synchronous_2_bit_up_down_counter_jk.v
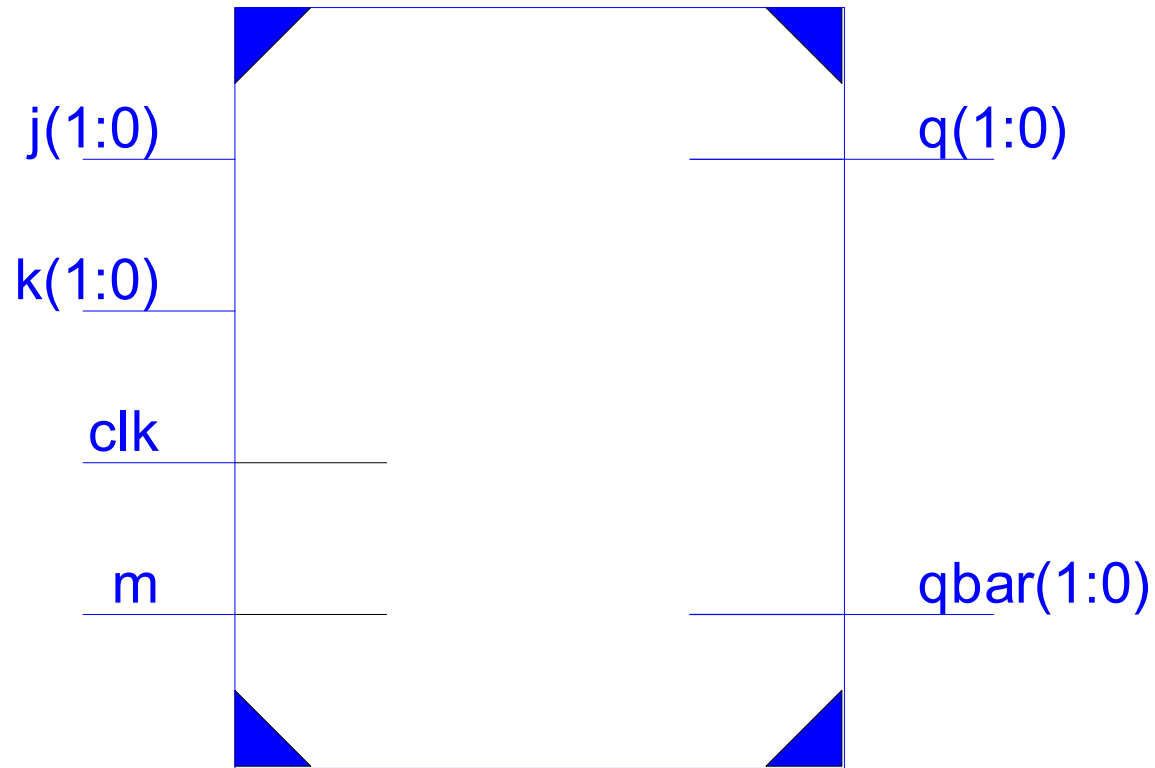
```verilog
1    `timescale 1ns / 1ps
2    //////////////////////////////////////////////////////////////////////////////////
3    // Company:
4    // Engineer:
5    //
6    // Create Date:    12:17:45 06/14/2022
7    // Design Name:
8    // Module Name:    synchronous_2_bit_up_down_counter_jk
