1. Requirement Engineering
   1. Elicitation Activities
      1. Interview Plans

To find out the problem domain, an interview with four different interviewees of different roles were interviewed.

All the questions prepared for this interview are documented below.

Questions

* + 1. **Dr. Simon White (Course Leader)**
       1. Could you describe the life cycle of staff and the life cycle of a student?
       2. Will we be getting any further documents regarding the life cycle of students and staff?
       3. Is there any college policy of legal requirement that we must be aware of?
       4. Is there any specific design you want the software to include? For example, a particular theme, use of colours, the font style and so on.
       5. We are assuming not everyone who are accessible to the system can use all the functionalities? Could you briefly explain who can access which functionality and who is prohibited?
       6. Could you tell us about the performance requirements of the software like speed of data, storage capacity and accessibility among users?
       7. Could you explain the record management system, student information portal and corporate website mentioned in the system interface designs?
       8. Can teachers add data from both GUI portion and from the backend?
       9. In terms of all the modules, do you have any of higher priorities? If in case of chance of delay, is there a part we can skip?
       10. What will be the consequence of poor attendance?
       11. Any other information you would like to share with us as a course leader regarding the software and your expectation?
    2. **Mr. Adam Blake (Course Administrator)**
    3. **Dr. Raj Singh (Senior lecturer, Module leader, Personal Tutor)**
    4. **Mr. Mark Williams (Existing student)**
    5. Interview Findings
       1. Interview Title: Initial Interview with the course leader – Simon White

Interview: Date: 08/05/2022

Duration: 10 minutes

Persons in attendance:

* Saurab
* Sadikshya
* Rohan

The questions and their respective answers for this interview are detailed in the table below:

|  |  |  |
| --- | --- | --- |
| Interviewer | Question Number | Question  Client - Response |
| 1 | Life cycle | |
| Sadikshya | 01 | Could you describe the life cycle of staff and the life cycle of a student?  Students could see the list of the courses. At the time when a student is not enrolled, he/she will have to submit required documents and functions. After the review of all the details submitted by the staff, it is verified. Maybe the student will be required to submit more important documents or will be rejected.  Then a module leader is assigned by the staff and all the follow ups will be conducted based on the system given by the module leaders and the tutors. |
| Saurab | 02 | Will we be getting any further documents regarding the life cycle of students and staff?  At the time, no any additional documents file is prepared regarding anything expect for the ones that is already provided. But in case of any need, it can be communicated through mail. |
| 2 | Policy or legal requirement | |
| Rohan | 03 | Is there any college policy of legal requirement that we must be aware of?  Must be aware of PII data that is Personally Identifiable Information. It will help identify a specific individual. So, this data should not be able to be shared among the students in the system. The PII data must be visible only to the administrative department authorised to this information as the data is also related to information security.  Even if it is not PII data, the academic information should only be visible and accessible to the related person.  From the security point of view, the particular roles like students, tutor, staff should not be given access to any other information except related to them. |
| 3 | Presentation style | |
| Sadikshya | 04 | Is there any specific design you want the software to include? For example, a particular theme, use of colours, the font style and so on.  For the font colour, theme and everything else, Nile can be taken as a reference. It could be used to create the UI of the system.  Other than that, there is no specific requirements. |
| 4 | Functionality accessibility | |
| Saurab | 05 | We are assuming not everyone who are accessible to the system can use all the functionalities? Could you briefly explain who can access which functionality and who is prohibited?  Regarding this topic, a list could be prepared listing the different roles and functionalities in the system. After that, from the client side, a mapping of the privileges and roles can be provided. Based on that matrix, the work can be done.  If after the development of the system some of the access or privileges are to be provoked, the system should provide a function in UI to remove such accesses.  Though at the very beginning it is not necessary to define which role has access to which functionalities. The administrator will handle the functionalities. With this matrix as a base, the development could be executed. |
| 5 | Performance Requirement | |
| Rohan | 06 | Could you tell us about the performance requirements of the software like speed of data, storage capacity and accessibility among users?  At the moment, there are no analytical reports. Hence, if talking about non-functional requirements, it would be good to see the webpage loading within 3 seconds.  As regard to others, the security mapping between the roles and authorised access to the functions is already specified. And about the back end development, backup of the codes should be maintained so that in case of any unfortunate problem, the codes can be easily retrieved. |
| 6 | System Interface Design | |
| Saurab | 07 | Could you explain the record management system, student information portal and corporate website mentioned in the system interface designs?  Put corporate website out of context here.  For the other two, they should be accessible easily. For the enrolment of students as well as better student experience, the student portal should be there. For record management system, as an admin or even as a staff should have their own portal so that they can access to specified functions. |
| Rohan | 08 | Can teachers add data from both GUI portion and from the backend?  Backend is not required for the teachers as it is only accessible to the administrators. |
| 7 | Module priority | |
| Saurab | 09 | In terms of all the modules, do you have any of higher priorities? If in case of chance of delay, is there a part we can skip?  Mobile implementation can be put in lower priority. From the priority point of view, student interface and teacher interface should be of higher priority than others. In fact, more focus on the student system such as being able to send enrolment requests, notifications regarding them.  Basically, delivery of functionalities from the student view should be highly prioritised and gradually can move to tutor and other staff. |
| 8 | Consequences | |
| Sadikshya | 10 | What will be the consequence of poor attendance?  If a student does not have at least 60% of attendance, the admit card will not be provided because of which they would be able to take their exams. |
| 9 | More information | |
| Saurab | 11 | Any other information you would like to share with us as a course leader regarding the software and your expectation?  As a course leader, what is wanted is being able to see what subjects are available in the course and what the modules are. Should have access to the course study materials uploaded by concerned authorities, and if required access to change the materials.  Also, see how the classes are going, their progress and participation is particular classes. Monitor how the assignments are happening and performance of each student. As a course leader, some of the requirements. |

