CONSTRUCTION DATABASE MANAGEMENT SYSTEM

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SECTION 1

Construction Database Management System

Areas of Focus:

- Project Resource Allocation
- Safety Compliance Monitoring

Current Data Management Problems

The construction industry faces significant challenges in data management, particularly in tracking resources, ensuring safety compliance, and managing workforce assignments efficiently. Many companies still rely on fragmented or manual record-keeping, leading to inefficiencies, miscommunication, and potential safety hazards. A major issue is improper resource allocation. Construction materials, machinery, and labor are often not tracked effectively, leading to project delays and budget overruns. Also, safety compliance monitoring is inconsistent, making it difficult to ensure that all employees adhere to regulations and have the necessary training and certifications.

The proposed database will serve as a centralized system to streamline construction project management. It will track employee assignments, ensuring workers are placed in projects where their skills are best utilized while preventing over-scheduling or under-utilization. It will also store and monitor safety certifications and compliance records, ensuring only qualified personnel are assigned to hazardous tasks. Moreover, the system will track materials and equipment usage, reducing waste and improving procurement efficiency.

Development Motivation

The motivation behind this database is to enhance operational efficiency and workplace safety in construction projects. By providing such a database companies can minimize delays, reduce unnecessary costs, and improve worker safety through real-time compliance tracking. The goal is to help construction firms avoid project inefficiencies, regulatory fines, and workplace accidents, leading to smoother project execution and increased profitability.

Benefits & Users

The potential user of this system is in the construction industry where construction project managers, site supervisors, safety officers, procurement teams, and company executives would benefit from its uses**.** Some benefits include an optimized workforce allocation, which ensures the right workers are assigned to the right projects. It also provides an automated safety compliance tracking which prevents unqualified employees from handling hazardous tasks. Lastly, it improvs resource management, reducing material waste and ensuring equipment availability. Also, the relational database will eliminate data anomalies by maintaining data integrity through constraints and normalization. This will ensure that operations such as adding new employees and updating project details do not lead to inconsistencies or errors. Using such

database, data integrity will be maintained through constraints, ensuring that all entered data is both valid and consistent

By implementing this construction database, companies can improve project efficiency by making the entire construction process more streamlined and cost-effective.

SECTION 2

Business Rules:

This is a construction company that works on projects mainly in the mining industry. The following is the list of business rules, entities and attributes.

1. The company has large number of employees for its work. Every employee has a unique number assigned (employee ID) and has their last and first name, phone number, job title and address.
    a. Some employees act as supervisors. An employee has either one or no supervisor, on the other hand a supervisor supervises at least one employee, but they usually supervise more. If an employee is a supervisor, a Supervisor ID is assigned and separately stored.
    b. There are two groups of employees. An employee is either a Fulltime or a Contractor. Fulltime employees have PTO days while contractor employees have a contractor name, contract start date and contract end date. An employee should be either one of the two.

2. Safety Certification has a compliance ID and a certification name. Each employee should have at least one certificate, and a certification can be held by multiple employees.

3. Due to the nature of projects done by this company, each project is also defined by a safety compliance which allows employees to be matched to each project. The project also stores the Project ID, Project title, start date, end date and allocated budget. Since projects are hazardous in nature, each project should meet at least one safety compliance.

4. The company maintains a fleet of equipment, each uniquely identified by an equipment ID. Equipment is assigned to specific projects one at a time to manage resources effectively. Not all equipment is required for every project, but each project needs one or more pieces of equipment to be utilized.