9    // Project Name:
10   // Target Devices:
11   // Tool versions:
12   // Description:
13   //
14   // Dependencies:
15   //
16   // Revision:
17   // Revision 0.01 - File Created
18   // Additional Comments:
19   //
20   //////////////////////////////////////////////////////////////////////////////////
21   module synchronous_2_bit_up_down_counter_jk(q,qbar,j,k,clk,m);
22   output [1:0]q,qbar;
23   input [1:0]j,k;
24   input clk,m;
25   JKFF_POSEDGE_TRIGGER jkff0(q[0],qbar[0],1'b1,1'b1,clk);
26   JKFF_POSEDGE_TRIGGER jkff1(q[1],qbar[1],(m^q[0]),(m^q[0]),clk);
27   endmodule
28
```
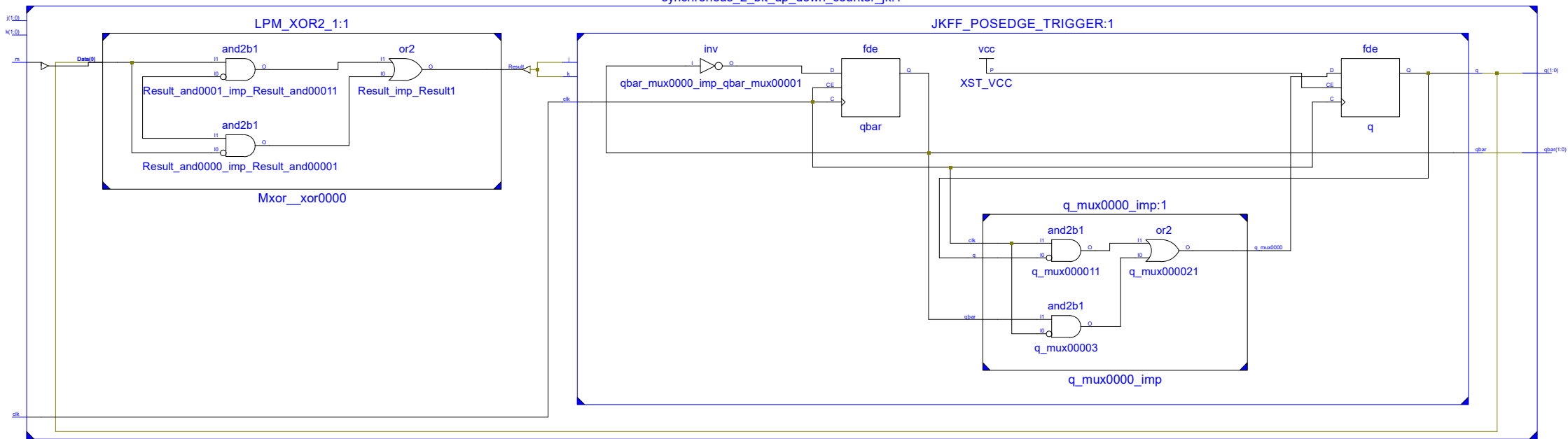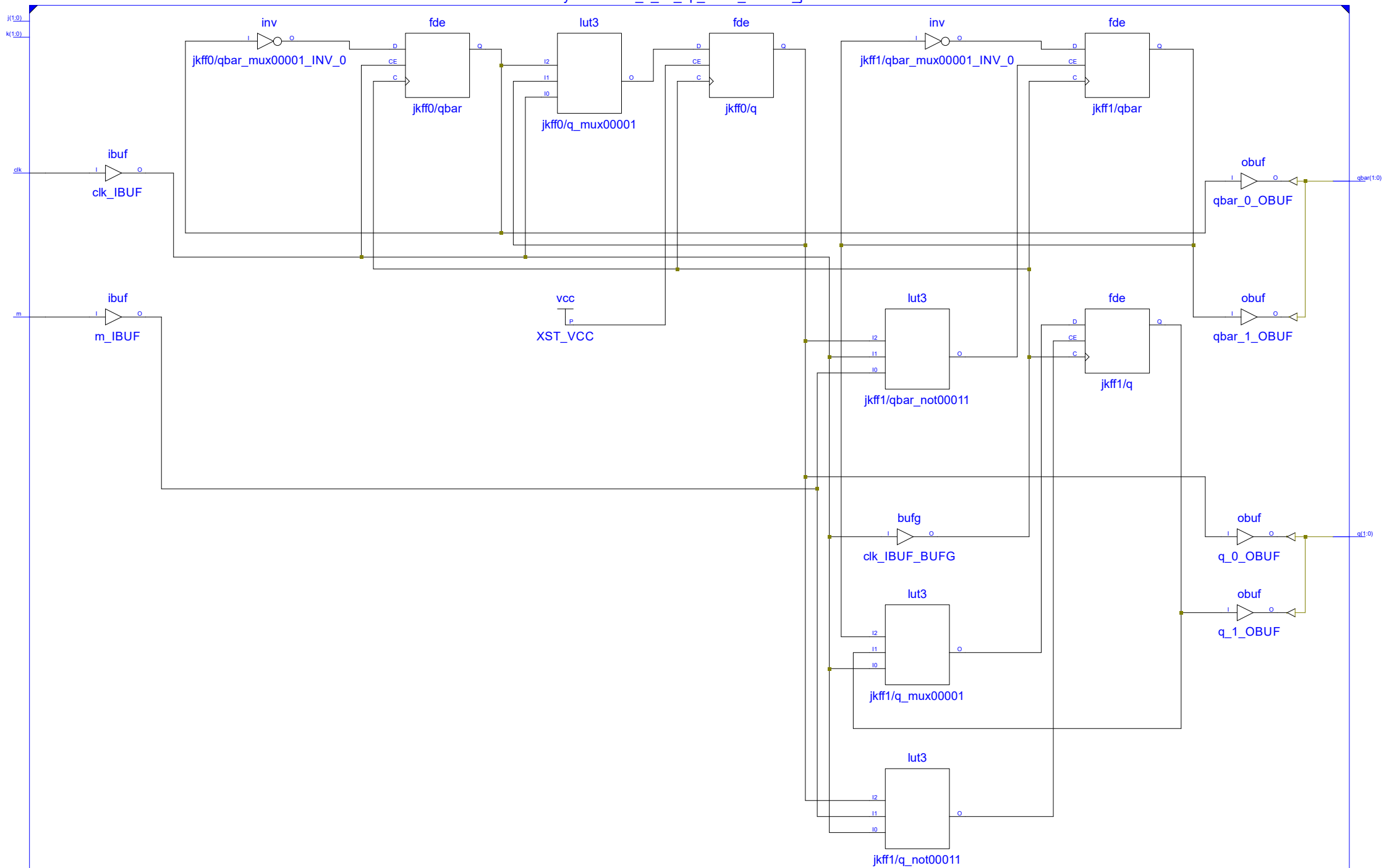
j(1:0)

