

CPSC 304 Project Cover Page

Milestone #: 2

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Group Number: 116

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

2. Project Summary

Our project operates in the domain of urban planning, food security, sustainability and community engagement. It aims to support the planning and management of urban community gardens, catering to community garden managers, individual gardeners, and suppliers. The main uses of our database are to connect urban gardeners with available community garden spaces, enable gardening in areas with environmental limitations, and offer plant recommendations based on those limitations.

3. ER Diagram

The following table summarizes the modifications made to the ER diagram from the version submitted in Milestone 1.

Entity/Relationship Set	Modification(s)	Rationale
CommunityGarden	<ul style="list-style-type: none">● Changed “# Plots” attribute to “TotalPlots”● Added “OccupiedPlots” and “AvailablePlots” attributes● Removed “StartDate” and “ClimateConditions” attributes● Changed “SunConditions” attribute to “DailySunExposure”● Changed “WaterConditions” attribute to “MonthlyPrecipitation”	<ul style="list-style-type: none">● Eliminates unnecessary attributes, improves the descriptiveness of attribute names and adds attributes to create FDs other than those identified by the PK
DeliveryRequest	<ul style="list-style-type: none">● Changed “Delivery” entity set to “DeliveryRequest”● Changed “Cost” attribute to “TotalCost”● Added “Quantity” and “AvgCostPerUnit” attributes	<ul style="list-style-type: none">● Improves the descriptiveness of the entity set name and adds attributes to create FDs other than those identified by the PK
Material	<ul style="list-style-type: none">● Changed “Type” attribute to “Name”	<ul style="list-style-type: none">● Better reflects the attribute data associated with the entity
Plant	<ul style="list-style-type: none">● Removed “ClimateRequirements” attribute● Changed “SunRequirements” attribute to “DailySunRequirements”● Changed “Water Requirements” attribute to “MonthlyWaterRequirements”	<ul style="list-style-type: none">● Eliminates unnecessary attributes and improves the descriptiveness of attribute names

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Entity/Relationship Set	Modification(s)	Rationale
Event	<ul style="list-style-type: none">● Changed “Capacity” attribute to “MaxCapacity”● Added “Registered” attribute● Added “SpaceAvailable” attribute	<ul style="list-style-type: none">● Improves the descriptiveness of the entity set name and adds attributes to create FDs other than those identified by the PK
Gardener	<ul style="list-style-type: none">● Removed “Role” attribute	<ul style="list-style-type: none">● Eliminates unnecessary attributes

4. Relational Schema

With respect to the following schemas, primary keys are underlined, foreign keys are **bolded**, and candidate keys are *italicized*. Additional constraints are listed explicitly (e.g., UNIQUE and NOT NULL).

- CommunityGarden(GardenID: int, Name: varchar, *Address*: varchar, TotalPlots: int, OccupiedPlots: int, AvailablePlots: int, DailySunExposure: int, MonthlyPrecipitation: int)
 - *Address* is UNIQUE, NOT NULL
- Organization(OrganizationID: int, Name: varchar, Address: varchar, PhoneNumber: varchar, Budget: int, **GardenID**: varchar)
 - Name is NOT NULL
 - Address is NOT NULL
 - PhoneNumber is NOT NULL
 - **GardenID** is UNIQUE, NOT NULL
- DeliveryRequest(DeliveryID: int, Status: varchar, TotalCost: float, Quantity: int, AvgCostPerUnit: float, DateCreated: date, DateFulfilled: date, **OrganizationID**: int, **SupplierID**: int)
 - Status is NOT NULL
 - TotalCost is NOT NULL
 - Quantity is NOT NULL
 - AvgCostPerUnit is NOT NULL
 - DateCreated is NOT NULL
 - **OrganizationID** is NOT NULL
 - **SupplierID** is NOT NULL
- Supplier(SupplierID: int, Name: varchar, Address: varchar, PhoneNumber: varchar)
 - Name is NOT NULL
 - Address is NOT NULL
 - PhoneNumber is NOT NULL
- Contains(**DeliveryID**: int, **MaterialID**: int)
- Material(MaterialID: int, *Name*: varchar)
 - *Name* is UNIQUE, NOT NULL
- Soil(**MaterialID**: int, Coverage: int, Composition: varchar)
- Seed(**MaterialID**: int, Species: varchar)

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- Tool(MaterialID: int, Function: varchar)
- Plot(GardenID: int, PlotNumber: int, Size: int, Status: varchar)
- UsedIn(GardenID: int, PlotNumber: int, MaterialID: int, Quantity: int)
- Plant(PlantID: int, *Species*: varchar, DailySunRequirements: int, MonthlyWaterRequirements: int)
 - *Species* is UNIQUE, NOT NULL
- GrowsIn(PlantID: int, GardenID: int, PlotNumber: int, Quantity: int)
 - Quantity is NOT NULL
- Gardener(GardenerID: int, Name: varchar, Address: varchar, PhoneNumber: varchar)
 - Name is NOT NULL
 - PhoneNumber is NOT NULL
- TendsTo(GardenerID: int, GardenID: int, PlotNumber: int)
- MemberOf(GardenerID: int, GardenID: int, Since: date)
- Event(EventID: int, Name: varchar, Type: varchar, Date: date, MaxCapacity: int, Registered: int, SpaceAvailable: int, GardenID: int)
 - MaxCapacity is NOT NULL
 - Registered is NOT NULL
 - SpaceAvailable is NOT NULL
 - **GardenID** is NOT NULL
- Attends(EventID: int, GardenerID: int)
- Task(TaskID: int, DateAssigned: date, DateCompleted: date, Status: varchar)
 - DateAssigned is NOT NULL
 - Status is NOT NULL
- Water(TaskID: int, Duration: int)
- Weed(TaskID: int, Method: varchar)
- Sow(TaskID: int, Species: varchar, Season: varchar)
- Harvest(TaskID: int, Species: varchar, Season: varchar)
- Performs(GardenerID: int, TaskID: int)

5. Functional Dependencies

The following table summarizes the functional dependencies (FDs) in the relational schema defined in Section 4. With respect to the table attributes, primary keys are underlined, foreign keys are **bolded**, and candidate keys are *italicized*.

