# VLSI LAB REPORT

# **Complete Lab Report**

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# **Experiment no. 1**:

<u>Aim</u>: To simulate and synthesize the verilog modules of the processor using Cadence Genus Tool.

# Observation:

# ADP and PDP analysis

Module Name	Area	Internal Power	Switching Power	Timing	ADP	PDP		
ripple carry adder	597.92	5213.88	6540.15	1531.4	915654.688	10015585.71		
Carry Look ahead adder	437.77	7151.83	12615.74	1011.2	442673.024	12757036.29		
Prefix Adder	904.89	7522.71	26107.24	80	72391.2	2088579.2		
floating Point Adder	4057.34	46186.17	94711.11	1506	6110354.04	142634931.7		
floating Point Multiplier	8054.78	248604.65	315199.31	550	4430129	173359620.5		
Wallace Tree Multiplier	7500.06	431019.33	589326.41	869.9	6524302.194	512655044.1		
right shifter	1041.03	7869.29	16780.13	104	108267.12	1745133.52		
right rotator	1041.03	8342.19	17620.91	104	108267.12	1832574.64		
left shifter	1041.03	7866.58	16775.36	104	108267.12	1744637.44		
left rotator	1041.03	8336.76	17611.69	104	108267.12	1831615.76		
register	6072.66	18162.32	27915.43	250	1518165	6978857.5		
ALU	4193.47	25931.15	37743.62	301	1262234.47	11360829.62		
Processor	13592.08	23289.93	29355.05	289.5	3934907.16	8498286.975		
Memory	1403.91	712.63	2184.48	381.8	536012.838	834034.464		
Inference								
As per area, CLA is bette	r as compared to	other adders since	e, the area require	d is less.				
As per power, ripple carry	adder is better as	compared to oth	er adders since, th	ne area required is	s less.			
On the basis of timing, pr	efix adder is better	. Not because it is	pipelined. Pipelir	ning doesn't make	it compute faster	. It just makes the	computation hap	pen concurrently
Wallace tree multiplier ha	s the highest ADP	and PDP.						

# **Conclusion**:

We learnt how the high level Verilog constructs gets transformed into low level logical constructs which can be modelled in the form of transistor logic.

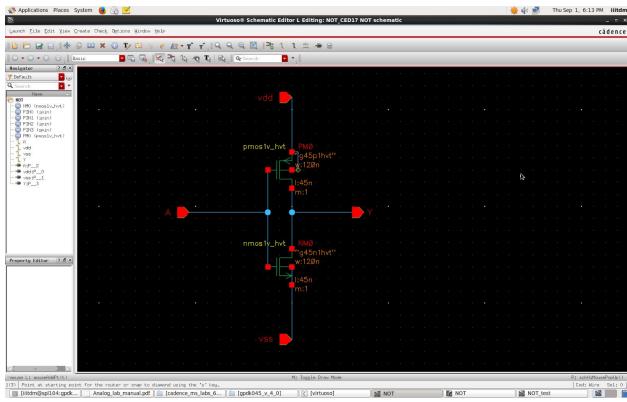
# **Experiment no. 2:**

<u>Aim</u>: To learn the Virtuoso tool as well learn the flow of the Full

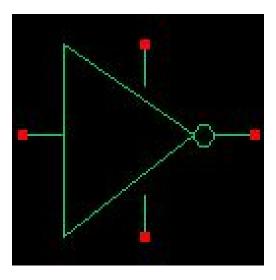
Custom IC design cycle. To do the DRC check for the designs.

### Observation:

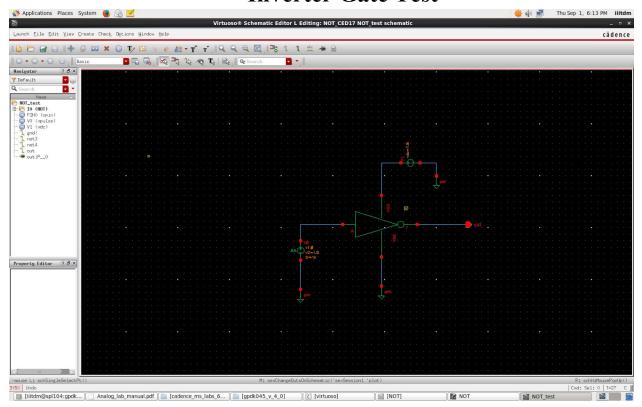
#### **Inverter Gate Schematic**



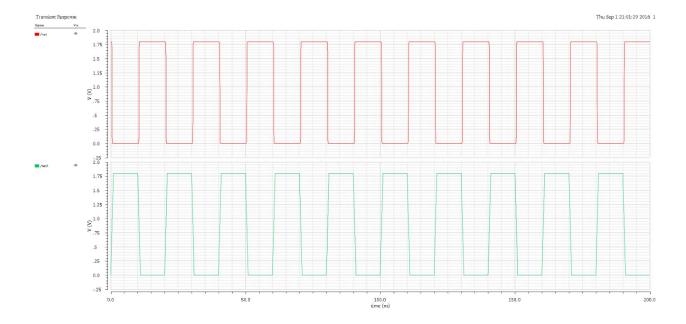
**Inverter Gate Symbol** 



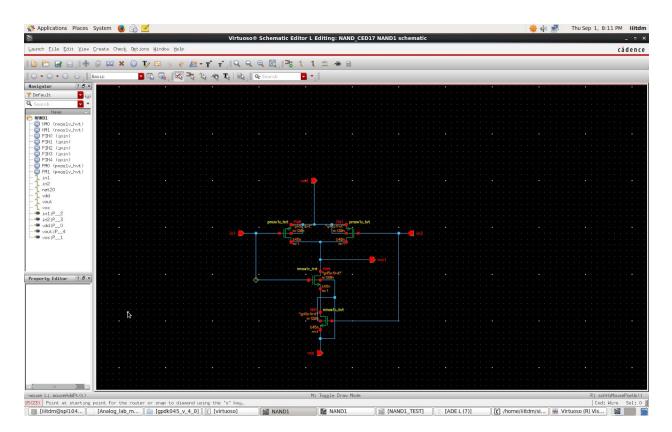
#### **Inverter Gate Test**



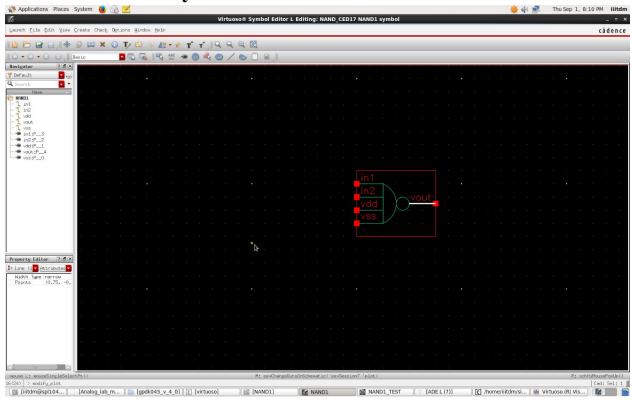
**Inverter Gate Simulated Graph** 



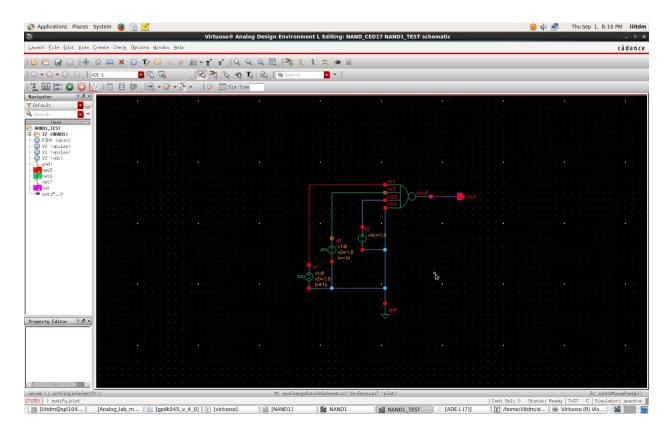
### **Nand Gate Schematic**



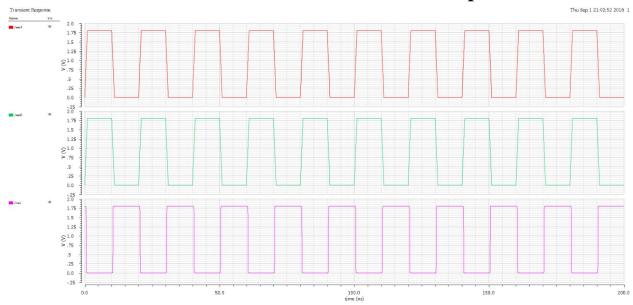
# **Nand Gate Symbol**



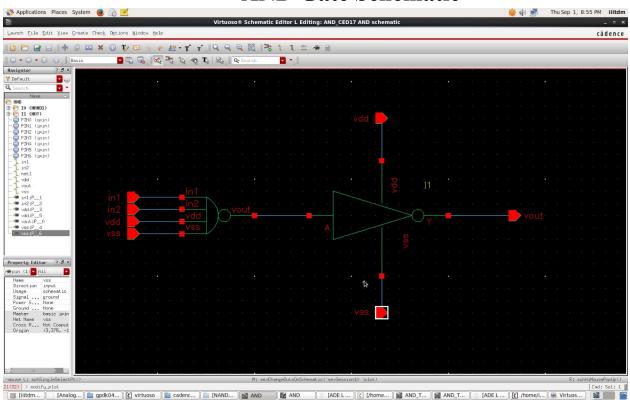
#### **Nand Gate Test**



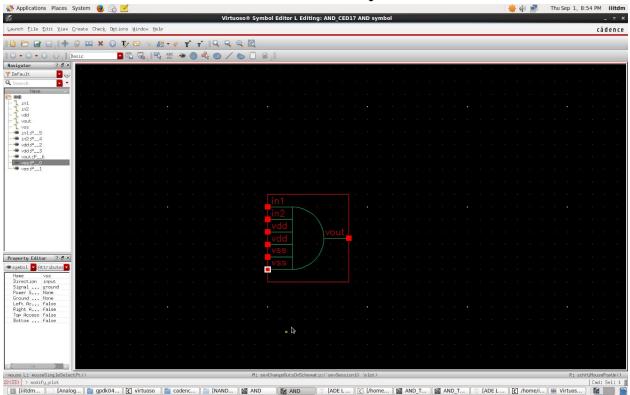
# **Nand Gate Simulated Graph**



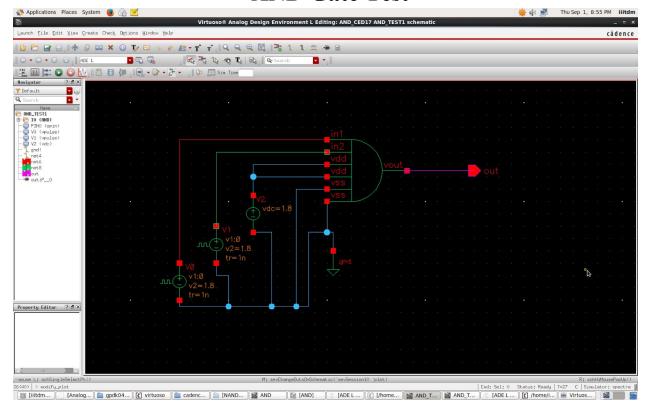
# **AND Gate Schematic**



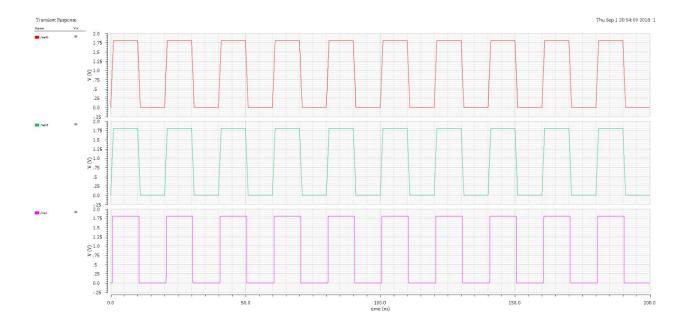
**AND Gate Symbol** 



#### **AND Gate Test**



**AND Gate Simulated Graph** 



<u>Conclusion</u>: We learnt to do the Schematic construction and simulation of NAND, NOR, AND gates.

# **Experiment no. 3:**

<u>Aim</u>: To write a Python code that produces a Netlist for given algebraic expression of a CMOS Circuit.

```
Code:
class ssstack:
    def __init__(self):
        self.items = []

def isEmpty(self):
    return self.items == []

def push(self, item):
    self.items.append(item)

def pop(self):
    return self.items.pop()
```

```
def peek(self):
    return self.items[len(self.items)-1]
   def size(self):
    return len(self.items)
def infix_to_postfix():
    infx=str(input('Enter the infix expression : '))
    e=list(infx)
    print(e)
    pr = \{\}
    pr["!"] = 4
    pr["."] = 3
    pr["+"] = 2
    pr["("] = 1]
    pr["\$"] = 0
    postfix_list=[]
    opstack=ssstack()
    for ch in e:
          if ch in
"ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnop
qrstuvwxyz":
               postfix_list.append(ch)
          elif ch=='(':
               opstack.push(ch)
          elif ch==')':
               elem=opstack.pop()
               while elem!='(':
                    postfix list.append(elem)
                    elem=opstack.pop()
```

```
else:
              while (not opstack.isEmpty()) and
(pr[opstack.peek()]>=pr[ch]):
                   postfix list.append(opstack.pop())
                   \#k=k+1
              opstack.push(ch)
    while not opstack.isEmpty():
         postfix list.append(opstack.pop())
    Eval(postfix list)
    return "".join(postfix_list)
def Eval(post_exp):
    nmosStack = ssstack()
    pmosStack = ssstack()
    e = list(post exp)
    for ch in e:
         if ch in
"ABCDEFGHIJKLMNRSTUVWXYZabcdefghijklmnrstuvw
xyz":
              nmosStack.push(ch)
              pmosStack.push(ch)
         else.
              #nmos
              result = nmosOper(ch,nmosStack)
              nmosStack.push(result)
       #pmos
              result = pmosOper(ch,pmosStack)
              pmosStack.push(result)
```

```
global out counter
    print("OUTPUT O" + str(out counter) )
out counter=0
#input counters
x counter=0
y counter=0
#performing the NMOS operation
def nmosOper(op, nmosStack):
    global out counter
    global x_counter
    global y counter
    out counter=out counter+1
    output= "O" +str(out counter)
    #nmos series connection
    if op==".":
         operand2=nmosStack.pop()
         operand1=nmosStack.pop()
         x counter=x counter+1
         y counter=y counter+1
         print("nmos ( GND, " + str(operand2) + ", X" +
str(x counter) + " )")
         print("nmos (X" +str(x counter)+ ", " +
str(operand1) +", Y" + str(y counter)+ ")")
          # Inverted in(parallel)
         print("nmos (GND, Y" + str(y counter) + ", " +
str(output) + " )" )
```

```
#nmos parallel connection
    elif op == "+":
         operand2=nmosStack.pop()
         operand1=nmosStack.pop()
         x counter=x counter+1
         y_counter=y_counter+1
         print("nmos (GND, "+str(operand2) + ", Y" +
str(y counter) + ")")
         print("nmos ( GND, " + str(operand1) + ", Y" +
str(y counter) + " )" )
    #inverted in (series)
         print("nmos ( GND, Y" + str(y_counter) + ", " +
str(output) + " )" )
    else: # not case
         operand1 = nmosStack.pop()
    # Invert output
         print("nmos ( GND, " + str(operand1) + ", " +
str(output) + " )" )
    return output
#performing the PMOS operaation
def pmosOper(op, pmosStack):
    global out counter
    global x counter
    global y counter
    #out_counter=out_counter+1
    output= "O" +str(out counter)
```

```
if op==".":
         operand2=pmosStack.pop()
         operand1=pmosStack.pop()
         print("pmos ( VDD, " + str(operand2) + ", Y" +
str(y counter) + " )")
         print("pmos ( VDD, " + str(operand1) + ", Y" +
str(y counter) + " )")
         #Invert output
         print("pmos ( VDD, Y" + str(y counter) + ", " +
str(output) + " )" )
    elif op == "+":
         operand2 = pmosStack.pop()
         operand1 = pmosStack.pop()
    # PMOS(S,G,D)
    # Series
         print("pmos ( VDD, " + str(operand2) + ", X" +
str(x counter) + ")")
         print("pmos ( X" + str(x_counter) + " , " +
str(operand1) + ", Y" + str(y counter) + ")")
    # Invert output
         print("pmos ( VDD, Y" + str(y counter) + ", " +
str(output) + " )" )
    else: # not case
         operand1 = pmosStack.pop()
    # Invert output
```

```
print("pmos ( VDD, " + str(operand1) + ", " +
str(output) + " )" )
return output
```

#converting the given infix expression to postfix
k=infix\_to\_postfix()
#printing the postfix form of the given input
print("POSTFIX expression: " + k)

#### Output:

```
yutika@kulwe ~/VLSI LAB/lab3 $ Sat Nov-11 5:00:54pm
> python3 a5.py
Enter the infix expression : (a+b.c)!
['(', 'a', '+', 'b', '.', 'c', ')', '!']
nmos ( GND, c, X1 )
nmos ( GND, c, X1 )
nmos ( SND, Y1, 01 )
pmos ( VDD, c, Y1 )
pmos ( VDD, b, Y1 )
pmos ( VDD, Y1, 01 )
nmos ( GND, 01, Y2 )
nmos ( GND, a, Y2 )
nmos ( GND, Y2, 02 )
pmos ( VDD, 01, X2 )
pmos ( VDD, V2, 02 )
nmos ( GND, 02, 03 )
pmos ( VDD, 02, 03 )
pmos ( VDD, 02, 03 )
OUTPUT 03
POSTFIX expression: abc.+!
yutika@kulwe ~/VLSI LAB/lab3 $ Sat Nov-11 5:00:54pm
```

### **Experiment no. 4:**

<u>Aim</u>: To write a Python code that determines the state of every PMOS and NMOS Transistors present in a CMOS circuit for a given input.

### Code:

```
class ssstack:

def __init__(self):
    self.items = []

def isEmpty(self):
    return self.items == []
```

```
def push(self, item):
     self.items.append(item)
   def pop(self):
     return self.items.pop()
   def peek(self):
     return self.items[len(self.items)-1]
   def size(self):
     return len(self.items)
definfix to postfix():
     infx=str(input('Enter the infix expression : '))
     e=list(infx)
     print(e)
     pr = \{\}
     pr["!"] = 4
     pr["."] = 3
     pr["+"] = 2
     pr["("] = 1
     pr["\$"] = 0
     postfix list=[]
     opstack=ssstack()
     for ch in e:
          if ch in
"ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnop
qrstuvwxyz" :
               postfix list.append(ch)
          elif ch=='(':
```

```
opstack.push(ch)
         elif ch==')':
              elem=opstack.pop()
              while elem!='(':
                   postfix list.append(elem)
                   elem=opstack.pop()
         else:
              while (not opstack.isEmpty()) and
(pr[opstack.peek()]>=pr[ch]):
                   postfix_list.append(opstack.pop())
                   \#k = k + 1
              opstack.push(ch)
    while not opstack.isEmpty():
         postfix list.append(opstack.pop())
    Eval(postfix list)
    return "".join(postfix list)
def Eval(post_exp):
    nmosStack = ssstack()
    pmosStack = ssstack()
    e = list(post exp)
    for ch in e:
         if ch in
"ABCDEFGHIJKLMNRSTUVWXYZabcdefghijklmnrstuvw
xyz":
              nmosStack.push(ch)
              pmosStack.push(ch)
         else:
              #nmos
```

```
result = nmosOper(ch,nmosStack)
              nmosStack.push(result)
      #pmos
              result = pmosOper(ch,pmosStack)
              pmosStack.push(result)
    global out counter
    print("OUTPUT O" + str(out_counter) )
out counter=0
#input counters
x_counter=0
y_counter=0
#performing the NMOS operation
def nmosOper(op, nmosStack):
    global out counter
    global x_counter
    global y_counter
    out counter=out counter+1
    output= "O" +str(out_counter)
    #nmos series connection
    if op==".":
         operand2=nmosStack.pop()
         operand1=nmosStack.pop()
         x counter=x counter+1
         y_counter=y_counter+1
         print("nmos ( GND, " + str(operand2) + ", X" +
str(x counter) + " )")
```

```
print("nmos ( X" +str(x counter)+ " , " +
str(operand1) +", Y" + str(y counter)+ ")")
          # Inverted in(parallel)
         print("nmos (GND, Y" + str(y counter) + ", " +
str(output) + " )" )
  #nmos parallel connection
    elif op == "+":
         operand2=nmosStack.pop()
         operand1=nmosStack.pop()
         x counter=x counter+1
         y counter=y counter+1
         print("nmos (GND, " + str(operand2) + ", Y" +
str(y counter) + ")")
         print("nmos ( GND, " + str(operand1) + ", Y" +
str(y counter) + ")")
    #inverted in (series)
         print("nmos ( GND, Y" + str(y counter) + ", " +
str(output) + " )" )
    else: # not case
         operand1 = nmosStack.pop()
    # Invert output
         print("nmos ( GND, " + str(operand1) + ", " +
str(output) + " )" )
    return output
#performing the PMOS operaation
def pmosOper(op, pmosStack):
```

```
global out counter
    global x counter
    global y_counter
    #out counter=out counter+1
    output= "O" +str(out counter)
    if op==".":
         operand2=pmosStack.pop()
         operand1=pmosStack.pop()
         print("pmos (VDD, " + str(operand2) + ", Y" +
str(y counter) + " )")
         print("pmos ( VDD, " + str(operand1) + ", Y" +
str(y counter) + " )")
         #Invert output
         print("pmos ( VDD, Y" + str(y counter) + ", " +
str(output) + " )" )
    elif op == "+":
         operand2 = pmosStack.pop()
         operand1 = pmosStack.pop()
    # PMOS(S,G,D)
    # Series
         print("pmos ( VDD, " + str(operand2) + ", X" +
str(x counter) + ")")
         print("pmos ( X" + str(x counter) + " , " +
str(operand1) + ", Y" + str(y_counter) + ")")
    # Invert output
```

# Output:

```
pmos ( X2 , 1, Y2 ) def peek (self):

OFF return self.items[len(self.items) - 1]

pmos ( VDD, Y2, 02 )

OFF return len(self.items)

pmos ( VDD, 02, 03 )

OFF return len(self.items)

pmos ( VDD, 02, 03 )

OFF return len(self.items)

pmos ( VDD, 02, 03 )

OFF return len(self.items)

pmos ( VDD, 02, 03 )

OFF return len(self.items)

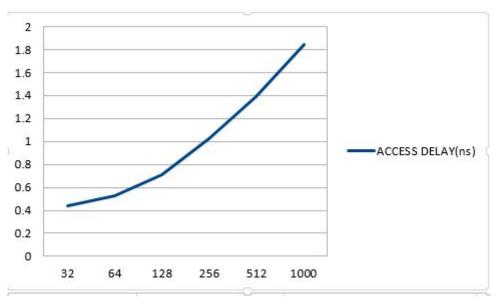
putika@kulwe ~/VLSI LAB/lab3 $ Sat Nov-11 6:00:54pm
```

### **Experiment no. 5:**

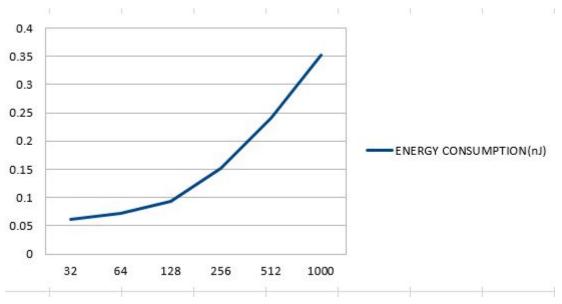
<u>Aim:</u> To plot the "Memory Size Vs Energy Consumption & Access Delay" for the following sizes -- 32 Kb, 64Kb, 128Kb, 256Kb, 512 Kb, and 1Mb SRAMs using the latest CACTI tool version.

#### Observation:

	SRAM		
MEMORY SIZE	ACCESS DELAY(ns)	ENERGY CONSUMPTION(nJ)	<b>AVERAGE</b>
32	0.44249	0.0616486	0.2520693
64	0.527409	0.0720062	0.2997076
128	0.712282	0.0931197	0.40270085
256	1.02563	0.152539	0.5890845
512	1.38959	0.240552	0.815071
1000	1.84607	0.352186	1.099128
7000	7.04007	0.002700	7.0337



**Memory Size vs Access Delay** 



**Memory Size vs Energy Consumption** 

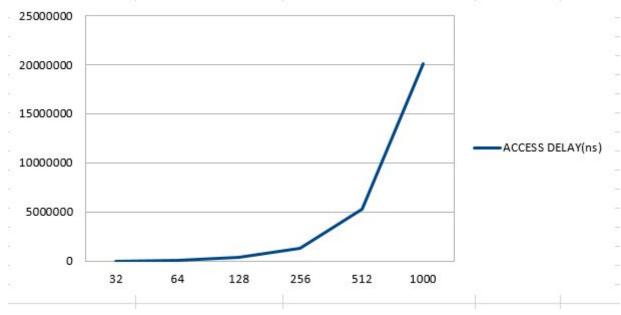
<u>Conclusion:</u> We studied the SRAM memory performance metrics in terms of power and delay primarily.