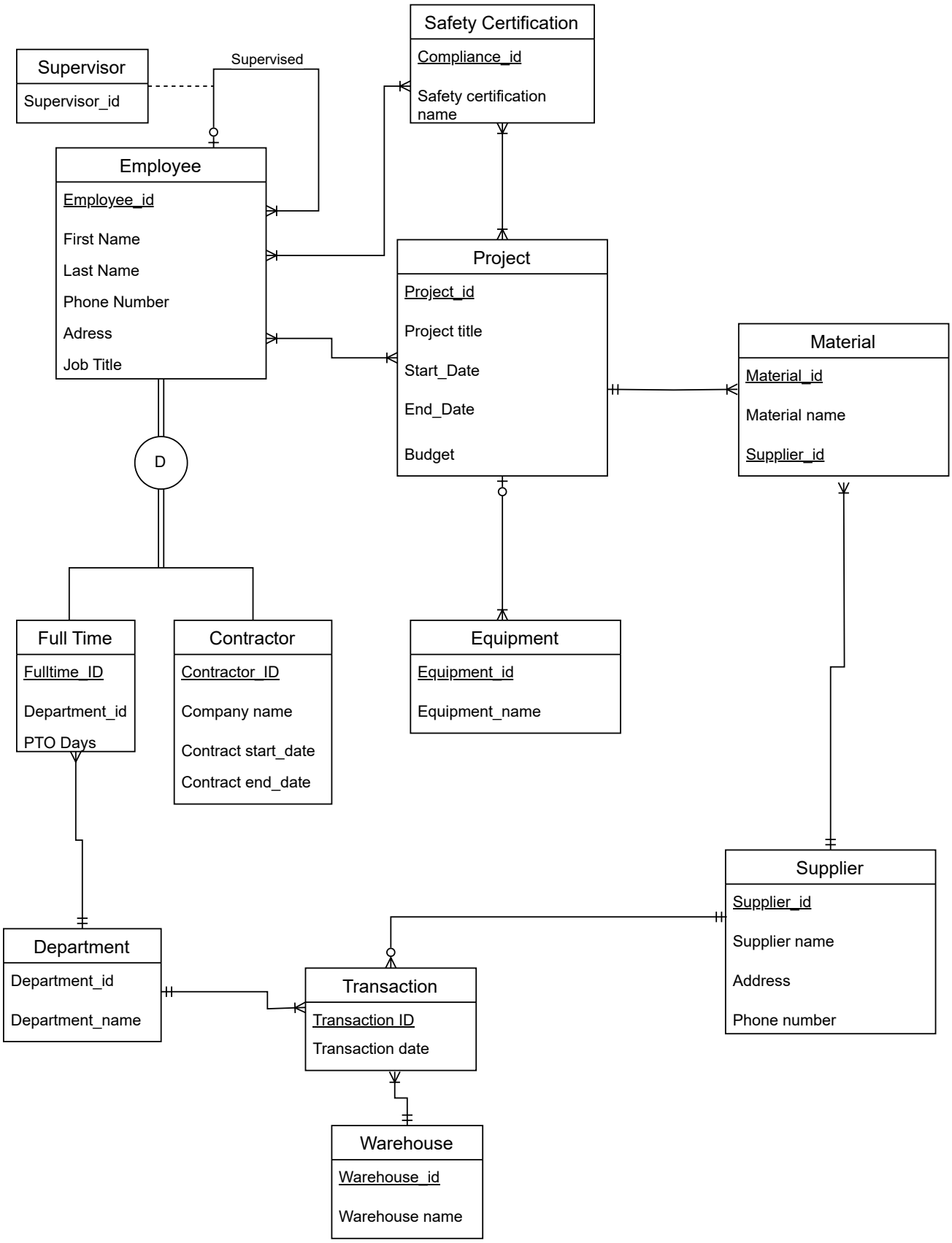
5. To track the supplier for each material, a supplier ID is attached to each material to facilitate re-ordering. Materials can be used across multiple projects, and a specific material may not be needed for every project. However, each project requires at least one material to be utilized. For instance, a scaffold can be used on several projects, but not all projects require the use of a scaffold. Materials have their material name and quantities.

6. Suppliers provide materials to the construction company. A supplier can supply one or multiple types of materials, but each material must be supplied by only one supplier. Suppliers have their name, address, and phone numbers stored. For each supply, the transaction is recorded separately with a unique transaction ID and date.

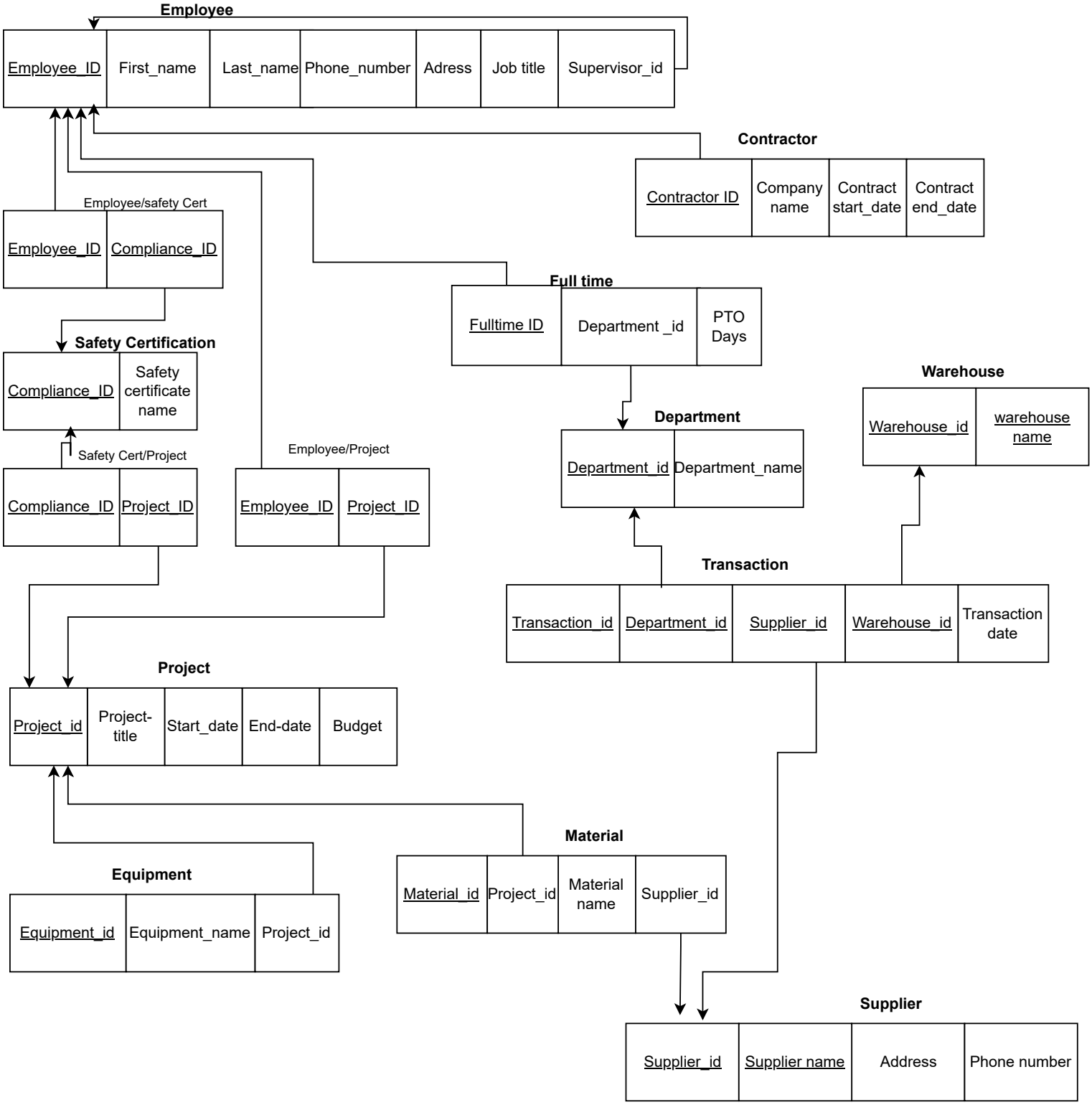
User Requirements.

