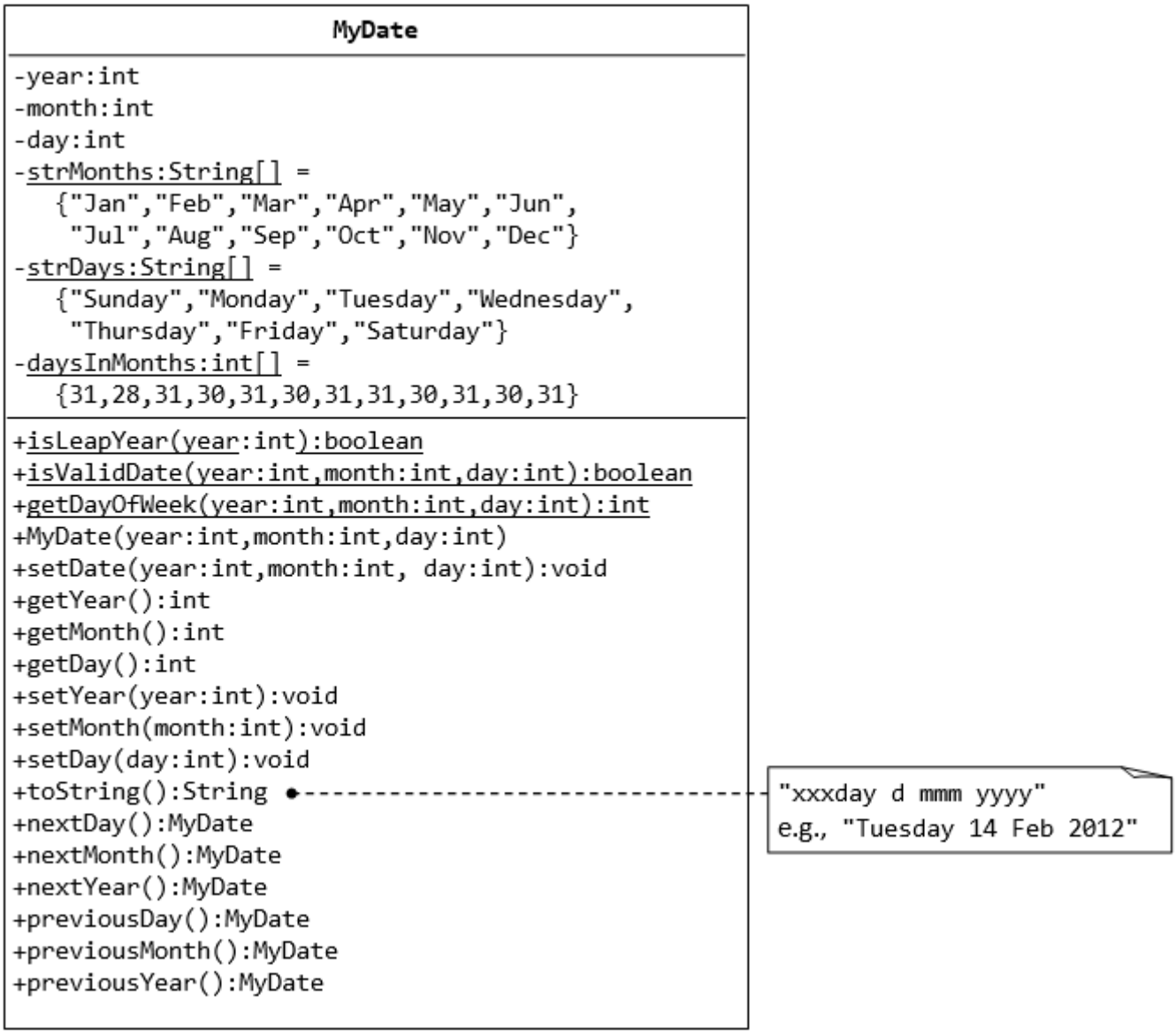
3.5 Ex: The MyDate Class



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. Pozn.: tato metoda je statická, protože se použije v konstruktoru pro ověření, zda je datum platné. Tedy se metoda zavolá dříve, než je instance vytvořena. Podobně i další metoda.

- `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. Read the earlier exercise on how to determine the day of the week (or Wiki "Determination of the day of the week"). Pozn.: tato metoda by mohla být i instanční, vyzkoušejte obě verze.

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!
```

Write a test program that tests the `nextDay()` in a loop, by printing the dates from `28 Dec 2011` to `2 Mar 2012`.