# **Experiment no. 6:**

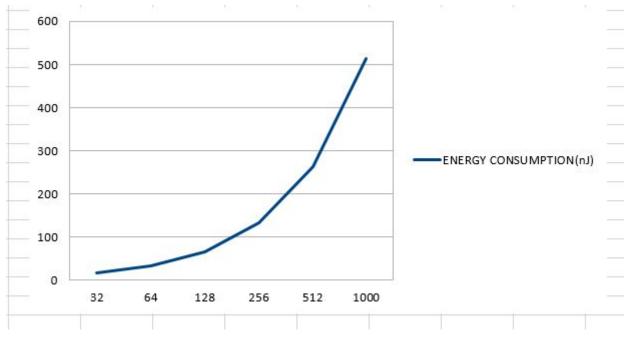
<u>Aim</u>: To plot the "Memory Size Vs Energy Consumption & Access Delay" for the following sizes -- 32 Kb, 64Kb, 128Kb, 256Kb, 512 Kb, and 1Mb SRAMs using the latest TCAM tool version.

### Observation:

	TCAM			
MEMORY SIZE	ACCESS DELAY(ns)	ENERGY CONSUMPTION(nJ)	<b>AVERAGE</b>	
32	20983.61802	16.443847	10500.03093	
64	83126.53517	32.887318	41579.71125	
128	330891.5184	65.774266	165478.6463	
256	1320338.342	131.548148	660234.9452	
512	5274900.235	263.095927	2637581.666	
1000	20110135.9	513.858879	10055324.88	



**Memory Size vs Access Delay** 



**Memory Size vs Energy Consumption** 

<u>Conclusion</u>: We assessed the TCAM performance using TCAM tool in terms of delay and power against their sizes.

# **Experiment no. 7:**

<u>Aim</u>: To write a verilog code for Priority Encoder.

#### Code:

#### Priority4bit.v:

```
module PriorityEncoder_4Bit(d,y,v);
input [3:0]d;
output [3:0]y;
output v;
wire v;
wire [3:0]y;
assign y[0] = d[0] & 1'b1;
assign y[1] = d[1] & ~d[0] & 1'b1;
assign y[2] = d[2] & ~d[1] & ~d[0] & 1'b1;
assign y[3] = d[3] & ~d[2] & ~d[1] & ~d[0] & 1'b1;
```

```
assign v = d[0] | d[1] | d[2] | d[3];
```

24 ],v7);

#### endmodule

```
Priority256bit.v:
// Usage: iverilog -o abc Priority256bit.v Priority4bit.v
Conversion element.v
// vvp abc
module pe_256bit(d,y,v);
    input [255:0]d;
    output v;
    output [255:0]y;
    wire v;
    wire [255:0]y;
    wire [255:0]p,k,q,j,r,h,c,x,z;
    //first layer
    PriorityEncoder 4Bit
                             a1(d[ 3 : 0 ],y[ 3 : 0
 ],v1);
    PriorityEncoder_4Bit
                             a2(d[
                                                     ],y[ 7
                                       7
                                                4
              ],v2);
    PriorityEncoder 4Bit
                             a3(d[
                                                     ],y[ 11
                                       11
                                                8
              ],v3);
         8
    PriorityEncoder 4Bit
                                                 12
                                                     ],y[ 15
                             a4(d[
                                       15 :
             ],v4);
         12
    PriorityEncoder 4Bit
                                                 16
                                                     ],y[ 19
                             a5(d[
                                       19
         16
             ],v5);
    PriorityEncoder_4Bit
                             a6(d[
                                       23 :
                                                20
                                                     ],y[ 23
         20 ],v6);
    PriorityEncoder 4Bit
                                       27 :
                                                24
                             a7(d[
                                                     ],y[27]
```

PriorityEncoder_4Bit: 28 ],v8);	a8(d[	31	:	28	],y[ 31
PriorityEncoder_4Bit: 32 ],v9);	a9(d[	35	:	32	],y[ 35
PriorityEncoder_4Bit: 36 ],v10);	a10(d[	39	:	36	],y[ 39
PriorityEncoder_4Bit: 40 ],v11);	a11(d[	43	:	40	],y[ 43
PriorityEncoder_4Bit: 44 ],v12);	a12(d[	47	:	44	],y[ 47
PriorityEncoder_4Bit: 48 ],v13);	a13(d[	51	•	48	],y[ 51
PriorityEncoder_4Bit: 52 ],v14);	a14(d[	55	:	52	],y[ 55
PriorityEncoder_4Bit	a15(d[	59	:	56	],y[ 59
: 56 ],v15); PriorityEncoder_4Bit	a16(d[	63	•	60	],y[ 63
: 60 ],v16); PriorityEncoder_4Bit	a17(d[	67	•	64	],y[ 67
	a18(d[	71	:	68	],y[ 71
: 68 ],v18); PriorityEncoder_4Bit	a19(d[	75	:	72	],y[ 75
: 72 ],v19); PriorityEncoder_4Bit	a21(d[	79	:	76	],y[ 79
: 76 ],v20); PriorityEncoder_4Bit	a22(d[	83	:	80	],y[ 83
: 80 ],v21); PriorityEncoder_4Bit	a23(d[	87	:	84	],y[ 87
<ul><li>: 84 ],v22);</li><li>PriorityEncoder_4Bit</li><li>: 88 ],v23);</li></ul>	a24(d[	91	:	88	],y[ 91
J, //					

	PriorityEncoder_4Bit	a25(d[	95 :	92 ],y[ 95
	: 92 ],v24);			
	PriorityEncoder_4Bit	a26(d[	99 :	96 ],y[ 99
	: 96 ],v25);	/		
400	PriorityEncoder_4Bit	a27(d[	103 :	100 ],y[
103	: 100 ],v26);	20/15	105	104 7 5
107	PriorityEncoder_4Bit	a28(d[	107 :	104 ],y[
107	: 104 ],v27);	20/15	111	100 ] [
111	PriorityEncoder_4Bit	a29(d[	111:	108 ],y[
111	: 108 ],v28);	-20(JF	115 .	110 ][
115	PriorityEncoder_4Bit	a30(d[	115 :	112 ],y[
113	: 112 ],v29); PriorityEncoder 4Bit	o21(d[	119 :	116 lul
110	: 116 ],v30);	a31(d[	119 .	116 ],y[
119	PriorityEncoder 4Bit	a32(d[	123 :	120 ],y[
123	: 120 ],v31);	a52(u[	123 .	120 ],y[
123	PriorityEncoder 4Bit	a33(d[	127 :	124 ],y[
127	: 124 ],v32);	u33(u[	12/ .	12. ], J
12,	PriorityEncoder 4Bit	a34(d[	131 :	128 ],y[
131	: 128 ],v33);	([		377 [
	PriorityEncoder 4Bit	a35(d[	135 :	132 ],y[
135	: 132 ],v34);	\ L		3/ <b>3</b> E
	PriorityEncoder_4Bit	a36(d[	139 :	136 ],y[
139	: 136 ],v35);			
	PriorityEncoder_4Bit	a37(d[	143 :	140 ],y[
143	: 140 ],v36);			
	PriorityEncoder_4Bit	a38(d[	147 :	144 ],y[
147	: 144 ],v37);			
	PriorityEncoder_4Bit	a39(d[	151 :	148 ],y[
151	: 148 ],v38);			
	PriorityEncoder_4Bit	a40(d[	155 :	152 ],y[
155	: 152 ],v39);			

150	PriorityEncoder_4Bit: 156 ],v40);	a41(d[	159 :	156 ],y[
139	PriorityEncoder_4Bit	a42(d[	163 :	160 ],y[
163	: 160 ],v41);			
	PriorityEncoder_4Bit	a43(d[	167:	164],y[
167	: 164 ],v42);			
	PriorityEncoder_4Bit	a44(d[	171 :	168],y[
171	: 168 ],v43);			
	PriorityEncoder_4Bit	a45(d[	175 :	172 ],y[
175	: 172 ],v44);			
	PriorityEncoder_4Bit	a46(d[	179 :	176],y[
179	: 176 ],v45);			
	PriorityEncoder_4Bit	a47(d[	183 :	180 ],y[
183	: 180 ],v46);	40/15	40=	1017
107	PriorityEncoder_4Bit	a48(d[	187 :	184 ],y[
187	: 184 ],v47);	40 / 15	101	100 ] [
101	PriorityEncoder_4Bit	a49(d[	191 :	188 ],y[
191	: 188 ],v48);	<b>7</b> 0/1F	107	100 7 7
105	PriorityEncoder_4Bit	a50(d[	195 :	192 ],y[
195	: 192 ],v49);	- <b>5</b> 1 ( <b>3</b> F	100 .	107 ][
100	PriorityEncoder_4Bit	as I (al	199 :	196 ],y[
199	: 196 ],v50);	~ <b>5</b> 0(4F	202 .	200 1[
202	PriorityEncoder_4Bit	asz(al	203 .	200 ],y[
203	: 200 ],v51); PriorityEncoder 4Bit	253(d[	207 ·	204 ],y[
207	: 204 ],v52);	ass(ul	207.	204 ],y[
207	PriorityEncoder 4Bit	254(d[	211 ·	208 ],y[
211	: 208 ],v53);	ast(a[	211 .	200 ],y[
<b>4</b> 11	PriorityEncoder 4Bit	a55(d[	215 ·	212 ],y[
215	: 212 ],v54);	u33(u[	213 .	212 ], y [
<b>4</b> 10	PriorityEncoder 4Bit	a56(d[	219 ·	216 ],y[
219	: 216 ],v55);	us o(ul	<b>∠</b> 1/ .	<b>2</b> 10 ], <b>y</b> [
<b>—</b> 1 /				

```
220 ],y[
    PriorityEncoder 4Bit
                                   223 :
                            a57(d[
         220 ],v56);
    PriorityEncoder 4Bit
                            a58(d[
                                     227 :
                                              224 ],y[
         224 ],v57);
    PriorityEncoder 4Bit
                                              228 ],y[
                            a59(d[
                                     231:
         228 ],v58);
231 :
    PriorityEncoder 4Bit
                                              232 ],y[
                            a60(d[
                                     235 :
235 :
         232 ],v59);
    PriorityEncoder 4Bit
                            a61(d[
                                     239:
                                              236 ],y[
         236 ],v60);
239 :
    PriorityEncoder_4Bit
                            a62(d[
                                              240 ],y[
                                     243 :
         240 ],v61);
243 :
    PriorityEncoder 4Bit
                            a63(d[
                                     247 :
                                              244 ],y[
         244 ],v62);
247 :
    PriorityEncoder 4Bit
                            a64(d[
                                     251:
                                              248 ],y[
         248 ],v63);
251:
    PriorityEncoder 4Bit
                            a20(d[
                                              252 ],y[
                                     255 :
         252 ],v64);
255 :
    //second layer
    assign p[0
                           ] | y [
                  =y[0]
                                         ] | y [
                                                   2
                                                        1
    3 ];
у[
    assign p[ 1
                  ]=y[ 4
                           ] | y [
                                         ] | y [
                                                        5
                                                   6
    7 ];
y [
                  ]=y[ 8
    assign p[ 2
                           ] | y [
                                          ] | y [
                                                        9
                                                   10
у[
    11 ];
    assign p[ 3
                  ]=y[ 12
                           ] | y [
                                         ] | y [
                                                        13
                                                   14
    15 ];
у[
                           ] | y [
    assign p[ 4
                  ]=y[ 16
                                         ] | y [
                                                        ] |
                                     17
                                                   18
y [
    19 ];
```

```
]=y[20]
                              ] | y [
                                             ] | y [
     assign p 5
                                        21
                                                       22
                                                            11
     23 ];
yΓ
                                             ] | y [
                    ]=y[ 24
                              ] | y [
                                        25
                                                            11
     assign p 6
                                                       26
     27 ];
y [
                                             ] | y [
     assign p[7
                    ]=y[ 28
                              ] | y [
                                                            11
                                        29
                                                       30
     31 ];
y [
     assign p[8
                    ]=y[ 32
                              ] | y [
                                             ] | y [
                                                            11
                                        33
                                                       34
     35 ];
yΓ
     assign p[ 9
                              ] | y [
                    ]=y[ 36
                                        37
                                             ] | y [
                                                       38
                                                            11
     39 ];
y [
                              ] | y [
                                                            ]|
     assign p[ 10
                    ]=y[ 40
                                        41
                                             ] | y [
                                                       42
     43 ];
у[
                              ] | y [
     assign p[ 11
                    ]=y[ 44
                                             ] | y [
                                                            ]|
                                        45
                                                       46
     47 ];
у[
                    ]=y[ 48
                              ] | y [
                                                            ]|
     assign p[ 12
                                        49
                                             ] | y [
                                                       50
у[
     51 ];
     assign p[ 13
                    ]=y[ 52
                              ] | y [
                                        53
                                                            ]|
                                             ] | y [
                                                       54
у[
     55 ];
                                                       58
                    ]=y[ 56
                              ] | y [
                                        57
                                             ] | y [
                                                            ]|
     assign p[ 14
     59 ];
у[
     assign p[ 15
                    ]=y[ 60
                              ] | y [
                                        61
                                             ] | y [
                                                            ]|
                                                       62
     63 ];
y [
     assign p[ 16
                    ]=y[ 64
                              ] | y [
                                        65
                                             ] | y [
                                                       66
                                                            ] [
у[
     67];
     assign p[ 17
                    ]=y[ 68
                              ] | y [
                                             ] | y [
                                                            69
                                                       70
у[
     71 ];
     assign p[ 18
                                             ] | y [
                              ] | y [
                                                            ]=y[ 72
                                        73
                                                       74
    75 ];
у[
     assign p[ 19
                    ]=y[ 76
                              ] | y [
                                             ] | y [
                                                            ] |
                                        77
                                                       78
     79 ];
у[
     assign p[ 20
                                                            ] |
                   ]=y[ 80
                              ] | y [
                                        81
                                             ] | y [
                                                       82
     83 ];
у[
```

```
assign p[ 21
                             ] | y [
                                            ] | y [
                  ]=y[ 84
                                       85
                                                      86
                                                           11
     87 ];
yΓ
                                            ]|y[
                   ]=y[ 88
                             ] | y [
                                       89
                                                      90
     assign p[ 22
                                                           11
    91
         ];
y [
                   ]=y[ 92
                                            ] | y [
                             ] | y [
                                                           11
                                                      94
     assign p[ 23
                                       93
        ];
    95
y [
                   ]=y[ 96
                             ] | y [
                                            ] | y [
                                       97
                                                      98
                                                           11
     assign p[ 24
    99 ];
yΓ
     assign p[ 25
                   =y[100]y[
                                       101 ] | y [
                                                      102 ] |
    103 ];
y [
                                       105 ] | y [
    assign p[ 26
                   ]=y[ 104 ] | y [
                                                      106 ] |
    107 ];
у[
     assign p[ 27
                   ]=y[ 108 ] | y [
                                       109 ] | y [
                                                      110 ]
у[
    111 ];
     assign p[ 28
                   ]=y[ 112 ] | y [
                                       113 ] | y [
                                                      114 ] |
у[
    115 ];
     assign p[ 29
                   ]=y[ 116 ] | y [
                                       117 ] | y [
                                                      118 ] |
    119 ];
у[
                   ]=y[ 120 ] | y [
                                       121 ] | y [
     assign p[ 30
                                                      122 ] |
у[
    123 ];
                                       125 ] | y [
                                                      126 ]|
     assign p[ 31
                   ]=y[ 124 ] | y [
    127 ];
у[
    assign p[ 32
                   ]=y[ 128 ] | y [
                                       129 ] | y [
                                                      130 ]|
у[
    131 ];
     assign p[ 33
                   ]=y[ 132 ] | y [
                                       133 ] | y [
                                                      134 ] |
    135 ];
у[
    assign p[ 34
                   ]=y[ 136 ] | y [
                                       137 ] | y [
                                                      138 ] |
    139 ];
у[
     assign p[ 35
                   ]=y[ 140 ] | y [
                                       141 ] | y [
                                                      142 ] |
    143 ];
y [
     assign p[ 36 ]=y[ 144 ] | y [ 145 ] | y [
                                                      146 ] |
     147 ];
у[
```

```
assign p[ 37 ]=y[ 148 ] | y [
                                      149 ] | y [ 150 ] |
     151 ];
yΓ
    assign p[ 38
                   ]=y[ 152 ] | y [
                                      153 ] | y [
                                                     154 ] |
    155 ];
y [
    assign p[ 39
                   ]=y[ 156 ] | y [
                                       157 ] | y [
                                                     158 ] |
    159 ];
y [
    assign p[ 40
                   ]=y[ 160 ] | y [
                                       161 ] | y [
                                                     162 ] |
    163 ];
y [
                                                     166 ]|
                                       165 ] | y [
    assign p[ 41
                   ]=y[ 164 ] | y [
    167 ];
y [
                                       169 ]|y[
    assign p[ 42
                   ]=y[ 168 ] | y [
                                                     170 ] |
    171 ];
у[
    assign p[ 43
                   ]=y[ 172 ] | y [
                                       173 ] | y [
                                                     174 ]|
    175];
у[
    assign p[ 44
                   ]=y[ 176 ] | y [
                                       177 ] | y [
                                                     178 ] |
у[
    179];
    assign p[ 45
                   ]=y[ 180 ] | y [
                                       181 ] | y [
                                                     182 ] |
    183 ];
у[
                   ]=y[ 184 ] | y [
                                       185 ] | y [
                                                     186 ]|
    assign p[ 46
у[
    187];
    assign p[ 47
                                       189 ] | y [
                                                     190 ]|
                   ]=y[ 188 ] | y [
    191];
у[
    assign p[ 48
                   ]=y[ 192 ] | y [
                                       193 ] | y [
                                                     194 ]|
у[
    195];
                                                     198 ] |
    assign p[ 49
                   ]=y[ 196 ] | y [
                                       197 ] | y [
    199 ];
у[
    assign p[ 50
                   ]=y[ 200 ] | y [
                                       201 ] | y [
                                                     202 ] |
    203 ];
у[
                   ]=y[ 204 ] | y [
                                       205 ] | y [
                                                     206 ] |
    assign p[51]
    207];
y [
                                                     210 ]|
    assign p[ 52 ]=y[ 208 ] | y [ 209 ] | y [
    211 ];
у[
```

```
assign p[ 53 ]=y[ 212 ] | y [
                                      213 ] | y [
                                                    214 ]
    215];
y [
    assign p[ 54
                   =y[216]y[
                                      217 ] | y [
                                                    218 ]
    219 ];
y [
    assign p[ 55
                   =y[220]y[
                                      221 ] | y [
                                                     222 ] |
    223 ];
y [
    assign p[ 56
                   =y[224]y[
                                      225 ] | y [
                                                     226 ] |
    227 ];
y [
    assign p[ 57
                   ]=y[ 228 ] | y [
                                      229 ] | y [
                                                     230 ] |
    231 ];
y [
                                      233 ] | y [
    assign p[ 58
                   ]=y[ 232 ] | y [
                                                     234 ] |
    235 ];
y [
    assign p[ 59
                   ]=y[ 236 ] | y [
                                      237 ] | y [
                                                     238 ] |
    239 ];
у[
    assign p[ 60
                   ]=y[ 240 ] | y [
                                      241 ] | y [
                                                     242 ] |
y [
    243 ];
    assign p[61
                                      245 ] | y [
                                                     246 ] |
                  ]=y[ 244 ] | y [
    247 ];
у[
    assign p[ 62
                                      249 ] | y [
                                                     250 ]|
                  ]=y[ 248 ] | y [
    251 ];
y [
                                                     254 ] |
    assign p[ 63
                  ]=y[ 252 ] | y [
                                      253 ] | y [
    255 ];
у[
    //third layer
    PriorityEncoder_4Bit
                            b1(p[
                                      3
                                                     ],k[3]
                                                0
              ],v65);
         0
    PriorityEncoder 4Bit
                            b2(p[
                                      7
                                                4
                                                     ],k[7]
              ],v66);
         4
    PriorityEncoder 4Bit
                            b3(p[
                                      11 :
                                                8
                                                     ],k[ 11
              ],v67);
         8
```

```
12
PriorityEncoder 4Bit
                        b4(p[
                                 15 :
                                              ],k[ 15
     12 ],v68);
                        b5(p[
PriorityEncoder 4Bit
                                 19
                                           16
                                                ],k[ 19
         ],v69);
     16
PriorityEncoder 4Bit
                                 23
                                           20
                        b6(p[
                                                ],k[ 23
     20
        ],v70);
PriorityEncoder 4Bit
                                 27
                                           24
                        b7(p[
                                                ],k[27]
     24 ],v71);
PriorityEncoder 4Bit
                                 31
                        b8(p[
                                           28
                                                ],k[31]
        ],v72);
     28
PriorityEncoder_4Bit
                        b9(p[
                                           32
                                 35
                                                ],k[ 35
         ],v78);
     32
PriorityEncoder 4Bit
                        b10(p[
                                           36
                                                ],k[ 39
                                 39
         ],v73);
     36
PriorityEncoder 4Bit
                        b11(p[
                                 43
                                           40
                                                ],k[ 43
         ],v74);
     40
PriorityEncoder 4Bit
                        b12(p[
                                                ],k[ 47
                                 47
                                           44
     44
         ],v75);
                                 51
PriorityEncoder 4Bit
                        b13(p[
                                                ],k[ 51
                                           48
         ],v76);
     48
PriorityEncoder 4Bit
                                 55
                                                ],k[ 55
                        b14(p[
                                           52
                                     •
         ],v77);
     52
PriorityEncoder_4Bit
                        b15(p[
                                 59
                                           56
                                                ],k[ 59
     56
         ],v79);
PriorityEncoder 4Bit
                        b16(p[
                                 63
                                           60
                                                ],k[ 63
         ],v80);
     60
coversion element u21(y[
                             3
                                      0
                                           ],k[0]
3
         0
              ]);
coversion_element u22(y[
                             7
                                           ],k[1]
                                      4
7
              ]);
         4
```

