King Fahd University of Petroleum & Minerals
Information and Computer Science Department

SWE 316: Software Design and Construction (Term 251)

Homework # 1 Weight 7%

6	28 ٦	29 HW # 1	30 ٨	1-Oct ٩	2 ١٠	3 ١١	4 ١٢
7	5 ١٣	6 ١٤	7 ١٥	8 ١٦	9 ١٧	10 ١٨	11-Oct ١٩ ربيع الثاني
8	12 ٢٠	13 ٢١	14 ٢٢	15 ٢٣	16 ٢٤	17 ٢٥	18 ٢٦
9	19 ٢٧	20 Due Date ٢٨	21 ٢٩	22 ٣٠	23 ١ جمادى الأولى	24 ٢	25 ٣

Instructions

1. Answers have to be typed; **handwritten solutions will not be accepted**.
2. Submission:
   a. through BlackBoard
   b. **Softcopy** - report in PDF format (**WORD format is NOT acceptable**).
   c. **Source code** should be submitted as a single compressed file
3. The report should include a **cover page** showing: course name, assignment number, date of submission, your names and ID's
4. Include the following table in your cover page

Task	Grade	Your Grade	Comments
Task # 1: Class Diagram	15		
Task # 2: Application	55		
Check list and penalties No Cover page with grade table -5 ☐ File name (report) -5 ☐ Not in PDF format -5 ☐			
Total	70		

5. The file (report) name should be in the following format: **HW<#> - <YOUR ID> - <YOUR NAME>**
6. Your report **MUST** include your code and it should be **formatted properly**

   a. NOTE: You don't have to copy ALL your code.
   Just copy the parts that need to be illustrated.
   e.g, GUI code is not needed

   Try to use some callouts (like this one) to illustrate the code

7. Correct solutions earn full mark. However, ***not following the previous points will reduce your mark.***

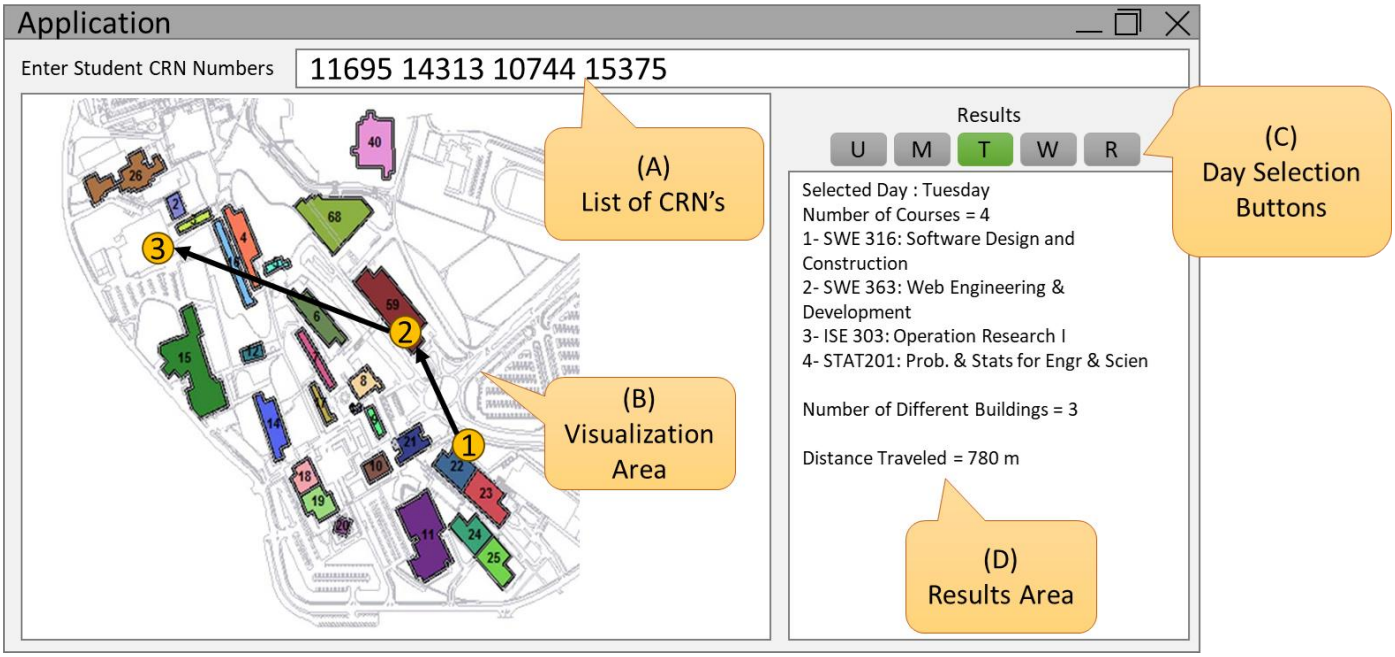
Problem Description

Term Schedule represents all the courses that are offered in a certain semester. Being in raw data format, it becomes difficult to get insights about the distribution of courses or classrooms used.