a. The users of the database should be construction project managers, site supervisors, safety officers, procurement teams, and company executives.
b. Users should have access to projects, safety certifications, available equipment, and materials for project resource allocation. Additionally, the procurement team should have access to all of the above, as well as information on suppliers and the transactions related to the supply of materials.

Section 3


Safety Certification
Compliance_id
Safety certification name
Supervisor
Supervisor_id
Supervised
Employee
Employee_id
First Name
Last Name
Phone Number
Adress
Job Title
Project
Project_id
Project title
Start_Date
End_Date
Budget
Material
Material_id
Material name
Supplier_id
D
Full Time
Fulltime_ID
Department_id
PTO Days
Contractor
Contractor_ID
Company name
Contract start_date
Contract end_date
Equipment
Equipment_id
Equipment_name
Supplier
Supplier_id
Supplier name
Address
Phone number
Department
Department_id
Department_name
Transaction
Transaction ID
Transaction date
Warehouse
Warehouse_id
Warehouse name

SECTION 4


Employee
Employee_ID
First_name
Last_name
Phone_number
Adress
Job title
Supervisor_id
Contractor
Contractor ID
Company name
Contract start_date
Contract end_date
Employee/safety Cert
Employee_ID
Compliance_ID
Full time
Fulltime ID
Department _id
PTO Days
Safety Certification
Compliance_ID
Safety certificate name
Warehouse
Warehouse_id
warehouse name
Department
Department_id
Department_name
Safety Cert/Project
Compliance_ID
Project_ID
Employee/Project
Employee_ID
Project_ID
Transaction
Transaction_id
Department_id
Supplier_id
Warehouse_id
Transaction date
Project
Project_id
Project-title
Start_date
End-date
Budget
Material
Material_id
Project_id
Material name
Supplier_id
Equipment
Equipment_id
Equipment_name
Project_id
Supplier
Supplier_id
Supplier name
Address
Phone number

SECTION 5

On this section, a copy of the SQL code used to create a database and the inserted values are shown.

```
CREATE DATABASE CIDM_PROJECT

USE CIDM_PROJECT

CREATE TABLE EMPLOYEE (EMPLOYEE_ID VARCHAR (15) NOT NULL, FIRST_NAME VARCHAR (25) NOT NULL, LAST_NAME VARCHAR (25) NOT NULL, PHONE_NUMBER VARCHAR (15), ADDRESS VARCHAR (50), JOB_TITLE VARCHAR (25), SUPERVISOR_ID VARCHAR (15), CONSTRAINT EMPLOYEE_PK PRIMARY KEY(EMPLOYEE_ID));

CREATE TABLE SAFETY_COMPLIANCE (COMPLIANCE_ID VARCHAR (25) NOT NULL, SAFETY_CERTIFICATION VARCHAR (25), CONSTRAINT SC_PK PRIMARY KEY(COMPLIANCE_ID));

CREATE TABLE EMPLOYEE_SAFETY (EMPLOYEE_ID VARCHAR (15), COMPLIANCE_ID VARCHAR (15), CONSTRAINT ES_PK PRIMARY KEY (EMPLOYEE_ID, COMPLIANCE_ID),CONSTRAINT ES_FK FOREIGN KEY(EMPLOYEE_ID) REFERENCES EMPLOYEE(EMPLOYEE_ID), CONSTRAINT ES_FK1 FOREIGN KEY(COMPLIANCE_ID) REFERENCES SAFETY_COMPLIANCE(COMPLIANCE_ID));

CREATE TABLE FULLTIME (FULLTIME_ID VARCHAR (15) NOT NULL, DEPARTMENT_ID VARCHAR (15), PTO_DAYS VARCHAR (3), CONSTRAINT FT_PK PRIMARY KEY(FULLTIME_ID), CONSTRAINT FT_FK FOREIGN KEY(FULLTIME_ID) REFERENCES EMPLOYEE(EMPLOYEE_ID));

CREATE TABLE CONTRACTOR (CONTRACTOR_ID VARCHAR (15) NOT NULL, COMPANY_NAME VARCHAR (50), CONTRACT_START_DATE DATE, CONTRACT_END_DATE DATE, CONSTRAINT CONTRACTOR_PK PRIMARY KEY(CONTRACTOR_ID), CONSTRAINT CONTRACTOR_FK FOREIGN KEY(CONTRACTOR_ID) REFERENCES EMPLOYEE(EMPLOYEE_ID));

CREATE TABLE DEPARTMENT (DEPARTMENT_ID VARCHAR (15) NOT NULL, DEPARTMENT_NAME VARCHAR (50), CONSTRAINT DP_PK PRIMARY KEY(DEPARTMENT_ID));

ALTER TABLE FULLTIME ADD CONSTRAINT FT_FK1 FOREIGN KEY(DEPARTMENT_ID) REFERENCES DEPARTMENT(DEPARTMENT_ID);

CREATE TABLE WAREHOUSE (WAREHOUSE_ID VARCHAR (15) NOT NULL, WAREHOUSE_NAME VARCHAR (50), CONSTRAINT WAREHOUSE_PK PRIMARY KEY(WAREHOUSE_ID));

CREATE TABLE SUPPLIER (SUPPLIER_ID VARCHAR (15) NOT NULL, SUPPLIER_NAME VARCHAR (50) NOT NULL, ADDRESS VARCHAR (100), PHONE_NUMBER NUMERIC, CONSTRAINT SUPPLIER_PK PRIMARY KEY(SUPPLIER_ID));

CREATE TABLE TRANSACTION ( TRANSACTION_ID VARCHAR(15),DEPARTMENT_ID VARCHAR(15), SUPPLIER_ID VARCHAR(15), WAREHOUSE_ID VARCHAR(15),TRANSACTION_DATE DATE, CONSTRAINT TR_PK PRIMARY KEY( TRANSACTION_ID,DEPARTMENT_ID,SUPPLIER_ID,WAREHOUSE_ID), CONSTRAINT TR_FK FOREIGN KEY( DEPARTMENT_ID) REFERENCES DEPARTMENT(DEPARTMENT_ID), CONSTRAINT TR_FK1
```

