

# Farmer Bronson Alcott's dairy farm

Introduction to Information Systems staff

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# 1 Introduction

Farmer Bronson Alcott has recently received an inheritance, which he wants to invest in his dairy farm “The Wayside”. The last years his farm has grown significantly and it’s not possible anymore to do the bookkeeping by hand, therefore Bronson wants you to design a database system that allows him to do administration of his livestock more efficiently. The project description that Bronson wrote follows in section 2.

## 1.1 Domain expert interaction

You can ask questions to the domain expert in the first week of the computer lab sessions, feel free to drop Farmer Alcott a line at [farmer.bronson.alcott@gmail.com](mailto:farmer.bronson.alcott@gmail.com) . During the christmas break an update of this document will be made available on Nestor, this update will include the questions and answers.

# 2 Project description

Howdy! You lot are good with computers, eh? I need you to make a program that records information about my cattle, and about their milk production. We produce a lot of milk here, we even have two rotary milking parlors, an advanced milking machine in which the cows stand on a big, slowly rotating disk while they’re being milked. This of course gives too much administration work for me and my stableboys, because each milking session must be registered.

But first on recording the cattle, of course you have two types: cows and bulls; we still have plenty of room, so all healthy cows that are born at “The Wayside” stay here and become dairy cattle. We only have room for 3 in the bullshed, so most bulls are sold to an Insemination Farm.

## 2.1 Cattle naming

All animals have a name that consists of two parts: a given name followed by a number. To trace the pedigree of cattle, it is customary to name newborn cows after their mother and newborn bulls after their father, with the suffix number being one larger than the largest number that is assigned to cattle with that given name. So if Jo-72 births a cow, the daughter would be named Jo-85.

## 2.2 Cow milking

Each cow is milked twice a day, preferably with 11 to 13 hours between these moments, but only if the cow has calved recently. After a period of 250 days the milk is of too poor a quality to sell, so then the cow should be marked that she can be inseminated again. Sadly, when the lactation period after the third calf is over, a cow is too weak and old to be of use at the farm, so she’s sold to the abattoir. You can’t use the milk of a sick cow either, nor is it allowed to pollute the milk with medicines, so every cow that receives medicine should not be milked in the milking parlor, but one of the employees should milk her once a day while she is in quarantine. To make sure the milk stays of high quality, a cow should not be milked in the milking parlor until she’s completely free of medicine, which is about 2 weeks after the last dose of medicine was given. Of course we want to administrate how much milk the farm produces and the quality of the milk, therefore the volume of each milking is measured. The machine also takes a sample of the milk and measures how much fat the milk contains. The machine displays the lipidity in percents,

Cow	Time & date	Volume (l)	Lipidity (g/dl)	Parlor nr.	Assistant
Jo-70	7:20, April 2, 2011	11.35	8.02	1	BA
Jo-71	7:30, April 2, 2011	10.77	7.79	1	BA
Meg-42	7:40, April 2, 2011	12.30	6.98	1	BA
Meg-30	7:20, April 2, 2011	10.50	8.50	2	WA
Jo-70	19:40, April 2, 2011	11.10	7.99	1	WA
Jo-71	19:40, April 2, 2011	10.88	7.80	2	BA
Meg-42	19:50, April 2, 2011	12.50	6.75	1	WA
Meg-30	19:50, April 2, 2011	10.23	8.60	2	BA
Jo-70	7:20, April 3, 2011	11.40	7.80	1	BA

Table 1: Information about milkings

it means ‘grams of fat per 100 milliliters’, but I also want to know how much grams there are in the extraction, to calculate the lipidity of the container as a whole. In the future it would be nice if we could redirect the cows that usually give fatter milk to the ‘fat parlor’ and the other cows to the ‘skimmed parlor so I can ask a higher price for the fat milk.

If anything goes wrong with the milking, I should be able to trace the employee that operated the milking parlor where, for example a sick cow was milked and the milk got in the tank, so I can ask him what went wrong and why. It is important to note that not all of my employees are able to operate the milking parlor, so only the employees with a certificate may perform a milking session.

Name	Salary (\$)	Job	Skills
Bronson Alcott	2400	Manager	MSc. Agricultural engineering, tractor license, milking parlor certificate
William Alcott	2200	General Executive	BSc. Agri. Engineering, milking parlor certificate
Abby May Alcott	1800	Secretary & cook	
Heinrich Pestalozzi	1800	Stableboy	tractor license
Lloyd Garrison	1800	Stableboy	milking parlor certificate
Louisa May Alcott	1800	Shopkeeper	
George Sand	1700	Stableboy	

Table 2: Information about employees

Name	Ear tag	Gender	Birth	Sold	Comments
Jo-52	699-140	C	January 5, 2008	–	Died at July 16, 2010
Meg-30	699-141	C	January 20, 2008	–	
Fritz-15	699-142	B	March 26, 2008	–	
Fritz-16	699-143	B	March 26, 2008	April 14, 2008	Missing front right leg
Jo-70	699-181	C	June 15, 2009	–	Received 1 dose of antibiotics per day from April 5, 2010 until April 26, 2010
Jo-71	699-182	C	June 15, 2009	–	
John-1	699-183	B	July 2, 2009	–	Acquired on July 10, 2010
Fritz-17	699-205	B	July 16, 2010	–	
Meg-42	699-184	C	September 5, 2009	–	
Fritz-19	699-185	B	September 5, 2009	October 5, 2009	
Meg-46	699-186	C	October 10, 2010	–	Died of illness on October 17

