

: Exp. 8 :-

Aim:- Conduct Function Point Analysis (FPA) for the project.

Q1) What is cost estimation?

- Cost estimation in SW engg is critical phase that involves predicting future financial and resource requirements.
- Encompasses analytical various factors such as project scope, complexity, team expertise & tech.
- Accurate cost estimation is crucial for budget planning, resource allocation.
- Effect. cost estimator helps org. make informed decisions avoid budget overruns by deliver

Q2) List the diff. methods of cost estimation.

- a) LOC (Line of code) :- A method that estimates SW development cost based on the no. of lines of code written. may increase due to varying complexity & lang.
- b) Function Point (FP) Anderson:- Measure SW fun. containing I/P, O/P, interface files & interfaces.
- c) COCOMO (constructive cost model) :- Employ eqn to estimate cost, effort and time based on proj. charac. like size, complexity, env.

Explains in detail :- function point (FP): (Q) FP is a SW metric used in SW engg.

To measure the func. or feature provided by a SW

b) objective measurement :- is an objective measure  
functionality independent of technology or program  
components of EP: R/P → external data and  
O/P → output produced by  
Inquiries → uses Extracts for inquiry  
files:- logical data files  
Extracts:- Extract with external

d) eg: for Airlines reservation system, FP is catalyst, among which ticketing is

Info. domain Value	Comb	Weighting factor		
		Simple	Avg	Logarith.
No. of user i/p	5	3	5	6
No. of user o/p	2	4	5	7
No. of user requires	3	3	6	6
No. of files	3	7	10	15
No. of equal files	2	5	7	10
No. among				

Now arranging values to 15  
 so values are  $\{4, 12, 3, 4, 3, 3, 5, 3, 2, 4, 5, 3\}$   
 Questions on scale of  
 $\therefore \text{FF} = \frac{\text{Total}}{15} = 5$

$$\begin{aligned}
 \therefore F_F &= \frac{\sum H}{T_{\text{Total}}} = \frac{51}{82} = 0.63 \quad (\text{cont}) \\
 &= 82 * [0.65 + 0.01 * 8] \\
 &= 82 * [0.65 + 0.01 * 16] \\
 &= 95.12
 \end{aligned}$$

e) Benefits:-

- 1) helps in estimating project size & complexity.
- 2) enables cost & effort estimation.
- 3) supports project planning & resources allocation.
- 4) facilitates performance measurement & benchmarking.

f) uses cases:- FP often used in size cost estimation.  
Project management, and as a basic for size  
quality assessment and improvement.

(g) further point analysis for your application.

→ for Holt margin diagram, FP computation.

is calculated assuming weightage factor as "average".

Info Domain	Value	Const	Weight factor		Const
No of user FIP	5	= 3	4	6	= 20
No of user O/P	5	= 5	5	7	= 25
No of user user queries	6	= 3	4	6	= 24
No of files	5	= 7	10	15	= 50
No of external if	5	= 8	7	10	= 35
			Total	= 154	

Now Assigning values to 14 questions on scale of 0-5

so values are :- { 5, 4, 1, 2, 3, 15, 1, 3, 12, 4, 15 }

$$= \frac{\sum f_i}{n} = \frac{90}{14}$$

$$\therefore FP = \text{Total Const} * [0.65 + 0.01 * \frac{\sum f_i}{n}]$$

$$= 154 * [0.65 + 0.01 * \frac{90}{14}]$$

$$= 154 * 1.05$$

$$\therefore FP = 161.7$$

### \* Value Adjustment factors -

- (1) Does the sys. require reliable bus. recovery?
- (2) Are delta comm. requires - marine
- (3) Are there distinct procng. funcns?
- (4) Is performance critical?
- (5) Will the system run in an existing h/w utilised operator env.?
- (6) Does the sys. require on-line data
- (7) Does the online data entry require the transaction to be held over multiple screens or operations?
- (8) Are the master files updated online?
- (9) Are file I/O, O/P (files) or inquiries complex?
- (10) Is the intend procng. complex.
- (11) Is the code designed to be reusable?
- (12) All conversion & installation includes in design?
- (13) Is the system designed for multiple ports in diff. orgg.
- (14) Is the application designed to facilitate ease of use by user?

The ans. of all 14 que. are as S. f.i.

## -: Experiment 9 :-

Aim: Application of COCOMO model for software estimation of the project.

What is COCOMO?

COCOMO short for Constructive Cost Model is a family of software estimation models developed by Barry Boehm in the 1980s. It is used to estimate the effort, time and cost required for software development based on various project parameters. COCOMO models are valuable tools for project managers and software developers in planning and controlling software projects.

