Department of Industrial and Manufacturing Systems Engineering

IMSE2113 Information Systems

Assignment 1 – Developing an Asset Management System

(15% of Total Course Mark)

General instructions:

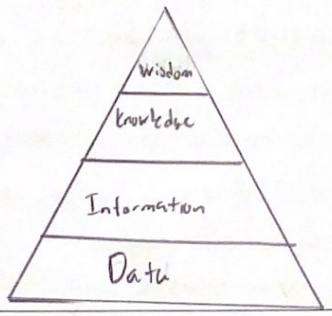
1. **Answer ALL questions.**
2. **All sketches/diagrams should be hand sketches.**
3. **Section 1 should be handwritten.**
4. **Scan your answers of Section 1, zip the scanned answer sheets and all of your program & user guide of Section 2 as "UID.7z" (e.g. 3035568000.7z), and submit the zip file to Moodle by 11:59 pm 28 March 2024.** ***(Note: Please submit an online drive link for downloading your work if the file size is very big)***

Section 1. Short Questions (Total 40 Marks)

Question 1. (10 Marks)

Describe what is a DIKW Model and sketch a diagram of the DIKW Model.

The DIKW model is a model that represents the relationships between Data, information, knowledge and Wisdom. It is a pyramid model showing the progression and the buildas blocks of each level. At the bottom is data, the rawest form of a collection of facts. Above it is information, which is a collection of data that is organized, processed and cleaned and provide meaning and can be analyzed. Above that is knowledge, which is how to understand and apply the information, giving it context. Above all is wisdom, which is the the application of knowledge to perform the best action



Question 2 (10 Marks)

(a) Describe SaaS, PaaS, and IaaS.

(b) Why use Cloud Services from Cloud Service Providers?

a) SaaS:

Software-as-a-Service are ready-to-use, cloud-hosted application software that can be accessed on demand. These applications do not need to be maintained or controlled by the users, and are designed to be used by end users. They are ready-to-go and should require minimal integration. Pricing is usually based on a monthly fee per user. Examples include Google Drive and Salesforce

PaaS:

Platform-as-a-Services are cloud-hosted platforms for use by software developers to develop, run, maintain and manage applications. Similar to SaaS, these platforms are available on-demand and are ready-to-use. Examples include Heroku and Azure

IaaS:

Infrastructure-as-a-Services provide access to cloud-hosted servers, storage and networking. These are used by IT teams or network architects to act as the backend IT infrastructure for running applications. Examples include AWS and Google Cloud

b) Using Cloud services from Cloud service providers can reduce the cost and effort required to implement certain technologies. By going through a provider, the cost of development and maintenance go down, with no need for IT specialists, private infrastructure and constant maintenance. These will all be handled by the provider, which will offer a lot more flexibility when it comes to setup, pricing and scaling, as no long-term contracts are needed

By using a trusted provider, data security and scalability can also be better, as the service does not need to be managed privately.

Question 3 (10 Marks)

Given that a data table named "Product" has the following data columns and there is no data row/record stored in the data table.

Data column name	Data Type	Is primary key	Comment
Name	Varchar(30)	Yes	Storing the name of a product
Price	NUMERIC	No	Storing the selling price of a product
Quantity	NUMERIC	No	Storing the available quantity of a product

(a) Write one or more SQL statements to add the following data to the given data table.

Name	Price	Quantity
Coca Cola	10	20
Apple	8	30
Candy	10	16
Headset	100	2

(b) Write a SQL SELECT statement that returns a result set of records as shown in the following table.

Name	Quantity
Coca Cola	20
Candy	16
Headset	2

(c) Write a SQL UPDATE statement to change the Quantity of the Headset to 8.

(d) Write a SQL DELETE statement to delete all data rows/records with Quantity less than 20.

a)
```
INSERT INTO Product (Name, Price, Quantity)
VALUES ('Coca Cola', 10, 20),
       ('Apple', 8, 30),
       ('Candy', 10, 16),
       ('Headset', 100, 2);
```

b)
```
SELECT Name, Quantity FROM Product
WHERE Name IN ('Coca Cola', 'Candy', 'Headset')
ORDER BY Quantity DESC;
```

c) UPDATE Product
SET Quantity = 8
WHERE Name = 'Headset';

d) DELETE FROM Product
WHERE Quantity < 20;

Question 4 (10 Marks)

Describe SQL Joins with examples.

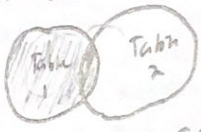
SQL Joins are used to combine rows/records from two or more tables based on a related field between the tables

The common types of joins are:

- Inner Join: Returns records that have matching values in both tables.

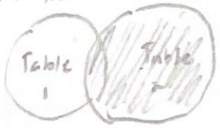
E.g: Select * From Table1 INNER JOIN Table2
ON Table1.Name = Table2.Name;

- Left Outer Join: Returns all records from left table and matched records from right table



E.g: Select * From Table1 LEFT OUTER JOIN Table2
ON Table1.Name = Table2.Name;

- Right Outer Join: Returns all records from the right table and any matched records from the left



E.g: Select * From Table1 RIGHT OUTER JOIN Table2
ON Table1.Name = Table2.Name

- Full outer Join: Returns all matched records from either of the two tables

E.g Select * From Table1 FULL OUTER JOIN Table2
ON Table1.Name = Table2.Name