05.02 Virtual Lecture Notes (Part 1)

Is your birthday 02/04/03? If you were born in the United States on February 4, 2003 the answer would be yes. If you were born in Europe on April 2, 2003 the answer would be yes. If you were born in South Africa on April 3, 2002 your answer would be yes. Confused? For this reason the International Organization for Standardization (ISO) developed a standard way to express a numeric calendar date that eliminates ambiguity. Their format is year first, followed by month, then day with each separated with a hyphen (“-“). So a birthdate of 2003-02-04 would be February 4, 2003 for everyone no matter the country of their birth.

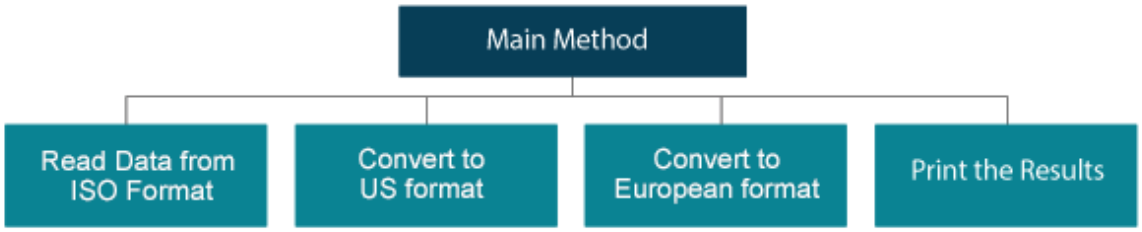
The purpose of this demo program is to convert a date between ISO format and US and European format. Applying procedural abstraction, the task can be divided into smaller functional units, which will eventually become static methods.

1. Read a date in ISO format
2. Convert to US format
3. Convert to European format
4. Print the results.

The **`main()`** method will call each static method, passing along any arguments required.

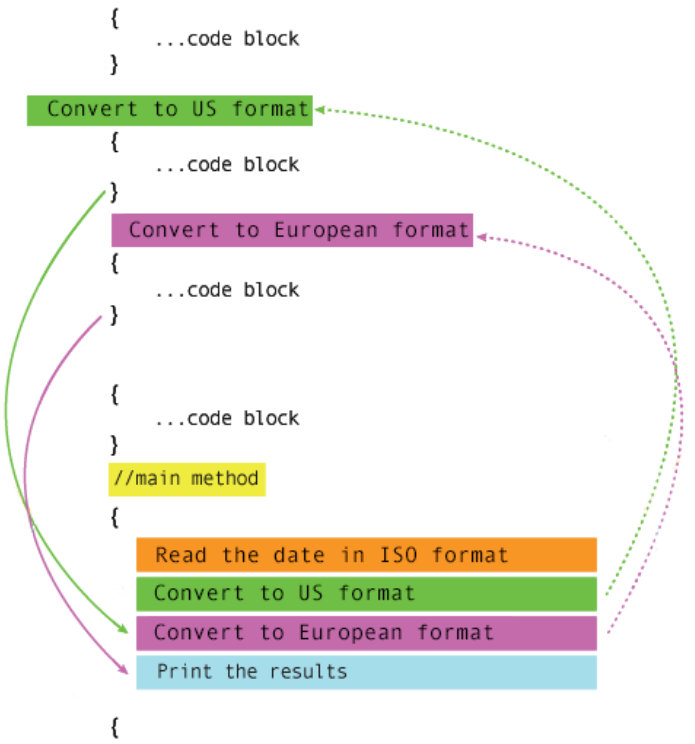
Based on this design, the **`main()`** method would call four methods to complete the task.

Initially, the hardest thing to get a handle on when a program is written with methods is the organizational structure flow of control within the program. Sometimes a picture is worth several hundred lines of code, so programmers often start by laying out a modular design as shown below.



This diagram illustrates the organizational hierarchy of the static methods in relation to the **`main()`** method and implies that execution will proceed from left to right; however, what you need at this stage is a way to superimpose on the organizational structure the flow of control within the program. Although the following diagram may appear a little jumbled, the arrows reveal how the **`main()`** method will call each of the static methods and where control returns after executing each code block. Method calls are shown with the dotted

arrows on the right and returns are shown with solid arrows on the left. The top-down nature of the algorithm is depicted as the main method calls each method in turn from top to bottom. Start with the first statement in the **`main()`** method and follow the arrows to gain a sense of how this program executes.



Analyzing structure and flow of control is good programming practice and is essential to the design of effective and efficient code. In fact, notice that no code has been discussed at this point. Planning always saves time!

The program (color coded) to analyze the date converter is shown below. Please study it carefully and run the program previously downloaded.

```
import java.util.Scanner;
public class DateFormatConverter
{
     //convert the ISO date format YYYY-MM-DD to US date format MM/DD/YYYY
     public static String convertToUS(String date)
     {
          int pos1 = date.indexOf("-");
          String year = date.substring(0, pos1);

          String temp = date.substring(pos1 + 1);
          int pos2 = temp.indexOf("-");
```

```
        String month = temp.substring(0, pos2);
        String day = temp.substring(pos2 + 1);
        return month + "/" + day + "/" + year;
    }

    //convert the ISO date format YYYY-MM-DD to European date format DD/MM/YYYY
    public static String convertToEuropean(String date)
    {
        int pos1 = date.indexOf("-");
        String year = date.substring(0, pos1);

        String temp = date.substring(pos1 + 1);
        int pos2 = temp.indexOf("-");
        String month = temp.substring(0, pos2);

        String day = temp.substring(pos2 + 1);
        return day + "/" + month + "/" + year;
    }

    //the main method
    public static void main(String[] args)
    {
        //read in the ISO date
        Scanner in = new Scanner(System.in);
        System.out.println("Enter the ISO formatted date YYYY-MM-DD");
        String isoDate = in.nextLine();

        String usDate = convertToUS(isoDate);

        String euroDate = convertToEuropean(isoDate);

        // print the results
        System.out.println("ISO Date: " + isoDate);
        System.out.println("US Date: " + usDate);
        System.out.println("US Date: " + usDate);
        System.out.println("European Date: " + euroDate);
    }//end main
}//end class
```

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