],z[

],z[

```
coversion element u23(y[
                              11 :
                                           ],k[2]
                                       8
],z[ 11
       : 8
    coversion element u24(y[
                              15
                                       12
                                           ],k[3]
],z[ 15
       : 12
                 1):
    coversion element u25(y[
                                           ],k[ 4
                              19
                                       16
],z[ 19 : 16 ]);
    coversion element u26(y[
                              23
                                       20
                                           ],k[5]
],z[ 23 :
            20 ]);
    coversion_element u27(y[
                              27
                                           ],k[6]
                                       24
],z[ 27 :
            24 ]);
    coversion_element u28(y[
                                           ],k[ 7
                              31
                                       28
],z[ 31 :
            28 ]);
    coversion_element u29(y[
                                           ],k[ 8
                              35
                                       32
],z[ 35 : 32 ]);
    coversion_element u30(y[
                              39 :
                                       36
                                           ],k[9]
],z[ 39 : 36
                 ]);
    coversion_element u31(y[
                              43 :
                                       40
                                           ],k[10]
],z[ 43 :
            40
                 ]);
    coversion_element u32(y[
                                           ],k[ 11
                              47
                                       44
],z[ 47 :
            44
                 1);
    coversion_element u33(y[
                              51
                                       48
                                           ],k[ 12
],z[ 51 :
            48
                 1);
    coversion_element u34(y[
                              55
                                       52
                                           ],k[ 13
],z[ 55 : 52 ]);
    coversion_element u35(y[
                              59
                                       56
                                           ],k[14]
],z[ 59 : 56 ]);
    coversion_element u36(y[
                              63
                                       60
                                           ],k[ 15
],z[ 63 : 60 ]);
    coversion element u37(y[
                              67 :
                                       64
                                           ],k[ 16
],z[ 67 : 64
                 1);
    coversion element u38(y[
                              71 :
                                       68
                                           ],k[ 17
],z[ 71 : 68
                 1);
```

```
coversion element u39(y[
                              75 :
                                      72 ],k[ 18
],z[ 75 : 72
                1);
                              79 :
    coversion element u40(y[
                                          ],k[ 19
                                      76
],z[ 79 : 76 ]);
    coversion element u41(y[
                                          ],k[ 20
                              83
                                      80
],z[ 83 : 80 ]);
    coversion element u42(y[
                                          ],k[ 21
                              87
                                      84
],z[ 87 : 84 ]);
    coversion_element u43(y[
                              91
                                      88
                                          ],k[ 22
],z[ 91 :
            88 ]);
    coversion_element u44(y[
                                          ],k[ 23
                              95 :
                                      92
],z[ 95 :
            92 ]);
    coversion_element u45(y[
                                          ],k[ 24
                              99 :
                                      96
],z[ 99 :
            96 ]);
                                      100 ],k[ 25
    coversion_element u46(y[
                              103 :
],z[ 103 : 100 ]);
    coversion_element u47(y[
                              107:
                                      104 ],k[ 26
],z[ 107 : 104 ]);
    coversion_element u48(y[
                              111 :
                                      108 ],k[ 27
],z[ 111 : 108 ]);
    coversion_element u49(y[
                                      112 ],k[ 28
                              115 :
],z[ 115 : 112 ]);
    coversion_element u50(y[
                              119:
                                      116 ],k[ 29
],z[ 119 : 116 ]);
    coversion element u51(y[
                              123 :
                                      120 ],k[ 30
],z[ 123 : 120 ]);
    coversion_element u52(y[
                              127 :
                                      124 ],k[ 31
],z[ 127 : 124 ]);
    coversion element u53(y[
                              131 :
                                      128 ],k[ 32
],z[ 131 : 128 ]);
    coversion element u54(y[ 135 :
                                      132 ],k[ 33
],z[ 135 : 132 ]);
```

```
coversion element u55(y[ 139 : 136 ],k[ 34
],z[ 139 : 136 ]);
                              143 :
    coversion element u56(y[
                                      140 ],k[ 35
],z[ 143 : 140 ]);
    coversion_element u57(y[
                              147 :
                                      144 ],k[ 36
],z[ 147 : 144 ]);
    coversion element u58(y[
                              151 :
                                      148 ],k[ 37
],z[ 151 : 148 ]);
    coversion element u60(y[
                              155 :
                                      152 ],k[ 38
],z[ 155 : 152 ]);
    coversion_element u59(y[
                              159:
                                      156 ],k[ 39
],z[ 159 : 156 ]);
    coversion_element u84(y[
                                      160 ],k[ 40
                              163 :
],z[ 163 : 160 ]);
    coversion_element u61(y[
                                      164 ],k[ 41
                              167:
],z[ 167 : 164 ]);
    coversion_element u62(y[
                              171:
                                      168 ],k[ 42
],z[ 171 : 168 ]);
    coversion_element u63(y[
                              175 :
                                      172 ],k[ 43
],z[ 175 : 172 ]);
    coversion_element u64(y[
                                      176 ],k[ 44
                              179 :
],z[ 179 : 176 ]);
                                      180 ],k[ 45
    coversion_element u65(y[
                              183 :
],z[ 183 : 180 ]);
    coversion element u66(y[
                              187 :
                                      184 ],k[ 46
],z[ 187 : 184 ]);
                              191:
    coversion_element u67(y[
                                      188 ],k[ 47
],z[ 191 : 188 ]);
    coversion element u68(y[
                                      192 ],k[ 48
                              195 :
],z[ 195 : 192 ]);
    coversion element u69(y[
                                      196 ],k[ 49
                              199 :
],z[ 199 : 196 ]);
```

```
coversion element u70(y
                             203 :
                                      200 ],k[ 50
],z[ 203 : 200 ]);
                             207 :
    coversion element u71(y[
                                      204 ],k[ 51
],z[ 207 : 204 ]);
    coversion element u72(y[
                             211:
                                      208 ],k[ 52
],z[ 211 : 208 ]);
    coversion element u73(y[
                             215 :
                                      212 ],k[ 53
],z[ 215 : 212 ]);
    coversion element u74(y[
                                      216 ],k[ 54
                             219:
],z[ 219 : 216 ]);
    coversion_element u75(y[
                                      220 ],k[ 55
                             223 :
],z[ 223 : 220 ]);
    coversion_element u76(y[
                                      224 ],k[ 56
                             227 :
],z[ 227 : 224 ]);
    coversion_element u77(y[
                                      228 ],k[ 57
                             231 :
],z[ 231 : 228 ]);
    coversion_element u78(y[
                                      232 ],k[ 58
                             235 :
],z[ 235 : 232 ]);
    coversion_element u79(y[
                             239 :
                                      236 ],k[ 59
],z[ 239 : 236 ]);
    coversion_element u80(y[
                                      240 ],k[ 60
                             243 :
],z[ 243 : 240 ]);
    coversion_element u81(y[
                             247 :
                                      244 ],k[ 61
],z[ 247 : 244 ]);
    coversion element u82(y[
                             251 :
                                      248 ],k[ 62
],z[ 251 : 248 ]);
    coversion_element u83(y[
                             255 :
                                      252 ],k[ 63
],z[ 255 : 252 ]);
```

//fourth layer

```
]=k[ 0
                              ] | k [
                                              ] | k [
                                                         2
     assign q[0
                                         1
k [
                    =k[4
                               ] | k [
                                         5
                                                              ] [
                                              ] | k [
                                                         6
     assign q[ 1
         ];
k [
                    =k[8]
                                                              ] [
     assign q[ 2
                                         9
                                                         10
                               | | k |
                                              ] | k [
        ];
kΓ
     11
     assign q[ 3
                    ]=k[ 12
                                                              ] | k [
                                         13
                                                         14
                                              ] | k [
     15
        ];
k [
     assign q[4
                    =k[16]
                               ] | k [
                                         17
                                              ] | k [
                                                         18
                                                              19 ];
k [
                                                         22
                                         21
     assign q[5
                    ]=k[20]
                               ] | k [
                                              ] | k [
                                                              23 ];
k [
     assign q[6
                    ]=k[ 24
                               ] | k [
                                         25
                                              ] | k [
                                                         26
                                                              ]|
     27 ];
k [
                                                         30
     assign q[7
                                                              ]|
                    ]=k[ 28
                               ] | k [
                                         29
                                              ] | k [
k [
     31 ];
     assign q[8
                    ]=k[ 32
                                         33
                                                              ] |
                               ] | k [
                                              ] | k [
                                                         34
k [
     35 ];
                                                         38
                    ]=k[ 36
                                         37
                                                              ] |
     assign q[ 9
                               ] | k [
                                              ] | k [
     39 ];
k [
                                                         42
                    ]=k[ 40
                                                              ] |
     assign q[ 10
                               ] | k [
                                         41
                                              ] | k [
k [
     43 ];
     assign q[ 11
                    ]=k[ 44
                               ] | k [
                                         45
                                              ] | k [
                                                         46
                                                              ] [
k [
     47 ];
                    ]=k[ 48
     assign q[ 12
                               ] | k [
                                              ] | k [
                                                         50
                                                              49
     51 ];
k [
                    ]=k[ 52
                                         53
                                                         54
                                                              assign q[ 13
                               ] | k [
                                              ] | k [
     55 ];
k [
                                         57
                                                         58
                                                              ] [
     assign q[ 14
                    = k [56]
                               ] | k [
                                              ] | k [
k [
     59 ];
                                                              ] [
                                         61
                                                         62
     assign q[ 15 ]=k[ 60
                              ] | k [
                                              ] | k [
     63];
k [
```

```
//fifth layer
                             c1(q[
                                                     ],j[
    PriorityEncoder 4Bit
                                      3 :
                                                          3
                                                0
              ],v81);
                             c2(q[
                                                     ],j[
    PriorityEncoder 4Bit
                                       7 :
                                                          7
                                                4
              ],v82);
    PriorityEncoder 4Bit
                                                     ],j[
                             c3(q[
                                       11 :
                                                8
                                                          11
              ],v83);
         8
    PriorityEncoder 4Bit
                             c4(q[
                                       15 :
                                                12
                                                     ],i[
                                                          15
         12
              1,v84);
    coversion element u5 (z[3:0],j[0],x[3:0]);
    coversion element u6 (z[7:4],j[0],x[7:4]);
    coversion_element u7 (z[11:8],j[0],x[11:8]);
    coversion_element u8 (z[15:12],j[0],x[15:12]);
    coversion element u9 (z[19:16],j[1],x[19:16]);
    coversion element u10 (z[23:20],j[1],x[23:20]);
    coversion element u11 (z[27:24],j[1],x[27:24]);
    coversion element u12 (z[31:28],j[1],x[31:28]);
    coversion element u13 (z[35:32],j[2],x[35:32]);
    coversion element u14 (z[39:36], j[2], x[39:36]);
    coversion element u15 (z[43:40],j[2],x[43:40]);
    coversion element u16 (z[47:44],j[2],x[47:44]);
    coversion element u17 (z[51:48],i[3],x[51:48]);
    coversion element u18 (z[55:52],i[3],x[55:52]);
    coversion element u19 (z[59:56],j[3],x[59:56]);
    coversion element u20 (z[63:60],j[3],x[63:60]);
    coversion element u85 (z[67:64],j[4],x[67:64]);
    coversion element u103(z[ 71
                                           68
                                                ],j[
              68
    71
                   1);
]x[
    coversion element u104(z[ 75 :
                                           72
                                                ],i[
],x[75]
              72
                   1);
```

```
coversion element u105(z[ 79 :
                                      76 ],j[ 4
],x[79:76]);
                             83 :
    coversion element u106(z[
                                          ],j[
                                      80
       : 80 ]);
],x[ 83
    coversion element u107(z[
                             87
                                      84
                                          ],j[
],x[ 87 : 84 ]);
    coversion element u108(z[
                                      88
                                          ],i[
                             91
],x[ 91 : 88 ]);
    coversion_element u109(z[
                                          ],j[
                             95
                                      92
],x[ 95 :
            92 ]);
    coversion_element u110(z[
                                      96
                             99 :
                                          ],i[
],x[ 99 :
            96 ]);
    coversion_element u111(z[
                             103 :
                                      100 ],j[
],x[ 103 : 100 ]);
    coversion_element u112(z[
                                      104 ],j[
                             107 :
],x[ 107 : 104 ]);
    coversion_element u113(z[
                             111:
                                      108 ],j[
],x[ 111 : 108 ]);
    coversion_element u114(z[
                             115:
                                      112 ],j[
],x[ 115 : 112 ]);
    coversion_element u115(z[
                             119:
                                      116 ],j[
],x[ 119 : 116 ]);
    coversion_element u116(z[
                             123 :
                                      120 ],j[
],x[ 123 : 120 ]);
    coversion_element u117(z[
                             127 :
                                      124 ],j[
],x[ 127 : 124 ]);
    coversion element u118(z[
                             131 :
                                      128 ],j[
                                              8
],x[ 131 : 128 ]);
    coversion element u119(z[ 135 :
                                      132 ],i[
],x[ 135 : 132 ]);
    coversion element u120(z[ 139 :
                                      136 ],j[ 8
],x[ 139 : 136 ]);
```

```
coversion element u121(z[143:140],j[8]
],x[143 : 140];
    coversion element u122(z[ 147 :
                                      144 ],j[
],x[ 147 : 144 ]);
    coversion element u123(z[ 151 :
                                      148 ],j[
],x[151 : 148];
    coversion element u124(z[ 155 :
                                      152 ],j[
],x[155:152]);
    coversion element u125(z[
                                      156 ],j[
                             159 :
],x[ 159 : 156 ]);
    coversion_element u126(z[
                             163 :
                                      160 ],j[
                                              10
],x[ 163 : 160 ]);
    coversion_element u127(z[
                                      164 ],j[
                             167 :
                                              10
],x[ 167 : 164 ]);
                             171 :
    coversion_element u128(z[
                                      168 ],j[
                                              10
],x[ 171 : 168 ]);
    coversion element u129(z[
                             175 :
                                      172 ],j[
                                              10
],x[ 175 : 172 ]);
                             179 :
    coversion_element u130(z[
                                      176 ],j[
                                              11
],x[ 179 : 176 ]);
    coversion_element u131(z[
                             183 :
                                      180 ],j[
                                              11
],x[ 183 : 180 ]);
    coversion element u132(z[
                             187 :
                                      184 ],j[
                                              11
],x[ 187 : 184 ]);
                             191:
    coversion element u133(z[
                                      188 ],j[
                                              11
],x[ 191 : 188 ]);
    coversion_element u134(z[
                             195 :
                                      192 ],j[
                                              12
],x[ 195 : 192 ]);
                            199 :
    coversion element u135(z[
                                      196 ],j[
                                              12
],x[ 199 : 196 ]);
    coversion element u136(z[ 203 :
                                      200 ],j[ 12
],x[203:200];
```

```
coversion element u137(z[ 207 :
                                    204 ],j[ 12
],x[207:204]);
    coversion element u138(z[ 211 :
                                    208 ],j[
                                            13
],x[211:208];
    coversion element u139(z[ 215 :
                                    212 ],j[
                                            13
],x[215:212];
    coversion element u140(z[
                            219:
                                    216 ],j[
                                            13
],x[219:216];
    coversion element u141(z[
                            223 :
                                    220 ],j[
                                            13
],x[223:220]);
    coversion_element_u142(z[
                            227 :
                                    224 ],j[
                                            14
],x[227:224]);
    coversion_element u143(z[ 231 :
                                    228 ],j[
                                            14
],x[ 231 : 228 ]);
    coversion element u144(z[ 235 :
                                    232 ],j[
                                            14
],x[ 235 : 232 ]);
    coversion element u145(z[ 239 :
                                    236 ],j[
                                            14
],x[239:236];
    coversion_element u146(z[
                            243 :
                                    240 ],j[
                                            15
],x[243:240]);
    coversion_element u147(z[ 247 :
                                    244 ],j[
                                            15
],x[247:244];
    coversion_element u148(z[ 251 :
                                    248 ],j[
                                            15
],x[ 251 : 248 ]);
    coversion element u149(z[ 255 :
                                    252 ],j[
],x[ 255 : 252 ]);
```

//sixth layer

assign r[ 0 ]=j[ 0 ]|j[1 ]|j[2 ]|j[3 ];

```
assign r[ 1 ]=j[ 4 ] | j [ 5
                                    ] | j [6
                                             ]|i[7
    assign r[ 2 ]=j[ 8 ]|j[ 9 ]|j[ 10
                                             ]|j[11
                                             ] | j [ 15
    assign r[ 3 ]=j[12]
                          ]|j[13]|j[14]
    //seventh layer
    PriorityEncoder_4Bit d1(r[3:0],h[3:0],v85);
    //eighth layer
    //assign t[0] = h[0]|h[1]|h[2]|h[3];
    coversion_element j86 (x[
                                             ],h[ 0
                               3 :
                                         0
],c[ 3 :
             0
                  ]);
    coversion_element j87 (x[
                                             ],h[ 0
                                         4
],c[ 7 :
                  ]);
             4
    coversion_element j88 (x[
                                             ],h[ 0
                               11
                                         8
],c[ 11 :
             8
                  ]);
    coversion_element j89 (x[
                                             ],h[ 0
                               15
                                         12
],c[ 15 :
             12
                  ]);
    coversion element j90 (x[
                                             ],h[ 0
                               19
                                         16
],c[ 19 :
             16
                  1);
    coversion element j91 (x[
                                             ],h[ 0
                               23
                                         20
],c[ 23 :
             20
                  1);
    coversion_element j92 (x[
                                             ],h[ 0
                               27
                                         24
],c[ 27 :
             24
                  1);
    coversion_element j93 (x[
                               31
                                         28
                                             ],h[0]
],c[ 31
             28
                  1);
    coversion_element j94 (x[
                               35
                                         32
                                             ],h[0]
],c[ 35 :
             32
                  1);
    coversion element j95 (x[
                               39
                                         36
                                             ],h[0]
],c[ 39 :
             36
                  1):
                                         40
    coversion element j96 (x[
                               43 :
                                             ],h[0]
],c[43:
             40
                  ]);
```

];

];

];

```
coversion_element j97 (x[ 47 :
                                            ],h[0]
                                        44
       : 44
                 1):
    coversion element j98 (x[
                               51
                                        48
                                             ],h[0]
             48
                 1):
],c[
    coversion element j99 (x[
                               55
                                             ],h[0]
                                        52
],c[ 55
             52
                 1);
    coversion element j100 (x[
                               59
                                             ],h[0]
                                        56
],c[ 59 :
             56
                ]);
    coversion_element j101 (x[
                                        60
                                             ],h[0]
                               63
],c[ 63 :
             60
                ]);
    coversion_element j102 (x[
                                             ],h[ 1
                               67
                                        64
],c[ 67 :
             64 ]);
    coversion_element j103 (x[
                                             ],h[ 1
                               71
                                        68
],c[ 71 :
             68 ]);
    coversion_element j104 (x[
                                             ],h[ 1
                               75
                                        72
],c[ 75 :
             72
                 1);
    coversion_element j105 (x[
                                             ],h[ 1
                               79 :
                                        76
],c[ 79 :
             76
                 ]);
    coversion_element j106 (x[
                               83
                                        80
                                             ],h[ 1
],c[ 83 :
             80
                 1);
    coversion_element j107 (x[
                               87
                                        84
                                             ],h[ 1
],c[ 87 :
             84
                 1);
    coversion_element j108 (x[
                               91
                                        88
                                             ],h[ 1
],c[ 91 :
             88
                 1);
    coversion_element j109 (x[
                               95
                                        92
                                             ],h[ 1
],c[ 95 :
             92
                 1);
    coversion_element j110 (x[
                               99 :
                                        96
                                             ],h[1]
],c[ 99 :
             96 ]);
    coversion element j111 (x[
                               103 :
                                        100 ],h[ 1
],c[ 103 : 100 ]);
    coversion element j112 (x[ 107 :
                                        104 ],h[ 1
],c[ 107 : 104 ]);
```

```
coversion element j113 (x[ 111 : 108 ],h[ 1
],c[ 111 : 108 ]);
    coversion element j114 (x[ 115 :
                                      112 ],h[ 1
],c[ 115 : 112 ]);
    coversion element j115 (x[ 119 :
                                      116 ],h[ 1
],c[ 119 : 116 ]);
    coversion element j116 (x[ 123 :
                                      120 ],h[ 1
],c[ 123 : 120 ]);
    coversion element j117 (x[ 127 :
                                      124 ],h[ 1
],c[ 127 : 124 ]);
    coversion_element j118 (x[ 131 :
                                      128 ],h[ 2
],c[ 131 : 128 ]);
    coversion_element j119 (x[ 135 :
                                      132 ],h[ 2
],c[ 135 : 132 ]);
    coversion_element j120 (x[
                                      136 ],h[ 2
                              139 :
],c[ 139 : 136 ]);
    coversion_element j121 (x[ 143 :
                                      [140],h[2]
],c[ 143 : 140 ]);
    coversion_element j122 (x[ 147 :
                                      144 \, ],h[ 2]
],c[ 147 : 144 ]);
    coversion_element j123 (x[
                              151 :
                                      148 ],h[ 2
],c[ 151 : 148 ]);
    coversion_element j124 (x[
                              155 :
                                      152 ],h[ 2
],c[ 155 : 152 ]);
    coversion_element j125 (x[
                              159:
                                      156 ],h[ 2
],c[ 159 : 156 ]);
    coversion_element j126 (x[
                              163:
                                      160 ],h[ 2
],c[ 163 : 160 ]);
    coversion element j127 (x[ 167 :
                                      164 ],h[ 2
],c[ 167 : 164 ]);
    coversion element j128 (x[ 171 : 168 ],h[ 2
],c[ 171 : 168 ]);
```

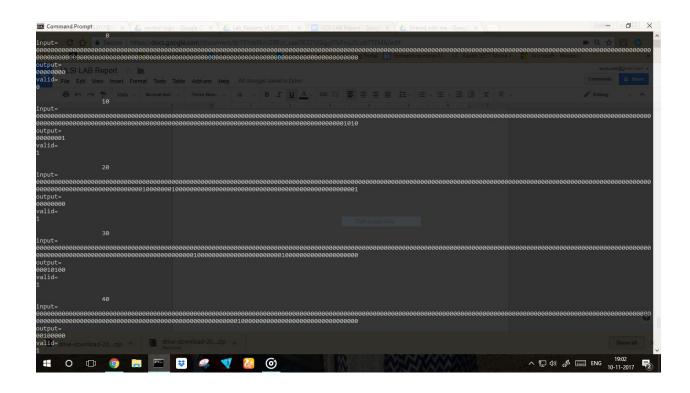
```
coversion element j129 (x[ 175 : 172 ],h[ 2
],c[ 175 : 172 ]);
    coversion element j130 (x[ 179 :
                                      176 ],h[ 2
],c[ 179 : 176 ]);
    coversion element j131 (x[ 183 :
                                      180 ],h[ 2
],c[ 183 : 180 ]);
    coversion element j132 (x[ 187 :
                                      184 ],h[ 2
],c[ 187 : 184 ]);
    coversion_element j133 (x[ 191 :
                                      188 ],h[ 2
],c[ 191 : 188 ]);
    coversion_element j134 (x[ 195 :
                                      192 ],h[ 3
],c[ 195 : 192 ]);
    coversion_element j135 (x[
                              199:
                                      196 ],h[ 3
],c[ 199 :
            196 ]);
    coversion_element j136 (x[
                                      200 ],h[ 3
                              203 :
],c[ 203 :
            200 ]);
    coversion_element j137 (x[
                              207 :
                                      204 ],h[ 3
],c[ 207 :
           204 ]);
    coversion_element j138 (x[
                             211:
                                      208 ],h[ 3
],c[ 211 : 208 ]);
    coversion_element j139 (x[ 215 :
                                      212 ],h[ 3
],c[ 215 : 212 ]);
    coversion_element j140 (x[ 219 :
                                      216 ],h[ 3
],c[ 219 : 216 ]);
    coversion_element j141 (x[
                             223 :
                                      220 ],h[ 3
],c[ 223 : 220 ]);
    coversion_element j142 (x[
                             227 :
                                      224 ],h[ 3
],c[ 227 : 224 ]);
    coversion element j143 (x[ 231 :
                                      228 ],h[ 3
],c[ 231 : 228 ]);
    coversion_element j144 (x[ 235 : 232 ],h[ 3
],c[ 235 : 232 ]);
```

```
coversion element j145 (x\begin{bmatrix} 239 : 236 \end{bmatrix},h\begin{bmatrix} 3 \end{bmatrix}
            236 ]);
],c[ 239 :
     coversion element j146 (x[ 243 : 240 ],h[ 3
],c[ 243 :
            240 ]);
     coversion element j147 (x[ 247 : 244 ],h[ 3
],c[ 247 : 244 ]);
     coversion element j148 (x[ 251 : 248 ],h[ 3
],c[ 251 : 248 ]);
     coversion_element j149 (x[ 255 : 252 ],h[ 3
],c[ 255 : 252 ]);
endmodule
module pe_256bit_Test();
reg [255:0] D;
wire [255:0] Y;
wire V;
pe_256bit i(D,Y,V);
initial
begin
// Initialize Inputs
D = 0;
#100;
#2 D = 256'b00001;
#2 D = 256'b00010;
#2 D = 256'b00011;
#2 D = 256'b00100;
#2 D = 256'b10101;
end
initial
```

```
begin
$monitor("time=",$time,, "D=%b : Y=%b V=%b",D,Y,V);
end
endmodule

*Conversion_element.v:
module coversion_element(a, b, res);
input [3:0]a;
input b;
output [3:0]res;
wire [3:0]res;
assign res[0] = a[0] & b;
assign res[1] = a[1] & b;
assign res[2] = a[2] & b;
assign res[3] = a[3] & b;
endmodule
```

## Output:



## **Experiment no. 8:**

Aim: To write a verilog code for TCAM using SRAM.

