

# Chapter 1: Introduction

## 1.1 Background Information

Agriculture is the art and science of cultivating the soil, growing crops and raising livestock. It includes the preparation of plant and animal products for people to use and their distribution to markets. Agriculture in Ethiopia is the foundation of the country's economy, accounting for 46.3 percent of the nation's Gross Domestic Product (GDP), 83.9 percent of exports, and 80% of the labor force. Many other economic activities depend on agriculture, including marketing, processing and export of agricultural products. Until recent years the exchange of agricultural products in Ethiopia was conducted in traditional ways. The farmers in rural areas sell what they produce to buyers in areas nearby their residence. They are obliged to sell their product on market price, not by their price to bring money home. These buyers in turn take the products to towns or cities and sell them with higher prices. Most of the time the intermediate sellers are more than one until the product reaches its final purchaser. This increase in price is arbitrary, which is decided by these temporary owners of the products. As a result there will be a large gap in prices when reached to the utilizer. The intermediate sellers are the beneficiary ones from such trading. Neither the farmers nor the final buyers are gaining anything from this rise. The distribution place is also decided by the intermediate sellers, which mostly creates the high supply of a certain product in one place and scarcity in another.

The Ethiopian Commodity Exchange was founded by Dr. Elleni G/Medihen with the mission to bring integrity, security, and efficiency to the market, creating opportunities for unparalleled growth in the commodity sector. The ECX is a partnership between market actors, the members of the exchange, and the Government of Ethiopia. It made a significant change in both distribution and price of products. Its main trading product was coffee. Before the ECX was established, many Ethiopian coffee producers had little to no access to sufficient credit, market information, and goods transportation among many other vital resources. For many Ethiopian farmers, coffee producers included, the ECX came as a way forward after years of struggle and hardship. The ECX has warehouses in different parts of the country. It receives the products from the farmers and checks the quality followed by rating. The farmers put the price with which they want to sell. Then it reveals the prices and the quality of that cereal across the country. When the exchange took place the farmer will get his money by the next day. The buyer also gets quality products from anywhere in the country within short period of time.

Only some kinds of cereals like coffee, sesame are exchanged by EXC and there are no facilities provided to the farmers to ease their life. Our project tries to address these limitations of EXC through a web based database. We will provide a means for the farmers to trade any of their products including animals. In addition, by inviting governmental and nongovernmental enterprises, investors and industries to be our partners, we will create a way the farmer can trade fertilizers, water pumps and other farm supporting materials.

## **1.2 Statement of the Problem**

EXC made some farmers get what they deserve from their products but only farmers with some kinds of products got this chance to experience. The remaining ones producing other products that can't be exchanged through EXC are still exchanging their goods at low price in order to continue supporting their home and families. Besides this the whole producing community is not getting the access to purchase materials that ease their tiresome work and increase their yield. Fertilizers, water pumps, machineries, combiners aren't easily available to farmers.

Our database project will change the lives of poor farmers that are not included in EXC, with their money in their account the next day after the exchange. It will also provide fertilizers, machineries and any other farmer helping equipment with affordable prices within a short period of time.

In addition, it will avoid the tiresome file based data collection method practiced by the agricultural sectors by providing a centralized database system. This system will save them time, money and labor force by performing its task with high efficiency and effectiveness.

## **1.3 Scope of the project**

This project focuses on designing and developing a database system that will facilitate the buying-selling process of agricultural products. This database system will be designed and developed for the Ethiopian Agriculture sectors.

## **1.4 Objective of the project**

### **1.4.1 General Objective**

The objective of our system is to design and develop a database system that will help to create a safe and secured marketing environment for farmers and clients by developing a simple, integrated and centralized database system for the Ethiopian Agriculture Sector.

