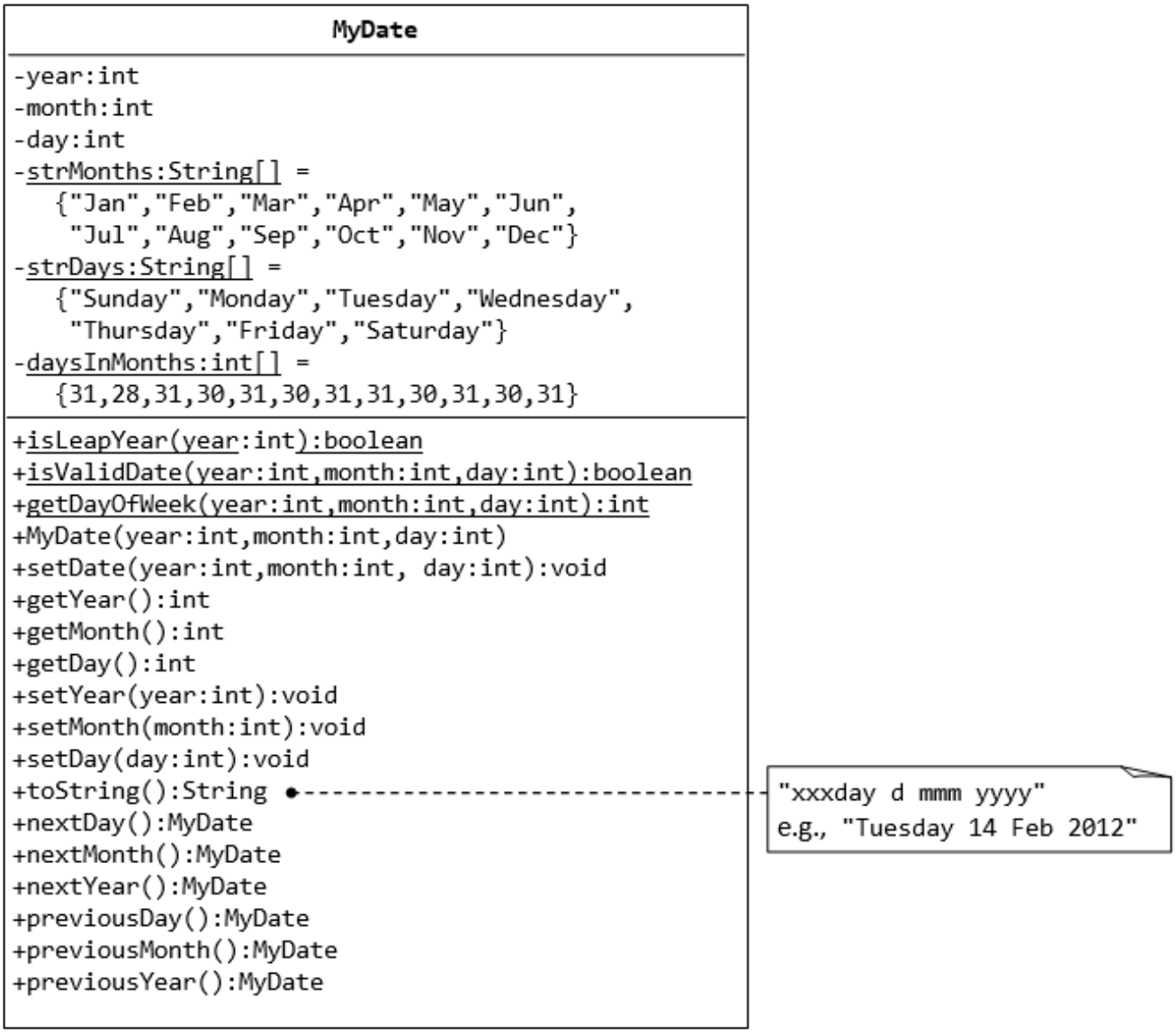
Lab 09: Object Oriented Programming

Objectives:

- Putting Things together

Exercise 1



A class called `MyDate`, which models a date instance, is defined as shown in the class diagram.

The `MyDate` class contains the following `private` instance variables:

- `year` (`int`): Between 1 to 9999.

- `month` (`int`): Between `1` (Jan) to `12` (Dec).
- `day` (`int`): Between `1` to `28|29|30|31`, where the last day depends on the month and whether it is a leap year for Feb (`28|29`).

