

King Fahd University of Petroleum and Minerals
 College of Computer Sciences and Engineering
 Department of Computer Engineering

COE 308 – Computer Architecture (T031)

Homework # 03 (due date: Tuesday 30/12/2003)

*** Show all your work. No credit will be given if work is not shown! ***

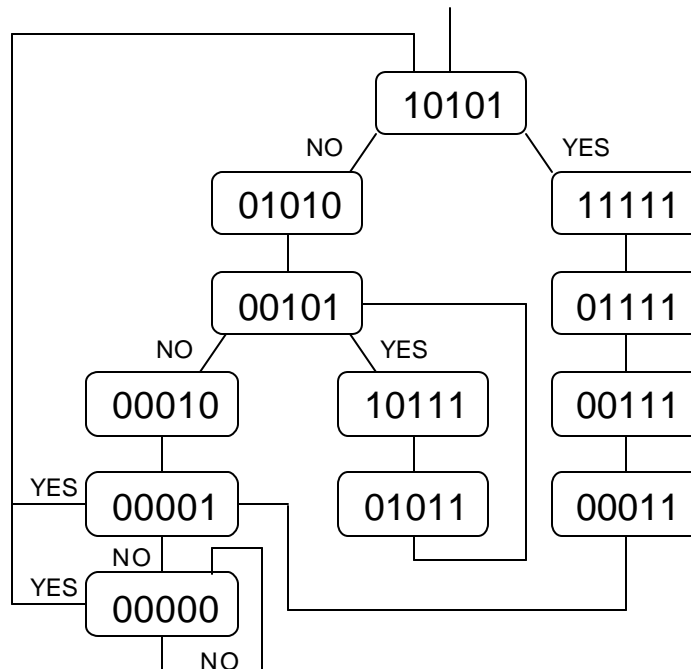
Problem # 1: Solve problem 5.14 from the textbook.

Solution:

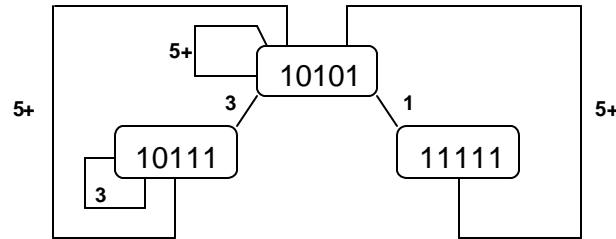
- To find *Initial Collision Vector*, find the distances between every pair of X's in each row:

Stage	Distance
1	{ }
2	2, 4
3	2
4	{ }

- Distance vector = (4, 2, 0) \Rightarrow *Initial Collision Vector* = 10101
- State diagram is as follows:



- Reduced/Simplified state diagram is as follows:



- Simple cycles:

State	Simplified Cycles	Average
10101	5, 5, 5, 5, ...	5
	OR 3, 5, 3, 5, ...	4
	OR 1, 5, 1, 5, ...	3
10111	3, 3, 3, 3, ...	3
	OR 5, 3, 5, 3, ...	4
11111	5, 1, 5, 1, ...	3

Thus, simple cycles are (5), (3,5), (1,5), (3)

- From previous step, the minimum greedy cycle average latency is 3. Also, from reservation table, maximum number of X's in a row = maximum(1,3,2,1) = 3. Furthermore, maximum number of 1's in **Initial Collision Vector** is 3.

$$\Rightarrow 3 \leq \text{Minimum Average Latency (MAL)} \leq 3 \leq 3$$

Problem # 2: Solve problem 5.15 from the textbook.

Solution:

Original Reservation Table:

		Time						
		0	1	2	3	4	5	6
Stages	1	/	/		/			
	2			/			/	
	3				/		/	
	4					/		/

Working table:

		Time								
		0	1	2	3	4	5	6	7	8
Stages	1	/	/		F	F	/	F	F	F
	2			/			F		/	F
	3				/			F	/	
	4							/		/

Modified Reservation Table:

		Time								
		0	1	2	3	4	5	6	7	8
Stages	1	/	/		D	D	/			
	2			/					/	
	3				/				/	
	4							/		/