UML

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UFP

Introducion

- Unified Modeling Language
- International standard for software analysis and design
- Currently a huge standard, covering most of the documentation needs
- 14 UML diagram types

UML diagrams

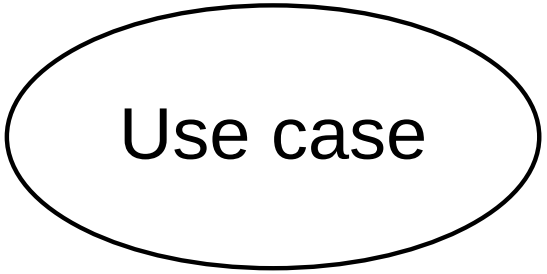
- Class diagram
- Component diagram
- Deployment diagram
- Object diagram
- Package diagram
- Profile diagram
- Composite structure diagram
- Use case diagram
- Activity diagram
- State machine diagram
- Sequence diagram
- Communication diagram
- Interaction overview diagram
- Timing diagram

Use case diagrams

- Are used during requirements elicitation and analysis as a graphical means of representing the functional requirements of the system.
- Use cases are very helpful for writing acceptance test cases.
- Consist of 4 objects:
  - Use cases
  - Actors
  - System
  - Package

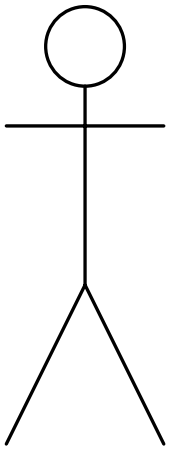
Use case diagrams: use case

- A use case typically represents a major piece of functionality that is complete from beginning to end.
- Represents a function or an action within the system.



Use case diagrams: actors

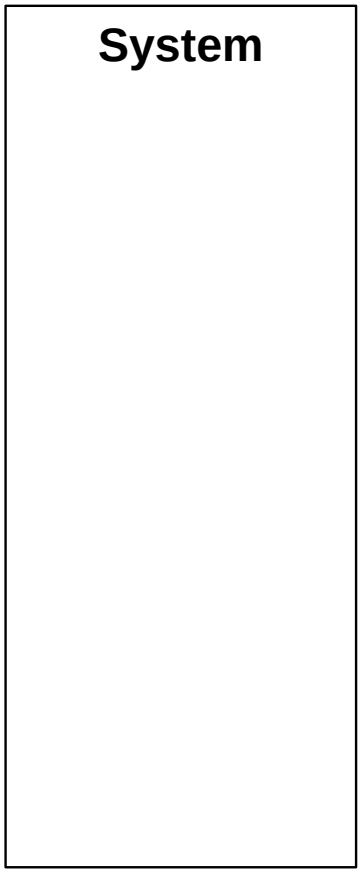
- An actor represents whoever or whatever (person, machine, or other) interacts with the system.
- The actor is not part of the system itself and represents anyone or anything that must interact with the system to:
  - Input information to the system;
  - Receive information from the system; or
  - Both input information to and receive information from the system.



Actor

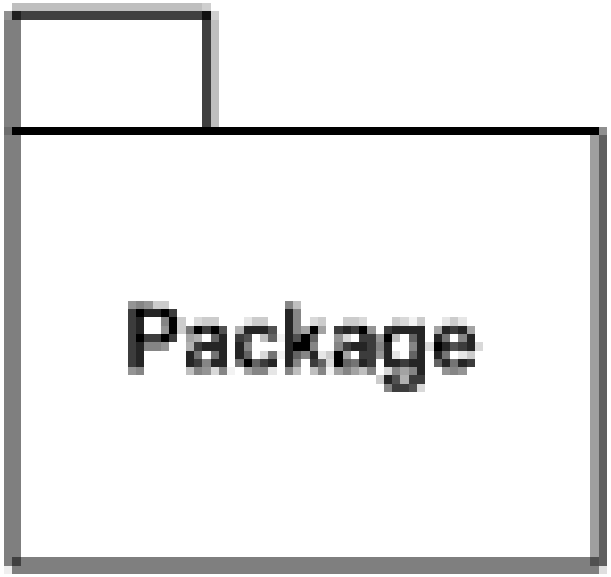
Use case diagrams: system

- System is used to **define the scope of the use case** and drawn as a rectangle.