### **1.4.2 Specific Objective**

To accomplish the general objective, this project has the following specific objectives:

- Gather requirements by analyzing the current or the existing system
- Organize data collection and gathering
- Design and develop effective database system for The Ethiopian Agriculture sector
- Keep track of the product transaction
- Create connection between the branches of the warehouse
- Keep track of employee's information and working status
- Keep track of farmer's production rate

## 1.5 Methodology

### 1.5.1 Data collection methods

In order to collect the data for the database system we are going to develop, we will utilize the following strategies of data collection:

- **Interview:** - We will interview stakeholders in Agricultural sectors about the existing system they are using in selling-buying file systems of agricultural goods.
- **Reviewing written documents:** - We will analyze existing records and try to understand the methodologies used to gather data.
- **Observation**

### 1.5.2 Development tools

Our entire project will be developed by using the following tools:

- For writing documentation: **MS word 2010**
- For the implementation phase: **MySQL**-- Is preferred since it is robust in managing large databases and has a lot of community support.
- Tools for the Design (developing ER diagram): **lucid charts software**
- Tools for Communication and team tasks: **Telegram**

## 1.6 Benefits and Beneficiaries of the new system

### 1.6.1 Benefits of the new system

Some of the benefits of the system is:

- **Flexibility** - Users can see the data in a way that benefits them the best by using different views and search queries. For instance customers can see the information about all agricultural products.
- **Improved data Sharing and data security.**
- **Consistent, standardized data.**
- **Fast queries** - Using a database to search for information or relationships within a huge volume of data is often faster.
- **Multiple users** - Multiple users can access the database at the same time.
- **Easy to find** - Any private sector or customer or any user with a reliable internet connection can access a database at any time.

### **1.6.2 Beneficiaries of the system**

The main beneficiaries of this system are:

- Farmers as the system provide information that can help them identify efficiencies that lead to higher productivity and profitability, lower input costs, and optimized machinery and fertilizer use.
- Agricultural sectors as the system provide access to real time information which in turn helps them to save time, money and labor that would have been wasted if spent in a manual system.
- Investors as the system provide all necessary information regarding time, cost and productivity of the project they want to invest in.
- Buyers as the system provide a user-friendly environment that gives explanatory information on the products they would like to consume.

