



Al Imam Mohammad Ibn Saud Islamic University College of Computer and Information Sciences Computer Science Department

Course Title:	Introduction to Databases	
Course Code:	CS 370	
Project:	Group-based Project	
Semester:	2023-1 st semester	
Marks:	15	
Section No:	172 - 173	

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Instructor: Dr. Qaisar Abbas.





- Table Creation:

```
CREATE TABLE "IUSER"
    "USER_ID" NUMBER(20,0) GENERATED BY DEFAULT ON NULL AS
START WITH 1 CACHE 20 NOORDER NOCYCLE NOKEEP NOSCALE NOT NULL
ENABLE,
    "ROLE" VARCHAR<sub>2</sub>(50),
    "PASSWORD" NUMBER NOT NULL ENABLE,
    "USERNAME" VARCHAR2(50) NOT NULL ENABLE,
     CONSTRAINT "IUSER PK" PRIMARY KEY ("USER ID")
USING INDEX ENABLE
);
CREATE TABLE "PLANTS"
    "PLANT_ID" NUMBER(20,0) GENERATED BY DEFAULT ON NULL AS
START WITH 1 CACHE 20 NOORDER NOCYCLE NOKEEP NOSCALE NOT NULL
ENABLE,
    "PLANT_NAME" VARCHAR2(20),
    "IDEAL_MOISTURE" VARCHAR2(20),
    "IDEAL_TEMP" NUMBER,
    "IDEAL LIGHT" NUMBER,
    "GROWTH_STAGE" VARCHAR2(20),
     CONSTRAINT "PLANTS PK" PRIMARY KEY ("PLANT ID")
USING INDEX ENABLE
);
CREATE TABLE "SENSOR"
    "SENSOR_ID" NUMBER GENERATED BY DEFAULT ON NULL AS IDENTITY
WITH 1 CACHE 20 NOORDER NOCYCLE NOKEEP NOSCALE NOT NULL ENABLE,
    "LOCATION" VARCHAR2(20 CHAR),
    "SLEEP_MODE" NUMBER,
    "FUNCATIONAL_CATAGORY" VARCHAR2(20 CHAR),
    "USER ID" NUMBER,
     CONSTRAINT "SENSOR PK" PRIMARY KEY ("SENSOR ID")
USING INDEX ENABLE
);
ALTER TABLE "SENSOR" ADD CONSTRAINT "SENSOR_CON" FOREIGN KEY
("USER_ID")
     REFERENCES "IUSER" ("USER_ID") ON DELETE SET NULL ENABLE;
CREATE TABLE "SENSOR_DATA"
    "S_ID" NUMBER,
```





```
"DATA ID" NUMBER GENERATED BY DEFAULT ON NULL AS IDENTITY
WITH 1 CACHE 20 NOORDER NOCYCLE NOKEEP NOSCALE NOT NULL ENABLE,
    "TIMESTAMPDATA" TIMESTAMP (6),
    "SENSORVALUE" NUMBER,
     CONSTRAINT "SENSOR_DATA_PK" PRIMARY KEY ("DATA ID")
USING INDEX ENABLE
);
ALTER TABLE "SENSOR_DATA" ADD CONSTRAINT "SENSOR_DATA_CON"
FOREIGN KEY ("S ID")
     REFERENCES "SENSOR" ("SENSOR_ID") ON DELETE SET NULL ENABLE:
CREATE TABLE "MONITOR"
    "P_ID" NUMBER,
    "SEN_ID" NUMBER
 );
ALTER TABLE "MONITOR" ADD CONSTRAINT "MONITOR_CON" FOREIGN KEY
("P ID")
     REFERENCES "PLANTS" ("PLANT ID") ON DELETE SET NULL ENABLE;
CREATE TABLE "INVENTORY ID"
    "INVENTORY_ID" NUMBER(20,0) GENERATED BY DEFAULT ON NULL AS
START WITH 1 CACHE 20 NOORDER NOCYCLE NOKEEP NOSCALE NOT NULL
ENABLE,
    "TOOLS" VARCHAR2(30 CHAR),
    "QUANTITY" NUMBER,
    "LASTRESOTKEDDATA" TIMESTAMP (6),
    "INVENTORY_NAME" VARCHAR2(30 CHAR),
     CONSTRAINT "INVENTORY_ID_PK" PRIMARY KEY ("INVENTORY_ID")
USING INDEX ENABLE
 );
CREATE TABLE "SENSOR_DATA"
    "SEN_ID" NUMBER,
 (
    "D ID" NUMBER.
    "TIMESTAMPDATA" DATE,
    "SENSORVALUE" NUMBER,
     CONSTRAINT "SENSOR_DATA_PK" PRIMARY KEY ("SEN_ID", "D_ID")
USING INDEX ENABLE
 );
ALTER TABLE "SENSOR DATA" ADD CONSTRAINT "SENSOR DATA CON"
FOREIGN KEY ("SEN ID")
     REFERENCES "SENSOR" ("SENSOR ID") ON DELETE SET NULL ENABLE;
```





```
CREATE TABLE "HAS"
     "INVEN_ID" NUMBER,
     "US_ID" NUMBER,
     CONSTRAINT "HAS_PK" PRIMARY KEY ("INVEN_ID", "US_ID")
USING INDEX ENABLE
 );
ALTER TABLE "HAS" ADD CONSTRAINT "HAS_CON" FOREIGN KEY
("INVEN ID")
      REFERENCES "INVENTORY_ID" ("INVENTORY_ID") ON DELETE
CASCADE ENABLE:
 ALTER TABLE "HAS" ADD CONSTRAINT "HAS_CON1" FOREIGN KEY ("US_ID")
      REFERENCES "IUSER" ("USER ID") ON DELETE SET NULL ENABLE;
```

