

## Object-oriented system design with UML

### Case study: Multimedia library information system

A public library stocks multimedia documents available for consultation by the general public and lending to registered members.

#### Members

To become a member of the library, a person supplies the following information to the librarian, who enters it into the library information system (IS): surname, first name, social security number, physical address, email address and phone number. Each registered member is assigned a member number, encoded on a library card. A physical person may not have more than one membership.

#### Documents

The library stocks three types of documents: Books, Audio CDs and Video DVDs. Every document is assigned a unique number, encoded on a bar code stuck onto the document. The library IS stores the following information on each document to make cataloguing and searching possible:

- For books: title, author (writer or editor), date of publication, genre (examples: sewing, photography, detective, science fiction), publisher, number of pages;
- For CDs: title, group, release date, musical style (examples: classical, rock), record label, length;
- For DVDs: title, director, release date, genre (examples: documentary, comedy, detective), runtime, production company, age restriction;

The IS also stores the shelf number where each document is kept in order to help find them.

#### Lending rules

1. Library members may borrow up to 5 documents at a time.
2. Some documents, such as reference books, language CDs and magazines cannot be borrowed, only consulted on-site.
3. The duration of a loan depends on the type of document lent. Books are lent for 5 weeks, audio CDs for 3 weeks, and video DVDs for 2 weeks. Return of a document after the due date incurs a fine of 10 cents per day. A member may not borrow a new document while he has an overdue loan or an unpaid fine.
4. A member may reserve a document currently lent out. When the document is returned, the system will send the member an email (if configured) informing him/her that it is available, and will reserve the document for 3 days.

5. A member may renew a document exactly once, unless other members reserve it, in which case the member must return it.

### Management functions

The IS offers a number of management functions to the librarian:

1. Addition of new purchases, and withdrawal of old / lost / unpopular documents.
2. Creation and cancellation of memberships.
3. Generation of per-document usage statistics, showing the number of loans, date of the last loan, and popularity (% of total loans of its document type).
4. Display of overdue loans and generation of reminder letters/emails;