## Code:

```
Priority256.v:
module pe_256(D, result,14);
    input[255:0]D;
    wire[3:0]w[84:0];// stage outputs
    wire [63:0]o;//or output 1st stage
    wire [16:0]o1;
    wire [3:0]o2;
```

```
wire [63:0]11;
wire [15:0]12;
wire [3:0]13;
output 14;
wire [3:0]cout[127:0];
wire [3:0]fin[63:0];
wire [255:0]outfi;
real result1;
integer n,p;
output [255:0]result;
//stage1
priority4bit a(D[3:0],w[0],l1[0]);
priority4bit a1(D[7:4],w[1],11[1]);
priority4bit a2(D[11:8],w[2],11[2]);
priority4bit a3(D[15:12],w[3],l1[3]);
priority4bit a4(D[19:16],w[4],11[4]);
priority4bit a5(D[23:20],w[5],l1[5]);
priority4bit a6(D[27:24],w[6],l1[6]);
priority4bit a7(D[31:28],w[7],l1[7]);
priority4bit a8(D[35:32],w[8],11[8]);
priority4bit a9(D[39:36],w[9],11[9]);
priority4bit a10(D[43:40],w[10],l1[10]);
priority4bit a11(D[47:44],w[11],l1[11]);
priority4bit a12(D[51:48],w[12],11[12]);
priority4bit a13(D[55:52],w[13],l1[13]);
priority4bit a14(D[59:56],w[14],11[14]);
priority4bit a15(D[63:60],w[15],l1[15]);
priority4bit a16(D[67:64],w[16],l1[16]);
priority4bit a17(D[71:68],w[17],l1[17]);
priority4bit a18(D[75:72],w[18],l1[18]);
```

```
priority4bit a19(D[79:76],w[19],11[19]);
priority4bit a20(D[83:80],w[20],11[20]);
priority4bit a21(D[87:84],w[21],11[21]);
priority4bit a22(D[91:88],w[22],11[22]);
priority4bit a23(D[95:92],w[23],11[23]);
priority4bit a24(D[99:96],w[24],11[24]);
priority4bit a25(D[103:100],w[25],11[25]);
priority4bit a26(D[107:104],w[26],11[26]);
priority4bit a27(D[111:108],w[27],11[27]);
priority4bit a28(D[115:112],w[28],11[28]);
priority4bit a29(D[119:116],w[29],11[29]);
priority4bit a30(D[123:120],w[30],11[30]);
priority4bit a31(D[127:124],w[31],l1[31]);
priority4bit a32(D[131:128],w[32],11[32]);
priority4bit a33(D[135:132],w[33],11[33]);
priority4bit a34(D[139:136],w[34],11[34]);
priority4bit a35(D[143:140],w[35],11[35]);
priority4bit a36(D[147:144],w[36],11[36]);
priority4bit a37(D[151:148],w[37],11[37]);
priority4bit a38(D[155:152],w[38],11[38]);
priority4bit a39(D[159:156],w[39],11[39]);
priority4bit a40(D[163:160],w[40],11[40]);
priority4bit a41(D[167:164],w[41],l1[41]);
priority4bit a42(D[171:168],w[42],11[42]);
priority4bit a43(D[175:172],w[43],11[43]);
priority4bit a44(D[179:176],w[44],11[44]);
priority4bit a45(D[183:180],w[45],11[45]);
priority4bit a46(D[187:184],w[46],11[46]);
priority4bit a47(D[191:188],w[47],11[47]);
priority4bit a48(D[195:192],w[48],11[48]);
priority4bit a49(D[199:196],w[49],11[49]);
priority4bit a50(D[203:200],w[50],11[50]);
```

```
priority4bit a52(D[211:208],w[52],11[52]);
         priority4bit a53(D[215:212],w[53],l1[53]);
         priority4bit a54(D[219:216],w[54],l1[54]);
         priority4bit a55(D[223:220],w[55],l1[55]);
         priority4bit a56(D[227:224],w[56],l1[56]);
         priority4bit a57(D[231:228],w[57],l1[57]);
         priority4bit a58(D[235:232],w[58],l1[58]);
         priority4bit a59(D[239:236],w[59],11[59]);
         priority4bit a60(D[243:240],w[60],l1[60]);
         priority4bit a61(D[247:244],w[61],l1[61]);
         priority4bit a62(D[251:248],w[62],l1[62]);
         priority4bit a63(D[255:252],w[63],l1[63]);
         //stage 1 or
         assign o[ 0 ]=w[ 0 ][0]|w[ 0 ][1]|w[ 0 ][2]|w[
  ][3];
0
                                                ][1]|w[
                                 ][0]|w[
                                           1
                                                          1
         assign o[ 1 ]=w[1]
                   ][3];
    ][2]|w[
         assign o [2] =w[2
                                  ][0]|w[
                                                ][1]|w[
                                                          2
                                           2
              2 ][3];
    ][2]|w[
                                                          3
         assign o[ 3
                                  ][0]|w[
                                                ][1]|w[
                     ]=w[3]
                                           3
    ][2]|w[
              3
                  ][3];
                                  ][0]|w[
                                           4
                                                ][1]|w[
                                                          4
         assign o[4
                      =w[4
    ][2]|w[
                  ][3];
                                                          5
         assign o[ 5
                                           5
                                                ][1]|w[
                                  ][0]|w[
                      ]=w[5]
    ][2]|w[
             5
                  ][3];
         assign o[6
                                  ][0]|w[
                                                ][1]|w[
                       =w[6
                                                          6
                                           6
                  ][3];
             6
    ||2||w||
         assign o 7
                                  ||0||w||
                                           7
                                                ||1||w||
                      ]=w[7]
                                                          7
    ][2]|w[
                   ][3];
              7
```

priority4bit a51(D[207:204],w[51],l1[51]);

```
8
    assign o[ 8 ]=w[8
                           ||0||w||
                                         ||1||w||
                                    8
             ][3];
||2||w|| 8
    assign of 9 = w[9]
                           |0|w
                                     9
                                         ||1||w||
                                                  9
||2||w|| 9
             ][3];
    assign o[ 10 ]=w[10
                           ||0||w||
                                         ||1||w||
                                     10
                                                  10
][2]|w[ 10 ][3];
    assign o[ 11 ]=w[11
                           ||0||w||
                                         ||1||w||
                                                  11
                                     11
][2]|w[ 11 ][3];
    assign o[ 12 ]=w[12
                           ||0||w||
                                     12
                                         ||1||w||
                                                  12
][2]|w[ 12 ][3];
    assign o[ 13 ]=w[13
                                         ][1]|w[
                           ][0]|w[
                                     13
                                                   13
][2]|w[ 13 ][3];
                                         ][1]|w[
    assign o[ 14 ]=w[14
                           ][0]|w[
                                                   14
                                     14
][2]|w[ 14 ][3];
    assign o[ 15 ]=w[15
                           ][0]|w[
                                         ][1]|w[
                                     15
                                                  15
][2]|w[ 15 ][3];
                           ][0]|w[
                                         ][1]|w[
    assign o[ 16 ]=w[16
                                                   16
                                     16
][2]|w[ 16 ][3];
                           ][0]|w[
                                         ][1]|w[
                                                   17
    assign o[ 17 ]=w[17
                                     17
][2]|w[ 17 ][3];
                           ][0]|w[
                                         ][1]|w[
    assign o[ 18 ]=w[18
                                     18
                                                   18
][2]|w[ 18 ][3];
    assign o[ 19 ]=w[19
                           ][0]|w[
                                     19
                                         ][1]|w[
                                                  19
][2]|w[ 19 ][3];
    assign o[ 20 ]=w[20
                           ][0]|w[
                                         ][1]|w[
                                     20
                                                  20
][2]|w[ 20 ][3];
    assign o[ 21 ]=w[21
                           ][0]|w[
                                         ][1]|w[
                                                  21
                                     21
][2]|w[ 21 ][3];
    assign o[ 22 ]=w[22
                           ||0||w||
                                    22
                                         ||1||w||
                                                  22
][2]|w[ 22 ][3];
    assign o[ 23 ]=w[23
                          ||0||w||
                                    23
                                         ||1||w||
                                                  23
][2]|w[ 23 ][3];
```

```
24
    assign o[ 24 ]=w[24
                          ||0||w||
                                    24
                                        |[1]|w[
        24 ][3];
][2]|w[
    assign o[ 25 ]=w[25
                           ||0||w||
                                    25
                                         ||1||w||
                                                  25
       25 ][3];
][2]|w[
    assign o[ 26 ]=w[26
                           ||0||w||
                                                  26
                                    26
                                         ||1||w|
][2]|w[ 26 ][3];
    assign o[ 27 ]=w[27
                           ||0||w||
                                         ||1||w||
                                                  27
                                    27
][2]|w[ 27 ][3];
    assign o[ 28 ]=w[28
                           ||0||w||
                                    28
                                         ||1||w||
                                                  28
][2]|w[ 28 ][3];
    assign o[ 29 ]=w[29
                                         |[1]|w[
                           ][0]|w[
                                    29
                                                  29
][2]|w[ 29 ][3];
    assign o[ 30 ]=w[30
                                         |[1]|w[
                           ][0]|w[
                                    30
                                                  30
][2]|w[ 30 ][3];
    assign o[ 31 ]=w[31
                           ][0]|w[
                                         ][1][w[
                                                  31
                                    31
][2]|w[ 31 ][3];
                           ][0]|w[
                                         ][1]|w[
    assign o[ 32 ]=w[32
                                    32
                                                  32
][2]|w[ 32 ][3];
                           ][0]|w[
                                         ][1]|w[
                                                  33
    assign o[ 33 ]=w[33
                                    33
][2]|w[ 33 ][3];
                           ][0]|w[
                                         ][1]|w[
    assign o[ 34 ]=w[34
                                    34
                                                  34
][2]|w[ 34 ][3];
    assign o[ 35 ]=w[35
                           ][0]|w[
                                    35
                                         ][1]|w[
                                                  35
][2]|w[ 35 ][3];
                                         [1]
    assign o[ 36 ]=w[36
                           ][0]|w[
                                    36
                                                  36
][2]|w[ 36 ][3];
    assign o[ 37 ]=w[37
                           ][0]|w[
                                         ][1]|w[
                                                  37
                                    37
][2]|w[ 37 ][3];
    assign o[ 38 ]=w[38
                           ||0||w||
                                    38
                                         ||1||w||
                                                  38
][2]|w[ 38 ][3];
    assign o[ 39 ]=w[39
                          ||0||w||
                                         ||1||w||
                                                  39
                                    39
][2]|w[ 39 ][3];
```

```
assign o[ 40 ]=w[40
                          ||0||w||
                                   40
                                        ||1||w|
                                                 40
|[2]|w[40]|[3];
                          ||0||w|
                                   41
                                        ||1||w||
                                                 41
    assign o[ 41 ]=w[41
][2]|w[ 41 ][3];
    assign of 42 = w 42
                          ||0||w|
                                                 42
                                   42
                                        ||1||w||
][2]|w[ 42 ][3];
    assign o[ 43 ]=w[43
                          ||0||w|
                                    43
                                        ||1||w||
                                                 43
][2]|w[ 43 ][3];
    assign o[ 44 ]=w[44
                          ||0||w|
                                    44
                                        |[1]|w[
                                                 44
][2]|w[ 44 ][3];
    assign o[ 45 ]=w[45
                                        |[1]|w[
                          ][0]|w[
                                    45
                                                 45
][2]|w[ 45 ][3];
    assign o[ 46 ]=w[46
                                        |[1]|w[
                          ][0]|w[
                                    46
                                                 46
][2]|w[ 46 ][3];
    assign o[ 47 ]=w[47
                                        |[1]|w[
                          ][0]|w[
                                    47
                                                 47
][2]|w[ 47 ][3];
                          ][0]|w[
                                        |[1]|w[
    assign o[ 48 ]=w[48
                                    48
                                                 48
][2]|w[ 48 ][3];
                          ][0]|w[
                                        ][1]|w[
                                                 49
    assign o[ 49 ]=w[49
                                    49
][2]|w[ 49 ][3];
                          ][0]|w[
                                        ][1]|w[
                                                 50
    assign o[ 50 ]=w[50
                                    50
][2]|w[ 50 ][3];
    assign o[ 51 ]=w[51
                          ][0]|w[
                                    51
                                        ][1]|w[
                                                 51
][2]|w[ 51 ][3];
                                        [1]
    assign o[ 52 ]=w[52
                          ][0]|w[
                                                 52
                                    52
][2]|w[ 52 ][3];
    assign o[ 53 ]=w[53
                          ][0]|w[
                                    53
                                        ][1]|w[
                                                 53
][2]|w[ 53 ][3];
    assign o[ 54 ]=w[54
                          |0|w
                                    54
                                        ||1||w||
                                                 54
][2]|w[ 54 ][3];
    assign o[ 55 ]=w[55
                          ][0]|w[
                                                 55
                                   55
                                        |[1]|w[
][2]|w[ 55 ][3];
```

```
|[0]|w[
                                                       56
     assign o[ 56 ]=w[56
                                        56
                                             ||1||w||
][2]|w[
          56
               [3];
     assign o[ 57 ]=w[57
                              ][0]|w[
                                        57
                                             ][1]|w[
                                                       57
||2||w||
          57
              [3];
     assign o[ 58 ]=w[58
                              ][0]|w[
                                             ][1]|w[
                                                       58
                                        58
          58
               ][3];
||2||w||
     assign o[ 59 ]=w[59
                              ][0]|w[
                                             ][1]|w[
                                                       59
                                        59
          59
              ][3];
||2||w||
     assign o[ 60 ]=w[60
                                             ][1]|w[
                              ][0]|w[
                                        60
                                                       60
              ][3];
          60
][2]|w[
     assign o[ 61 ]=w[61
                              ][0]|w[
                                             ][1]|w[
                                                       61
                                        61
          61
              ][3];
][2]|w[
     assign o[ 62 ]=w[62
                              ][0]|w[
                                        62
                                             ][1]|w[
                                                       62
][2]|w[
          62
               ][3];
     assign o[ 63 ]=w[63
                              ][0]|w[
                                        63
                                             ][1]|w[
                                                       63
][2]|w[
          63
               [3];
     //stage 2
     priority4bit
                   b(o[3:0],w[64],12[0]);
     priority4bit
                    b1(o[7:4],w[65],l2[1]);
     priority4bit
                    b2(o[11:8],w[66],l2[2]);
                    b3(o[15:12],w[67],l2[3]);
     priority4bit
     priority4bit
                    b4(o[19:16],w[68],l2[4]);
     priority4bit
                    b5(o[23:20],w[69],12[5]);
     priority4bit
                    b6(o[27:24],w[70],l2[6]);
     priority4bit
                    b7(o[31:28],w[71],l2[7]);
     priority4bit
                    b8(o[35:32],w[72],l2[8]);
     priority4bit
                    b9(o[39:36],w[73],l2[9]);
                    b10(o[43:40],w[74],l2[10]);
     priority4bit
                    b11(o[47:44],w[75],l2[11]);
     priority4bit
                    b12(o[51:48],w[76],l2[12]);
     priority4bit
     priority4bit
                    b13(o[55:52],w[77],l2[13]);
```

```
priority4bit
               b14(o[59:56],w[78],12[14]);
priority4bit
               b15(o[63:60],w[79],l2[15]);
//ce
    e (w[0 ],w[64 ][0 ],cout[0
ce
                                    1):
                          ][1
                              ],cout[1
          (w[1],w[64])
ce
    e1
                                         ]);
          (w[2],w[64]
                         ][2
ce
    e2
                              ],cout[2
                                         ]);
          (w[3],w[64])
                         ][3
                              ],cout[3
                                         ]);
    e3
ce
          (w[4],w[65])
                         ][0 ],cout[4
    e4
                                         ]);
ce
          (w[5],w[65])
                         ][1
                                         ]);
    e5
                              ],cout[5
ce
                          ][2 ],cout[6
    e6
          (w[6],w[65])
                                         ]);
ce
                         ][3
                                         ]);
    e7
          (w[7],w[65])
                              ],cout[7
ce
          (w[8],w[66])
                         ][0
    e8
                               ],cout[8
                                         ]);
ce
          (w[9],w[66])
                          ][1
    e9
                               ],cout[9
                                         1);
ce
          (w[10]
                               ][2 ],cout[10]);
    e10
                    ],w[66]
ce
                               ][3
          (w[11]
                    ],w[66]
    e11
                                    ],cout[11 ]);
ce
          (w[12
    e12
                    ],w[67]
                               ][0
                                   ],cout[12]);
ce
          (w[13
    e13
                    ],w[67
                               ][1
                                    ],cout[13 ]);
ce
          (w[14
                               ][2 ],cout[14 ]);
    e14
                    ],w[67
ce
          (w[15]
                               ][3 ],cout[15 ]);
    e15
                    ],w[67
ce
          (w[16
                               ][0 ],cout[16 ]);
    e16
                    ],w[68
ce
                    ],w[68
                               ][1
    e17
                                    ],cout[17]);
          (w[17]
ce
    e18
                    ],w[68
                                    ],cout[18 ]);
          (w[18]
                               ][2
ce
          (w[19
                               ][3
    e19
                    ],w[68
                                    ],cout[19]);
ce
          (w[20
                    ],w[69
                               ||0||
    e20
                                    ],cout[20 ]);
ce
          (w[21
                    ],w[69
                               ][1
    e21
                                    ],cout[21 ]);
ce
    e22
          (w[22
                    ],w[69
                               ][2
                                    ],cout[22]);
ce
          (w[23
                                    ],cout[23 ]);
    e23
                    ],w[69
                               ][3
ce
                                    ],cout[24 ]);
          (w[24]
    e24
                    ],w[70]
                               ||0||
ce
          (w[25
                                    ],cout[25 ]);
    e25
                    ],w[70]
                               ][1
ce
                               ][2
                                    ],cout[26]);
          (w[26]
    e26
                    ],w[70]
ce
          (w[27]
                               ][3
                                    ],cout[27]);
    e27
                    ],w[70]
ce
```

```
(w[28]
    e28
                     ],w[71]
                               ][0
                                     ],cout[28]);
ce
          (w[29]
    e29
                     ],w[71]
                               ||1|
                                     ],cout[29]);
ce
    e30
          (w[30]
                     ],w[71]
                               ][2
                                     ],cout[30]);
ce
    e31
          (w[31]
                     ],w[71]
                               ][3
                                     ],cout[31]);
ce
    e32
          (w[32]
                               ||0||
ce
                     ],w[72]
                                     ],cout[32]);
    e33
          (w[33]
                     ],w[72]
                               ][1
                                     ],cout[33 ]);
ce
    e34
                               ][2
          (w[34]
                     ],w[72]
                                     ],cout[34]);
ce
    e35
                                     ],cout[35 ]);
          (w[35]
                     ],w[72]
                               ][3
ce
          (w[36
                     ],w[73
                                     ],cout[36]);
    e36
                               ||0||
ce
          (w[37
                                     ],cout[37 ]);
                     ],w[73]
    e37
                               ][1
ce
          (w[38
                               ][2
                                    ],cout[38 ]);
                     ],w[73]
    e38
ce
          (w[39]
                     ],w[73]
                               ][3
                                    ],cout[39]);
    e39
ce
                     ],w[74
    e40
          (w[40]
                               ][0
                                    ],cout[40 ]);
ce
          (w[41]
    e41
                     ],w[74]
                               ][1
                                    ],cout[41 ]);
ce
                               ][2
                     ],w[74]
    e42
                                    ],cout[42 ]);
ce
          (w[42]
                               ][3
          (w[43]
    e43
                                    ],cout[43 ]);
ce
                     ],w[74]
          (w[44]
                                    ],cout[44 ]);
    e44
                               ][0
ce
                     ],w[75]
    e45
          (w[45]
                               ][1
                     ],w[75]
                                     ],cout[45 ]);
ce
          (w[46]
                     ],w[75]
                               ][2
    e46
                                    ],cout[46]);
ce
          (w[47]
                     ],w[75
                               ][3
                                    ],cout[47 ]);
    e47
ce
          (w[48]
                     ],w[76
                               ][0
    e48
                                     ],cout[48 ]);
ce
          (w[49]
                     ],w[76]
                               ][1
                                     ],cout[49 ]);
    e49
ce
    e50
          (w[50]
                     ],w[76]
                               ][2
                                     ],cout[50 ]);
ce
    e51
          (w[51]
                     ],w[76]
                               ][3
                                     ],cout[51]);
ce
                               ][0
ce
    e52
          (w[52]
                     ],w[77]
                                     ],cout[52]);
                               ][1
    e53
          (w[53]
                     ],w[77]
                                    ],cout[53]);
ce
          (w[54]
    e54
                     ],w[77]
                               ][2
                                    ],cout[54]);
ce
                               ][3
                                    ],cout[55 ]);
    e55
          (w[55]
                     ],w[77]
ce
                                    ],cout[56 ]);
    e56
          (w[56]
                     ],w[78]
                               ||0||
ce
          (w[57]
                               ][1
    e57
                     ],w[78]
                                    ],cout[57]);
ce
                                    ],cout[58 ]);
          (w[58]
    e58
                               ][2
ce
                     ],w[78]
    e59
                               ][3
          (w[59]
                                    ],cout[59]);
                     ],w[78]
ce
```

```
ce e60 (w[60 ],w[79 ][0 ],cout[60 ]);
ce e61 (w[61 ],w[79 ][1 ],cout[61 ]);
ce e62 (w[62 ],w[79 ][2 ],cout[62 ]);
ce e63 (w[63 ],w[79 ][3 ],cout[63 ]);
```

