

Mining and Extraction Management System

Scenario:

An Mining and Extraction Mananagement System consist of and there main goal is to extract various types of resources such as gas, oil, gold, silver. In order to achieve this goal the system consist contain Workers, Crafting Staff, Equipment, Supplier etc.

The Workers Managed to extract the materials. There will be many workers for the single Mineral resource. The materials are extrated by workers with the help of different types of equipement every equipement has the unique job and is used for the specific purpose. Inorder to maintain the peacefull environment there must be some environmental regulations that are applied on the workers. There environmental regulations are imposed by the Supervisor that supervise all the activities that are being carried out by the workers. The resources which are extracted are Supplied by the supplier. These different types of the materials are purchase by the customer. There is a Crafting staff and the staff job include to craft and give proper shape to the craftable materials. There are training programs available for the workers so that the system become more efficient. Marketing and sales department can manage the marketing side. There are location available where the supervisors are assigned.

Workers are the main body and the features include Worker's Name, Worker ID, Skills, Role, Shift Schedule. The Worker's ID is the unique element. There are many workers in this system. They are supervise by supervisor that has unique CNIC.

Equipement has unique ID, Model, Serial Number, Maintenace History, Capacity, and Equipement Type. Each single equipement is being carried out and used by many workers at the same time.

Environmental regulations include Env-Reg ID, Issuing Authority, Name, Description, Regulation Number, Compliance Requirement. These are the fixed set of regualtions that are applied on the workers.

Supervisor has Supervisor Name, Joining Year, Experience. There can be more than one supervisor to enforce set of environmental regulations.

These materials obtained during the process are supplied by the supplier That has Name, Phone Number, Website, Supplier Type, unique Supplier ID. There are many suppliers to supply many differenet types of other materials.

The Materials are purchased by the customers that include Unique ID, Name, Products Purchased, Email that is optional , Address. There are many customers availabel to buy differenet materials.

There is a Crafting Staff Available whose attributes include Unique ID, Name, Contact Number, and Experience Level. This staff manages to craft all the craftable materials.

There are many supervisors appointed and assigned to a specific location having unique Location ID. Location has Attributes Name, Coordinates is composed of longitude and latitude, Capacity.

There are different training programs available for different workers having unique training program ID. The other attributes are Name, Duration, Description, Trainer, Skills Covered.

There is a marketing and sales department that can target multiple customers. The Features of the department are unique ID, Department head, Sales Target, Sales Channel.

ENTITIES

Supplier:

ATTRIBUTES	Attribute Type	DATATYPE
Supplier_id (primary Key)	Unique	INT (10)
Supplier_Name	Simple	CHAR (30)
Supplier Type	Multi-Valued	CHAR (30)
Website (o)	Optional	VARCHAR(30)
Phone Number	simple	INT (20)

Customer:

ATTRIBUTES	Attribute Type	DATATYPE
Customer_id (primary key)	Unique	INT (10)
Customer_Name	Simple	CHAR (20)
Address	Composite	VARCHAR (40)
Products_Purchased	Simple	INT (10)
Email (o)	Optional	VARCHAR (30)

Materials:

ATTRIBUTES	ATTRIBUTE TYPE	DATATYPE
Material_id (primary key)	Unique	INT (10)
Grade	Simple	VARCHAR(10)
Location	Simple	VARCHAR (40)
Quantity	Simple	INT (10)
Type	Multi_valued	CHAR (20)

Workers:

ATTRIBUTES	ATTRIBUTES TYPE	DATATYPE
Woker_id (primary key)	Unique	INT (10)
Role	Simple	CHAR (30)
Shift_schedule	Simple	CHAR (10)
Woker_Name	Simple	CHAR (30)
Skills	Simle	CHAR (20)

Equipment:

ATTRIBUTES	ATTRIBUTES TYPE	DATATYPE
Equipment_id (primary key)	Unique	INT (10)
Model	Simple	INT (10)
Type	Multi-Valued	CHAR (20)
Maintainance_history	Simple	VARCHAR (30)
Capacity	Simple	INT (20)
Serial_Number	Simple	INT (20)