k(1:0)

clk

m

q(1:0)

qbar(1:0)

LPM_XOR2_1:1

JKFF_POSEDGE_TRIGGER:1

and2b1

or2

Result_and0001_imp_Result_and00011

Result_imp_Result1

and2b1

Result_and0000_imp_Result_and00001

Mxor__xor0000

inv

fde

vcc

fde

qbar_mux0000_imp_qbar_mux00001

XST_VCC

qbar

q

q_mux0000_imp:1

and2b1

or2

q_mux000011

q_mux000021

q_mux0000

and2b1

q_mux00003

q_mux0000_imp

synchronous_2_bit_up_down_counter_jk:1

synchronous_2_bit_up_down_counter_jk

```verilog
1    `timescale 1ns / 1ps
2
3    //////////////////////////////////////////////////////////////////////////////////
4    // Company:
5    // Engineer:
6    //
7    // Create Date:   12:22:08 06/14/2022
8    // Design Name:   synchronous_2_bit_up_down_counter_jk
9    // Module Name:   E:/VI SEM DSDV Lab
     Execution/synchronous_2_bit_up_down_counter_jk/synchronous_2_bit_up_down_counter_jk_tb.
     v
10   // Project Name:  synchronous_2_bit_up_down_counter_jk
11   // Target Device:
12   // Tool versions:
13   // Description:
14   //
15   // Verilog Test Fixture created by ISE for module: synchronous_2_bit_up_down_counter_jk
16   //
17   // Dependencies:
18   //
19   // Revision:
20   // Revision 0.01 - File Created
21   // Additional Comments:
22   //
23   //////////////////////////////////////////////////////////////////////////////////
24
25   module synchronous_2_bit_up_down_counter_jk_tb;
26
27       // Inputs
28       reg [1:0] j;
29       reg [1:0] k;
30       reg clk;
31       reg m;
32
33       // Outputs
34       wire [1:0] q;
35       wire [1:0] qbar;
36
37       // Instantiate the Unit Under Test (UUT)
38       synchronous_2_bit_up_down_counter_jk uut (
39           .q(q),
40           .qbar(qbar),
41           .j(j),
42           .k(k),
43           .clk(clk),
44           .m(m)
45       );
46
47       initial
48       begin
49       $monitor($time,"clk=%b,m=%b,j=%b,k=%b,q=%b,qbar=%b,m",clk,m,j,k,q,qbar);
50           // Initialize Inputs
51           j = 0;
52           k = 0;
```

```
53            clk = 0;
54            m = 0;
55        end
56        always #140 m = m + 1;
57        always #20 clk = clk + 1;
58        always #10 j = j + 1;
59        always #5 k = k + 1;
60    endmodule
61
62
```

```
ISim log file
Running: E:\VI SEM DSDV Lab
Execution\synchronous_2_bit_up_down_counter_jk\synchronous_2_bit_up_down_counter_jk_tb_isim_
beh.exe -intstyle ise -gui -tclbatch isim.cmd -wdb E:/VI SEM DSDV Lab
Execution/synchronous_2_bit_up_down_counter_jk/synchronous_2_bit_up_down_counter_jk_tb_isim_