Table	Attributes	Functional Dependencies (FDs)
CommunityGarden	<u>GardenID</u> (G) Name (N) <i>Address</i> (A) TotalPlots (T) OccupiedPlots (O) AvailablePlots (F) DailySunExposure (S) MonthlyPrecipitation (P)	$G \rightarrow N, A, T, O, F, S, P$ $A \rightarrow G, N, T, O, F, S, P$ $T, O \rightarrow F$
Organization	<u>OrganizationID</u> (O) Name (N) Address (A) PhoneNumber (P) Budget (B) GardenID (G)	$O \rightarrow N, A, P, B, G$ $N, A \rightarrow P$
DeliveryRequest	<u>DeliveryID</u> (D) Status (S) TotalCost (C) Quantity (Q) AvgCostPerUnit (A) DateCreated (P) DateFulfilled (F) OrganizationID (O) SupplierID (N)	$D \rightarrow S, C, Q, A, P, F, O, N$ $Q, A \rightarrow C$
Supplier	<u>SupplierID</u> (S) Name (N) Address (A) PhoneNumber (P)	$S \rightarrow N, A, P$ $N, A \rightarrow P$
Contains	<u>DeliveryID</u> (D) <u>MaterialID</u> (M)	No non-trivial FDs

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Table	Attributes	Functional Dependencies (FDs)
Material	<u>MaterialID</u> (M) Name (N)	$M \rightarrow N$ $N \rightarrow M$
Soil	MaterialID (M) Coverage (C) Composition (O)	$M \rightarrow C, O$
Seed	MaterialID (M) Species (S)	$M \rightarrow S$
Tool	MaterialID (M) Function (F)	$M \rightarrow F$
Plot	GardenID (G) <u>PlotNumber</u> (N) Size (S) Status (T)	$G, N \rightarrow S, T$
UsedIn	GardenID (G) PlotNumber (N) MaterialID (M) Quantity (Q)	$G, N, M \rightarrow Q$
Plant	<u>PlantID</u> (P) Species (S) DailySunRequirements (D) MonthlyWaterRequirements (W)	$P \rightarrow S, D, W$ $S \rightarrow P, D, W$
GrowsIn	PlantID (P) GardenID (G) PlotNumber (N) Quantity (Q)	$P, G, N \rightarrow Q$
Gardener	<u>GardenerID</u> (R) Name (N) Address (A) PhoneNumber (P)	$R \rightarrow N, A, P$ $N, A \rightarrow P$
TendsTo	GardenerID (R) GardenID (G) PlotNumber (N)	No non-trivial FDs

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Table	Attributes	Functional Dependencies (FDs)
MemberOf	<u>GardenerID</u> (R) GardenID (G) Since (S)	$R, G \rightarrow S$
Event	<u>EventID</u> (E) Name (N) Type (T) Date (D) MaxCapacity (M) Registered (R) SpaceAvailable (S) GardenID (G)	$E \rightarrow N, T, D, M, R, S, G$ $M, R \rightarrow S$
Attends	<u>GardenerID</u> (R) GardenID (G)	No non-trivial FDs
Task	<u>TaskID</u> (T) DateAssigned (A) DateCompleted (C) Status (S)	$T \rightarrow A, C, S$ $D \rightarrow S$
Water	<u>TaskID</u> (T) Duration (D)	$T \rightarrow D$
Weed	<u>TaskID</u> (T) Method (M)	$T \rightarrow M$
Sow	<u>TaskID</u> (T) Species (S) Season (E)	$T \rightarrow S, E$
Harvest	<u>TaskID</u> (T) Species (S) Season (E)	$T \rightarrow S, E$
Performs	<u>GardenerID</u> (R) <u>TaskID</u> (T)	No non-trivial FDs

6. Normalization

We use the BCNF lossless-join normalization method to reduce redundancy and improve data integrity. Based on the functional dependencies listed in Section 5, we observe that all relations satisfy BCNF with the exception of the `CommunityGarden`, `Organization`, `DeliveryRequest`, `Supplier`, `Gardener`, and `Event` relations. We carry out BCNF decomposition on these specific relations to satisfy the BCNF requirements, while leaving all other relations unchanged.

CommunityGarden

R(G, N, A, T, O, F, S, P)

FDs:

$G \rightarrow N, A, T, O, F, S, P$

$A \rightarrow G, N, T, O, F, S, P$

$T, O \rightarrow F$

$T, F \rightarrow O$

$O, F \rightarrow T$

Closures:

$G^+ = \{G, N, A, T, O, F, S, P\}$ **superkey**

$A^+ = \{G, N, A, T, O, F, S, P\}$ **superkey**

$TO^+ = \{T, O, F\}$ **violates BCNF**

Decompose R on $T, O \rightarrow F$:

R1(G, N, A, **T**, **O**, S, P)

R2(**T**, O, F)

Decomposed relations:

- `CommunityGarden1`(GardenID: int, Name: varchar, Address: varchar, **TotalPlots**: int, **OccupiedPlots**: int, DailySunExposure: int, MonthlyPrecipitation: int)
 - Address is UNIQUE, NOT NULL
 - TotalPlots is NOT NULL
 - OccupiedPlots is NOT NULL
- `CommunityGarden2`(TotalPlots: int, OccupiedPlots: int, AvailablePlots: int)

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Organization

$R(O, N, A, P, B, G)$

FDs:

$O \rightarrow N, A, P, B, G$

$N, A \rightarrow P$

Closures:

$O^+ = \{O, N, A, P, B, G\}$ **superkey**

$NA^+ = \{N, A, P\}$ **violates BCNF**

Decompose R on $N, A \rightarrow P$:

$R1(\underline{O}, N, A, B, G)$

$R2(\underline{N}, \underline{A}, P)$

Decomposed relations:

- Organization1(OrganizationID: int, **Name**: varchar, **Address**: varchar, Budget: int, **GardenID**: varchar)
 - Name is NOT NULL
 - Address is NOT NULL
 - **GardenID** is UNIQUE, NOT NULL
- Organization2(Name: varchar, Address: varchar, PhoneNumber: varchar)
 - PhoneNumber is NOT NULL

DeliveryRequest

$R(D, S, C, Q, A, P, F, O, N)$

FDs:

$D \rightarrow S, C, Q, A, P, F, O, N$

$Q, A \rightarrow C$

$C, A \rightarrow Q$

$C, Q \rightarrow A$

Closures:

$D^+ = \{D, S, C, Q, A, P, F, O, N\}$ **superkey**

$QA^+ = \{C, A, Q\}$ **violates BCNF**

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Decompose R on Q, $A \rightarrow C$:

R1(D, S, Q, A, P, F, O, N)

R2(Q, A, C)

Decomposed relations:

- DeliveryRequest1(DeliveryID: int, Status: varchar, **Quantity**: int, **AvgCostPerUnit**: float, DateCreated: date, DateFulfilled: date, **OrganizationID**: int, **SupplierID**: int)
 - Status is NOT NULL
 - Quantity is NOT NULL
 - AvgCostPerUnit is NOT NULL
 - DateCreated is NOT NULL
 - **OrganizationID** is NOT NULL
 - **SupplierID** is NOT NULL
- DeliveryRequest2(Quantity: int, AvgCostPerUnit: float, TotalCost: float)
 - TotalCost is NOT NULL

Supplier

R(S, N, A, P)

FDs:

$S \rightarrow N, A, P$

$N, A \rightarrow P$

Closures:

$S^+ = \{S, N, A, P\}$ **superkey**

$NA^+ = \{N, A, P\}$ **violates BCNF**

Decompose R on N, $A \rightarrow P$

R1(S, N, A)

R2(N, A, P)

Decomposed relations:

- Supplier1(SupplierID: int, **Name**: varchar, **Address**: varchar)
 - Name is NOT NULL
 - Address is NOT NULL
- Supplier2(Name: varchar, Address: varchar, PhoneNumber: varchar)
 - PhoneNumber is NOT NULL

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Gardener

$R(R, N, A, P)$

FDs:

$R \rightarrow N, A, P$

$N, A \rightarrow P$

Closures:

$R^+ = \{R, N, A, P\}$ **superkey**

$NA^+ = \{N, A, P\}$ **violates BCNF**

Decompose R on $N, A \rightarrow P$:

$R1(\underline{R}, N, A)$

$R2(\underline{N}, \underline{A}, P)$

Decomposed relations:

- Gardener1(GardenerID: int, **Name**: varchar, **Address**: varchar)
 - Name is NOT NULL
 - Address is NOT NULL
- Gardener2(Name: varchar, Address: varchar, PhoneNumber: varchar)
 - PhoneNumber is NOT NULL

Event

$R(E, N, T, D, M, R, S, G)$

FDs:

$E \rightarrow N, T, D, M, R, S, G$

$M, R \rightarrow S$

$M, S \rightarrow R$

$R, S \rightarrow M$

Closures:

$E^+ = \{E, N, T, D, M, R, S, G\}$ **superkey**

$MR^+ = \{M, R, S\}$ **violates BCNF**

Decompose R on $M, R \rightarrow S$:

$R1(\underline{E}, N, T, D, M, R, G)$

$R2(\underline{M}, \underline{R}, S)$

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Decomposed relations:

- Event1(EventID: int, Name: varchar, Type: varchar, Date: date, **MaxCapacity**: int, **Registered**: int, **GardenID**: int)
 - MaxCapacity is NOT NULL
 - Registered is NOT NULL
 - GardenID is NOT NULL
- Event2(MaxCapacity: int, Registered: int, SpaceAvailable: int)
 - SpaceAvailable is NOT NULL

7. SQL DDL Statements

```
CREATE TABLE CommunityGarden2(
```

```
    TotalPlots INT,  
    OccupiedPlots INT,  
    AvailablePlots INT,  
    PRIMARY KEY (TotalPlots, OccupiedPlots))
```

```
CREATE TABLE CommunityGarden1(
```

```
    GardenId INT,  
    Name VARCHAR(100),  
    Address VARCHAR(100) NOT NULL UNIQUE,  
    TotalPlots INT NOT NULL,  
    OccupiedPlots INT NOT NULL,  
    DailySunExposure INT,  
    MonthlyPrecipitation INT,  
    PRIMARY KEY (GardenId),  
    FOREIGN KEY (TotalPlots, OccupiedPlots)  
        REFERENCES CommunityGarden2 (TotalPlots, OccupiedPlots)  
        ON DELETE NO ACTION))
```

```
CREATE TABLE Organization2(
```

```
    Name VARCHAR(100),  
    Address VARCHAR(100),  
    PhoneNumber VARCHAR(100) NOT NULL,  
    PRIMARY KEY (Name, Address))
```

```
CREATE TABLE Organization1(
```

```
    OrganizationID INT,  
    Name VARCHAR(100) NOT NULL,  
    Address VARCHAR(100) NOT NULL,  
    Budget INT,  
    GardenID VARCHAR(100) NOT NULL UNIQUE,  
    PRIMARY KEY (OrganizationID),  
    FOREIGN KEY (Name, Address)  
        REFERENCES Organization2(Name, Address),  
    FOREIGN KEY (GardenID)  
        REFERENCES CommunityGarden1(GardenID))
```

