Lecture SAT Example
Best First Search

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State Space

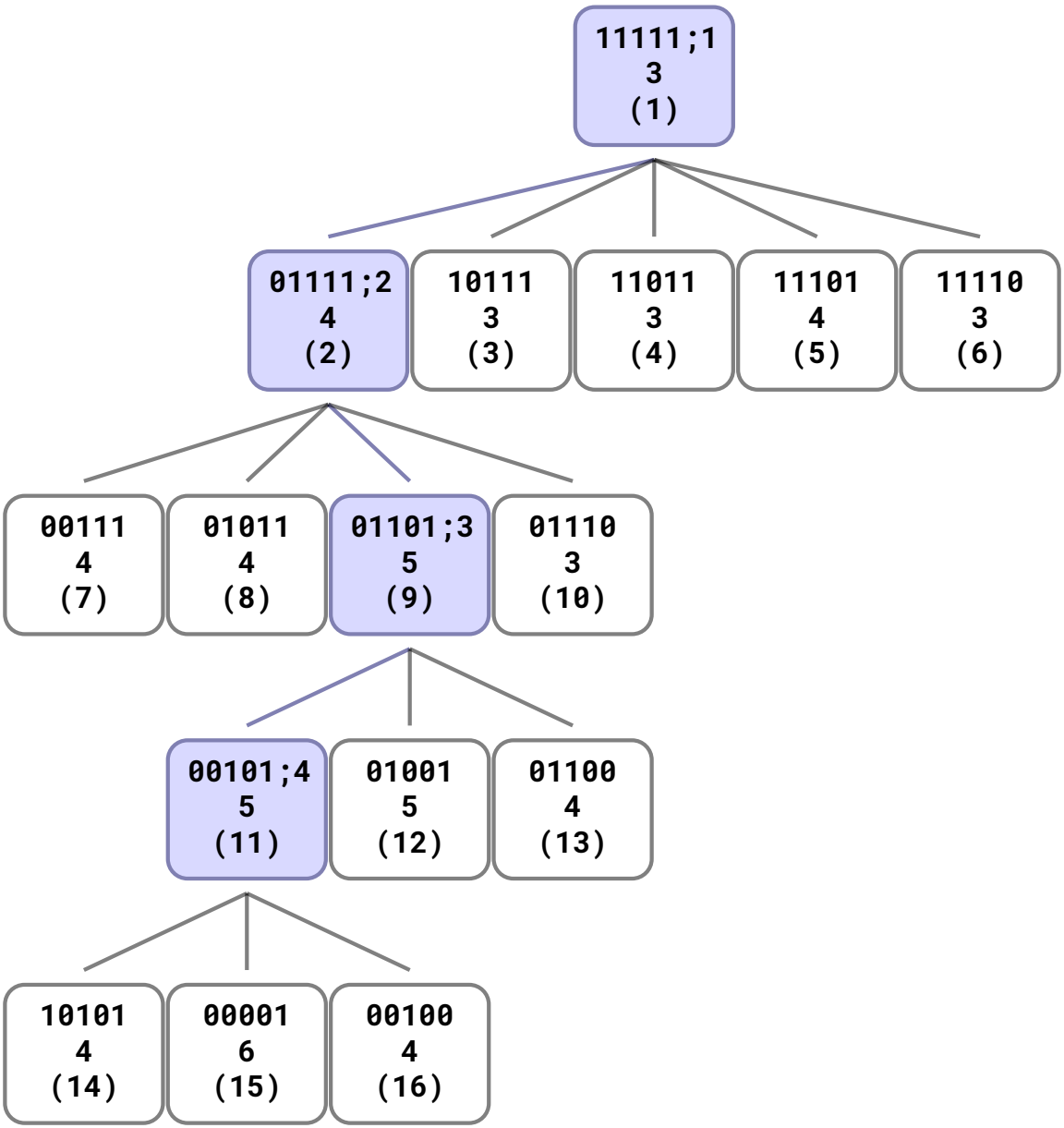
The start state is “11111”.

MoveGen is a one bit flip function.
It flips the bits from left to right, one bit at a time, and accordingly returns the neighbours.

