

## **EXPERIMENT NO.:05**

**Date of Performance:**

**Date of Submission:**

**Aim:** Use of Metrics to estimate the cost

**Software Used: Ms-Word**

### **Software Cost Estimation**

For any new software project, it is necessary to know how much it will cost to develop and how much development time will it take. These estimates are needed before development is initiated, but how is this done? Several estimation procedures have been developed and are having the following attributes in common.

1. Project scope must be established in advanced.
2. Software metrics are used as a support from which evaluation is made.
3. The project is broken into small PCs which are estimated individually.  
To achieve true cost & schedule estimate, several option arise.
4. Delay estimation
5. Used symbol decomposition techniques to generate project cost and schedule estimates.
6. Acquire one or more automated estimation tools.

### **Uses of Cost Estimation**

1. During the planning stage, one needs to choose how many engineers are required for the project and to develop a schedule.
2. In monitoring the project's progress, one needs to access whether the project is progressing according to the procedure and takes corrective action, if necessary.
3. Estimation is the process of finding an estimate, or approximation, which is a value that can be used for some purpose even if input data may be incomplete, uncertain, or unstable.
4. Estimation determines how much money, effort, resources, and time it will take to build a specific system or product.

### **Loc-based Cost Estimation**

The LOC (Line of Code) is a product size metric in software engineering. Here, the number of lines in the code are counted and based on the number of lines the cost is calculated.

### **LOC-based Estimation**

- Different languages lead to different lengths of code
- It is not clear how to count lines of code
- A report, screen, or GUI generator, can generate thousands of lines of code in minutes
- Depending on the application, the complexity of code is different

### Function Points: FP

Function Points is used in 2 contexts:

- **Past:** To develop **metrics** from historical data
- **Future:** Use of available metrics to size the s/w of a new project

### FP-based Estimation

- Based on FP metric for the size of a product
- Based on the number of inputs (Inp), outputs (Out), inquiries (Inq), master files (Maf), interfaces (Inf)
- Classify each component of the product (Inp, Out, Inq, Maf, Inf) as simple, average or complex (next slide)

LOC-based Cost Estimation:

Component	Estimated LOC Document
- UI	3000 LOC
- Database Management	2000 LOC
- Search and Filter	1500 LOC
- Authentication & Authorization	1000 LOC
- Report Generation	1000 LOC
- Security Features	500 LOC
- API Integration	500 LOC

Average productivity based on historical data: 320 LOC/person-month.

Average salary: ₹8,000/month.

1. Total Estimated LOC = **10,500 LOC**
2. Cost per LOC: ₹8,000 / 320 = ₹25/LOC
3. Total Project Cost: 10,500 \* ₹25 = ₹262,500
4. Estimated Efforts: ₹262,500 / ₹8,000 = 32.8 person-months

Parameters

- Number of user inputs: 6 (search, login, filter options)
- Number of user outputs: 5 (scholarship lists, reports)
- Number of user inquiries: 3 (scholarship details)
- Number of files: 3 (scholarship database, user data)
- Number of external interfaces: 2 (external API for scholarship data)

FP-Based Estimation:

Parameters	Estimated Count	Weight (Average Complexity)	Total
Number of user inputs:	6	4	24
Number of user outputs	5	5	25
Number of inquiries:	3	4	12
Number of files	3	10	30
Number of external interfaces	2	7	14

Total Function Points (FP):  $24 + 25 + 12 + 30 + 14 = 105$  FP

Sum of  $F_i$  values:  $\sum F_i = 46$

Function Point = Total FP \*  $[0.65 + 0.01 * \sum F_i]$

$$= 105 * [0.65 + 0.01 * 46]$$

$$= 105 * 1.11$$

**Function Point = 116.55**

Thus, the Function Point estimate is approximately **116.55 FP**.

**Conclusion:**

Hence we have used metrics for cost estimation successfully.

**Sign and Remark:**

R1	R2	R3	Total Marks	Signature
(5)	(5)	(5)	(15)	