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```
CREATE TABLE DeliveryRequest2(  
    Quantity INT,  
    AvgCostPerUnit FLOAT,  
    TotalCost FLOAT NOT NULL,  
    PRIMARY KEY (Quantity, AvgCostPerUnit))
```

```
CREATE TABLE DeliveryRequest1(  
    DeliveryID INT,  
    Status VARCHAR(100) NOT NULL,  
    Quantity INT NOT NULL,  
    AvgCostPerUnit FLOAT NOT NULL,  
    DateCreated DATE NOT NULL,  
    DateFulfilled DATE,  
    OrganizationID INT NOT NULL,  
    SupplierID INT NOT NULL,  
    PRIMARY KEY (DeliveryID),  
    FOREIGN KEY (Quantity, AvgCostPerUnit)  
        REFERENCES DeliveryRequest2(Quantity, AvgCostPerUnit),  
    FOREIGN KEY (OrganizationID)  
        REFERENCES Organization1(OrganizationID)  
        ON DELETE CASCADE,  
    FOREIGN KEY (SupplierID)  
        REFERENCES Supplier1(SupplierID)  
        ON DELETE CASCADE))
```

```
CREATE TABLE Supplier2(  
    Name VARCHAR(100),  
    Address VARCHAR(100),  
    PhoneNumber VARCHAR(100) NOT NULL,  
    PRIMARY KEY (Name, Address))
```

```
CREATE TABLE Supplier1(  
    SupplierID INT,  
    Name VARCHAR(100) NOT NULL,  
    Address VARCHAR(100) NOT NULL,  
    PRIMARY KEY (SupplierID),  
    FOREIGN KEY (Name, Address)  
        REFERENCES Supplier2(Name, Address))
```

```
CREATE TABLE Contains(  
    DeliveryID INT,  
    MaterialID INT,  
    PRIMARY KEY(DeliveryID, MaterialID),
```


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```
"
    FOREIGN KEY (DeliveryID)
        REFERENCES DeliveryRequest1(DeliveryID),
    FOREIGN KEY (MaterialID)
        REFERENCES Material(MaterialID))

CREATE TABLE Material(
    MaterialID INT,
    Name VARCHAR(100) UNIQUE NOT NULL,
    PRIMARY KEY (MaterialID))

CREATE TABLE Soil(
    MaterialID INT,
    Coverage INT,
    Composition VARCHAR(100),
    PRIMARY KEY (MaterialID),
    FOREIGN KEY (MaterialID)
        REFERENCES Material(MaterialID))

CREATE TABLE Seed(
    MaterialID INT,
    Species VARCHAR(100),
    PRIMARY KEY (MaterialID),
    FOREIGN KEY (MaterialID)
        REFERENCES Material(MaterialID))

CREATE TABLE Tool(
    MaterialID INT,
    Function VARCHAR(100),
    PRIMARY KEY (MaterialID),
    FOREIGN KEY (MaterialID)
        REFERENCES Material(MaterialID))

CREATE TABLE Plot(
    GardenID INT,
    PlotNumber INT,
    Size INT,
    Status VARCHAR(100),
    PRIMARY KEY (GardenID, PlotNumber),
    FOREIGN KEY (GardenID)
        REFERENCES CommunityGarden1(GardenID)
        ON DELETE CASCADE))
```

