**EXPERIMENT NO : 5**

***Aim :*** *Calculate the Effort, Scheduled time for development. Also, calculate the Average resource size and Productivity of the software for using Basic COCOMO*

**Explanation:**

The COCOMO (Constructive Cost Model) is one of the most popularly used software cost estimation models i.e. it estimates or predicts the effort required for the project, total project cost and scheduled time for the project. This model depends on the number of lines of code for software product development. It was developed by a software engineer Barry Boehm in 1981.

**What is COCOMO Model?**

The COCOMO estimates the cost for software product development in terms of effort (resources required to complete the project work) and schedule (time required to complete the project work) based on the size of the software product. It estimates the required number of Man-Months (MM) for the full development of software products. According to COCOMO, there are three modes of software development projects that depend on complexity. Such as:

*1. Organic Project*

It belongs to small & simple software projects which are handled by a small team with good domain knowledge and few rigid requirements. Example: Small data processing or Inventory management system.

*2. Semidetached Project*

It is an intermediate (in terms of size and complexity) project, where the team having mixed experience (both experience & inexperience resources) to deals with rigid/nonrigid requirements. Example: Database design or OS development.

*3. Embedded Project*

This project having a high level of complexity with a large team size by considering all sets of parameters (software, hardware and operational). Example: Banking software or Traffic light control software.

**The Basic COCOMO**

It is the one type of static model to estimates software development effort quickly and roughly. It mainly deals with the number of lines of code and the level of estimation accuracy is less as we don’t consider the all parameters belongs to the project. The estimated effort and scheduled time for the project are given by the relation:

Effort (E) = a\*(KLOC)b MM

Scheduled Time (D) = c\*(E)d Months(M)

Where,

* E = Total effort required for the project in Man-Months (MM).
* D = Total time required for project development in Months (M).
* KLOC = the size of the code for the project in Kilo lines of Code.
* a,b,c,d = The constant parameters for software project.

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| --- | --- | --- | --- | --- |
| **PROJECT TYPE** | **a** | **b** | **c** | **d** |
| **Organic** | **2.4** | **1.05** | **2.5** | **0.38** |
| **Semidetached** | **3** | **1.12** | **2.5** | **0.35** |
| **Embedded** | **3.6** | **1.2** | **2.5** | **0.32** |

Example: For a given project was estimated with a size of 400 KLOC. Calculate the Effort, Scheduled time for development. Also, calculate the Average resource size and Productivity of the software for Organic project type.

Ans: Given estimated size of project is: 400 KLOC

**For Organic**

Effort (E) = a\*(KLOC)b = 2.4\*(400)1.05 = 1295.31 MM

Scheduled Time (D) = c\*(E)d= 2.5\*(1295.31)0.38 =38.07 Months(M) Avg.

Resource Size = E/D = 1295.31/38.07 = 34.02 Mans

Productivity of Software = KLOC/E = 400/1295.31 = 0.3088 KLOC/MM = 308 LOC/MM

**For Semidetached**

Effort (E) = a\*(KLOC)b = 3.0\*(400)1.12 = 2462.7960 MM

Scheduled Time (D) = c\*(E)d = 2.5\*(2462.79)0.35 = 38.45 Months(M)

**For Embedded**

Effort (E) = a\*(KLOC)b = 3.6\*(400)1.2 = 4772.81 MM

Scheduled Time (D) = c\*(E)d = 2.5\*(4772.81)0.32 = 37.59 Months(M)