SENECA COLLEGE OF APPLIED ARTS AND TECHNOLOGY

School of Software Design & Data Science

Introduction to Database Systems

DBS211

Group Project

Milestone 2 – Database Design (5%)

Farming Database

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Database function summary

The function of the designed database focuses on understanding the environmental parameters linked to performance declines and, consequently, to the profits generated by farmers. This tool can be used by individual farmers as well as farmer associations to discern trends and patterns.

Previously, in the database proposal, the inclusion of livestock farmers, as well as machinery and equipment, was considered. However, because this would entail adding a series of tables unrelated to the main function of the database, it was decided to remove them so that the database can operate more harmoniously and cohesively.
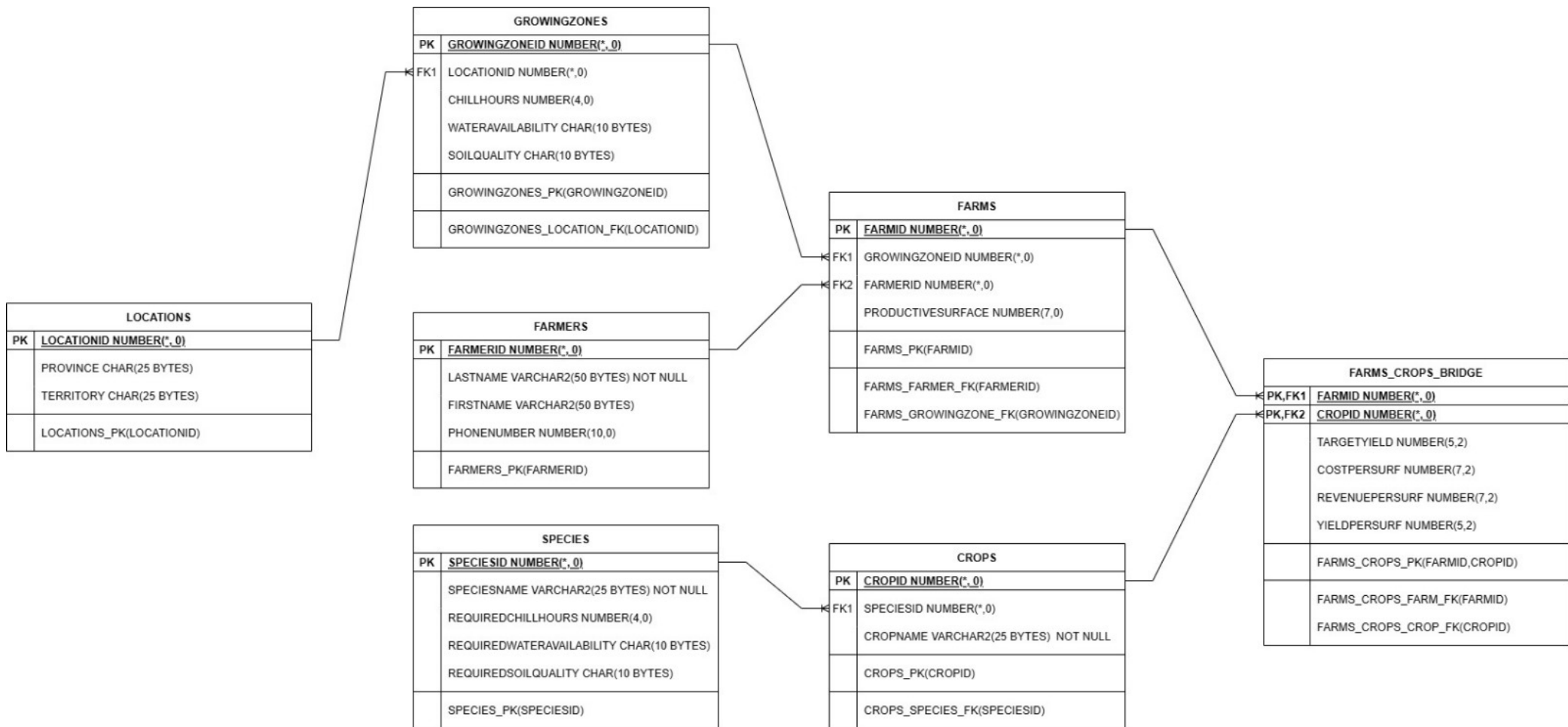
Entity-Relationship Diagram

