Contents

I. Introduction

Projects for technology students give an edge over the race of recruitment to work hard to ensure a good career. In spite of employment practices in recent times, students are progressively taking up projects to pad up their skill-set. Technology projects help students to learn and acquire practical knowledge. Despite of theory concept they acquire, various industries also need to know their capacity to complete projects using their specific initiatives. Thus, we recommend students to realize technology projects in their four years of technology and try to present as many white papers as possible. Students who give importance to their course projects are expected to learn how to:

- Work in teams including multidisciplinary teams
- Build a major design experience based on the knowledge and skills acquired in the course work
- Build a major design experience incorporates appropriate technology standards and multiple realistic constraints
- Apply both analysis and synthesis in the technology design process, resulting in designs that meet the desired needs

In the design process, both creativity and criticism are essential. The followings are the seven steps that students should consider while designing their projects:

- Recognition of the need and identifying opportunities: Every project begins with recognition that needs improvement. These needs may be obvious or hidden to be revealed by investigation, surveys or research.
- Definition of the design problem: It is a major task requires gathering information about the problem.
- Definition of the design criteria and constraints: While the problem is being defined, the design criteria and constraints must be defined
    a. Design criteria are performance standards to be met by the design

b. Design constraints are limitations placed on the designer, the final design or manufacturing process. *Examples of possible constraints include accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, regulations, schedule, standards, sustainability, or usability.*

c. Risk analysis

- The design loop: design is a repetitive process of:
  a. Synthesis (Brainstorming - Generating new ideas)
  b. Analysis (Breaking ideas – find expected results)
  c. Decision-making (Deciding the best alternative)
- Optimization: Design team must ask themselves if it is the optimum design. Optimum is the best design that can be achieved at reasonable cost. The proposed design is judged against the design criteria
- Evaluation: Design team should hold a design review to approve drawings and specifications before they are released. If an optimum design cannot be achieved, the design team might revise the problem definition, the design criteria or the constraints in order to achieve the optimal solution or prototype.

This project assesses your ability to carry out various software development activities in order to develop an engineered solution to a given problem. This involves identifying the requirements, writing a specification, designing, testing and evaluating a solution. The process has several stages and some investigation is required so you should plan the work carefully. The project contributes valuable experience in the understanding of programming using C#, and provides an important element in preparation for the end-of-semester examination.

Working successfully as a team is a key requirement for working in industry, and for this project

you will be working in a group of 3 students.

Your lecturers will act as the client for the software development project, and you will need to elicit detailed information from them at appropriate times. The client's initial outline of the requirements appears later in this document.

You must develop the solution to the assignment mainly in your own time, however, some of the office hours will be set aside to enable you to seek clarification, elicit more details from the client, and receive feedback on your work.

In keeping with the practical industrial scenario, there will be three milestones set for deliverable components of the project; the difference in this case is that rather than the company takes a substantial financial penalty for a missed milestone, you will be penalized with a percentage reduction of your assignment mark.

The stages of the project are as follows:

1. System Analysis and Design (logical design of your program: defining the main menu, defining all methods and interaction between these methods) and implementing the main menu, full system Implementation.

2. Project discussion/interview

This is a console application. Do not diverge from the project specification. If you do not conform to the project specification then you will lose marks. If you do want to make some addition to the project, and you are unsure whether the change will break the specification then check with your instructor first.

The format of the program output is given in the specification. You must adhere to this format. Some example output will be provided. You can therefore test your output against the expected output.

II. Project Description

The main objective of this project is to reinforce your understanding of C# programming by creating a console application of "Repository Administration System" in Kuwait. You should note that this is not a complete system as the complete system implementation needs data base to be used. Repository Administration System is a simple desktop application to be developed using C# Language. Suppose that you have a small company in Kuwait called XYZ that is selling various types of stocks. Your company has to have a software that will help you to maintain information about stocks, consumers, and sales.

In this project you should develop a "Repository Administration System" using C# programming language; basically the program will have the following three tables:

Table 1 (2-D array) – Consumers: To store ConsumerID, and phone number.