beh.wdb
ISim P.20131013 (signature 0x7708f090)
--------------------------------------------------------------------
INFO:Security:50 - The XILINXD_LICENSE_FILE environment variable is set to 'O:\OneDrive -
Methodist College of Engineering & Technology\Softwares\EDA LAB Softwares\xilinx 14.7
setup\Xilinx.lic'.
INFO:Security:53 - The LM_LICENSE_FILE environment variable is not set.
INFO:Security:68a - user is TMSY_College_PC, on host DESKTOP-MKD5T3R.
WARNING:Security:43 - No license file was found in the standard Xilinx license directory.
WARNING:Security:44 - Since no license file was found,
        please run the Xilinx License Configuration Manager
        (xlcm or "Manage Xilinx Licenses")
        to assist in obtaining a license.
ERROR:Security:14 - No feature was available for 'ISIM'.

No such feature exists.
Feature:       ISIM
License path:  O:\OneDrive - Methodist College of Engineering & Technology\Softwares\EDA
LAB Softwares\xilinx 14.7
setup\Xilinx.lic;C:/.Xilinx;C:\Xilinx\14.7\ISE_DS\ISE\/coregen/core_licenses\Xilinx.lic;C:\X
ilinx\14.7\ISE_DS\ISE\/coregen/core_licenses\XilinxFree.lic;C:\Xilinx\14.7\ISE_DS\EDK/data/c
ore_licenses\Xilinx.lic;
FLEXnet Licensing error:-5,357
For further information, refer to the FLEXnet Licensing documentation,
available at "www.flexerasoftware.com".
--------------------------------------------------------------------
WARNING: A full ISim License cannot be checked out due to the issues listed above. Please
use Xilinx License Configuration Manager to fix these issues in order to check out a full
ISim license.
WARNING: ISim will run in Lite mode. Please refer to the ISim documentation for more
information on the differences between the Lite and the Full version.
This is a Lite version of ISim.
Time resolution is 1 ps
# onerror resume
# wave add /
# run 1000 ns
Simulator is doing circuit initialization process.
Finished circuit initialization process.
                   0clk=0,m=0,j=00,k=00,q=00,qbar=11,m
                   5clk=0,m=0,j=00,k=01,q=00,qbar=11,m
                  10clk=0,m=0,j=01,k=10,q=00,qbar=11,m
                  15clk=0,m=0,j=01,k=11,q=00,qbar=11,m
                  20clk=1,m=0,j=10,k=00,q=01,qbar=10,m
                  25clk=1,m=0,j=10,k=01,q=01,qbar=10,m
                  30clk=1,m=0,j=11,k=10,q=01,qbar=10,m
                  35clk=1,m=0,j=11,k=11,q=01,qbar=10,m
                  40clk=0,m=0,j=00,k=00,q=01,qbar=10,m
                  45clk=0,m=0,j=00,k=01,q=01,qbar=10,m