## Chapter 2: Database Design

### 2.1 Conceptual Database Design of the New System

#### 2.1.1 Entities Description

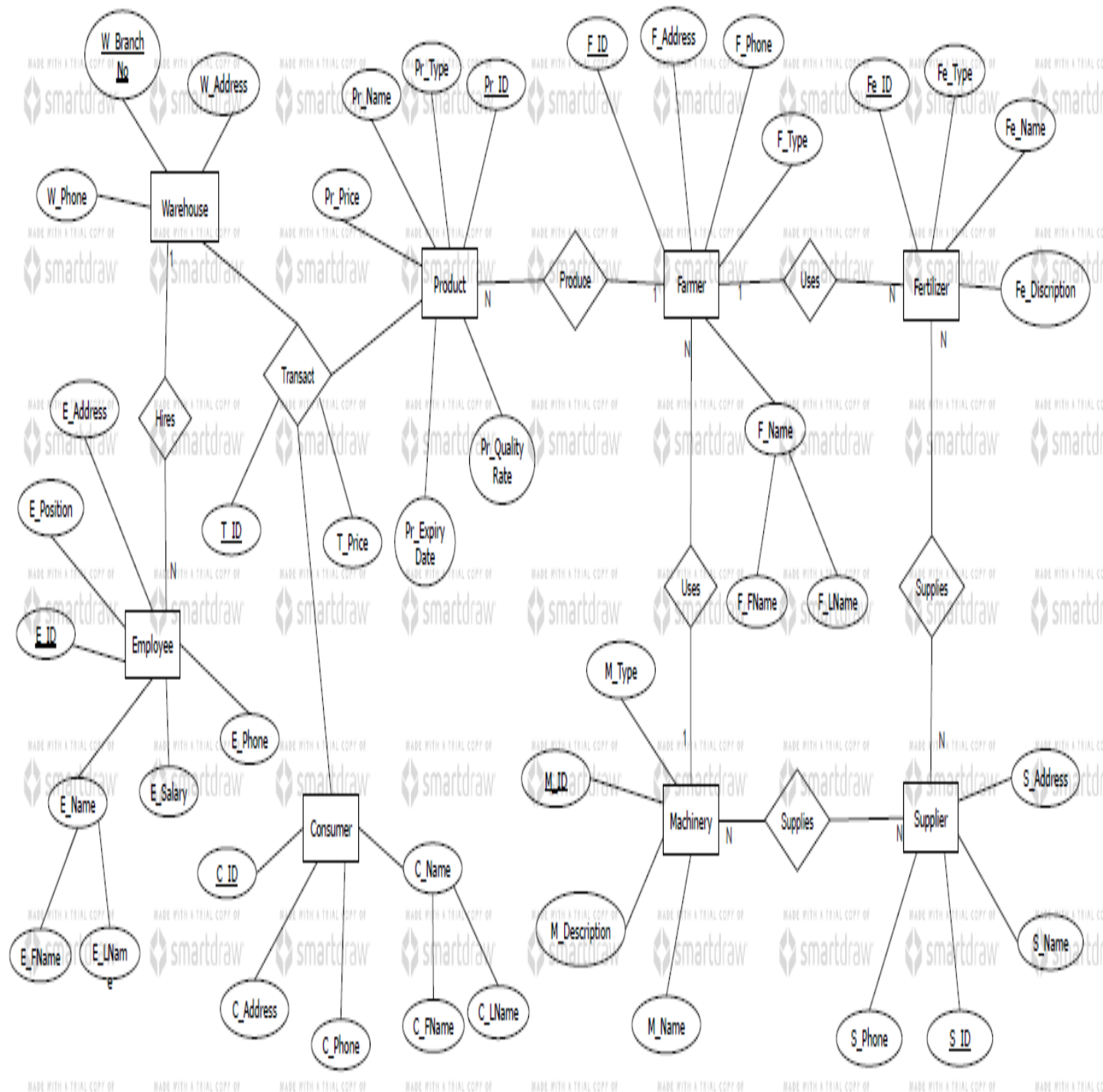
Entity	Description
Warehouse	Building to store, inspect and transact product
Farmer	Person that produce product
Customer	Person that buys product
Product	Agricultural product either crop or animal
Employee	Person that works in the warehouse such as Salesperson, Quality Inspector and etc.
Supplier	Company that provides fertilizer and machinery
Fertilizer	Substance used by Farmer to improve its crop
Machinery	Machine used by Farmer to improve its crop

#### 2.1.2 Entity Attributes Description

Entities	Attributes	Description
Warehouse	WH_ID	Warehouse ID, Unique Warehouse identification number
	WH_Name	Warehouse Name
	WH_Location	Warehouse Location
Farmer	F_ID	Farmer ID, Unique Farmer identification number
	F_FName	Farmer First Name
	F_LName	Farmer Last Name
	F_Type	Farmer Type
	F_Address	Farmer Address
	F_Phone	Farmer Phone Number

Customer	C_ID	Customer ID, Unique Customer identification number
	C_FName	Customer First Name
	C_LName	Customer Last Name
	C_Address	Customer Address
	C_Phone	Customer Phone Number
Product	Pr_ID	Product ID, Unique crop identification number
	Pr_Type	Product Type
	Pr_Name	Product Name
	Pr_ExpiryDate	Product Expiry Date
	Pr_QualityRate	Product Quality Rate
Employee	E_ID	Employee ID, Unique Employee identification number
	E_FName	Employee First Name
	E_LName	Employee Last Name
	E_Position	Employee Position
	E_Address	Employee Address
	E_Salary	Employee Salary
	E_Phone	Employee Phone Number
Supplier	S_ID	Supplier ID, Unique Supplier identification number
	S_Name	Supplier Name
	S_Address	Supplier Address
	S_Email	Supplier Email
	S_Phone	Supplier Phone Number
Fertilizer	Fe_ID	Fertilizer ID, Unique Fertilizer identification number
	Fe_Type	Fertilizer Type
	Fe_Name	Fertilizer Name
	Fe_Description	Fertilizer Description
Machinery	M_ID	Machinery ID, Unique Machinery identification number
	M_Name	Machinery Name
	M_Type	Machinery Type
	M_Description	Machinery Description

