

# **SOFTWARE PROJECT MANAGEMENT LAB - G2**

## **EXPERIMENT 2**

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- 2K18/SE/041

**AIM:-** Design a Constructive Cost Model(COCOMO) to calculate effort and development time for organic, semi-detached and embedded modes based on estimated size of the project.

### **THEORY:-**

Cocomo (Constructive Cost Model) is a regression model based on LOC, i.e number of Lines of Code. It is a procedural cost estimate model for software projects and often used as a process of reliably predicting the various parameters associated with making a project such as size, effort, cost, time and quality. It was proposed by Barry Boehm in 1970.

Different models of Cocomo have been proposed to predict the cost estimation at different levels, based on the amount of accuracy and correctness required. These characteristics pertaining to different system types are mentioned below.

1. **Organic** – A software project is said to be an organic type if the team size required is adequately small, the problem is well understood and has been solved in the past and also the team members have a nominal experience regarding the problem.
2. **Semi-detached** – A software project is said to be a Semi-detached type if the vital characteristics such as team-size, experience, knowledge of the various programming environment lie in between that of organic and Embedded. Eg: Compilers or different Embedded Systems can be considered of Semi-Detached type.
3. **Embedded** – A software project with requiring the highest level of complexity, creativity, and experience requirement fall under this category. Such software requires a larger team size than the other two models and also the developers need to be sufficiently experienced and creative to develop such complex models.

**Types of Models:** COCOMO consists of a hierarchy of three increasingly detailed and accurate forms. Any of the three forms can be adopted according to our requirements.

These are types of COCOMO model:

1. Basic COCOMO Model
2. Intermediate COCOMO Model
3. Detailed COCOMO Model

The first level, Basic COCOMO can be used for quick and slightly rough calculations of Software Costs. Its accuracy is somewhat restricted due to the absence of sufficient factor considerations.

### Estimation of Effort: Calculations –

Basic Model:

Effort =  $a * (KDLOC)^b$  Person months

Time =  $c * (effort)^d$  Months

Software Projects	a	b	c	d
Organic	2.4	1.05	2.5	0.38
Semi Detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

**Table: Basic COCOMO coefficients**

### CODE:-

```
#include <bits/stdc++.h>
#include<iostream>
using namespace std;

int i,ss[3];

float kloc,fp,E[3],D[3],P[3];

float a[3] = {2.4, 3.0, 3.6};

float b[3] = {1.05, 1.12, 1.20};

float c[3] = {2.5, 2.5, 2.5};

float d[3] = {0.38, 0.35, 0.32};

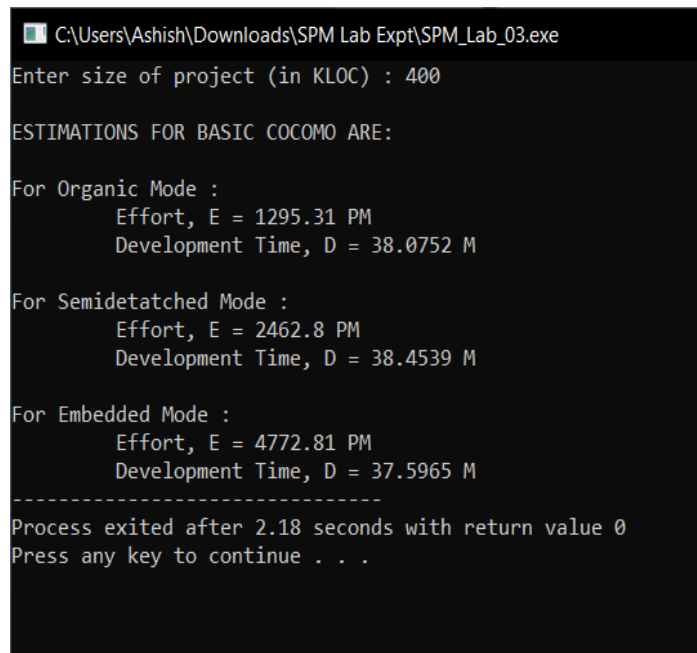
void calc(int i)
{
    E[i] = a[i]*(pow(kloc,b[i]));
    D[i] = c[i]*(pow(E[i],d[i]));
    cout<<"\n\t Effort, E = "<<E[i]<<" PM";
    cout<<"\n\t Development Time, D = "<<D[i]<<" M";
}
```

```

int main()
{
cout<<"Enter size of project (in KLOC) : ";
cin>>kloc;
cout<<"\nESTIMATIONS FOR BASIC COCOMO ARE:" ;
cout<<"\n\nFor Organic Mode :"; calc(0);
cout<<"\n\nFor Semidetatched Mode :"; calc(1);
cout<<"\n\nFor Embedded Mode :"; calc(2);
return 0;
}

```

## **OUTPUT:-**



```

C:\Users\Ashish\Downloads\SPM Lab Expt\SPM_Lab_03.exe
Enter size of project (in KLOC) : 400

ESTIMATIONS FOR BASIC COCOMO ARE:

For Organic Mode :
    Effort, E = 1295.31 PM
    Development Time, D = 38.0752 M

For Semidetatched Mode :
    Effort, E = 2462.8 PM
    Development Time, D = 38.4539 M

For Embedded Mode :
    Effort, E = 4772.81 PM
    Development Time, D = 37.5965 M
-----
Process exited after 2.18 seconds with return value 0
Press any key to continue . . .

```

**CONCLUSION:-** We have successfully implemented COCOMO model and calculated effort and development time for a given size of the project. COCOMO model is a very easy procedural cost estimation model for software projects.