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"

```
CREATE TABLE UsedIn(  
    GardenID INT,  
    PlotNumber INT,  
    MaterialID INT,  
    Quantity INT,  
    PRIMARY KEY (GardenID, MaterialID, PlotNumber),  
    FOREIGN KEY (GardenID)  
        REFERENCES CommunityGarden1(GardenID),  
    FOREIGN KEY (MaterialID)  
        REFERENCES Material(MaterialID),  
    FOREIGN KEY (PlotNumber)  
        REFERENCES Plot(PlotNumber))
```

```
CREATE TABLE Plant(  
    PlantID INT,  
    Species VARCHAR(100) NOT NULL UNIQUE,  
    DailySunRequirements INT,  
    MonthlyWaterRequirements INT,  
    PRIMARY KEY (PlantID))
```

```
CREATE TABLE GrowsIn(  
    PlantID INT,  
    GardenID INT,  
    PlotNumber INT,  
    Quantity INT NOT NULL,  
    PRIMARY KEY (PlantID, GardenID, PlotNumber),  
    FOREIGN KEY (PlantID)  
        REFERENCES Plant(PlantID),  
    FOREIGN KEY (GardenID)  
        REFERENCES CommunityGarden2(GardenID),  
    FOREIGN KEY (PlotNumber)  
        REFERENCES Plot(PlotNumber))
```

```
CREATE TABLE Gardener2(  
    Name VARCHAR(100),  
    Address VARCHAR(100),  
    PhoneNumber VARCHAR(100) NOT NULL,  
    PRIMARY KEY(Name, Address))
```

```
CREATE TABLE Gardener1(  
    GardenerID INT,  
    Name VARCHAR(100) NOT NULL,  
    Address VARCHAR(100) NOT NULL,
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```

PRIMARY KEY(GardenerID),
FOREIGN KEYS (Name, Address)
REFERENCES Gardener2(Name, Address))

CREATE TABLE TendsTo(
    GardenerID VARCHAR(100),
    GardenID VARCHAR(100),
    PlotNumber VARCHAR(100),
    PRIMARY KEY(GardenerID, GardenID, PlotNumber),
    FOREIGN KEY (GardenerID)
        REFERENCES Gardener1(GardenerID),
    FOREIGN KEY (GardenID)
        REFERENCES CommunityGarden1(GardenID),
    FOREIGN KEY (PlotNumber)
        REFERENCES Plot(PlotNumber))

CREATE TABLE MemberOf(
    GardenerID INT,
    GardenID INT,
    Since DATE,
    PRIMARY KEY (GardenerID, GardenID),
    FOREIGN KEY (GardenerID)
        REFERENCES Gardener1(GardenerID),
    FOREIGN KEY (GardenID)
        REFERENCES CommunityGarden1(GardenID))

CREATE TABLE Event2(
    MaxCapacity INT,
    Registered INT,
    SpaceAvailable INT NOT NULL,
    PRIMARY KEY(MaxCapacity, Registered))

CREATE TABLE Event1(
    EventID INT),
    Name VARCHAR(100),
    Type VARCHAR(100),
    Date DATE,
    MaxCapacity INT NOT NULL,
    Registered INT NOT NULL,
    GardenID INT NOT NULL,
    PRIMARY KEY(EventID),
    FOREIGN KEY (MaxCapacity, Registered)
        REFERENCES Event2(MaxCapacity, Registered),
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```
"
    FOREIGN KEY (GardenID)
        REFERENCES CommunityGarden1(GardenID)
        ON DELETE CASCADE))

CREATE TABLE Attends(
    EventID INT,
    GardenerID INT,
    PRIMARY KEY (EventID, GardenerID),
    FOREIGN KEY (EventID)
        REFERENCES Event1(EventID),
    FOREIGN KEY (GardenerID)
        REFERENCES Gardener1(GardenerID))

CREATE TABLE Task(
    TaskID INT,
    DateAssigned DATE NOT NULL,
    DateCompleted DATE,
    Status VARCHAR(100) NOT NULL,
    PRIMARY KEY (TaskID))

CREATE TABLE Water(
    TaskID VARCHAR(100),
    Duration INT,
    PRIMARY KEY (TaskID),
    FOREIGN KEY (TaskID)
        REFERENCES Task(TaskID))

CREATE TABLE Weed(
    TaskID VARCHAR(100),
    Method VARCHAR(100),
    PRIMARY KEY (TaskID),
    FOREIGN KEY (TaskID)
        REFERENCES Task(TaskID))

CREATE TABLE Sow(
    TaskID INT,
    Species VARCHAR(100),
    Season VARCHAR(100),
    PRIMARY KEY (TaskID),
    FOREIGN KEY (TaskID)
        REFERENCES Task(TaskID))
```

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```
CREATE TABLE Harvest(  
    TaskID INT,  
    Species VARCHAR(100),  
    Season VARCHAR(100),  
    PRIMARY KEY (TaskID),  
    FOREIGN KEY (TaskID)  
        REFERENCES Task(TaskID))
```

```
CREATE TABLE Performs(  
    GardenerID VARCHAR(100),  
    TaskID INT,  
    PRIMARY KEY(GardenerID, TaskID),  
    FOREIGN KEY (GardenerID)  
        REFERENCES Gardener1(GardenerID),  
    FOREIGN KEY (TaskID)  
        REFERENCES Task(TaskID))
```

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8. INSERT Statements

CommunityGarden2

```
INSERT INTO CommunityGarden2 (TotalPlots, OccupiedPlots, AvailablePlots)
VALUES (19, 6, 13);
```

```
INSERT INTO CommunityGarden2 (TotalPlots, OccupiedPlots, AvailablePlots)
VALUES (17, 4, 13);
```

```
INSERT INTO CommunityGarden2 (TotalPlots, OccupiedPlots, AvailablePlots)
VALUES (21, 1, 20);
```

```
INSERT INTO CommunityGarden2 (TotalPlots, OccupiedPlots, AvailablePlots)
VALUES (28, 0, 28);
```

```
INSERT INTO CommunityGarden2 (TotalPlots, OccupiedPlots, AvailablePlots)
VALUES (54, 10, 44);
```

CommunityGarden1

```
INSERT INTO CommunityGarden1 (GardenId, Name, Address, TotalPlots, OccupiedPlots,
DailySunExposure, MonthlyPrecipitation)
VALUES (101, 'East boulevard allotment plots', '11879 Gilmore Crescent, Vancouver', 19, 6, 5,
50);
```

```
INSERT INTO CommunityGarden1 (GardenId, Name, Address, TotalPlots, OccupiedPlots,
DailySunExposure, MonthlyPrecipitation)
VALUES (102, 'Copley Community Orchards', '14173 68 Avenue, Vancouver', 17, 4, 5, 60);
```

```
INSERT INTO CommunityGarden1 (GardenId, Name, Address, TotalPlots, OccupiedPlots,
DailySunExposure, MonthlyPrecipitation)
VALUES (103, 'John McBride Community Garden', '7324 55 Avenue, Vancouver', 21, 1, 3, 60);
```

```
INSERT INTO CommunityGarden1 (GardenId, Name, Address, TotalPlots, OccupiedPlots,
DailySunExposure, MonthlyPrecipitation)
VALUES (104, 'Maple Community Garden', '87911 Kings Boulevard, Vancouver', 28, 0, 8, 45);
```

