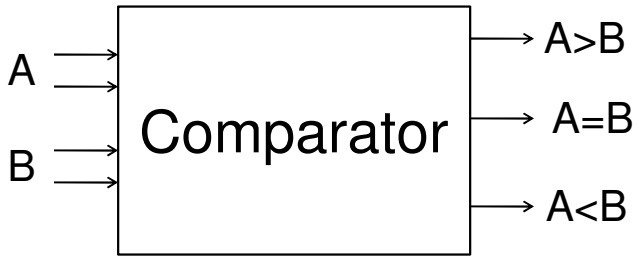
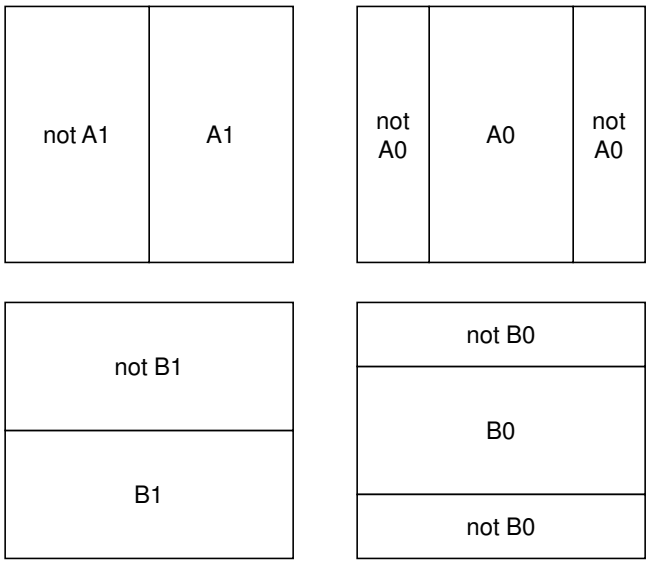
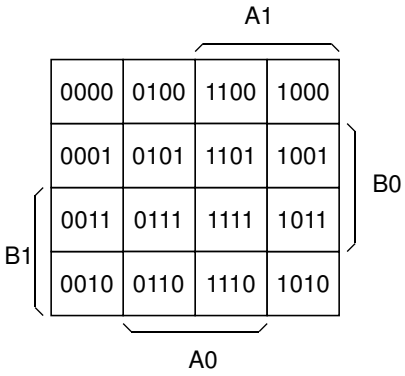
2 Bit Comparator

Basic Problem: Compare Two 2-bit Numbers



K-Map Construction (4 bits)





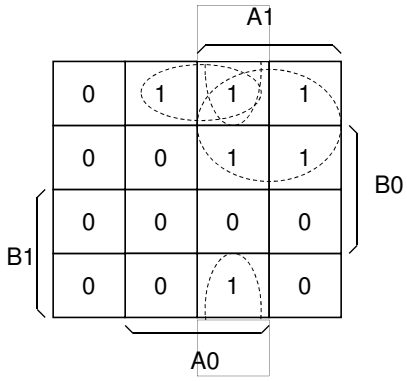
A val	B val					
00	00					
00	01					
00	10					
00	11					
01	00					
01	01					
01	10					
01	11					
10	00					
10	01					
10	10					
10	11					
11	00					
11	01					
11	10					
11	11					

A val	B val	A val	B val			
00	00	0	0			
00	01	0	1			
00	10	0	2			
00	11	0	3			
01	00	1	0			
01	01	1	1			
01	10	1	2			
01	11	1	3			
10	00	2	0			
10	01	2	1			
10	10	2	2			
10	11	2	3			
11	00	3	0			
11	01	3	1			
11	10	3	2			
11	11	3	3			

A val	B val	A val	B val	A>B	A=B	A<B
00	00	0	0			
00	01	0	1			
00	10	0	2			
00	11	0	3			
01	00	1	0			
01	01	1	1			
01	10	1	2			
01	11	1	3			
10	00	2	0			
10	01	2	1			
10	10	2	2			
10	11	2	3			
11	00	3	0			
11	01	3	1			
11	10	3	2			
11	11	3	3			

