Birla Institute of Technology & Science, Pilani
Pilani Campus

Course No : EEE G626,
Course Title : Hardware Software Co-design
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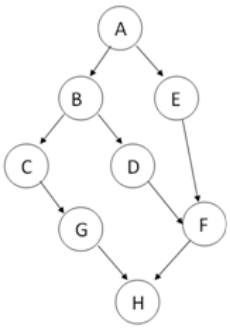
Lab-2

Given the task graph in figure and it's corresponding area and delay values on components. Calculate the best mapping which satisfies time constraint of 275 units with minimizing overall area.

Note:

(i) A cutline partitions the graph into two parts (HW & SW) and cuts minimum **three edges**.
(ii) Communication delay is **zero**.
(iii) All the task run **sequentially** on time line(CPU and ASIC)
(iv) There can be only two components in the system.
(v) Start from all software implementation and move to hardware implementation.



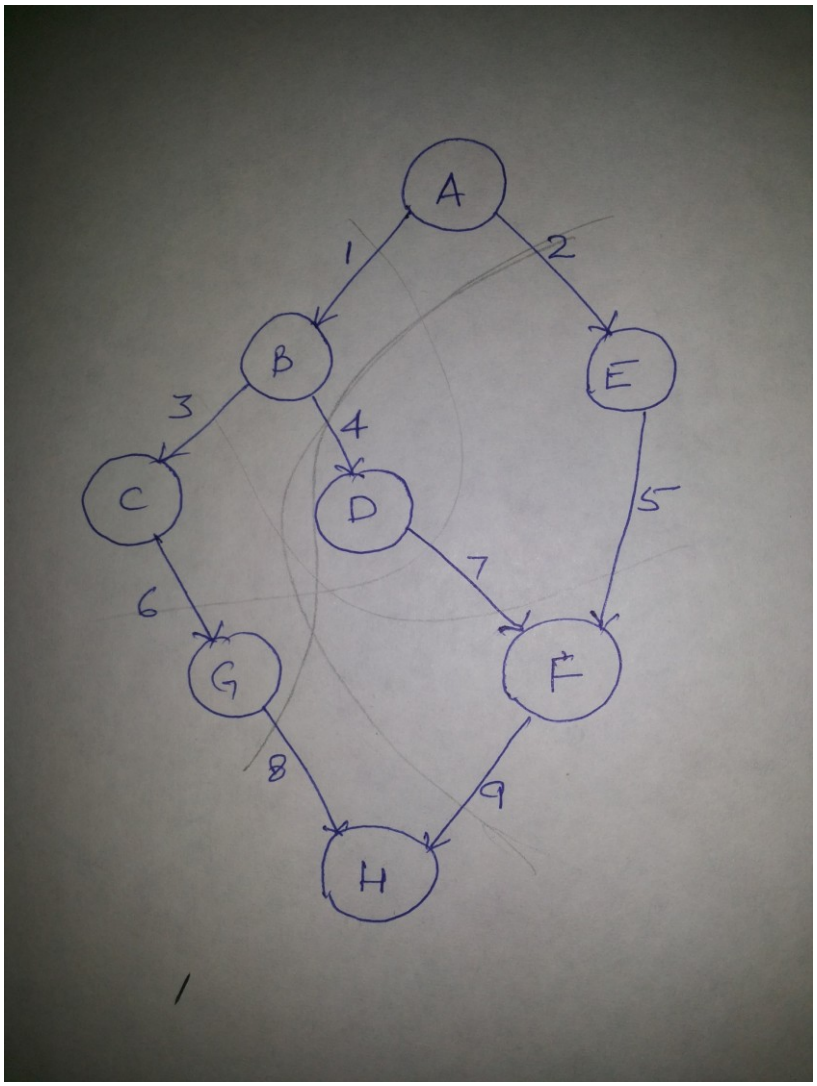
	Time		Time		Area			
	CPU1	CPU2	ASIC1	ASIC2	CPU1	CPU2	ASIC1	ASIC2
A	60	30	20	10	40	60	25	45
B	90	50	30	15	40	60	30	35
C	81	54	27	15	40	60	15	20
D	60	40	20	10	40	60	10	15
E	90	44	30	15	40	60	10	10
F	87	30	27	20	40	60	10	25
G	90	50	40	15	40	60	15	35
H	99	56	33	20	40	60	15	15