Table 2 (2-D array) - Stocks: To store StockID, Stockprice, and quantity.

Table 3 (2-D array) - Acquisitions: To store each transaction along with AcquisitionID, ConsumerID, and StockID.

The program enables the user to do some specific operations on the above arrays, such as "add, delete, update, search and list (display)".

1. Since the array size cannot be changed dynamically after its creation, we initially choose the number of rows for each array to be (50 X SectionValue). SectionValue will be: 1 for M1, 2 for F1 section. For example, if my section is F1 then the size of each array in my case will be (50X2 = 100) and so on, so that we can have sufficient space for records to grow. However, the only used parts within the array should be listed (displayed). For instance, if you have only four Acquisitions in the table, you should list only these four, not all the fifties that include empty rows. In the beginning, you should fill the whole array with a number with a negative value. Negative values means that these values are not used yet.

2. Initialize a **2D array** named **Consumers** of size 50x2. First column is to store **ConsumerID**, second column is 8-digit **phone number**. ConsumerID must be unique for each consumer. In the beginning, you should fill the whole array with a number with a negative value. This number is a combination of the first digit of the ID of each member of the group. For example, if the group are three students with Id's: 42938, 32511, and 23456. Then this value will be: -432. Minus value means that these values are not used yet.

Sample of Table 1. Consumers

ConsumerID	Phone number
1	95553366
2	94442233
3	57778899
-432	-432

3. Initialize a **2D array** named **Stocks** of size 50x3. First column is to store **StockID**, second column stores **price** and the third one stores available **quantity** in the stock. StockID must be unique for each Stock. The user should be prevented from inserting another stock with an existing ID. The quantity should be reduced properly after a sale occurred. In the beginning, you should fill the whole array with a number with a negative value. This number is a combination of the second digit of the ID of each member of the group. For example, if the group are three students with Id's: 42938, 32511, and 23456. Then this value will be: -223. Negative value means that these values are not used yet.

Sample of Table 2. Stocks

StockID	Stockprice	quantity
1	20	5
2	10	17
3	25	32
-223	-223	-223

4. Initialize a **2D array** named **Acquisitions** of size 50x3. The columns should follow **AcquisitionID**, **ConsumerID**, and **StocktID**. In the beginning, you should fill the whole array with a number with a negative value. This number is a combination of the third digit of the ID of each member of the group. For example, if the group are three students with Id's: 42938, 32511, and 23456. Then this value will be: -954. Negative value means that these values are not used yet.

Sample of Table3. Acquisitions

AcquisitionID	ConsumerID	StockID
1	1	2
2	2	3
3	3	1

5. At the beginning of the program, the program needs to fill some parts of each array with the values shown in the sample tables above (tables 1, 2, 3).
6. Then, the program should display the main menu **with A, B, C, and D** options. Each main menu option will have a submenu where for each you need to develop a method to be called in case of selection.

7. **When the program starts**, provide a welcome screen containing the names and ID's of the group members and the title of the project. Then, the main menu options are displayed. The user will be requested to make a selection. Based on the user's selection, a submenu will be shown on the screen. The user can then navigate through the menus.
8. **When you select an option from the menu**, the results are shown on the screen. Printing the main menu again should be shown on a new/clear screen to start from the beginning, and so on.

Below is the part of the project that describes how the submenus should operate.

Note that 0 is always used to return to the main menu. Also, a method should be developed for each submenu.

A. Stocks
   0. Main menu
   1. Add a new stock
      Add a new stock to the list. Request an **ID**, **price** and available **quantity**. Do not allow an existing **ID** to be inserted to the list. In such case, the program should display an error message and request for the information again.
   2. Update price
      Modify the **price** of a stock. Request for the **ID** of the stock and the new **price** of the stock; information should be updated accordingly. In case of invalid **ID**, the program displays an error message and displays the main menu again.
   3. Update quantity
      Update the **quantity** of the stock in the stock array. Request the **ID** of the stock and the new value for available **quantity**.
   4. List stocks
      List all the stocks with **price** and available **quantity** information.