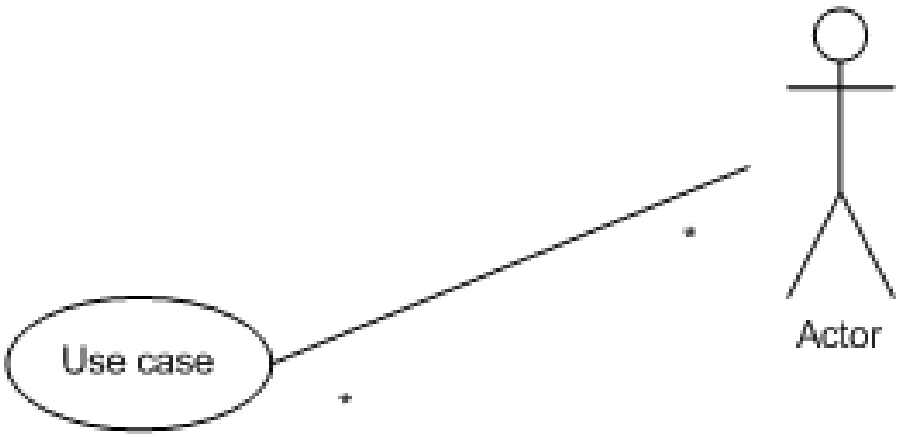
Use case diagrams: package

- Package is another optional element that is extremely useful in complex diagrams. Similar to class diagrams, packages are **used to group together use cases**.



