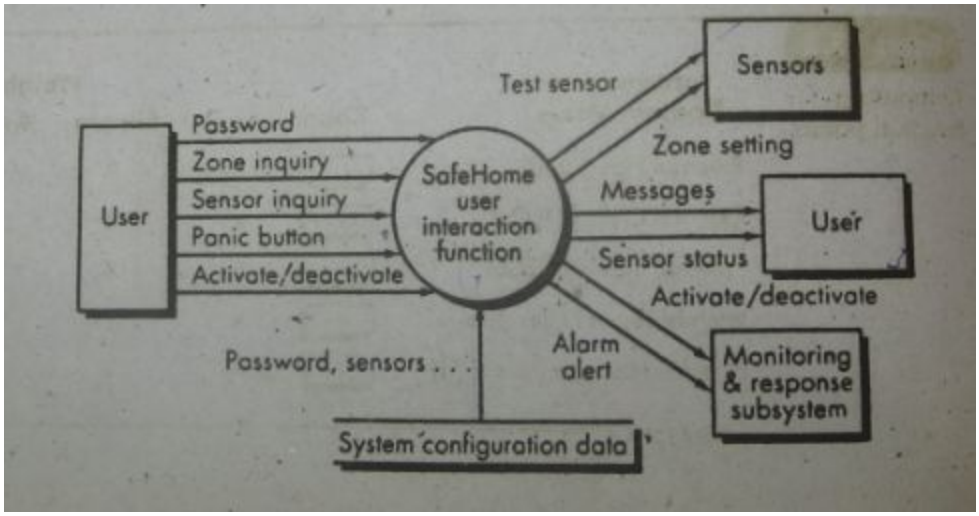
National University of Computer and Emerging Sciences, Lahore Campus

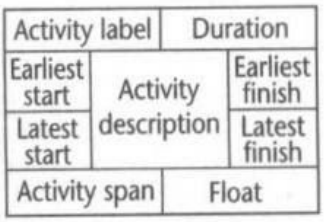
Course:	Introduction to Software Project Management	Course Code:	CS-450
Program:	BS (Computer Science)	Semester:	Spring 2020
Duration:	5 Hours	Total Marks:	45
Paper Date:	29-Jun-2020	Weight	45 %
Section:	A,B,C	Page(s):	2
Exam:	Final Exam	Roll No.	15L-4115

1. Below is a data flow model for a function within the SafeHome software. Assume that each arrow represents one component or "external user type".



   a. Classify the components into the different "user types" required for Albrecht Function Points calculation. Assume a random complexity (low, average, high) for each component (more than one component may have the same complexity, but all components should not have the same complexity). Calculate the unadjusted Albrecht Function Points for the given model. (5 marks)
   b. Using a conversion factor of 50 SLOC per Function Point and the parameters given below, calculate the effort in person-months required for the system using the COCOMO II model.
      A = 2.94
      Precedentedness = 3, Development Flexibility = 4, Architecture/Risk Resolution = 3, Team Cohesion = 1, Process Maturity = 3
      RCPX = 1.3, RUSE = 1.0, PDIF = 1.0, PERS = 1.0, PREX = 1.1, FCIL = 1.0, SCED = 1.2 (5 marks)

2. Refer to the activity estimates and precedents below.
   a. Replace D1-D15 with any number(s) between 1 and 15 randomly. You may use a number more than once, however, do not use the same number for all durations, or any obvious/systematic pattern like 1 for D1, 2 for D2, etc.
   b. Calculate the expected duration for each activity using PERT.
   c. Using the expected durations, create a precedence network, using the following labeling conventions. Do NOT change the labeling convention, however, you may abbreviate the activity description:



Hint: You may draw a rough network using simple boxes, and when you have worked it out, then draw the detailed one with the labeling conventions.

d. Perform forward pass and backward pass, and calculate the span and float.

