Customers And Accounts:

1. For each entity:

* Customer(custID, firstName, lastName, prov, postalCode, street, city, phone, SIN)
* Account(acctNum, type, balance)

1. For each relationship:

* “has” N:M
* CustomerAccount(custID(fk), accNum(fk))
* Constraints:
  + CustomerAccount(custID(fk)) references Customer(custID)
  + CostomerAccount(acctNum(fk)) references Account(acctNum)

1. Final Schema

* Customer(custID, firstName, lastName, prov, postalCode, street, city, phone, SIN)
* Account(acctNum, type, balance)
* CustomerAccount(custID(fk), accNum(fk))
* Constraints:
  + CustomerAccount(custID(fk)) references Customer(custID)
  + CostomerAccount(acctNum(fk)) references Account(acctNum)

Farm

1. For each entity

* VacationFarm(farmName,annualBudget, yearlyAttendance)
* CareTaker(careTakerID, firstName, lastName, yearsWorkedAtFarm, farmName)
* Animal(whenArrived, farmName, age, weight, gender)
* Cow(whenArrived, farmName, barnLocation, barnTemperature, bodyDepth, muscularity)
* Horse(whenArrived, farmName, barnLocation, barnTemperature, trained, enduranceLevel)

\*NOTE: if you decided you did not like the PK in Animal, I will let you change it here BUT make sure you state WHY you are changing it.

1. For each relationship:

* “managed by”
  + CareTaker(careTakerID, firstName, lastName, yearsWorkedAtFarm, farmName(fk))
  + Constraints:
    - CareTaker(farmName(fk)) references VacationFarm(farmName)
* “owns”
  + Animal(whenArrived, farmName(fk), age, weight, gender)
  + Constraints:
    - Animal(farmName(fk)) references VacationFarm(farmName)
* “is a”
  + Cow(whenArrived(fk), farmName(fk), barnLocation, barnTemperature, bodyDepth, muscularity)
  + Constraints:
    - Cow(whenArrived, farmName(fk)) references Animal(whenArrived, farmName)
* “is a”
  + Horse(whenArrived(fk), farmName(fk), barnLocation, barnTemperature, trained, enduranceLevel)
  + Constraints:
    - Horse(whenArrived, farmName(fk)) references Animal(whenArrived, farmName)
* “takes care of”
  + CaresFor(CareTakerID(fk), whenArrived(fk), farmName(fk))
  + Constraints:
    - CaresFor(careTakerID(fk)) references CareTaker(careTakerID)
    - CaresFor(whenArrived, farmName (fk)) references Animal(whenArrived, farmName)

1. For each weak entity

CaresFor – has 2 fks/pks so is no longer a weak entity

Horse/Cow – are weak but they have a 1:1 relation and are directly tied to the Animal relation. So it is ok that the Animal PK is the horse/cow pk

farmName – there could be a discussion whether farmName is a good PK. The other attributes do not describe it uniquely – so there would have to be a business rule that states that the VacationFarm cannot have 2 farms with the same name OR could use a surrogate key.

1. Review and Consolidate

Animal would be better off with a surrogate key because whenArrived and farmName may not always be unique. Do not need whenArrived and farmName to be PK’s anymore.

* Animal(animalID, whenArrived, farmName, age, weight, gender)

Cow and horse both access the primary key from Animal – so update these relations

* Cow(animalID(fk), barnLocation, barnTemperature, bodyDepth, muscularity)
  + Constraints:
    - Cow(animalID(fk)) references Animal(animalID)
* Horse(animalID(fk), barnLocation, barnTemperature, trained, enduranceLevel)
  + Constraints:
    - Horse(animalID(fk)) references Animal(animalID)

Both Cow and Horse have a barnLocation, move to Animal

* Animal(animalID, whenArrived, farmName, age, weight, gender, barnLocation)
* Cow(animalID(fk), barnTemperature, bodyDepth, muscularity)
  + Constraints:
    - Cow(animalID(fk)) references Animal(animalID)
* Horse(animalID(fk), barnTemperature, trained, enduranceLevel)
  + Constraints:
    - Horse(animalID(fk)) references Animal(animalID)

barnTemperature/barnLocation – could discuss whether this is an attribute of a barn or an animal (could be the temperature the animal is at when they are in the barn and the location of the animal in the barn (stall 3)) – if so then move to the Animal relation. My assumption is that it is an attribute of an animal.

Animal(animalID, whenArrived, farmName, age, weight, gender, barnLocation, barnTemperature)

* Cow(animalID(fk), bodyDepth, muscularity)
  + Constraints:
    - Cow(animalID(fk)) references Animal(animalID)
* Horse(animalID(fk), trained, enduranceLevel)
  + Constraints:
    - Horse(animalID(fk)) references Animal(animalID)

If you assumed that barn temp it is an attribute of a barn, then you may need a new entity to handle the temp. and you may need to show which barn the animal is located in.

**Example:**

Barn(barnID, barnTemp, barnLocation)

Animal(Animal(animalID, whenArrived, farmName, age, weight, gender, barnID(fk))

\*Note, my final schema will not include the Barn entity as per my assumptions above but if you added it, your final schema needs it.

1. Final Schema:

* Animal(animalID, whenArrived, farmName, age, weight, gender, barnLocation, barnTemperature)
* Cow(animalID(fk), bodyDepth, muscularity)
  + Constraints:
    - Cow(animalID(fk)) references Animal(animalID)
* Horse(animalID(fk), trained, enduranceLevel)
  + Constraints:
    - Horse(animalID(fk)) references Animal(animalID)
* CaresFor(CareTakerID(fk), whenArrived(fk), farmName(fk))
  + Constraints:
    - CaresFor(careTakerID(fk)) references CareTaker(careTakerID)
    - CaresFor(whenArrived, farmName (fk)) references Animal(whenArrived, farmName)
* CareTaker(careTakerID, firstName, lastName, yearsWorkedAtFarm, farmName(fk))
  + Constraints:
    - CareTaker(farmName(fk)) references VacationFarm(farmName)
* VacationFarm(farmName,annualBudget, yearlyAttendance)