Crafting Staff:

ATTRIBUTES	ATTRIBUTES TYPE	DATATYPE
Crafting_Staff_id (primary key)	Unique	INT (10)
Experience_Level	Simple	CHAR (20)
Contact_info	Simple	VARCHAR (30)
Crafting_Staff_Name	Simple	CHAR (20)

Supervisor:

ATTRIBUTES	ATTRIBUTES TYPE	DATATYPE
CNIC (pirmary key)	Unique	INT (30)
Experience	Derived	CHAR (20)
Joining_Year	Simple	INT (10)
Supervisor_Name	Simple	CHAR(30)

Equiment Regulations:

ATTRIBUTES	ATTRIBUTES TYPE	DATATYPE
Env-reg_id (primary Key)	Unique	INT (10)
Issuing Authority	Simple	VARCHAR (20)
Compliance Requirement	Simple	CHAR (500)
Description	Simple	VARCHAR (200)
Title/Name	Simple	CHAR (40)
Regulation_Number	Multi-Valued	INT (20)

Training Programs:

ATTRIBUTES	ATTRIBUTES TYPE	DATATYPE
Prgram_id (primary key)	Unique	INT (20)
TP.Name	Simple	CHAR (50)
Duration	Simple	DATE
Description	Simple	CHAR (50)
Trainer	Simple	CHAR (20)
Skills_Covered	Simple	CHAR (100)

Marketing and Sales Department:

ATTRIBUTES	ATTRIBUTES TYPE	DATATYPE
MSD_id (primary key)	Unique	INT (50)
MSD_name	Simple	CHAR (50)
Department_Head	Simple	CHAR (20)
Sales_Target	Simple	CHAR (60)
Sales_Channels	Simple	VARCHAR (30)

Location:

ATTRIBUTE_NAME	ATTRIBUTE TYPE	DATATYPE
Location_id (primary key)	Unique	INT (20)
Name	Simple	CHAR (50)
Coordinates	Composite	VARCHAR (40)
Type	Simple	CHAR (30)
Capacity	Simple	FLOAT CAPACITY()

Relations:

Supplier-Material: Supplier and Material has **Many-To-Many** relationship because There are many supplier to supply different types of material.

Customer-Material: Customer and material has **Many-To-Many** relationship because there are many customers that can buy different types of materials.

Crafting Staff-Materials: Crafig Staff and Material has **One-to-Many** relationship beacause there is a single crafting staff available to craft different type of materials.

Workers-Materials: Material and Workers has **Many-to-One** relationship because many workers can extract single mterials.

Environmental regulations-Workers: Environmental Regulations and Workers has **One-to-Many** relationship because a set of environmental regulations will be applied to all workers.

Equipement-Workers: Equipement and Workers has **One-to-Many** relationship because Single equipement can be operated by many workers.

Supervisor- Environmental regulations: There is a **Many-to-One** relationship of this. There are many supervisors available to decide and impose environmental regulations.

Supervisor-Location: Supervisor and Location has **Many-to-One** relationship. Many Supervisors can be assigned to one location but each location is overseen by one supervisor.

Training Program-Workers: Training Programs and workers has **Many-to-Many** relationship. Each taining program can be attended by multiple workers and each worker can attend multiple training programs.

Marketing Sales Department: Marketing and sales department and Customers has **One-to-Many** relationship. The department can target multiple customers but each customer is targeted by one Marketing and Sales Department.

Assumptions:

- Environmental Regulation ID is made unique.
- In Equipement, Equipement ID is unique.
- In Environmental Regulation, Regulation Number is Multivalued(Junior Worker Reg, Senior Worker Reg).
- In Supplier, Supplier Website is the optional Attribute.
- In Supplier, Supplier Type is Multivalued(Material Supplier, Equipement Supplier, Service Provider etc).
- In Customer, Address is a Composite attribute that consist of Street, City, House Number.
- In Equipement, Equipement Type is Multivalued(Drill, Excavator, truck).
- In Supervisor, Experience is the derived attribute that is derived from Joining Year.
- In Material, Material Type is Multivalued(Mineral, Ore, Oil, Gass).