

Assignment 2

Deadline:	Thursday 6 May, 11 PM
Evaluation:	40 marks – which represents 20% of your final grade
Late Submission:	5 marks off per day late
Teams:	The assignment can be done individually or in teams of two people (one assignment per team submitted including both student names in the source code).
Purpose:	Practice programming with OOP core concepts using Java

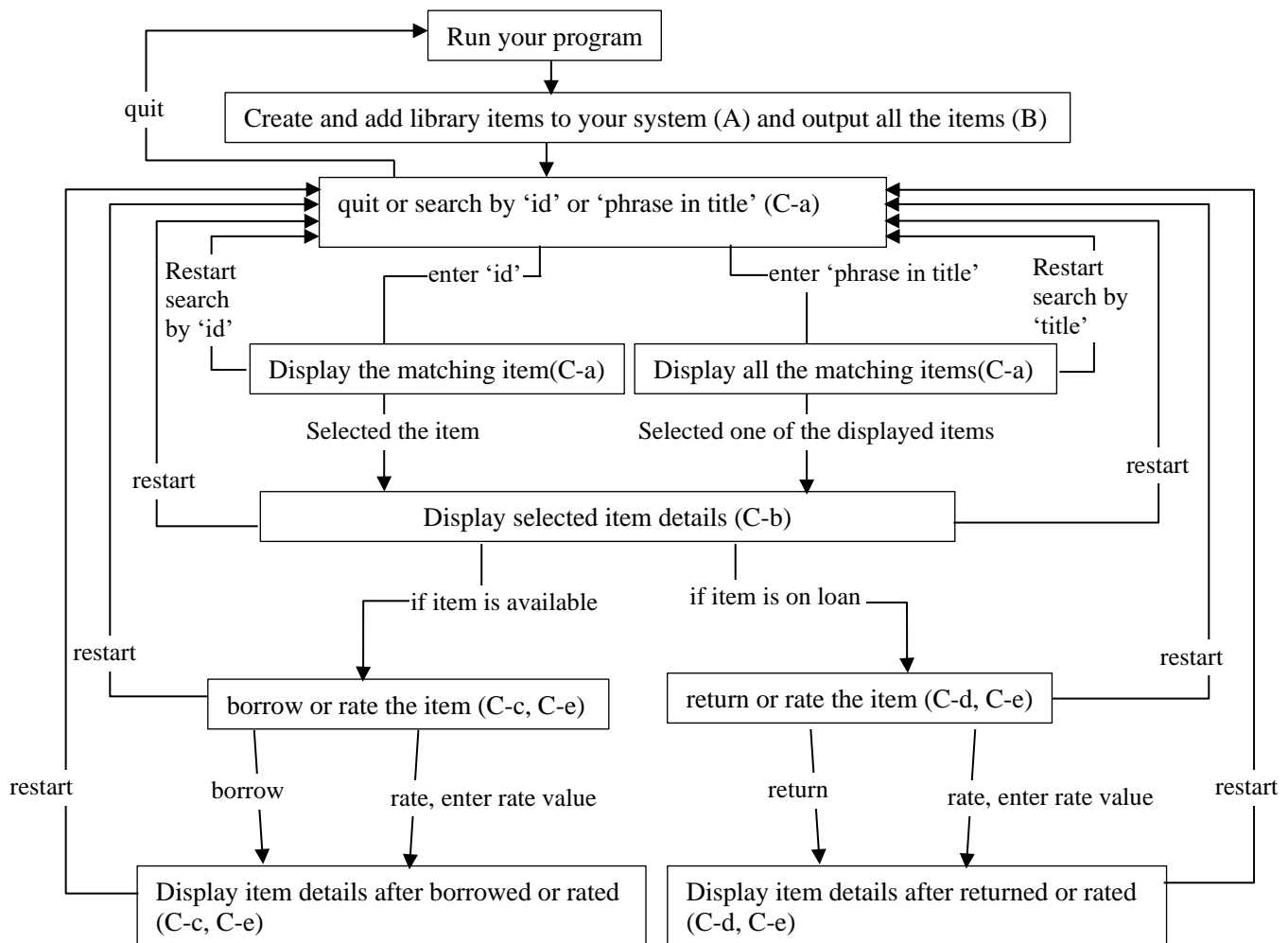
1. Problem to solve:

You are asked to write a program to be used by Massey University Library. There are **three types** of items that can be borrowed from the library – **Books, Journals** and **Movies**. The library keeps records of each item's **type, id, title, year, average rating, number of reviews, and max number of days for borrowing** (28 days for books, 14 days for journals, and 7 days for movies). If an item is **on loan**, its **due date** should also be recorded. Other information you should record: **author** and **number of pages** for books, **director** for movies, and **volume** and **number** for journals.