It also contains the following `private static` variables (drawn with underlined in the class diagram):

- `strMonths` (`String[]`), `strDays` (`String[]`), and `dayInMonths` (`int[]`): `static` variables, initialized as shown, which are used in the methods.

The `MyDate` class has the following `public static` methods (drawn with underlined in the class diagram):

- `isLeapYear(int year)`: returns `true` if the given `year` is a leap year. A year is a leap year if it is divisible by 4 but not by 100, or it is divisible by 400.
- `isValidDate(int year, int month, int day)`: returns `true` if the given `year`, `month`, and `day` constitute a valid date. Assume that `year` is between `1` and `9999`, `month` is between `1` (Jan) to `12` (Dec) and `day` shall be between `1` and `28|29|30|31` depending on the `month` and whether it is a leap year on Feb.
- `getDayOfWeek(int year, int month, int day)`: returns the day of the week, where `0` for Sun, `1` for Mon, ..., `6` for Sat, for the given date. Assume that the date is valid.
- The `MyDate` class has one constructor, which takes 3 parameters: `year`, `month` and `day`. It shall invoke `setDate()` method (to be described later) to set the instance variables.

The `MyDate` class has the following `public` methods:

- `setDate(int year, int month, int day)`: It shall invoke the `static` method `isValidDate()` to verify that the given `year`, `month` and `day` constitute a valid date. (Advanced: Otherwise, it shall throw an `IllegalArgumentException` with the message "Invalid year, month, or day!".)
- `setYear(int year)`: It shall verify that the given `year` is between `1` and `9999`. (Advanced: Otherwise, it shall throw an `IllegalArgumentException` with the message "Invalid year!".)
- `setMonth(int month)`: It shall verify that the given `month` is between `1` and `12`. (Advanced: Otherwise, it shall throw an `IllegalArgumentException` with the message "Invalid month!".)
- `setDay(int day)`: It shall verify that the given `day` is between `1` and `dayMax`, where `dayMax` depends on the `month` and whether it is a leap year for Feb. (Advanced: Otherwise, it shall throw an `IllegalArgumentException` with the message "Invalid month!".)

- `getYear()`, `getMonth()`, `getDay()`: return the value for the `year`, `month` and `day`, respectively.
- `toString()`: returns a date string in the format "`xxxday d mmm yyyy`", e.g., "Tuesday 14 Feb 2012".
- `nextDay()`: update `this` instance to the next day and return `this` instance. Take note that `nextDay()` for `31 Dec 2000` shall be `1 Jan 2001`.
- `nextMonth()`: update `this` instance to the next month and return `this` instance. Take note that `nextMonth()` for `31 Oct 2012` shall be `30 Nov 2012`.
- `nextYear()`: update `this` instance to the next year and return `this` instance. Take note that `nextYear()` for `29 Feb 2012` shall be `28 Feb 2013`. (Advanced: throw an `IllegalStateException` with the message "Year out of range!" if year > 9999.)
- `previousDay()`, `previousMonth()`, `previousYear()`: similar to the above.

Write the code for the `MyDate` class.

Use the following test statements to test the `MyDate` class:

```
MyDate d1 = new MyDate(2012, 2, 28);

System.out.println(d1);             // Tuesday 28 Feb 2012

System.out.println(d1.nextDay());   // Wednesday 29 Feb 2012

System.out.println(d1.nextDay());   // Thursday 1 Mar 2012

System.out.println(d1.nextMonth()); // Sunday 1 Apr 2012

System.out.println(d1.nextYear());  // Monday 1 Apr 2013

MyDate d2 = new MyDate(2012, 1, 2);

System.out.println(d2);                 // Monday 2 Jan 2012

System.out.println(d2.previousDay());   // Sunday 1 Jan 2012

System.out.println(d2.previousDay());   // Saturday 31 Dec 2011

System.out.println(d2.previousMonth()); // Wednesday 30 Nov 2011

System.out.println(d2.previousYear());  // Tuesday 30 Nov 2010

MyDate d3 = new MyDate(2012, 2, 29);

System.out.println(d3.previousYear());  // Monday 28 Feb 2011

// MyDate d4 = new MyDate(2099, 11, 31); // Invalid year, month, or day!

// MyDate d5 = new MyDate(2011, 2, 29);  // Invalid year, month, or day!
```