e. Also calculate the free float and interfering float for each activity, and identify the critical path(s).
Note: Use Week 0 as the starting point and the week number used should indicate the end of each week. Calculate the numbers accordingly. (20 marks)

Activity ID	Activity Description	Precedents	Optimistic Duration (Weeks)	Most Likely Duration (Weeks)	Pessimistic Duration (Weeks)
1	Specify overall system		D1	D1+2	D1+4
2	Specify module A	1	D2	D2+2	D2+4
3	Specify module B	1	D3	D3+2	D3+4
4	Specify module C	1	D4	D4+2	D4+4
5	Specify module D	1	D5	D5+2	D5+4
6	Check specification	2,3,4,5	D6	D6+2	D6+4
7	Design module A	6	D7	D7+2	D7+4
8	Design module B	6	D8	D8+2	D8+4
9	Design module C	6	D9	D9+2	D9+4
10	Design module D	6	D10	D10+2	D10+4
11	Code/test module A	7	D11	D11+2	D11+4
12	Code/test module B	8	D12	D12+2	D12+4
13	Code/test module C	9	D13	D13+2	D13+4
14	Code/test module D	10	D14	D14+2	D14+4
15	System integration	11,12,13,14	D15	D15+2	D15+4

3.

a. A project has the following estimated parameters:
Number of People = 10 persons
Working Average = 5 hours/day
Cost = 5 dollars/person-hour
After ten weeks (50 working days), a total of $10,000 worth of actual effort has been spent, while there is a slippage of 10 days in the schedule. Calculate BCWS, BCWP, ACWP, CV, SV, CPI, and SPI. (10 marks)

b. What can you do now that the project has slipped from its schedule? Briefly describe five different options. (5 marks)

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FINAL SPM

Q1 a) ① External Input types — (low complexity)

- password
- panic button
- activate / deactivate

② External Output types — (Averge complexity)

- messages
- sensor status

③ External Inquiry types — (Averge complexity)

- Zone inquiry
- sensor inquiry.

④ Logical Internal file types — (High complexity)

- System configuration data

⑤ External Interface file types. — (High complexity)

- test sensor
- zone setting
- activate / deactivate
- alarm alert.

b) $A = 2.94$ $\quad Size = FP \times 50/1000 KLoc$

$SF = 0.91 + 0.01 \times \Sigma(3+4+3+1+3)$

$= 0.92 \times 14$

$= 12.88$

$PM = A \times Size^{SF} \times 1.3 \times 1.0 \times 1.0 \times 1.0 \times 1.1 \times 1.0 \times 1.2$

$= 2.94 \left(\frac{5q}{20} \times 91\right)^{12.88} \times 1.3 \times 1.1 \times 1.0 \times 1.2$

