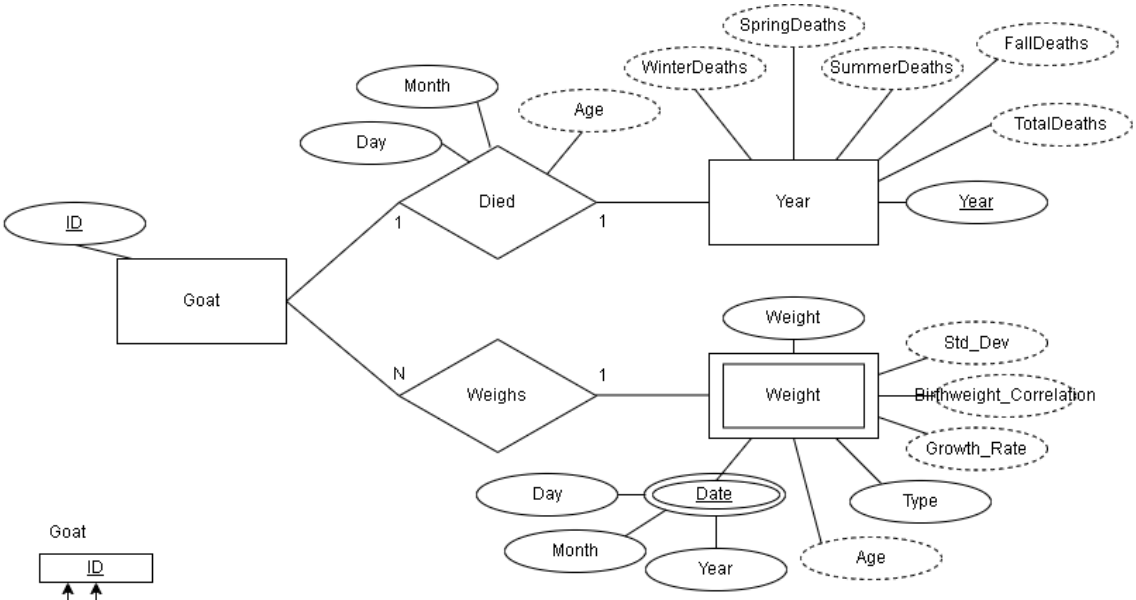
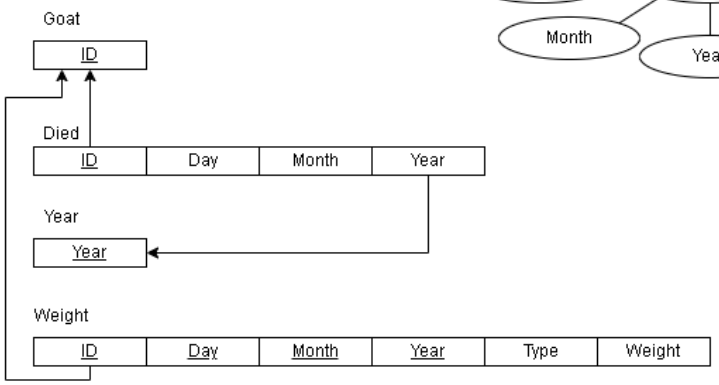
ER Diagram and Relational Schema