```
INSERT INTO CommunityGarden1 (GardenId, Name, Address, TotalPlots, OccupiedPlots,
DailySunExposure, MonthlyPrecipitation)
VALUES (105, 'Ladybug Garden', '45 Steam Clock Street, Vancouver', 54, 10, 4, 25);
```

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Organization2

INSERT INTO Organization2 (Name, Address, PhoneNumber)

VALUES ('Vancouver Park Board', '2099 Beach Avenue, Vancouver', '+1 111 111 111');

INSERT INTO Organization2 (Name, Address, PhoneNumber)

VALUES ('Compley Park Board', '13 Queens Street, Beach Avenue, Vancouver', '+1 222 222 2222');

INSERT INTO Organization2 (Name, Address, PhoneNumber)

VALUES ('McBride Park Board', '45 Marine Drive, Vancouver', '+1 333 333 3333');

INSERT INTO Organization2 (Name, Address, PhoneNumber)

VALUES ('Maple Park Board', '453 Cambie Street, Vancouver', '+1 444 444 4444');

INSERT INTO Organization2 (Name, Address, PhoneNumber)

VALUES ('LadyBug Park Board', '150 Rosewat Street, Vancouver', '+1 555 555 5555');

Organization1

INSERT INTO Organization1 (OrganizationID, Name, GardenID, Address, Budget)

VALUES (5001, 'Vancouver Park Board', 101, '2099, Beach Avenue, Vancouver', 100);

INSERT INTO Organization1 (OrganizationID, Name, GardenID, Address, Budget)

VALUES (5002, 'Compley Park Board', 102, '13 queens street, Beach Avenue, Vancouver', 100);

INSERT INTO Organization1 (OrganizationID, Name, GardenID, Address, Budget)

VALUES (5003, 'McBride Park Board', 103, '45 marine drive, Vancouver', 50);

INSERT INTO Organization1 (OrganizationID, Name, GardenID, Address, Budget)

VALUES (5004, 'Maple Park Board', 104, '453 cambie Street, Vancouver', 30);

INSERT INTO Organization1 (OrganizationID, Name, GardenID, Address, Budget)

VALUES (5005, 'LadyBug Park Board', 105, '150 Rosewat Street, Vancouver', 34);

DeliveryRequest2

INSERT INTO DeliveryRequest2 (TotalCost, Quantity, AvgCostPerUnit)

VALUES (121.50, 3, 40.50);

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```
"  
INSERT INTO DeliveryRequest2 (TotalCost, Quantity, AvgCostPerUnit)  
VALUES (151.25, 5, 30.25);
```

```
INSERT INTO DeliveryRequest2 (TotalCost, Quantity, AvgCostPerUnit)  
VALUES (28.00, 7, 4.00);
```

```
INSERT INTO DeliveryRequest2 (TotalCost, Quantity, AvgCostPerUnit)  
VALUES (57.00, 2, 23.50);
```

```
INSERT INTO DeliveryRequest2 (TotalCost, Quantity, AvgCostPerUnit)  
VALUES (200.00, 10, 20.00);
```

DeliveryRequest1

```
INSERT INTO DeliveryRequest1(DeliveryID, Status, AvgCostPerUnit, Quantity, OrganizationID,  
SupplierID, DateCreated, DateFulfilled)  
VALUES (4567, 'Fulfilled', 40.50, 3, 5001, 21, '2023-06-12', '2023-06-22');
```

```
INSERT INTO DeliveryRequest1 (DeliveryID, Status, AvgCostPerUnit, Quantity, OrganizationID,  
SupplierID, DateCreated, DateFulfilled)  
VALUES (6432, 'in process', 30.25, 5, 5001, 21, '2023-02-16', NULL);
```

```
INSERT INTO DeliveryRequest1 (DeliveryID, Status, AvgCostPerUnit, Quantity, OrganizationID,  
SupplierID, DateCreated, DateFulfilled)  
VALUES (9072, 'delayed', 4.00, 7, 5003, 22, '2023-08-19', NULL);
```

```
INSERT INTO DeliveryRequest1 (DeliveryID, Status, AvgCostPerUnit, Quantity, OrganizationID,  
SupplierID, DateCreated, DateFulfilled)  
VALUES (8975, 'in process', 23.50, 2, 5004, 23, '2023-02-23', NULL);
```

```
INSERT INTO DeliveryRequest1 (DeliveryID, Status, AvgCostPerUnit, Quantity, OrganizationID,  
SupplierID, DateCreated, DateFulfilled)  
VALUES (3526, 'fulfilled', 20.00, 10, 5005, 24, '2023-07-22', '2023-08-20');
```

Supplier2

```
INSERT INTO Supplier2 (Name, Address, PhoneNumber)  
VALUES ( 'Home Depot', '120 Burnaby', '675 483 6633');
```

```
INSERT INTO Supplier2 (Name, Address, PhoneNumber)  
VALUES ( 'JYSK', '122 Delta', '345 341 8888');
```


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"

```
INSERT INTO Supplier2 (Name, Address, PhoneNumber)
VALUES ( 'Walmart', '56 Surrey', '783 783 9999');
```

```
INSERT INTO Supplier2 (Name, Address, PhoneNumber)
VALUES ( 'Costco', '78 Richmond', '232 783 7777');
```

```
INSERT INTO Supplier2 (Name, Address, PhoneNumber)
VALUES ( 'Staples', '12 Coquitlam', '344 532 444');
```

Supplier1

```
INSERT INTO Supplier1 (SupplierID, Name, Address)
VALUES (21, 'Home Depot', '120 Burnaby,');
```

```
INSERT INTO Supplier1 (SupplierID, Name, Address)
VALUES (22, 'JYSK', '122 Delta');
```

```
INSERT INTO Supplier1 (SupplierID, Name, Address)
VALUES (23, 'Walmart', '56 Surrey');
```

```
INSERT INTO Supplier1 (SupplierID, Name, Address)
VALUES (24, 'Costco', '78 Richmond');
```

```
INSERT INTO Supplier1 (SupplierID, Name, Address)
VALUES (25, 'Staples', '12 Coquitlam');
```

Contains

```
INSERT INTO Contains (DeliveryID, MaterialID)
VALUES (4567, 1001);
```

```
INSERT INTO Contains (DeliveryID, MaterialID)
VALUES (6432, 1002);
```

```
INSERT INTO Contains (DeliveryID, MaterialID)
VALUES (9072, 1003);
```

```
INSERT INTO Contains (DeliveryID, MaterialID)
VALUES (8975, 1004);
```

