Academic Year: 2023_24

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Experiment No. 6

Aim: Estimate effort and cost required using FP/COCOMO for the project. Create WBS and Gantt Chart for the same. Use PM Tool to depict a project plan.

Theory:

Work Breakdown Structure:

Work Breakdown Statement

A work breakdown statement (WBS) is a categorized list of tasks with an estimate of resources required to complete the task. An example WBS appears below.

WBS #	Task Description	Est Person -Hrs	Who	Resources	M&S
5	Profile motor power				
5.1	Design test stand	20	SE, JM	Pro/E	
5.2	Build test stand	15	SE, JM	Frame & brake parts	$35
5.3	Test 3 motors	3	SE, JM	Stroboscope	$75
5.4	Plot torque vs. speed	2	JM	Excel	

(M&S = Materials & Supplies)

Gantt Chart Basics

Gantt charts are a project planning tool that can be used to represent the timing of tasks required to complete a project. Because Gantt charts are simple to understand and easy to construct, they are used by most project managers for all but the most complex projects.

In a Gantt chart, each task takes up one row. Dates run along the top in increments of days, weeks or months, depending on the total length of the project. The expected time for each task is represented by a horizontal bar whose left end marks the expected beginning of the

task and whose right end marks the expected completion date. Tasks may run sequentially, in parallel or overlapping.

As the project progresses, the chart is updated by filling in the bars to a length proportional to the fraction of work that has been accomplished on the task. This way, one can get a quick reading of project progress by drawing a vertical line through the chart at the current date. Completed tasks lie to the left of the line and are completely filled in. Current tasks cross the line and are behind schedule if their filled-in section is to the left of the line and ahead of schedule if the filled-in section stops to the right of the line. Future tasks lie completely to the right of the line.
In constructing a Gantt chart, keep the tasks to a manageable number (no more than 15 or 20) so that the chart fits on a single page. More complex projects may require subordinate charts which detail the timing of all the subtasks which make up one of the main tasks. For team projects, it often helps to have an additional column containing numbers or initials which identify who on the team is responsible for the task.

Often the project has important events which you would like to appear on the project timeline, but which are not tasks. For example, you may wish to highlight when a prototype is complete or the date of a design review. You enter these on a Gantt chart as "milestone" events and mark them with a special symbol, often an upside-down triangle.

Gantt Chart Example from http://www.criticaltools.com/projwbs.htm

Practical:

For Estimation

1. Use FP / COCOMO model to estimate Effort and subsequently Cost required to develop the project.
2. Show all the tables and steps of the estimation model.

FPA -

Step 1: Identify the Functionality
Identify the key functionalities of PingPal. Based on your description, we have:

User Registration
Messaging (text, voice, media)
Group Chat
Authentication
User Profile Management

Chat History
Media Sharing

Step 2: Assign Complexity Weights
Assign complexity weights to each functionality based on its complexity. Use a scale from low to high complexity.

Functionality	Complexity Weight
User Registration	Low
Messaging	High
Group Chat	High
Authentication	Medium
User Profile Management	Medium
Chat History	Medium
Media Sharing	Medium

Step 3: Calculate Unadjusted Function Points (UFP)
Calculate the total Unadjusted Function Points (UFP) by summing the complexity weights assigned to each functionality.

Total UFP = 1 (User Registration) + 3 (Messaging) + 3 (Group Chat) + 2 (Authentication) + 2 (User Profile Management) + 2 (Chat History) + 2 (Media Sharing) = 15

Step 4: Apply Technical Factors
Apply technical factor adjustments to account for factors such as database complexity, performance requirements, and security considerations. For example:

Database complexity: 1.10
Performance requirements: 1.05
Security considerations: 1.05
Total Technical Factor = 1.10 * 1.05 * 1.05 = 1.21

Step 5: Calculate Adjusted Function Points (AFP)
Calculate the Adjusted Function Points (AFP) by multiplying the UFP by the total technical factor adjustment.

AFP = UFP * Technical Factor = 15 * 1.21 = 18.15

Step 6: Estimate Effort
Assuming 1 AFP is equivalent to 10 person-days:
Estimated Effort = AFP * 10 = 18.15 * 10 = 181.5 person-days

COCOMO -
Step 1: Calculate Effort Adjustment Factor (EAF)
The Effort Adjustment Factor (EAF) is based on various project and team factors. For PingPal, let's assume an EAF of 1.05.

Step 2: Calculate Scale Factor (SF)
The Scale Factor (SF) reflects the project's scale, complexity, and team experience. Let's assume a SF of 1.12 for PingPal.

Step 3: Calculate Basic Effort
The Basic Effort (EB) is calculated using the formula:

EB=ab×(KLOC)bbEB=ab×(KLOC)bb

Where:

abab is a constant based on the project type (for Organic projects, ab=2.4ab=2.4)
bbbb is a constant based on the project type (for Organic projects, bb=1.05bb=1.05)
KLOC is the estimated size of the software project in thousands of lines of code
Assuming PingPal's size is estimated to be 20,000 lines of code (20 KLOC), we can calculate the Basic Effort:

EB=2.4×(20)1.05=2.4×35.70=85.68 Person-MonthsEB=2.4×(20)1.05=2.4×35.70=85.68 Person-Months

Step 4: Calculate Adjusted Effort
The Adjusted Effort (E) is calculated as:

E=EB×EAF×SF=85.68×1.05×1.12=102.37 Person-MonthsE=EB×EAF×SF=85.68×1.05×1.12=102.37 Person-Months

Step 5: Calculate Development Time
Assuming a productivity factor of 2.5 person-months per person, the development time (D) can be calculated as:

D=E/Number of Developers=102.37/2.5=40.95 MonthsD=E/Number of Developers=102.37/2.5=40.95 Months

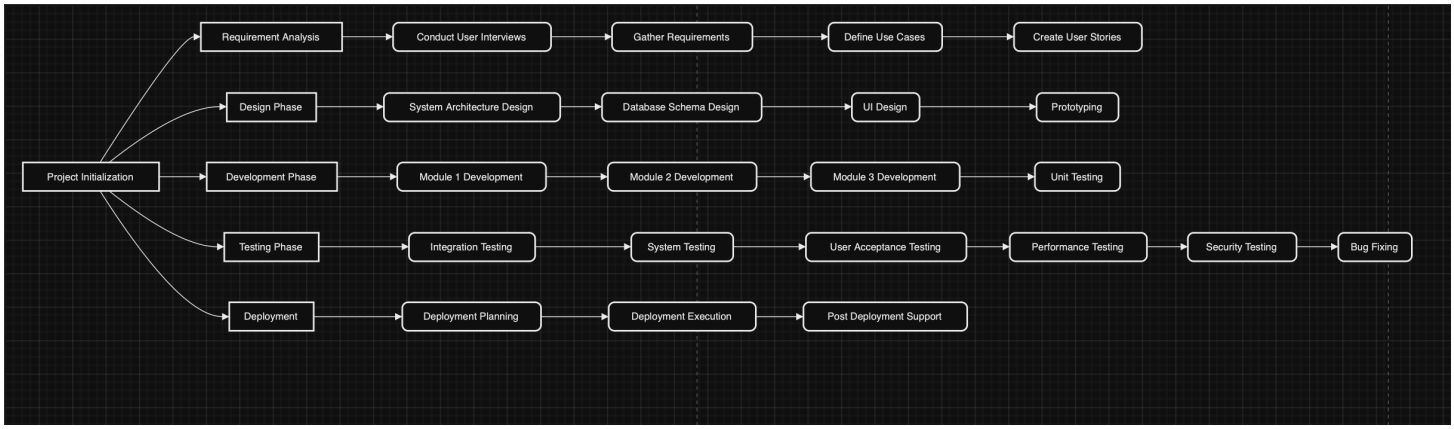
Step 6: Calculate Cost
Assuming an average salary of $10,000 per person-month, the total cost can be estimated as:

Cost=E×Average Salary=102.37×10,000=$1,023,700Cost=E×Average Salary=102.37×10,000=$1,023,700

For WBS and Gantt Chart

1. Create different tasks of your project depending on the process model that you have selected for the same.
2. Create a WBS or Task network diagram depicting clearly which tasks can happen in parallel and sequential.
3. Identify team members and allot them to the task
4. Based on the effort estimated in person months distribute the effort in 40-20-40 % basis.
5. Prepare a Gantt chart using any PM tool

Work Breakdown Structure -



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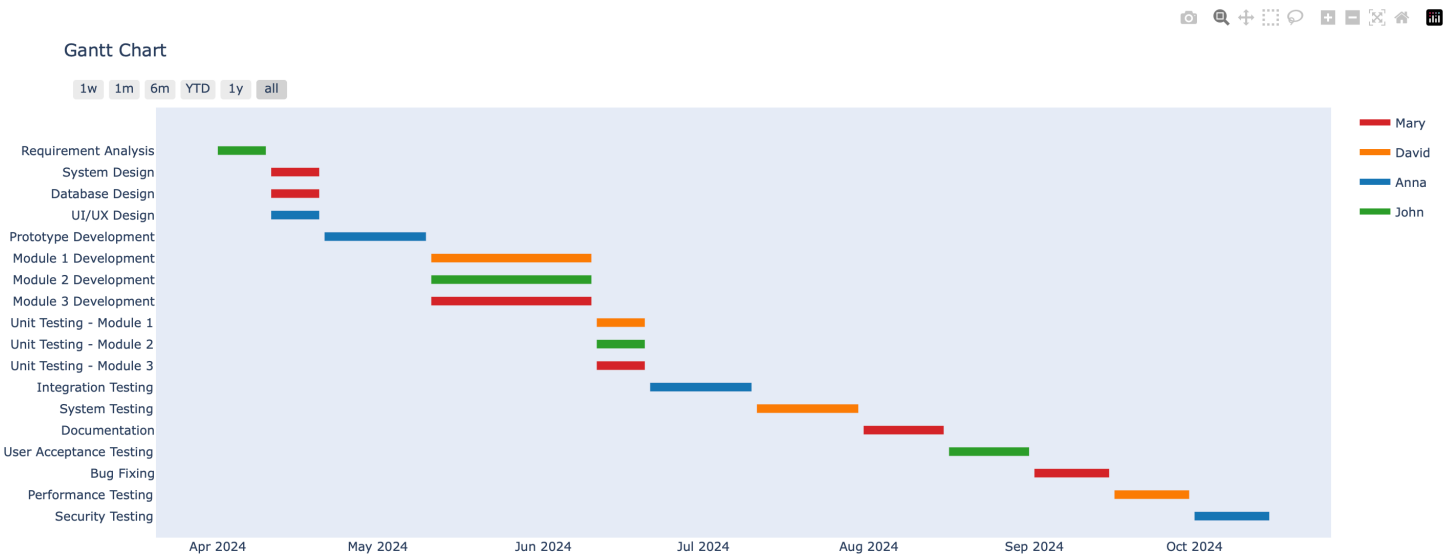
Gantt chart -



Conclusion:

Thus, we are able to estimate effort required for our project and also create Gantt Chart.