

Service Processes and Systems Homework #5

Assigned: Mar. 22, 2006

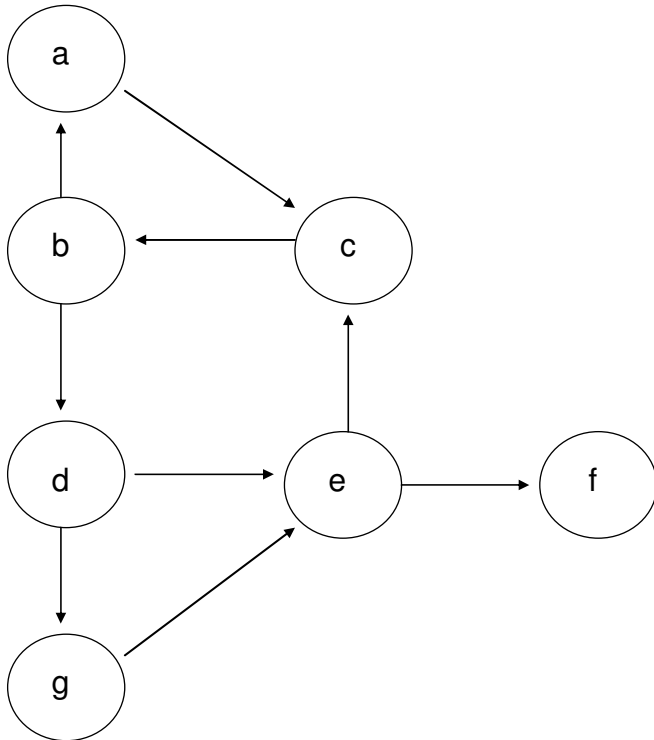
Due: Mar. 29, 2006

1. Review paper titled: "Simulating Multiple Emergent Phenomena - Exemplified in an Ant Colony" by Kluegl et al. 1998 found at:

http://www6.informatik.uni-wuerzburg.de/~kluegl/pubs/1998/kluegl_etal_Alife98.pdf

And write a one paragraph summary of the paper.

2. Based on the terminology described in class, identify all the possible walks, paths, cycles, or tours, also point out if the graph is acyclic or not



3. The table below provides data on the activities associated with constructing a new home in Houghton. Use the data to construct an activity network and determine the critical path.

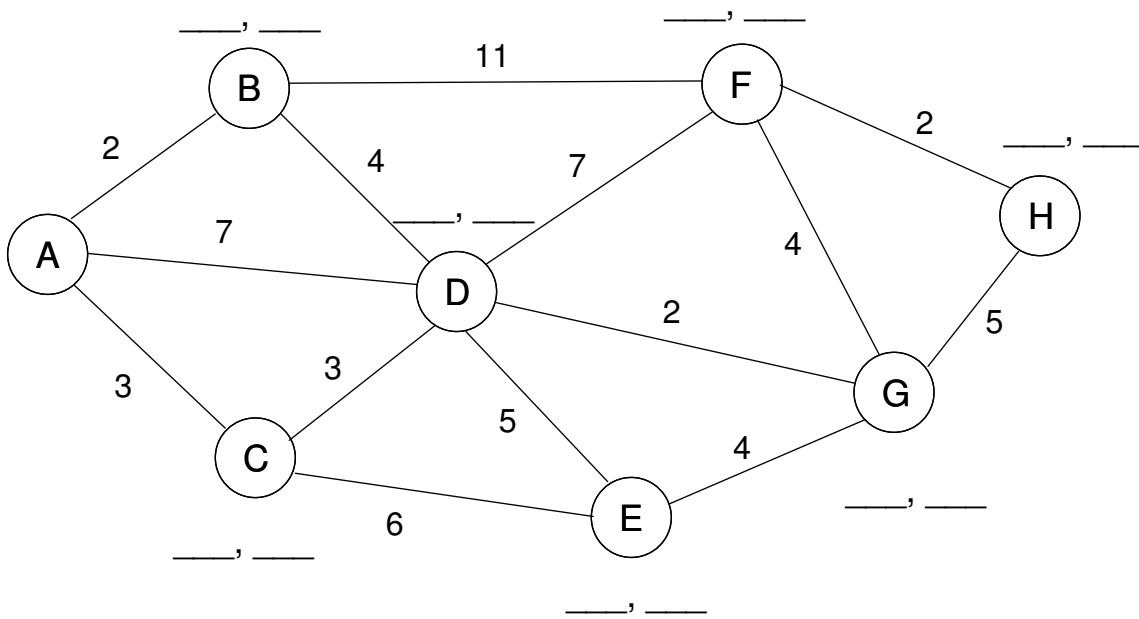
Activity	Description	Immediate Predecessor(s)	Duration (days)
A	Clear site	-	1
B	Bring utilities to site	-	2
C	Excavate	A	1
D	Pour foundation	C	2
E	Outside plumbing	B, C	6
F	Frame building	D	10
G	Electric wiring	F	3
H	Lay floor	G	1
I	Install roof	F	1
J	Inside plumbing	E, H	5
K	Shingling	I	2
L	Outside sheathing insulation	F, J	1
M	Install windows and outside doors	F	2
N	Brick work	L, M	4
O	Insulate walls and ceiling	G, J	2
P	Cover walls and ceiling	O	2
Q	Insulate roof	I, P	1
R	Finish interior	P	7
S	Finish exterior	I, N	7
T	Landscape	S	3

