EX:3 Using COCOMO model estimate effort.

AIM :- Develop the COCOMO model estimate effort for a Software Project

Theory :-

The Cocomo Model is a procedural cost estimate model for software projects and is 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 1981 and is based on the study of 63 projects, which makes it one of the best-documented models. The key parameters that define the quality of any software products, which are also an outcome of the Cocomo are primarily Effort and schedule:

1. Effort: Amount of labor that will be required to complete a task. It is measured in person- months units.

2. Duration (Time): This simply means the amount of time required for the completion of the job, which is, of course, proportional to the effort put in. It is measured in the units of time such as weeks, and months.

Different models of Cocomo have been proposed to predict the cost estimation at different levels, based on the amount of accuracy and correctness required. All of these models can be applied to a variety of projects, whose characteristics determine the value of the constant to be used in subsequent calculations.

These characteristics of different system types are mentioned below. Boehm’s definition of organic, semidetached, and embedded systems:

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, and knowledge of the various programming environments lie in between organic and embedded. The projects classified as Semi -Detached are comparatively less familiar and difficult to develop compared to the organic ones and require more experience better guidance and creativity. Eg: Compilers or different Embedded Systems can be considered Semi-Detached types.

3. Embedded

A software project requiring the highest level of complexity, creativity, and experience requirement falls 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.

According to Boehm, software cost estimation should be done through three stages: – Basic COCOMO,

– Intermediate COCOMO, And – Complete (detailed)COCOMO.The basic COCOMO estimation model is given by expressions of the following forms:

Effort = a × (KLOC)b PM

Tdev = C × (Effort)d months

where,

KLOC is the estimated size of the software product expressed in Kilo Lines Of Code

a, b, c, d are constants for each category of software product

Tdev is the estimated time to develop the software, expressed in months

Effort is the total effort required to develop the software product, expressed in person- months (PMs).

TABLE:

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

Note : in addition to above in general the no of line of code is <50KLOC it is consided as ORGANIC, Between 50 to 300KLOC it is consided as Semi-Detached, and more than 300KLOC it is considered as Embeded type.

Example :

Consider a project have 400 KLOC

Assuming the project is Embided Type (based on No of lines) Effort=3.6(400)1.20=4772.81 PMC-Program for Basic COCOMO Model

#include <stdio.h>

#include <math.h>

// Function to calculate effort in person-months

float calculateEffort(float size, float a, float b)

{

return a \* pow(size, b) ;

}

int main()

{

float size,effort ,time,a,b,c,d ;

// Input size of the software project

printf("Enter the size of the software project (in KLOC): ");

scanf("%f", &size);

if (size<50)

a = 2.4,b = 1.05, c = 2.5,d = 0.38; // Organic COCOMO parameters

else if (size>50 && size <300)

a = 3.0 ,b = 1.12 , c = 2.5,d = 0.35; // Semi-detatched COCOMO parameters else a=3.6,b= 1.2,c=2.5,d=0.32; // embeded cocomo

// Calculate effort

effort = calculateEffort (size, a, b );

// Display the results

printf("\nEffort required: %.2f person-months\n", effort); return 0;

}

Out Put :-