Three Main types of COCOMO models

a. COCOMO Basic:

- This is the original model.
- It is suitable for small to medium size projects.
- It estimates effort & cost based on line of code (LOC).

b. COCOMO Intermediate

- An extension of the base model.
- Suitable for medium to large size projects.

c. COCOMO II:

- A more detailed & flexible model.
- Suitable for a wide range of project size and type.

• Takes into account numerous factors like product, time, personnel & project attributes.

### • Stages of calculation:

#### a. Pre-processing:

- Gather project-related data, such as complexity and team capabilities.
- Determine the type of module to build based on project characteristics.

#### b. Effort Estimation:

- Calculate the effort required for project based on COCOMO equations.
- Effort is often measured in person or person-hours.

#### c. Cost Estimation:

- Once effort is estimated, determine the cost using factors like personnel costs and overhead expenses.

#### d. Schedule Estimation:

- Calculate the expected project duration based on the effort estimate and other factors.

Formulae:

The COCOMO model formula for effort estimation in its basic form is -

$$\text{Effort (E)} = a \cdot (\text{KLOC})^b$$

where -

- $E \rightarrow$  Effort in person months.
- $a$  &  $b \rightarrow$  Constants based on project attribute.
- KLOC  $\rightarrow$  represents the estimated size of the SW in thousands of line of code.

Example of Three steps -

Let's apply COCOMO to estimate the cost of developing a Project Management System.

Project details :-

System size - around 100 KLOC

Project type : Organic

Effort Estimation -

Using COCOMO basic ;  $E = a \cdot (\text{KLOC})^b$   
For organic project  $a = 2.5$  and  $b = 1.05$ .

$$E = 244 \times (100 \text{ NOS}) = \\ = 242 \text{ person-months}$$

### (C) Cost Estimation

Assuming a avg team member salary is \$5000 per month.

$$\text{Cost} = \text{Effort} * \text{Salary per Month} \\ \text{Cost} = 242 \text{ person months} * \$5,000 = \\ = \$1210,000$$

### (D) Schedule Estimation

$$\text{Schedule} = \frac{\text{Effort}}{\text{Team Size}}$$

Assuming a team size of 10 people,

$$\text{Schedule} = 21.2$$

$$\text{person-months} / 10 = 2.12 \text{ months}$$

- Experiment 10 :-

Aim :- Develop a Risk Mitigation and Management Plan for the project (RMM)

Theory :-

What is risk in SE Development?

Risk in SE refers to the likelihood of unfavorable events or circumstances that can potentially disrupt the project's progress or impact its success. These risks can manifest in various forms and at different stages of the SE lifecycle. Effective risk management aims to minimize the impact of these risks and increase the likelihood of project success.

Different Types of Risk3 Important categories of risk

1) Project risks: That directly affect the schedule of the project and the resources involved in the development

Ex: after project loss: loss of an experienced developer and designer.

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2) Product risk : The product risk of the application built.

Ex: Failure of purchased component perform as per expectation.

3) Business risk : All affecting the those develop and process the software.

Ex: A competitor of the organization introduce a new product.

### Risk Management Strategies

Risk	Categories	Probability	Impact	RMM
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Developer Personnel Risks

Medium

High

- Cross train  
number to  
dependency on  
experts.

- Maintaining a  
dep. to do  
project info  
monitor

Moral  
address  
proactivity

Data Security	Operational Risk	Very High	<ul style="list-style-type: none"><li>- Implement robust encryption and access control for sensitive data.</li><li>- Regular security audits and penetration testing.</li><li>- Incident response plan for data breaches.</li></ul>
Hard deadline	Project Risks	High	<ul style="list-style-type: none"><li>- Use agile development methodologies to accommodate changes.</li><li>- Regularly review project schedule and resource allocation.</li><li>- Identify potential bottlenecks and contingency plans.</li></ul>

## Management System

### Risks specific to Hotel

Risk	Categories	Probability	Impact	RAMM
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Integration challenges

Technical risks

Medium

High

- Conduct thorough integration testing and identify potential issues.
- Use standard interfaces and facilitate integration with external systems.
- Allocate resources in the project for unexpected challenges.

Regulatory Business  
compliance risks

Low

Very  
High

- Continuously monitor changes in regulatory requirements.
- Establish clear policies and compliance procedures.
- Conduct regular compliance audits to ensure adherence to regulations.

-! Experiment 11:-

Aim:- Case Study: Critical decision  
Control.

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