GROWINGZONES

PK	GROWINGZONEID NUMBER(*, 0)
FK1	LOCATIONID NUMBER(*,0)
	CHILLHOURS NUMBER(4,0)
	WATERAVAILABILITY CHAR(10 BYTES)
	SOILQUALITY CHAR(10 BYTES)
	GROWINGZONES_PK(GROWINGZONEID)
	GROWINGZONES_LOCATION_FK(LOCATIONID)

LOCATIONS

PK	LOCATIONID NUMBER(*, 0)
	PROVINCE CHAR(25 BYTES)
	TERRITORY CHAR(25 BYTES)
	LOCATIONS_PK(LOCATIONID)

FARMERS

PK	FARMERID NUMBER(*, 0)
	LASTNAME VARCHAR2(50 BYTES) NOT NULL
	FIRSTNAME VARCHAR2(50 BYTES)
	PHONENUMBER NUMBER(10,0)
	FARMERS_PK(FARMERID)

FARMS

PK	FARMID NUMBER(*, 0)
FK1	GROWINGZONEID NUMBER(*,0)
FK2	FARMERID NUMBER(*,0)
	PRODUCTIVESURFACE NUMBER(7,0)
	FARMS_PK(FARMID)
	FARMS_FARMER_FK(FARMERID)
	FARMS_GROWINGZONE_FK(GROWINGZONEID)

SPECIES

PK	SPECIESID NUMBER(*, 0)
	SPECIESNAME VARCHAR2(25 BYTES) NOT NULL
	REQUIREDCHILLHOURS NUMBER(4,0)
	REQUIREDWATERAVAILABILITY CHAR(10 BYTES)
	REQUIREDSOILQUALITY CHAR(10 BYTES)
	SPECIES_PK(SPECIESID)

CROPS

PK	CROPID NUMBER(*, 0)
FK1	SPECIESID NUMBER(*,0)
	CROPNAME VARCHAR2(25 BYTES) NOT NULL
	CROPS_PK(CROPID)
	CROPS_SPECIES_FK(SPECIESID)

FARMS_CROPS_BRIDGE

PK,FK1	FARMID NUMBER(*, 0)
PK,FK2	CROPID NUMBER(*, 0)
	TARGETYIELD NUMBER(5,2)
	COSTPERSURF NUMBER(7,2)
	REVENUEPERSURF NUMBER(7,2)
	YIELDPERSURF NUMBER(5,2)
	FARMS_CROPS_PK(FARMID,CROPID)
	FARMS_CROPS_FARM_FK(FARMID)
	FARMS_CROPS_CROP_FK(CROPID)

TABLE: **Location**

Column	Data Type	Size, Precision	Default	PK/FK	Required	Range	Sample Data	Notes
locationID	NUMBER	38		PK	Y	$1-(10^{39}-1)$	1234	
ProvinceORTerritory	CHAR	25					'Ontario'	Province or territory where farms can be
DistrictORCity	CHAR	25					'Toronto'	District or city where farms can be

TABLE: **growingZone**

Column	Data Type	Size, Precision	Default	PK/FK	Required	Range	Sample Data	Notes
growingZoneID	NUMBER	38		PK	Y	$1-(10^{39}-1)$	1234	
locationID	NUMBER	38		FK	Y	$1-(10^{39}-1)$	1234	
chillHours	NUMBER	4,0				1-9999	1250	Number of chill hrs available at a growing zone
waterAvailability	CHAR	10					'low'	Availability is indicated as 'low', 'moderate', or 'high'.
soilQuality	CHAR	10					'low'	Quality is indicated as 'low', 'mid', or 'high'

