

SOFTWARE ENGINEERING COURSE PROJECT

Prepared by Effoi Assignment Helper

EFFOI ASSIGNMENT HELPER

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Chapter One

Introduction

1.1. Background information of the Organization

Founded in the year 2002 G.C, XYZ College was from the first private institution to work on engineering and technology disciplines in Ethiopia, especially in SNNP region. Since then, the College has been contributing a lot for the capacity building efforts started by the regional and national governments through producing qualified and skilled manpower and transferring of appropriate technology.

Currently, the College operates in three cities of the SNNPRS, i.e., Hawassa, Wolayitta Soddo, and Dilla. The College gives trainings in wide streams as, Business, Social Sciences, Engineering, Computer Science and Information Technology. The training and education programs reach from certificate to Masters levels.

XYZ is an accredited college by the Ethiopian Higher Education Relevance & Quality Agency and Southern Nations Nationalities Peoples Regional State (SNNPRS AND Sidama) TVET Bureau. Since its establishment, in year 2002, the College has created jobs for more than 1500 people. The number of graduates is more than 1000 in teaching fields, around 500 in Engineering fields (Electrical Engineering, Computer Engineering and Civil Engineering), and more than 5000 in TVET fields (Law, Accounting, Secretarial Science and Office Management, Surveying Technology, Information Technology, Library Science, and Human Resource Management). In addition, around 300 students have graduated in Computer Science at first degree level. That is, a total of more than 10,000 peoples have got the opportunity to acquire the skill, attitude and knowledge that enables them to participate in the national development plans and programs of the country.

Business Administration (MBA), M.Sc. in Information Technology and M.Sc. in Accounting & Finance. It has also First-degree accreditation from HERQA in Hawassa Campus in Computer Science, Civil Engineering, Accounting & Finance, Business Management, In Dilla Campus, Accounting & Finance, Business Management, Sociology & Social Works, Information

Technology, In Wolayita Soddo Campus Accounting & Finance, Business Management, and Information Technology.

1.1.1. Vision of XYZ College

- Enabling growth
- Becoming good environmental
- Excellence in education
- Excellence in education

1.1.2. Mission of XYZ College

To produce matured and conscientious working generations through providing knowledge-based quality education and training at secondary and tertiary level and the introduction and application of ICT that will benefit the community by equipping the manpower with the necessary tool's techniques and methods of modern knowledge and technology so as to make significant contributions to SNNP Region in particular and Ethiopia in large.

1.2. Background of the project

In 2004, XYZ College embarked on a project to implement a campus-wide information system for its student and academic staff population. The search for an “out-of-the-box” solution began following an attempt to build an integrated data management system in-house. For many years, the college had been running POISE software on an Alpha system. The software managed all of the college's data, yet each institution had its own database. In addition to having independent data repositories, specific offices on different campuses often housed their own student information. The university realized that one shared database among

1.3. Team composition

Assistant Dean	Technical Team
Project Director	Assistant Dean
Core Group	Core Group
Project Director	

1.4. Statement of the problem

Considering the aforementioned context, it is important to notice that a lack of awareness of numerous and varied challenging issues surrounding the implementation process could cause problems for the whole process of ERP development and deployment. Furthermore, the problem of a lack of key success issues seems to be a serious obstacle for the ERP implementation process. It is essential to define the success factors and manage them in order to carry out a successful the implementation. Additionally, ERP implementation effects an organization and these effects are related to the consequences of the business processes. Consequently, this issue is critical and crucial for an organization to consider when implementing a new ERP in the organization. The problem addressed in this study focus the challenges and key success issues regarding IS implementation. Additionally, the problem addressed in this study refers to effects and consequences on an organization and its business process.

1.5. Objective of the project

1.5.1. General Objective

- Developing and implementing a modern, efficient, and customizable student information database system for the university to operate more efficiently and effectively.
- Developing an effective institutional data reporting system.
- Ensuring staff capabilities, understanding, and operation of relevant modules.

1.5.2. Specific objective

- Ensuring functionality of the Datatel system.
- Ensuring timely installation of the Datatel system.
- Successful conversion of existing data to the Datatel system.

