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Example 3.19 and Example 3.20

Example 3.19 Convert the given Mealy machine to an equivalent Moore machine.

	I/P = 0		I/P = 1	
Present State	Next State	O/P	Next State	O/P
→ q_0	q_2	z_0	q_1	z_1
q_1	q_0	z_0	q_2	z_0
q_2	q_0	z_1	q_2	z_1

Solution: For q_0 for input 0, the output differs. For q_2 for inputs 0 and 1, the output differs. So the states are broken as $q_0 0$, $q_0 1$ and $q_2 0$, $q_2 1$. According to the new states, the modified Mealy machine becomes

	I/P = 0		I/P = 1	
Present State	Next State	O/P	Next State	O/P
→ q_{00}	q_{20}	z_0	q_1	z_1
q_{01}	q_{20}	z_0	q_1	z_1

Present State	I/P = 0		I/P = 1	
	Next State	O/P	Next State	O/P
q_1	q_{00}	z_0	q_{20}	z_0
q_{20}	q_{01}	z_1	q_{21}	z_1
q_{21}	q_{01}	z_1	q_{21}	z_1

From this modified Mealy machine, the Moore machine is

Present State	Next State		O/P
	I/P = 0	I/P = 1	
→ q_{00}	q_{20}	q_1	z_0
q_{01}	q_{20}	q_1	z_1
q_1	q_{00}	q_{20}	z_1
q_{20}	q_{01}	q_{21}	z_0
q_{21}	q_{01}	q_{21}	z_1

Example 3.20 Convert the given Mealy machine to an equivalent Moore machine.

	I/P = 0		I/P = 1	
Present State	Next State	O/P	Next State	O/P
→ q_0	q_2	0	q_1	0
q_1	q_0	1	q_3	0
q_2	q_1	1	q_0	1
q_3	q_3	1	q_2	0

Solution: In the next state column of the given Mealy machine, the output differs for q_1 and q_3 as the next state. So, the states are divided as $q_1 0$, $q_1 1$ and $q_3 0$,$q_3 1$, respectively. After dividing the states, the modified Mealy machine becomes

	I/P = 0		I/P = 1	
Present State	Next State	O/P	Next State	O/P
→ q_0	q_2	0	q_{10}	0
q_{10}	q_0	1	q_{30}	0
q_{11}	q_0	1	q_{30}	0
q_2	q_{11}	1	q_0	1
q_{30}	q_{31}	1	q_2	0
q_{31}	q_{31}	1	q_2	0

In the next state column of the modifi ed Mealy machine, when q_0 is a next state, the output is 0. So, in the constructing Moore machine, for the present state q_0, the output is also 0. Similarly, for the present state q_2, the output is 0.

For the divided states like $q_1 0$, $q_1 1$, there is no need to mention the output as they were divided according to the distinguished output. So, the constructing Moore machine is

	Next State		
Present State	I/P = 0	I/P = 1	O/P
→ q_0	q_2	q_{10}	1
q_{10}	q_0	q_{30}	0
q_{11}	q_0	q_{30}	1
q_2	q_{11}	q_0	0
q_{30}	q_{31}	q_2	0
q_{31}	q_{31}	q_2	1

To get rid of the problem of the occurrence of null string, we need to include another state, q_a, with same transactions as of q_0 but with output 0. The modified final Moore machine equivalent to the given Mealy machine becomes

	Next State		
Present State	I/P = 0	I/P = 1	O/P
$\rightarrow q_a$	q_2	q_{10}	0
q_0	q_2	q_{10}	1
q_{10}	q_0	q_{30}	0
q_{11}	q_0	q_{30}	1
q_2	q_{11}	q_0	0
q_{30}	q_{31}	q_2	0
q_{31}	q_{31}	q_2	1