

Lab 4: Enhanced Bookstore System Simulation (with Real Data)

Objective:

Students will create an enhanced bookstore system with a class hierarchy that utilizes principles of object-oriented programming (OOP) such as inheritance, interfaces, and encapsulation. Students will implement custom validation for constructor arguments and make appropriate use of `.equals()`, `.compareTo()`, and interfaces like `Printable` and `Reversible`. Use the best practices that we learn in class. Work with a partner.

Class (C) and Interface (I) Descriptions

Date (C)

Data Members:

- Follows the implementation from Lab 1.

Implements:

- Printable

Name (C)

Data Members:

- first: String, not null, not blank, less than 50 characters.
- last: String, not null, not blank, less than 50 characters.

Methods:

- Printable: Implements the `display()` method to print the full name.

Person (C)

Data Members:

- dateOfBirth: Date, not null.
- dateOfDeath: Date, nullable (optional for living persons).
- name: Name, not null.

Implements:

- Comparable: Older people are "larger."
- Printable: Prints all attributes.
- Reversible: Prints the full name backward.

Author (C)

Extends Person.

Data Members:

- Genre (e.g. "Horror"): not null, not blank, less than 30 characters

Methods:

- Inherits methods from ``Person``.

Implements:

- Printable: Prints the author's information.

Book (C)

Data Members:

- title: String, not null, not blank, less than 100 characters.
- yearPublished: int, must be between year 1 and the current year.
- author: Author, not null.

Implements:

- Comparable: Older books are "larger."
- Printable: Prints the title, year, and author.
- Reversible: Prints the title backward.

Biography (C)

Extends Book.

Data Members:

- subject: Person, not null.

Overrides:

- ``equals()``: Two biographies are equal if they are about the same subject.

Implements:

- Printable: Prints all attributes including the subject.

Autobiography (C)

Extends Biography.

Behavior:

- The ``subject`` is automatically set to the ``author``.

Implements:

- Printable: Prints the book and author's information.

Printable (I)

Methods:

- ``display()``: Prints every instance variable (including those in parent classes) in a sentence.

Reversible (I)

Methods:

- ``backward()``: Prints the name/title backward.

Main Method Instructions (Use the actual data shown below)

1. ****Create Five Books****:

- Ensure each book has a unique title, author, and publication year.
- Authors must be instances of `Author` class.

2. ****Create Five Biographies****:

- Each biography should be about a unique person.
- The subject should be a `Person` object.

3. ****Create Five Autobiographies****:

- Automatically set the `subject` to the `author` for each autobiography.

4. ****Comparisons & Printing****:

- Perform comparisons using `.equals()` and `.compareTo()`. Examples:
 - Compare books by publication year.
 - Compare authors by birthdate.
 - Compare biographies by subjects.
- Use the `Printable` interface to print details for each object.
- Use the `Reversible` interface to print the book titles and author names backward.
- Print the results of all comparisons and outputs from interfaces.

Real-World Examples for Main Method

Five of the Greatest Books:

Title: 1984

Year Published: 1949

Author: George Orwell

Title: To Kill a Mockingbird

Year Published: 1960

Author: Harper Lee

Title: Pride and Prejudice

Year Published: 1813

Author: Jane Austen

Title: The Great Gatsby

Year Published: 1925

Author: F. Scott Fitzgerald

Title: Moby-Dick
Year Published: 1851
Author: Herman Melville

Five of the Greatest Biographies:

Title: The Power Broker
Year Published: 1974
Author: Robert Caro
Subject: Robert Moses

Title: Steve Jobs
Year Published: 2011
Author: Walter Isaacson
Subject: Steve Jobs

Title: Churchill: A Life
Year Published: 1991
Author: Martin Gilbert
Subject: Winston Churchill

Title: Alexander Hamilton
Year Published: 2004
Author: Ron Chernow
Subject: Alexander Hamilton

Title: Einstein: His Life and Universe
Year Published: 2007
Author: Walter Isaacson
Subject: Albert Einstein

Five of the Greatest Autobiographies:

Title: The Diary of a Young Girl
Year Published: 1947
Author: Anne Frank
Subject: Anne Frank

Title: Long Walk to Freedom
Year Published: 1994

Author: Nelson Mandela
Subject: Nelson Mandela

Title: The Story of My Experiments with Truth
Year Published: 1927
Author: Mahatma Gandhi
Subject: Mahatma Gandhi

Title: I Know Why the Caged Bird Sings
Year Published: 1969
Author: Maya Angelou
Subject: Maya Angelou

Title: Autobiography of Malcolm X
Year Published: 1965
Author: Malcolm X
Subject: Malcolm X