1.6. Feasibility Analysis

1.6.1. Operational feasibility

ERP is an integrated user machine system designed for providing information to support operational control, management control and decision-making functions in an organization. The information systems make use of resources such as hardware, software, man, procedures as well as supplier

1.6.2. Technical feasibility

Project ERP is a complete web-based application. The main technologies and tools that are associated with ERP are

- HTML
- CSS
- JSP
- MySQL'
- JS
- NetBeans
- Diagram Drawing tools
 - NCLASS
 - Microsoft project
 - Vision
 - Draw.IO

Each of the technologies are freely available and the technical skills required are manageable. Time limitations of the product development and the case of implementing using these technologies are synchronized

Initially the website will be hosted in a free web hosting space, but for later implementations it will be hosted in a paid web hosting space with a sufficient bandwidth required in this application is very low, since it doesn't incorporate any multimedia aspect/

From these it's clear that the project ERP is technically feasible.

1.6.3. Economic feasibility

Being a web application ERP will have associated hosting cost. Since the system doesn't consist of any multimedia data transfer bandwidth required for the operation of this application is very low

The system will follow the freeware standards. No cost will be charged from the potential customer. Bug fixes and maintaining tasks will have an associated cost. At the initial stage the potential market space will be the local universities and higher educational institutes.

Beside the associated cost, there will be many benefits for the customers. Especially the extra effort that is associated with paper making will be significantly reduced while the effort to create descriptive statistical support will be eliminated, since reports generation is fully automated

From these it's clear that the project ERP is financially feasible

1.6.4. Schedule feasibility

- Cost Benefit Analysis
- Cost of the project

ERP Costs	ERP Benefits
Project Management	Replacing/Retiring Current Systems
Implementation	Not Implementing Planned / Anticipated systems
Software	Business Continuity
Hardware	Benefits/Savings from Process Improvements
Ongoing Operations	
Upgrades	

A project account will be established to which all charges will be made. All charges to the project account must be approved by the Project Director. A quarterly report of year-to-date actual costs compared to budget will be prepared by the Project Director and submitted to the VP for

Planning, Budgets & Technology. The project budget will include a breakdown of the cost components, such as:

Datatel Contract	FY 2005 Costs
Software	ETB120,000
Consulting	ETB50,000
Training	ETB30,000
Maintenance	ETB20,000
Licenses	ETB15,000
Hardware	
Purchase	ETB100,000
Maintenance	ETB15,000
Licenses	ETB10,000
Other Costs	
Training Facility (on-campus)	ETB45,000
Training — Consultants, Travel, Food	ETB20,000
Process Improvement Consultant	ETB10,000
Supplies and Other Miscellaneous Items	ETB8,000
Total Costs	ETB443,000

Table 1: Cost Breakdown

1.7. Scope and significance of the project

The scope of the system implementation, as it pertains to the Project Management Team, consists of the implementation of each of the major subsystems: the Colleague® CORE system, the Student Base system, the Financial Base system, the Human Resources system, Payroll system and ultimately responsible for the implementation of each system's sub-modules. The Project Management Team is responsible for all project planning, documentation, training, and management. The project director provides leadership for the entire project implementation

Allows for integration of image processing, campus-wide ID cards, a kiosk system, and telephone processing of information.

1.8. Methodology for the project

1.8.1. Data Source

The ERP System Feasibility Study included the following high-level tasks, the results of which are summarized in this report to the State's Chief Information Officer (CIO):

- Conducted initial planning sessions to confirm overall project scope;
- Reviewed and evaluated statewide administrative systems currently in use;
- Reviewed documentation of the State's hardware/systems infrastructure for potential of existing technology to support or integrate with ERP solutions;

1.8.2. Fact Finding Techniques

- Interview

Conducted interviews with key administrative systems stakeholders at the enterprise-level and the largest user agencies, and documented results as support for our recommendations

- Practical Observation

With the assistance of State staff, gathered high-level information on the costs of current systems, including full-time equivalent (FTE) positions involved in the use and support of each major system that would be replaced by a statewide ERP system

- Document Analysis

Calculated and documented the estimated costs of implementing and maintaining a statewide ERP system; and prepared this written report documenting the results of our study.