$F(abcde) = (b \vee \neg c) \wedge (c \vee \neg d) \wedge (\neg b) \wedge (\neg a \vee \neg e) \wedge (e \vee \neg c) \wedge (\neg c \vee \neg d)$

				eval					
S.No.	abcde	h(F)	eval(F)	$(b \vee \neg c)$	$(c \vee \neg d)$	$(\neg b)$	$(\neg a \vee \neg e)$	$(e \vee \neg c)$	$(\neg c \vee \neg d)$
1	00000	6	1	1	1	1	1	1	1
2	00001	6	1	1	1	1	1	1	1
3	00010	5	0	1	0	1	1	1	1
4	00011	5	0	1	0	1	1	1	1
5	00100	4	0	0	1	1	1	0	1
6	00101	5	0	0	1	1	1	1	1
7	00110	3	0	0	1	1	1	0	0
8	00111	4	0	0	1	1	1	1	0
9	01000	5	0	1	1	0	1	1	1
10	01001	5	0	1	1	0	1	1	1
11	01010	4	0	1	0	0	1	1	1
12	01011	4	0	1	0	0	1	1	1
13	01100	4	0	1	1	0	1	0	1
14	01101	5	0	1	1	0	1	1	1
15	01110	3	0	1	1	0	1	0	0
16	01111	4	0	1	1	0	1	1	0
17	10000	6	1	1	1	1	1	1	1
18	10001	5	0	1	1	1	0	1	1
19	10010	5	0	1	0	1	1	1	1
20	10011	4	0	1	0	1	0	1	1
21	10100	4	0	0	1	1	1	0	1
22	10101	4	0	0	1	1	0	1	1
23	10110	3	0	0	1	1	1	0	0
24	10111	3	0	0	1	1	0	1	0
25	11000	5	0	1	1	0	1	1	1
26	11001	4	0	1	1	0	0	1	1
27	11010	4	0	1	0	0	1	1	1
28	11011	3	0	1	0	0	0	1	1
29	11100	4	0	1	1	0	1	0	1
30	11101	4	0	1	1	0	0	1	1
31	11110	3	0	1	1	0	1	0	0
32	11111	3	0	1	1	0	0	1	0

Search Tree


11111;13
(1)
01111;24
(2)
10111
3
(3)
11011
3
(4)
11101
4
(5)
11110
3
(6)
00111
4
(7)
01011
4
(8)
01101;35
(9)
01110
3
(10)
00101;45
(11)
01001
5
(12)
01100
4
(13)
10101
4
(14)
00001
6
(15)
00100
4
(16)

Solution

```
OPEN and CLOSED carry tuples: (NODE,PARENT,H-VALUE)

OPEN       (11111,null,3):[]
CLOSED     []

1.
NODE       11111
close      (11111,null,3)
moveGen    01111:10111:11011:11101:11110:[]
newNodes   01111:10111:11011:11101:11110:[]
newPairs   (01111,11111,4):(10111,11111,3):(11011,11111,3):
           (11101,11111,4):(11110,11111,3):[]

OPEN       (01111,11111,4):(11101,11111,4):(10111,11111,3):
           (11011,11111,3):(11110,11111,3):[]

CLOSED     (11111,null,3):[]

2.
NODE       01111
close      (01111,11111,4)
moveGen    11111:00111:01011:01101:01110:[]
newNodes   00111:01011:01101:01110:[]
newPairs   (00111,01111,4):(01011,01111,4):(01101,01111,5):
           (01110,01111,3):[]

OPEN       (01101,01111,5):(00111,01111,4):(01011,01111,4):
           (11101,11111,4):(01110,01111,3):(10111,11111,3):
           (11011,11111,3):(11110,11111,3):[]

CLOSED     (01111,11111,4):(11111,null,3):[]

3.
NODE       01101
close      (01101,01111,5)
moveGen    11101:00101:01001:01111:01100:[]
newNodes   00101:01001:01100:[]
newPairs   (00101,01101,5):(01001,01101,5):(01100,01101,4):[]

OPEN       (00101,01101,5):(01001,01101,5):(00111,01111,4):
           (01011,01111,4):(01100,01101,4):(11101,11111,4):
           (01110,01111,3):(10111,11111,3):(11011,11111,3):
           (11110,11111,3):[]

CLOSED     (01101,01111,5):(01111,11111,4):(11111,null,3):[]

4.
NODE       00101
close      (00101,01101,5)
moveGen    10101:01101:00001:00111:00100:[]
newNodes   10101:00001:00100:[]
newPairs   (10101,00101,4):(00001,00101,6):(00100,00101,4):[]

OPEN       (00001,00101,6):(01001,01101,5):(00100,00101,4):
           (00111,01111,4):(01011,01111,4):(01100,01101,4):
           (10101,00101,4):(11101,11111,4):(01110,01111,3):
           (10111,11111,3):(11011,11111,3):(11110,11111,3):[]

CLOSED     (00101,01101,5):(01101,01111,5):(01111,11111,4):
           (11111,null,3):[]

5.
NODE       00001
GOAL       00001

OPEN       (00001,00101,6):(01001,01101,5):(00100,00101,4):
           (00111,01111,4):(01011,01111,4):(01100,01101,4):
           (10101,00101,4):(11101,11111,4):(01110,01111,3):
           (10111,11111,3):(11011,11111,3):(11110,11111,3):[]

CLOSED     (00101,01101,5):(01101,01111,5):(01111,11111,4):
           (11111,null,3):[]

PATH       11111:01111:01101:00101:00001:[]
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