Data Visualization is a powerful mechanism that helps in getting insights from data. You are required to develop an application that traverses a large Excel file (sample is shown below) and creates the necessary objects required for this application.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	TERM	CRN	COURSE	DEPT	SEC	TITLE	M_ACT	DAYS1	START1	END1	BLDG	ROOM	INSTR
2	202510	11672	ISE 320	ISE	01	Quality Control and Industrial Statistics	LEC	UT	1530	1645	22	119	KHALED AL-SHAREEF
3	202510	13014	ISE 320	ISE	02	Quality Control and Industrial Statistics	LEC	UT	1230	1345	24	146	KHALED AL-SHAREEF
4	202510	15245	ISE 320	ISE	F02	Quality Control and Industrial Statistics	LEC	MW	0800	0915	22	134	M DHURGHAM
5	202510	11923	ISE 321	ISE	01	Optimization Methods	LEC	MW	1100	1215	24	174	AHMAD BAUBAID
6	202510	11925	ISE 324	ISE	01	Work and Process Improvements	LEC	MW	0900	0950	22	127	ABDUL RAHMAN AFZAL
7	202510	11926	ISE 324	ISE	02	Work and Process Improvements	LEC	MW	1000	1050	24	236A	ABDUL RAHMAN AFZAL
8	202510	14228	ISE 324	ISE	F01	Work and Process Improvements	LEC	UT	0900	0950	22	134	OMAR ELDALGAMOUNY
9	202510	12334	ISE 351	ISE	01	Cooperative Work	COP						ISMAIL ALMARAJ
10	202510	12868	ISE 391	ISE	01	Industrial Engineering Design	LEC	M	1300	1350	24	121	ESAM ALHOMAIDI
11	202510	12868	ISE 391	ISE	01	Industrial Engineering Design	LAB	M	1400	1640	24	121	ESAM ALHOMAIDI
12	202510	13495	ISE 391	ISE	02	Industrial Engineering Design	LEC	M	1300	1350	24	178	ESAM ALHOMAIDI
13	202510	13495	ISE 391	ISE	02	Industrial Engineering Design	LAB	M	1400	1640	24	240	ESAM ALHOMAIDI
14	202510	13064	ISE 398	ISE	01	Internship	INT						ISMAIL ALMARAJ
15	202510	12628	ISE 402	ISE	01	Production Systems and Inventory Control	LEC	MW	0800	0915	24	236A	ANAS ALGHAZI
16	202510	12939	ISE 405	ISE	01	Stochastic Systems Simulation	LEC	MW	0800	0850	24	165	OMAR ALSAWAFY
17	202510	12939	ISE 405	ISE	01	Stochastic Systems Simulation	LAB	M	1400	1640	22	231	KHALID ALBADIA
18	202510	10497	ISE 405	ISE	02	Stochastic Systems Simulation	LEC	UT	1000	1050	24	165	MOHAMMAD AL-YAGOUB

Once the data are successfully read, the main screen should allow the user to enter a list of CRN's in Area (A). After that, the user should select one of the week days (Sunday to Thursday) in Area (C). Once you select one of the days, you should visualize the **route** that the student is taking between his/her classes during that day (see image below). Area (D) is a textbox where you should show some results about resulted visualization including: Selected Day, Number of Courses, List of Courses, Number of Buildings, and Distance Traveled by the student on that particular day. For the visualization part, you CANNOT use any ready components in your application. You should achieve this by drawing on a panel. (A sample project will be given to you as a starting point)



Programming Language?

You have to develop this homework in **Visual Studio using either C# or VB.NET(Preferred) or Java (using Swing or JavaFX)**. Visual Studio will help create the User Interface easily while having all the Object-Oriented language constructs that you are familiar with in Java. Other options are not allowed.

Task 1: Class Diagram

The problem is not that difficult. You might end up with few classes. However, remember that you are a "Designer" not only a programmer! You have to approach this problem having in mind that the **requirements might get bigger** (in the next homework). Develop a class diagram that reflects this structure and make sure to follow the main principles we discussed in the class including:

- Abstraction and Encapsulation
- Single Responsibility Principle
- Open-Closed Principle

You have to include all fields and methods in every class with proper access modifiers (private, public, etc.). If the relation between two classes is an association, specify the multiplicity, label and direction of the relationship. Make sure that your class diagram represents all needed components in this system and also the main application.

Task 2: Develop the application

Develop your program to fulfill the requirements mentioned above.

Category	Marks	Details / What to Look For
Excel Data Processing & Object Creation	**15**	• Correctly reads the Excel file • Proper parsing and mapping to objects (courses, schedule items, buildings, etc.) • Handles edge cases (empty cells, invalid CRNs).
Core Logic & Functionality	**15**	• Selecting CRNs and filtering by day works correctly • Accurate computation of number of courses, buildings, and total distance • Route calculation is logical and correct.
Visualization / Drawing on Panel	**25**	• Route is drawn correctly on the provided campus map • Distinctive visual cues (colors, lines, legends) without using pre-made components • Updates properly when the day changes.

NOTE: Your program should reflect your class diagram

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