Use cases: notation

- Actor comunicates with the system



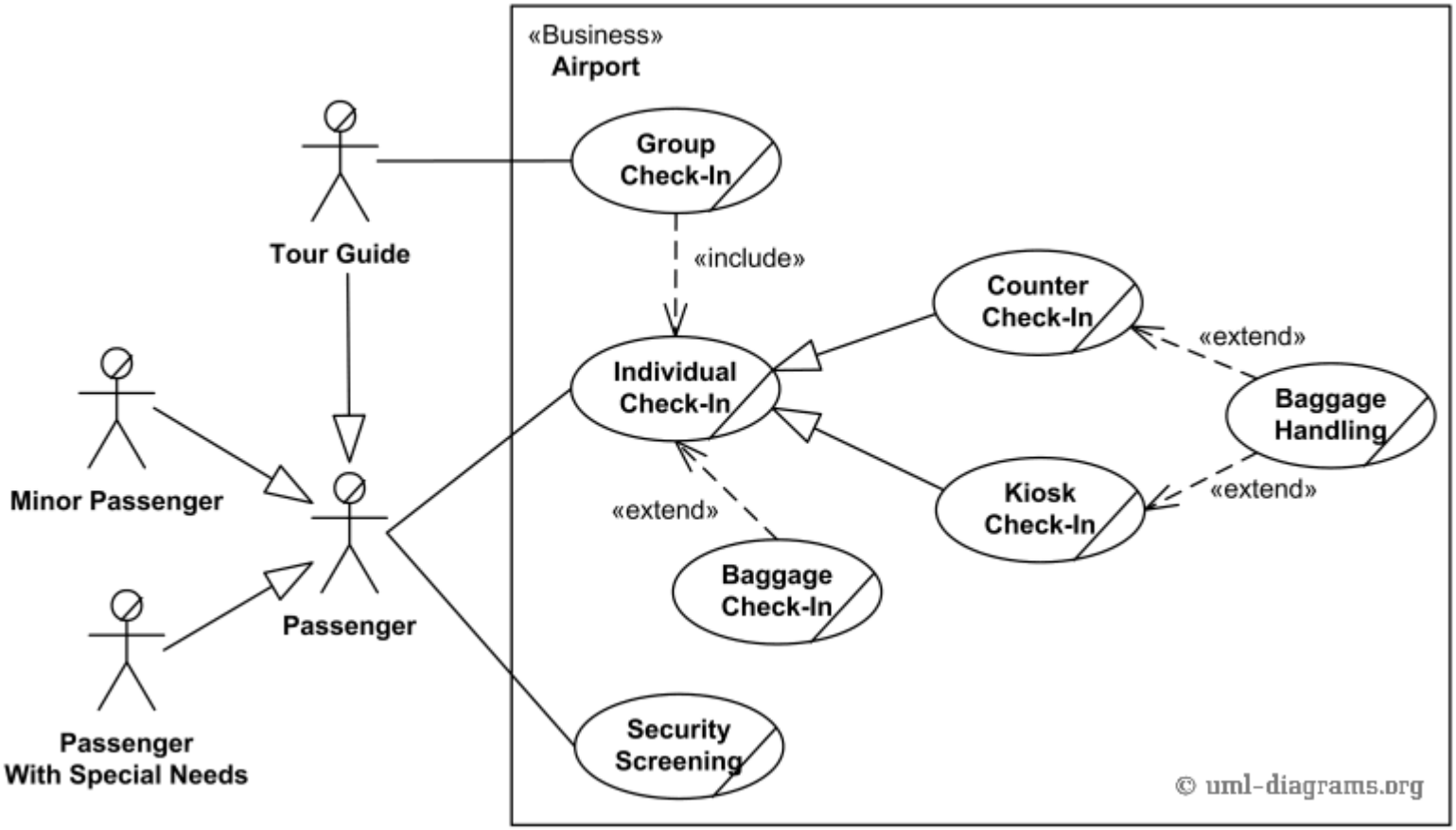
Use case diagrams: relationships

- There are five types of relationships in a use case diagram. They are:
  - Association between an actor and a use case
  - Generalization of an actor
  - Extend relationship between two use cases
  - Include relationship between two use cases
  - Generalization of a use case

Use case: relationships