2. Tasks: Your program should

- Read text file **library.txt**; for each line in the file create a Movie/Book/Journal object and add the object to the library object.
- Output all items in the library
- Prompt questions to allow users to do the following (see attached output for more details):
 - Search** items by **id** or **phrase in title**, and list the items found
 - Select** an item from the listed items of a search result and display its details
 - Borrow** the selected item if it is available, and display new due date, or
 - Return** the selected item if it is on loan, or
 - Rate** the selected item, and display new average rating

Functions workflow (related tasks are marked as A, B, C-a, C-b, C-d, C-d, and C-e):



3. Design and Implementation Guideline

Note: The following **OOP and general software design concepts** will be checked while marking the program

- 1) Class design and implementation
 - b. data fields – internal data not accessed by external classes
 - c. methods
 - d. constructors
- 2) Encapsulation design and implementation – proper use of modifiers
 - a. private
 - b. protected
 - c. public
- 3) Inheritance design and implementation
 - a. Reasonable class hierarchies
 - b. Proper data fields separation in base and derived classes
 - c. Proper methods separation/overloading/overriding in base and derived classes
 - d. Proper use of base and derived class constructors
- 4) Polymorphism and implementation
 - a. Write generic code that targets the base class whenever possible
 - b. Appropriate use of overriding in derived classes to realize polymorphism
- 5) Information store and implementation
 - a. Use ArrayList or other Java collection class to store information.
 - b. Must make use of getters and/or setters wherever appropriate.
- 6) Exception handling
 - a. Throw an exception object when an application error occurs (For example, an invalid piece of data is entered)
 - b. Using “try/catch/finally” or “try/catch” block to handle the exception

4. You must follow the next three specifications in **each and every assignment for this course**
- 1) Place the following comments at the top of your program code and **provide the appropriate information**:

```
// Family Name, Given Name, Student ID, Assignment number, 159.234
/* explain what the program is doing . . . */
```

- 2) Create the function *displayInfo* and **provide the appropriate information** as shown below:

```
-----
Assignment 2 Semester 1 2021
Submitted by: Mouse, Mickey 12345678
             and Donald, Duck 98765432
-----
```

The *displayInfo* should be the first thing that you display on the screen.

- 3) **DO NOT** use any function to clean the screen at any stage of a program, for any assignment in this course.

5. **Hand-in:** Submit all your .java file as **a2.zip** electronically on the course stream site.

Marks will be allocated for: correctness, completeness, no code duplication, applying OOP core concepts appropriately, documentation, clear on screen output display...

6. Output of a sample solution

Task A: Add the test data (see library.txt file) into your system.

This is the content of the provided library.txt for test purpose.

Movie,200,Remember The Alamo,1945,George Smith	}	Record of movie: Type, Id, title, year, director
Movie,203,Lord of the ring: the fellowship of the ring,2001,Pete Jackson		
Movie,206,Lord of the ring: the two towers,2002,Peter Jackson		
Movie,210,Going for the Touchdown,1984,Frank Madden		
Movie,211,Martian Hairdresser,1992,Debbie Gold		
Book,231,How to Make Money,1987,Phil Barton,324	}	Record of book: Type, Id, title, year, author, number of pages
Book,240,Garden Projects At Home,1998,Mary Freeman,164		
Book,202,The Haunted House Mystery,1996,Bert Morgan,53		
Journal,207,ACM,2009,6,8	}	Record of journal: Type, Id, title, year, volume, number
Journal,212,ACM,2010,5,8		
Journal,215,J of Logic,2008,23,14		
Journal,231,J of AI,2009,35,1		

