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Software Project Management Assignment

Exercise 5.11

A small computer system controls the entry of vehicles to a car park. Each time a vehicle pulls up before an entry barrier, a sensor notifies the computer system of the vehicle's presence. The system examines a count that it maintains of the number of vehicles that are currently in the car park. This count is kept on backing storage so that it will still be available if the system is temporarily shut down, for example because of a power cut. If the count does not exceed the maximum allowed then the barrier is lifted and the count is incremented. When a vehicle leaves the car park, a sensor detects the exit and reduces the count of vehicles.

There is a system administration system that can set the maximum number of cars allowed, and which can be used to adjust or replace the count of cars when the system is restarted.

Identify the entries, exits, reads and writes in this application.

Solution:

1. Incoming vehicle is sensed – Entry
2. Examine the count of vehicles – Read
3. Barrier is lifted – Exit
4. Increment the count – Write
5. Outgoing vehicle is sensed – Entry
6. Decrement the count – Write
7. Set new maximum – Write

Exercise 5.12

A new project has 'average' novelty for the software supplier that is going to execute it and is thus given a nominal rating on this account for precedentedness. Development flexibility is high, but requirements may change radically and so the risk resolution exponent is rated very low. The development team are all located in the same office and this leads to team cohesion being rated as very high, but the software house as a whole tends to be very informal in its standards and procedures and the process maturity driver has therefore been given a rating of 'low'.

i. What would be the scale factor (sf) in this case?

ii. What would the estimate of effort if the size of the application was estimated as in the region of 2000 lines of code?

Solution:

- PREC = Average (Normal) = 3.72
- FLEX = High = 2.03

- RESL = very low = 7.07
- TEAM = very high = 1.10
- PMAT = low = 6.24

The vales are taken from the COCOMO II Scale factor values

COCOMO II Scale factor values

Driver	Very low	Low	Nominal	High	Very high	Extra high
PREC	6.20	4.96	3.72	2.48	1.24	0.00
FLEX	5.07	4.05	3.04	2.03	1.01	0.00
RESL	7.07	5.65	4.24	2.83	1.41	0.00
TEAM	5.48	4.38	3.29	2.19	1.10	0.00
PMAT	7.80	6.24	4.68	3.12	1.56	0.00

i. scale factor (sf)

$$sf = B + 0.01 * \sum (exponent\ driver\ ratings)$$

where B is a constant currently set at 0.91

Substituting the values we get,

sf = 0.91 + 0.01 * [3.72+2.03+7.-7+1.10+6.24]

= 0.91+0.01*20.16

=1.112

ii. Effort

$$pm = A(size)\ (sf)\ 3\ (em1)\ 3\ (em2)\ 3\ \ldots\ 3\ (emn)$$

where pm is the effort in 'person-months', A is a constant 2.94,size is measured in kdsi

Size = 2000 LOC = 2

Substituting the values we get,

pm = 2.94 $(2)^{1.112}$ *1

= 2.94*2.161

= 6.35

Exercise 5.13

A software supplier has to produce an application that controls a piece of equipment in a factory. A high degree of reliability is needed as a malfunction could injure the operators. The algorithms to control the equipment are also complex. The product reliability and complexity are therefore rated as very high. The company would like to take the opportunity to exploit fully the investment that they made in the project by reusing the control system, with suitable modifications, on future contracts. The reusability requirement is therefore rated as very high. Developers are familiar with the platform and the possibility of potential problems in that respect is regarded as low. The current staff are generally very capable and are rated in this respect as very high, but the project is in a somewhat novel application domain for them

so experience is rated as nominal. The tool sets available to the developers are judged to be typical for the size of company and are rated as nominal, as is the degree of schedule pressure to meet a deadline.

i. What would be the value for each of the effort multipliers?
ii. What would be the impact of all the effort multipliers on a project estimated as taking 200 staff months?

Solution:

i. Values of each Effort multipliers

- RCPX = very high = 1.91
- RUSE = very high = 1.15
- PDIF = low = 0.87
- PERS = very high = 0.63
- PREX = nominal = 1.00
- FCIL = nominal = 1.00
- SCED = very high = 1.00

The values are taken from the following table

COCOMO II Early design effort multipliers

Code	Effort modifier	Extra low	Very low	Low	Nominal	High	Very high	Extra high
RCPX	Product reliability and complexity	0.49	0.60	0.83	1.00	1.33	1.91	2.72
RUSE	Required reusability			0.95	1.00	1.07	1.15	1.24
PDIF	Platform difficulty			0.87	1.00	1.29	1.81	2.61
PERS	Personnel capability	2.12	1.62	1.26	1.00	0.83	0.63	0.50
PREX	Personnel experience	1.59	1.33	1.12	1.00	0.87	0.74	0.62
FCIL	Facilities available	1.43	1.30	1.10	1.00	0.87	0.73	0.62
SCED	Schedule pressure		1.43	1.14	1.00	1.00	1.00	

ii. Impact of all the effort multipliers on a project

= 200 * (1.91*1.15*0.87*0.63*1.00*1.00*1.00)