FOREIGN KEY(SUPPLIER_ID) REFERENCES SUPPLIER(SUPPLIER_ID), CONSTRAINT TR_FK2 FOREIGN KEY(WAREHOUSE_ID) REFERENCES WAREHOUSE(WAREHOUSE_ID));

CREATE TABLE PROJECT (PROJECT_ID VARCHAR (15) NOT NULL, PROJECT_TITLE VARCHAR (50), START_DATE DATE, END_DATE DATE, BUDGET NUMERIC, CONSTRAINT PROJECT_PK PRIMARY KEY(PROJECT_ID));

CREATE TABLE EQUIPMENT (EQUIPMENT_ID VARCHAR (15) NOT NULL, EQUIPMENT_NAME VARCHAR (100), PROJECT_ID VARCHAR (15), CONSTRAINT EQUIPMENT_PK PRIMARY KEY(EQUIPMENT_ID), CONSTRAINT EQUIPMENT_FK FOREIGN KEY(PROJECT_ID) REFERENCES PROJECT(PROJECT_ID));

CREATE TABLE MATERIAL (MATERIAL_ID VARCHAR (15) NOT NULL, MATERIAL_NAME VARCHAR (100), PROJECT_ID VARCHAR (15), SUPPLIER_ID VARCHAR (15), CONSTRAINT MATERIAL_PK PRIMARY KEY(MATERIAL_ID), CONSTRAINT MATERIAL_FK FOREIGN KEY(PROJECT_ID) REFERENCES PROJECT(PROJECT_ID), CONSTRAINT MATERIAL_FK1 FOREIGN KEY(SUPPLIER_ID) REFERENCES SUPPLIER(SUPPLIER_ID));

CREATE TABLE EMPLOYEE_PROJECT (EMPLOYEE_ID VARCHAR (15) NOT NULL, PROJECT_ID VARCHAR (15), CONSTRAINT EP_PK PRIMARY KEY (EMPLOYEE_ID, PROJECT_ID), CONSTRAINT EP_FK FOREIGN KEY(EMPLOYEE_ID) REFERENCES EMPLOYEE(EMPLOYEE_ID), CONSTRAINT EP_FK1 FOREIGN KEY(PROJECT_ID) REFERENCES PROJECT(PROJECT_ID));

CREATE TABLE PROJECT_SAFETY (COMPLIANCE_ID VARCHAR (15), PROJECT_ID VARCHAR (15), CONSTRAINT PS_PK PRIMARY KEY (COMPLIANCE_ID, PROJECT_ID), CONSTRAINT PS_FK FOREIGN KEY(COMPLIANCE_ID) REFERENCES SAFETY_COMPLIANCE(COMPLIANCE_ID), CONSTRAINT PS_FK1 FOREIGN KEY(PROJECT_ID) REFERENCES PROJECT(PROJECT_ID));

-- Insert values into EMPLOYEE table

INSERT INTO EMPLOYEE (EMPLOYEE_ID, FIRST_NAME, LAST_NAME, PHONE_NUMBER, ADDRESS, JOB_TITLE, SUPERVISOR_ID) VALUES

('E001', 'John', 'Doe', '1234567890', '123 Elm St', 'Manager', NULL),

('E002', 'Jane', 'Smith', '0987654321', '456 Oak St', 'Engineer', 'E001'),

('E003', 'Alice', 'Johnson', '1112223333', '789 Pine St', 'Technician', 'E002'),

('E004', 'Bob', 'Brown', '4445556666', '101 Maple St', 'Clerk', 'E001'),

('E005', 'Charlie', 'Davis', '7778889999', '202 Birch St', 'Analyst', 'E003'),

('E006', 'Diana', 'Evans', '0001112222', '303 Cedar St', 'Consultant', NULL),

('E007', 'Frank', 'Green', '3334445555', '404 Spruce St', 'Supervisor', NULL),

('E008', 'Grace', 'Harris', '5556667777', '505 Willow St', 'Forklift Operator', 'E007'),