Task B output: all the items in the library:

```

-----
Assignment 2 Semester 1 2021
Submitted by: Mouse, Mickey 12345678
              and Donald, Duck 98765432
-----
Type: Movie
Title: Remember The Alamo
ID: 200
Year: 1945
Average rating: 0.0
Number of reviewers: 0
Status: available
Director: George Smith
Max number of days for borrowing: 7
-----
Type: Movie
Title: Lord of the ring: the fellowship of the ring
ID: 203
Year: 2001
Average rating: 0.0
Number of reviewers: 0
Status: available
Director: Pete Jackson
Max number of days for borrowing: 7
-----
Type: Movie
Title: Lord of the ring: the two towers
ID: 206
Year: 2002
Average rating: 0.0
Number of reviewers: 0
Status: available
Director: Peter Jackson
Max number of days for borrowing: 7
-----
Type: Movie
Title: Going for the Touchdown
ID: 210
Year: 1984
Average rating: 0.0
Number of reviewers: 0
Status: available
Director: Frank Madden
Max number of days for borrowing: 7

```

First, Output all items' details one by one

The initial value of 'Average rating' should be set to 0.0 for all items – no rating at the beginning

The initial value of 'Number of reviewers' should be set to 0 for all items – no reviewer at the beginning

The initial value of 'Status' should be set to 'available' for all items – not on loan yet

```
-----
Type: Movie
Title: Martian Hairdresser
ID: 211
Year: 1992
Average rating: 0.0
Number of reviewers: 0
Status: available
Director: Debbie Gold
Max number of days for borrowing: 7
-----

Type: Book
Title: How to Make Money
ID: 231
Year: 1987
Average rating: 0.0
Number of reviewers: 0
Status: available
Author: Phil Barton
Number of pages: 324
Max number of days for borrowing: 28
-----

Type: Book
Title: Garden Projects At Home
ID: 240
Year: 1998
Average rating: 0.0
Number of reviewers: 0
Status: available
Author: Mary Freeman
Number of pages: 164
Max number of days for borrowing: 28
-----

Type: Book
Title: The Haunted House Mystery
ID: 202
Year: 1996
Average rating: 0.0
Number of reviewers: 0
Status: available
Author: Bert Morgan
Number of pages: 53
Max number of days for borrowing: 28
-----
```

```
-----
Type: Journal
Title: ACM
ID: 207
Year: 2009
Average rating: 0.0
Number of reviewers: 0
Status: available
Volume: 6
Number: 8
Max number of days for borrowing: 14
-----
Type: Journal
Title: ACM
ID: 212
Year: 2010
Average rating: 0.0
Number of reviewers: 0
Status: available
Volume: 5
Number: 8
Max number of days for borrowing: 14
-----
Type: Journal
Title: J of Logic
ID: 215
Year: 2008
Average rating: 0.0
Number of reviewers: 0
Status: available
Volume: 23
Number: 14
Max number of days for borrowing: 14
-----
Type: Journal
Title: J of AI
ID: 231
Year: 2009
Average rating: 0.0
Number of reviewers: 0
Status: available
Volume: 35
Number: 1
Max number of days for borrowing: 14
-----
Enter 'q' to quit, enter 'i' to search by ID, or enter any other key to search by phrase in title
```

After you output all items, prompt these options to allow the user to choose a search method

Task C: Prompt questions to allow the user to select all the functions:

```
-----
Enter 'q' to quit, enter 'i' to search by ID, or enter any other key to search by phrase in title
i

Enter ID to start search, or enter 'b' to go back to choose search method
211
-----
Type: Movie
Title: Martian Hairdresser
ID: 211
Year: 1992
Average rating: 0.0
Number of reviewers: 0
Status: available
Director: Debbie Gold
Max number of days for borrowing: 7
-----

Enter 'i' to search other item by ID, or enter any other key to select this item
s

Selected item is
-----
Type: Movie
Title: Martian Hairdresser
ID: 211
Year: 1992
Average rating: 0.0
Number of reviewers: 0
Status: available
Director: Debbie Gold
Max number of days for borrowing: 7
-----

Enter 'b' to borrow the item, enter 'a' to rate the item, or enter any other key to restart
b

The item's due data is 2020/04/05

Selected item is
-----
Type: Movie
Title: Martian Hairdresser
ID: 211
```

If 'b' is entered, previous options will be prompted

 Enter 'b' to borrow the item, enter 'a' to rate the item, or enter any other key to restart

b

The item's due data is 2020/04/05

Due date is current date + max number of days for borrowing.