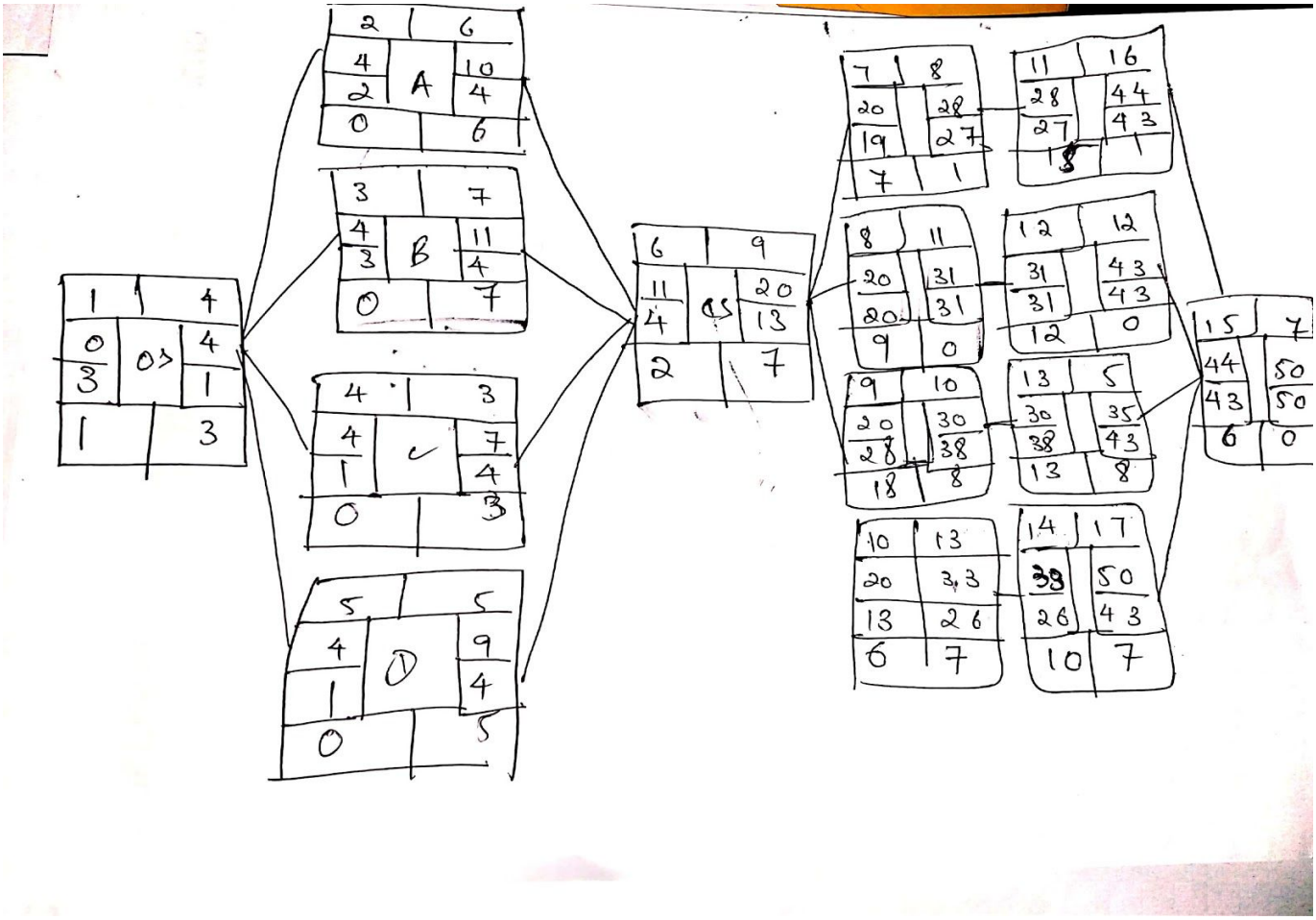
~~$PM = 6.5 \times 10^{4.7}$~~

$= 2.94 \times \left(\frac{1}{20} \times 91\right)^{12.88} \times 1.3 \times 1.1 \times 1.2$

$PM = 22.9 \approx 23$ person months

(2)

ID	a (optimistic)	m (ML)	b (Pessimistic)	Expected duration.
1	2	4	6	4
2	4	6	8	6
3	5	7	9	7
4	1	3	5	3
5	3	5	7	5
6	7	9	11	9
7	6	8	10	8
8	9	11	13	11
9	8	10	12	10
10	11	13	15	13
11	14	16	18	16
12	10	12	14	12
13	3	5	7	5
14	15	17	19	17
15	5	7	9	7


A
B
C
D

Q3 a) Cost per day for 10 people. = $250.

ACWP = $10K

BCWP = 250 x 40 = $10K

BCWS = 250 x 50 = $12.5K

SV = BCWP - BCWS = -2500

CV = BCWP - ACWP = 0

SPI = BCWP / BCWS = 0.8

CPI = BCWP / ACWP = 1

b) 1) Work overtime

2) Reallocate resources

3) Crash the schedule

4) Fast track the schedule

5) Prevent all scope change.