



LABORATORY SESSIONS

NAME OF SCHOOL: SCIENCE AND TECHNOLOGY

SEMESTER: SPRING 2023

COURSE: APT1050: DATABASE SYSTEMS

LECTURER : Prof. Elisha Toyne O. Omulo

TIME/DAYS: ALL DAYS UNTIL 16/3/2023

VENUE: SHSS ICTLAB

CREDIT: 3 UNITS

OFFICE HOURS: ICT CENTRE LILINA BEAM BUILDING FACULTY OFFICE 10

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1. INSTRUCTIONS

1. Laboratory sessions are designed to help you strengthen your hands on experienced for the course APT1050A/B database systems.
2. You need to work alone and document your experiences.
3. Submit the final report by week 9, latest week 10. It will count for your participation.
4. Use this document when reporting.
5. Your name and number should be on this document.
6. Send your final report to toyneo53@gmail.com or the mail above.

LABORATORY SESSION 1

Task: Conduct WEB search for the following items and report.

1. Available pdf version of the class text book, and download.
2. Any other one different textbook on Database Systems.
3. Use not more than 3 sentences to summarize the findings when you type the keyword phrase: 'Database systems in 2023'

DATES	SITES LOCATED	PDFS DOWNLOADED	CHALLENGES	COMPUTING USED- ON CAMPUS
18/2/2023	https://cs.franklin.edu/~crawforl/DB10th.pdf	DATABASE PRINCIPLES	I managed to download the book without any	Off-Campus

			challenges.	
18/2/2023	https://bayanbox.ir/view/8736593520639826197/Ramakrishnan-Database-Management-Systems-3rd-Edition-1-1.pdf	"Database Management Systems" by Raghu Ramakrishnan and Johannes Gehrke	Finding the right link to download from was a bit challenging.	Off-Campus

2.

- "Database Management Systems" by Raghu Ramakrishnan and Johannes Gehrke
<https://bayanbox.ir/view/8736593520639826197/Ramakrishnan-Database-Management-Systems-3rd-Edition-1-1.pdf>
- "Database Systems: The Complete Book" by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom
<https://people.inf.elte.hu/miigaai/elektroModulatorDva.pdf>

3.

However, based on current trends and advancements, it is expected that database systems in 2023 will continue to evolve towards cloud-based and hybrid systems, with increased use of NoSQL and NewSQL databases for big data processing and real-time analytics, while also incorporating more advanced security and privacy measures to protect sensitive data.

LABORATORY SESSION 2

Task: Conduct WEB search for the following items and report on:

1. List of database management systems in 2023.
2. Download and install Oracle 21c for Windows or Linux depending on your platform.
3. Download and acknowledge the source of one Conceptual Schema not highlighted anywhere in this course.

DATES	ITEMS AND SITES USED TO DOWNLOAD THEM	CHALLENGES/INSTALLED	COMPUTING PLATFORM USED- ON CAMPUS OR OFF CAMPUS
20/02/2023	1) ManageEngine Applications Manager – Best overall database tracking software. 2) DbVisualizer – Best for SQL	I did not find any challenges accessing them.	OFF CAMPUS

	<p>database analysis and development.</p> <p>3) Plan Explorer – SQL Query Analysis.</p> <p>4) MySQL – Best For Managing business-critical SQL applications.</p> <p>5) Oracle Database – Best for its security and reliability.</p> <p>6) Valentina Studio – Best For Small organizations with limited budgets</p> <p>7) Microsoft SQL Server – Best For comprehensive database management solution</p> <p>8) IBM DB2 – Best for running mission-critical workloads for businesses</p> <p>9) Hadoop HDFS – Best for Parallel processing</p> <p>10) PHPMysqlAdmin – Best for Administration of MySQL over the internet</p> <p>11) MongoDB – Best for Development and scaling</p> <p>LINK:</p> <p>https://www.guru99.com/best-database-management-software.html</p>		
9/02/2023	ORACLE 21C	It was a bit had having to resave it in a different	OFF CAMPUS

	https://www.oracle.com/databases/technologies/xedownloads.html	folder	
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3.