* + - 1. Development Relevant Legislation

2.1.3.2.1 Equality Act:

The Equality Act of 2010 legally protects people against discrimination in the workplace and in society as a whole. We've replaced pre- taboos with a single law that's easier to understand and, in certain cases, enhances protection. It shows the various ways in which it is illegal to treat someone.

Equality Act provisions, effective October 1, 2010:

1) Basis for protection against direct and indirect discrimination, harassment and harm in public, office, work, education, association and traffic. Frames.

2) Modifying the definition of sex reassignment by removing the requirement for medical supervision. 3) Protects people who are believed to have protected characteristics or who are discriminated against because of their relationship with someone with protected characteristics.

4) More obvious protection for nursing mothers.

5) Applying a stable definition of indirect discrimination to all protected establishments.

6) Harmonizing the regulations that allow voluntary and positive behavior.

2.1.3.2.2 General Data Protection Regulations (GDPR):

The supplied software or system for Woodland University College will contain many types of data and information regarding students, academic staff, modules, or persons who are directly or indirectly associated with the college and its new computerized system. Because the information gathered is so sensitive, it must be handled responsibly and in accordance with particular rules and regulations.

Different requirements should be enforced under the Data Protection Act 2018 of the United Kingdom (UK), as stated by the General Data Protection Regulation (GDPR) required in law. According to GOV.UK, 2018, the following are the regulations of privacy and protection of data and information maintained inside the system.

1) Data should be used lawfully and transparently.

2) Data should only be collected for specific and stated purposes.

3) Relevant data should be used sparingly.

4) The information should be used in a suitable and applicable manner.

5) Unnecessary data storage should be limited.

6) The data should only be used within a certain organization's system.

7) Only certified employees of the organization should have access to the organization's key data and information.

2.1.3.2.3 Education Relevant Legislation:

The Education Act 2011 helps teachers raise the standards of their education. It includes new legal authority to help teachers eliminate bad behavior, tackle inefficiencies and improve how schools are held accountable. The provisions of Law are as follows:

1) Permit the search of students for dangerous or prohibited items without the school's consent.

2) Raise restrictions that prohibit schools from notifying students written birth without notice.

3) New advance notice Tax notice Student limitation Crime against teachers.

4) Authorization to facilitate free early childhood education for underprivileged children hardship 2 years old.

5) New school process reform and academy establishment Priority free schools.

6) Refocus Regular school assessment on the four key areas most important to parents.

7) Eligibility for schools to be exempted from regular Ofsted assessments Expand

8) New agency for underperforming schools including.

9) State minister's authority to close these schools.

10) Abolish five independent schools e existing agencies, some of their functions more efficient and report directly to the Secretary of State 44 44 Transferred to law enforcement.

**2.2.2 Functional Requirements**

A functional requirement is a definition of behavior between inputs and outputs that describes a function of a system or its component. Calculations, technical details, data manipulation, processing, and other specific functionality that define what a system is expected to perform are examples of functional requirements. Behavioral requirements are used to describe all of the scenarios in which the system applies the functional requirements, which are represented in use cases.

