

Q1.

Refer to the DFD in figure 2.1 to provide cost and effort estimates of a product. The figure shows different elements, of a SafeHome System, identified in analysis phase. There are external inputs namely password, panic button and activate/deactivate, external inquiries namely zone inquiry and sensor inquiry. The ILF is System Configuration File, and the EIFs are test sensor, zone setting, activate/deactivate, and alarm alert. The external outputs are messages and sensor status. The impact of 14 characteristics affecting the SafeHome application is given by vector $F_i = [3 \ 2 \ 0 \ 4 \ 2 \ 3 \ 4 \ 3 \ 5 \ 5 \ 4 \ 3 \ 4 \ 5]$. The **complexity weighting factor** for this project is assumed to be **average**.

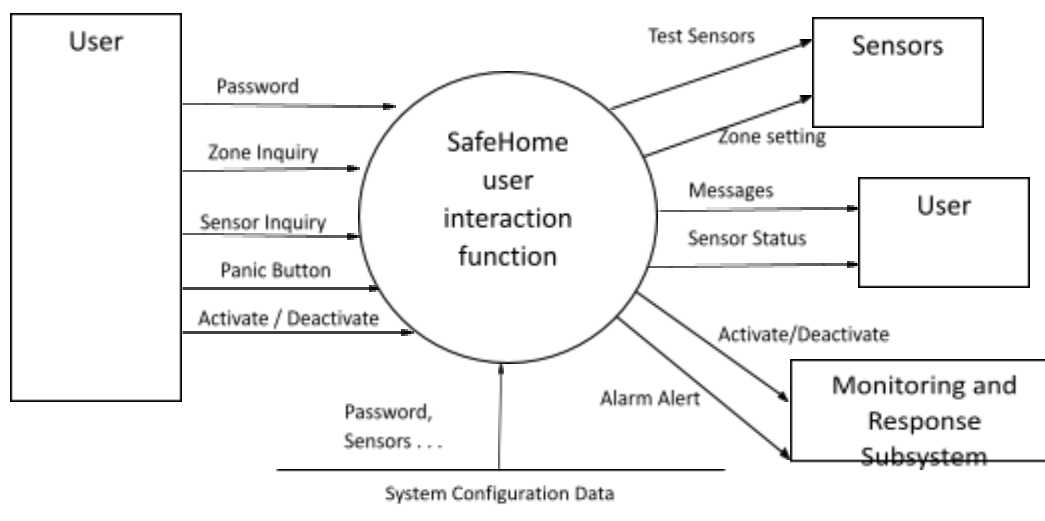


Figure 2.1: Dataflow diagram of SafeHome application

To do:

- Give a **Function Points (FP)** based estimate of size of the information system. Calculate the cost and effort required to complete the project where from the previous project history we know that it takes one person month to deliver 12 FP. Labor rate is \$5000 per month.
- Using the FP based estimate of size, determine the **estimated lines of code** for the system. Assume 60 lines of OO code will be written per function point. We are in early stage of high level design.
- Based on the number of lines calculated in part b, calculate the cost and effort required to complete the project where from the previous project history we know that it takes one person month to complete 720 lines of code. Labor rate is \$5000 per month.

Solution:

a)

Information Domain Value	Count	Weighting Factor	
External Inputs	3	4	12
External Outputs	2	5	10
External Inquiries	2	4	8
Internal Logical Files	1	10	10
External Interface Files	4	7	28
Unadjusted Function Points (Count Total) =			68

$$FP = \text{count_total} \times [0.65 + 0.01 \times \sum (F_i)]$$

$$FP = 68 \times [0.65 + 0.01 \times (3+2+0+4+2+3+4+3+5+5+4+3+4+5)]$$

$$FP = 68 \times [0.65 + 0.01 \times 47]$$

$$FP = 68 \times 1.12$$

$$FP = 76.16$$

$$\text{Cost per FP} = \frac{\text{Labor Rate}}{\text{Average Productivity}}$$

$$\text{Cost per FP} = \frac{5000}{12}$$

$$\text{Cost per FP} = \$ 417 \text{ (approx.)}$$

$$\text{Total Estimated Project Cost} = FP \times \text{Cost per FP}$$

$$\text{Total Estimated Project Cost} = 76.16 \times 417$$

$$\text{Total Estimated Project Cost} = \$ 31759 \text{ (approx.)}$$

$$\text{Estimated Effort} = \frac{FP}{\text{Average Productivity}}$$

$$\text{Estimated Effort} = \frac{76.16}{12}$$

Estimated Effort = 6.3 person-months or (approx. 6 person-months)

b)

Estimated Lines of Code = 60 x 76.16

Estimated Lines of Code = 4570

c)

$$\text{Cost per LOC} = \frac{\text{Labor Rate}}{\text{Average Productivity}}$$

$$\text{Cost per LOC} = \frac{5000}{720}$$

Cost per LOC = \$ 7 (approx.)

Total Estimated Project Cost = LOC x Cost per LOC

Total Estimated Project Cost = 4570 x 7

Total Estimated Project Cost = \$ 31990 (approx.)