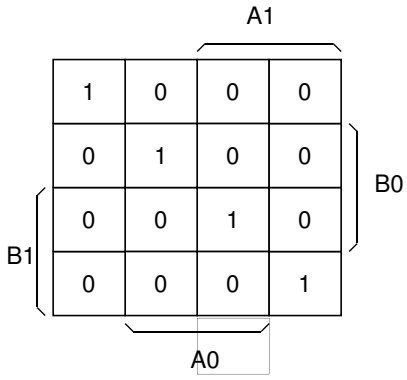
A val	B val	A val	B val	A>B	A=B	A<B
00	00	0	0	0	1	0
00	01	0	1	0	0	1
00	10	0	2	0	0	1
00	11	0	3	0	0	1
01	00	1	0	1	0	0
01	01	1	1	0	1	0
01	10	1	2	0	0	1
01	11	1	3	0	0	1
10	00	2	0	1	0	0
10	01	2	1	1	0	0
10	10	2	2	0	1	0
10	11	2	3	0	0	1
11	00	3	0	1	0	0
11	01	3	1	1	0	0
11	10	3	2	1	0	0
11	11	3	3	0	1	0

K-Map For A > B



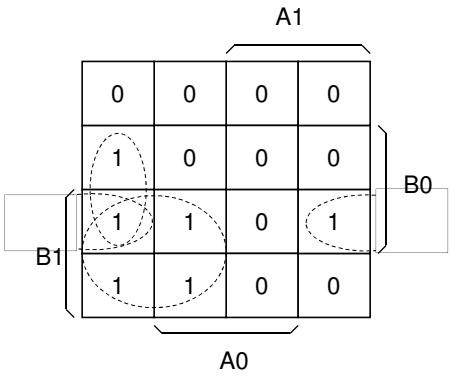
$$A\_GT\_B = A0 \bullet \overline{B1} \bullet \overline{B0} + A1 \bullet A0 \bullet \overline{B0} + A1 \bullet \overline{B1}$$

K-Map For A = B



$$A\_EQ\_B = \overline{A1} \bullet \overline{A0} \bullet \overline{B1} \bullet \overline{B0} + A1 \bullet \overline{A0} \bullet B1 \bullet \overline{B0} +$$
$$A1 \bullet A0 \bullet B1 \bullet B0 + \overline{A1} \bullet A0 \bullet \overline{B1} \bullet B0$$

