advertisement section to be available on the site to introduce new courses/ other advertisements?**  Response:  Mr. Blake agreed and suggested that there should be a separate section for the advertisement field. |
|  | 15. | **How much timeframe are you expecting for the pilot system?**  Response:  “This a pilot we want to see your project management skills. So, we would like to see the complete documentation and the design of the complete system by early January and we want to see the pilot by end of April.  ” – he said. |
|  |  | **With this, the interview with Mr. Adam Blake concluded. The future meetings with him would be conducted as per the appointments via email.** |
|  |  |  |
| **Dr. Raj Singh** | 1. | **Can you briefly explain the current system in the university?**  Response:  He explained that the university was running on an obsolete paper based system. |
|  | 2. | **Explain your role. What are the biggest challenge in your role?**  Response:  His problems were:   * Every student as well as tutors had to go to see the notice board every now and then to get updated with the changes. * Wastage of paper. * Time consuming. * If somehow an student missed a class, the slides couldn’t be provided to them. |
|  | 3. | **Any bad experiences you have faced in the current system.**  Response:  His bad experiences were:   * Degrade in attendance * Poor result * Delay in information due to the paper based system * Due to the non-availability of the dynamic notice board system the students would not get updated regularly with the changes resulting into poor attendance. |
|  | 4. | **How do you take in the students?**  Response:  He answered that this topic would be covered by the admin. |
|  | 5. | **As a module tutor, how are you managing your class schedule / attendance?**  Response:  “As we know currently there is paper based system in our university so attendance are recorded in paper due to which there are chances of losing the records, dirty and time consuming.” – he said. |
|  | 6. | **How would you want the new system to help in the class management schedule and attendance department?**  Response:  He said that the system should be able to provide effective data, facilities to upload slides, students should be able to download the slides, proper diary management should be provided, announcements to the new changes should be provided etc. |
|  | 7. | **How would you like to update the students with new information?**  Response:  “Announcement on notification box should help to update the students with new information.” – he said. |
|  | 8. | **How would you like to update the course materials / time schedules etc.?**  Response:  There was not an exact answer to this question because the case would be different for different tutors. (Some teachers would prefer to update the courses materials every week while others would prefer some different way). |
|  | 9. | **Do you support the availability of a discussion link like, online community & forums link on the site?**  Response:  He agreed saying it would be effective for both tutor and student, because some students prefer to research and discuss with tutor. It could be helpful for communication between tutor and students. |
|  | 10. | **What kind of information would you want on your system personal profile? Things that would make your workflow easier.**  Response:  “On profile there could be a notification box, information provided by university related to holidays, exam, lecture slide, log in, queries of students, announcement and extra materials for students. These could help to make our workflow easier” – he said. |
|  | 11. | **What kind of information would you share with the students? And how would you like to do that?**  Response:  They would share information about the research materials, course materials, slides etc. Some other queries would be shared with the help of a query box or something that should be available in the system. |
|  | 12. | **Any additional features you want to suggest to make the new system more flexible, reliable?**  Response:  “All assignment should be submitted electronically before deadline and there should be the availability for multiple submissions before deadline. Diary management could be useful for both students and tutor.” – he replied. |
|  | 13. | **What are the average number of students per class in your university?**  Response:  He said that this would depend upon module to module. However, on average there were around 30-40 students on each module. |
|  | 14. | **Are there any other additional data / features you think you need to add in new system?**  Response:  He said that there should be the functionality to check the student records even from tutor level. |
|  |  |  |
|  |  |  |

2.2 Requirements Specification

2.2.1 Problem Domain Description

2.2.1.1Existing Business Operation

Based upon the facts drawn from the interview, the university couldn’t reach its potential due to its main flaw in its management system which was all paper-based. (Paper based system is a non-efficient system of data management in common business organization.)

2.2.1.2 Summary of existing business limitations

The pile of papers on shelves caused searching and editing of the data difficult. Additionally, the use of paper based system used up more space making even the simplest work on them, time consuming.

Everyone had to go and see the notice board every now and then to see the changes. This would result to a majority of students as well as tutors missing out the changes occurring. Some students had to come to the university and see the changes during holidays which is tedious.

