Chapter 4 Function Minimization Algorithms (III)

Prime Implicant Tables for Multiple Output Problems (1/4)

- Consider finding the minimum output of the set of functions

$$f(a,b,c)=\Sigma m(2,3,7)$$

$$g(a,b,c)=\Sigma m(4,3,7)$$

- Essential prime implicants are found as before. An X is placed in the column of a function for which the term is an implicant

Table 4.9 A multiple output prime implicant table.

			f			*g*		
			√	√		√	√	
	S		**2**	**3**	**7**	**4**	**5**	**7**
1 1 1	4	*A*			X			X
0 1 –*	3	*B*	X	X				
1 0 –*	3	*C*				X	X	
– 1 1	3	*D*		X	X			
1 – 1	3	*E*					X	X

Prime Implicant Tables for Multiple Output Problems (2/4)

- The table is then reduced as in Table 4.10

Table 4.10 A reduced prime implicant table.

			f	*g*
	$		7	7
1 1 1	4	*A*	X	X
– 1 1	3	*D*	X	
1 – 1	3	*E*		X

- It is clear that we can use term *A* to cover both functions, rather than two separate terms, even though *A* costs 4 and the others cost 3

Prime Implicant Tables for Multiple Output Problems (3/4)

- The solution is thus

$$f = a'b + abc$$
$$g = ab' + abc$$

- **Example 4.12.** Consider finding the minimum output of the functions

$$f(a, b, c, d) = \Sigma m(2, 3, 4, 6, 9, 11, 12) + \Sigma d(0, 1, 14, 15)$$

$$g(a, b, c, d) = \Sigma m(2, 6, 10, 11, 12) + \Sigma d(0, 1, 14, 15)$$

- Don't Cares will not be consider again because all the prime implicants (including Don't Cares) are found by Q-M method or Iterated Consensus method. They are listed below

Prime Implicant Tables for Multiple Output Problems (4/4)