B. Consumers
   0. Main menu
   1. Add a new Consumer
      Add a new consumer to the list. Request an **ID** and **phone number**. Do not allow an existing **ID** to be inserted to the list.
   2. Update Consumer phone number
      Modify the **phone number** of a given consumer. Request the **ID** of the consumer and new **phone number**. Make the proper change.

3. Search by phone number
   Request consumer's **phone number** to search and then display consumer's details.

C. Acquisitions
   0. Main Menu
   1. New Acquisition
      To add a new **Acquisition** to the list:
      - Generate an **AcquisitionID** automatically (instead of getting it from the user) by checking the table to see the next available number.
      - Request **consumerID**, and **stockID** of the Acquisition.
      - Insert the **Acquisition** record into Acquisition array so that "**Acquisition** approved" message is displayed on the screen.
   2. Delete Acquisition
      Delete a record from **Acquisition** array. Request the **AcquisitionID** and delete the record. Delete means making the field values -1 for all columns.

D. Exit the application
   Choosing this option the application will be terminated.

III. ABET Learning Outcome

By completing this project, the student should be able to:

1. Recognize the language by creating working C# programs using both the simple command line and the Visual Studio environment .*(1,2)
2. Identify data and how to input, store, and output data in C#.* (1,2)
3. Explain and identify basic GUI applications.* (1,2)
4. Identify and describe classic programming structures—making decisions, looping, and manipulating arrays—and how to implement them in C#.*(1, 2)
5. Discuss thorough study of methods, including passing parameters into and out of methods and overloading them.*(1,2)

IV. Project Management & Deliverables

This project is two deliverables as follows.

Deliverable (10%):

Deliverable 1 (5%): Prototype: (Code submission by Moodle + Q&A)-(Due Week 13 (Wednesday 20 Dec 2023@ 23:59)

- Students of each class need to form project groups of three students.
- One student from the group need to submit the complete code (.cs code) on Moodle link and consider the following:
  1. Name the code: **CNIT155-project-studentname-ID.cs**
  2. The group names with IDs should be in a comment at the beginning of the code.
  3. Sufficient comments for each part of the code must be provided (descriptions of all variables, Specific purpose for each method, control structure, loops, and output results etc.)
  4. Appropriate values and display text should be chosen for each step.
  5. Use of all C# programming techniques specified in the project requirement are mandatory.
  6. Excellent use of variables (no unambiguous naming) are mandatory.
  7. The output should be very clear and organized.
- Group members will be asked questions about the code contents and design. Therefore, you need to understand your part of the code.
- Each group member will be evaluated based on his/her understanding of his/her part and the main contribution in the project.
- You will be informed by your instructor whether the evaluation will be done in the Lab or Class session of Week 13.

Deliverable 2 (5%): Presentation with Voice Over (Due during the Class/Lab session of Week 13)

- The presentation duration is 10 minutes that is followed by 5-10 minutes of Q&A and discussion period. Group members will be evaluated based on his/her part done in the project. All presentations must be done using presentation software like MS PowerPoint. An electronic copy of the presentation must be submitted through Moodle prior to the presentation due date. A rough structure of oral presentation is as follows:
  a. Project Overview
  b. Presentation of final code/Design
  c. Reflections of the project on students' learning
  d. Conclusion and Future Remarks
  e. Related References

- Two files must be submitted by Moodle:
  a. A presentation file (PPT).
  b. A recorded file for the presentation with voice over. This recording should contain individual presentation from each member of the group.

V. Turnitin

Turnitin is a web-based solution that lets AUM faculty and AUM students check written work for improper citation or misappropriated content. You may be assigned a username and a password to be able to upload your assignments online, when and if requested. If you face any technical problem, please contact IT at AUM.

VI. APA Style

AUM adopts the APA writing style for all its academic programs. AUM students need to use this style for their assignments. The following web site is of value for students: http://owl.english.purdue.edu/owl/resource/560/01/. Students are also encouraged to visit the AUM Writing Lab to receive help and guidance on all APA-related questions.