K-Map For A < B

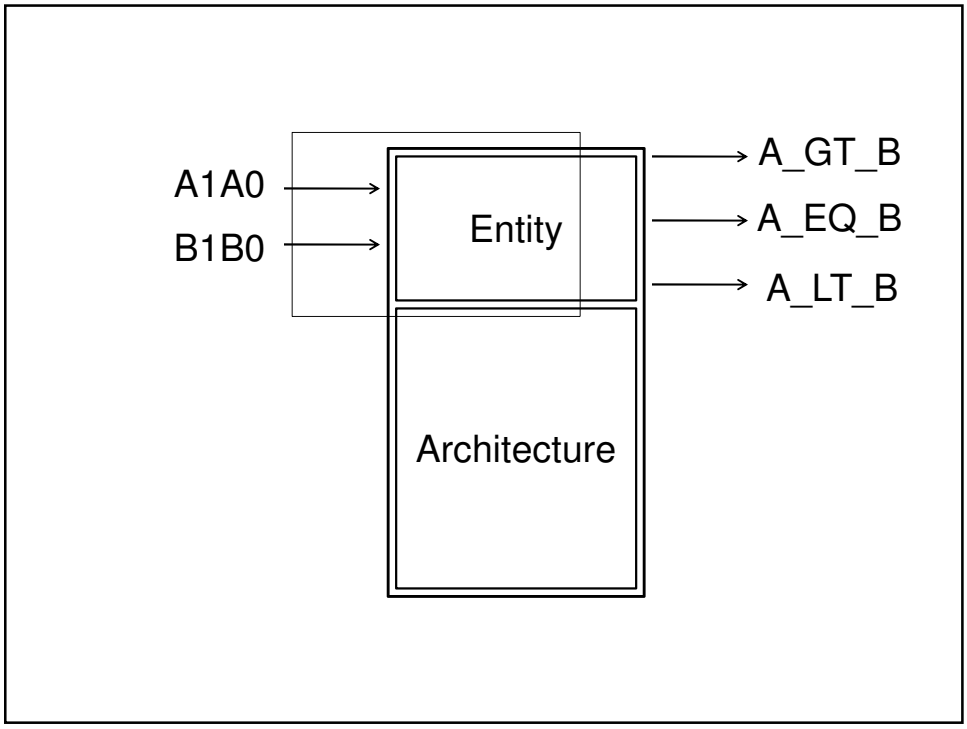


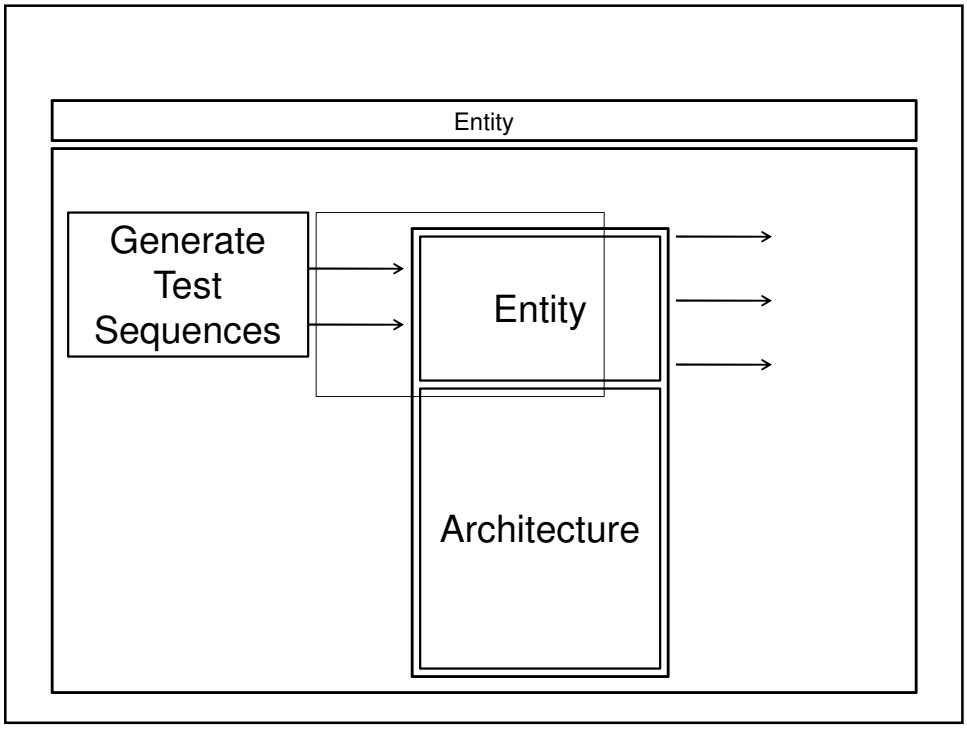
$$A\_LT\_B = \overline{A1} \bullet \overline{A0} \bullet B0 + \overline{A0} \bullet B1 \bullet B0 + \overline{A1} \bullet B1$$

$$A\_GT\_B = A0 \bullet \overline{B1} \bullet \overline{B0} + A1 \bullet A0 \bullet \overline{B0} + A1 \bullet \overline{B1}$$

$$A\_EQ\_B = \overline{A1} \bullet \overline{A0} \bullet \overline{B1} \bullet \overline{B0} + A1 \bullet \overline{A0} \bullet B1 \bullet \overline{B0} + A1 \bullet A0 \bullet B1 \bullet B0 + \overline{A1} \bullet A0 \bullet \overline{B1} \bullet B0$$

$$A\_LT\_B = \overline{A1} \bullet \overline{A0} \bullet B0 + \overline{A0} \bullet B1 \bullet B0 + \overline{A1} \bullet B1$$


A1A0
B1B0
Entity
Architecture
A_GT_B
A_EQ_B
A_LT_B


Entity
Generate
Test
Sequences
Entity
Architecture