### 2.1.3 Entity Relationship Diagram



### 2.2 Logical Database Design of the New System

## 2.2.1 ER-Relation/Table Mapping

Warehouse

<b>W_BranchNO</b>	W_Address	W_Phone
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Employee

<b>E_ID</b>	E_FName	E_LName	E_Address	E_Phone	E_Position	E_Salary	W_BranchNo
-------------	---------	---------	-----------	---------	------------	----------	------------

Transact

<b>T_ID</b>	W_BranchNO	C_ID	P_ID	T_Price
-------------	------------	------	------	---------

Farmer

<b>F_ID</b>	F_FName	F_LName	F_Type	F_Address	F_Phone	M_ID
-------------	---------	---------	--------	-----------	---------	------

Customer

<b>C_ID</b>	C_FName	C_LName	C_Address	C_Phone
-------------	---------	---------	-----------	---------

Product

<b>Pr_ID</b>	Pr_Name	Pr_Type	Pr_ExpiryDate	Pr_QualityRate	F_ID
--------------	---------	---------	---------------	----------------	------

Supplier

<b>S_ID</b>	S_Name	S_Address	S_Phone
-------------	--------	-----------	---------

Machinery

<b>M_ID</b>	M_Name	M_Type	M_Description
-------------	--------	--------	---------------

Fertilizers



<b><u>Fe_ID</u></b>	Fe_Name	Fe_Type	Fe_Description	F_ID
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Supplies

<b><u>S_ID</u></b>	<b><u>M_ID</u></b>	<b><u>Fe_ID</u></b>
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## 2.2.2 Validate Model using Normalization

### 1<sup>st</sup> Normal Form

Farmer

<b><u>F_ID</u></b>	F_FName	F_LName	F_Address	F_Phone	F_Type	M_ID
--------------------	---------	---------	-----------	---------	--------	------

Customer

<b><u>C_ID</u></b>	C_FName	C_LName	C_Address	C_Phone
--------------------	---------	---------	-----------	---------

Employee

<b><u>E_ID</u></b>	E_FName	E_LName	E_Address	E_Phone	E_Position	E_Salary	W_Branch No
--------------------	---------	---------	-----------	---------	------------	----------	-------------

Warehouse

<b><u>W_Branch No</u></b>	W_Address	W_Phone
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Machinery

<b><u>M_ID</u></b>	M_Name	M_Type	M_Description
--------------------	--------	--------	---------------

Fertilizer

<b><u>Fe_ID</u></b>	Fe_Type	Fe_Name	Fe_Description	F_ID
---------------------	---------	---------	----------------	------

Product

<b><u>Pr_ID</u></b>	Pr_Name	Pr_Type	Pr_Expiry Date	Pr_Quality	F_ID	P_Price
---------------------	---------	---------	----------------	------------	------	---------

Transact

<u>T_ID</u>	W_BranchNO	C_ID	P_ID	T_Price
-------------	------------	------	------	---------

Supplies

<u>M_ID</u>	<u>S_ID</u>	<u>Fe_ID</u>
-------------	-------------	--------------

Supplier

<u>S_ID</u>	S_Name	S_Address	S_Phone
-------------	--------	-----------	---------

## 2<sup>nd</sup> Normal Form

Farmer

<u>F_ID</u>	F_FName	F_LName	F_Address	F_Phone
-------------	---------	---------	-----------	---------

<u>F_ID</u>	F_Type
-------------	--------

<u>F_ID</u>	M_ID
-------------	------

Customer

<u>C_ID</u>	C_FName	C_LName	C_Address	C_Phone
-------------	---------	---------	-----------	---------