**2.2.2.1.1 Records Management Systems**

A records management system manages the administration of records for an organization throughout the records-life cycle. This facilitates the methodical and efficient management of record deletion, deletion, and related business transactions. It is a precise, simple, and safe system that includes features such as monitoring and updating student records. The various records management systems are listed below.

* **Student Records managements**

1. All information about the students is recorded in an organized manner in this management.
2. With just a few clicks, users may locate and retrieve student information.
3. Students can manage their personal information in Student Records, and academic and administrative staff can view student information and perform student administration tasks.

The student records operation list is provided below.

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Admins | Staff | Student |
| Create | Create a new record | No access | No access |
| Amend | Add a record to the achieve list | No access | No access |
| Archive | Transfer a record to the achieve | No access | No access |
| Display | Displays a list of all records, with all information displayed when an item is clicked | Students name and contact details are visible. | They can see their own name and rank. |
| Assign | Assign a course to a student | No access | No access |

1. System Analysis and Design (Record Management System)

Here, the current system is analysed and with the help of the requirement specification that is created, better procedures and methods are designed to make the system more effective. Here, the system will implement the Business Object Notation (BON).

* 1. Preliminary Design Stages
     1. Textual Analysis

Textual analysis will model the possible classes of the system as well as the behaviours of those classes. This is done with the help of the documents provided and the necessary researches.

|  |  |
| --- | --- |
| Candidate Class | Class Responsibilities/Behaviours |
| Student | create\_student, amend\_student, archive\_student, display\_student, assign\_student |
| Staff | create\_staff, amend\_staff, archive\_staff, display\_staff,  assign\_staff |
| Course | create\_course\_structure, amend\_course, display\_course, delete\_course, assign\_course |
| Module | create\_module, amend\_module, delete\_module, archive\_module, display\_module, assign\_module |
| Assignment | create\_assignment, amend\_ assignment, delete\_ assignment, archive\_ assignment, display\_ assignment, assign\_ assignment, mark |
| Attendance | create\_attendance, amend\_ attendance, archive\_ attendance, monitor, display\_ attendance, action\_poor\_attendance |
| PersonalTutor | create\_tutor, amend\_tutor, assign\_tutor, display\_tutor |
| Timetable | create\_timetable, amend\_timetable, delete\_timetable, archive\_timetable, display\_timetable |
| Diary | create\_diary, amend\_diary, display\_diary, prompt\_diary, initiate\_automated\_action |
| Report | create\_report, display\_report, print\_report |

* + 1. Significant Event Analysis

Here, the possible classes in the system is identified with the help of significant events in the system. In other words, actions that will result to change in the system state.

|  |  |  |
| --- | --- | --- |
| Event | Performer | Candidate Attributes |
| Login to the system | Administrator | User Id  Password |
| Log out of the system | Administrator | - |
|  | | |
| Add student record | Administrator | Id  Full Name  Address  Contact  DOB  Course ID |
| Update/Amend student record | Administrator |
| Archive student record | Administrator |
| View student record | Administrator, Student | Id |
| Assign student | Administrator |
|  | | |
| Add staff record | Administrator | Id  Full Name  Address  Contact  Module Id |
| Update/Amend staff record | Administrator |
| Archive staff record | Administrator |
| View staff record | Administrator, Staff | Id |
| Assign staff | Administrator |
|  | | |
| Add course structure | Administrator | Id  Course Name  Module Id |
| Update/Amend course | Administrator |
| Archive course | Administrator |
| View course | Administrator, Staff, Student | Id |
| Delete course | Administrator |
|  | | |
| Add module | Administrator | Id  Module Name  Staff Id |
| Update/Amend module | Administrator |
| Delete module | Administrator |
| Archive module | Administrator |
| View module | Administrator, Staff, Student |
| Assign module | Administrator |
|  | | |
| Add assignment | Administrator | Id  Assignment Name  Module Id  Initialized Date  Deadline  Information |
| Update/Amend Assignment | Administrator |
| Delete Assignment | Administrator |
| Archive Assignment | Administrator |
| View Assignment | Administrator, Staff, Student | Id |
| Assign assignment | Administrator, Staff | Id  Student Id |
| Mark | Administrator, Staff | Id  Student Id |
|  | | |
| Generate attendance record | Administrator | Attendance percent  Student Id  Student Name |
| Update/Amend attendance | Administrator, Staff |
| Archive attendance | Administrator |
| View attendance | Administrator, Staff |
| Action poor attendance | Administrator |
| Monitor | Administrator | - |
|  | | |
| Add personal tutor | Administrator | Staff Id  Module Id  Student Id |
| Update/Amend tutor | Administrator |
| View tutor | Administrator, Student |
| Assign tutor | Administrator | Staff Id  Student Id |
|  | | |
| Add timetable | Administrator | Course Id  Day  Time  Module Id |
| Update/Amend timetable | Administrator |
| Archive timetable | Administrator |
| Delete timetable | Administrator | Course Id |
| View timetable | Administrator, Staff, Student | Course Id |
|  | | |
| Generate report | Administrator | Staff Id  Student Id |
| View report | Administrator, Staff, Student |
| Print report | Administrator | - |
|  | | |
| Create diary | Administrator | Id  Message  Schedule  Pictures  Student Id |
| Update/Amend diary | Administrator, Staff |
| Prompt | Administrator |
| View diary | Administrator, Staff, Student | Id |
| Initiated Automated Action | Administrator |