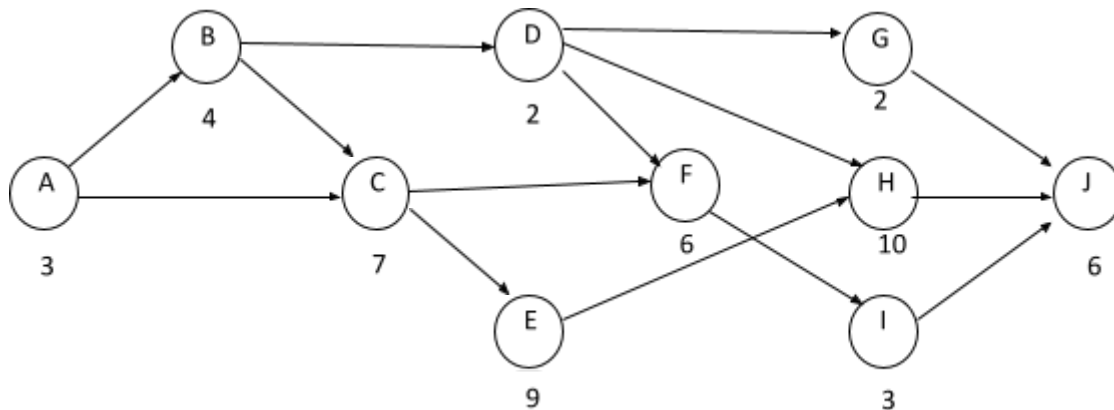
$$\text{Estimated Effort} = \frac{LOC}{\text{Average Productivity}}$$

$$\text{Estimated Effort} = \frac{4570}{720}$$

Estimated Effort = 6.3 person-months or (approx. 6 person-months)

Q2.

Consider the following AoN graph where nodes represent activities, arcs represent dependencies and the numbers below the nodes represent duration of the activity in days. Redraw the graph using the appropriate node structure. Determine and explicitly mention the minimum time required to complete the project (use appropriate units). For each node, also mention the earliest start, earliest finish, latest start, latest finish, and slack. Clearly highlight/mention the critical path and critical activities.

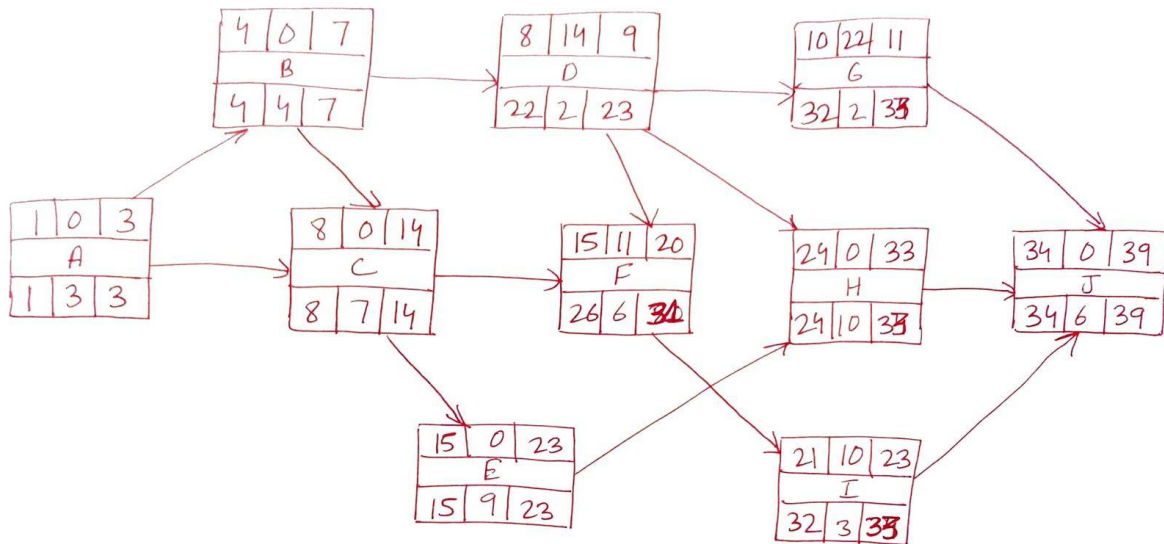


Q3. For a project, eleven activities are to be carried out. Their relationship with other activities and expected durations are mentioned in table below. A predecessor is an activity which needs to be completed before the start of the successor activity. For example if there is an X → Y relationship between activities X and Y, X is predecessor of Y i.e. Y cannot be started before completing X. Y in this case is successor of X.

Activities	Predecessors	Duration (Days)
A	-	3
B	A	4
C	A, B	7
D	B	2
E	C	9
F	C, D	6
G	D	2
H	D, E	10
I	F	3
J	G, H, I	6

To do: Draw the activity on node graph for the activities mentioned in the above table. Use the appropriate node structure. Determine and explicitly mention the minimum time required to complete the project (use appropriate units). For each node, also mention the earliest start, earliest finish, latest start, latest finish, and slack. Highlight the critical path and critical activities. Explicitly mention the minimum time required to complete the project. Use appropriate units.

Solution of Q2 and Q3



$$EF = ES + D - 1$$

$$LS = LF - D + 1$$

$$ST = LF - EF \text{ or } LS - ES$$

Critical Path :- A → C → E → H → J or
A → B → C → E → H → J

Minimum Time to complete the project = 39 days