Software Cost Estimation

C-TALK

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Revision History

Version	Description	Authors	Reviewers
2.1	Software Cost Estimation	Anjali kumari	Kenneth Tenny

Contents

1 Purpose

The purpose of this document is to estimate effort and development time for project in order to keep track of project's progress and money invested.

2 Introduction

Software cost estimation is the process of predicting the amount effort required to build a software system. There are various techniques used in software cost estimation. We are planning to achieve this goal by using basic COCOMO model. COCOMO stands for Constructive Cost Model, it is a software cost estimation model. By using COCOMO we can calculate the amount of effort and the development time for projects. COCOMO uses three model to estimate effort and development time and these are as follows:

- Basic COCOMO
  2Intermediate COCOMO
  3. Detailed COCOMO

We are using Intermidiate COCOMO model for our projcet. Since Intermidiate COCOMO model considere other factor namely "14 Cost Driver" along with project size, which can affect overall estimated cost. Those cost drivers are:

- Product attributes:The characteristics of the product that are considered include the inherent complexity of the product, reliability requirements of the product, etc.

1. Required software reliability
2. Size of application database
3. Complexity of the product

- Hardware attributes:Characteristics of the computer that are considered include the execution speed required, storage space required etc.

4. Run-time performance constraints
5. Memory constraints
6. Volatility of the virtual machine environment
7. Required turnabout time
    - Personnel attributes:The attributes of development personnel that are considered include the experience level of personnel, programming capability, analysis capability, etc.
8. Analyst capability
9. Software engineering capability
10. Applications experience
11. Virtual machine experience
12. Programming language experience
    - Project attributes:Development environment attributes capture the development facilities available to the developers. An important parameter that is considered is the sophistication of the automation (CASE) tools used for software development.
13. Use of software tools
14. Application of software engineering methods
15. Required development schedule

We can calculate the estimated value by using formula:

$$E = a(KLOC)^b[person - month]$$

$$D.T. = x(Effort)^y[month]$$

where $E = Effort, D.T = DevelopmentTime, KLOC = KiloOfLinesOfCode$, Values of a,b depends on mode of software project as shown below:

Modes Of Software Project Every project can be mapped to a particular category and those category are :

- Basic
- Semi-detached
- Embedded

Our project falls under Semi-detached mode since our group consists of a mixture of experienced and inexperienced members and team members have limited experience on related systems and also we are unfamiliar with some aspects of the system being developed.

Software Project Mode	a	b	x	y
Organic	3.2	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	2.8	1.2	2.5	0.32

3 Cost Drivers

All the 15 cost drivers is rated from low to very high depending on how these factor affect our cost and effort estimation of our project.

4 Cost Drivers Rating for calculation of EAF

Cost Driver attribute	**Rating**
Required software reliability	1
Size of application database	1.08
Complexity of the product	1
Run-time performance constraints	1
Memory constraints	1
Volatility of the virtual machine environment	0.87
Required turnabout time	1
Analyst capability	1.19
Software engineering capability	1.13
Applications experience	1.17
Virtual machine experience	0.90
Programming language experience	0.95
Use of software tools	0.91
Application of software engineering methods	0.91

5 Estimation of Lines Of Code

To accomplish our project, we are using following programming language:

- HTML
- CSS
- JavaScript
- NodeJS

Table-1: Estimation Of Lines Of Code:

Programming Language	Approx. Lines of code
HTML	1000-1200
CSS	700-800
JavaScript	600-800
Nodejs	500-700
Total LOC	2800-3500

6 Estimation process

Minimum $LOC = 2800$
Minimum $KLOC = 2.8$
$EAF = 1*1.08*1*1*1*0.87*1*1.19*1.13*1.17*0.90*0.95*0.91*0.91*1.04$
$= 1.088$

For Semi-detached
$Effort = 3.0 * (KLOC)^{1.12}$ PM
Effort = 3.0*$(2.8)^{1.12}$ * EAF PM
Effort = 3.0*$(2.8)^{1.12}$ * 1.088 PM
Effort = 9.504 * 1.088 PM
Effort = 10.34 PM

D.T = $2.5(10.34)^{0.35}$ = 5.66 [MONTH]

Maximum $LOC = 3500$
Maximum $KLOC = 3.5$
$EAF = 1*1.08*1*1*1*0.87*1*1.19*1.13*1.17*0.90*0.95*0.91*0.91*1.04$
= 1.088

For Semi-detached
$Effort = 3.0 * (KLOC)^{1.12}$ PM
Effort = 3.0*($3.5^{1.12}$ * EAF PM
Effort = 3.0*$(3.5)^{1.12}$ * 1.088 PM
Effort = 12.203 * 1.088 PM
Effort = 13.277 PM

$D.T = 2.5(13.277)^{0.35}$= 6.18 [MONTH]

7 References

- http://www.computing.dcu.ie/ renaat/ca421/report.html
- http://nptel.ac.in/courses/Webcourse-contents/IITKharagpur/Soft Engg/pdf/m11L28.pdf