= 200 * 1.20

= 240 staff months

Exercise 6.1

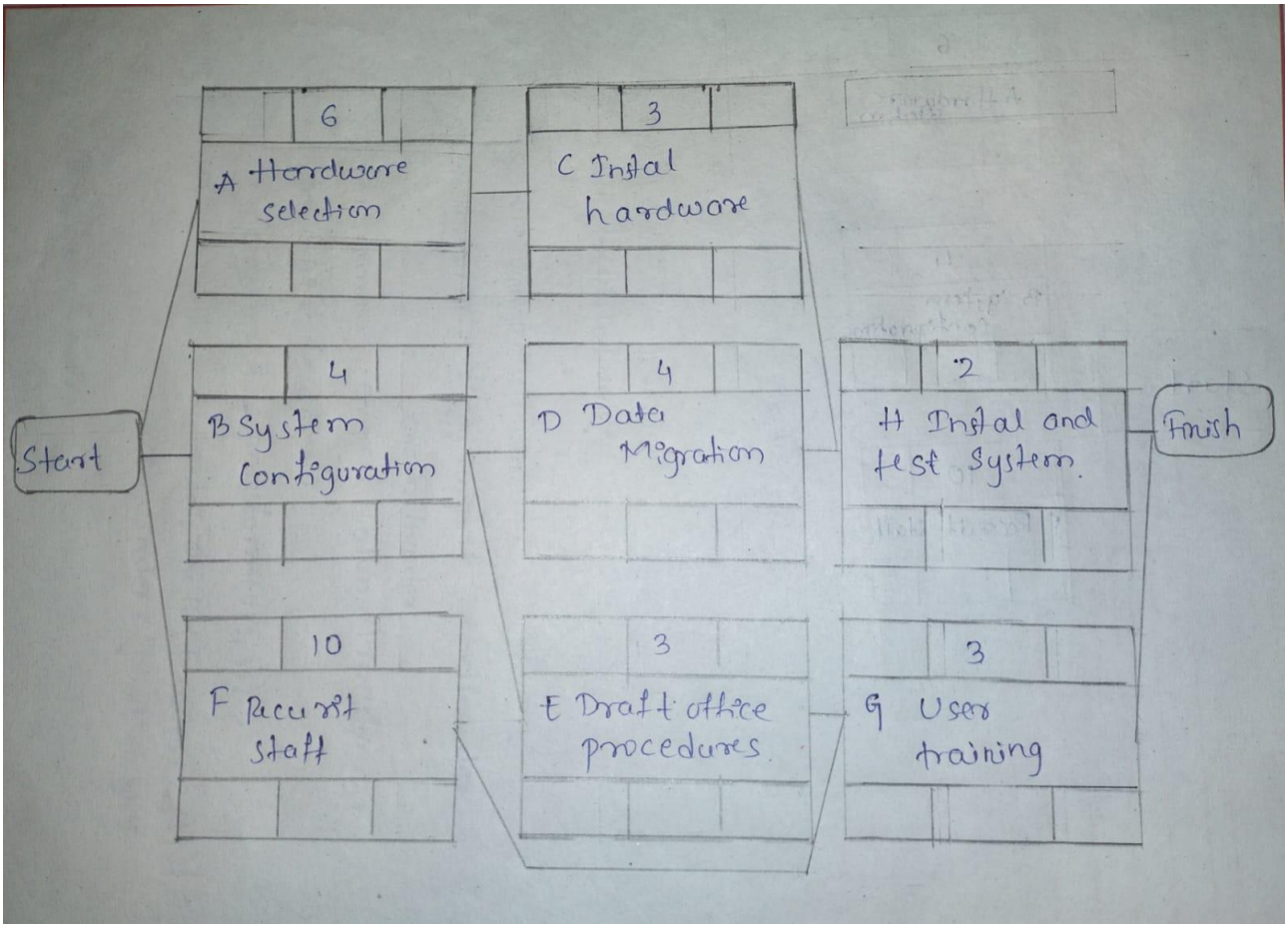
Draw an activity network using precedence network conventions for the project specified in Table 6.1.

	Activity	Duration (weeks)	Precedents
A	Hardware selection	6	
B	System configuration	4	
C	Instal hardware	3	A
D	Data migration	4	B
E	Draft office procedures	3	B
F	Recruit staff	10	
G	User training	3	E, F
H	Instal and test system	2	C, D

Solution:

Precedence network convention

Earliest start	**Duration**	**Earliest finish**
Activity label, activity description		
Latest start	**Float**	**Latest finish**


Start
6
A Hardware selection
3
C Instal hardware
4
B System Configuration
4
D Data Migration
2
H Instal and test System.
Finish
10
F Recruit staff
3
E Draft office procedures.
3
G User training