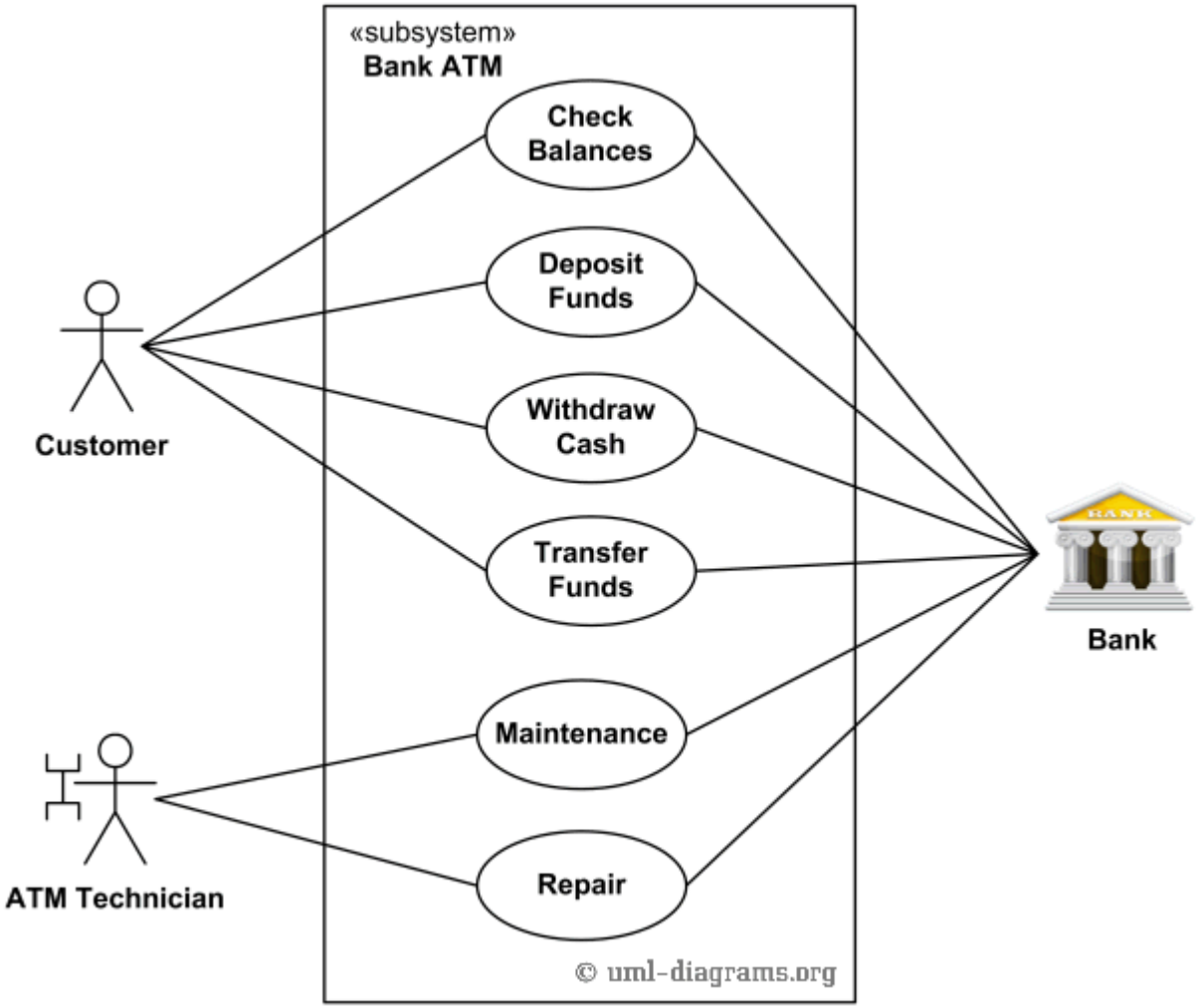
- A use case can “include” another use case; this is useful to avoid repeating the description of a behavior; e.g. if several use cases require a login, it’s best to include the login use case;
- A use case can “extend” another use case; this can be used for variations on a use case, that only happen under certain circunstances;
- Note that an include use case is always completed, but an exclude use case is sometimes completed