1.8.3. Systems Analysis and Design

- The implementation of ERP is generally done in close association with the vendor, who supplies the package.
- Many organizations go for hiring professionals/consultants to facilitate the implementation process. Within the organization, there is a need to form an ERP-team.
- This team comprises of people with high caliber and motivation. They are from different streams. Process engineer, industrial engineer, HRD personal, financial executive and works manager are sure to find a place in this team.
- The role of top management is crucial, as the commitment and required flow of finance are major ingredients without which any effort whatsoever is futile.
- A general methodology for the implementation of ERP is presented in a flow chart.
- The identification of the need for ERP should be developed through a feasibility report.
- In this report the present enterprise should also be evaluated alone with much needed future capabilities.
- Then comes the stages of selection and evaluation of ERP. if the ERP solution is acceptable, then strategy for business process engineering (BPR) is decided.

Chapter Two

Description of the Existing System

2.1. Introduction of Existing System

Database: It is an integrated collection of logically organized data to manage an organization. It includes transient data such as input documents, reports and results obtained during processing.

2.2. Players in the existing system

Database Administrators:

Administering the primary (database) and secondary (DBMS and related software) is the responsibility of the database administrator (DBA). The DBA is responsible for authorizing access to the database, for coordinating and monitoring its use, and for acquiring software and hardware resources as needed.

Database Designers:

Database Designers are responsible for identifying the data to be stored in the database and for choosing appropriate structures to represent and store this data. Database designer typically interact with each potential group and users and develop a view of the database that meets the data and processing requirements of this groups.

End Users:

End users are the people whose jobs require access to the database for querying, updating and generating reports; the database primarily exists for their use.

There are several categories of end users:

- **Casual end user:**

Occasionally access the database, but they may need different information each time. They are typically middle-or high-level managers or other occasional browsers.

- **Naive or Parametric end user:**

Their main job function revolves around constantly querying and updating the database, using standard types of queries and updates that have been carefully programmed and tested. Bank tellers, Reservation Clerks for airlines, hotels, etc. are the example of Naive end users.

- **Sophisticated end users:**

Sophisticated end users include engineers, scientist, business analyst and others who thoroughly familiarize themselves with the facilities of the DBMS so as to implement their applications to meet their complex requirements.

- **Stand-alone users:**

They maintain personal database by using ready-made program packages that provide easy-to-use menu or graphics-based interfaces.

Software Engineers:

System analysts determines the requirements of end users, especially naive and parametric end users, and develop specifications for canned transactions that meet these requirements. Application programmers implement these specifications as programs; then they test, debug, document, and maintain these canned transactions. Such analyst and programmers are called Software Engineers.

2.3. [Major functions](#)

A database management system (DBMS) is a collection of programs that enables you to store, modify, and extract information from a database. There are many different types of DBMSs, ranging from small systems that run on personal computers to huge systems that run on mainframes. The DBMS acts as an interface between the application program and the data in the database. The following are examples of database applications:

- Computerized library systems
- Automated teller machines
- Flight reservation systems

- Computerized parts inventory systems

2.4. Business rules

Business rules are rules imposed by the customer who ordered (and pays for the development of) the application. Those rules are irrelevant to the application developers, but they must write the code that enforces them. Examples: “every customer must have a name” is a business rule that is best implemented by declaring a NOT NULL constraint on the relevant table column. Another example: “every invoice must reference a customer record” - probably a foreign key on the customer ID column of the Invoices table referencing the primary key of the customers table, and a not null constraint on the foreign key. More complex business rules may require procedural code in the database.

2.5. Bottlenecks of the existing system

- It requires considerable outlay of resources.
- Main frame hardware is expensive and although today there are a number of PC based database, multiple copies of the software, combined with training, can become an expensive proposition.