## //or stage2

	assign o1[	0 = w[64]	][0] w[	64	][1] w[
64	][2] w[ 64	][3];			
	assign o1[	1 = w[65]	][0] w[	65	][1] w[
65	][2] w[ 65	][3];			
	assign o1[	2 = w[66]	][0] w[	66	][1] w[
66	][2] w[ 66	][3];			
	assign o1[	3 = w[67]	][0] w[	67	][1] w[
67	][2] w[ 67	][3];			
	assign o1[	4 = w[68]	][0] w[	68	][1] w[
68	][2] w[ 68	][3];			
	assign o1[	5 ]=w[69	0  w	69	[1] w[
69	][2] w[ 69	][3];			
	assign o1[	6 ]=w[70	0 w	70	[1] w[
70	][2] w[ 70	][3];	32 31 2		32 31 2
	assign o1[	7 = w[71]	0  w	71	1 w
71	][2] w[ 71	][3];	32 31 2		3. 3
	assign o1[	8 ]=w[72	0	72	1 w
72	][2] w[ 72	][3];	JL JI L		JL J1 L
	assign o1[	9 ]=w[73	0  w	73	1 w
73	][2] w[ 73	][3];	JL JI L		JL J1 L
		$10^{\circ}$ ]=w[74	][0] w[	74	][1] w[
74	][2] w[ 74		Jr.Ji.,r	-	JL JI
, -		11 ]=w[75	1[0] w[	75	][1] w[
75	][2] w[ 75		][_] [	, 0	JL*J  ** L
15	][ <del>-</del> ] ''	٦٢-٦٠			

```
12 = w[76]
                                     ||0||w|
                                               76
                                                   ||1||w||
        assign o1
    76
        ||2||w||
                 76
                       [3];
                       13 = w[77]
                                                   |[1]|w[
                                     ||0||w|
                                               77
        assign o1
    77
        ||2||w||
                 77
                       ][3];
                    assign o1[
                                     ||0||w|
                                               78
                                                   ||1||w||
        ][2]|w[ 78
                      ][3];
    78
        assign o1[ 15 ]=w[ 79 ][0]|w[ 79 ][1]|w[ 79
][2]|w[ 79 ][3];
        //stage3
        priority4bit
                      c(o1[3:0],w[80],13[0]);
        priority4bit
                      c1(o1[7:4],w[81],13[1]);
        priority4bit
                      c2(o1[11:8],w[82],l3[2]);
                       c3(o1[15:12],w[83],13[3]);
        priority4bit
        //ce
            f (cout[0],w[80][0],cout[64]);
        ce
                           ],w[80]
            f1
                  (cout[1
                                     ][0 ],cout[65]);
         ce
                           ],w[80
            f2
                  (cout[2
                                     ][0 ],cout[66 ]);
         ce
                           ],w[80
                                     ][0 ],cout[67]);
            f3
                  (cout[3
         ce
                           ],w[80
                                     ][1 ],cout[68 ]);
            f4
                  (cout[4
         ce
                                     [1 ],cout[69]);
            f5
                  (cout[5
                           ],w[80]
        ce
                           ],w[80]
                                     ][1],cout[70
            f6
                  (cout[6
        ce
                                                   ]);
            f7
                  (cout[7
                           ],w[80
                                     ][1 ],cout[71 ]);
        ce
                  (cout[8
                           ],w[80
                                     ][2 ],cout[72 ]);
        ce
            f8
                  (cout[9
                           ],w[80]
                                     ][2
            f9
                                        ],cout[73 ]);
        ce
            f10(cout[10],w[80
                                     ],cout[74 ]);
                                ][2
         ce
            f11(cout[11],w[80
                                ][2
                                     ],cout[75 ]);
        ce
            f12(cout[12],w[80
                                ][3 ],cout[76 ]);
        ce
            f13(cout[13],w[80
                                ][3 ],cout[77 ]);
        ce
                                ][3 ],cout[78]);
            f14(cout[14],w[80
        ce
            f15(cout[15],w[80
                                ][3 ],cout[79 ]);
        ce
            f16(cout[16],w[81
                                ||0||
                                    ],cout[80 ]);
         ce
```

```
f17(cout[17],w[81
                         ||0||
                              ],cout[81]);
ce
    f18(cout[18],w[81
                         \prod_{i=1}^{n} 0
                              ],cout[82]);
ce
    f19(cout[19],w[81
                         ||0||
                              ],cout[83]);
ce
                         ][1
    f20(cout[20],w[81
                              ],cout[84]);
ce
    f21(cout[21],w[81
                         ][1
                              ],cout[85]);
ce
                         ][1
    f22(cout[22],w[81
                              ],cout[86]);
ce
                         ][1
                              ],cout[87]);
    f23(cout[23],w[81
ce
    f24(cout[24],w[81
                         ][2
                              ],cout[88]);
ce
                         ][2
    f25(cout[25],w[81
                             ],cout[89]);
ce
    f26(cout[26],w[81
                         ][2
                             ],cout[90 ]);
ce
                         ][2 ],cout[91 ]);
    f27(cout[27],w[81
ce
    f28(cout[28],w[81
                         ][3
                             ],cout[92 ]);
ce
    f29(cout[29],w[81
                         ][3
                              ],cout[93 ]);
ce
    f30(cout[30],w[81
                         ][3
                              ],cout[94]);
ce
                              ],cout[95 ]);
    f31(cout[31],w[81
                         ][3
ce
                              ],cout[96 ]);
    f32(cout[32],w[82
                         ][0
ce
    f33(cout[33],w[82]
                         ][0
                              ],cout[97 ]);
ce
    f34(cout[34],w[82]
                         ][0
                              ],cout[98 ]);
ce
    f35(cout[35],w[82
                         ][0
                              ],cout[99 ]);
ce
    f36(cout[36],w[82
                         ][1
                              ],cout[100
ce
                                             ]);
    f37(cout[37],w[82
                         ][1
                              ],cout[101
                                             ]);
ce
    f38(cout[38],w[82
                         ][1
                              ],cout[102
                                             ]);
ce
    f39(cout[39],w[82
                         ][1
                              ],cout[103
                                              ]);
ce
    f40(cout[40],w[82]
                         ][2
                             ],cout[104
                                             ]);
ce
                         ][2
                                              ]);
    f41(cout[41],w[82]
                             ],cout[105
ce
    f42(cout[42],w[82
                         ][2 ],cout[106
                                             ]);
ce
    f43(cout[43],w[82
                         ][2
                                             ]);
                             ],cout[107
ce
                         ][3
    f44(cout[44],w[82]
                              ],cout[108
                                             ]);
ce
    f45(cout[45],w[82]
                         ][3
                              ],cout[109
                                             ]);
ce
                         ][3
    f46(cout[46],w[82]
                              ],cout[110
                                             ]);
ce
                         ][3
    f47(cout[47],w[82]
                                             ]);
ce
                              ],cout[111
    f48(cout[48],w[83
                         ||0||
                                             ]);
                              ],cout[112
ce
```

```
f49(cout[49],w[83
                              ||0||
     ce
                                   ],cout[113
                                                   ]);
         f50(cout[50],w[83
                              ||0||
                                   ],cout[114
                                                   ]);
     ce
                              ][0
                                   ],cout[115
         f51(cout[51],w[83]
                                                   ]);
     ce
                              ][1
                                   ],cout[116
         f52(cout[52],w[83]
                                                   ]);
     ce
         f53(cout[53],w[83
                              ][1
                                                   ]);
                                   ],cout[117
     ce
         f54(cout[54],w[83
                              ][1
                                                   ]);
                                   ],cout[118
     ce
         f55(cout[55],w[83
                              ][1
                                                   ]);
                                   ],cout[119
     ce
         f56(cout[56],w[83]
                              ][2
                                   ],cout[120
                                                   ]);
     ce
         f57(cout[57],w[83
                              ][2
                                                   ]);
                                   ],cout[121
     ce
         f58(cout[58],w[83
                              ][2
                                   ],cout[122
                                                   ]);
     ce
                              ][2 ],cout[123
         f59(cout[59],w[83
                                                   ]);
     ce
         f60(cout[60],w[83
                              ][3
                                   ],cout[124
                                                   ]);
     ce
         f61(cout[61],w[83
                              ][3
                                   ],cout[125
                                                   ]);
     ce
         f62(cout[62],w[83
                              ][3
                                                   ]);
                                   ],cout[126
     ce
         f63(cout[63],w[83
                              ][3
                                   ],cout[127
                                                   ]);
     ce
    //or stage3
     assign o2[
                                              80
                         =w[80]
                                   ||0||w||
                                                   ||1||w||
                    0
80
     ][2]|w[
               80
                    ][3];
                                   ][0]|w[
     assign o2[
                         ]=w[81]
                                                   ][1]|w[
                                              81
                    1
                    ][3];
81
     ][2]|w[
               81
                         ]=w[82]
                                   ][0]|w[
                                              82
                                                   ][1]|w[
     assign o2[
                    2
82
     ][2]|w[
                    ][3];
               82
                    3 = w[83]
                                   ][0]|w[
                                              83
     assign o2[
                                                   ][1]|w[
83
     ][2]|w[
               83
                    ][3];
    //stage 4
     priority4bit
                   d(o2[3:0],w[84],l4);
    //
               (cout[64], w[84]
                                   ||0||
                                                   ]);
                                        ],fin[0
         g
     ce
```

```
],fin[1
           (cout 65
                      ],w[84]
                                  \prod_{i=1}^{n} 0_{i}
                                                   ]);
    g1
ce
           (cout[66
                      ],w[84]
                                  ||0||
                                       ],fin[2
                                                   ]);
    g2
ce
                                  ||0
    g3
           (cout 67
                      ],w[84]
                                       ],fin[3
                                                   ]);
ce
                                  ||0||
           (cout [68]
                      ],w[84]
                                       ],fin[4
                                                   ]);
    g4
ce
                                       ],fin[5
                      ],w[84]
                                  ||0||
    g5
           (cout [69]
                                                   ]);
ce
                                  ||0||
                                       ],fin[6
                                                   ]);
                      ],w[84]
    g6
           (cout[70]
ce
                                  ||0||
                                                   ]);
                      ],w[84]
    g7
           (cout[71]
                                       ],fin[7
ce
           (cout[72
    g8
                      ],w[84]
                                  ][0
                                                   ]);
                                       ],fin[8
ce
                      ],w[84]
                                                   ]);
    g9
           (cout[73]
                                  ][0
                                       ],fin[9
ce
    g10(cout[74
                      ],w[84]
                                                   ]);
                                  ][0
                                       ],fin[10
ce
                      ],w[84]
                                                   ]);
    g11(cout[75]
                                  ][0
                                       ],fin[11
ce
                      ],w[84]
    g12(cout[76
                                  ][0
                                       ],fin[12
                                                   ]);
ce
    g13(cout[77
                      ],w[84]
                                  ][0
                                       ],fin[13
                                                   ]);
ce
                                  ][0
                      ],w[84]
    g14(cout[78]
                                       ],fin[14
                                                   ]);
ce
                                  ][0
    g15(cout[79]
                                       ],fin[15
                                                   ]);
                      ],w[84]
ce
    g16(cout[80
                                  ][1
                                       ],fin[16
                                                   ]);
                      ],w[84]
ce
                                  ][1
                                       ],fin[17
                                                   ]);
    g17(cout[81
                      ],w[84]
ce
                      ],w[84
                                  ][1
                                       ],fin[18
                                                   ]);
    g18(cout[82]
ce
                                  ][1
    g19(cout[83
                      ],w[84
                                       ],fin[19
                                                   ]);
ce
                      ],w[84]
                                  ][1
                                       ],fin[20
    g20(cout[84
                                                   ]);
ce
    g21(cout[85
                      ],w[84
                                  ][1
                                       ],fin[21
                                                   ]);
ce
    g22(cout[86
                      ],w[84]
                                  ][1
                                       ],fin[22
                                                   ]);
ce
    g23(cout[87
                      ],w[84]
                                  ][1
                                       ],fin[23
                                                   ]);
ce
    g24(cout[88
                      ],w[84]
                                  ][1
                                       ],fin[24
                                                   ]);
ce
                                  ][1
                                                   ]);
ce
    g25(cout[89]
                      ],w[84]
                                       ],fin[25
                                                   ]);
                      ],w[84]
                                       ],fin[26
ce
    g26(cout[90]
                                  ][1
                                  ][1
                                       ],fin[27
                                                   ]);
                      ],w[84]
ce
    g27(cout[91
                                  ][1
                                       ],fin[28
                      ],w[84]
                                                   ]);
    g28(cout[92]
ce
                                       ],fin[29
                                  ][1
                                                   ]);
    g29(cout[93
                      ],w[84]
ce
                                  ][1
    g30(cout[94]
                      ],w[84]
                                       ],fin[30
                                                   ]);
ce
                                  ][1
                                                   ]);
    g31(cout[95]
                      ],w[84]
                                       ],fin[31
ce
                                  ][2
                                                   ]);
    g32(cout[96]
                      ],w[84]
                                       ],fin[32
ce
```

```
g33(cout[97]
                     ],w[84]
                                1[2
                                      ],fin[33
                                                 ]);
ce
                     ],w[84]
                                      ],fin[34
    g34(cout[98]
                                ][2
                                                 ]);
ce
    g35(cout[99
                     ],w[84
                                ][2
                                      ],fin[35
                                                 ]);
ce
    g36(cout[100
                     ],w[84]
                                ][2
                                      ],fin[36
                                                 ]);
ce
                                ][2
                                      ],fin[37
                                                 ]);
    g37(cout[101
                     ],w[84]
ce
                                ][2
                                      ],fin[38
                                                 ]);
    g38(cout[102
                     ],w[84]
ce
    g39(cout[103
                     ],w[84]
                                ][2
                                      ],fin[39
                                                 ]);
ce
    g40(cout[104
                     ],w[84]
                                ][2
                                                 ]);
                                      ],fin[40
ce
                     ],w[84]
                                ][2
                                                 ]);
    g41(cout[105]
                                      ],fin[41
ce
                     ],w[84]
                                ][2
                                      ],fin[42
                                                 ]);
    g42(cout[106
ce
                     ],w[84
                                ][2
                                      ],fin[43
                                                 ]);
    g43(cout[107
ce
                     ],w[84]
                                ][2
                                      ],fin[44
    g44(cout[108
                                                 ]);
ce
                                      ],fin[45
    g45(cout[109
                     ],w[84]
                                ][2
                                                 ]);
ce
                                ][2
                     ],w[84]
    g46(cout[110
                                      ],fin[46
                                                 ]);
ce
                     ],w[84]
                                ][2
                                      ],fin[47
    g47(cout[111
                                                 ]);
ce
    g48(cout[112
                     ],w[84]
                                ][3
                                      ],fin[48
                                                 ]);
ce
                     ],w[84]
                                ][3
                                      ],fin[49
                                                 ]);
    g49(cout[113
ce
                     ],w[84]
                                ][3
                                      ],fin[50
                                                 ]);
    g50(cout[114
ce
                     ],w[84
                                ][3
    g51(cout[115
                                      ],fin[51
                                                 ]);
ce
                     ],w[84
                                ][3
    g52(cout[116
                                      ],fin[52
                                                 ]);
ce
    g53(cout[117
                     ],w[84]
                                ][3
                                      ],fin[53
                                                 ]);
ce
    g54(cout[118
                     ],w[84]
                                ][3
                                      ],fin[54
                                                 ]);
ce
    g55(cout[119]
                     ],w[84]
                                ][3
                                      ],fin[55
                                                 ]);
ce
                                      ],fin[56
    g56(cout[120]
                     ],w[84]
                                ][3
                                                 ]);
ce
                                ][3
                                                 ]);
ce
    g57(cout[121]
                     ],w[84]
                                      ],fin[57
                                ][3
                                                 ]);
    g58(cout[122
                     ],w[84]
                                      ],fin[58
ce
                                ][3
                                      ],fin[59
                                                 ]);
    g59(cout[123]
                     ],w[84]
ce
                                ][3
                     ],w[84]
                                                 ]);
    g60(cout[124]
                                      ],fin[60
ce
    g61(cout[125]
                     ],w[84]
                                                 ]);
                                ][3
                                      ],fin[61
ce
    g62(cout[126]
                     ],w[84]
                                ][3
                                      ],fin[62
                                                 ]);
ce
                                ][3
    g63(cout[127]
                     ],w[84]
                                                 ]);
                                      ],fin[63
ce
```

```
assign outfi[0 ]=fin[0
                          ][0]
                                ];
assign outfi[1 ]=fin[0
                          \prod 1
                                ];
assign outfi[2]=fin[0]
                          ][2
                                ];
assign outfi[3 ]=fin[0
                          ][3
                                ];
assign outfi[4 ]=fin[1
                          ||0|
assign outfi[5]=fin[1]
                          ][1
                                ];
                                ];
assign outfi[6]=fin[1
                          ][2
assign outfi[7]=fin[1
                                ];
                          ][3
                                ];
assign outfi[8 ]=fin[2
                          ][0
                                ];
assign outfi[9 ]=fin[2
                          ][1
                          ][2
                               ];
assign outfi[10]=fin[2
                               ];
assign outfi[11]=fin[2
                          ][3
                          ][0
                               ];
assign outfi[12]=fin[3
                          ][1
                                ];
assign outfi[13]=fin[3
                          ][2
                                ];
assign outfi[14]=fin[3
                                ];
assign outfi[15]=fin[3
                          ][3
assign outfi[16]=fin[4
                          ][0
                                ];
                                ];
assign outfi[17]=fin[4
                          ][1
                                ];
                          ][2
assign outfi[18]=fin[4
                          ][3
                                ];
assign outfi[19]=fin[4
assign outfi[20]=fin[5
                          ][0
                                ];
assign outfi[21]=fin[5
                          ][1
                                ];
                                ];
assign outfi[22]=fin[5
                          ][2
                                ];
assign outfi[23]=fin[5
                          ][3
                                ];
assign outfi[24]=fin[6
                          ][0
                          ][1
                                ];
assign outfi[25]=fin[6
                          ][2
                               ];
assign outfi[26]=fin[6
                          ][3
                               ];
assign outfi[27]=fin[6
assign outfi[28]=fin[7
                          ][0
                               ];
                          ][1
                                ];
assign outfi[29]=fin[7
                          ||2|
                                ];
assign outfi[30]=fin[7
```

```
assign outfi[31]=fin[7
                          ][3
                               ];
assign outfi[32]=fin[8
                          ||0||
                               ];
assign outfi[33]=fin[8
                          \prod 1
                          ][2
                               ];
assign outfi[34]=fin[8
                               ];
                          ][3
assign outfi[35]=fin[8
                               ];
assign outfi[36]=fin[9
                          ||0
assign outfi[37]=fin[9
                          ||1|
                               ];
                               ];
assign outfi[38]=fin[9
                          ][2
                               ];
assign outfi[39]=fin[9
                          ][3
                               ];
assign outfi[40]=fin[10
                         ][0
                         ][1
                               ];
assign outfi[41]=fin[10
assign outfi[42]=fin[10
                         ][2
                               ];
assign outfi[43]=fin[10]
                         ][3
                               ];
                               ];
assign outfi[44]=fin[11
                         ][0
                         ][1
                               ];
assign outfi[45]=fin[11
                         ][2
                               ];
assign outfi[46]=fin[11
assign outfi[47]=fin[11
                         ][3
                               ];
assign outfi[48]=fin[12
                          ][0
                               ];
                               ];
assign outfi[49]=fin[12
                          ][1
                               ];
assign outfi[50]=fin[12
                          ][2
                               ];
assign outfi[51]=fin[12
                          ][3
assign outfi[52]=fin[13
                          ][0
                               ];
assign outfi[53]=fin[13
                          ][1
                               ];
                               ];
assign outfi[54]=fin[13
                         ][2
                               ];
assign outfi[55]=fin[13
                         ][3
                               ];
assign outfi[56]=fin[14
                         ][0
                               ];
assign outfi[57]=fin[14
                         ][1
                         ][2
                               ];
assign outfi[58]=fin[14
                         ][3
                               ];
assign outfi[59]=fin[14
                               ];
assign outfi[60]=fin[15
                         ][0]
assign outfi[61]=fin[15][1
                               ];
                               ];
assign outfi[62]=fin[15
                         1[2
```

```
assign outfi[63]=fin[15
                         ][3
assign outfi[64]=fin[16
                         ][0
                              ];
assign outfi[65]=fin[16
                         ][1
assign outfi[66]=fin[16
                        ][2
                               ];
assign outfi[67]=fin[16
                        ][3
assign outfi[68]=fin[17
                         1[0
assign outfi[69]=fin[17
                              ];
                         ][1
                              ];
assign outfi[70]=fin[17
                         ][2
                              ];
assign outfi[71]=fin[17
                         ][3
                              ];
assign outfi[72]=fin[18
                         ][0
                         ][1
                              ];
assign outfi[73]=fin[18
                        ][2
                              ];
assign outfi[74]=fin[18
assign outfi[75]=fin[18
                        ][3
                              ];
                              ];
assign outfi[76]=fin[19][0
assign outfi[77]=fin[19 ][1
                              ];
                              ];
assign outfi[78]=fin[19][2
assign outfi[79]=fin[19 ][3
                              ];
assign outfi[80]=fin[20
                        ][0
                              ];
                              ];
assign outfi[81]=fin[20
                        ][1
assign outfi[82]=fin[20
                        ][2
                               ];
assign outfi[83]=fin[20
                        ][3
                        ][0
                              ];
assign outfi[84]=fin[21
assign outfi[85]=fin[21
                        ][1
                              ];
assign outfi[86]=fin[21
                        ][2
                              ];
assign outfi[87]=fin[21
                        ][3
                              ];
assign outfi[88]=fin[22
                        ][0
assign outfi[89]=fin[22
                              ];
                         ][1
                        ][2
                              ];
assign outfi[90]=fin[22]
assign outfi[91]=fin[22
                        ][3
                              ];
                              ];
assign outfi[92]=fin[23][0
                              ];
assign outfi[93]=fin[23 ][1
assign outfi[94]=fin[23 ][2
```

```
assign outfi[95]=fin[23
                          ][3
assign outfi[96]=fin[24]
                          ][0]
                               ];
assign outfi[97]=fin[24]
                          ][1
assign outfi[98]=fin[24
                                ];
                          1[2
                                ];
assign outfi[99]=fin[24
                          1[3
assign outfi[100
                               ||0
                     ]=fin[25
assign outfi[101
                                     ];
                     ]=fin[25
                               \prod 1
assign outfi[102
                     ]=fin[25
                                     ];
                               ][2
assign outfi[103
                     ]=fin[25
                               ][3
                     ]=fin[26
assign outfi[104
                               ][0
                     ]=fin[26
assign outfi[105
                               ][1
                                     ];
assign outfi[106
                     ]=fin[26
                               ][2
assign outfi[107
                     ]=fin[26 ][3
                                     ];
                     ]=fin[27
                                     ];
assign outfi[108
                               ][0
                                     ];
assign outfi[109
                               ][1
                     ]=fin[27
                     ]=fin[27
                                     ];
assign outfi[110
                               ][2
assign outfi[111
                     ]=fin[27
                               ][3
                                     ];
assign outfi[112
                     ]=fin[28
                                     ];
                               ][0
                     ]=fin[28
assign outfi[113
                               ][1
                                     ];
                     ]=fin[28
                                     ];
assign outfi[114
                               ][2
assign outfi[115
                     ]=fin[28
                                     ];
                               ][3
assign outfi[116
                     ]=fin[29
                                     ];
                               ][0
assign outfi[117
                     ]=fin[29
                               ][1
                                     ];
assign outfi[118
                     ]=fin[29
                               ||2|
assign outfi[119
                     = \sin[29][3]
                     ]=fin[30]
assign outfi[120]
                               ||0||
assign outfi[121
                     ]=fin[30]
                               ][1
                                     ];
                     ]=fin[30 ][2
                                     ];
assign outfi[122
assign outfi[123
                                     ];
                     =fin[30
                               ][3
                                     ];
assign outfi[124]
                     =fin[31
                               ][0
assign outfi[125
                               ][1
                                     ];
                     =fin[31
assign outfi[126
                               ][2
                     =fin[31
                                     ];
```

```
assign outfi[127
                     =fin[31
                                ][3
                                     ];
                     ]=fin[32
assign outfi[128]
                                ][0]
                                     ];
assign outfi[129]
                     =fin[32]
                                \prod 1
                                     ];
assign outfi[130
                     ]=fin[32
                                1[2
assign outfi[131
                     ]=fin[32
                                ][3
assign outfi[132
                     ]=fin[33
                                      ];
                                ][0
assign outfi[133
                     ]=fin[33
                                      ];
                                \prod 1
assign outfi[134
                     ]=fin[33
                                      ];
                                ][2
assign outfi[135
                     ]=fin[33
                                      ];
                               ][3
                     ]=fin[34
                                     ];
assign outfi[136
                               ][0
                     ]=fin[34
                                     ];
assign outfi[137
                               ][1
                     ]=fin[34
                                     ];
assign outfi[138
                               ||2|
                     ]=fin[34
assign outfi[139
                                ][3
                                     ];
                                     ];
assign outfi[140
                     ]=fin[35
                                ][0
                                     ];
assign outfi[141
                     ]=fin[35
                                ][1
                                     ];
assign outfi[142
                     ]=fin[35
                                ][2
assign outfi[143
                     ]=fin[35
                                ][3
                                     ];
assign outfi[144
                     ]=fin[36
                                     ];
                                ][0
assign outfi[145
                     ]=fin[36
                                ][1
                                     ];
                     ]=fin[36
assign outfi[146
                                ][2
                                     ];
assign outfi[147
                     ]=fin[36
                                      ];
                                ][3
assign outfi[148
                     ]=fin[37
                                      ];
                                ][0
assign outfi[149
                     ]=fin[37
                                ][1
                                      ];
assign outfi[150
                     ]=fin[37
                                ][2
assign outfi[151
                     ]=fin[37
                                      ];
                                ][3
assign outfi[152
                     ]=fin[38
                                     ];
                               ][0
assign outfi[153
                     ]=fin[38
                               ][1
                                     ];
assign outfi[154
                     ]=fin[38
                                     ];
                               ][2
assign outfi[155
                     ]=fin[38
                                     ];
                               ][3
assign outfi[156
                                     ];
                     ]=fin[39
                                ][0
assign outfi[157
                                ][1
                     ]=fin[39
                                     ];
assign outfi[158
                               ][2
                                     ];
                     ]=fin[39
```

```
assign outfi[159]
                     ]=fin[39
                                ][3
                                     ];
                     ]=fin[40
assign outfi[160]
                                ][0]
                                      ];
                     ]=fin[40
assign outfi[161
                                \prod 1
                                      ];
assign outfi[162
                     =fin[40
                                ][2
                                      ];
assign outfi[163
                     =fin[40
                                      ];
                                ][3
assign outfi[164
                     ]=fin[41
                                      ];
                                ][0
assign outfi[165
                     =fin[41]
                                      ];
                                \prod 1
assign outfi[166
                     =fin[41]
                                      ];
                                ][2
assign outfi[167
                     =fin[41
                                      ];
                                ][3
                     ]=fin[42
                                      ];
assign outfi[168
                               ][0
                     ]=fin[42
                                     ];
assign outfi[169
                               ][1
                               ][2
                                     ];
assign outfi[170
                     ]=fin[42
assign outfi[171
                     ]=fin[42
                               ][3
                                     ];
                                     ];
assign outfi[172
                     ]=fin[43
                                ][0
                                     ];
assign outfi[173
                     ]=fin[43
                                ][1
                                     ];
assign outfi[174
                     ]=fin[43
                                ][2
assign outfi[175
                     ]=fin[43
                                ][3
                                     ];
                     ]=fin[44
assign outfi[176
                                ][0
                                      ];
                     ]=fin[44
assign outfi[177
                                ][1
                                      ];
assign outfi[178
                     ]=fin[44
                                      ];
                                ][2
assign outfi[179
                     ]=fin[44
                                      ];
                                ][3
assign outfi[180
                     ]=fin[45
                                      ];
                                ][0
assign outfi[181
                     ]=fin[45
                                ][1
                                      ];
assign outfi[182
                     ]=fin[45
                                ][2
                                      ];
assign outfi[183
                     ]=fin[45
                                      ];
                                ][3
assign outfi[184
                                      ];
                     ]=fin[46
                                ][0
assign outfi[185
                                ][1
                                     ];
                     ]=fin[46
                     ]=fin[46
                                     ];
                                ][2
assign outfi[186
assign outfi[187
                     ]=fin[46
                                     ];
                                ][3
assign outfi[188
                                     ];
                     ]=fin[47
                                ][0
assign outfi[189
                                ][1
                     ]=fin[47
                                     ];
assign outfi[190
                                ][2
                                     ];
                     ]=fin[47
```

```
][3
assign outfi[191
                     =fin[47]
                                     ];
assign outfi[192
                     ]=fin[48
                                ][0]
                                      ];
                     ]=fin[48
assign outfi[193
                                \prod 1
                                      ];
assign outfi[194
                     ]=fin[48
                                1[2
assign outfi[195
                     ]=fin[48
                                      ];
                                ][3
assign outfi[196
                                ||0
                                      ];
                     ]=fin[49
assign outfi[197
                     ]=fin[49
                                      ];
                                \prod 1
assign outfi[198
                     ]=fin[49
                                      ];
                                ][2
assign outfi[199
                     ]=fin[49
                                      ];
                               ][3
assign outfi[200
                     ]=fin[50
                                      ];
                               ][0
                     ]=fin[50
                                     ];
assign outfi[201
                               ][1
                                     ];
assign outfi[202
                     ]=fin[50]
                               ||2|
                     ]=fin[50
assign outfi[203
                                ][3
                                     ];
assign outfi[204
                                     ];
                     ]=fin[51
                                ][0
assign outfi[205
                                     ];
                     ]=fin[51
                                ][1
assign outfi[206
                                     ];
                     ]=fin[51
                                ][2
assign outfi[207
                     ]=fin[51
                                ][3
                                     ];
assign outfi[208
                     ]=fin[52
                                     ];
                                ][0
assign outfi[209
                     ]=fin[52
                                ][1
                                      ];
assign outfi[210
                     ]=fin[52
                                      ];
                                ][2
assign outfi[211
                     ]=fin[52
                                      ];
                                ][3
assign outfi[212
                     ]=fin[53
                                      ];
                                ][0
assign outfi[213
                     ]=fin[53
                                ][1
                                      ];
assign outfi[214
                     ]=fin[53]
                                ][2
                                      ];
assign outfi[215
                     ]=fin[53
                                      ];
                                ][3
assign outfi[216
                     ]=fin[54
                                ][0
assign outfi[217
                     ]=fin[54
                                ][1
                                     ];
assign outfi[218
                     ]=fin[54
                                     ];
                                ][2
assign outfi[219
                     ]=fin[54
                                     ];
                                ][3
assign outfi[220
                     ]=fin[55
                                     ];
                               ][0
assign outfi[221
                                ][1
                     ]=fin[55
                                     ];
assign outfi[222
                                ][2
                                     ];
                     ]=fin[55
```

```
assign outfi[223]
                     ]=fin[55
                                ][3
                                     ];
                     ]=fin[56
assign outfi[224]
                                ][0]
                                     ];
assign outfi[225]
                     ]=fin[56
                                \prod 1
                                     ];
                     ]=fin[56
assign outfi[226]
                                1[2
assign outfi[227
                     ]=fin[56
                                ][3
assign outfi[228
                     ]=fin[57
                                     ];
                                ||0||
assign outfi[229
                     ]=fin[57
                                     ];
                                \prod 1
assign outfi[230
                     ]=fin[57
                                     ];
                                ][2
assign outfi[231
                     ]=fin[57
                                     ];
                                ][3
assign outfi[232
                     ]=fin[58
                                     ];
                               ][0
                                     ];
assign outfi[233
                     ]=fin[58
                               ][1
                                     ];
assign outfi[234
                     ]=fin[58
                               ][2
assign outfi[235
                     ]=fin[58
                               ][3
                                     ];
                     ]=fin[59
                                     ];
assign outfi[236
                                ][0
                     ]=fin[59
assign outfi[237
                                     ];
                                ][1
                                     ];
assign outfi[238
                     ]=fin[59
                                ][2
assign outfi[239
                     ]=fin[59
                                ][3
                                     ];
assign outfi[240
                     ]=fin[60
                                ][0
                                     ];
assign outfi[241
                     ]=fin[60
                                ][1
                                     ];
assign outfi[242
                     ]=fin[60
                                     ];
                                ][2
assign outfi[243
                     ]=fin[60
                                     ];
                                ][3
assign outfi[244
                     ]=fin[61
                                     ];
                                ][0
assign outfi[245
                     ]=fin[61
                                ][1
                                     ];
assign outfi[246
                     ]=fin[61
                                ][2
                                     ];
                     ]=fin[61
                                     ];
assign outfi[247
                                ][3
                     ]=fin[62
assign outfi[248
                               ][0
assign outfi[249
                     ]=fin[62
                               ][1
                                     ];
assign outfi[250
                     ]=fin[62
                                     ];
                               ][2
assign outfi[251
                     ]=fin[62
                                     ];
                               ][3
                               ][0
assign outfi[252
                                     ];
                     ]=fin[63
assign outfi[253
                                ][1
                     ]=fin[63
                                     ];
assign outfi[254
                                ][2
                                     ];
                     ]=fin[63
```