('E009', 'Henry', 'Ivy', '8889990000', '606 Aspen St', 'Carpenter', 'E007');

-- Insert values into SAFETY_COMPLIANCE table

INSERT INTO SAFETY_COMPLIANCE (COMPLIANCE_ID, SAFETY_CERTIFICATION) VALUES

('SC001', 'Fire Safety'),

('SC002', 'Electrical Safety'),

('SC003', 'Chemical Safety'),

('SC004', 'First Aid'),

('SC005', 'Machine Safety'),

('SC006', 'Workplace Safety');

-- Insert values into EMPLOYEE_SAFETY table

INSERT INTO EMPLOYEE_SAFETY (EMPLOYEE_ID, COMPLIANCE_ID) VALUES

('E001', 'SC001'),

('E002', 'SC002'),

('E003', 'SC003'),

('E004', 'SC004'),

('E005', 'SC005'),

('E006', 'SC006'),

('E007', 'SC002'),

('E001', 'SC004'),

('E001', 'SC006'),

('E008', 'SC001'),

('E009', 'SC003'),

('E003', 'SC006');

-- Insert values into DEPARTMENT table

INSERT INTO DEPARTMENT (DEPARTMENT_ID, DEPARTMENT_NAME) VALUES

('D001', 'Human Resources'),

('D002', 'Engineering'),

('D003', 'Finance'),

('D004', 'Procurement'),

('D005', 'Safety'),

('D006', 'IT'),

('D007', 'Operations');

-- Insert values into FULLTIME table

INSERT INTO FULLTIME (FULLTIME_ID, DEPARTMENT_ID, PTO_DAYS) VALUES

('E001', 'D001', '15'),

('E002', 'D002', '12'),

('E003', 'D003', '10'),

('E004', 'D001', '20'),

('E005', 'D002', '18'),

('E006', 'D003', '14'),

('E007', 'D001', '2');

-- Insert values into CONTRACTOR table

INSERT INTO CONTRACTOR (CONTRACTOR_ID, COMPANY_NAME, CONTRACT_START_DATE, CONTRACT_END_DATE) VALUES

('E008', 'Rock Construction Ltd', '2024-01-01', '2026-12-31'),

('E009', 'Low Carpentry Ltd', '2023-02-01', '2025-11-30');

-- Insert values into WAREHOUSE table

INSERT INTO WAREHOUSE (WAREHOUSE_ID, WAREHOUSE_NAME) VALUES

('W001', 'Central Warehouse'),

('W002', 'East Warehouse'),

('W003', 'West Warehouse'),

('W004', 'North Warehouse'),

('W005', 'South Warehouse'),

('W006', 'Main Warehouse'),

('W007', 'Backup Warehouse');

-- Insert values into SUPPLIER table

INSERT INTO SUPPLIER (SUPPLIER_ID, SUPPLIER_NAME, ADDRESS, PHONE_NUMBER) VALUES

('S001', 'Walmart', '123 Supplier St', 1234567890),

('S002', 'Home Depot', '456 Supplier Ave', 2345678901),

('S003', 'Ace Hardware', '789 Supplier Blvd', 3456789012),

('S004', 'Cal Portland Cement', '101 Supplier Rd', 4567890123),

('S005', 'Kofi Export', '202 Supplier Ln', 5678901234),

('S006', 'Gyimah spare parts', '303 Supplier Dr', 6789012345),

('S007', 'Nimo Supplying agency', '404 Supplier Ct', 7890123456);

-- Insert values into TRANSACTION table

INSERT INTO TRANSACTION (TRANSACTION_ID, DEPARTMENT_ID, SUPPLIER_ID, WAREHOUSE_ID, TRANSACTION_DATE) VALUES

('T001', 'D001', 'S001', 'W001', '2025-01-01'),

('T002', 'D002', 'S002', 'W002', '2025-01-01'),

('T003', 'D003', 'S003', 'W003', '2025-03-25'),

('T004', 'D004', 'S004', 'W004', '2024-04-01'),

('T005', 'D005', 'S005', 'W005', '2024-06-01'),

('T006', 'D006', 'S006', 'W006', '2025-02-14'),

('T007', 'D007', 'S007', 'W007', '2023-07-01');

-- Insert values into PROJECT table

INSERT INTO PROJECT (PROJECT_ID, PROJECT_TITLE, START_DATE, END_DATE, BUDGET) VALUES

('P001', 'Microsoft data center construction', '2023-01-01', '2023-12-31', 100000),

('P002', 'Golden state bridge repair works', '2023-02-01', '2023-11-30', 200000),

('P003', 'Arizona Football stadium renovation', '2023-03-01', '2023-10-31', 300000),

('P004', 'Tucson Road repairs', '2023-04-01', '2023-09-30', 400000),

('P005', '10-story mall construction', '2023-06-01', '2023-07-31', 600000),

('P006', 'Project Eta', '2023-07-01', '2023-06-30', 700000);

-- Insert values into EQUIPMENT table

INSERT INTO EQUIPMENT (EQUIPMENT_ID, EQUIPMENT_NAME, PROJECT_ID) VALUES

('EQ001', 'Excavator', 'P001'),

('EQ002', 'Bulldozer', 'P002'),

('EQ003', 'Crane', 'P001'),

('EQ004', 'Forklift', 'P003'),

('EQ005', 'Loader', 'P004'),

('EQ006', 'Dump Truck', 'P005'),

('EQ007', 'Backhoe', 'P006'),

('EQ008', 'Manlift', NULL);

