<http://www.sqa.org.uk/e-learning/MDBS01CD/page_03.htm>

<http://www.comphist.org/computing_history/new_page_9.htm>

Typical problems with storing data in two places are:

* Duplication of data (ie: multiple copies of the same data) leading to potential inconsistencies when inserting, deleting and modifying data
* Different data formats
* Procedures needed to keep duplicate data in line with each other
* Extra resources needed to hold the multiple copies, eg: disk storage, memory, hardware, etc
* Extra personnel to manage the different versions
* Multiple backups to manage all the copies
* Large amounts of media (eg: tapes) and physical room to store all the backups
* Duplicated security procedures to manage the separate copies

You may have identified other problems.

**Advantages and Limitations**

A good database management system (DBMS) should provide the following advantages over a conventional system:

**Advantages**

1. Reduced data redundancy
2. Reduced updating errors and increased consistency
3. Greater data integrity and independence from applications programs
4. Improved data access to users through use of host and query languages
5. Improved data security
6. Reduced data entry, storage, and retrieval costs

However, the following can be viewed as some of the limitations of a database:

**Disadvantages**

1. Database systems are complex, difficult, and time-consuming to design
2. Substantial hardware and software start-up costs
3. Damage to database affects virtually all applications programs
4. Extensive conversion costs in moving form a file-based system to a database system
5. Initial training required for all programmers and users

**The entity is the thing in the top left corner of the table and the other column headings are attributes *for* that entity.**

**Only attributes which are dependent on two different entities in a relational database are primary/foreign keys.**

In database systems one-to-one relationships rarely exist in practice, but they can. However, you may consider combining them into one entity.

**This is like that time we had two entities connecting one to one so added in a third entity which had a many to one to them both.**

Like one-to-one relationships, many-to-many relationships rarely exist in databases. Normally they occur because an entity has been missed

**Add another one in between – two one to many relationships, opposite from above example.**

<http://www.sqa.org.uk/e-learning/MDBS01CD/page_13.htm>

**Foreign key – it is foreign if it is not the primary key, but it is in the other table e.g**

**Department employee**

**DepartmentNumber DepartmentNumber – foreign key because below is the primary  
primary key EmployeeNumber**

[**http://www.sqa.org.uk/e-learning/MDBS01CD/page\_26.htm#Example**](http://www.sqa.org.uk/e-learning/MDBS01CD/page_26.htm#Example)