

Object-Oriented Design II



Modeling Classes

Given a real-life system, how do you decide what classes to use?

- What terms do the users and implementers use to describe the system? They are candidates for classes.
- Is each candidate class crisply defined?
- For each class, what is its set of responsibilities? Are the responsibilities evenly balanced among the classes?
- What attributes and operations does each class need to carry out its responsibilities?

Noun Identification: A Library Example



The library contains books and journals. It may have several copies of a given book. Some of the books are reserved for short-term loans only. All others may be borrowed by any library member for three weeks. Members of the library can normally borrow up to six items at a time, but members of staff may borrow up to 12 items at one time. Only members of staff may borrow journals.

The system must keep track of when books and journals are borrowed and returned and enforce the rules.


Noun Identification: A Library Example



The **library** contains **books** and **journals**. It may have several **copies** of a given book. Some of the books are reserved for **short-term loans** only. All others may be borrowed by any **library member** for three **weeks**. **Members of the library** can normally borrow up to six **items** at a time, but **members of staff** may borrow up to 12 items at one time. Only members of staff may borrow journals.

The **system** must keep track of when books and journals are borrowed and returned and enforce the **rules**.

Candidate Classes



| | |
|-----------------|------------------------|
| Library | the name of the system |
| Book | |
| Journal | |
| Copy | |
| ShortTermLoan | event |
| LibraryMember | |
| Week | measure |
| MemberOfLibrary | repeat |
| Item | book or journal |
| Time | abstract term |
| MemberOfStaff | |
| System | general term |
| Rule | general term |

Relations between Classes



| | | |
|---------------|----------------|---------------|
| Book | is an | Item |
| Journal | is an | Item |
| Copy | is a copy of a | Book |
| LibraryMember | | |
| Item | | |
| MemberOfStaff | is a | LibraryMember |

Is Item needed?

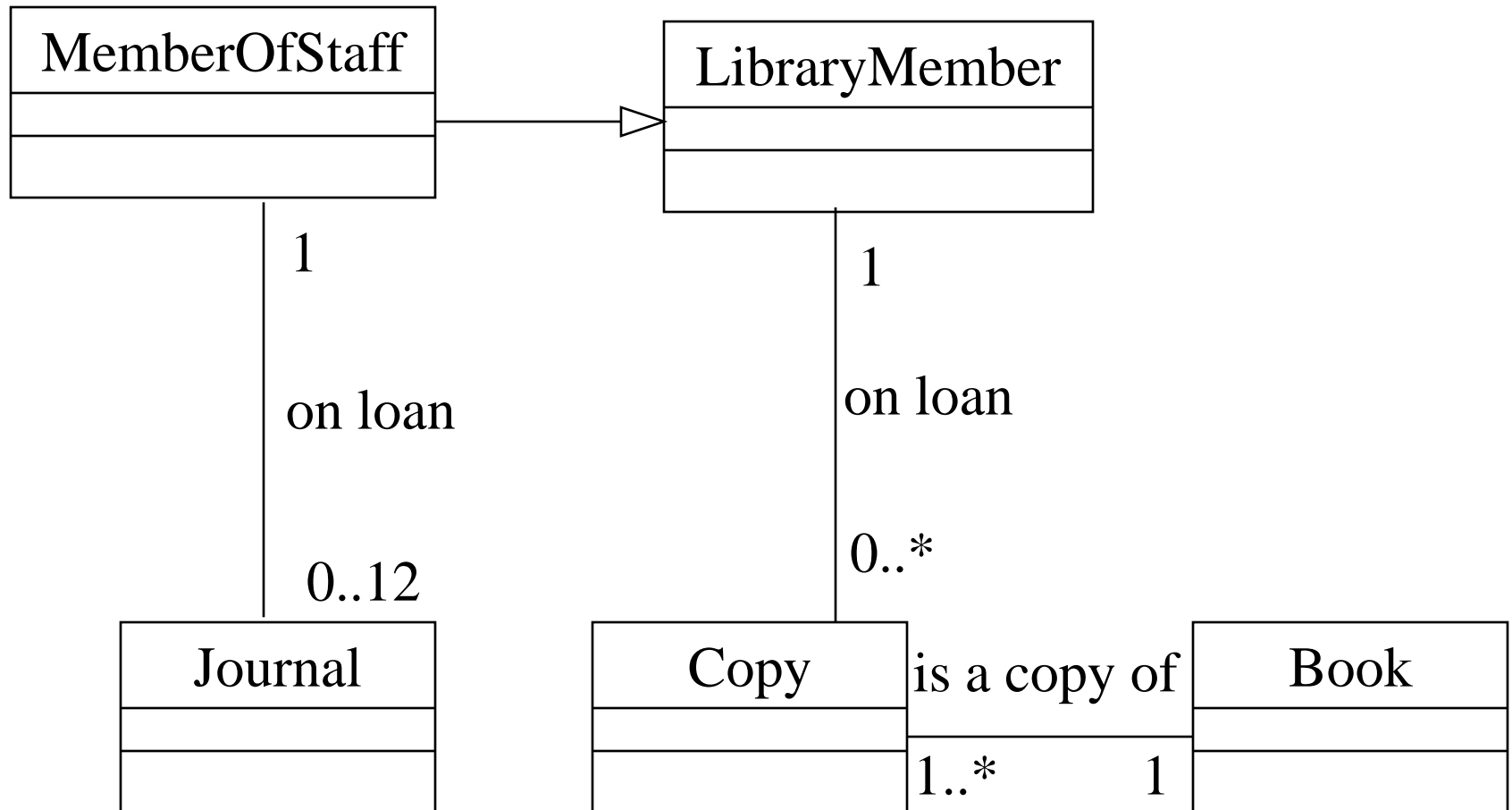
Operations



| | | |
|---------------|--------|---------|
| LibraryMember | borrow | Copy |
| LibraryMember | return | Copy |
| MemberOfStaff | borrow | Journal |
| MemberOfStaff | return | Journal |

Item not needed yet.

Class Diagram



Rough Sketch: Wholesale System



A wholesale merchant supplies retail stores from stocks of goods in a warehouse.

What classes would you use to model this business?

Rough Sketch: Wholesale System



RetailStore

Order

Merchant

Product

Warehouse

Invoice

Shipment