(a) Which task is mapped to which component? **[02]**

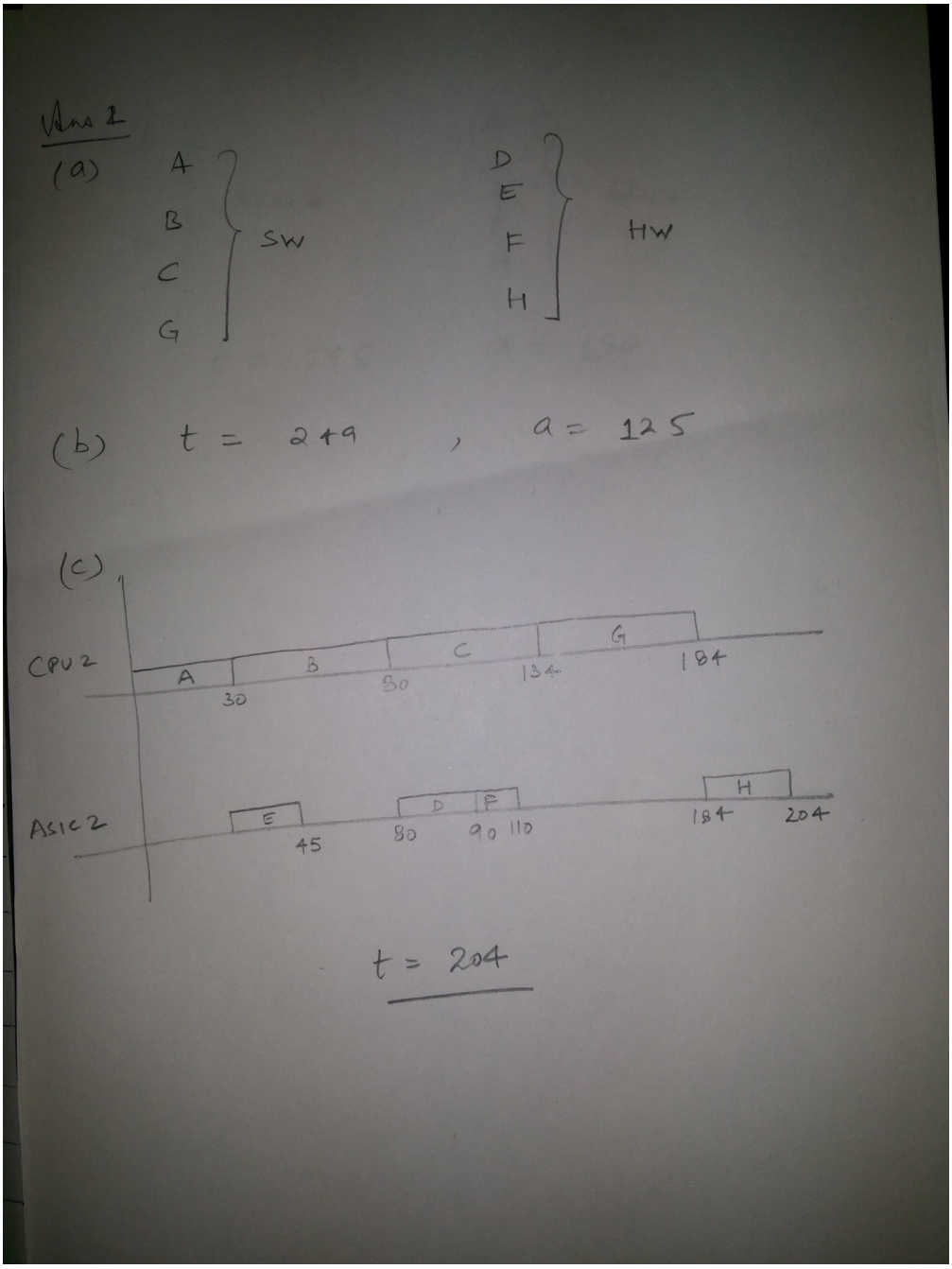
(b) What is the latency and area for the mapping? **[02]**

(c) Suppose the parallel execution is possible on ASIC now what is the latency for the solution obtained? Draw the schedule. **[02]**

Manual Solution



Cutline Edges	(HW - SW) A B C D E F G H	C1A1 T	C1A1 A	C1A2 T	C1A2 A	C2A1 T	C2A1 A	C2A2 T	C2A2 A	Best
1 7 9	10 50 54 40 15 20 50 56 H S S S H H S S	X		X		(X)		295	X	
1 7 8	30 45 30 56 15 15 15 15 AEFH-SW BCDG-HW 50 40 50 50 15 20 20 20 BCDG-SW AEFH-HW	X		X		X		215,165 259,175		
1 6 4	S H H S S S S S	X		X		X		X		
1 3 4	S H S S S S S S	X		X		X		X		
1 7 6	30 15 15 10 44 30 50 56 S H H H S S S S	X		X		(X)		250,130		
1 4 8	30 15 15 40 44 30 15 56 S H H S S S H S	X		X		X		245,150		
2 7 9	S S S S H H S S	X		X		X		X		
2 7 8	30 50 54 40 15 20 50 20 S S S S H H S H	X		X		(X)		279,	X	
2 4 6	10 15 15 40 44 30 50 56 H H H S S S S S	X		X		(X)		260,160		
2 4 8	10 15 15 15 40 44 50 50 ABCG-HW BEFH-SW 10 15 20 20 20 50 50 50 DEFH-SW ABCG-SW	X		X		X		205,195 249,125		
2 4 9	30 50 54 10 15 20 50 56 S S S H H H S S	X		X		(X)		285		
3 4 5	10 15 54 40 15 20 50 56 H H S S H S S S	X		X		(X)		270,	X	
3 4 7 9	10 15 15 20 50 40 54 56 ABEF-HW CDGH-SW 15 10 15 20 20 50 54 56 CDGH-HW ABEF-SW	X		X		X		260,175 250,155		
3 4 7 8	S S H H S S H S	X		X		X		X		
5 7 8	90° S S S S S H S H	X		X		(X)		X		
4 5 6	ABCE-HW DGFH-SW 50 54 20 20 20 50 54 44 DGFH-HW ABCE-SW	X		X		X		-	241,150	
5 6 7	30 50 54 40 44 20 15 20 S S S S S H H H	X		X		X		273,	X	
3 5 7	10 15 15 10 50 54 54 50 ABED-HW CGFH-SW 15 15 20 20 20 54 54 40 CGFH-HW ABED-SW	X		X		X		264,165 248,155		



Use Genetic Algorithm to solve the problem

Kindly contact me for any further details
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