# EXERCISE 3-1

Consider the following scenario and sketch some use cases and an initial data model. Assume that the main objectives for the system are to record student absences for the classroom teacher, for school reports, and for statistics for the Department of Education.

> *When parents call to say that children are sick, we have to let their classroom teachers know, and if it's sports day and the child is on a school team, the sports teacher might have to sort out substitutes. Then we need to count up all the days missed to put on the child's report. The Department of Education needs the totals each term, too.*

Let's run through the steps in the summary section of Chapter 3.

1. Determine the main objective of the system.

   We agreed with the client that the main objectives are to record the absences for the classroom teacher, for school reports, and for statistics for the Department of Education.

2. Determine the jobs different users do in an average day.

   - Secretary takes phone calls and records name of each student.

- Secretary collates the absences for each classroom teacher and informs them of which students are away.
- Secretary gives list of absences to sports teacher if it is a sports day.
- Each student's absences are totaled for his or her report.
- All absences are totaled for Department of Education.

3. Brainstorm the data that could be associated with each job.

   a. Secretary takes phone calls and records name of each student.

      Because the absences need to be collated for each student, we need to ensure that the correct student is identified. This student data is going to be an essential part of the system. We will need to record names for all students and should consider introducing an ID number to distinguish students who might have the same name. We also need to record the current date.

   b. Secretary collates the absences for each classroom teacher and informs them of which students are away.

      We need to be able to associate each student with a classroom teacher. We will need the names of teachers and some contact information. How is the teacher informed? Do they get delivered a printed list or are they called on their phones? Maybe we could e-mail them. Recording contact information such as room numbers, phone numbers, and e-mail addresses for teachers would give us flexibility and is easy to do right from the start.

c. Secretary gives list of sports team absences to sports teacher if it is a competition day.

   This isn't one of the main objectives, so recording members of sports teams looks like it is outside the scope of the problem for now. Being able to print a list of all today's absences is probably sufficient at this point, and we have all that information.

d. Each student's absences are totaled for his or her report.

   We are collecting dates of absences and the IDs of the students so we can count absences for each student for any required time period (week, term, or year).

e. All absences are totaled for Department of Education.

   Same as the preceding, but totaled over all students.

4. Agree on the scope of the project and decide on the relevant data.

   At a minimum we need:

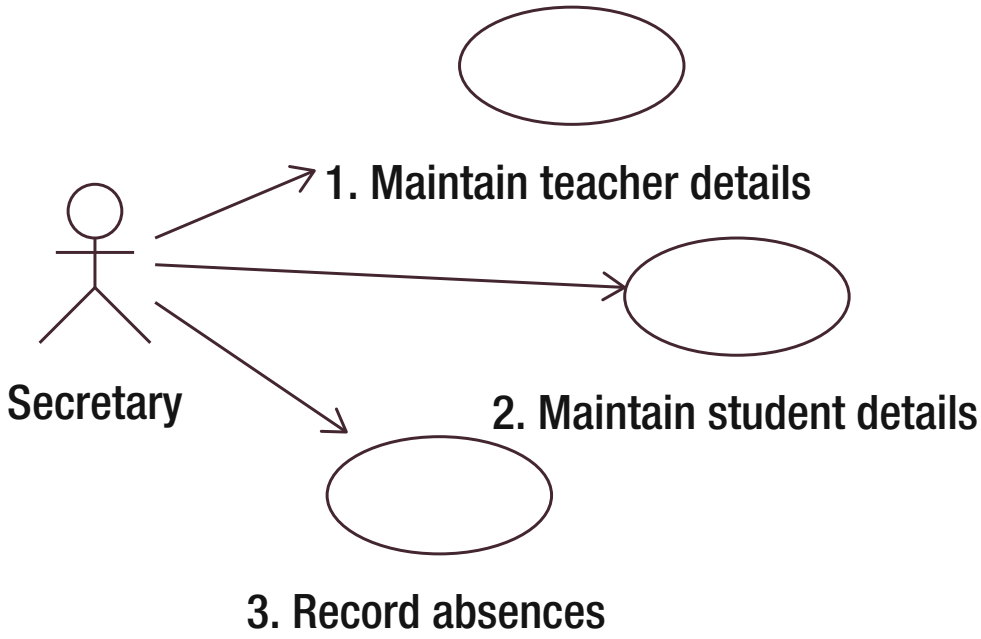
   For each teacher: Name and contact details (maybe an ID)

   For each student: An ID, name, and classroom teacher

   For each absence: Student ID and date

5. Sketch data input use cases—consider exceptions—check existing forms.

   Figure A-9 shows some initial input use cases.




***A-9.*** *Use cases for data input*

Here are brief descriptions of the use cases depicted in Figure A-9.