#### endmodule

```
Tcam.v:
module tcam(W,N);
input [143:0]W;
output [255:0]N;
```

```
wire [255:0]d1[3:0];
assign d1[0][255:0] = 256'd120;
assign d1[1][255:0] = 256'd121;
assign d1[2][255:0] = 256'd122;
assign d1[3][255:0] = 256'd123;
wire [255:0]d2[3:0];
assign d2[0][255:0] = 256'd120;
assign d2[1][255:0] = 256'd121;
assign d2[2][255:0] = 256'd122;
assign d2[3][255:0] = 256'd123;
wire [255:0]d3[3:0];
assign d3[0][255:0] = 256'd120;
assign d3[1][255:0] = 256'd121;
assign d3[2][255:0] = 256'd122;
assign d3[3][255:0] = 256'd123;
wire [255:0]d4[3:0];
assign d4[0][255:0] = 256'd120;
assign d4[1][255:0] = 256'd121;
assign d4[2][255:0] = 256'd122;
assign d4[3][255:0] = 256'd123;
wire [255:0]d5[3:0];
assign d5[0][255:0] = 256'd120;
```

```
assign d5[1][255:0] = 256'd121;
assign d5[2][255:0] = 256'd122;
assign d5[3][255:0] = 256'd123;
wire [255:0]d6[3:0];
assign d6[0][255:0] = 256'd120;
assign d6[1][255:0] = 256'd121;
assign d6[2][255:0] = 256'd122;
assign d6[3][255:0] = 256'd123;
wire [255:0]d7[3:0];
assign d7[0][255:0] = 256'd120;
assign d7[1][255:0] = 256'd121;
assign d7[2][255:0] = 256'd122;
assign d7[3][255:0] = 256'd123;
wire [255:0]d8[3:0];
assign d8[0][255:0] = 256'd120;
assign d8[1][255:0] = 256'd121;
assign d8[2][255:0] = 256'd122;
assign d8[3][255:0] = 256'd123;
wire [255:0]d9[3:0];
assign d9[0][255:0] = 256'd120;
assign d9[1][255:0] = 256'd121;
assign d9[2][255:0] = 256'd122;
assign d9[3][255:0] = 256'd123;
wire [255:0]d10[3:0];
assign d10[0][255:0] = 256'd120;
assign d10[1][255:0] = 256'd121;
assign d10[2][255:0] = 256'd122;
assign d10[3][255:0] = 256'd123;
wire [255:0]d11[3:0];
assign d11[0][255:0] = 256'd120;
assign d11[1][255:0] = 256'd121;
assign d11[2][255:0] = 256'd122;
```

```
assign d11[3][255:0] = 256'd123;
wire [255:0]d12[3:0];
assign d12[0][255:0] = 256'd120;
assign d12[1][255:0] = 256'd121;
assign d12[2][255:0] = 256'd122;
assign d12[3][255:0] = 256'd123;
wire [255:0]d13[3:0];
assign d13[0][255:0] = 256'd120;
assign d13[1][255:0] = 256'd121;
assign d13[2][255:0] = 256'd122;
assign d13[3][255:0] = 256'd123;
wire [255:0]d14[3:0];
assign d14[0][255:0] = 256'd120;
assign d14[1][255:0] = 256'd121;
assign d14[2][255:0] = 256'd122;
assign d14[3][255:0] = 256'd123;
wire [255:0]d15[3:0];
assign d15[0][255:0] = 256'd120;
assign d15[1][255:0] = 256'd121;
assign d15[2][255:0] = 256'd122;
assign d15[3][255:0] = 256'd123;
wire [255:0]d16[3:0];
assign d16[0][255:0] = 256'd120;
assign d16[1][255:0] = 256'd121;
assign d16[2][255:0] = 256'd122;
assign d16[3][255:0] = 256'd123;
wire [255:0]d17[3:0];
assign d17[0][255:0] = 256'd120;
assign d17[1][255:0] = 256'd121;
assign d17[2][255:0] = 256'd122;
assign d17[3][255:0] = 256'd123;
wire [255:0]d18[3:0];
```

```
assign d18[0][255:0] = 256'd120;
assign d18[1][255:0] = 256'd121;
assign d18[2][255:0] = 256'd122;
assign d18[3][255:0] = 256'd123;
wire [255:0]d19[3:0];
assign d19[0][255:0] = 256'd120;
assign d19[1][255:0] = 256'd121;
assign d19[2][255:0] = 256'd122;
assign d19[3][255:0] = 256'd123;
wire [255:0]d20[3:0];
assign d20[0][255:0] = 256'd120;
assign d20[1][255:0] = 256'd121;
assign d20[2][255:0] = 256'd122;
assign d20[3][255:0] = 256'd123;
wire [255:0]d21[3:0];
assign d21[0][255:0] = 256'd120;
assign d21[1][255:0] = 256'd121;
assign d21[2][255:0] = 256'd122;
assign d21[3][255:0] = 256'd123;
wire [255:0]d22[3:0];
assign d22[0][255:0] = 256'd120;
assign d22[1][255:0] = 256'd121;
assign d22[2][255:0] = 256'd122;
assign d22[3][255:0] = 256'd123;
wire [255:0]d23[3:0];
assign d23[0][255:0] = 256'd120;
assign d23[1][255:0] = 256'd121;
assign d23[2][255:0] = 256'd122;
assign d23[3][255:0] = 256'd123;
wire [255:0]d24[3:0];
assign d24[0][255:0] = 256'd120;
assign d24[1][255:0] = 256'd121;
```

```
assign d24[2][255:0] = 256'd122;
assign d24[3][255:0] = 256'd123;
wire [255:0]d25[3:0];
assign d25[0][255:0] = 256'd120;
assign d25[1][255:0] = 256'd121;
assign d25[2][255:0] = 256'd122;
assign d25[3][255:0] = 256'd123;
wire [255:0]d26[3:0];
assign d26[0][255:0] = 256'd120;
assign d26[1][255:0] = 256'd121;
assign d26[2][255:0] = 256'd122;
assign d26[3][255:0] = 256'd123;
wire [255:0]d27[3:0];
assign d27[0][255:0] = 256'd120;
assign d27[1][255:0] = 256'd121;
assign d27[2][255:0] = 256'd122;
assign d27[3][255:0] = 256'd123;
wire [255:0]d28[3:0];
assign d28[0][255:0] = 256'd120;
assign d28[1][255:0] = 256'd121;
assign d28[2][255:0] = 256'd122;
assign d28[3][255:0] = 256'd123;
wire [255:0]d29[3:0];
assign d29[0][255:0] = 256'd120;
assign d29[1][255:0] = 256'd121;
assign d29[2][255:0] = 256'd122;
assign d29[3][255:0] = 256'd123;
wire [255:0]d30[3:0];
assign d30[0][255:0] = 256'd120;
assign d30[1][255:0] = 256'd121;
assign d30[2][255:0] = 256'd122;
assign d30[3][255:0] = 256'd123;
```

```
wire [255:0]d31[3:0];
assign d31[0][255:0] = 256'd120;
assign d31[1][255:0] = 256'd121;
assign d31[2][255:0] = 256'd122;
assign d31[3][255:0] = 256'd123;
wire [255:0]d32[3:0];
assign d32[0][255:0] = 256'd120;
assign d32[1][255:0] = 256'd121;
assign d32[2][255:0] = 256'd122;
assign d32[3][255:0] = 256'd123;
wire [255:0]d33[3:0];
assign d33[0][255:0] = 256'd120;
assign d33[1][255:0] = 256'd121;
assign d33[2][255:0] = 256'd122;
assign d33[3][255:0] = 256'd123;
wire [255:0]d34[3:0];
assign d34[0][255:0] = 256'd120;
assign d34[1][255:0] = 256'd121;
assign d34[2][255:0] = 256'd122;
assign d34[3][255:0] = 256'd123;
wire [255:0]d35[3:0];
assign d35[0][255:0] = 256'd120;
assign d35[1][255:0] = 256'd121;
assign d35[2][255:0] = 256'd122;
assign d35[3][255:0] = 256'd123;
wire [255:0]d36[3:0];
assign d36[0][255:0] = 256'd120;
assign d36[1][255:0] = 256'd121;
assign d36[2][255:0] = 256'd122;
assign d36[3][255:0] = 256'd123;
wire [255:0]d37[3:0];
assign d37[0][255:0] = 256'd120;
```

```
assign d37[1][255:0] = 256'd121;
assign d37[2][255:0] = 256'd122;
assign d37[3][255:0] = 256'd123;
wire [255:0]d38[3:0];
assign d38[0][255:0] = 256'd120;
assign d38[1][255:0] = 256'd121;
assign d38[2][255:0] = 256'd122;
assign d38[3][255:0] = 256'd123;
wire [255:0]d39[3:0];
assign d39[0][255:0] = 256'd120;
assign d39[1][255:0] = 256'd121;
assign d39[2][255:0] = 256'd122;
assign d39[3][255:0] = 256'd123;
wire [255:0]d40[3:0];
assign d40[0][255:0] = 256'd120;
assign d40[1][255:0] = 256'd121;
assign d40[2][255:0] = 256'd122;
assign d40[3][255:0] = 256'd123;
wire [255:0]d41[3:0];
assign d41[0][255:0] = 256'd120;
assign d41[1][255:0] = 256'd121;
assign d41[2][255:0] = 256'd122;
assign d41[3][255:0] = 256'd123;
wire [255:0]d42[3:0];
assign d42[0][255:0] = 256'd120;
assign d42[1][255:0] = 256'd121;
assign d42[2][255:0] = 256'd122;
assign d42[3][255:0] = 256'd123;
wire [255:0]d43[3:0];
assign d43[0][255:0] = 256'd120;
assign d43[1][255:0] = 256'd121;
assign d43[2][255:0] = 256'd122;
```

```
assign d43[3][255:0] = 256'd123;
wire [255:0]d44[3:0];
assign d44[0][255:0] = 256'd120;
assign d44[1][255:0] = 256'd121;
assign d44[2][255:0] = 256'd122;
assign d44[3][255:0] = 256'd123;
wire [255:0]d45[3:0];
assign d45[0][255:0] = 256'd120;
assign d45[1][255:0] = 256'd121;
assign d45[2][255:0] = 256'd122;
assign d45[3][255:0] = 256'd123;
wire [255:0]d46[3:0];
assign d46[0][255:0] = 256'd120;
assign d46[1][255:0] = 256'd121;
assign d46[2][255:0] = 256'd122;
assign d46[3][255:0] = 256'd123;
wire [255:0]d47[3:0];
assign d47[0][255:0] = 256'd120;
assign d47[1][255:0] = 256'd121;
assign d47[2][255:0] = 256'd122;
assign d47[3][255:0] = 256'd123;
wire [255:0]d48[3:0];
assign d48[0][255:0] = 256'd120;
assign d48[1][255:0] = 256'd121;
assign d48[2][255:0] = 256'd122;
assign d48[3][255:0] = 256'd123;
wire [255:0]d49[3:0];
assign d49[0][255:0] = 256'd120;
assign d49[1][255:0] = 256'd121;
assign d49[2][255:0] = 256'd122;
assign d49[3][255:0] = 256'd123;
wire [255:0]d50[3:0];
```

```
assign d50[0][255:0] = 256'd120;
assign d50[1][255:0] = 256'd121;
assign d50[2][255:0] = 256'd122;
assign d50[3][255:0] = 256'd123;
wire [255:0]d51[3:0];
assign d51[0][255:0] = 256'd120;
assign d51[1][255:0] = 256'd121;
assign d51[2][255:0] = 256'd122;
assign d51[3][255:0] = 256'd123;
wire [255:0]d52[3:0];
assign d52[0][255:0] = 256'd120;
assign d52[1][255:0] = 256'd121;
assign d52[2][255:0] = 256'd122;
assign d52[3][255:0] = 256'd123;
wire [255:0]d53[3:0];
assign d53[0][255:0] = 256'd120;
assign d53[1][255:0] = 256'd121;
assign d53[2][255:0] = 256'd122;
assign d53[3][255:0] = 256'd123;
wire [255:0]d54[3:0];
assign d54[0][255:0] = 256'd120;
assign d54[1][255:0] = 256'd121;
assign d54[2][255:0] = 256'd122;
assign d54[3][255:0] = 256'd123;
wire [255:0]d55[3:0];
assign d55[0][255:0] = 256'd120;
assign d55[1][255:0] = 256'd121;
assign d55[2][255:0] = 256'd122;
assign d55[3][255:0] = 256'd123;
wire [255:0]d56[3:0];
assign d56[0][255:0] = 256'd120;
assign d56[1][255:0] = 256'd121;
```

```
assign d56[2][255:0] = 256'd122;
assign d56[3][255:0] = 256'd123;
wire [255:0]d57[3:0];
assign d57[0][255:0] = 256'd120;
assign d57[1][255:0] = 256'd121;
assign d57[2][255:0] = 256'd122;
assign d57[3][255:0] = 256'd123;
wire [255:0]d58[3:0];
assign d58[0][255:0] = 256'd120;
assign d58[1][255:0] = 256'd121;
assign d58[2][255:0] = 256'd122;
assign d58[3][255:0] = 256'd123;
wire [255:0]d59[3:0];
assign d59[0][255:0] = 256'd120;
assign d59[1][255:0] = 256'd121;
assign d59[2][255:0] = 256'd122;
assign d59[3][255:0] = 256'd123;
wire [255:0]d60[3:0];
assign d60[0][255:0] = 256'd120;
assign d60[1][255:0] = 256'd121;
assign d60[2][255:0] = 256'd122;
assign d60[3][255:0] = 256'd123;
wire [255:0]d61[3:0];
assign d61[0][255:0] = 256'd120;
assign d61[1][255:0] = 256'd121;
assign d61[2][255:0] = 256'd122;
assign d61[3][255:0] = 256'd123;
wire [255:0]d62[3:0];
assign d62[0][255:0] = 256'd120;
assign d62[1][255:0] = 256'd121;
assign d62[2][255:0] = 256'd122;
assign d62[3][255:0] = 256'd123;
```

```
wire [255:0]d63[3:0];
assign d63[0][255:0] = 256'd120;
assign d63[1][255:0] = 256'd121;
assign d63[2][255:0] = 256'd122;
assign d63[3][255:0] = 256'd123;
wire [255:0]d64[3:0];
assign d64[0][255:0] = 256'd120;
assign d64[1][255:0] = 256'd121;
assign d64[2][255:0] = 256'd122;
assign d64[3][255:0] = 256'd123;
wire [255:0]d65[3:0];
assign d65[0][255:0] = 256'd120;
assign d65[1][255:0] = 256'd121;
assign d65[2][255:0] = 256'd122;
assign d65[3][255:0] = 256'd123;
wire [255:0]d66[3:0];
assign d66[0][255:0] = 256'd120;
assign d66[1][255:0] = 256'd121;
assign d66[2][255:0] = 256'd122;
assign d66[3][255:0] = 256'd123;
wire [255:0]d67[3:0];
assign d67[0][255:0] = 256'd120;
assign d67[1][255:0] = 256'd121;
assign d67[2][255:0] = 256'd122;
assign d67[3][255:0] = 256'd123;
wire [255:0]d68[3:0];
assign d68[0][255:0] = 256'd120;
assign d68[1][255:0] = 256'd121;
assign d68[2][255:0] = 256'd122;
assign d68[3][255:0] = 256'd123;
wire [255:0]d69[3:0];
assign d69[0][255:0] = 256'd120;
```

```
assign d69[1][255:0] = 256'd121;
assign d69[2][255:0] = 256'd122;
assign d69[3][255:0] = 256'd123;
wire [255:0]d70[3:0];
assign d70[0][255:0] = 256'd120;
assign d70[1][255:0] = 256'd121;
assign d70[2][255:0] = 256'd122;
assign d70[3][255:0] = 256'd123;
wire [255:0]d71[3:0];
assign d71[0][255:0] = 256'd120;
assign d71[1][255:0] = 256'd121;
assign d71[2][255:0] = 256'd122;
assign d71[3][255:0] = 256'd123;
wire [255:0]d72[3:0];
assign d72[0][255:0] = 256'd120;
assign d72[1][255:0] = 256'd121;
assign d72[2][255:0] = 256'd122;
assign d72[3][255:0] = 256'd123;
wire [255:0]out1;
wire [255:0]out2;
wire [255:0]out3;
wire [255:0]out4;
wire [255:0]out5;
wire [255:0]out6;
wire [255:0]out7;
wire [255:0]out8;
wire [255:0]out9;
wire [255:0]out10;
wire [255:0]out11;
wire [255:0]out12;
wire [255:0]out13;
```

```
wire [255:0]out14;
wire [255:0]out15;
wire [255:0]out16;
wire [255:0]out17;
wire [255:0]out18;
wire [255:0]out19;
wire [255:0]out20;
wire [255:0]out21;
wire [255:0]out22;
wire [255:0]out23;
wire [255:0]out24;
wire [255:0]out25;
wire [255:0]out26;
wire [255:0]out27;
wire [255:0]out28;
wire [255:0]out29;
wire [255:0]out30;
wire [255:0]out31;
wire [255:0]out32;
wire [255:0]out33;
wire [255:0]out34;
wire [255:0]out35;
wire [255:0]out36;
wire [255:0]out37;
wire [255:0]out38;
wire [255:0]out39;
wire [255:0]out40;
wire [255:0]out41;
wire [255:0]out42;
wire [255:0]out43;
wire [255:0]out44;
wire [255:0]out45;
```

```
wire [255:0]out46;
wire [255:0]out47;
wire [255:0]out48;
wire [255:0]out49;
wire [255:0]out50;
wire [255:0]out51;
wire [255:0]out52;
wire [255:0]out53;
wire [255:0]out54;
wire [255:0]out55;
wire [255:0]out56;
wire [255:0]out57;
wire [255:0]out58;
wire [255:0]out59;
wire [255:0]out60;
wire [255:0]out61;
wire [255:0]out62;
wire [255:0]out63;
wire [255:0]out64;
wire [255:0]out65;
wire [255:0]out66;
wire [255:0]out67;
wire [255:0]out68;
wire [255:0]out69;
wire [255:0]out70;
wire [255:0]out71;
wire [255:0]out72;
integer i1;
mux m1(W[1:0],d1[0],d1[1],d1[2],d1[3],out1);
//assign N[255:0] = out1[255:0];
mux m2(W[3:2],d2[0],d2[1],d2[2],d2[3],out2);
```

```
mux m3(W[5:4],d3[0],d3[1],d3[2],d3[3],out3);
         mux m4(W[7:6],d4[0],d4[1],d4[2],d4[3],out4);
         mux m5(W[9:8],d5[0],d5[1],d5[2],d5[3],out5);
         mux m6(W[11:10],d6[0],d6[1],d6[2],d6[3],out6);
         mux m7(W[13:12],d7[0],d7[1],d7[2],d7[3],out7);
         mux m8(W[15:14],d8[0],d8[1],d8[2],d8[3],out8);
         mux m9(W[17:16],d9[0],d9[1],d9[2],d9[3],out9);
         mux
m10(W[19:18],d10[0],d10[1],d10[2],d10[3],out10);
         mux
m11(W[21:20],d11[0],d11[1],d11[2],d11[3],out11);
         mux
m12(W[23:22],d12[0],d12[1],d12[2],d12[3],out12);
         mux
m13(W[25:24],d13[0],d13[1],d13[2],d13[3],out13);
         mux
m14(W[27:26],d14[0],d14[1],d14[2],d14[3],out14);
         mux
m15(W[29:28],d15[0],d15[1],d15[2],d15[3],out15);
         mux
m16(W[31:30],d16[0],d16[1],d16[2],d16[3],out16);
         mux
m17(W[33:32],d17[0],d17[1],d17[2],d17[3],out17);
         mux
m18(W[35:34],d18[0],d18[1],d18[2],d18[3],out18);
         mux
m19(W[37:36],d19[0],d19[1],d19[2],d19[3],out19);
         mux
m20(W[39:38],d20[0],d20[1],d20[2],d20[3],out20);
         mux
m21(W[41:40],d21[0],d21[1],d21[2],d21[3],out21);
```

```
mux
m22(W[43:42],d22[0],d22[1],d22[2],d22[3],out22);
m23(W[45:44],d23[0],d23[1],d23[2],d23[3],out23);
m24(W[47:46],d24[0],d24[1],d24[2],d24[3],out24);
m25(W[49:48],d25[0],d25[1],d25[2],d25[3],out25);
m26(W[51:50],d26[0],d26[1],d26[2],d26[3],out26);
         mux
m27(W[53:52],d27[0],d27[1],d27[2],d27[3],out27);
         mux
m28(W[55:54],d28[0],d28[1],d28[2],d28[3],out28);
         mux
m29(W[57:56],d29[0],d29[1],d29[2],d29[3],out29);
         mux
m30(W[59:58],d30[0],d30[1],d30[2],d30[3],out30);
         mux
m31(W[61:60],d31[0],d31[1],d31[2],d31[3],out31);
         mux
m32(W[63:62],d32[0],d32[1],d32[2],d32[3],out32);
         mux
m33(W[65:64],d33[0],d33[1],d33[2],d33[3],out33);
         mux
m34(W[67:66],d34[0],d34[1],d34[2],d34[3],out34);
         mux
m35(W[69:68],d35[0],d35[1],d35[2],d35[3],out35);
m36(W[71:70],d36[0],d36[1],d36[2],d36[3],out36);
         mux
m37(W[73:72],d37[0],d37[1],d37[2],d37[3],out37);
```

```
mux
m38(W[75:74],d38[0],d38[1],d38[2],d38[3],out38);
m39(W[77:76],d39[0],d39[1],d39[2],d39[3],out39);
m40(W[79:78],d40[0],d40[1],d40[2],d40[3],out40);
m41(W[81:80],d41[0],d41[1],d41[2],d41[3],out41);
m42(W[83:82],d42[0],d42[1],d42[2],d42[3],out42);
         mux
m43(W[85:84],d43[0],d43[1],d43[2],d43[3],out43);
         mux
m44(W[87:86],d44[0],d44[1],d44[2],d44[3],out44);
         mux
m45(W[89:88],d45[0],d45[1],d45[2],d45[3],out45);
         mux
m46(W[91:90],d46[0],d46[1],d46[2],d46[3],out46);
         mux
m47(W[93:92],d47[0],d47[1],d47[2],d47[3],out47);
         mux
m48(W[95:94],d48[0],d48[1],d48[2],d48[3],out48);
         mux
m49(W[97:96],d49[0],d49[1],d49[2],d49[3],out49);
         mux
m50(W[99:98],d50[0],d50[1],d50[2],d50[3],out50);
         mux
m51(W[101:100],d51[0],d51[1],d51[2],d51[3],out51);
m52(W[103:102],d52[0],d52[1],d52[2],d52[3],out52);
         mux
m53(W[105:104],d53[0],d53[1],d53[2],d53[3],out53);
```

```
mux
m54(W[107:106],d54[0],d54[1],d54[2],d54[3],out54);
m55(W[109:108],d55[0],d55[1],d55[2],d55[3],out55);
m56(W[111:110],d56[0],d56[1],d56[2],d56[3],out56);
m57(W[113:112],d57[0],d57[1],d57[2],d57[3],out57);
m58(W[115:114],d58[0],d58[1],d58[2],d58[3],out58);
m59(W[117:116],d59[0],d59[1],d59[2],d59[3],out59);
         mux
m60(W[119:118],d60[0],d60[1],d60[2],d60[3],out60);
         mux
m61(W[121:120],d61[0],d61[1],d61[2],d61[3],out61);
         mux
m62(W[123:122],d62[0],d62[1],d62[2],d62[3],out62);
         mux
m63(W[125:124],d63[0],d63[1],d63[2],d63[3],out63);
         mux
m64(W[127:126],d64[0],d64[1],d64[2],d64[3],out64);
         mux
m65(W[129:128],d65[0],d65[1],d65[2],d65[3],out65);
         mux
m66(W[131:130],d66[0],d66[1],d66[2],d66[3],out66);
         mux
m67(W[133:132],d67[0],d67[1],d67[2],d67[3],out67);
         mux
m68(W[135:134],d68[0],d68[1],d68[2],d68[3],out68);
         mux
```

m69(W[137:136],d69[0],d69[1],d69[2],d69[3],out69);

```
mux
m70(W[139:138],d70[0],d70[1],d70[2],d70[3],out70);
         mux
m71(W[141:140],d71[0],d71[1],d71[2],d71[3],out71);
m72(W[143:142],d72[0],d72[1],d72[2],d72[3],out72);
         wire [255:0] and 1;
         wire [255:0] and 2;
         assign and 1 = out 1 & out 2 & out 3 & out 4 & out 5 &
out6 & out7 & out8 & out9 & out10 & out11 & out12 & out13
& out14 & out15 & out16 & out17 & out18 & out19 & out20
& out21 & out22 & out23 & out24 & out25 & out26 & out27
& out28 & out29 & out30 & out31 & out32 & out33 & out34
& out35 & out36 & out37 & out38 & out39 & out40 & out41
& out42 & out43 & out44 & out45 & out46 & out47 & out48
& out49 & out50 & out51 & out52 & out53 & out54 & out55
& out56 & out57 & out58 & out59 & out60 & out61 & out62
& out63 & out64 & out65 & out66 & out67 & out68 & out69
& out70 & out71 & out72;
         wire u;
         pe 256 hjk(and1,and2,u);
         assign N[255:0] = and1[255:0];
endmodule
    Ce.v:
module ce(w,r,out);
input [3:0]w;
input r;
output[3:0]out;
```

```
assign out[0]=w[0]& r;
assign out[1]=w[1]& r;
assign out [2]=w[2]&r;
assign out[3]=w[3]& r;
endmodule
    Mux.v:
    module mux(a,b,d,e,f,c);
    input [1:0]a;
    input [255:0]b;
    input [255:0]d;
    input [255:0]e;
    input [255:0]f;
    output [255:0]c;
    reg [255:0]c;
    always@*
    begin
         if(a[0] == 0 \&\& a[1] == 0)
              c[255:0] = b[255:0];
         if(a[0] == 1 \&\& a[1] == 0)
              c[255:0] = d[255:0];
         if(a[0] == 0 \&\& a[1] == 1)
              c[255:0] = e[255:0];
          if(a[0] == 1 && a[1] == 1)
              c[255:0] = f[255:0];
     end
    endmodule
```

# Priority4.v:

module priority4bit(D,Y,V);

```
input [3:0] D;
output [3:0] Y;
output V;
assign Y[0]=1&D[0];
assign Y[1]=1&D[1]&~D[0];
assign Y[2]=1&D[2]&\sim D[0]&\sim D[1];
assign Y[3]=1&D[3]&\sim D[0]&\sim D[1]&\sim D[2];
assign V = D[0]|D[1]|D[2]|D[3];
endmodule
Tcam test.v:
module tcam_test;
    reg [143:0]W;
    wire [255:0]N;
    tcam t1(W,N);
    initial
    begin
         W = 144'd0;
    end
    initial
    begin
     $monitor("W=%b,N=%b",W,N);
    end
endmodule
```

### Output:

```
C:\Users\CHANDRA\Desktop\hjhk>

C:\Users\CHANDRA\Desktop\hjhk>

MIRE [::]\W[:4::]]:// stage outputs
```

## **Experiment no. 9:**

Aim: To synthesize the Priority encoder and map it onto the FPGA.