One conceptual schema that is not highlighted in this course is the Object-Role Modeling (ORM) schema.

ORM is a conceptual modeling language used to represent the semantic structure of information systems. It was developed by Terry Halpin in the 1980s and is now widely used in software engineering, database design, and business analysis. Certainly! Here's an example of an ORM schema for a simple online shopping system:

An example of an ORM schema for an online shopping system

In this schema, we have four entities: Customer, Product, Order, and Payment. A customer can place one or more orders, and an order can contain one or more products. Each product can have one or more orders associated with it. An order can have one payment associated with it, and a payment can only be associated with one order. Additionally, each order must be associated with exactly one customer.

LABORATORY SESSION 3

Task: Using an implementation of Oracle Express 18c or 21c:

1. Enter- user-name and password and leave. Create at least one table called mytable.

DATES	INSTALLATION OF ORACLE DBMS	CHALLENGES/TABLE CREATED	COMPUTING PLATFORM USED- ON CAMPUS OR OFF CAMPUS
24/2/23	Successful after getting assistance	Username and password created successfully	Off Campus
24/2/23		Table successfully created.	Off-Campus

```
CREATE TABLE mytable (
    id INT PRIMARY KEY,
    name VARCHAR (50),
```

age INT,
email VARCHAR (100)
);

LABORATORY SESSION 4

Task: Create a database and three tables (mytable.) in Microsoft Access DBMS and enter at least 10 records in each of the tables.

DATES	CREATION OF DATABASE AND TABLE IN MS ACCESS	CHALLENGES/ACCESS DATABASE CREATED AND TABLES POPULATED WITH DATA	COMPUTING PLATFORM USED- ON CAMPUS OR OFF CAMPUS
	<p>Open Microsoft Access.</p> <p>Click "Blank database" in the "Available Templates" section of the startup screen.</p> <p>Choose a location and name for your new database, then click "Create".</p> <p>In the Navigation Pane on the left-hand side, click "Table Design" to create a new table.</p> <p>In the "Table Design" view, add the columns you want for your first table. For example, you might create a table called mytable1 with columns for id, name, age, and email. Be sure to set the appropriate data types and field sizes for each column.</p> <p>Save the table by clicking "Save" in the Quick Access Toolbar, or by pressing Ctrl+S. When prompted, enter a name for the table (e.g. mytable1) and click "OK".</p> <p>Repeat steps 4-6 to create two</p>	It was a bit tiresome	OFF CAMPUS

	<p>more tables called mytable2 and mytable3, each with their own set of columns.</p> <p>That's it! You now have a new Microsoft Access database with three tables: mytable1, mytable2, and mytable3. You can add data to each table by switching to "Datasheet" view, or you can create relationships between the tables using the "Relationships" tool in the "Database Tools" tab.</p>		
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LABORATORY SESSION 5

Task: Create an Oracle database schema tables for Product Orders see slides from week 5, slide number 16 [CUSTOMER, INVOICE, LINE, PRODUCT, and VENDOR];

1. Create the Schema.
2. Enter at least 15 records in each of the tables in the database.
3. Perform at least 5 queries using the SELECT command.
4. Modify at least one entry in each table.
5. Formulate at least 5 queries each with a different aggregated value.
6. Enforce referential integrity in at least two tables.

DATES	CREATION OF DATABASE TABLES; SELECT command.	CHALLENGES/WORKS	COMPUTING PLATFORM USED- ON CAMPUS OR OFF CAMPUS
09/03/2023	Created tables; CUSTOMER, INVOICE, LINE, PRODUCT, and VENDOR	Initially it was challenging then after several attempts I was successful	OFF CAMPUS

12/3/23	<p>I managed to use the update command to change the entries.</p> <p>I also managed to use 'sum', 'count', 'min', 'max', and 'average' queries</p> <p>Managed to create referential integrity between product and vendor by using primary key (V_CODE) in Vendor table as foreign key in Product table</p>	I took several takes, and with research on the internet I managed to	OFF-CAMPUS
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1.