- Database State:

```
INSERT INTO IUSER (USER ID, ROLE, PASSWORD, USERNAME)
VALUES
(1, 'supervisor', '1234567', 'Faisal'),
```

- (2, 'Farmer', '1234567', 'Ahmed'),
- (4, 'Farmer', '1234567', 'Khaled'),
- (5, 'Farmer', '1234567', 'Yazeed'),
- (3, '-', '1234567', 'Ali');

INSERT INTO plants (PLANT ID, PLANT NAME, IDEAL MOISTURE, IDEAL TEMP, IDEAL LIGHT, GROWTH STAGE)

VALUES

- (2, 'Basil', 10, 26, 10, 'Seeding'),
- (4, 'Fern', 10, 24, 3, 'Adult'),
- (5, 'Sunflower', 1, 26, 3, 'Seeding'),
- (1, 'Rose', 7, 23, 10, 'Seeding'),
- (3, 'Orchid', 10, 23, 7, 'Mature');

INSERT INTO inventory (INVENTORY_ID, TOOLS, QUANTITY, LASTRESTOCKEDDATA, INVENTORY_NAME) VALUES

- (1, 'Shovels', 10, '2023-10-21', 'One'),
- (4, 'Wheelbarrows', 5, '2023-10-05', 'Three'),
- (3, 'Rakes', 20, '2023-09-30', 'Two'),
- (2, 'Hoes', 15, '2023-10-01', 'One'),
- (5, 'Pruners', 12, '2023-05-10', 'Four');

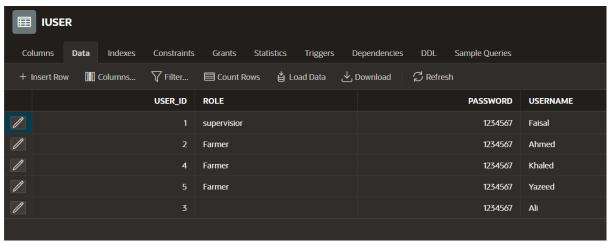




INSERT INTO sensors (SENSOR_ID, LOCATION, SLEEP_MODE, FUNCATIONAL_CATAGORY, USER_ID) VALUES

- (1, 'West', 1, 'Soil', 2),
- (5, 'East', 0, 'Temperature', 5),
- (2, 'South', 1, 'Temperature', 2),
- (3, 'South', 0, 'Light', 2),
- (4, 'North', 0, 'pH', 3);
- -- Assuming "sensor data" is the name of your table INSERT INTO sensor data (SEN_ID, D_ID, TIMESTAMPDATA, SENSORVALUE) VALUES
- (3, 3, '2023-10-21', 19),
- (1, 1, '2023-10-26', 25),
- (2, 2, '2023-10-22', 27),
- (4, 4, '2023-10-15', 16);

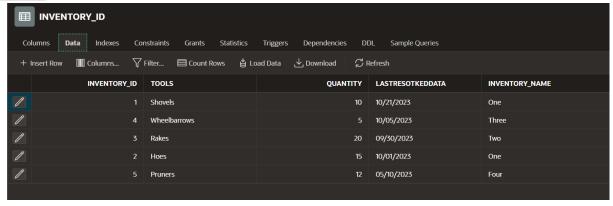
- Table ScreenShot:



IUSER TABLE



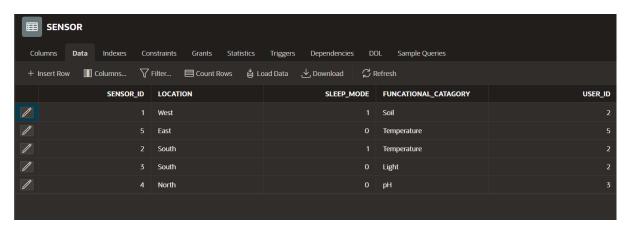




Inventory Table



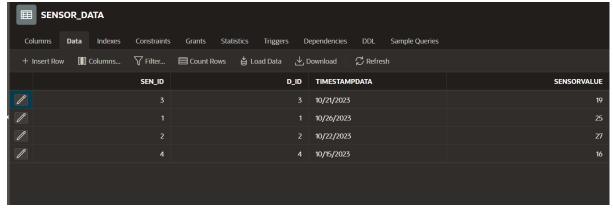
PLANTS Table



Sensor Table







Sensor_Data Table

- Query Implementation:

Views list:

1- NonSupervisorUsersView: This view lists the usernames of users who are not supervisors (excluding users with the 'supervisor' role).

