East West University
Department of Computer Science and Engineering

CSE 110: LAB 07 (Lab Exam)
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Question 1 (4 marks):

An Armstrong number is an integer such that the sum of the cubes of its digits is equal to the number itself. For example, 1 is an Armstrong number since $1^3 = 1$. Again, 371 is an Armstrong number since $3^3 + 7^3 + 1^3 = 371$.

Write a program in Java that takes a series of numbers (from 0 to 999) and prints whether the number is an Armstrong number. Use scanner class to take the inputs and input is terminated when the user enters 0. A sample input and output for this program is given below.

```
Sample Input:          Sample Output:
371                    371 is an Armstrong number
150                    150 is not an Armstrong number
153                    153 is an Armstrong number
0
```

Question 2 (6 marks):

The following diagram shows relationships among three classes: Author, Book and Publisher.

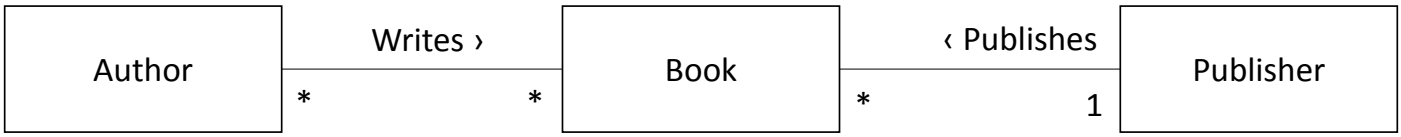

Figure 1: Relationship Diagram

Define these classes as per the following definitions.

Author	**Book**	**Publisher**
- authorId: int - authorName: String - authorCountry: String	- ISBN: int - bookTitle: String - bookPrice: double - publishingDate: Calendar - authorList: Author[] - publisher: Publisher - numberOfAuthors: int	- publisherId: int - publisherName: String - publisherCountry: String

// add constructors
// add appropriate getters and setters
+ toString(): String
	// add constructors
	// add appropriate getters and setters
	+ toString(): String
	+ addAuthor(Author): void
	+ dropAuthor(authorId): void
	+ addPublisher(Publisher): void
	+ dropPublisher(): void
		// add constructors
		// add appropriate getters and setters
		+ toString(): String

You must write a Main class that should have the following public static variables and methods:

i) Keep a public static type array of Authors to hold all authors. Choose reasonable size for the array.

(Example: `public static Author[] authors = new Author[10];`)

ii) Do the same for holding books and publishers list.
iii) Define a static method `searchBooks(ISBN)` that takes the ISBN of the book as the parameter and prints all details about that book including author names and publisher name.
iv) Define a static method `showBooksByPublisher(publisherId)` that takes the publisher id as the parameter and prints the ISBN, title and publishing date of the books published by that publisher.
v) Define a static method `updateAuthor(authorId)` that takes the author id as the parameter and prompts the user to provide modified value for author name and country.
vi) (Bonus Task): Define a static method `showBooksByAuthor(authorId)` that takes the author id as the parameter and prints the book title and book price of all books which are written by that author.

Inside your main method, you must do the followings:

i) Create a few objects of Author, Book and Publisher type and store them appropriately.
ii) Add a few authors in the author list of several books by calling `addAuthor(Author)` instance method of Book class.
iii) Drop an author from the author list of a book by calling `dropAuthor(authorId)` instance method of Book class.
iv) Add a publisher for several books by calling `addPublisher(Publisher)` instance method of the book class.
v) Call the above-mentioned methods - `searchBooks(ISBN)`, `showBooksByPublisher(publisherId)`, `updateAuthor(authorId)` and `showBooksByAuthor(authorId)` to demonstrate their functionalities.