                  50clk=0,m=0,j=01,k=10,q=01,qbar=10,m
                  55clk=0,m=0,j=01,k=11,q=01,qbar=10,m
                  60clk=1,m=0,j=10,k=00,q=10,qbar=01,m
                  65clk=1,m=0,j=10,k=01,q=10,qbar=01,m
                  70clk=1,m=0,j=11,k=10,q=10,qbar=01,m
                  75clk=1,m=0,j=11,k=11,q=10,qbar=01,m
                  80clk=0,m=0,j=00,k=00,q=10,qbar=01,m
                  85clk=0,m=0,j=00,k=01,q=10,qbar=01,m
```

```
 90clk=0,m=0,j=01,k=10,q=10,qbar=01,m
 95clk=0,m=0,j=01,k=11,q=10,qbar=01,m
100clk=1,m=0,j=10,k=00,q=11,qbar=00,m
105clk=1,m=0,j=10,k=01,q=11,qbar=00,m
110clk=1,m=0,j=11,k=10,q=11,qbar=00,m
115clk=1,m=0,j=11,k=11,q=11,qbar=00,m
120clk=0,m=0,j=00,k=00,q=11,qbar=00,m
125clk=0,m=0,j=00,k=01,q=11,qbar=00,m
130clk=0,m=0,j=01,k=10,q=11,qbar=00,m
135clk=0,m=0,j=01,k=11,q=11,qbar=00,m
140clk=1,m=1,j=10,k=00,q=10,qbar=01,m
145clk=1,m=1,j=10,k=01,q=10,qbar=01,m
150clk=1,m=1,j=11,k=10,q=10,qbar=01,m
155clk=1,m=1,j=11,k=11,q=10,qbar=01,m
160clk=0,m=1,j=00,k=00,q=10,qbar=01,m
165clk=0,m=1,j=00,k=01,q=10,qbar=01,m
170clk=0,m=1,j=01,k=10,q=10,qbar=01,m
175clk=0,m=1,j=01,k=11,q=10,qbar=01,m
180clk=1,m=1,j=10,k=00,q=01,qbar=10,m
185clk=1,m=1,j=10,k=01,q=01,qbar=10,m
190clk=1,m=1,j=11,k=10,q=01,qbar=10,m
195clk=1,m=1,j=11,k=11,q=01,qbar=10,m
200clk=0,m=1,j=00,k=00,q=01,qbar=10,m
205clk=0,m=1,j=00,k=01,q=01,qbar=10,m
210clk=0,m=1,j=01,k=10,q=01,qbar=10,m
215clk=0,m=1,j=01,k=11,q=01,qbar=10,m
220clk=1,m=1,j=10,k=00,q=00,qbar=11,m
225clk=1,m=1,j=10,k=01,q=00,qbar=11,m
230clk=1,m=1,j=11,k=10,q=00,qbar=11,m
235clk=1,m=1,j=11,k=11,q=00,qbar=11,m
240clk=0,m=1,j=00,k=00,q=00,qbar=11,m
245clk=0,m=1,j=00,k=01,q=00,qbar=11,m
250clk=0,m=1,j=01,k=10,q=00,qbar=11,m
255clk=0,m=1,j=01,k=11,q=00,qbar=11,m
260clk=1,m=1,j=10,k=00,q=11,qbar=00,m
265clk=1,m=1,j=10,k=01,q=11,qbar=00,m
270clk=1,m=1,j=11,k=10,q=11,qbar=00,m
275clk=1,m=1,j=11,k=11,q=11,qbar=00,m
280clk=0,m=0,j=00,k=00,q=11,qbar=00,m
285clk=0,m=0,j=00,k=01,q=11,qbar=00,m
290clk=0,m=0,j=01,k=10,q=11,qbar=00,m
295clk=0,m=0,j=01,k=11,q=11,qbar=00,m
300clk=1,m=0,j=10,k=00,q=00,qbar=11,m
305clk=1,m=0,j=10,k=01,q=00,qbar=11,m
310clk=1,m=0,j=11,k=10,q=00,qbar=11,m
315clk=1,m=0,j=11,k=11,q=00,qbar=11,m
320clk=0,m=0,j=00,k=00,q=00,qbar=11,m
325clk=0,m=0,j=00,k=01,q=00,qbar=11,m
330clk=0,m=0,j=01,k=10,q=00,qbar=11,m
335clk=0,m=0,j=01,k=11,q=00,qbar=11,m
340clk=1,m=0,j=10,k=00,q=01,qbar=10,m
345clk=1,m=0,j=10,k=01,q=01,qbar=10,m
350clk=1,m=0,j=11,k=10,q=01,qbar=10,m
355clk=1,m=0,j=11,k=11,q=01,qbar=10,m