Employee

<u>E_ID</u>	W_Branch No
-------------	-------------

<u>E_ID</u>	E_FName	E_LName	E_Address	E_Phone
-------------	---------	---------	-----------	---------

E_Position	E_Salary
------------	----------

Warehouse

<u>W_Branch No</u>	W_Address	W_Phone
--------------------	-----------	---------

#### Machinery

<u>M_ID</u>	M_Name	M_Type	M_Description
-------------	--------	--------	---------------

#### Fertilizer

<u>Fe_ID</u>	F_ID
--------------	------

<u>Fe_ID</u>	Fe_Type	Fe_Name	Fe_Description
--------------	---------	---------	----------------

#### Product

<u>Pr_ID</u>	F_ID
--------------	------

<u>Pr_ID</u>	Pr_Name	Pr_Type	Pr_Expiry Date	Pr_Quality
--------------	---------	---------	----------------	------------

#### Transact

<u>T_ID</u>	W_BranchNO	C_ID	P_ID
-------------	------------	------	------

<u>T_ID</u>	T_Price
-------------	---------

#### Supplies

<u>M_ID</u>	<u>S_ID</u>	<u>Fe_ID</u>
-------------	-------------	--------------

#### Supplier

<u>S_ID</u>	S_Name	S_Address	S_Phone
-------------	--------	-----------	---------

### 3<sup>rd</sup> Normal Form

#### Employee

<u>E_ID</u>	W_Branch No
-------------	-------------

E_Address	E_Phone	E_Position	E_Salary
-----------	---------	------------	----------

#### Customer

<u>C_ID</u>	C_FName	C_LName	C_Address	C_Phone
-------------	---------	---------	-----------	---------

#### Warehouse

<u>W_Branch No</u>	W_Address	W_Phone
--------------------	-----------	---------

#### Machinery

<u>M_ID</u>	M_Name	M_Type
-------------	--------	--------

<u>M_Type</u>	M_Description
---------------	---------------

#### Farmer

<u>F_ID</u>	F_FName	F_LName	F_Address	F_Phone
-------------	---------	---------	-----------	---------

<u>F_ID</u>	F_Type	M_ID
-------------	--------	------

#### Fertilizer

<u>Fe_ID</u>	F_ID
--------------	------

<u>Fe_ID</u>	Fe_Name	Fe_Type
--------------	---------	---------

<u>Fe_Type</u>	Fe_Description
----------------	----------------

#### Product

<u>Pr_ID</u>	F_ID
--------------	------

<u>Pr_ID</u>	Pr_Name	Pr_Type	Pr_Expiry Date	Pr_Quality
--------------	---------	---------	----------------	------------

Transact

<u>T_ID</u>	W_BranchNO	<u>C_ID</u>	<u>P_ID</u>
-------------	------------	-------------	-------------

<u>T_ID</u>	T_Price
-------------	---------

Supplies

<u>M_ID</u>	<u>S_ID</u>	<u>Fe_ID</u>
-------------	-------------	--------------

Supplier

<u>S_ID</u>	S_Name	S_Address	S_Phone
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## Chapter Three: IMPLIMENTATION