Table 3: Basic information about cattle

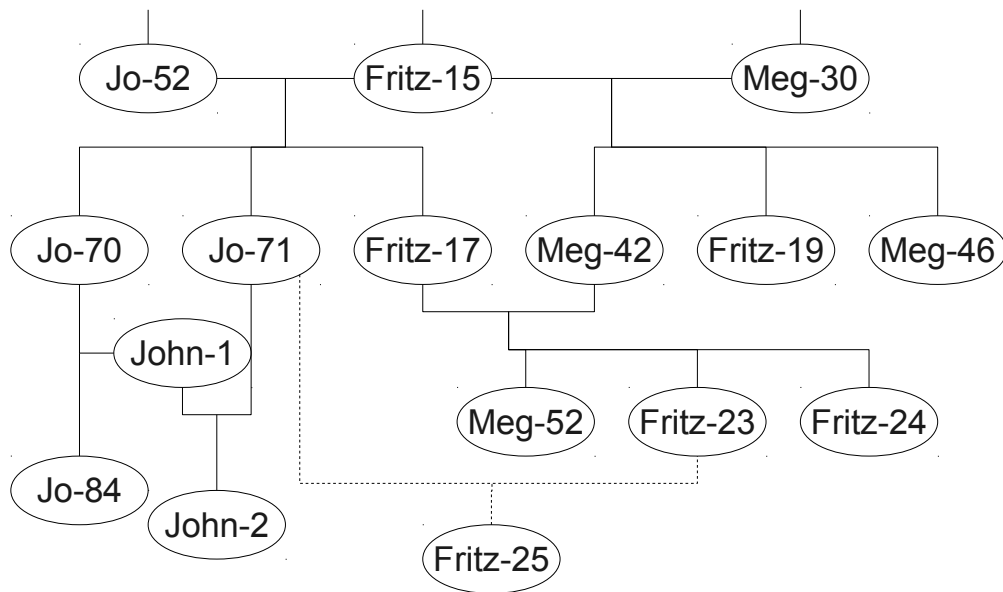


Figure 1: The pedigree of some cows

### 3 Ask farmer Bronson

In previous years I received some questions regarding this information system and I would like to share this knowledge with you on beforehand. If however you still have questions left, be sure to drop me an email.

#### On naming

Are newborn calves *always* named after their father/mother with an incremented number, or are there situations that calves are named differently, possibly without a number?

Yes, newborn calves are always named according to the rule specified in subsection 2.1

#### On birthing

Is there a limit to the number of calves that are born at the same time (from the same mother)?

Not really, there are possibilities that a cow births twins or triplets, but more than 3 is possible, though rare.

## 4 Questions

### 4.1 Modeling assignments

1. Perform step 1 of the CSDP.
2. Perform steps 2-5 of the CSDP.<sup>1</sup>
3. Perform steps 6-7 of the CSDP.
4. RMap the diagram and show what lassoos you defined.

### 4.2 SQL assignments

Hint: A nice (free) application to use for creating- and testing your SQL statements is called H2. It can be found at [www.h2database.com](http://www.h2database.com).

1. Create DDL statements defining your database.
2. Insert the sample data that is given in section 2 into your database.
3. Give an SQL query that lists all names of employees who operated the second milking carroussel in June 2011. Show the result of this query.
4. Give an SQL query that lists all pairs of cows and bulls, with the number of cows they have as offspring, don't include the pairs that have no offspring. Show the result of this query.
5. Jo-71 birthed a cow, she was last inseminated with Fritz-23. Give an SQL query that inserts this cow into the database. (hint: take a look at subsection 2.1)
6. Bonus question (not mandatory): Give an SQL query that lists all bulls, ordered by the average fat percentage in their daughters' milk, from high to low.

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<sup>1</sup>When you finished this step it would be a good moment to get your model checked by a teaching assistant.

## 5 Report guidelines

Make sure that your submission matches at least these guidelines:

- **The 7 steps of the CSDP are clearly traceable in your report.**
- Your report is self-contained, meaning:
  - The names, student numbers and major subjects of all team members must be on the cover page of your report.
  - A representation of your ORM schema is contained in your report.
  - All figures and diagrams you refer to are present in your report.
  - References to anything are unambiguously clear.
  - The answers to all questions from section 4 are present in your report.
  - All design decisions you make are clearly documented.
- You should include the \*.orm file along with the report.
- Your report is in PDF format.  
The use of L<sup>A</sup>T<sub>E</sub>X is not mandatory, but **highly** appreciated.
- Your report is sent by email to farmer.bronson.alcott@gmail.com.
- The names, student numbers and major subjects of all team members must be included in the body text of the email.
- In the email, you should include the name of the student assistant who checked your ORM file, if applicable.
- A printed copy of the report should also be submitted in the dropbox in front of room 216 of the Bernoulliborg. The dropbox is labeled "Introduction Information Systems". Make sure that your physical submission in this box is the same as your final submission via email.

Any submission that fails to comply with these guidelines won't be graded.