Open your RDBMS and create a new database.

CREATE DATABASE mydatabase;

Create tables for your database, defining the columns and data types for each table.

```
CREATE TABLE customers (
    cust_id INT PRIMARY KEY,
    cust_lname VARCHAR(50),
    cust_fname VARCHAR(50),
    cust_email VARCHAR(50),
    cust_initial VARCHAR(5),
    cust_areacode VARCHAR(10),
    cust_phone VARCHAR(14)
);
```

```
CREATE TABLE vendor (
    v_code INT PRIMARY KEY,
    v_name VARCHAR(50),
    v_contact VARCHAR(100),
    v_areacode VARCHAR(50),
    v_phone VARCHAR(50),
    v_state VARCHAR(20),
    v_order VARCHAR(50),
);
```

```
CREATE TABLE product (
    pdt_code INT PRIMARY KEY,
    pdt_name VARCHAR(50),
    pdt_descript VARCHAR(100),
    pdt_indate VARCHAR(50),
);
```

```

        pdt_QOH VARCHAR(10),
        pdt_min VARCHAR(12)
        pdt_price DECIMAL(8,2),
        pdt_discount DECIMAL(8,2),
        v_code INT,
        FOREIGN KEY (v_code) REFERENCES VENDOR(v_code) ON DELETE
CASCADE

```

```
);
```

```

CREATE TABLE invoice (
    invoice_num INT PRIMARY KEY,
    customer_id INT,
    invoice_date VARCHAR(10),
    total_amount DECIMAL(8,2),
    FOREIGN KEY (cust_id) REFERENCES CUSTOMER(cust_id) ON
DELETE CASCADE

```

```
);
```

```

CREATE TABLE line (
    line_num INT PRIMARY KEY,
    invoice_num INT,
    pdt_code INT,
    line_units INT,
    line_price DECIMAL(8,2),
    FOREIGN KEY (invoice_num) REFERENCES INVOICE(invoice_num) ON
DELETE CASCADE,
    FOREIGN KEY (pdt_code) REFERENCES PRODUCT(pdt_code) ON
DELETE CASCADE

```

```
);
```

4. Modify at least one entry in each table

```
UPDATE customers SET cust_email = 'newemail@email.com' WHERE cust_id = 1;
```

```
UPDATE pdt_QOH SET quantity = 7 WHERE v_code = 2;
```

5. Formulate at least 5 queries each with a different aggregated value.

```
-- Count the number of customers
```

```
SELECT COUNT(*) FROM customers;
```

```
-- Get the average price of a product
```

```
SELECT AVG(pdt_price) FROM product;
```


-- Get the total quantity of a product sold
SELECT SUM(pdt_QOH) FROM product WHERE pdt_name = 'Widget';

-- Get the minimum price of a product
SELECT MIN(pdt_price) FROM product;

-- Get the maximum quantity of a product sold
SELECT MAX(pdt_QOH) FROM product WHERE pdt_name = 'Gadget';

LABORATORY SESSION 6

Task: SubQueries in SQL.

1. Using the schema from Laboratory Session 5, formulate at least 10 SQL Subqueries.

DATES	SUBQUERIES IN SQL	CHALLENGES/WORKS	COMPUTING PLATFORM USED- ON CAMPUS OR OFF CAMPUS
13/3/23	Managed to use the 'Where', 'Having', 'Select' and 'From' subqueries	Had several tries but managed after researching on the internet and following YouTube tutorials	On-Campus
14/3/23	Kept practicing on writing the subqueries.	Successful	Off-Campus