VII. Academic Honesty and Integrity Assurance

One of the signs that the course material has been properly understood is honesty when accomplishing the assignments. Lack of academic integrity (e.g. plagiarism, copying another person's work, the use of unauthorized aids on examinations, cheating, facilitating acts of academic dishonesty by others) will not be tolerated. Therefore, if students include ideas,

sentences, or other material that are not theirs in their work, they must properly quote the source(s). Students are encouraged to consult with the instructor if they have any questions on the issues of academic integrity or technical formatting of the references.

Upon suspicion and doubt of the authenticity of the work submitted, the Instructor has the right to ask the student to verify her/his work. This can be done through, but not limited to, repeating the work, oral examination or discussion, alternative or similar on spot class assignment, pop quiz, or any other action deemed necessary. If the student fails to prove the authenticity of the work, then the Instructor will apply the academic misconduct rules as mentioned in the AUM Student Handbook which may include awarding the work a zero grade.

Students are expected and encouraged to be honest and to maintain the highest standards of academic integrity in their academic work and assignments at the University. Any act of Academic Dishonesty may result in severe consequences for violations range from zero grades given for the assignments, failing the course, and suspension from the University. Students will refrain from any academic dishonesty or misconduct including, but not limited to:

- Upon suspicion and doubt of the authenticity of the work submitted, the Instructor has the right to ask the student to verify her/his work. This can be done through, but not limited to, oral examination or discussion, or any other action deemed necessary. If the student fails to prove the authenticity of the work, then the Instructor will apply the academic misconduct rules as mentioned in the AUM Student Handbook
- A zero grade will be given to all students that share exactly the same results: You will also be held responsible if someone else copies your work - unless you can demonstrate that you have taken reasonable precautions against copying.
- Any violation of the AUM standards will be taken as a violation to AUM policy and can lead to penalties. If you wonder whether a course of action violates this policy, simply ask in advance and please refer to the undergraduate AUM Student Handbook.

For a detailed description of academic misconduct, please refer to the AUM Student Handbook.

VIII. Copyrights

Students are expected to adhere to copyright practices, refer to the undergraduate AUM Student Handbook.

IX. Project and team-based work

The Project component of the course, if exist, is essential to passing this course. The project shows competency in understanding and applying the course objectives and achieving the learning outcomes. The project should allow the student to investigate, apply, research, and practice real-life business situations. It is expected that each student to fully and actively participate in the project as an effective team member. A project document will be distributed later in the semester with details about the project.

Inclusion in a team is ensuring that every member has a sense of belonging, trust, and support, member can therefore participate fully and authentically in the project. When a team is inclusive, all team members contribute, show interest in the work, feel respected and involved, and are able to bring their own unique strengths and skills to their roles. Inclusivity in a project resolve in a team that perform better, solve problems faster, and achieve more.

How to render your team more inclusive:

1- Be yourself, and show up at times to your meeting

2- Treat all your teammates with dignity, respect, fairness, and without discrimination

3- Speak up about your own thoughts and show initiative

4- Communicate nicely with the right approach without affronting your teammates

5- Accept criticism and Involve and empower your team members in the project

6- Challenge stereotypes and biases and accept your teammates and their differences

Things that hinder your inclusiveness:

1- Avoiding face-to-face communication and overreliance on email or messaging

2- Creating communication barriers based on differences

3- Creating biases based on stereotypes and prejudice

4- Inconsistent response to mistakes

5- Lack of motivation or demotivating your team members

6- Leaving team members ideas unheard and disregarding members contribution.

For all group related work, the **entire team is responsible for the team outcome and the deliverables**, except for the specific parts of the project that may be graded individually depending on the project's requirement and as communicated in the project document.

X. Marking Scheme

The project is worth 10% of the total grade of your course. The grade will be based on every group's work, code, prototype, etc. The student will be evaluated based on the below grading scheme:

Functionality (30%)	Proposed Design (30%)	Program structure (20%)	Data Structure (20%)
-Menu driven is implemented properly (10%) -Neatness of the layout (5%) -No Execution Errors (5%) -Exit option (5%) -Sufficient comments for the Project (5%)	-Navigation between menu options is done properly (20%) -Using attractive fonts, background when showing information/details (10%)	-Loops: Using the loops correctly and enable the program to execute (10%) -Selection: Using Appropriate selection statements (10%)	Arrays: Using 2D arrays in a proper way to reflect the required system. (20%).