### 3.1 SQL Implementation

Lidyagebi, [1/28/2022 1:00 PM]

```
create table Employee(E_ID int primary key, E_Fname varchar(10), E_Lname  
varchar(10), E_Address varchar(20), E_Phone varchar(15), E_Position  
varchar(15));
```

```
insert into Employee values(1000, 'Mohammed', 'Ali', 'Megenagna', 0911234556,  
'Salesperson');
```

```
insert into Employee values(2000, 'Senayit', 'Dawit', 'Mexico', 0934569000,  
'QualityInspector');
```

```
insert into Employee values(2001, 'Makda', 'Tekeste', 'Saris', 0990807654,  
'QualityInspector');
```

```
insert into Employee values(3000, 'Abinet', 'Agonafir', 'Bole', 0912985606,  
'Cashier');
```

```
insert into Employee values(3001, 'Sena', 'Mengistu', 'Gofa', 0911234556,
'Cashier');

insert into Employee values(4000, 'Abi', 'Kebede', 'Sarbet', 099876556, 'Security');

insert into Employee values(1001, 'Maya', 'Abate', 'Megenagna', 0912309556,
'Salesperson');

insert into Employee values(4001, 'Getu', 'Yilma', 'Piassa', 0901934577, 'Security');
```

```
create table Employee1(E_ID int primary key, W_BranchNO int not null
references warehouse(W_BranchNO))
```

```
insert into Employee1 values( , )
insert into Employee1 values( , )
insert into Employee1 values( , )
insert into Employee1 values( , )
insert into Employee1 values( , )
```

```
create table Employee2(E_Position varchar(20), E_Salary varchar(20));

insert into Employee2 values('Salesperson', 5000)

insert into Employee2 values('QualityInspector', 10000)

insert into Employee2 values('Cashier', 6000)

insert into Employee2 values('Security', 4500)
```

Lidyagebi, [1/28/2022 1:03 PM]

```
create table tranact(T_ID int primary key, W_BranchNo int not null references Warehouse(W_BranchNO), C_ID int not null references Customer(C_ID), P_ID int not null references Product(P_ID))
```

```
insert into tranact values(0001, , , , )
```

```
insert into tranact values(0002, , , , )
```

```
insert into tranact values(0003, , , , )
```

```
insert into tranact values(0004, , , , )
```

```
insert into tranact values(0005, , , , )
```

```
insert into tranact values(0006, , , , )
```

```
create table transact1 values(P_ID int, T_Price varchar(10))
```

```
insert into transact1 values( , )
```

```
insert into transact1 values( , )
```

```
insert into transact1 values( , )
```

```
insert into transact1 values( , )
```

```
insert into transact1 values( , )
```

```
insert into transact1 values( , )
```

```
create table Fertilizer(Fe_ID int primary key, Fe_Name varchar(20), Fe_Type varchar(20))
```

```
insert into Fertilizer values( , , )
```

```
insert into Fertilizer values( , , )
```

```
insert into Fertilizer values( , , )
```

```
insert into Fertilizer values( , , )
```

```
insert into Fertilizer values( , , )
```

```
insert into Fertilizer values( , , )
```

```
create table Fertilizer1(Fe_Type varchar(20), Fe_Description varchar(50))
```

```
insert into Fertilizer1 values( , )
```

```
insert into Fertilizer1 values( , )
```

```
insert into Fertilizer1 values( , )
```

```
insert into Fertilizer1 values( , )
```

```
insert into Fertilizer1 values( , )
```

```
create table Fertilizer2(Fe_ID int primary key, F_ID int not null references  
Farmer(F_ID))
```

```
insert into Fertilizer2 values( , )
```

```
insert into Fertilizer2 values( , )
```

```
insert into Fertilizer2 values( , )
```

```
insert into Fertilizer2 values( , )
```