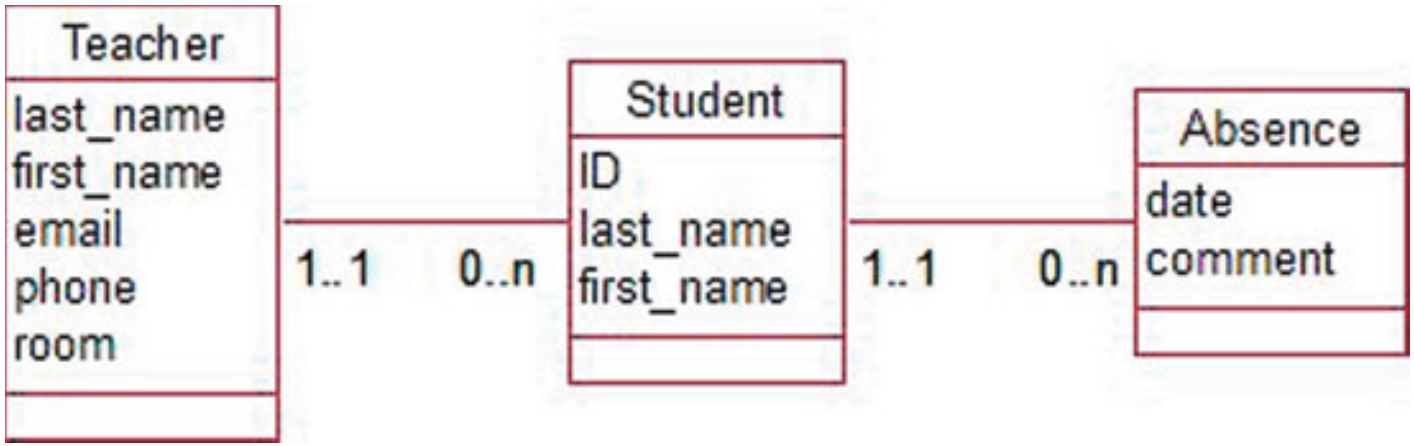
1. Maintain teacher details: Record or update name and contact details.
2. Maintain student details: Assign IDs for new students. Record or update names and associate the student with an existing classroom teacher.
3. Record the date of each absence and the ID of the absent student.

6. Consider exceptions and complications.

One question that springs to mind is: how do we record that a student is away for several days at one time? We have a couple of choices; we could record each day as a separate absence or we could have one absence with a start date and end date. The former is the easiest option. However, if the school is likely to want some statistics about the types of absences (e.g., what is the average length of an absence? How many students are away for longer than a week at a time?), then we would have to rethink our approach. As the main objective is just to total the overall number of days, we will record each day as a separate absence for now. Another issue involves students that are absent without a call from their parents. Classroom teachers will be able to use existing use cases, but this raises the question as to whether there are different categories of absence. For now we will just add a comment to the data about absences.

7. Sketch a first data model.

   A data model is shown in Figure A-10.




***A-10.*** *Class diagram to record student absences*

For the model in Figure A-10 the following statements are true:

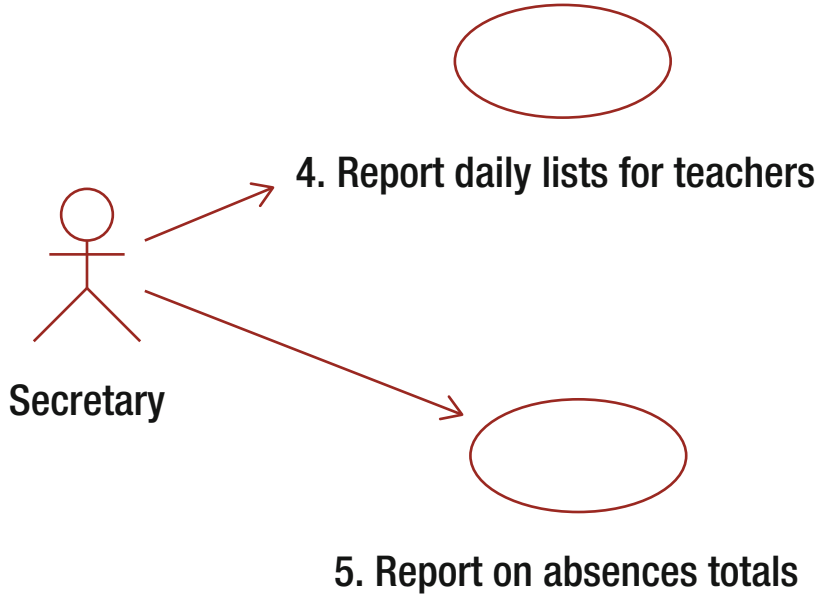
- Each student has just one classroom teacher and could have many absences.
- Each teacher may be responsible as a classroom teacher for many students (but some teachers may not be classroom teachers).
- Each absence is for exactly one student.

8. Brainstorm the possible outputs given the data being collected.

   We have all the information we need for reporting the number of absences for each student or for all students. What further information could we retrieve? We have decided not to keep durations of absences. What about the reason for an absence? It would be a simple addition to keep some categories of absences (illness, school trip, sports match, etc.). That may be worth discussing with the client.

   Sketch information output use cases.

   Figure A-11 shows some output use cases which satisfy the main objectives of the system.




***A-11.*** *Use cases for reporting information*

Here are brief descriptions of the use cases depicted in Figure A-11.

4. Full list for sports teacher: Find all the absences with today's date. Print out names of associated students.

   Lists for classroom teachers: Find all the absences with today's date. Print out names of students and names of teachers, and group by teacher.

5. For Department of Education: Find all the absences with dates in the relevant time period and count them.

   For school reports: For each student, count all the absences with dates in the relevant time period.