4. Problem 3 is revisited, but this time additional data is available on the duration of the activities (see table below). Apply the PERT method to determine the expected time for each activity as well as the activity variances. Finally, compute the expected project completion time and establish a 95% interval estimate for how long the project will take to complete.

Activity	Description	Immediate Predecessor(s)	Optimistic Time (days)	Most Probable Time (days)	Pessimistic Time (days)
A	Clear site	-	0.5	2	2
B	Bring utilities to site	-	1	2	3
C	Excavate	A	1	2	2.5
D	Pour foundation	C	2	3	4
E	Outside plumbing	B, C	6	7	8
F	Frame building	D	8	10	12
G	Electric wiring	F	3	4	5
H	Lay floor	G	0.5	1	2

I	Install roof	F	1	2	3
J	Inside plumbing	E, H	5	6	8
K	Shingling	I	2	3	4
L	Outside sheathing insulation	F, J	1	3	5
M	Install windows and outside doors	F	1	2	3
N	Brick work	L, M	4	6	8
O	Insulate walls and ceiling	G, J	1.5	2	3
P	Cover walls and ceiling	O	2	2.5	3
Q	Insulate roof	I, P	1	2	3
R	Finish interior	P	5	7	9
S	Finish exterior	I, N	7	8	10
T	Landscape	S	3	5	7

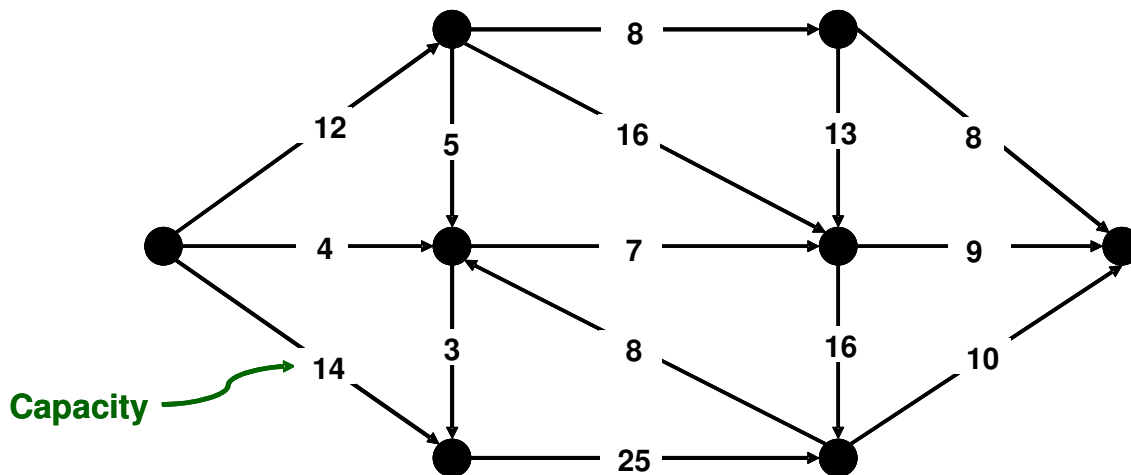
5. Analyze the following distance network and find the shortest route from A to H.



6. A traveling salesperson must complete a tour to each of the nodes shown in the distance matrix below. Assume node 1 is the depot node. Use the nearest neighbor procedure to find a tour.

From node	Distance to Node in miles							
	1	2	3	4	5	6	7	8
1	-	2.2	5.8	4.0	5.0	8.5	3.6	3.6
2	2.2	-	4.1	3.6	5.8	9.4	5.0	5.8
3	5.8	4.1	-	3.2	6.1	9.0	6.7	9.2
4	4.0	3.6	3.2	-	3.0	6.3	3.6	6.7
5	5.0	5.8	6.1	3.0	-	3.6	2.0	6.0
6	8.5	9.4	9.0	6.3	3.6	-	3.6	8.5
7	3.6	5.0	6.7	3.6	2.0	3.6	-	4.0
8	3.6	5.8	9.2	6.7	6.0	8.5	4.0	-

7. Analyze the following flow network, and determine the maximum flow possible based on the indicated capacities.



For Graduate Credit:

Identify a technical paper that applies PERT or CPM to a service process.

Prepare a critical review of the paper. What are the positive contributions of the paper? What are the technical deficiencies of the paper? Be sure to include a copy of the paper with your submission.