Attendances were covered in paper. If a teacher were to see the attendance report of a particular student, he / she had to request to the admin department. Then it would take days to retrieve that particular record which took a lot of time.

Admission processes were obsolete. For instance, sending a provisional letter to each and every student is ridiculously time consuming which could be simple with the help of an automated email client. Data retrieval of a particular student was difficult as they would have to go through all the records and find that particular record.

Similarly, assignments had to be handed out to the tutor during the class i.e. for a student to submit their assignments, they had to come to the university and hand out those assignments. Hence there are chances that the tutor might be absent or busy. This is difficult for both the tutor as well as the student.

2.2.2 Functional Requirements

|  |  |
| --- | --- |
| **Area** | **Notes/Essential Functionality** |
| Student Records | Create, Amend, Archive, Display, Assign. |
| Staff Records | Create, Amend, Archive, Display, Assign. |
| Course Records | Create Structure, Amend, Display, Delete, Archive. |
| Module Management | Create, Amend, Delete, Archive, Display, Assign. |
| Assignment Management | Create, Amend, Delete, Archive, Display, Assign, Mark/Grade |
| Attendance Records | Create, Amend, Archive, Monitor, Display, Action Poor Attendance. |
| Personal Tutor Management | Create, Amend, Assign, Display, |
| Timetable Management | Create, Amend, Delete, Archive, Display |
| Diary Management | Create, Amend, Display, Prompt, Initiate Automated Action. |
| Report Generation/  Management | Create, Display, Print |

* + 1. Performance Requirements
       1. Speed:

This refers to how fast the web site will respond to the user’s throughputs. Generally, this depends partly on the internet connection of the user (ping) as well as how heavy the system is. Dr. White suggested us to make the website accessible to everyone and speed is one of the necessary requirements.

Hence, our planning in this section would be:

* An affordable, reliable and fast domain to register the system into.
* Multiple servers on various locations would reduce the response time (ping) of the site i.e. make it load up faster.
* The system should be minimal (not clotted up with). This would result the web browser to cache less info. This directly affects the speed.
  + - 1. Capacity:

This refers to the storage capacity used by the site. Dr. White recommend us to use a separate database situated in the university itself rather than the cloud storage option. Generally, the system will be able to hold more information with more storage capacity. In addition, capacity can be referred to the number of users the system can hold simultaneously.

The capacity planning for the system includes:

* Well-equipped server computers (especially better RAM, CPU with higher clock speeds, SSDs etc.) to make changes to the system whenever necessary. This is necessary to avoid memory leaks, application crashes.
* The central database with HDDs / SSDs in RAID.
* HDDs are budget friendly and slower while SSDs are more expensive but faster.
* Well-skilled manpower to take hold of the central database (to add more storage space when necessary).
  + - 1. Reliability:

Reliability is the key goal of a well-optimized software. The system needs to be reliable i.e. it should not distract the users from what they’re trying to do. Application crashes, malware / viruses etc. are some of the constraints to an unreliable system.

Reliability planning for the system includes:

* Our system is recommended to hold as much users as possible to make the system more reliable.
* Malware / viruses are bits of code that has the power to ruin the functionalities of the system. Unreliable systems are easier to inject with malware / viruses without the owner’s knowledge. Hackers can inject these malwares for various purposes such as data leaking, identity theft etc. This results to an obsolete unreliable system. Hence, the system has to be well-equipped with updated sources of antivirus plugins to ensure that it is free from malware / viruses.
* There are cases when the system crashes on a certain action. In our case, this would generally result due to memory leaks. Hence, the user should have minimum requirements fulfilled in order to use this system. (Not much of an issue since computer these days are well equipped to handle web browsers and web apps)
  + - 1. Usability

Usability is also one of our key goals. The system has to be that simple that the users can easily use the system without any assistance.

No matter how well the system works, if it’s not user-friendly, users will not be able to use the system and probably will spend a long time learning to use the system.

Hence, the system has to be easy to grasp on. Some of the usability constraints in our system includes:

* A responsive minimal system interface design.
* Appropriate color coding.
* In built tutorial for the first time users.
* A suggestion link to gather information from users about the changes that could be made to make the system more user-friendly.