* + 1. Commands, Queries and Constraints

**Login**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | LOGIN | | PART 1/1 |
| TYPE OF OBJECT  A login object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | User Id, Password, Status | |
| Commands | | Login | |
| Constraints | | * The user Id and password must be correct. * There is three possible user types: administrator, staff and student. | |

**Student**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | STUDENT | | PART 1/1 |
| TYPE OF OBJECT  A student record object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Id, Full Name, Address, Contact, DOB | |
| Commands | | Create, Amend, Archive, Display, Assign | |
| Constraints | | * Id must be unique. * DOB should of valid date. * Should not be able to enrol to more than one course. * Contact must be unique. * Administrator can access every command. * Student can only view his/her record. | |

**Staff**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | STAFF | | PART 1/1 |
| TYPE OF OBJECT  A staff record object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Id, Full Name, Address, Contact | |
| Commands | | Create, Amend, Archive, Display, Assign | |
| Constraints | | * Id must be unique. * Contact must be unique. * Administrator can access every command. * Staff can only view their own record. | |

**Course**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | COURSE | | PART 1/1 |
| TYPE OF OBJECT  A course record object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Id, Course Name | |
| Commands | | Create, Amend, Archive, Display, Delete | |
| Constraints | | * Id must be unique. * Administrator can access every command. * Staff and student can only view the course Id and name. | |

**Module**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | MODULE | | PART 1/1 |
| TYPE OF OBJECT  A module management object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Id, Module Name | |
| Commands | | Create, Amend, Archive, Display, Delete | |
| Constraints | | * Id must be unique. * Administrator can access every command. * Staff and student can only view the module Id and name. | |

**Assignment**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | ASSIGNMENT | | PART 1/1 |
| TYPE OF OBJECT  An assignment management object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Id, Assignment Name, Initialized date, Deadline, Information | |
| Commands | | Create, Amend, Archive, Display, Delete, Assign, Mark | |
| Constraints | | * Id must be unique. * Initialized date and deadline must be valid. * Administrator can access every command. * Staff can assign and mark. * Student can only view the assignment queries. | |

**Attendance**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | ATTENDANCE | | PART 1/1 |
| TYPE OF OBJECT  An attendance record object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Attendance percent | |
| Commands | | Create, Amend, Archive, Display, Monitor, Action Poor Attendance | |
| Constraints | | * Students with attendance percent less than 40% shall face appropriate actions. * Administrator can access every command. | |

**Personal Tutor**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | PERSONAL\_TUTOR | | PART 1/1 |
| TYPE OF OBJECT  A personal tutor management object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Staff Id | |
| Commands | | Create, Amend, Assign, Display | |
| Constraints | | * Id must be unique. * Contact must be unique * Administrator can access every command. * Student can only view the personal tutor queries. | |

**Timetable**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | TIMETABLE | | PART 1/1 |
| TYPE OF OBJECT  A timetable management object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Day, Time | |
| Commands | | Create, Amend, Archive, Display, Delete | |
| Constraints | | * Id must be unique. * Administrator can access every command. * Staff and student can only view the timetable. | |