2.6. Proposed solution for the new system

- Maintaining effective communication among modules enables dissemination of relevant information at appropriate time: during the project, weekly meetings were scheduled to enable all modules to share information and ask question of each other.
- Planning well will reduce delays and budget overruns. It was essential to work with the vendor to develop a feasible project time-line and take the budget into serious consideration.
- Allocating sufficient time to implement the modules will increase chances of success: if a realistic time frame were not adopted, it would contribute to more errors when the team rushed to bring the module on-line.
- Assembling a quality project team will increase the success of the new system. Identifying good module leaders and their supporting cast was crucial to the project’s progress and success.

2.7. Requirements of the Proposed System

Task	Description of Role
Review current account coding block, document shortcomings and perform “clean-up” activities (i.e., clean-up object codes)	Facilitate discussion of existing coding block, documentation of coding block and its deficiencies, and management of “clean-up” activities
Develop requirements for inclusion in RFP	Lead work sessions with each functional team to develop requirements for inclusion in the RFP.

Task	Description of Role
Provide assistance in support of funding efforts	Support the Department on legislative and funding issues on an “as needed” basis.
Development of evaluation process and evaluation guide	Facilitate development of an evaluation guide that will address the evaluation process to be followed, evaluation criteria, scoring system, and roles and responsibilities of evaluation committee members.
Development of Request for Proposal(s)	Lead the development of the Request for Proposal(s) for acquiring ERP software and implementation services. The RFP will contain the key information necessary for vendors to prepare a comprehensive response including background, information regarding current environment, requirements, schedule of activities, terms and conditions, etc.

Development of demonstration evaluation scripts	Facilitate development of demonstration scripts that will be provided to the vendors so they can structure their software demonstrations.
ERP / Change Management Training	Work with project management to develop and present an overview of ERP software, how it will impact the State's business processes and staff, and provide an initial discussion on organizational change management.
Data cleansing activities	Function in a facilitation role and provide project management to ensure this task is completed as appropriate and on a timely basis.
Development of existing reports inventory	Assist project management in developing the standards / format to be used in documenting existing reports.
Development of project risk assessment methodology and initial risk management plan	Develop the risk assessment methodology and tools to be utilized for the project.

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Chapter Three:

System Analysis

2.1. Introduction

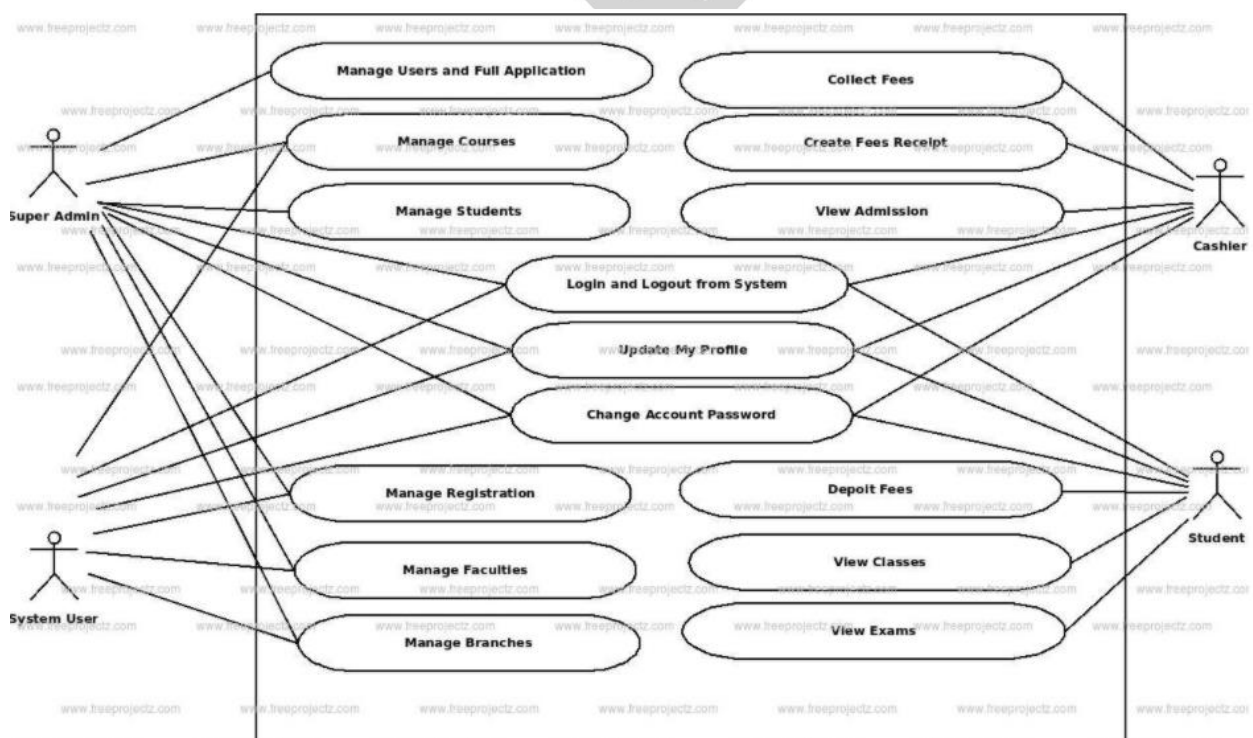
Enterprise resource planning (ERP) is a software architecture facilitating the flow of information among different functions of an organization. The main features of ERP:

