# Simple Library Assignment

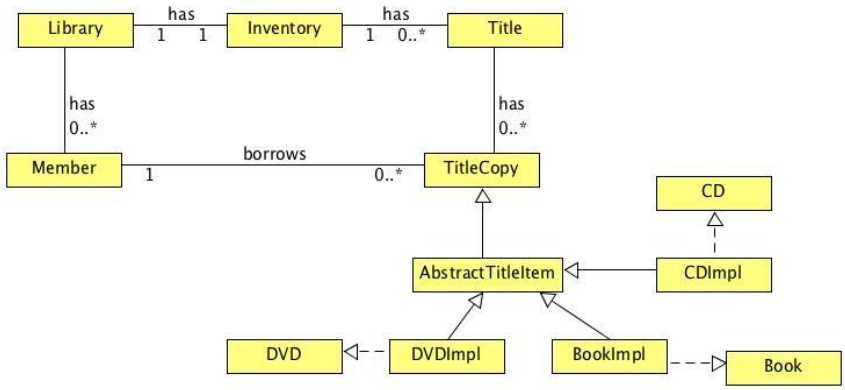
## The Simple library Design

The Simple library system consists of the following main classes:

| Class Name | Description |
|---|---|
| **Library** | The main facade to the library system |
| **Inventory** | The repository for storing titles, searching and loaning titles |
| **Member** | The user of the library who can borrow items |
| **Title** | The title is the media type e.g. book, DVD, CD |
| **TitleCopy** | The copy of a Title. e.g. the Tale of Peter Rabbit title can have a book and DVD formats. |

## Domain Model

The class diagram below describes the classes and their relationships.




## Extensibility

1. The system allows new title copy formats to be introduced by letting sub-classing of AbstractTitleItem and implementing marker interface for the new type.

## Thread Safety and scalability

The system is made thread safe and scalable by:

1. Using ConcurrentHashMap for storing titles and members. The ConcurrentHashMap is used as it offers thread-safety and high throughput as it uses CAS.

2. The CopyOnWriteArray is used for tracking the state of the copies of titles and the copies borrowed by a member.

3. The immutable loan class is used to track the borrowing of a title copy.

Thread safety was tested using the third-party tool vmlens concurrent-junit framework (https://vmlens.com).

## Development Process

The system was developed using TDD with BDD acceptance criteria.

## How to run the Library API Tests

The program uses the Gradle build tool to build and test the Library system.  To run the unit tests:

1. Unzip the file simple-library.zip

2. From the terminal, cd into the unzipped folder.

3. Execute the following command in the terminal.

```
./gradlew clean build test
```