### Code:

```
Priority4bit.v:
```

```
module PriorityEncoder_4Bit(d,y,v); input [3:0]d; output [3:0]y; output v; wire v; wire [3:0]y; assign y[0] = d[0] & 1'b1; assign y[1] = d[1] & \simd[0] & 1'b1; assign y[2] = d[2] & \simd[1] & \simd[0] & 1'b1; assign y[3] = d[3] & \simd[2] & \simd[1] & \simd[0] & 1'b1; assign v = d[0] | d[1] | d[2] | d[3];
```

endmodule

### Priority256bit.v:

```
// Usage: iverilog -o abc Priority256bit.v Priority4bit.v
Conversion element.v
// vvp abc
module pe 256bit(d,y,v);
    input [255:0]d;
    output v;
    output [255:0]y;
    wire v;
    wire [255:0]y;
    wire [255:0]p,k,q,j,r,h,c,x,z;
    //first layer
    PriorityEncoder 4Bit
                             a1(d[ 3 : 0 ],y[ 3 : 0
 ],v1);
                                                     ],y[ 7
    PriorityEncoder 4Bit
                             a2(d[
                                      7 :
                                                4
              ],v2);
         4
    PriorityEncoder 4Bit
                                       11
                             a3(d[
                                                8
                                                     ],y[ 11
              ],v3);
         8
    PriorityEncoder 4Bit
                             a4(d[
                                       15
                                                12
                                                     ],y[ 15
         12 ],v4);
    PriorityEncoder 4Bit
                                       19
                                                16
                             a5(d[
                                                     ],y[ 19
         16
              ],v5);
    PriorityEncoder 4Bit
                             a6(d[
                                                20
                                      23
                                                     ],y[ 23
         20
              ],v6);
    PriorityEncoder 4Bit
                             a7(d[
                                      27 :
                                                24
                                                     ],y[ 27
         24
              ],v7);
    PriorityEncoder 4Bit
                             a8(d[
                                                     ],y[ 31
                                      31
                                                28
              ],v8);
         28
    PriorityEncoder 4Bit
                             a9(d[
                                      35 :
                                                32
                                                     ],y[ 35
              ],v9);
         32
```

PriorityEncoder_4Bit	a10(d[	39	:	36	],y[ 39
: 36 ],v10); PriorityEncoder_4Bit	a11(d[	43	•	40	],y[ 43
: 40 ],v11); PriorityEncoder_4Bit	a12(d[	47	•	44	],y[ 47
: 44 ],v12); PriorityEncoder_4Bit	a13(d[	51	:	48	],y[ 51
: 48 ],v13); PriorityEncoder_4Bit	a14(d[	55	•	52	],y[ 55
: 52 ],v14); PriorityEncoder_4Bit	a15(d[	59	•	56	],y[ 59
: 56 ],v15); PriorityEncoder_4Bit	a16(d[	63	•	60	],y[ 63
: 60 ],v16); PriorityEncoder_4Bit	a17(d[	67	•	64	],y[ 67
: 64 ],v17); PriorityEncoder_4Bit	a18(d[	71	:	68	],y[ 71
: 68 ],v18); PriorityEncoder_4Bit	a19(d[	75	:	72	],y[ 75
: 72 ],v19); PriorityEncoder_4Bit	a21(d[	79	•	76	],y[ 79
: 76 ],v20); PriorityEncoder_4Bit	a22(d[	83	:	80	],y[ 83
: 80 ],v21); PriorityEncoder_4Bit	a23(d[	87	:	84	],y[ 87
: 84 ],v22); PriorityEncoder_4Bit	a24(d[	91	•	88	],y[ 91
: 88 ],v23); PriorityEncoder_4Bit	a25(d[	95	•	92	],y[ 95
: 92 ],v24); PriorityEncoder_4Bit	a26(d[	99		96	],y[ 99
: 96 ],v25);	` <b>L</b>				

103	PriorityEncoder_4Bit: 100 ],v26);	a27(d[	103 :	100 ],y[
	PriorityEncoder_4Bit	a28(d[	107:	104 ],y[
107	: 104 ],v27); PriorityEncoder_4Bit	a29(d[	111 :	108 ],y[
111	: 108 ],v28); PriorityEncoder_4Bit	a30(d[	115 :	112 ],y[
115	: 112 ],v29); PriorityEncoder 4Bit	a31(d[	119 :	116 ],y[
119	: 116 ],v30); PriorityEncoder 4Bit	a32(d[	123 :	120 ],y[
123	: 120 ],v31); PriorityEncoder_4Bit	\ <b>L</b>	127 :	
127	: 124 ],v32);	a33(d[		124 ],y[
131	PriorityEncoder_4Bit: 128 ],v33);	a34(d[	131 :	128 ],y[
135	PriorityEncoder_4Bit: 132 ],v34);	a35(d[	135 :	132 ],y[
139	PriorityEncoder_4Bit: 136 ],v35);	a36(d[	139 :	136 ],y[
143	PriorityEncoder_4Bit: 140 ],v36);	a37(d[	143 :	140 ],y[
	PriorityEncoder_4Bit: 144 ],v37);	a38(d[	147 :	144 ],y[
	PriorityEncoder_4Bit: 148 ],v38);	a39(d[	151 :	148 ],y[
	PriorityEncoder_4Bit	a40(d[	155 :	152 ],y[
	: 152 ],v39); PriorityEncoder_4Bit	a41(d[	159 :	156 ],y[
159	: 156 ],v40); PriorityEncoder_4Bit	a42(d[	163 :	160 ],y[
163	: 160 ],v41);			

167	PriorityEncoder_4Bit	a43(d[	167:	164 ],y[
	: 164 ],v42); PriorityEncoder_4Bit	a44(d[	171 :	168 ],y[
	: 168 ],v43); PriorityEncoder_4Bit	a45(d[	175 :	172 ],y[
	: 172 ],v44); PriorityEncoder_4Bit	a46(d[	179 :	176 ],y[
179	: 176 ],v45); PriorityEncoder_4Bit	a47(d[	183 :	180 ],y[
183	: 180 ],v46); PriorityEncoder_4Bit	a48(d[	187 :	184 ],y[
187	: 184 ],v47); PriorityEncoder 4Bit	a49(d[	191 :	188 ],y[
191	: 188 ],v48); PriorityEncoder 4Bit	a50(d[	195 :	192 ],y[
195	: 192 ],v49);	\ <b>L</b>	199 :	-
199	PriorityEncoder_4Bit: 196 ],v50);	a51(d[		196 ],y[
203	PriorityEncoder_4Bit: 200 ],v51);	a52(d[	203 :	200 ],y[
207	PriorityEncoder_4Bit: 204 ],v52);	a53(d[	207 :	204 ],y[
211	PriorityEncoder_4Bit: 208 ],v53);	a54(d[	211 :	208 ],y[
215	PriorityEncoder_4Bit: 212 ],v54);	a55(d[	215 :	212 ],y[
	PriorityEncoder_4Bit: 216 ],v55);	a56(d[	219 :	216 ],y[
	PriorityEncoder_4Bit : 220 ],v56);	a57(d[	223 :	220 ],y[
	PriorityEncoder_4Bit	a58(d[	227 :	224 ],y[
221	: 224 ],v57);			

```
a59(d[
    PriorityEncoder 4Bit
                                     231 :
                                               228 ],y[
         228 ],v58);
231 :
    PriorityEncoder 4Bit
                                     235 :
                            a60(d[
                                               232 ],y[
         232 ],v59);
235 :
    PriorityEncoder 4Bit
                            a61(d[
                                               236 ],y[
                                      239:
         236 ],v60);
239 :
    PriorityEncoder 4Bit
                            a62(d[
                                               240 ],y[
                                      243:
         240 ],v61);
243 :
    PriorityEncoder 4Bit
                                               244 ],y[
                            a63(d[
                                      247:
247 :
         244 ],v62);
    PriorityEncoder_4Bit
                            a64(d[
                                      251:
                                               248 ],y[
         248 ],v63);
251:
    PriorityEncoder 4Bit
                            a20(d[
                                      255 :
                                               252 ],y[
         252 ],v64);
255 :
    //second layer
                            ] | y [
    assign p[0
                  ]=y[0]
                                      1
                                          ] | y [
                                                    2
                                                         3
       ];
у[
    assign p[ 1
                            ] | y [
                                          ] | y [
                   ]=y[ 4
                                      5
                                                    6
                                                         7 ];
y [
    assign p[ 2
                   ]=y[ 8
                            ] | y [
                                          ] | y [
                                      9
                                                    10
                                                         11
    11 ];
у[
    assign p[ 3
                   ]=y[ 12
                            ] | y [
                                      13
                                          ] | y [
                                                         14
у[
    15 ];
    assign p[ 4
                  ]=y[ 16
                            ] | y [
                                          ] | y [
                                                         18
                                      17
    19 ];
у[
    assign p[ 5
                  ]=y[ 20
                            ] | y [
                                      21
                                          ] | y [
                                                         22
    23 ];
у[
                            ] | y [
                                                         ]|
    assign p[6
                  ]=y[24]
                                      25
                                          ] | y [
                                                    26
y [
    27 ];
```

```
]=y[ 28
                             ] | y [
                                             ] | y [
                                                            29
                                                       30
     assign p 7
     31 ];
yΓ
                                             ] | y [
                    ]=y[ 32
                              ] | y [
                                        33
                                                            11
     assign p 8
                                                       34
     35 1:
y [
                              ]|y[
                                             ] | y [
     assign p[9
                    ]=y[ 36
                                                            11
                                        37
                                                       38
     39 ];
y [
                              ] | y [
                    ]=y[ 40
                                             ] | y [
                                                            assign p[ 10
                                        41
                                                       42
     43 ];
yΓ
     assign p[ 11
                              ] | y [
                    =y[44]
                                        45
                                             ] | y [
                                                       46
                                                            11
     47 ];
y [
                              ] | y [
                                             ] | y [
                                                            ]|
     assign p[ 12
                    ]=y[ 48
                                                       50
                                        49
     51 ];
у[
                              ] | y [
     assign p[ 13
                    ]=y[ 52
                                        53
                                             ] | y [
                                                            ] [
                                                       54
у[
     55 ];
                              ] | y [
                                        57
                                                            ]|
     assign p[ 14
                    ]=y[ 56
                                             ] | y [
                                                       58
у[
     59 ];
     assign p[ 15
                    ]=y[ 60
                              ] | y [
                                        61
                                                            ]|
                                             ] | y [
                                                       62
у[
     63 ];
     assign p[ 16
                    ]=y[ 64
                              ] | y [
                                        65
                                             ] | y [
                                                            ]|
                                                       66
     67 ];
у[
                    ]=y[ 68
                              ] | y [
                                        69
                                             ] | y [
                                                            ]|
     assign p[ 17
                                                       70
     71 ];
у[
     assign p[ 18
                    ]=y[ 72
                              ] | y [
                                        73
                                             ] | y [
                                                       74
                                                            ]|
у[
     75 ];
     assign p[ 19
                    ]=y[ 76
                              ] | y [
                                        77
                                             ] | y [
                                                            78
     79 ];
у[
                              ] | y [
                                                            assign p[ 20
                                        81
                                             ] | y [
                                                       82
                    ]=y[ 80
     83 ];
у[
     assign p[ 21
                    ]=y[ 84
                              ] | y [
                                             ] | y [
                                                       86
                                                            ] |
                                        85
     87 ];
у[
     assign p[ 22
                                                            ] [
                   ]=y[ 88
                              ] | y [
                                        89
                                             ] | y [
                                                       90
у[
     91 ];
```

```
] | y [
    assign p[ 23 ]=y[ 92 ] | y [
                                       93
                                                     94
                                                          11
    95
         ];
yΓ
                   ]=y[96]|y[
                                           ] | y [
                                                     98
                                                          11
    assign p[ 24
                                       97
    99 ];
y [
                                       101 ] | y [
                   =y[100]y[
                                                     102 ] |
    assign p[ 25
    103 ];
y [
                                       105 ] | y [
                   ]=y[ 104 ] | y [
    assign p[ 26
                                                     106 ] |
    107 ];
y [
    assign p[ 27
                   ]=y[ 108 ] | y [
                                       109 ] | y [
                                                     110 ]
    111 ];
y [
                                       113 ] | y [
    assign p[ 28
                   ]=y[ 112 ] | y [
                                                     114 ]|
    115 ];
у[
    assign p[ 29
                   ]=y[ 116 ] | y [
                                       117 ] | y [
                                                     118 ] |
    119 ];
у[
    assign p[ 30
                   ]=y[ 120 ] | y [
                                      121 ] | y [
                                                     122 ] |
у[
    123 ];
                                                     126 ] |
    assign p[ 31
                   ]=y[ 124 ] | y [
                                      125 ] | y [
    127 ];
у[
                   ]=y[ 128 ] | y [
                                       129 ] | y [
                                                     130 ]|
    assign p[ 32
у[
    131 ];
    assign p[ 33
                                       133 ] | y [
                   ]=y[ 132 ] | y [
                                                     134 ] |
    135 ];
у[
    assign p[ 34
                   ]=y[ 136 ] | y [
                                       137 ] | y [
                                                     138 ] |
у[
    139 ];
    assign p[ 35
                   ]=y[ 140 ] | y [
                                       141 ] | y [
                                                     142 ] |
    143 ];
у[
    assign p[ 36
                                                     146 ] |
                                      145 ] | y [
                   ]=y[ 144 ] | y [
    147 ];
у[
    assign p[ 37
                   ]=y[ 148 ] | y [
                                      149 ] | y [
                                                     150 ]
    151 ];
у[
    assign p[ 38 ]=y[ 152 ]|y[ 153 ]|y[
                                                     154 ] |
    155 ];
у[
```

```
assign p[ 39 ]=y[ 156 ] | y [ 157 ] | y [ 158 ] |
     159 ];
yΓ
                   ]=y[ 160 ] | y [
                                       161 ] | y [
                                                      162 ] |
     assign p[ 40
     163 ];
y [
     assign p[ 41
                   ]=y[ 164 ] | y [
                                       165 ] | y [
                                                      166 ]
    167 ];
y [
                                                      170 ] |
    assign p[ 42
                   ]=y[ 168 ] | y [
                                       169 ] | y [
    171];
y [
    assign p[ 43
                   ]=y[ 172 ] | y [
                                       173 ] | y [
                                                      174 ]|
    175 ];
y [
                                       177 ] | y [
    assign p[ 44
                   ]=y[ 176 ] | y [
                                                      178 ] |
    179 ];
у[
     assign p[ 45
                   ]=y[ 180 ] | y [
                                       181 ] | y [
                                                      182 ] |
    183 ];
у[
     assign p[ 46
                   ]=y[ 184 ] | y [
                                       185 ] | y [
                                                      186 ] |
у[
    187];
     assign p[ 47
                   ]=y[ 188 ] | y [
                                       189 ] | y [
                                                      190 ] |
    191];
у[
                   ]=y[ 192 ] | y [
                                       193 ] | y [
                                                      194 ]|
     assign p[ 48
    195 ];
у[
     assign p[ 49
                                       197 ] | y [
                                                      198 ]|
                   ]=y[ 196 ] | y [
    199 ];
у[
     assign p[ 50
                   ]=y[ 200 ] | y [
                                       201 ] | y [
                                                      202 ] |
    203 ];
у[
     assign p[51
                   ]=y[ 204 ] | y [
                                       205 ] | y [
                                                      206 ] |
    207 ];
у[
                   ]=y[ 208 ] | y [
                                       209 ] | y [
                                                     210 ]
    assign p[ 52
    211 ];
у[
                   ]=y[ 212 ] | y [
                                       213 ] | y [
     assign p[ 53
                                                     214 ] |
    215];
y [
    assign p[ 54 ]=y[ 216 ]|y[ 217 ]|y[
                                                     218 ] |
    219 ];
у[
```

```
assign p[ 55 ]=y[ 220 ] | y [
                                       221 ] | y [
                                                      222 ] |
    223 ];
yΓ
                   ]=y[ 224 ] | y [
                                                      226 ] |
                                       225 ] | y [
    assign p 56
    227 ];
y [
                   ]=y[ 228 ] | y [
                                                      230 ]|
    assign p[ 57
                                       229 ] | y [
    231 ];
y [
    assign p[ 58
                                                      234 ] |
                   =y[232]y[
                                       233 ] | y [
    235];
yΓ
    assign p[ 59
                   ]=y[ 236 ] | y [
                                       237 ] | y [
                                                      238 ] |
    239 ];
y [
    assign p[ 60
                   ]=y[ 240 ] | y [
                                       241 ] | y [
                                                      242 ] |
    243 ];
y [
    assign p[ 61
                   ]=y[ 244 ] | y [
                                       245 ] | y [
                                                      246 ] |
у[
    247 ];
    assign p[ 62
                   ]=y[ 248 ] | y [
                                       249 ] | y [
                                                      250 ] |
    251 ];
у[
    assign p[ 63
                                                      254 ] |
                   ]=y[ 252 ] | y [
                                       253 ] | y [
    255 ];
у[
    //third layer
    PriorityEncoder 4Bit
                             b1(p[
                                       3
                                                      ],k[3]
                                                 ()
         0
              ],v65);
    PriorityEncoder_4Bit
                             b2(p[
                                                      ],k[ 7
                                       7
                                                 4
              ],v66);
         4
    PriorityEncoder 4Bit
                             b3(p[
                                       11
                                                 8
                                                      ],k[ 11
              ],v67);
         8
    PriorityEncoder 4Bit
                             b4(p[
                                                      ],k[ 15
                                       15 :
                                                  12
              ],v68);
          12
    PriorityEncoder 4Bit
                             b5(p[
                                       19 :
                                                  16
                                                      ],k[ 19
              ],v69);
          16
```

```
PriorityEncoder 4Bit
                            b6(p[
                                      23 :
                                               20
                                                    ],k[ 23
         20 ],v70);
                            b7(p[
    PriorityEncoder 4Bit
                                      27
                                               24
                                                    ],k[ 27
         24
             ],v71);
    PriorityEncoder 4Bit
                                      31
                                               28
                            b8(p[
                                                    ],k[ 31
         28
             ],v72);
    PriorityEncoder 4Bit
                            b9(p[
                                      35
                                               32
                                                    ],k[ 35
         32 ],v78);
    PriorityEncoder 4Bit
                            b10(p[
                                      39
                                               36
                                                    ],k[ 39
         36 ],v73);
    PriorityEncoder 4Bit
                            b11(p[
                                      43
                                               40
                                                    ],k[ 43
             ],v74);
         40
    PriorityEncoder 4Bit
                            b12(p[
                                      47
                                                    ],k[ 47
                                               44
             ],v75);
         44
    PriorityEncoder 4Bit
                            b13(p[
                                      51
                                          :
                                               48
                                                    ],k[ 51
             ],v76);
         48
    PriorityEncoder 4Bit
                            b14(p[
                                      55
                                               52
                                                    ],k[ 55
                                         .
             ],v77);
         52
    PriorityEncoder 4Bit
                            b15(p[
                                                    ],k[ 59
                                      59
                                         .
                                               56
             ],v79);
         56
    PriorityEncoder 4Bit
                            b16(p[
                                      63
                                               60
                                                    ],k[ 63
              ],v80);
         60
    coversion element u21(y[
                                 3
                                               ],k[ 0
                                          0
],z[
              0
                  ]);
    coversion_element u22(y[
                                 7
                                               ],k[ 1
                                          4
                  ]);
],z[
              4
    coversion element u23(y[
                                               ],k[ 2
                                 11
                                          8
    11
              8
                  ]);
],z[
    coversion element u24(y[
                                 15
                                           12
                                               ],k[3]
],z[
    15 : 12
                  ]);
```

```
coversion element u25(y[
                              19 :
                                       [16], k[4]
],z[ 19 : 16
                 1);
    coversion element u26(y[
                              23 :
                                       20
                                           ],k[5]
],z[ 23
       : 20
                 1);
    coversion element u27(y[
                              27
                                       24
                                           ],k[6]
],z[ 27 : 24 ]);
    coversion_element u28(y[
                              31
                                       28
                                           ],k[7]
],z[ 31 :
            28 ]);
    coversion_element u29(y[
                              35
                                       32
                                           ],k[8]
],z[ 35 :
            32 ]);
    coversion_element u30(y[
                              39
                                           ],k[ 9
                                       36
],z[ 39 :
            36 ]);
    coversion_element u31(y[
                              43
                                       40
                                           ],k[10]
],z[ 43 :
             40 ]);
    coversion_element u32(y[
                              47
                                       44
                                           ],k[ 11
],z[ 47 : 44
                 ]);
    coversion_element u33(y[
                              51
                                       48
                                           ],k[ 12
],z[ 51 : 48
                 ]);
    coversion_element u34(y[
                                           ],k[ 13
                              55 :
                                       52
],z[ 55 :
            52
                 1);
    coversion_element u35(y[
                              59 :
                                       56
                                           ],k[14]
],z[ 59 :
            56
                 1);
    coversion_element u36(y[
                              63 :
                                       60
                                           ],k[ 15
],z[ 63 : 60 ]);
    coversion_element u37(y[
                              67
                                       64
                                           ],k[ 16
],z[ 67 : 64 ]);
    coversion_element u38(y[
                              71
                                       68
                                           ],k[ 17
],z[ 71 : 68 ]);
    coversion element u39(y[
                              75 :
                                       72
                                           ],k[18]
],z[ 75 : 72
                 1);
                                           ],k[ 19
    coversion element u40(y[
                              79 :
                                       76
],z[ 79 : 76
                 1);
```

```
coversion element u41(y
                             83 :
                                      80 ],k[ 20
],z[ 83 : 80
                1);
                             87 :
    coversion element u42(y[
                                          ],k[21]
                                      84
],z[ 87 : 84
                1);
    coversion element u43(y[
                             91
                                      88
                                          ],k[ 22
],z[ 91 :
            88 ]);
    coversion element u44(y[
                                          ],k[ 23
                             95 :
                                      92
],z[ 95 :
            92 ]);
    coversion_element u45(y[
                             99 :
                                      96
                                          ],k[24]
],z[ 99 :
            96 ]);
    coversion_element u46(y[
                                      100 ],k[ 25
                              103 :
],z[ 103 : 100 ]);
    coversion_element u47(y[
                              107:
                                      104 ],k[ 26
],z[ 107 : 104 ]);
    coversion_element u48(y[
                                      108 ],k[ 27
                              111:
],z[ 111 : 108 ]);
    coversion_element u49(y[
                                      112 ],k[ 28
                             115 :
],z[ 115 : 112 ]);
                             119:
    coversion_element u50(y[
                                      116 ],k[ 29
],z[ 119 : 116 ]);
    coversion_element u51(y[
                                      120 ],k[ 30
                             123 :
],z[ 123 : 120 ]);
    coversion_element u52(y[
                             127 :
                                      124 ],k[ 31
],z[ 127 : 124 ]);
    coversion_element u53(y[
                              131 :
                                      128 ],k[ 32
],z[ 131 : 128 ]);
                             135 :
    coversion_element u54(y[
                                      132 ],k[ 33
],z[ 135 : 132 ]);
    coversion element u55(y[
                                      136 ],k[ 34
                             139 :
],z[ 139 : 136 ]);
    coversion element u56(y[ 143 :
                                      140 ],k[ 35
],z[ 143 : 140 ]);
```

```
coversion element u57(y\begin{bmatrix} 147 : 144 \end{bmatrix},k\begin{bmatrix} 36 \end{bmatrix}
],z[ 147 : 144 ]);
                               151:
    coversion element u58(y[
                                        148 ],k[ 37
],z[ 151 : 148 ]);
    coversion_element u60(y[
                               155 :
                                        152 ],k[ 38
],z[ 155 : 152 ]);
    coversion element u59(y[
                               159:
                                        156 ],k[ 39
],z[ 159 : 156 ]);
    coversion element u84(y[
                               163:
                                         160 ],k[ 40
],z[ 163 : 160 ]);
    coversion_element u61(y[
                               167:
                                         164 ],k[ 41
],z[ 167 : 164 ]);
    coversion_element u62(y[
                                         168 ],k[ 42
                               171:
],z[ 171 : 168 ]);
                                         172 ],k[ 43
    coversion_element u63(y[
                               175 :
],z[ 175 : 172 ]);
    coversion_element u64(y[
                               179 :
                                         176 ],k[ 44
],z[ 179 : 176 ]);
    coversion_element u65(y[
                               183 :
                                         180 ],k[ 45
],z[ 183 : 180 ]);
    coversion_element u66(y[
                               187 :
                                        184 ],k[ 46
],z[ 187 : 184 ]);
    coversion_element u67(y[
                               191:
                                         188 ],k[ 47
],z[ 191 : 188 ]);
    coversion element u68(y[
                               195 :
                                         192 ],k[ 48
],z[ 195 : 192 ]);
                               199:
    coversion element u69(y[
                                         196 ],k[ 49
],z[ 199 : 196 ]);
    coversion element u70(y[
                               203 :
                                        200 ],k[ 50
],z[ 203 : 200 ]);
    coversion element u71(y[
                                        204 ],k[ 51
                               207 :
],z[ 207 : 204 ]);
```

```
coversion element u72(y
                             211 :
                                     208 ],k[ 52
],z[ 211 : 208 ]);
    coversion element u73(y[
                             215 :
                                     212 ],k[ 53
],z[ 215 : 212 ]);
    coversion element u74(y[
                                     216 ],k[ 54
                             219:
],z[ 219 : 216 ]);
                                     220 ],k[ 55
    coversion element u75(y[
                             223 :
],z[ 223 : 220 ]);
    coversion element u76(y[
                             227 :
                                      224 ],k[ 56
],z[ 227 : 224 ]);
    coversion_element u77(y[
                             231:
                                     228 ],k[ 57
],z[ 231 : 228 ]);
    coversion_element u78(y[
                             235 :
                                     232 ],k[ 58
],z[ 235 : 232 ]);
    coversion_element u79(y[
                             239 :
                                     236 ],k[ 59
],z[ 239 : 236 ]);
    coversion_element u80(y[
                                      240 ],k[ 60
                             243 :
],z[ 243 : 240 ]);
    coversion_element u81(y[
                                     244 ],k[ 61
                             247 :
],z[ 247 : 244 ]);
    coversion_element u82(y[
                                     248 ],k[ 62
                             251 :
],z[ 251 : 248 ]);
    coversion_element u83(y[
                             255 :
                                     252 ],k[ 63
],z[ 255 : 252 ]);
    //fourth layer
                                                  11
    assign q[0]=k[0]
                         |k|
                                     ] | k [
k [
    3 ];
    assign q[ 1 ]=k[ 4
                        ] | k [ 5
                                                  11
                                     ] | k [
                                              6
kГ
    7 ];
```

```
]=k[ 8
                               ] | k [
                                         9
                                              ] | k [
                                                         10
                                                              11
     assign q[ 2
k [
     11
         ];
     assign q[ 3
                    ]=k[ 12
                               ] | k [
                                                              13
                                              ] | k [
                                                         14
         ];
kΓ
     15
                    ]=k[ 16
     assign q[ 4
                                                         18
                                                              ] | k [
                                          17
                                              ] | k [
     19 ];
kΓ
     assign q[5
                    ]=k[20]
                               ] | k [
                                         21
                                                         22
                                                              ] | k [
     23
        ];
k [
                                         25
                                                         26
     assign q[6
                    ]=k[24]
                               ] | k [
                                              ] | k [
                                                              27 ];
k [
                                         29
                                                         30
     assign q[ 7
                    ]=k[28]
                               ] | k [
                                              ] | k [
                                                              ] |
     31 ];
k [
     assign q[ 8
                    ]=k[ 32
                               ] | k [
                                         33
                                              ] | k [
                                                         34
                                                              ]|
k [
     35 ];
     assign q[ 9
                                         37
                                                              ]|
                    ]=k[ 36
                               ] | k [
                                              ] | k [
                                                         38
k [
     39 ];
                    ]=k[40]
                                                              ] |
     assign q[ 10
                               ] | k [
                                         41
                                              ] | k [
                                                         42
k [
     43 ];
                    ]=k[ 44
                                         45
                                                              ] |
     assign q[ 11
                               ] | k [
                                              ] | k [
                                                         46
k [
     47 ];
                    ]=k[ 48
                                                              ] |
     assign q[ 12
                               ] | k [
                                         49
                                              ] | k [
                                                         50
     51 ];
k [
     assign q[ 13
                    ]=k[ 52
                               ] | k [
                                         53
                                              ] | k [
                                                         54
                                                              ] |
k [
     55 ];
     assign q[ 14
                    ]=k[ 56
                               ] | k [
                                              ] | k [
                                                         58
                                                              57
k [
     59 ];
                    ]=k[60]
                                                              61
                                                         62
     assign q[ 15
                               ] | k [
                                              ] | k [
k [
     63 ];
```