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"

```
INSERT INTO Contains (DeliveryID, MaterialID)
VALUES (3526, 1005);
```

Material

```
INSERT INTO Material (MaterialID, Name)
VALUES (1001, 'Soil and Mulch');
```

```
INSERT INTO Material (MaterialID, Name)
VALUES (1002, 'Soil and Mulch');
```

```
INSERT INTO Material (MaterialID, Name)
VALUES (1003, 'Seeds');
```

```
INSERT INTO Material (MaterialID, Name)
VALUES (1004, 'Trowel');
```

```
INSERT INTO Material (MaterialID, Name)
VALUES (1005, 'Shovel');
```

Soil

```
INSERT INTO Soil (MaterialID, Coverage, Composition)
VALUES (1001, 'organic mulch', 'loamy soil');
```

```
INSERT INTO Soil (MaterialID, Coverage, Composition)
VALUES (1002, 'bark chips', 'sandy soil');
```

Seed

```
INSERT INTO Seed (MaterialID, Species)
VALUES (1003, 'lettuce');
```

Tool

```
INSERT INTO Tool (MaterialID, Function)
VALUES (1004, 'planting');
```

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"

```
INSERT INTO Tool (MaterialID, Function)
VALUES (1005, 'digging');
```

Plot

```
INSERT INTO Plot (PlotNumber, GardenID, Size, Status)
VALUES (1, 101, 100, 'occupied');
```

```
INSERT INTO Plot (PlotNumber, GardenID, Size, Status)
VALUES (2, 101, 250, 'occupied');
```

```
INSERT INTO Plot (PlotNumber, GardenID, Size, Status)
VALUES (3, 101, 100, 'available');
```

```
INSERT INTO Plot (PlotNumber, GardenID, Size, Status)
VALUES (1, 104, 50, 'available');
```

```
INSERT INTO Plot (PlotNumber, GardenID, Size, Status)
VALUES (1, 105, 300, 'occupied');
```

UsedIn

```
INSERT INTO UsedIn (GardenID, PlotNumber, MaterialID, Quantity)
VALUES (101, 1, 1001, 5);
```

```
INSERT INTO UsedIn (GardenID, PlotNumber, MaterialID, Quantity)
VALUES (101, 1, 1002, 4);
```

```
INSERT INTO UsedIn (GardenID, PlotNumber, MaterialID, Quantity)
VALUES (101, 1, 1003, 4);
```

```
INSERT INTO UsedIn (GardenID, PlotNumber, MaterialID, Quantity)
VALUES (104, 2, 1004, 3);
```

```
INSERT INTO UsedIn (GardenID, PlotNumber, MaterialID, Quantity)
VALUES (104, 5, 1004, 2);
```

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"

Plant

```
INSERT INTO Plant (PlantID, Species, MonthlyWaterRequirements, DailySunRequirements)
VALUES (101, 'rose', 250, 4);
```

```
INSERT INTO Plant (PlantID, Species, MonthlyWaterRequirements, DailySunRequirements)
VALUES (102, 'cactus', 300, 5);
```

```
INSERT INTO Plant (PlantID, Species, MonthlyWaterRequirements, DailySunRequirements)
VALUES (103, 'cactus', 500, 3);
```

```
INSERT INTO Plant (PlantID, Species, MonthlyWaterRequirements, DailySunRequirements)
VALUES (104, 'lily', 200, 7);
```

```
INSERT INTO Plant (PlantID, Species, MonthlyWaterRequirements, DailySunRequirements)
VALUES (105, 'succulent', 350, 1);
```

GrowsIn

```
INSERT INTO GrowsIn (PlantID, PlotNumber, GardenName, Quantity)
VALUES (101, 1, 101, 60);
```

```
INSERT INTO GrowsIn (PlantID, PlotNumber, GardenName, Quantity)
VALUES (102, 1, 101, 44);
```

```
INSERT INTO GrowsIn (PlantID, PlotNumber, GardenName, Quantity)
VALUES (105, 1, 104, 81);
```

```
INSERT INTO GrowsIn (PlantID, PlotNumber, GardenName, Quantity)
VALUES (104, 2, 104, 18);
```

```
INSERT INTO GrowsIn (PlantID, PlotNumber, GardenName, Quantity)
VALUES (104, 3, 105, 18);
```

Gardener2

```
INSERT INTO Gardener2 (Name, Address, PhoneNumber)
VALUES ('Malkeet S', '123 2nd street, Vancouver', '+1 456 345 8755');
```

```
INSERT INTO Gardener2 (Name, Address, PhoneNumber)
VALUES ('Justin B', '345 4th street, Vancouver', '+1 235 896 5292');
```

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"

```
INSERT INTO Gardener2 (Name, Address, PhoneNumber)
VALUES ('Emilyn S', '786 8th street, Vancouver', '+1 756 456 0978');
```

```
INSERT INTO Gardener2 (Name, Address, PhoneNumber)
VALUES ('Gregor Burger', '707 3rd street, Vancouver', '+1 897 563 6734');
```

```
INSERT INTO Gardener2 (Name, Address, PhoneNumber)
VALUES ('Gregor Burger', '503 7th street, Vancouver', '+1 604 287 2787');
```

Gardener1

```
INSERT INTO Gardener1 (GardenerID, Name, Role, Address, PhoneNumber)
VALUES (7, 'Malkeet S', '123 2nd street, Vancouver');
```

```
INSERT INTO Gardener1 (GardenerID, Name, Role, Address, PhoneNumber)
VALUES (8, 'Justin B', '345 4th street, Vancouver');
```

```
INSERT INTO Gardener1 (GardenerID, Name, Role, Address, PhoneNumber)
VALUES (9, 'Emilyn S', '786 8th street, Vancouver');
```

```
INSERT INTO Gardener1 (GardenerID, Name, Role, Address, PhoneNumber)
VALUES (10, 'Gregor Burger', '707 3rd street, Vancouver');
```

```
INSERT INTO Gardener1 (GardenerID, Name, Role, Address, PhoneNumber)
VALUES (11, 'Gregor Burger', '503 7th street, Vancouver');
```