-- Insert values into MATERIAL table

INSERT INTO MATERIAL (MATERIAL_ID, MATERIAL_NAME, PROJECT_ID, SUPPLIER_ID) VALUES

('M001', 'Concrete', 'P001', 'S001'),

('M002', 'Steel', 'P002', 'S002'),

('M003', 'Wood', 'P003', 'S003'),

('M004', 'Glass', 'P004', 'S004'),

('M005', 'Bricks', 'P005', 'S005'),

('M006', 'Tiles', 'P006', 'S006'),

('M007', 'Paint', 'P001', 'S003');

INSERT INTO EMPLOYEE_PROJECT (EMPLOYEE_ID, PROJECT_ID) VALUES

('E001', 'P001'),

('E002', 'P002'),

('E003', 'P003'),

('E004', 'P004'),

('E005', 'P005'),

('E006', 'P006'),

('E007', 'P002'),

('E008', 'P001'),

('E009', 'P001');

-- Insert values into PROJECT_SAFETY table

INSERT INTO PROJECT_SAFETY (COMPLIANCE_ID, PROJECT_ID) VALUES

('SC001', 'P001'),

('SC001', 'P005'),

('SC002', 'P002'),

('SC003', 'P003'),

('SC004', 'P004'),

('SC005', 'P005'),

('SC006', 'P006'),

('SC004', 'P003');

SECTION 6

This section shows a screen shot of all tables and the records in the tables using DESC and SELECT commands.

SCREENSHOTS

```
163 •  DESC EMPLOYEE
164
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
EMPLOYEE_ID	varchar(15)	NO	PRI	NULL	
FIRST_NAME	varchar(25)	NO		NULL	
LAST_NAME	varchar(25)	NO		NULL	
PHONE_NUMBER	varchar(15)	YES		NULL	
ADDRESS	varchar(50)	YES		NULL	
JOB_TITLE	varchar(25)	YES		NULL	
SUPERVISOR_ID	varchar(15)	YES		NULL	

```
164 •  SELECT * FROM EMPLOYEE;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	PHONE_NUMBER	ADDRESS	JOB_TITLE	SUPERVISOR_ID
E001	John	Doe	1234567890	123 Elm St	Manager	NULL
E002	Jane	Smith	0987654321	456 Oak St	Engineer	E001
E003	Alice	Johnson	1112223333	789 Pine St	Technician	E002
E004	Bob	Brown	4445556666	101 Maple St	Clerk	E001
E005	Charlie	Davis	7778889999	202 Birch St	Analyst	E003
E006	Diana	Evans	0001112222	303 Cedar St	Consultant	NULL
E007	Frank	Green	3334445555	404 Spruce St	Supervisor	NULL
E008	Grace	Harris	5556667777	505 Willow St	Forklift Operator	E007
E009	Henry	Ivy	8889990000	606 Aspen St	Carpenter	E007

```
164 •  DESC SAFETY_COMPLIANCE;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content

Field	Type	Null	Key	Default	Extra
COMPLIANCE_ID	varchar(25)	NO	PRI	NULL	
SAFETY_CERTIFICATION	varchar(25)	YES		NULL	

```
166 •  SELECT * FROM SAFETY_COMPLIANCE;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

COMPLIANCE_ID	SAFETY_CERTIFICATION
SC001	Fire Safety
SC002	Electrical Safety
SC003	Chemical Safety
SC004	First Aid
SC005	Machine Safety
SC006	Workplace Safety

```
164 •  DESC EMPLOYEE_SAFETY;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
EMPLOYEE_ID	varchar(15)	NO	PRI	NULL	
COMPLIANCE_ID	varchar(15)	NO	PRI	NULL	

```
166 •  SELECT * FROM EMPLOYEE_SAFETY;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

EMPLOYEE_ID	COMPLIANCE_ID
E008	SC001
E002	SC002
E007	SC002
E003	SC003
E009	SC003
E001	SC004
E004	SC004
E005	SC005
E001	SC006
E003	SC006
E006	SC006

```
164 •  DESC FULLTIME;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
FULLTIME_ID	varchar(15)	NO	PRI	NULL	
DEPARTMENT_ID	varchar(15)	YES	MUL	NULL	
PTO_DAYS	varchar(3)	YES		NULL	

```
166 •  SELECT * FROM FULLTIME;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

FULLTIME_ID	DEPARTMENT_ID	PTO_DAYS
E001	D001	15
E002	D002	12
E003	D003	10
E004	D001	20
E005	D002	18
E006	D003	14
E007	D001	2

```
164 •  DESC CONTRACTOR;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
CONTRACTOR_ID	varchar(15)	NO	PRI	NULL	
COMPANY_NAME	varchar(50)	YES		NULL	
CONTRACT_START_DATE	date	YES		NULL	
CONTRACT_END_DATE	date	YES		NULL	

```
166 •  SELECT * FROM CONTRACTOR;
```

Result Grid | Filter Rows: | Edit: | Export/Import:

CONTRACTOR_ID	COMPANY_NAME	CONTRACT_START_DATE	CONTRACT_END_DATE
E008	Rock Construction Ltd	2024-01-01	2026-12-31
E009	Low Carpentry Ltd	2023-02-01	2025-11-30
NULL	NULL	NULL	NULL

