# Assignment 7

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**Grammars**

In your library, you regularly receive new books, CDs, Videos etc. from different publishers and producers. You have to update the database of your library application to reflect the recent changes in the stock of the library.  In order to performe this task, you receive from the Delivery Departament a list of the items recently delivered to your library. Here is an example list:

```
 Books[
 Computer Science[
 Compilers[
        (Alfred Aho, Ravi Sethi, Jeffrey Ullman; Compilers: principles,
techniques, and tools; 1986; Addison Wesley; 0-201-10194-7)
 ]
        Software Engineering[
        (Gustav Pomberger, Wolfgang Pree; Software Engineering: Architektur-
Design und Prozessorientierung; 2004; Hanser; 3-446-22429-7)
        ]
 Real-Time Systems[
        (Jane Liu; Real-time systems; 2000; Prentice Hall; 0-13-099651-3)
        (Giorgio Buttazzo; Hard real-time computing systems: predictable
scheduling algorithms and applications; 2000; Kluwer; 0-7923-9994-3)
        (Jane Liu; Real-time systems; 2000; Prentice Hall; 0-13-099651-3)
        (Alan Burns, Andy Wellings; Real-time systems and their programming
languages; 1990; Addison Wesley; 0-201-17529-0)
 ]
 ]
 Travel[
        (Daniel Simonis; Lonely Planet Spain; 2005; Lonely Planet
Publications; 1-740-59700-1)
 ]
 ]
```

List structure:

- A list consists of a name (e.g. "Compilers") followed by the body of the list embedded in brackets "[" and " ]".
- The listname of the first list is the media type (book, CD, etc), the remaining lists denote name of catalogues.
- The body of the list contains an arbitray number of other lists and datasets.
- A datasets consists of a set of attributes (author; title; year or appearance; publisher; ISBN) , which are separated from each other using a semicolon ";" and the dataset itself is delimited by "(" and ")".
- The author-field can contain more than one author and the authors are separated from each other with a comma.

- The catalogue names and the item titles may contain spaces and other characters (e.g., "-"). Titles may also consists of two parts separated by ":".

Assignment:

1. Write a grammar that reflects the structure of the list using Coco/R and display all the tokens.
2. Import the list into your library applications database.
3. Use **attributes and semantic actions** that verify that there are no duplicates in the list. You must check this before inserting the items into the database; do not insert duplicates into the database and report an error.