Lidyagebi, [1/28/2022 1:03 PM]

```
create database Alpha;
```

```
use Alpha;
```



```
create table Warehouse(W_BranchNo int primary key, W_Address varchar(10),  
W_Phone varchar(20));
```

```
insert into Warehouse values(01, 'Merkato' , 0912131415);
```

```
insert into Warehouse values(02, 'Gerji' , 0912346785);
```

```
insert into Warehouse values(03, 'Kotebe' , 0934761245);
```

```
insert into Warehouse values(04, 'Kaliti' , 0911980650);
```

```
insert into Warehouse values(05, '4Kilo' , 0987508923);
```

```
select *from Warehouse;
```

```
create table Employee(E_ID int primary key, E_Fname varchar(10), E_Lname  
varchar(10), E_Address varchar(20), E_Phone varchar(15), E_Position  
varchar(15));
```

```
insert into Employee values(1000, 'Mohammed', 'Ali', 'Megenagna', 0911234556,  
'Salesperson');
```

```
insert into Employee values(2000, 'Senayit', 'Dawit', 'Mexico', 0934569000,  
'QualityInspector');
```

```
insert into Employee values(2001, 'Makda', 'Tekeste', 'Saris', 0990807654,  
'QualityInspector');
```

```
insert into Employee values(3000, 'Abinet', 'Agonafir', 'Bole', 0912985606,  
'Cashier');
```

```
insert into Employee values(3001, 'Sena', 'Mengistu', 'Gofa', 0911234556,  
'Cashier');
```

```
insert into Employee values(4000, 'Abi', 'Kebede', 'Sarbet', 099876556, 'Security');
```

```
insert into Employee values(1001, 'Maya', 'Abate', 'Megenagna', 0912309556, 'Salesperson');
```

```
insert into Employee values(4001, 'Getu', 'Yilma', 'Piassa', 0901934577, 'Security');
```

```
create table Employee1(E_ID int primary key, W_BranchNO int not null references Warehouse(W_BranchNO))
```

```
insert into Employee1 values( , )
```

```
insert into Employee1 values( , )
```

```
insert into Employee1 values( , )
```

```
insert into Employee1 values( , )
```

```
insert into Employee1 values( , )
```

```
create table Employee2(E_Position varchar(20), E_Salary varchar(20));
```

```
insert into Employee2 values('Salesperson', 5000)
```

```
insert into Employee2 values('QualityInspector', 10000)
```

```
insert into Employee2 values('Cashier', 6000)
```

```
insert into Employee2 values('Security', 4500)
```

```
create table Machinery(M_ID int primary key, M_Name varchar(20), M_Type varchar(20))
```

```
insert into Machinery values(1100,'MTO356','Sprayer')
```

```
insert into Machinery values(1101 , 'MTO588','Sprayer')
```

```
insert into Machinery values(2200 , 'RT880','Cultivator')
```

```
insert into Machinery values(2201 , 'RT972','Cultivator')
```

```
insert into Machinery values(3300 , 'WST02','Waterer')
```

```
insert into Machinery values(3301 , 'WST67','Waterer')
```

```
select *from Machinery
```

```
create table Machinery1(M_Type varchar(20), M_Description varchar(50))
```

```
insert into Machinery1 values('Sprayer', 'A piece of tool that applies fertilizer to crop')
```

```
insert into Machinery1 values('Cultivator', 'A machine for cultivating farm')
```

```
insert into Machinery1 values('Waterer', 'A machine used for supplying water to livestock')
```

```
create table Farmer(F_ID int primary key, F_FName varchar(20), F_LName varchar(20), F_Address varchar(20), F_Phone varchar(20))
```

```
insert into Farmer values( 9901,'Taffese', 'Tadesse', 'BahirDar', '0945783215')
```

```
insert into Farmer values( 8901,'Selam', 'Tesfaye', 'Maychew', '0987644356')
```

```
insert into Farmer values( 8902,'Danial', 'Tilahun', 'Adama', '0943572766')
```

```
insert into Farmer values( 7900,'Kalab', 'Molla', 'Konso', '0976457987')
```

```
insert into Farmer values( 7902,'Rediet', 'Daget', 'Newear', '0954736889')
```

```
insert into Farmer values( 9902,'Yohannnes', 'Berhanu', 'Semera', '0967852976')
```

```
create table Farmer1(F_ID int primary key, F_Type varchar(20))
```

```
insert into Farmer1 values( 9901,'Crop A')
```

```
insert into Farmer1 values( 8901,'Crop B')
```

```
insert into Farmer1 values( 8902,'Crop B')
```

```
insert into Farmer1 values( 7900,'Livestock')
```

```
insert into Farmer1 values( 7902,'Livestock')
```

```
insert into Farmer1 values(9902 , 'Crop A')
```

```
create table Farmer2(F_Type varchar(20), M_ID int not null references  
Machinery(M_ID))
```

```
insert into Farmer2 values('Crop A', 1100)
```

```
insert into Farmer2 values('Crop B', 2200 )
```

```
insert into Farmer2 values('Livestock', 3300)
```