```
164 •  DESC DEPARTMENT;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
DEPARTMENT_ID	varchar(15)	NO	PRI	NULL	
DEPARTMENT_NAME	varchar(50)	YES		NULL	

```
166 •  SELECT * FROM DEPARTMENT;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

DEPARTMENT_ID	DEPARTMENT_NAME
D001	Human Resources
D002	Engineering
D003	Finance
D004	Procurement
D005	Safety
D006	IT
D007	Operations
NULL	NULL

```
164 •  DESC WAREHOUSE;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
WAREHOUSE_ID	varchar(15)	NO	PRI	NULL	
WAREHOUSE_NAME	varchar(50)	YES		NULL	

```
166 •  SELECT * FROM WAREHOUSE;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

WAREHOUSE_ID	WAREHOUSE_NAME
W001	Central Warehouse
W002	East Warehouse
W003	West Warehouse
W004	North Warehouse
W005	South Warehouse
W006	Main Warehouse
W007	Backup Warehouse
NULL	NULL

```
164 •  DESC SUPPLIER;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
SUPPLIER_ID	varchar(15)	NO	PRI	NULL	
SUPPLIER_NAME	varchar(50)	NO		NULL	
ADDRESS	varchar(100)	YES		NULL	
PHONE_NUMBER	decimal(10,0)	YES		NULL	

```
166 •  SELECT * FROM SUPPLIER;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

SUPPLIER_ID	SUPPLIER_NAME	ADDRESS	PHONE_NUMBER
S001	Walmart	123 Supplier St	1234567890
S002	Home Depot	456 Supplier Ave	2345678901
S003	Ace Hardware	789 Supplier Blvd	3456789012
S004	Cal Portland Cement	101 Supplier Rd	4567890123
S005	Kofi Export	202 Supplier Ln	5678901234
S006	Gyimah spare parts	303 Supplier Dr	6789012345
S007	Nimo Supplying agency	404 Supplier Ct	7890123456
NULL	NULL	NULL	NULL

```
164 •  DESC TRANSACTION;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
TRANSACTION_ID	varchar(15)	NO	PRI	NULL	
DEPARTMENT_ID	varchar(15)	NO	PRI	NULL	
SUPPLIER_ID	varchar(15)	NO	PRI	NULL	
WAREHOUSE_ID	varchar(15)	NO	PRI	NULL	
TRANSACTION_DATE	date	YES		NULL	

```
166 •  SELECT * FROM TRANSACTION;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

TRANSACTION_ID	DEPARTMENT_ID	SUPPLIER_ID	WAREHOUSE_ID	TRANSACTION_DATE
T001	D001	S001	W001	2025-01-01
T002	D002	S002	W002	2025-01-01
T003	D003	S003	W003	2025-03-25
T004	D004	S004	W004	2024-04-01
T005	D005	S005	W005	2024-06-01
T006	D006	S006	W006	2025-02-14
T007	D007	S007	W007	2023-07-01
NULL	NULL	NULL	NULL	NULL

```
164 •  DESC PROJECT;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
PROJECT_ID	varchar(15)	NO	PRI	NULL	
PROJECT_TITLE	varchar(50)	YES		NULL	
START_DATE	date	YES		NULL	
END_DATE	date	YES		NULL	
BUDGET	decimal(10,0)	YES		NULL	

```
166 •  SELECT * FROM PROJECT;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

PROJECT_ID	PROJECT_TITLE	START_DATE	END_DATE	BUDGET
P001	Microsoft data center construction	2023-01-01	2023-12-31	100000
P002	Golden state bridge repair works	2023-02-01	2023-11-30	200000
P003	Arizona Football stadium renovation	2023-03-01	2023-10-31	300000
P004	Tucson Road repairs	2023-04-01	2023-09-30	400000
P005	10-story mall construction	2023-06-01	2023-07-31	600000
P006	Project Eta	2023-07-01	2023-06-30	700000
NULL	NULL	NULL	NULL	NULL

```
164 •  DESC EQUIPMENT;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
EQUIPMENT_ID	varchar(15)	NO	PRI	NULL	
EQUIPMENT_NAME	varchar(100)	YES		NULL	
PROJECT_ID	varchar(15)	YES	MUL	NULL	

```
166 •  SELECT * FROM EQUIPMENT;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

EQUIPMENT_ID	EQUIPMENT_NAME	PROJECT_ID
EQ001	Excavator	P001
EQ002	Bulldozer	P002
EQ003	Crane	P001
EQ004	Forklift	P003
EQ005	Loader	P004
EQ006	Dump Truck	P005
EQ007	Backhoe	P006
EQ008	Manlift	NULL
NULL	NULL	NULL

```
164 •  DESC MATERIAL;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
MATERIAL_ID	varchar(15)	NO	PRI	NULL	
MATERIAL_NAME	varchar(100)	YES		NULL	
PROJECT_ID	varchar(15)	YES	MUL	NULL	
SUPPLIER_ID	varchar(15)	YES	MUL	NULL	

```
166 •  SELECT * FROM MATERIAL;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

MATERIAL_ID	MATERIAL_NAME	PROJECT_ID	SUPPLIER_ID
M001	Concrete	P001	S001
M002	Steel	P002	S002
M003	Wood	P003	S003
M004	Glass	P004	S004
M005	Bricks	P005	S005
M006	Tiles	P006	S006
M007	Paint	P001	S003
NULL	NULL	NULL	NULL