Final results (prototype, simulations, or research products, etc.):

- Code [70%]
  a. Does the code, etc. work or Not? **(20%)**
  b. How does the code look? [nice/catchy/basic design] **(20%)**
  c. Results meet initial expectation? Are the outputs satisfactory? **(20%)**
  d. Is the proposed solution/idea the most optimized? **(10%)**
  e. Steps of building the code (with its code if applicable) **(10%)**
  f. Explaining exactly the same components and elements used in the design of the code **(10%)**
  g. Clear and convincing explanation/comments on implementation of the design of the program **(10%)**
- Answering question correctly [30%].

a. Able to answer the questions related to the prototype and provide data to support their answers. (Accurate & detailed explanation of answer) **(15%)**

b. Show deep understanding on the prototype/simulations etc., its main functionality, the implementation, etc. **(15%)**

XI. Student Assessment Rubric

PD1: Rubric Prototype/Code with Q and A				
	Unsatisfactory (0-59%)	**Developing (60%-74%)**	**Satisfactory (75%-87%)**	**Excellent (>88%)**
Proposed Design/Prototype (50% - group)	1) The design is not well-developed through the needed approaches or may be incomplete or has numerous mistakes. 2) Prototype/model/simulation is poorly executed, lacking functionality or demonstrating significant flaws 3) Prototype/model/simulation results are not or incorrectly analyzed	1) The design is partially developed through the needed approaches, has some mistakes, but may lack detail or cohesiveness 2) Prototype/model/simulation shows some functionality, but improvements are needed to enhance its quality and effectiveness 3) Prototype/model/simulation results are partially analyzed while not showing students understanding of the results	1) The design well-developed through the needed approaches and detailed with minimal mistakes 2) Prototype/model/simulation is of good quality, demonstrating functionality and providing a realistic representation of the proposed design 3) Prototype/model/simulation results are briefly analyzed and discussed showing students understanding of the results	1) The design is exceptionally well-developed and detailed through the needed approaches and has no mistakes, with a clear and cohesive design that demonstrates an exceptional level of thought and creativity 2) Prototype/model/simulation is of exceptional quality, accurately representing the proposed design and showcasing advanced functionality. 3) Prototype/model/simulation results are carefully analyzed and discussed
Questions and Answers (50% - Individual)	1) Provides incorrect or incomplete answers. 2) Does not exhibit any confidence in answering questions.	1)Provides partially correct or vague answers. 2) Shows limited confidence in answering questions and often appears hesitant/unsure.	1) Provides mostly correct answers with minor mistakes or limited details. 2) Shows confidence in answering questions but occasionally appears hesitant/unsure.	1) Provides correct and detailed answers. 2) Consistently demonstrates a high level of confidence while answering questions.