- A software architecture integrating all functions of a business.
- Integration is seamless. This is achieved through (a) common databases (b) instant being sufficient for the whole enterprise to get updated.
- Powerful, user-friendly GUI technology.
- Supported by client –server architecture for communication at different levels of the system

2.2. System Requirement Specifications

Enterprise modelling is the most important prerequisite before the selection/implementation of an ERP system. It encompasses complete understanding and detailed mapping of the firm's business functions and decision-making process, both independently and interactively.

3.1. Use case diagrams



3.2. Use case documentation

Use Case ID:	UC-1		
Use Case Name:	Login to the system		
Created By:	Mahlet Tadele	Last Updated By:	Mahlet Tadele
Date Created	20/01/22	Date Last Updated:	20/01/22
Actors:	User		
Description:	Users will be prompted to login with their RIT account information before they can use the system.		
Trigger:	User requests to login		
Preconditions:	1. The user has an RIT account 2. The user is trying to log in with their RIT account 3. The user is not already logged in with Shibboleth		
Postconditions:	1. The user is logged in to the system 2. The user has access to the functions of the system		
Normal Flow:	1.0 User accesses the URL 1.1 The system prompts the user for their RIT account credentials. 1.2 The user enters their RIT username and password. 1.3 The system authenticates the RIT login with Shibboleth 1.4 The user gains access to the systems functionality		
Alternative Flows:	Invalid RIT account user or pass User already logged in with Shibboleth		

Exceptions:	Incorrect credentials
Includes:	None
Priority	High
Frequency of Use:	Every time the user wants to access the

		system.	
Assumptions:		The user wants to use the system	
Notes and Issues:		This is an include and precondition for all other use cases.	
Use Case ID:	UC-2		
Use Case Name:	Logout of the system		
Created By:	Mahlet Tadele	Last Updated By:	Mahlet Tadele
Date Created	20/01/22	Date Last Updated:	20/01/22
Actors:		User	
Description:		The user clicks on "Logout" and their session is terminated.	
Trigger:		User is done using the web application	
Preconditions:		1. The user is logged in 2. The user no longer wants to be logged in.	
Postconditions:		1. The user is logged out	
Normal Flow:		9.0 User is done using the web application 9.1 The user clicks on the logout button 9.2 The system logs the user out and invalidates the cookie/session	

	9.3 The system redirects to the default RIT logout page.
Alternative Flows:	N/A
Exceptions:	N/A
Includes:	Login to the system
Priority	Medium
Frequency of Use:	Whenever the user wants to log out.
Assumptions:	No one can use the login session after a user