TendsTo

```
INSERT INTO TendsTo (PlotNumber, GardenID, GardenerID)
VALUES (1, 100, 7);
```

```
INSERT INTO TendsTo (PlotNumber, GardenID, GardenerID)
VALUES (1, 100, 8);
```

```
INSERT INTO TendsTo (PlotNumber, GardenID, GardenerID)
VALUES (2, 104, 9);
```

```
INSERT INTO TendsTo (PlotNumber, GardenID, GardenerID)
VALUES (2, 105, 9);
```

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"

```
INSERT INTO TendsTo (PlotNumber, GardenID, GardenerID)
VALUES (3, 105, 9);
```

MemberOf

```
INSERT INTO MemberOf (GardenID, GardenerId, Since)
VALUES (101, 7, '2020-01-23');
```

```
INSERT INTO MemberOf (GardenID, GardenerId, Since)
VALUES (101, 8, '2017-01-22');
```

```
INSERT INTO MemberOf (GardenID, GardenerId, Since)
VALUES (101, 9, '2020-01-23');
```

```
INSERT INTO MemberOf (GardenID, GardenerId, Since)
VALUES (104, 7, '2016-05-16');
```

```
INSERT INTO MemberOf (GardenID, GardenerId, Since)
VALUES (105, 7, '2014-05-27');
```

Event2

```
INSERT INTO Event2 (MaxCapacity, Registered, SpaceAvailable)
VALUES (40, 35, 5);
```

```
INSERT INTO Event2 (MaxCapacity, Registered, SpaceAvailable)
VALUES (30, 15, 15);
```

```
INSERT INTO Event2 (MaxCapacity, Registered, SpaceAvailable)
VALUES (40, 32, 8);
```

```
INSERT INTO Event2 (MaxCapacity, Registered, SpaceAvailable)
VALUES (15, 5, 10);
```

```
INSERT INTO Event2 (MaxCapacity, Registered, SpaceAvailable)
VALUES (50, 47, 3);
```

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"

Event1

```
INSERT INTO Event1 (EventID, Name, GardenID, Type, MaxCapacity, Registered, Date)
VALUES (1001, 'Spring garden festival', 101, 'festival', 40, 35, '2023-01-11');
```

```
INSERT INTO Event1 (EventID, Name, GardenID, Type, MaxCapacity, Registered, Date)
VALUES (1002, 'Yoga in garden', 101, 'fitness', 30, 15, '2022-03-23');
```

```
INSERT INTO Event1 (EventID, Name, GardenID, Type, MaxCapacity, Registered, Date)
VALUES (1003, 'Gardening for beginners', 103, 'educational', 40, 32, '1986-05-17');
```

```
INSERT INTO Event1 (EventID, Name, GardenID, Type, MaxCapacity, Registered, Date)
VALUES (1004, 'Gardening workshop', 104, 'educational', 15, 5, '1986-05-17');
```

```
INSERT INTO Event1 (EventID, Name, GardenID, Type, MaxCapacity, Registered, Date)
VALUES (1005, 'Garden tour', 105, 'tour', 50, 47, '1988-01-27');
```

Attends

```
INSERT INTO Attends (EventID, GardenerID)
VALUES (1001, 7);
```

```
INSERT INTO Attends (EventID, GardenerID)
VALUES (1002, 7);
```

```
INSERT INTO Attends (EventID, GardenerID)
VALUES (1002, 8);
```

```
INSERT INTO Attends (EventID, GardenerID)
VALUES (1003, 9);
```

```
INSERT INTO Attends (EventID, GardenerID)
VALUES (1004, 10);
```

Task

```
INSERT INTO Task (TaskID, DateAssigned, DateCompleted, Status)
VALUES (1, '2023-01-20', '2023-01-22', 'completed');
```

```
INSERT INTO Task (TaskID, DateAssigned, DateCompleted, Status)
VALUES (1, '2023-01-20', '2023-01-22', 'completed');
```

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"

```
INSERT INTO Task (TaskID, DateAssigned, DateCompleted, Status)
VALUES (3, '2023-03-22', NULL, 'ongoing');
```

```
INSERT INTO Task (TaskID, DateAssigned, DateCompleted, Status)
VALUES (4, '2023-04-23', '2023-05-21', 'completed');
```

```
INSERT INTO Task (TaskID, DateAssigned, DateCompleted, Status)
VALUES (5, '2023-05-24', NULL, 'ongoing');
```

Water

```
INSERT INTO Water (TaskID, Duration)
VALUES (1, 3);
```

```
INSERT INTO Water (TaskID, Duration)
VALUES (2, 4);
```

Weed

```
INSERT INTO Weed (TaskID, Method)
VALUES (3, 'Chemical');
```

Sow

```
INSERT INTO Sow (TaskID, Species, Season)
VALUES (4, 'lettuce', 'spring');
```

Harvest

```
INSERT INTO Harvest (TaskID, Species, Season)
VALUES (5, 'broccoli', 'fall');
```

Performs

```
INSERT INTO Performs (GardenerID, TaskID)
VALUES (7, 1);
```


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"

```
INSERT INTO Performs (GardenerID, TaskID)  
VALUES (7, 2);
```

```
INSERT INTO Performs (GardenerID, TaskID)  
VALUES (8, 2);
```

```
INSERT INTO Performs (GardenerID, TaskID)  
VALUES (8, 1);
```

```
INSERT INTO Performs (GardenerID, TaskID)  
VALUES (9, 3);
```