PD2: Presentation with Voice Over				
	Unsatisfactory (0-59%)	**Developing (60%-74%)**	**Satisfactory (75%-87%)**	**Excellent (>88%)**
Slides Content (20% - Group)	The slides fail to meet any of the following criteria: 1) Information presented is accurate and relevant to the presentation topic 2) Content is well-organized, all key points are covered and clearly articulated. 3) An adequate level of detail is provided to cover and analyse the topic comprehensively	The slides meet only one of the following criteria: 1) Information presented is accurate and relevant to the presentation topic 2) Content is well-organized, all key points are covered and clearly articulated. 3) An adequate level of detail is provided to cover and analyse the topic comprehensively	The slides meet only two of the following criteria: 1) Information presented is accurate and relevant to the presentation topic 2) Content is well-organized, all key points are covered and clearly articulated. 3) An adequate level of detail is provided to cover and analyse the topic comprehensively	The slides meet all of the following criteria: 1) Information presented is accurate and relevant to the presentation topic 2) Content is well-organized, all key points are covered and clearly articulated. 3) An adequate level of detail is provided to cover and analyse the topic comprehensively
Slides Design (10% - Group)	The slides fail to meet any of the following criteria: 1) Video is of very good quality, visually engaging, and balanced in terms of text and figures. 2) Effective use of font and colors to emphasize key points and maintain visual appeal. 3) Consistent use of fonts, colors, and design elements throughout the presentation.	The slides meet only one of the following criteria: 1) Video is of very good quality, visually engaging, and balanced in terms of text and figures. 2) Effective use of font and colors to emphasize key points and maintain visual appeal. 3) Consistent use of fonts, colors, and design elements throughout the presentation.	The slides meet only two of the following criteria: 1) Video is of very good quality, visually engaging, and balanced in terms of text and figures. 2) Effective use of font and colors to emphasize key points and maintain visual appeal. 3) Consistent use of fonts, colors, and design elements throughout the presentation.	The slides meet all of the following criteria: 1) Video is of very good quality, visually engaging, and balanced in terms of text and figures. 2) Effective use of font and colors to emphasize key points and maintain visual appeal. 3) Consistent use of fonts, colors, and design elements throughout the presentation.
Voiceover Delivery (20% - Individual)	The voiceover fails to meet any of the following criteria: 1) Clear and audible voiceover, appropriate use of English language, and terminologies. 2) The student is explaining, not just reading, the presented information effectively. 3) Effective integration between the voiceover	The voiceover meets only one of the following criteria: 1) Clear and audible voiceover, appropriate use of English language, and terminologies. 2) The student is explaining, not just reading, the presented information effectively. 3) Effective integration between the voiceover	The voiceover meets only two of the following criteria: 1) Clear and audible voiceover, appropriate use of English language, and terminologies. 2) The student is explaining, not just reading, the presented information effectively. 3) Effective integration between the voiceover	The voiceover meets all of the following criteria: 1) Clear and audible voiceover, appropriate use of English language, and terminologies. 2) The student is explaining, not just reading, the presented information effectively. 3) Effective integration between the voiceover and slide content with

	and slide content with minimal stumbles, filler words, or awkward pauses.	and slide content with minimal stumbles, filler words, or awkward pauses.	and slide content with minimal stumbles, filler words, or awkward pauses.	minimal stumbles, filler words, or awkward pauses.
Voiceover Delivery (10% - Group)	The team voiceover fails to meet any of the following criteria: 1) The time allocation between team members is fair and provides equal opportunities for each member to contribute 2) The presentation is delivered within the exact provided time. 3) Smooth transitions between team members' segments.	The team voiceover meets only one of the following criteria: 1) The time allocation between team members is fair and provides equal opportunities for each member to contribute 2) The presentation is delivered within the exact provided time. 3) Smooth transitions between team members' segments	The team voiceover meets only two of the following criteria: 1) The time allocation between team members is fair and provides equal opportunities for each member to contribute 2) The presentation is delivered within the exact provided time. 3) Smooth transitions between team members' segments	The team voiceover meets all of the following criteria: 1) The time allocation between team members is fair and provides equal opportunities for each member to contribute 2) The presentation is delivered within the exact provided time. 3) Smooth transitions between team members' segments
Proposed Design(s) (40% - group)	The proposed design(s) fails to meet any of the following criteria: 1) Well-developed and detailed with no mistakes 2) Clear and understandable explanation of the design concept 3) Adequate consideration of relevant and realistic constraints	The proposed design(s) meets only one of the following criteria: 1) Well-developed and detailed with no mistakes 2) Clear and understandable explanation of the design concept 3) Adequate consideration of relevant and realistic constraints	The proposed design(s) meets only two of the following criteria: 1) Well-developed and detailed with no mistakes 2) Clear and understandable explanation of the design concept 3) Adequate consideration of relevant and realistic constraints	The proposed design(s) meets all of the following criteria: 1) Well-developed and detailed with no mistakes 2) Clear and understandable explanation of the design concept 3) Adequate consideration of relevant and realistic constraints