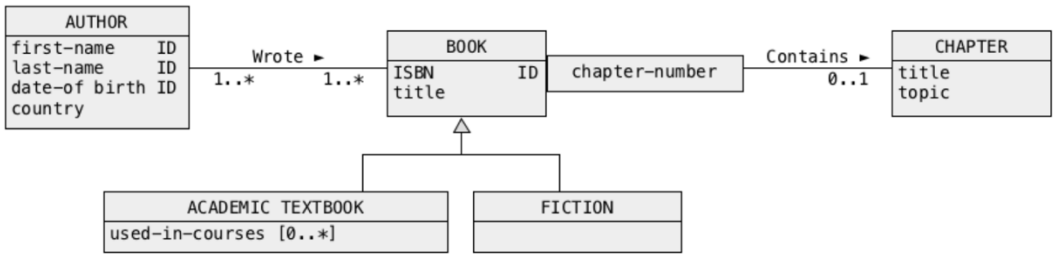
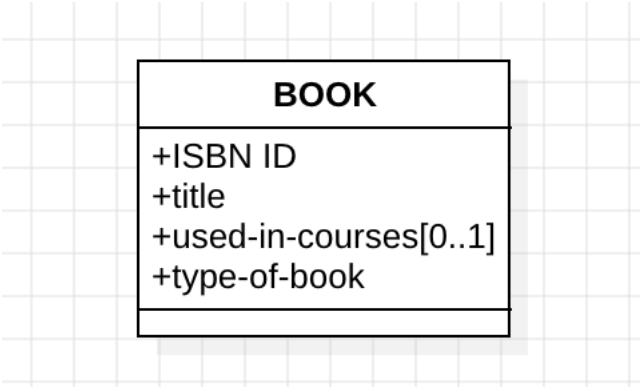
Solution3



Superset method

1.Remove the subclasses, merge attributes into the superset BOOK, add a type of attribute **type-of-book**.

```
BOOK(ISBN, title, used-in-courses[0..1], type-of-book)
PRIMARY KEY = (ISBN)
```



2. Handle Multi-valued Attributes **used-in-courses**, create a separate relation BOOK_COURSE for it.

```
BOOK_COURSE(ISBN, CourseID)
PRIMARY KEY = (ISBN, CourseID)
FOREIGN KEY = (ISBN) REFERENCES BOOK
```

So BOOK now is:

```
BOOK(ISBN, title, type-of-book)
PRIMARY KEY = (ISBN)
```

3.BOOK-CHAPTER is one-to-many.

```
CHAPTER(ChapterNumber, title, topic, ISBN)
PRIMARY KEY = (ChapterNumber, ISBN)
FOREIGN KEY = (ISBN) REFERENCES BOOK
```

4. An author can write many books and a book may have many authors.

```
AUTHOR_BOOK(AuthorID, ISBN)
PRIMARY KEY = (AuthorID, ISBN)
```

```
FOREIGN KEY = (AuthorID) REFERENCES AUTHOR
FOREIGN KEY = (ISBN) REFERENCES BOOK
```

5. For the many to many relation between BOOK and AUTHOR, the AUTHOR should be like:

```
AUTHOR(AuthorID, first-name, last-name, date-of-birth,
country)
PRIMARY KEY = (AuthorID)
```

6. Relational Schemas

```
AUTHOR(AuthorID, first-name, last-name, date-of-birth,
country)
PRIMARY KEY = (AuthorID)

BOOK(ISBN, title, type-of-book)
PRIMARY KEY = (ISBN)

CHAPTER(ChapterNumber, title, topic, ISBN)
PRIMARY KEY = (ChapterNumber, ISBN)
FOREIGN KEY = (ISBN) REFERENCES BOOK

BOOK_COURSE(ISBN, CourseID)
PRIMARY KEY = (ISBN, CourseID)
FOREIGN KEY = (ISBN) REFERENCES BOOK

AUTHOR_BOOK(AuthorID, ISBN)
PRIMARY KEY = (AuthorID, ISBN)
FOREIGN KEY = (AuthorID) REFERENCES AUTHOR
FOREIGN KEY = (ISBN) REFERENCES BOOK
```