```
164 •  DESC EMPLOYEE_PROJECT;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
EMPLOYEE_ID	varchar(15)	NO	PRI	NULL	
PROJECT_ID	varchar(15)	NO	PRI	NULL	

```
166 •  SELECT * FROM EMPLOYEE_PROJECT;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

EMPLOYEE_ID	PROJECT_ID
E001	P001
E008	P001
E009	P001
E002	P002
E007	P002
E003	P003
E004	P004
E005	P005
E006	P006
NULL	NULL

```
164 •  DESC PROJECT_SAFETY;
165
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Field	Type	Null	Key	Default	Extra
COMPLIANCE_ID	varchar(15)	NO	PRI	NULL	
PROJECT_ID	varchar(15)	NO	PRI	NULL	

```
166 •   SELECT * FROM PROJECT_SAFETY;
```

COMPLIANCE_ID	PROJECT_ID
SC001	P001
SC002	P002
SC003	P003
SC004	P003
SC004	P004
SC001	P005
SC005	P005
SC006	P006
NULL	NULL

SECTION 7

QUERIES FOR SOLVING SOME QUESTIONS IN THE DATABASE

1. Names and phone numbers of all employees

```
164 •  SELECT FIRST_NAME, LAST_NAME, PHONE_NUMBER
165    FROM EMPLOYEE;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

FIRST_NAME	LAST_NAME	PHONE_NUMBER
John	Doe	1234567890
Jane	Smith	0987654321
Alice	Johnson	1112223333
Bob	Brown	4445556666
Charlie	Davis	7778889999
Diana	Evans	0001112222
Frank	Green	3334445555
Grace	Harris	5556667777
Henry	Ivy	8889990000

2. Find employee names with their attached department

```
167 •  SELECT E.FIRST_NAME, E.LAST_NAME, D.DEPARTMENT_NAME
168    FROM EMPLOYEE E
169    JOIN FULLTIME F ON E.EMPLOYEE_ID = F.FULLTIME_ID
170    JOIN DEPARTMENT D ON F.DEPARTMENT_ID = D.DEPARTMENT_ID;
171
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

FIRST_NAME	LAST_NAME	DEPARTMENT_NAME
John	Doe	Human Resources
Bob	Brown	Human Resources
Frank	Green	Human Resources
Jane	Smith	Engineering
Charlie	Davis	Engineering
Alice	Johnson	Finance
Diana	Evans	Finance

3. Find the end date of the projects the equipment are attached to in order to help us plan for equipment usage for the next projects.

```
183
184 •  SELECT EQ.EQUIPMENT_NAME, P.PROJECT_TITLE, P.END_DATE
185    FROM EQUIPMENT EQ
186    JOIN PROJECT P ON EQ.PROJECT_ID = P.PROJECT_ID;
187
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

EQUIPMENT_NAME	PROJECT_TITLE	END_DATE
Excavator	Microsoft data center construction	2023-12-31
Crane	Microsoft data center construction	2023-12-31
Bulldozer	Golden state bridge repair works	2023-11-30
Forklift	Arizona Football stadium renovation	2023-10-31
Loader	Tucson Road repairs	2023-09-30
Dump Truck	10-story mall construction	2023-07-31
Backhoe	Project Eta	2023-06-30

4. Lets projects that require “Electrical safety certification” and the employees who already have those certifications and should be assigned to that project.

```
176 •  SELECT P.PROJECT_TITLE, E.FIRST_NAME, E.LAST_NAME
177    FROM PROJECT P
178    JOIN PROJECT_SAFETY PS ON P.PROJECT_ID = PS.PROJECT_ID
179    JOIN EMPLOYEE_SAFETY ES ON PS.COMPLIANCE_ID = ES.COMPLIANCE_ID
180    JOIN EMPLOYEE E ON ES.EMPLOYEE_ID = E.EMPLOYEE_ID
181    WHERE PS.COMPLIANCE_ID = 'SC001';
182
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

PROJECT_TITLE	FIRST_NAME	LAST_NAME
Microsoft data center construction	John	Doe
Microsoft data center construction	Grace	Harris
10-story mall construction	John	Doe
10-story mall construction	Grace	Harris

5. Which departments is creating more transaction and from which supplier

```sql
SELECT D.DEPARTMENT_NAME, S.SUPPLIER_NAME, COUNT(T.TRANSACTION_ID) AS TransactionCount
FROM TRANSACTION T
JOIN DEPARTMENT D ON T.DEPARTMENT_ID = D.DEPARTMENT_ID
JOIN SUPPLIER S ON T.SUPPLIER_ID = S.SUPPLIER_ID
GROUP BY D.DEPARTMENT_NAME, S.SUPPLIER_NAME
ORDER BY TransactionCount DESC;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

DEPARTMENT_NAME	SUPPLIER_NAME	TransactionCount
Human Resources	Walmart	1
Engineering	Home Depot	1
Finance	Ace Hardware	1
Procurement	Cal Portland Cement	1
Safety	Kofi Export	1
IT	Gyimah spare parts	1
Operations	Nimo Supplying agency	1

6. What is the maximum project budget so far in our projects.

```sql
SELECT PROJECT_TITLE, BUDGET
FROM PROJECT
WHERE BUDGET = (SELECT MAX(BUDGET) FROM PROJECT);
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

PROJECT_TITLE	BUDGET
Project Eta	700000