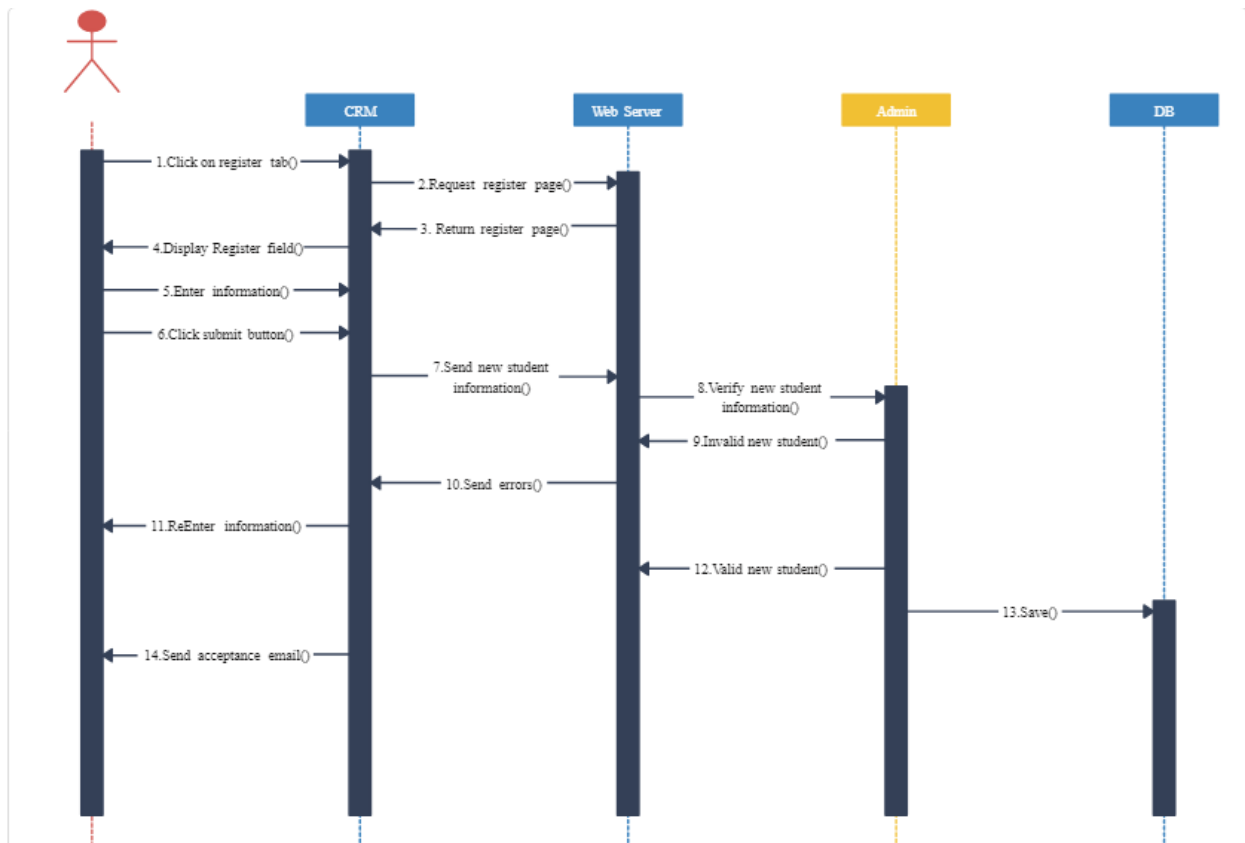
		has successfully logged out	
Notes and Issues:			
Use Case ID:	UC-3		
Use Case Name:	Export iCal		
Created By:	Mahlet Tadele	Last Updated By:	Mahlet Tadele
Date Created	20/01/22	Date Last Updated:	20/01/22
Actors:		User	
Description:		The user exports their calendar as a .ICS file.	
Trigger:		The user clicks on a button.	
Preconditions:		The user is authenticated. The user is authorized.	