360clk=0,m=0,j=00,k=00,q=01,qbar=10,m
365clk=0,m=0,j=00,k=01,q=01,qbar=10,m
370clk=0,m=0,j=01,k=10,q=01,qbar=10,m
375clk=0,m=0,j=01,k=11,q=01,qbar=10,m
380clk=1,m=0,j=10,k=00,q=10,qbar=01,m
385clk=1,m=0,j=10,k=01,q=10,qbar=01,m
390clk=1,m=0,j=11,k=10,q=10,qbar=01,m
```

```
395clk=1,m=0,j=11,k=11,q=10,qbar=01,m
400clk=0,m=0,j=00,k=00,q=10,qbar=01,m
405clk=0,m=0,j=00,k=01,q=10,qbar=01,m
410clk=0,m=0,j=01,k=10,q=10,qbar=01,m
415clk=0,m=0,j=01,k=11,q=10,qbar=01,m
420clk=1,m=1,j=10,k=00,q=01,qbar=10,m
425clk=1,m=1,j=10,k=01,q=01,qbar=10,m
430clk=1,m=1,j=11,k=10,q=01,qbar=10,m
435clk=1,m=1,j=11,k=11,q=01,qbar=10,m
440clk=0,m=1,j=00,k=00,q=01,qbar=10,m
445clk=0,m=1,j=00,k=01,q=01,qbar=10,m
450clk=0,m=1,j=01,k=10,q=01,qbar=10,m
455clk=0,m=1,j=01,k=11,q=01,qbar=10,m
460clk=1,m=1,j=10,k=00,q=00,qbar=11,m
465clk=1,m=1,j=10,k=01,q=00,qbar=11,m
470clk=1,m=1,j=11,k=10,q=00,qbar=11,m
475clk=1,m=1,j=11,k=11,q=00,qbar=11,m
480clk=0,m=1,j=00,k=00,q=00,qbar=11,m
485clk=0,m=1,j=00,k=01,q=00,qbar=11,m
490clk=0,m=1,j=01,k=10,q=00,qbar=11,m
495clk=0,m=1,j=01,k=11,q=00,qbar=11,m
500clk=1,m=1,j=10,k=00,q=11,qbar=00,m
505clk=1,m=1,j=10,k=01,q=11,qbar=00,m
510clk=1,m=1,j=11,k=10,q=11,qbar=00,m
515clk=1,m=1,j=11,k=11,q=11,qbar=00,m
520clk=0,m=1,j=00,k=00,q=11,qbar=00,m
525clk=0,m=1,j=00,k=01,q=11,qbar=00,m
530clk=0,m=1,j=01,k=10,q=11,qbar=00,m
535clk=0,m=1,j=01,k=11,q=11,qbar=00,m
540clk=1,m=1,j=10,k=00,q=10,qbar=01,m
545clk=1,m=1,j=10,k=01,q=10,qbar=01,m
550clk=1,m=1,j=11,k=10,q=10,qbar=01,m
555clk=1,m=1,j=11,k=11,q=10,qbar=01,m
560clk=0,m=0,j=00,k=00,q=10,qbar=01,m
565clk=0,m=0,j=00,k=01,q=10,qbar=01,m
570clk=0,m=0,j=01,k=10,q=10,qbar=01,m
575clk=0,m=0,j=01,k=11,q=10,qbar=01,m
580clk=1,m=0,j=10,k=00,q=11,qbar=00,m
585clk=1,m=0,j=10,k=01,q=11,qbar=00,m
590clk=1,m=0,j=11,k=10,q=11,qbar=00,m
595clk=1,m=0,j=11,k=11,q=11,qbar=00,m
600clk=0,m=0,j=00,k=00,q=11,qbar=00,m
605clk=0,m=0,j=00,k=01,q=11,qbar=00,m
610clk=0,m=0,j=01,k=10,q=11,qbar=00,m
615clk=0,m=0,j=01,k=11,q=11,qbar=00,m
620clk=1,m=0,j=10,k=00,q=00,qbar=11,m
625clk=1,m=0,j=10,k=01,q=00,qbar=11,m
630clk=1,m=0,j=11,k=10,q=00,qbar=11,m
635clk=1,m=0,j=11,k=11,q=00,qbar=11,m
640clk=0,m=0,j=00,k=00,q=00,qbar=11,m
645clk=0,m=0,j=00,k=01,q=00,qbar=11,m
650clk=0,m=0,j=01,k=10,q=00,qbar=11,m
655clk=0,m=0,j=01,k=11,q=00,qbar=11,m
660clk=1,m=0,j=10,k=00,q=01,qbar=10,m
665clk=1,m=0,j=10,k=01,q=01,qbar=10,m
670clk=1,m=0,j=11,k=10,q=01,qbar=10,m
675clk=1,m=0,j=11,k=11,q=01,qbar=10,m
680clk=0,m=0,j=00,k=00,q=01,qbar=10,m
