COST ESTIMATION
MeteoCal

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10/02/2015

Contents

1. FP

1.1 Internal Logic Files

The application includes a number of ILFs that will be used to store the information about:

Name	**Complexity**	**FPs**
Users	SIMPLE	7
Events	COMPLEX	15
Invites	MEDIUM	10
Notifications	MEDIUM	10
Weather conditions	SIMPLE	7
	TOTAL FPs:	**49**

- We consider USERS and WEATHER CONDITIONS as simple weight entities, because of their small number of fields. In this case, for WEATHER CONDITIONS we intend the accepted weather conditions for the event.
- We consider INVITES and NOTIFICATIONS as a medium weight entities because of their relations with other entities (both with EVENT and USER).
- We consider EVENTS as a high weight entity because oh its high number of fields and its relations with USERS for determine the organizer and the two relations with WEATHER CONDITIONS for determine the accepted weather conditions for the organizer and the weather forecast for the event location.

1.2 External Logic Files

Name	Complexity	FPs
Weather conditions	SIMPLE	5
	TOTAL FPs:	**5**

In this case, for WEATHER CONDITION we intend the weather forecast for the events. This is an external logic file because the weather forecast are received from an external meteo service. Since this entity is composed by a small number of fields, we can consider it as simple weight entity.

1.3 External Inputs

Name	Complexity	FPs
Sign up	MEDIUM	4
Log in	SIMPLE	3
Log out	SIMPLE	3
Modify profile	SIMPLE	3
Create event	COMPLEX	6
Modify event	COMPLEX	6
Delete event	COMPLEX	6
Send invitation to event	COMPLEX	6
Suggest registration	MEDIUM	4
Import calendar	COMPLEX	6
	TOTAL FPs:	**47**

- Sign up: it is a medium complexity external input, because it requires some checks before the creation of a new user.
- Log in, Log out, Modify Profile: these are simple complexity external inputs, because they involve only the entity USERS.
- Suggest Registration: it is a medium complexity external inputs, because some checks have to be done before sending the email (which has to be generated).
- Create Event, Modify Event, Delete Event, Send Invitation To Event and Import Calendar: these are complex external inputs, because all concernings events requires many checks (date consistency, creation of notification, update weather information in case of outdoor events,...).

1.4 External Inquiries

Name	Complexity	FPs
See own profile	MEDIUM	4
See own created events	MEDIUM	4
See event information	MEDIUM	4
See own notifications	MEDIUM	4
Search for a user	MEDIUM	4
See other user's profile	MEDIUM	4
Export calendar	MEDIUM	4
	TOTAL FPs:	**28**

All these external inquiries are of medium complexity because they perform some interrogation to the database in order to generate the requested results.

1.5 External Outputs

Name	Complexity	FPs
Suggest of a new date for an event	MEDIUM	5
Update the weather forecasts	MEDIUM	5
Send notifications	MEDIUM	5
Send emails	MEDIUM	5
	TOTAL FPs:	**20**

All these external outputs are of medium complexity.

1.6 Total FPs

The total sum of the previous defined function points is:
49 + 5 + 47 + 28 + 20 = 149 FPs
This result is the value of the UFP (Unadjusted Function Point).
Considering the fact that, on average, an FP requires 46 lines of code, the function point analysis estimates a project size of about: **6.8 KLOCS**.
Our implementation consists of **6.2 KLOCS**, the KLOCS value optained from the FP is comparable with our implementation.

2. COCOMO II

Now we take the KLOCS calculated in the previous part and we use them with the COCOMO approach that allows us to make an estimate of:

- Effort
- Duration
- Number of people

required by the application.

In order to calculare the Effort and the Duration we need to know 3 parameters:

- EAF: Effort Adjustment Factor derived from Cost Drivers
- E: Exponent derived from Scale Drivers
- SE: Schedule equation exponent derived from Scale Drivers

We derive them from Scale Drivers and Cost Drivers.

2.1 Scale Drivers

Scale Driver	**Name**		**Value**
PREC	Precedentedness	NOMINAL	2.43
FLEX	Development Flexibility	VERY HIGH	1.21
RESL	Architecture/Risk Resolution	NOMINAL	2.53
TEAM	Team Cohesion	EXTRA HIGH	0
PMAT	Process Maturity	NOMINAL	2.73

$$E = B + 0.1 * \sum_{i=1}^{5} SD_i = 1.01 + 0.01 * 8.9 = 1.099$$

$$SE = 0.28 + 0.2 * (E - B) = 0.2978$$

2.2 Cost Drivers

Cost Driver	Name		Value
RELY	Required Software Reliability	LOW	0.88
DATA	Data Base Size	LOW	0.93
CPLEX	Product Complexity	NOMINAL	1
RUSE	Required Reusability	NOMINAL	1
DOCU	Documentation Match	NOMINAL	1
TIME	Execution Time Constraint	NOMINAL	1
STOR	Main Storage Constraint	NOMINAL	1
PVOL	Platform Volatility	LOW	0.87
ACAP	Analyst Capability	NOMINAL	1
PCAP	Programmer Capability	NOMINAL	1
AEXP	Applications Experience	VERY LOW	1.22
PEXP	Platform Experience	VERY LOW	1.25
LTEX	Language and Tool Experience	LOW	1.10
PCON	Personnel Continuity	VERY HIGH	0.84
TOOL	Use of Software Tools	NOMINAL	1
SITE	Multisite Development	VERY HIGH	0.84
SCED	Required Development Schedule	VERY HIGH	1

$$\boxed{EAF = \prod_{i=1}^{17} C_i = 0,842764}$$

2.3 Final part

Now we can calculate effort, duration and number of required people for the project with these parameters:

Parameter	Value
KSLOC	6.2
EAF	0,842764
E	1.099
SE	0.2978

2.3.1 Effort

After the calculation of the three parameters, we can calculate the effort with the following formula:

$$effort = 2.94 * (EAF) * (KSLOC)^{E}$$

By inserting our data, we obtain:

$$\boxed{effort = 2.94 * (0,842764) * (6.2)^{1.099} = 18.40 Person - Months}$$

2.3.2 Duration

Now we can calculate the duration of project in month with the following formula:

$$Duration = 3.67 * (effort)^{SE}$$

By inserting our data, we obtain:

$$\boxed{Duration = 3.67 * (18.40)^{0.2978} = 8.74 Month}$$

2.3.3 Number of people required for the project

Finally, we can estimate the number of required people "N" needed to complete the project:

$$N_{people} = \frac{effort}{Duration}$$

By inserting our effort and our Duration, we obtain:

$$\boxed{N_{people} = \frac{18.40}{8.74} = 2.11 People \approx 3 People}$$

2.3.4 Project Effort

Total hours spent developing the project

	Total Hours
RASD	72
Design Document	49.5
Implementation	245.5
Acceptance Testing	24
TOTAL	391

The total effort is 391 hours, considering a normal working month composed by 8 hours per day, 5 working day per week and 4 week per month, we obtain 160 working hours for each month. The effort of our project becomes 2.44 months.

2.3.5 Conclusion

The result obtained with COCOMO is overestimated respect to the one reached with our project.
There could be different reasons: a not optimal estimation of the scales and the cost drivers; some of the scales and cost drivers loose part of their meaning if used for the cost estimation for a project at academic level.

Moreover, we have very tight deadline, so we have realized a first release of the application, but it is not in its final state: it has to be improved with more functionalities, some of the already provided ones have to be better realized and also the graphic interface could be improved, in order to reach better usability. Also the automatic test of the application has to be expanded, including new test cases and also a stress test.