Postconditions:	The user has been prompted to download a .ICS file.
Normal Flow:	1. The user clicks on the export button. 2. The user “save” when prompted by the browser.
Alternative Flows:	1. The user clicks the export button. a. The user enters option alarm time before class. b. Other possible options 2. The user clicks “Generate”. 3. The user saves the file.
Exceptions:	1. The user does not save the file. 1. The user reloads the webpage during the process.
Includes:	N/A
Priority	High
Frequency of Use:	One time per user.

Assumptions:		The user's browser can download files.	
Notes and Issues:		None.	
Use Case ID:	UC-4		
Use Case Name:	View Class on map		
Created By:	Mahlet Tadele	Last Updated By:	Mahlet Tadele
Date Created	20/01/22	Date Last Updated:	20/01/22

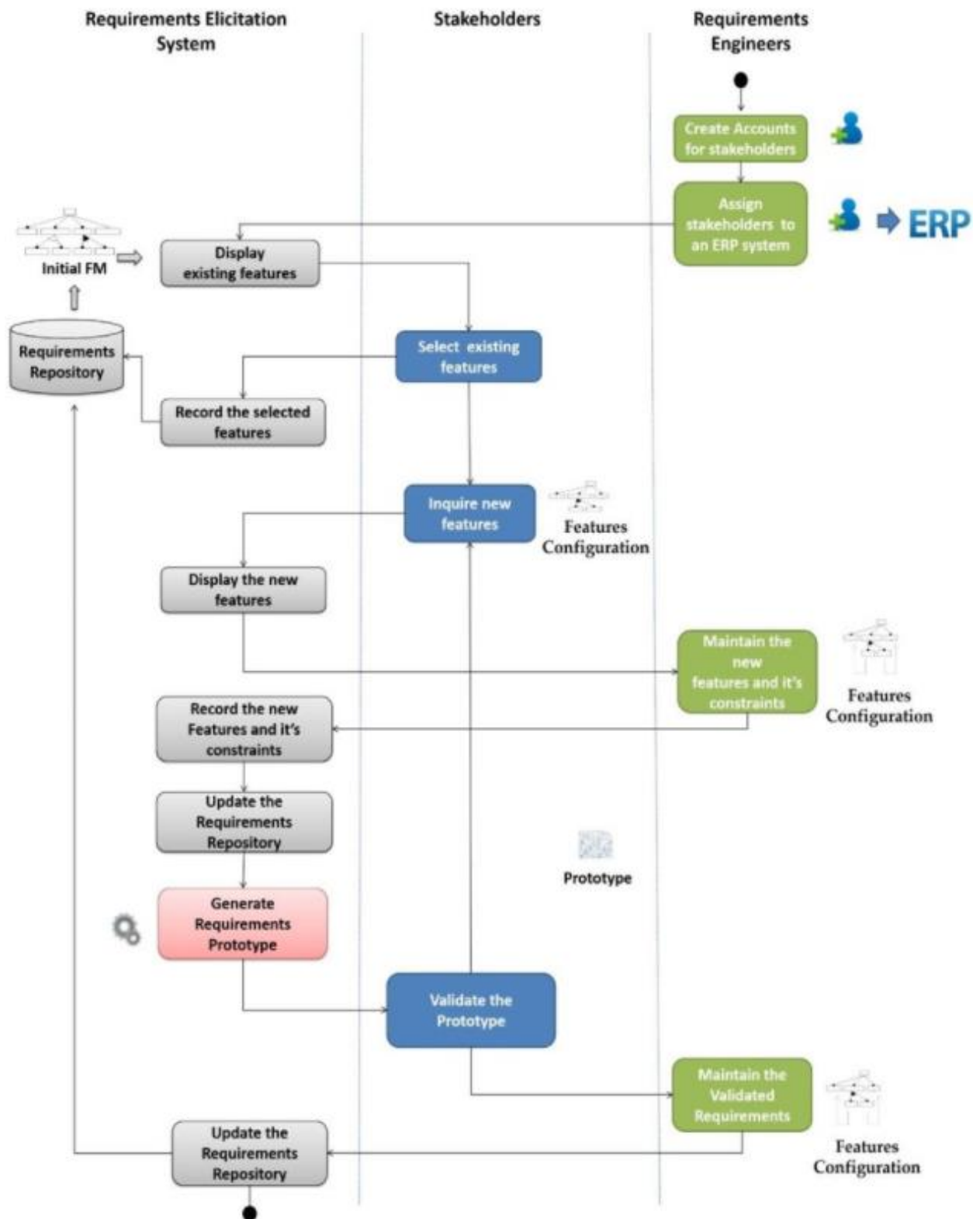
Actors:	User
Description:	The user chooses a class and is shown the building location of that class on the RIT Interactive Map.
Trigger:	The user clicks a link
Preconditions:	The user is authenticated. The user is authorized. The user has at least one class in their schedule.
Postconditions:	The users class location is visually pinpointed on the RIT Interactive Map.
Normal Flow:	1. User selects a class in their schedule 2. User clicks map link
Alternative Flows:	N/A
Exceptions:	1. Building was not found
Includes:	N/A
Priority	High
Frequency of Use:	Every time the user wants to see a class location.
Assumptions:	N/A
Notes and Issues:	