Selected item is

To calculate data in Java, you may use java library java.util.Calendar, java.text.SimpleDateFormat, etc.

 Type: Movie

Title: Martian Hairdresser

ID: 211

Year: 1992

Average rating: 0.0

Number of reviewers: 0

Status: on loan

The item's status changed to 'on loan' after being borrowed

Due date: 2020/04/05

Director: Debbie Gold

Max number of days for borrowing: 7

Enter 'r' to return the item, enter 'a' to rate the item, or enter any other key to restart

a

Please enter you rating (0 - 10)

8

The item's new average rating is 8.0

Selected item is

 Type: Movie

Title: Martian Hairdresser

ID: 211

Year: 1992

Average rating: 8.0

Only one rating is available so the user entered rating value (8 in this example) equal to the 'Average rating'

Number of reviewers: 1

Status: on loan

'Number of reviewers' changed from 0 to 1 after the first rating

Due date: 2020/04/05

Director: Debbie Gold

Max number of days for borrowing: 7

Enter 'r' to return the item, enter 'a' to rate the item, or enter any other key to restart

a

Please enter you rating (0 - 10)

6


```

Enter 'r' to return the item, enter 'a' to rate the item, or enter any other key to restart
a
Please enter you rating (0 - 10)
6
The item's new average rating is 7.0

Selected item is
-----
Type: Movie
Title: Martian Hairdresser
ID: 211
Year: 1992
Average rating: 7.0
Number of reviewers: 2
Status: on loan
Due date: 2020/04/05
Director: Debbie Gold
Max number of days for borrowing: 7
-----

Enter 'r' to return the item, enter 'a' to rate the item, or enter any other key to restart
r
The item is returned

Selected item is
-----
Type: Movie
Title: Martian Hairdresser
ID: 211
Year: 1992
Average rating: 7.0
Number of reviewers: 2
Status: available
Director: Debbie Gold
Max number of days for borrowing: 7
-----

Enter 'b' to borrow the item, enter 'a' to rate the item, or enter any other key to restart
s

Enter 'q' to quit, enter 'i' to search by ID, or enter any other key to search by phrase in title
t

Enter phrase in title to start search, or enter 'b' to go back to chose search method
Lord

```

Multiple rating for one item is allowed from one user, so after the second rating, the 'Average rating' is: $(8+6)/2=7$

'Number of reviewers' changed from 1 to 2 after the second rating

'Status' becomes 'available' after the item is returned

Enter phrase in title to start search, or enter 'b' to go back to chose search method

Lord

* 1 -----

Type: Movie

Title: Lord of the ring: the fellowship of the ring

ID: 203

Year: 2001

Average rating: 0.0

Number of reviewers: 0

Status: available

Director: Pete Jackson

Max number of days for borrowing: 7

* 2 -----

Type: Movie

Title: Lord of the ring: the two towers

ID: 206

Year: 2002

Average rating: 0.0

Number of reviewers: 0

Status: available

Director: Peter Jackson

Max number of days for borrowing: 7

Enter item number to select item, or enter any other key to continue searching

2

Selected item is

Type: Movie

Title: Lord of the ring: the two towers

ID: 206

Year: 2002

Average rating: 0.0

Number of reviewers: 0

Status: available

Director: Peter Jackson

Max number of days for borrowing: 7

Enter 'b' to borrow the item, enter 'a' to rate the item, or enter any other key to restart

Enter 'b' to borrow the item, enter 'a' to rate the item, or enter any other key to restart

start again

Enter 'q' to quit, enter 'i' to search by ID, or enter any other key to search by phrase in title

q

Process finished with exit code 0

There are two items whose titles include 'Lord' – see number '*1' and number '*2'