Use cases: example

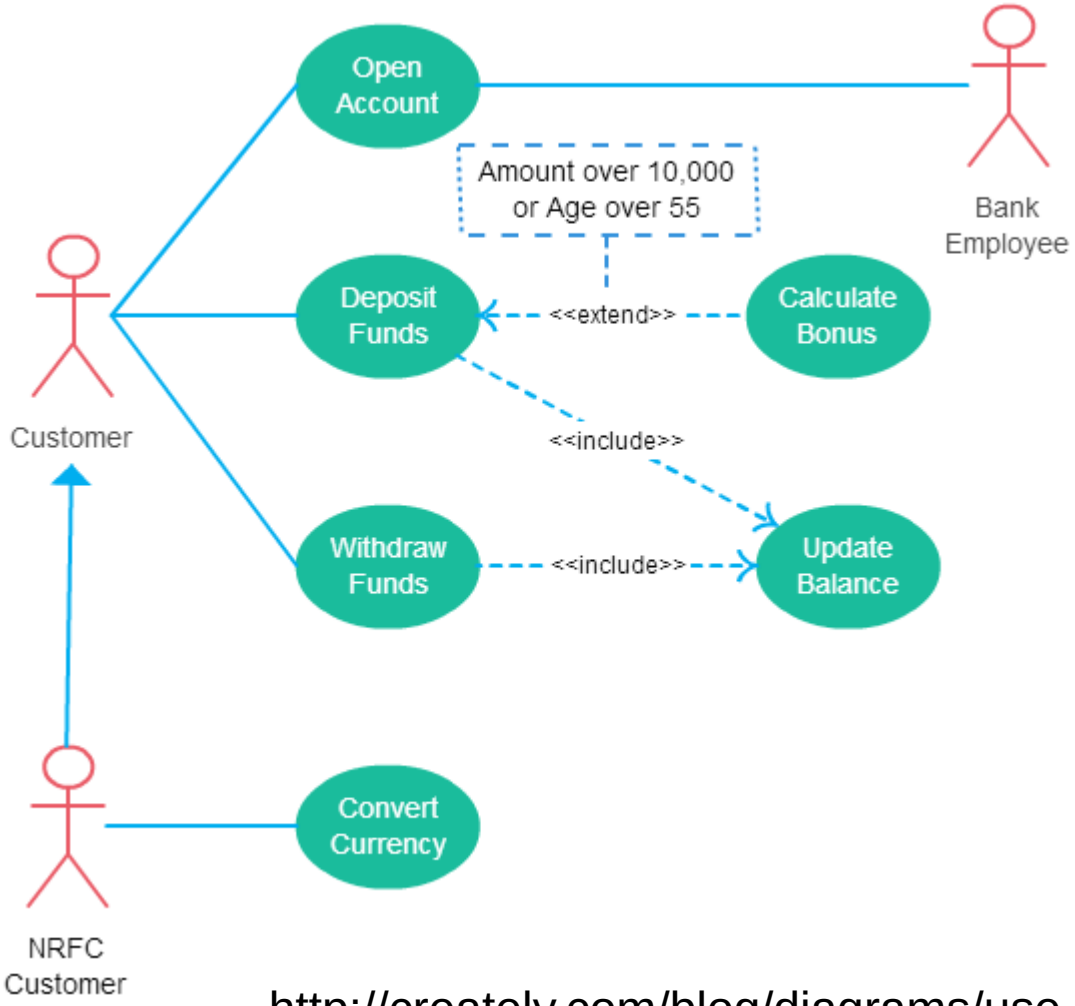


http://www.uml-diagrams.org/

Use cases: example



Use cases: example



http://creately.com/blog/diagrams/use-case-diagram-relationships/

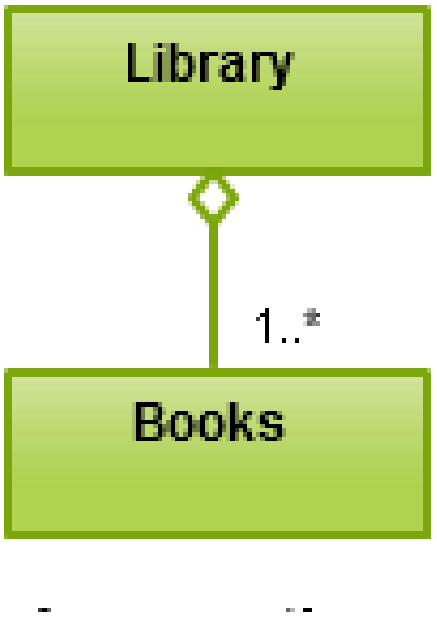
Class diagram

- Class diagrams are used in both the analysis and the design phases.
- They provide detailed information about the structure and the behavior of the classes
- There are two main types of relationships between classes:
  - Inheritance
  - Association

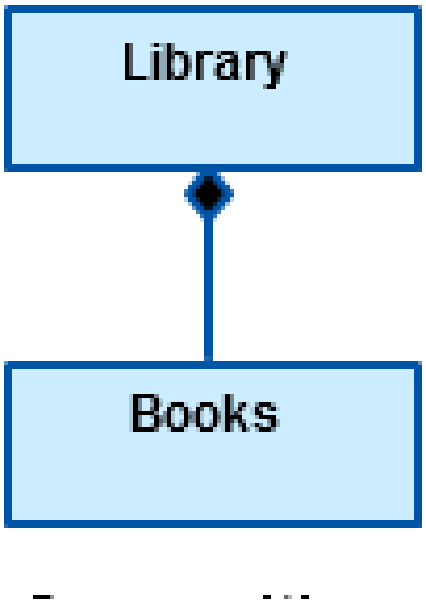
Class relationships

- Inheritance: one class is more general than others
- Association:
  - Aggregation: one object is part of another object but their lifetimes are independent (a department has employees)
  - Composition: one object is composed of other objects (an invoice is composed of invoice lines) and those can only exist as long as the container object exists
  - Association has multiplicity