**Report Generation**

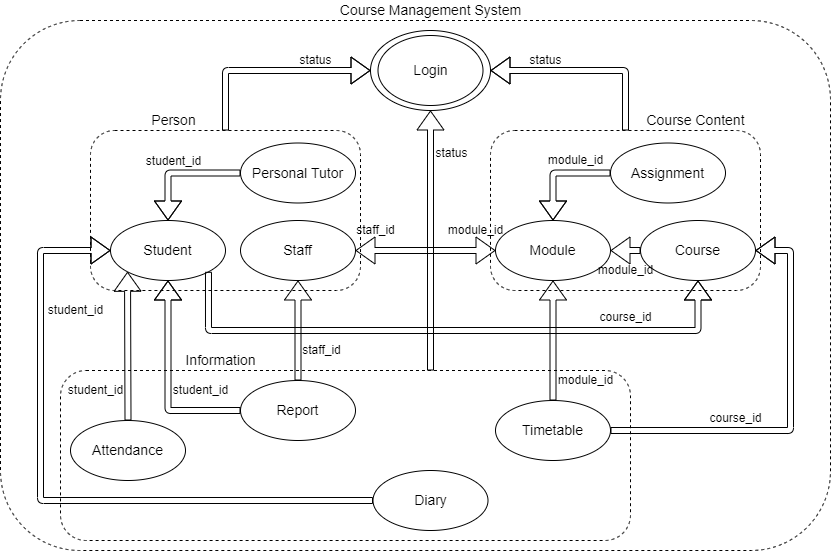
|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | REPORT\_GENERATION | | PART 1/1 |
| TYPE OF OBJECT  A report generation object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | |  | |
| Commands | | Create, Display, Print | |
| Constraints | | * Administrator can access every command. * Staff and student can only view their own report. | |

**Diary**

|  |  |  |  |
| --- | --- | --- | --- |
| CLASS | DIARY | | PART 1/1 |
| TYPE OF OBJECT  A diary management object in the system. | | Author - Saurab Khadka  Created – 9 May, 2022 | |
| Queries | | Id, Message, Schedule, Pictures | |
| Commands | | Create, Amend, Display, Prompt, Initiate Automated Action. | |
| Constraints | | * Administrator can access every command. * Staff can update and view diary. * Student can only view the diary. | |

* 1. Detailed Static System Designs
     1. First Draft BON System Architecture Diagram

The diagram below is a draft of the system architecture made with the help of the Business Object Notation (BON).



BON System Architecture Diagram

* + 1. BON System Chart

|  |  |  |  |
| --- | --- | --- | --- |
| SYSTEM | COURSE MANAGEMENT SYSTEM | | PART 1/1 |
| PURPOSE  Develop an effective system for course management. | | Author - Saurab Khadka  Created – 10 May, 2022 | |
| Cluster | | Description | |
| Person | | Records data of people of different roles in the university along with corresponding access to make changes. | |
| Course Content | | Records the different courses available in the university along with more detailed information such as modules included and assignments assigned. | |
| Information | | Records data about the timetable, attendance, information diary as well generated report about staff and student. | |

* + 1. BON Cluster Charts

|  |  |  |  |
| --- | --- | --- | --- |
| CLUSTER | PERSON | | PART 1/1 |
| PURPOSE  Record data of people of different roles. | | Author - Saurab Khadka  Created – 10 May, 2022 | |
| Cluster Components | | Description | |
| STUDENT | | Records all the necessary data about students as well as makes changes in the records as necessary. | |
| STAFF | | Records all the necessary data about staff as well as makes changes in the records as necessary. | |
| PERSONAL\_TUTOR | | Records all the necessary data about personal tutors as well as makes changes in the records as necessary. | |

|  |  |  |  |
| --- | --- | --- | --- |
| CLUSTER | COURSE CONTENT | | PART 1/1 |
| PURPOSE  Record data of courses and other course details. | | Author - Saurab Khadka  Created – 10 May, 2022 | |
| Cluster Components | | Description | |
| COURSE | | Records all the information about the courses available in the university as well as makes in the records changes as necessary. | |
| MODULE | | Records all the about the modules taught in the university as well as makes changes in the records as necessary. | |
| PERSONAL\_TUTOR | | Records all the necessary data about personal tutors as well as makes changes in the records as necessary. | |

|  |  |  |  |
| --- | --- | --- | --- |
| CLUSTER | INFORMATION | | PART 1/1 |
| PURPOSE  Record data other important details such as schedule, attendance and so on. | | Author - Saurab Khadka  Created – 10 May, 2022 | |
| Cluster Components | | Description | |
| ATTENDANCE | | Records data about student’s attendance as well as makes changes in the records as necessary. | |
| TIMETABLE | | Records the timetable of the courses as well as makes changes in the records as necessary. | |
| REPORT | | Generates report about all the record of student and staff of the university. | |
| DIARY | | Keeps record of any necessary schedules or any other information provided to the students. | |

* + 1. BON Class Charts