3.3. Sequence diagram

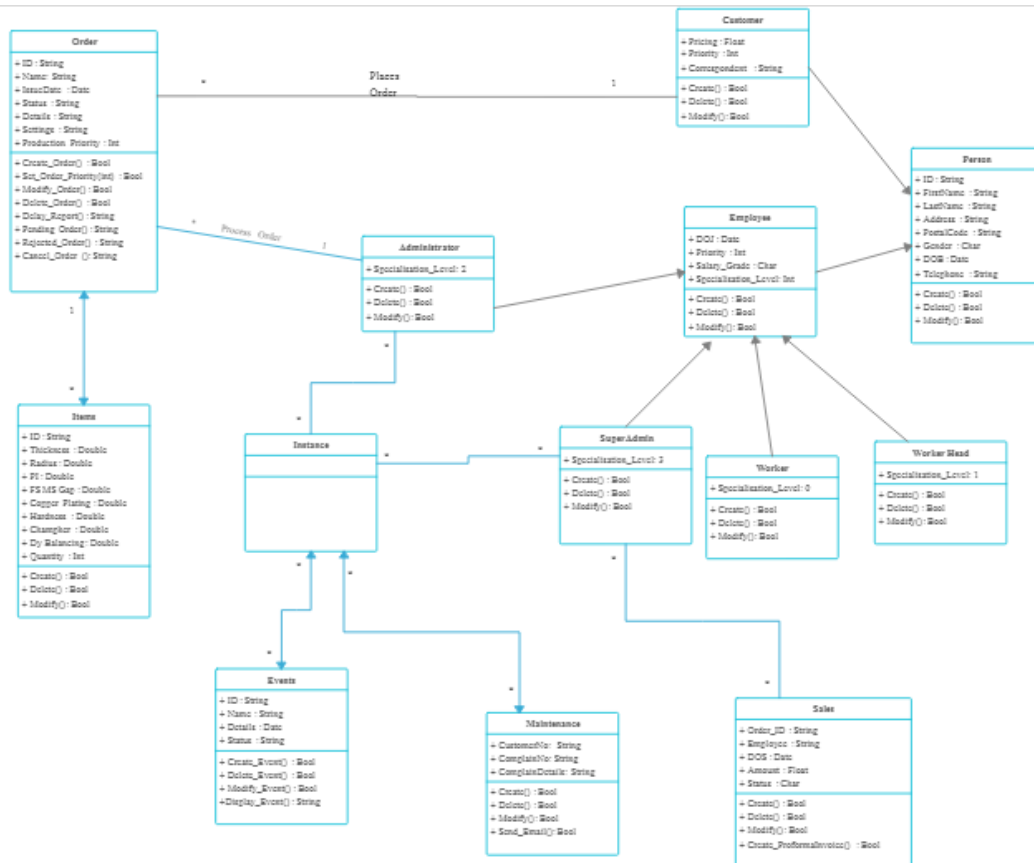


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3.4. Activity Diagram



3.5. Analysis level class diagram



Class Diagram for Production ERP

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