Assignment 3
Test Case Design for White Box Testing

CS4004 – Software Testing and Inspection

~~Submission Date: Thursday, 22/03/2012~~
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1. Specification of the behavior of the program

The program accepts a date as input, in the format "dd/mm/yyyy" (where these letters stay for digits), validates it and display a message accordingly.

- If date is valid, a message displaying the date in words with the day of the week (*"Date is: <DayOfWeek>, <dd> <MonthFullname> <yyyy>"*) is shown.

- If date is <u>not</u> valid, the message *"Date entered is invalid"* is shown.

- If input is incorrect, the message *"Format of input is incorrect – correct format is: dd/mm/yyyy"* is shown.

The program uses two functions to perform its work:

- **Date validation**: predicate; accepts and <u>assumes</u> a date as "dd/mm/yyyy";

  - <dd>,<mm>,<yyyy> must have valid values (<dd> according to <mm> and considering the leap year)

- **Date in words**: <u>assumes</u> a valid date

  - Calculates the day of the week, convert <mm> to its fullname textual representation, and return *"Date is: <DayOfWeek>, <dd> <MonthFullname> <yyyy>"*

(No. of words (calculated by gedit) = 148)

2. Test Oracle

A suitable test oracle for this program is one that reliably specifies the expected outcomes for a series of input dates (in the format "dd/mm/yyyy").

It must be able to recognize wheter a date is valid or invalid. In particular, it must be able to know if a given year is a leap year or not. It should also be able to know the day of the week of a given date.
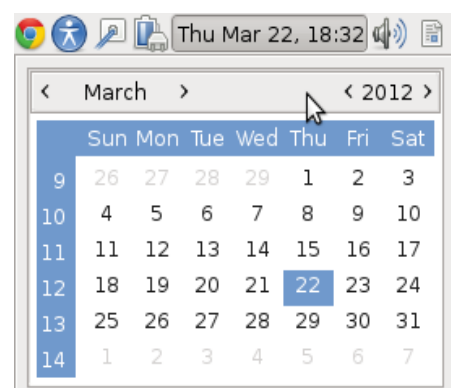
To this aim, for the need of this assignment, <u>considered the set of testcases</u> (shown in the following section), **a human being's judgement** (e.g. for what concerns the fact that a date with day or month or year equals to zero is invalid) **with the aid of a software calendar** (such as those available with the operating system) **is a suitable oracle**.

For more advanced tests on dates it may have sense to leverage on software libraries. They are reliabile.

E.g. in ruby =>

Date.new(2012,2,29).wday # => 3 (wednesday)

Date.new(2011,2,29) # => ArgumentError: invalid date

3. Documentation of Test Cases

Test Case Number	Test Case Description	Expected Outcome
1	1/03/2012	"Format of input is incorrect - correct format is: dd/mm/yyyy"
2	00/03/2012	"Date entered is invalid"
3	32/01/2012	"Date entered is invalid"
4	29/02/2012	"Date is: Wednesday, 29 February 2012"
5	01/03/2012	"Date is: Thursday, 1 March 2012"
6	01/00/2012	"Date entered is invalid"
7	01/01/0000	"Date entered is invalid"
8	01/13/2012	"Date entered is invalid"
9	29/03/2012	"Date is: Thursday, 29 March 2012"
10	29/02/2001	"Date entered is invalid"
11	29/02/2000	"Date is: Tuesday, 29 February 2000"

4. Test Cases for Statement Coverage

Test Case Number	Test Case Description	Expected Outcome	Covered code lines
1	1/01/2012	"Format of input is incorrect - correct format is: dd/mm/yyyy"	1-12, 21-23, 40, 59-60
2	00/01/2012	"Date entered is invalid"	13-17, 20, 24-34, 38-39
3	32/01/2012	"Date entered is invalid"	37
4	29/02/2012	"Date is: Wednesday, 29 February 2012"	18-19, 35-36, 41-58

Statement coverage = 100% (All the lines 1-60 are covered)

5. Test Cases for Decision Coverage

Test Case Number	Test Case Description	Expected Outcome	Decision line	Decision result
1	1/01/2012	"Format of input is incorrect - correct format is: dd/mm/yyyy"	11	T
2	00/01/2012	"Date entered is invalid"	11 16 34	F T T
3	32/01/2012	"Date entered is invalid"	34 35-36 37	F F T
4	29/02/2012	"Date is: Wednesday, 29 February 2012"	16 35-36 49	F T T
5	01/03/2012	"Date is: Thursday, 1 March 2012"	37 49	F F

Decision coverage = 100% (All the decisions are covered – i.e. they take both True and False values in the set of test cases)

Decisions:
Line 11   ✓
Line 16   ✓
Line 34   ✓
Line 35-36   ✓
Line 37   ✓
Line 49   ✓

5. Test Cases for Decision/Condition Coverage

Test Case Number	Test Case Description	Expected Outcome	Decision Line	Condition Number	Decision Result
1	1/01/2012	"Format of input is incorrect - correct format is: dd/mm/yyyy"	11	C1	T
2	00/01/2012	"Date entered is invalid"	11	C1	F
			16	C1	T

Test Case Number	Test Case Description	Expected Outcome	Decision Line	Condition Number	Decision Result
			34	C1	T
3	32/01/2012	"Date entered is invalid"	34	C1 C2 C3 C4	F F F F
			35-36	C1	F
			37	C1	T
4	29/02/2012	"Date is: Wednesday, 29 February 2012"	16	C1	F
			35-36	C1 C2 C3 C3.1 C3.1.1 C3.1.2	T T T T T T
			49	C1	T
5	01/03/2012	"Date is: Thursday, 1 March 2012"	37	C1	F
			49	C1	F
6	01/00/2012	"Date entered is invalid"	34	C2	T
7	01/01/0000	"Date entered is invalid"	34	C3	T
8	01/13/2012	"Date entered is invalid"	34	C4	T
9	29/03/2012	"Date is: Thursday, 29 March 2012"	35-36	C2	F
10	29/02/2001	"Date entered is invalid"	35-36	C3 C3.1 C3.1.1 C3.2	F F F F
11	29/02/2000	"Date is: Tuesday, 29 February 2000"	35-36	C3.1.2 C3.2	F T

Decision/Condition coverage = 100% (All the conditions are covered – i.e. they takes both True and False values in the set of test cases, as well as all the decisions)

Line 11   – C1   ✓
Line 16   – C1   ✓
Line 34   – C1, C2, C3, C4   ✓
Line 35-36   – C1, C2, C3, C3.1, C3.2, C3.1.1, C3.1.2   ✓
Line 37   – C1   ✓
Line 49   – C1   ✓