CREATE VIEW NonSupervisorUsersView AS

SELECT "USERNAME"

FROM "IUSER"

WHERE "ROLE" <> 'supervisor';

2- This view displays plants with their ideal temperature and light conditions.

CREATE VIEW PlantIdealConditionsView AS SELECT PLANT_NAME, IDEAL_TEMP, IDEAL_LIGHT FROM PLANTS:

3- This view lists inventory items that have not been restocked.

CREATE VIEW InventoryRestockStatusView AS

SELECT INVENTORY_NAME, LASTRESOTKEDDATA

FROM INVENTORY_ID

WHERE LASTRESOTKEDDATA IS NULL;





4- This view lists all active sensors (those with SLEEP_MODE = 0).

CREATE VIEW ActiveSensorsView AS

SELECT SENSOR_ID, LOCATION, FUNCATIONAL_CATAGORY

FROM SENSOR

WHERE SLEEP_MODE = 0;

Queries list:

1- Retrieve the users who have added sensors and the number of sensors they added

SELECT U.USERNAME, COUNT(S.SENSOR_ID) AS NUM_SENSORS

FROM IUSER U

LEFT JOIN SENSOR S ON U.USER_ID = S.USER_ID

GROUP BY U.USERNAME;

2- Find the plants that require an ideal temperature of 25 or higher:

SELECT "PLANT_NAME", "IDEAL_TEMP"

FROM "PLANTS"

WHERE "IDEAL_TEMP" >= 25;

3- Find the total quantity of each tool in the inventory:

SELECT "TOOLS", SUM("QUANTITY") AS "TOTAL_QUANTITY"

FROM "INVENTORY_ID"

GROUP BY "TOOLS";

4- Retrieve the user information for a specific user by their username (e.g., 'Ahmed'):

SELECT * FROM "IUSER" WHERE "USERNAME" = 'Ahmed';

5- Find the plants that are not in the 'Mature' growth stage:

SELECT "PLANT_NAME", "GROWTH_STAGE"

FROM "PLANTS"





WHERE "GROWTH STAGE" <> 'Mature';

6- Find the plants with an ideal light level less than 5:

SELECT "PLANT_NAME", "IDEAL_LIGHT"

FROM "PLANTS"

WHERE "IDEAL_LIGHT" < 5;

- **7- Calculate the average ideal temperature for all plants:**SELECT AVG("IDEAL_TEMP") AS "AverageIdealTemperature"
- 8- Find the plants with an ideal moisture level greater than 5 and an ideal temperature between 20 and 30:

SELECT "PLANT_NAME", "IDEAL_MOISTURE", "IDEAL_TEMP"

FROM "PLANTS"

WHERE "IDEAL_MOISTURE" > 5 AND "IDEAL_TEMP" BETWEEN 20 AND 30;

9- Calculate the total quantity of items in inventory:

SELECT SUM("QUANTITY") AS "TotalQuantity"

FROM "INVENTORY_ID";

10-List the usernames of users who are not supervisors (excluding users with 'supervisor' role):

SELECT "USERNAME"

FROM "IUSER"

WHERE "ROLE" <> 'supervisor';





Result:

Views:

• Result from View number 1

SENSOR_ID	LOCATION	FUNCATIONAL_CATAGORY
1	West	Soil
5	East	Temperature
2	South	Temperature
3	South	Light
4	North	pH

• Result from View number 2

PLANT_NAME	IDEAL_TEMP	IDEAL_LIGHT
Basil	26	10
Fern	24	3
Sunflower	26	3
Rose	23	10
Orchid	23	7

Query:

• Result from query number 2

PLANT_NAME	IDEAL_TEMP
Basil	26
Sunflower	26

• Result from query number 3

TOOLS	TOTAL_QUANTITY
Shovels	10
Hoes	15
Pruners	12
Rakes	20
Wheelbarrows	5

• Result from query number 4

USER_ID	ROLE	PASSWORD	USERNAME
2	Farmer	1234567	Ahmed
1			

• Result from query number 5

PLANT_NAME	GROWTH_STAGE
Basil	Seeding
Fern	Adult
Sunflower	Seeding
Rose	Seeding





• Result from query number 6

PLANT_NAME	IDEAL_LIGHT
Fern	3
Sunflower	3

• Result from query number 9

	TotalQuantity
62	

• Result from query number 10

	USERNAME
Faisal	
Ahmed	
Khaled	
Yazeed	
Ali	

• Result from query number 1

USERNAME	NUM_SENSORS
Yazeed	1
Ahmed	3
Khaled	0
Ali	1
Faisal	0