Class relationships



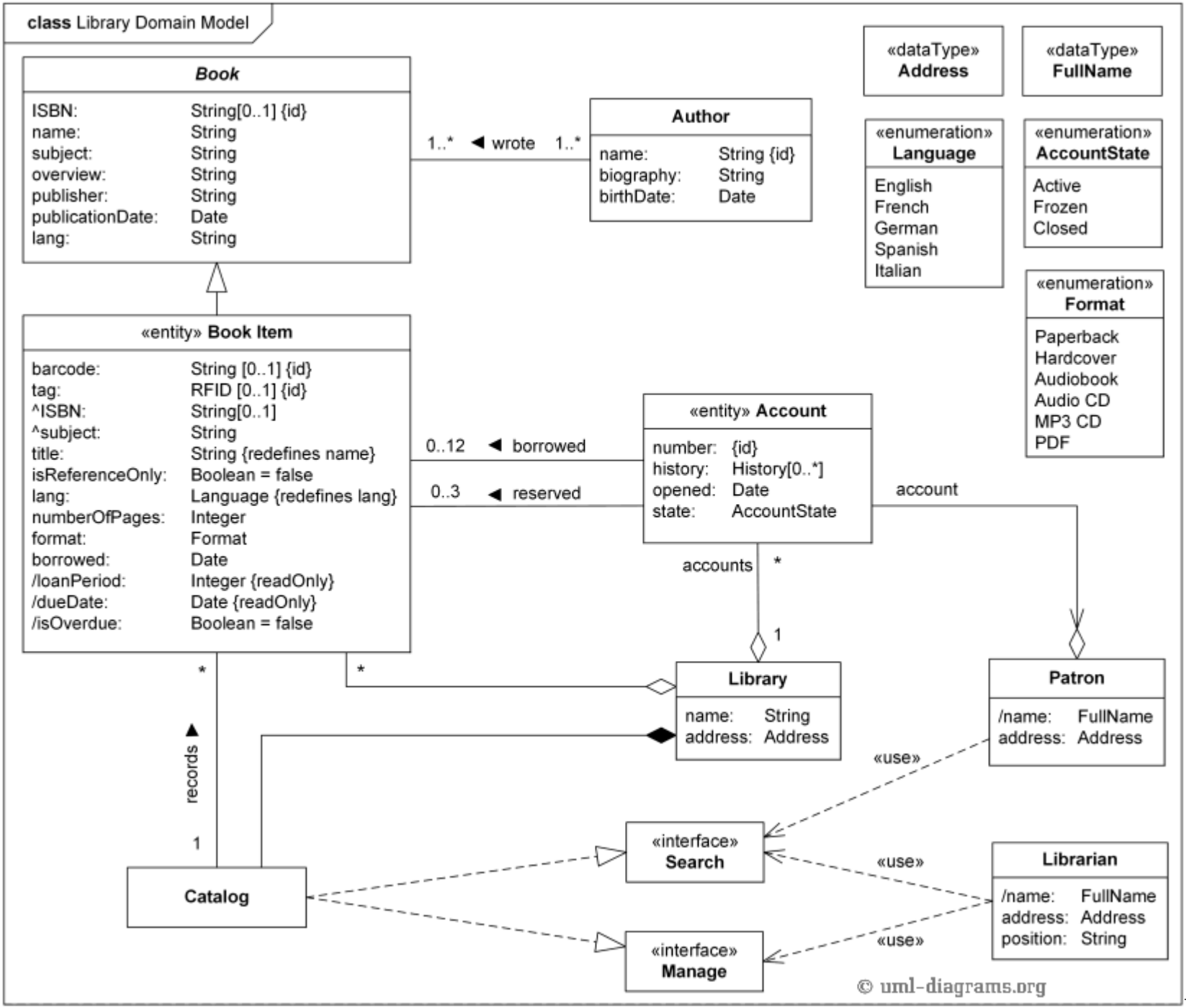
aggregation



composition

Class relationships: multiplicity

- One-to-one and mandatory: 1
- One-to-one and optional: 0..1
- One-to-many and mandatory: 1..*
- One-to-many and optional: *
- With lower bound l and upper bound u: l..u
- With lower bound l and no upper bound: l..*


class Library Domain Model
Book
ISBN: String[0..1] {id}
name: String
subject: String
overview: String
publisher: String
publicationDate: Date
lang: String
1..* wrote 1..*
Author
name: String {id}
biography: String
birthDate: Date
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«dataType» FullName
«enumeration» Language
English
French
German
Spanish
Italian
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Active
Frozen
Closed
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Hardcover
Audiobook
Audio CD
MP3 CD
PDF
«entity» Book Item
barcode: String [0..1] {id}
tag: RFID [0..1] {id}
^ISBN: String[0..1]
^subject: String
title: String {redefines name}
isReferenceOnly: Boolean = false
lang: Language {redefines lang}
numberOfPages: Integer
format: Format
borrowed: Date
/loanPeriod: Integer {readOnly}
/dueDate: Date {readOnly}
/isOverdue: Boolean = false
0..12 borrowed
0..3 reserved
«entity» Account
number: {id}
history: History[0..*]
opened: Date
state: AccountState
account
accounts
*
1
*
*
records
1
Library
name: String
address: Address
Patron
/name: FullName
address: Address
«use»
«interface» Search
«use»
Librarian
/name: FullName
address: Address
position: String
Catalog
«interface» Manage
«use»
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