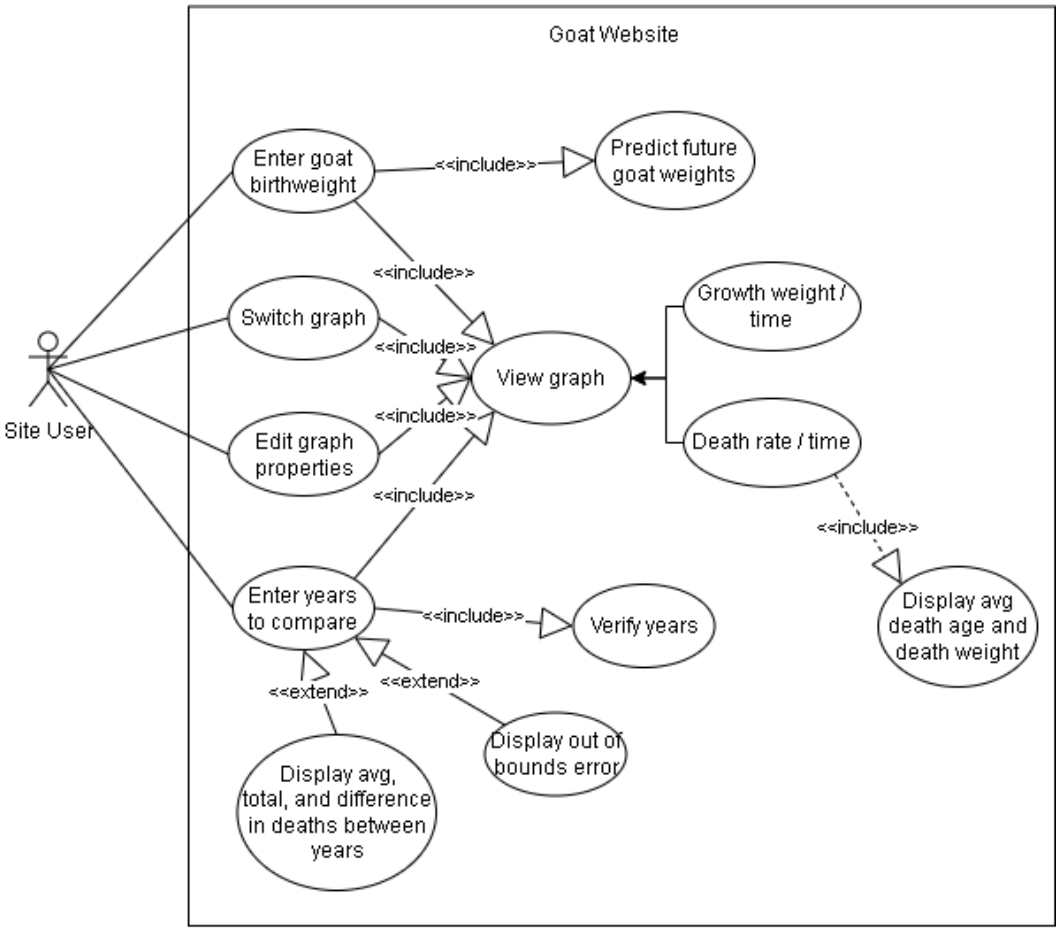
Estimated database size and types + average number of searches

Estimated Size: 8,382 (observations) * [4 (size of Died) * 0.25 (percentage of goats who died) + 6 (size of Weight) * 15 (avg number of times each goat is weighed)] = 754,380

Estimated Search Types: select, project, minus, avg, and count

Average number of searches per query: 20,955

UML Use Case Diagram



Textual Use Cases

1. Actor tells system to compare death rates between years
2. System asks actor to enter specific years
3. Actor enters years
4. System provides average, total, and difference in death rates between those years
5. Actor fine tunes specifications to a smaller time scale (seasons)
6. System edits calculations and provides more specific data

3.a. Actor enters invalid value for years

1. System informs user that years are out of range
2. Loop step 3 until entered years are valid

3. The use case continues at step 4

1. Actor tells system to predict future weight of goat
2. System prompts user to enter birth weight
3. Actor enters birth weight of goat
4. System estimates future weaning, winter, and sale weights
5. System produces graph of projected weights with visual comparison to average weight of every goat

Reasoning behind database design

We designed our database specifically so we can track each goat and see the year and season of its death. Our entities are goat, year, and weight which are all used to effectively determine how the death rate is affecting the goats.

For the entity goat we have one attribute which is ID, this attribute is used to differentiate the goats so we know how each one died and at what weight. Goat is connected to year through the relationship Died and Weight through the relationship Weighs. The relationship Died has the attributes Day, Month, and Age so we can determine the exact date of the goat's death and their age. The entity year had the attributes WinterDeaths, SpringDeaths, SummerDeaths, FallDeaths, TotalDeaths, and Year. These attributes help us keep track of what season each goat died in. This helps us to achieve the sustainability goals of our project because we will use this information to pinpoint when the goats die so Silvies can try to take preventative measures to stop these deaths. For example, if we observe that more deaths happen in the winter, Silves can try to find ways to help the more goats survive the winter.

For the other relationship, Weighs, it does not have any attributes, but Weight does. Weight has the attributes Weight, Std_Dev, Birthweight_Correlation, Type, Growth_Rate, Age, and Date. This entity helps us to find the correlation between the different weights of the goats to create a better understanding of each goat for Silvies. This also helps to achieve the sustainability goals of our project because it will help Silvies to better understand how certain weights lead to different outcomes. An example of this would be that if we notice that birth weight correlates with sale weight, Silvies can track which goats will most likely be sold and change their care system to better cater to that goat's weight.