685clk=0,m=0,j=00,k=01,q=01,qbar=10,m
690clk=0,m=0,j=01,k=10,q=01,qbar=10,m
695clk=0,m=0,j=01,k=11,q=01,qbar=10,m
```

```
 700clk=1,m=1,j=10,k=00,q=00,qbar=11,m
 705clk=1,m=1,j=10,k=01,q=00,qbar=11,m
 710clk=1,m=1,j=11,k=10,q=00,qbar=11,m
 715clk=1,m=1,j=11,k=11,q=00,qbar=11,m
 720clk=0,m=1,j=00,k=00,q=00,qbar=11,m
 725clk=0,m=1,j=00,k=01,q=00,qbar=11,m
 730clk=0,m=1,j=01,k=10,q=00,qbar=11,m
 735clk=0,m=1,j=01,k=11,q=00,qbar=11,m
 740clk=1,m=1,j=10,k=00,q=11,qbar=00,m
 745clk=1,m=1,j=10,k=01,q=11,qbar=00,m
 750clk=1,m=1,j=11,k=10,q=11,qbar=00,m
 755clk=1,m=1,j=11,k=11,q=11,qbar=00,m
 760clk=0,m=1,j=00,k=00,q=11,qbar=00,m
 765clk=0,m=1,j=00,k=01,q=11,qbar=00,m
 770clk=0,m=1,j=01,k=10,q=11,qbar=00,m
 775clk=0,m=1,j=01,k=11,q=11,qbar=00,m
 780clk=1,m=1,j=10,k=00,q=10,qbar=01,m
 785clk=1,m=1,j=10,k=01,q=10,qbar=01,m
 790clk=1,m=1,j=11,k=10,q=10,qbar=01,m
 795clk=1,m=1,j=11,k=11,q=10,qbar=01,m
 800clk=0,m=1,j=00,k=00,q=10,qbar=01,m
 805clk=0,m=1,j=00,k=01,q=10,qbar=01,m
 810clk=0,m=1,j=01,k=10,q=10,qbar=01,m
 815clk=0,m=1,j=01,k=11,q=10,qbar=01,m
 820clk=1,m=1,j=10,k=00,q=01,qbar=10,m
 825clk=1,m=1,j=10,k=01,q=01,qbar=10,m
 830clk=1,m=1,j=11,k=10,q=01,qbar=10,m
 835clk=1,m=1,j=11,k=11,q=01,qbar=10,m
 840clk=0,m=0,j=00,k=00,q=01,qbar=10,m
 845clk=0,m=0,j=00,k=01,q=01,qbar=10,m
 850clk=0,m=0,j=01,k=10,q=01,qbar=10,m
 855clk=0,m=0,j=01,k=11,q=01,qbar=10,m
 860clk=1,m=0,j=10,k=00,q=10,qbar=01,m
 865clk=1,m=0,j=10,k=01,q=10,qbar=01,m
 870clk=1,m=0,j=11,k=10,q=10,qbar=01,m
 875clk=1,m=0,j=11,k=11,q=10,qbar=01,m
 880clk=0,m=0,j=00,k=00,q=10,qbar=01,m
 885clk=0,m=0,j=00,k=01,q=10,qbar=01,m
 890clk=0,m=0,j=01,k=10,q=10,qbar=01,m
 895clk=0,m=0,j=01,k=11,q=10,qbar=01,m
 900clk=1,m=0,j=10,k=00,q=11,qbar=00,m
 905clk=1,m=0,j=10,k=01,q=11,qbar=00,m
 910clk=1,m=0,j=11,k=10,q=11,qbar=00,m
 915clk=1,m=0,j=11,k=11,q=11,qbar=00,m
 920clk=0,m=0,j=00,k=00,q=11,qbar=00,m
 925clk=0,m=0,j=00,k=01,q=11,qbar=00,m
 930clk=0,m=0,j=01,k=10,q=11,qbar=00,m
 935clk=0,m=0,j=01,k=11,q=11,qbar=00,m
 940clk=1,m=0,j=10,k=00,q=00,qbar=11,m
 945clk=1,m=0,j=10,k=01,q=00,qbar=11,m
 950clk=1,m=0,j=11,k=10,q=00,qbar=11,m
 955clk=1,m=0,j=11,k=11,q=00,qbar=11,m
 960clk=0,m=0,j=00,k=00,q=00,qbar=11,m
 965clk=0,m=0,j=00,k=01,q=00,qbar=11,m
 970clk=0,m=0,j=01,k=10,q=00,qbar=11,m
 975clk=0,m=0,j=01,k=11,q=00,qbar=11,m
 980clk=1,m=1,j=10,k=00,q=11,qbar=00,m
 985clk=1,m=1,j=10,k=01,q=11,qbar=00,m
 990clk=1,m=1,j=11,k=10,q=11,qbar=00,m
 995clk=1,m=1,j=11,k=11,q=11,qbar=00,m
1000clk=0,m=1,j=00,k=00,q=11,qbar=00,m
```