TABLE: **Farmer**

Column	Data Type	Size, Precision	Default	PK/FK	Required	Range	Sample Data	Notes
farmerID	NUMBER	38		PK	Y	$1-(10^{39}-1)$	1234	
lastName	VARCHAR2	50			Y		'Bob'	
firstName	VARCHAR2	50					'Brown'	
phoneNumber	NUMBER	10				1000000000-9999999999	9055551212	

TABLE: **Species**

Column	Data Type	Size, Precision	Default	PK/FK	Required	Range	Sample Data	Notes
speciesID	NUMBER	38		PK	Y	1-(10^{39}-1)	1234	
speciesName	VARCHAR2	25			Y		'Sorghum bicolor'	
requiredChillHours	NUMBER	4,0				1-9999	1250	Required number of chill hours for a species of crop
requiredWaterAvailability	CHAR	10					'low'	Availability for the crop is indicated as 'low', 'moderate', or 'high'.
requiredSoilQuality	CHAR	10					'low'	Quality for the crop is indicated as 'low', 'mid', or 'high'

TABLE: **Farm**

Column	Data Type	Size, Precision	Default	PK/FK	Required	Range	Sample Data	Notes
farmID	NUMBER	38		PK	Y	1-(10^{39}-1)	1234	
growingZoneID	NUMBER	38		FK	Y	1-(10^{39}-1)	1234	
farmerID	NUMBER	38		FK	Y	1-(10^{39}-1)	1234	
ProductiveSurface	NUMBER	7				1-9999999	1234	The productive surface of the farm in m^2 where crops can be grown

TABLE: **Crop**

Column	Data Type	Size, Precision	Default	PK/FK	Required	Range	Sample Data	Notes
cropID	NUMBER	38		PK	Y	1-(10^{39}-1)	1234	
speciesID	NUMBER	38		FK	Y	1-(10^{39}-1)	1234	
cropName	VARCHAR2	25			Y		'Millet'	

TABLE: **Farm_Crop_Bridge**

Column	Data Type	Size, Precision	Default	PK/FK	Required	Range	Sample Data	Notes
farmID	NUMBER	38		PK, FK	Y	1-(10^{39}-1)	1234	
cropID	NUMBER	38		PK, FK	Y	1-(10^{39}-1)	1234	
targetYield	NUMBER	5,2				1-999.99	25.50	The target yield for a particular crop at a particular farm in tonnes
costPerSurf	NUMBER	7,2				1-99999.99	10500.25	The cost in $ of sowing a particular crop at a particular farm in a 'surf'(session)
revenuePerSurf	NUMBER	7,2				1-99999.99	10500.25	The revenue in $ from harvesting a particular crop at a particular farm in a 'surf'(session)
yieldPerSurf	NUMBER	5,2				1-999.99	25.50	The yield in tonnes for a particular crop at a particular farm in a 'surf'(session)

Business Rules-Relationships:

• One-to-Many Relationship between Location and GrowingZone

The Location table has a one-to-many relationship with the GrowingZone table. This means that, one location can have many GrowingZones, but each GrowingZone can only be in one assigned location.

The locationID number column in the GrowingZone table is a foreign key referencing the locationID number column in the Location table.

• One-to-Many Relationship between GrowingZone and Farm

The GrowingZone table has a one-to-many relationship with the Farm table. This means that, one growingZone can have many farms, but each farm can only belong to one GrowingZone.

The growingZoneID number column in the farm table is a foreign key referencing the growingZoneID number column in the GrowingZone table.

• One-to-Many Relationship between Farmer and Farm

The Farmer table has a one-to-many relationship with the Farm table. This means that, one Farmer can have many farms, but each farm can only belong to one farmer.

The farmerID number column in the farm table is a foreign key referencing the farmerID number column in the farmer table.

• Many-to-Many Relationship between Farm and Crop

The Farm table has a many-to-many relationship with the Crop table. This means that one farm can have many crops, and each crop can be cultivated in many farms.

• One-to-Many Relationship between Species and Crop

The Species table has a one-to-many relationship with the Crop table. This means that, one species can have many crops, but each crop can only belong to one species.

 The speciesID number column in the Crop table is a foreign key referencing the speciesID number column in the Species table.