//fifth layer

```
PriorityEncoder 4Bit
                            c1(q[
                                      3 :
                                               0
                                                    ],j[
              ],v81);
         ()
    PriorityEncoder 4Bit
                            c2(q[
                                      7
                                               4
                                                    ],j[
              ],v82);
         4
    PriorityEncoder 4Bit
                            c3(q[
                                      11 :
                                               8
                                                    ],j[
                                                         11
              ],v83);
         8
    PriorityEncoder 4Bit
                                      15 :
                                               12
                                                    ],i[
                            c4(q[
                                                         15
         12 ],v84);
    coversion element u5 (z[3:0],j[0],x[3:0]);
    coversion_element u6 (z[7:4],j[0],x[7:4]);
    coversion element u7 (z[11:8],j[0],x[11:8]);
    coversion element u8 (z[15:12],j[0],x[15:12]);
    coversion_element u9 (z[19:16],j[1],x[19:16]);
    coversion element u10 (z[23:20],j[1],x[23:20]);
    coversion element u11 (z[27:24],j[1],x[27:24]);
    coversion element u12 (z[31:28],j[1],x[31:28]);
    coversion element u13 (z[35:32],j[2],x[35:32]);
    coversion element u14 (z[39:36],j[2],x[39:36]);
    coversion element u15 (z[43:40],j[2],x[43:40]);
    coversion element u16 (z[47:44],j[2],x[47:44]);
    coversion element u17 (z[51:48],j[3],x[51:48]);
    coversion element u18 (z[55:52],j[3],x[55:52]);
    coversion element u19 (z[59:56],j[3],x[59:56]);
    coversion element u20 (z[63:60],j[3],x[63:60]);
    coversion element u85 (z[67:64],j[4],x[67:64]);
    coversion element u103(z[ 71 :
],x[71:
              68
                  ]);
    coversion element u104(z[
                                 75
                                           72
                                               ],j[
],x[75:
              72
                 ]);
    coversion element u105(z[ 79 :
                                          76
                                               ],i[
              76
],x[79:
                  1):
```

```
coversion element u106(z[ 83 :
                                         ],j[5]
                                     80
],x[83:80];
                             87 :
    coversion element u107(z[
                                         ],j[5]
                                     84
],x[ 87 : 84 ]);
    coversion element u108(z[
                             91
                                     88
                                         ],j[
      : 88 ]);
],x[ 91
    coversion element u109(z[
                             95
                                     92
                                         ],j[
],x[ 95 : 92 ]);
    coversion_element u110(z[
                             99 :
                                     96
                                         ],i[
],x[ 99 : 96 ]);
    coversion_element u111(z[
                                     100 ],j[
                             103 :
],x[ 103 : 100 ]);
    coversion_element u112(z[
                                     104 ],j[
                             107 :
],x[ 107 : 104 ]);
    coversion_element u113(z[
                                     108 ],j[
                             111 :
],x[ 111 : 108 ]);
    coversion element u114(z[
                            115 :
                                     112 ],j[
],x[ 115 : 112 ]);
    coversion_element u115(z[
                             119:
                                     116 ],j[
],x[ 119 : 116 ]);
    coversion_element u116(z[
                             123 :
                                     120 ],j[
],x[ 123 : 120 ]);
    coversion_element u117(z[
                             127 :
                                     124 ],j[
],x[ 127 : 124 ]);
    coversion_element u118(z[
                             131 :
                                     128 ],j[
],x[ 131 : 128 ]);
    coversion_element u119(z[ 135 :
                                     132 ],j[
                                              8
],x[ 135 : 132 ]);
    coversion element u120(z[ 139 :
                                     136 ],j[
],x[ 139 : 136 ]);
    coversion element u121(z[143:140],j[8]
],x[143:140]);
```

```
coversion element u122(z[147:144],j[
],x[147 : 144];
    coversion element u123(z[ 151 :
                                      148 ],j[
],x[151 : 148];
    coversion element u124(z[ 155 :
                                     152 ],j[
],x[ 155 : 152 ]);
    coversion element u125(z[ 159 :
                                      156 ],j[
],x[159:156];
    coversion element u126(z[
                             163 :
                                      160 ],j[
                                              10
],x[ 163 : 160 ]);
    coversion_element u127(z[
                                      164 ],j[
                             167 :
                                              10
],x[ 167 : 164 ]);
    coversion_element u128(z[
                             171 :
                                      168 ],j[
                                              10
],x[ 171 : 168 ]);
    coversion_element u129(z[
                                      172 ],j[
                             175 :
                                              10
],x[ 175 : 172 ]);
    coversion element u130(z[
                             179:
                                      176 ],j[
                                              11
],x[ 179 : 176 ]);
    coversion_element u131(z[
                             183 :
                                      180 ],j[
                                              11
],x[183:180]);
    coversion_element u132(z[
                             187 :
                                      184 ],j[
                                              11
],x[187:184]);
    coversion_element u133(z[
                             191:
                                      188 ],j[
                                              11
],x[ 191 : 188 ]);
    coversion element u134(z[
                             195 :
                                      192 ],j[
                                              12
],x[ 195 : 192 ]);
                             199:
    coversion element u135(z[
                                      196 ],j[
                                              12
],x[ 199 : 196 ]);
                             203 :
    coversion element u136(z[
                                     200 ],j[
                                              12
],x[ 203 : 200 ]);
    coversion element u137(z[ 207 :
                                     204 ],j[ 12
],x[207:204]);
```

```
coversion_element u138(z[ 211 :
                                    208 ],j[ 13
],x[211:208];
   coversion element u139(z[ 215 : 212 ],j[
                                            13
],x[215:212];
   coversion element u140(z[ 219 :
                                    216 ],j[
                                            13
],x[219:216];
   coversion element u141(z[
                            223 :
                                    220 ],i[
                                            13
],x[223:220]);
    coversion element u142(z[
                            227 :
                                    224 ],j[
                                            14
],x[227:224]);
    coversion_element_u143(z[
                            231 :
                                    228 ],j[
                                            14
],x[231:228]);
    coversion_element u144(z[ 235 :
                                    232 ],j[
                                            14
],x[ 235 : 232 ]);
    coversion_element u145(z[ 239 :
                                    236 ],j[
                                            14
],x[239:236];
   coversion element u146(z[
                                    240 ],j[
                            243 :
                                            15
],x[243:240]);
   coversion_element u147(z[
                            247 :
                                    244 ],j[
                                            15
],x[247 : 244];
   coversion_element u148(z[ 251 :
                                    248 ],j[
                                            15
],x[251:248]);
    coversion_element u149(z[ 255 :
                                    252 ],j[
                                            15
],x[255:252];
   //sixth layer
                                        ] | j [3
    assign r[0]=j[0
                                                ];
                       ] | j [ 1
                                ] | j [2
    assign r[ 1 ]=j[ 4
                       ] | j [5
                                ] | j [6
                                                ];
    assign r[ 2 ]=i[ 8
                       ]|i[9
                                ] | j [ 10
                                                ];
                                        ]|i[11
```

```
assign r[ 3 ]=j[ 12 ]|j[13 ]|j[14 ]|j[15 ];
    //seventh layer
    PriorityEncoder_4Bit d1(r[3:0],h[3:0],v85);
    //eighth layer
    //assign t[0] = h[0]|h[1]|h[2]|h[3];
    coversion_element j86 (x[ 3 :
                                             ],h[ 0
                                         0
],c[ 3
             0
                  ]);
                                             ],h[ 0
    coversion_element j87 (x[
                                         4
],c[ 7 :
             4
                  1);
    coversion_element j88 (x[
                                             ],h[ 0
                               11
                                         8
],c[ 11 :
             8
                  ]);
    coversion_element j89 (x[
                                         12
                                             ],h[ 0
                               15
],c[ 15 : 12
                  1);
    coversion element j90 (x[
                                             ],h[ 0
                               19
                                         16
],c[ 19 :
             16
                  1);
    coversion element j91 (x[
                                             ],h[ 0
                               23
                                         20
],c[ 23 :
             20
                  1);
    coversion_element j92 (x[
                                             ],h[ 0
                               27
                                         24
],c[ 27 :
             24
                  1);
    coversion element j93 (x[
                               31
                                         28
                                             ],h[ 0
],c[ 31
             28
                  1);
                                             ],h[ 0
    coversion element j94 (x[
                               35
                                         32
],c[ 35 :
             32
                  1);
    coversion_element j95 (x[
                               39
                                         36
                                             ],h[0]
],c[ 39 :
             36
                  1);
    coversion element j96 (x[
                               43
                                         40
                                             ],h[0]
],c[ 43 :
             40
                  1):
    coversion element j97 (x[ 47 :
                                         44
                                             ],h[0]
             44
],c[47:
                  1);
```

```
coversion_element j98 (x[ 51 :
                                        48
                                            ],h[0]
       : 48
    51
                 1):
    coversion element j99 (x[
                               55 :
                                             ],h[0]
                                        52
],c[ 55
             52
                 1):
    coversion element j100 (x[
                               59
                                            ],h[0]
                                        56
],c[ 59 :
             56
                 1);
    coversion_element j101 (x[
                               63
                                             ],h[0]
                                        60
],c[ 63 :
             60
                 ]);
    coversion_element j102 (x[
                                             ],h[ 1
                               67
                                        64
],c[ 67 :
             64
                 ]);
    coversion_element j103 (x[
                                             ],h[ 1
                                        68
                               71
],c[ 71 :
             68 ]);
    coversion_element j104 (x[
                                             ],h[ 1
                               75
                                        72
],c[ 75 :
             72
                 ]);
    coversion_element j105 (x[
                                             ],h[ 1
                               79 :
                                        76
],c[ 79 :
             76
                 ]);
    coversion_element j106 (x[
                                             ],h[ 1
                               83
                                        80
],c[ 83 :
                 ]);
             80
    coversion_element j107 (x[
                               87
                                        84
                                             ],h[ 1
],c[ 87 :
             84
                 1);
    coversion_element j108 (x[
                               91
                                        88
                                             ],h[ 1
],c[ 91 :
             88
                 1);
    coversion_element j109 (x[
                               95
                                        92
                                             ],h[ 1
],c[ 95 :
             92
                 1);
    coversion_element j110 (x[
                               99 :
                                        96
                                             ],h[ 1
],c[ 99 :
             96
                1);
    coversion_element j111 (x[
                               103:
                                        100 ],h[ 1
],c[ 103 : 100 ]);
                               107:
    coversion element j112 (x[
                                        104 ],h[ 1
],c[ 107 : 104 ]);
    coversion element j113 (x[ 111 :
                                        108 ],h[ 1
],c[ 111 : 108 ]);
```

```
coversion_element j114 (x[ 115 : 112 ],h[ 1
],c[ 115 : 112 ]);
    coversion element j115 (x[ 119 :
                                      116 ],h[ 1
],c[ 119 : 116 ]);
    coversion element j116 (x[ 123 :
                                      120 ],h[ 1
],c[ 123 : 120 ]);
    coversion element j117 (x[ 127 :
                                      124 ],h[ 1
],c[ 127 : 124 ]);
    coversion element j118 (x[ 131 :
                                      128 ],h[ 2
],c[ 131 : 128 ]);
    coversion_element j119 (x[ 135 :
                                      132 ],h[ 2
],c[ 135 : 132 ]);
    coversion_element j120 (x[ 139 :
                                      136 ],h[ 2
],c[ 139 : 136 ]);
    coversion_element j121 (x[ 143 :
                                      [140],h[2]
],c[ 143 : 140 ]);
    coversion_element j122 (x[ 147 :
                                      144 \, ],h[ 2]
],c[ 147 : 144 ]);
    coversion_element j123 (x[
                              151:
                                      148 ],h[ 2
],c[ 151 : 148 ]);
    coversion_element j124 (x[ 155 :
                                      152 ],h[ 2
],c[ 155 : 152 ]);
                             159 :
    coversion_element j125 (x[
                                      156 ],h[ 2
],c[ 159 : 156 ]);
    coversion_element j126 (x[
                              163:
                                      160 ],h[ 2
],c[ 163 : 160 ]);
    coversion_element j127 (x[
                              167:
                                      164 ],h[ 2
],c[ 167 : 164 ]);
    coversion element j128 (x[ 171 :
                                      168 ],h[ 2
],c[ 171 : 168 ]);
    coversion element j129 (x[ 175 : 172 ],h[ 2
],c[ 175 : 172 ]);
```

```
coversion element j130 (x[ 179 : 176 ],h[ 2
],c[ 179 :
          176 ]);
    coversion element j131 (x[ 183 :
                                      180 ],h[ 2
],c[ 183 :
          180 ]);
    coversion element j132 (x[ 187 :
                                      184 ],h[ 2
],c[ 187 : 184 ]);
    coversion element j133 (x[ 191 :
                                      188 ],h[ 2
],c[ 191 : 188 ]);
    coversion_element j134 (x[ 195 :
                                      192 ],h[ 3
],c[ 195 : 192 ]);
                                      196 ],h[ 3
    coversion_element j135 (x[
                              199:
],c[ 199 : 196 ]);
    coversion_element j136 (x[
                                      200 ],h[ 3
                             203 :
            200 ]);
],c[ 203 :
    coversion_element j137 (x[
                              207 :
                                      204 ],h[ 3
],c[ 207 :
            204 ]);
    coversion_element j138 (x[
                                      208 ],h[ 3
                             211 :
],c[ 211 :
           208 ]);
    coversion_element j139 (x[ 215 :
                                      212 ],h[ 3
],c[ 215 : 212 ]);
    coversion_element j140 (x[ 219 :
                                      216 ],h[ 3
],c[ 219 : 216 ]);
    coversion_element j141 (x[ 223 :
                                      220 ],h[ 3
],c[ 223 :
            220 ]);
    coversion_element j142 (x[
                             227 :
                                      224 ],h[ 3
],c[ 227 : 224 ]);
                             231 :
    coversion_element j143 (x[
                                      228 ],h[ 3
],c[ 231 : 228 ]);
    coversion element j144 (x[ 235 :
                                      232 ],h[ 3
],c[ 235 : 232 ]);
    coversion element j145 (x[ 239 : 236 ],h[ 3
],c[ 239 : 236 ]);
```

```
coversion element j146 (x\begin{bmatrix} 243 : 240 \end{bmatrix},h\begin{bmatrix} 3 \end{bmatrix}
            240 ]);
],c[ 243 :
     coversion_element j147 (x[ 247 : 244 ],h[ 3
],c[ 247 :
           244 ]);
     coversion element j148 (x[ 251 : 248 ],h[ 3
],c[ 251 : 248 ]);
     coversion_element j149 (x[ 255 : 252 ],h[ 3
],c[ 255 : 252 ]);
encoder_256 prrr(outfi,result,clk);
endmodule
module pe_256bit_Test();
reg [255:0] D;
wire [255:0] Y;
wire V;
pe_256bit i(D,Y,V);
initial
begin
// Initialize Inputs
D = 0;
#100;
#2 D = 256'b00001;
#2 D = 256'b00010;
#2 D = 256'b00011;
#2 D = 256'b00100;
#2 D = 256'b10101;
end
initial
```

```
begin
$monitor("time=",$time,, "D=%b : Y=%b V=%b",D,Y,V);
end
endmodule
     Conversion element.v:
module coversion element(a, b, res);
input [3:0]a;
input b;
output [3:0]res;
     wire [3:0]res;
     assign res[0] = a[0] \& b;
     assign res[1] = a[1] & b;
     assign res[2] = a[2] & b;
     assign res[3] = a[3] & b;
endmodule
     Encoder256 8.v
module encoder 256 (in, out, clk);
  input [255:0]in;
  output [7:0]out;
  input clk;
  assign out[0] = in[1] | in[3] | in[5] | in[7] | in[9] | in[11] |
in[13] | in[15] | in[17] | in[19] | in[21] | in[23] | in[25] | in[27] |
in[29] | in[31] | in[33] | in[35] | in[37] | in[39] | in[41] | in[43] |
```

```
in[45] | in[47] | in[49] | in[51] | in[53] | in[55] | in[57] | in[59] |
in[61] | in[63] | in[65] | in[67] | in[69] | in[71] | in[73] | in[75] |
in[77] | in[79] | in[81] | in[83] | in[85] | in[87] | in[89] | in[91] |
in[93] | in[95] | in[97] | in[99] | in[101] | in[103] | in[105] |
in[107] | in[109] | in[111] | in[113] | in[115] | in[117] | in[119]
| in[121] | in[123] | in[125] | in[127] | in[129] | in[131] |
in[133] | in[135] | in[137] | in[139] | in[141] | in[143] | in[145]
| in[147] | in[149] | in[151] | in[153] | in[155] | in[157] |
in[159] | in[161] | in[163] | in[165] | in[167] | in[169] | in[171]
| in[173] | in[175] | in[177] | in[179] | in[181] | in[183] |
in[185] | in[187] | in[189] | in[191] | in[193] | in[195] | in[197]
| in[199] | in[201] | in[203] | in[205] | in[207] | in[209] |
in[211] | in[213] | in[215] | in[217] | in[219] | in[221] | in[223]
| in[225] | in[227] | in[229] | in[231] | in[233] | in[235] |
in[237] | in[239] | in[241] | in[243] | in[245] | in[247] | in[249]
| in[251] | in[253] | in[255];
```

```
assign out[1] = in[2] | in[3] | in[6] | in[7] | in[10] | in[11] |
in[14] | in[15] | in[18] | in[19] | in[22] | in[23] | in[26] | in[27] |
in[30] | in[31] | in[34] | in[35] | in[38] | in[39] | in[42] | in[43] |
in[46] | in[47] | in[50] | in[51] | in[54] | in[55] | in[58] | in[59] |
in[62] | in[63] | in[66] | in[67] | in[70] | in[71] | in[74] | in[75] |
in[78] | in[79] | in[82] | in[83] | in[86] | in[87] | in[90] | in[91] |
in[94] | in[95] | in[98] | in[99] | in[102] | in[103] | in[106] |
in[107] | in[110] | in[111] | in[114] | in[115] | in[118] | in[119] |
in[122] | in[123] | in[126] | in[127] | in[130] | in[131] |
in[134] | in[135] | in[138] | in[139] | in[142] | in[143] | in[146] |
in[147] | in[150] | in[151] | in[154] | in[155] | in[170] | in[171] |
in[174] | in[175] | in[178] | in[179] | in[182] | in[183] |
```

```
in[186] | in[187] | in[190] | in[191] | in[194] | in[195] | in[198] | in[199] | in[202] | in[203] | in[206] | in[207] | in[210] | in[211] | in[214] | in[215] | in[218] | in[219] | in[222] | in[223] | in[226] | in[227] | in[230] | in[231] | in[234] | in[235] | in[238] | in[239] | in[242] | in[243] | in[246] | in[247] | in[250] | in[251] | in[254] | in[255];
```

```
assign out[2] = in[4] | in[5] | in[6] | in[7] | in[12] | in[13] |
in[14] | in[15] | in[20] | in[21] | in[22] | in[23] | in[28] | in[29] |
in[30] | in[31] | in[36] | in[37] | in[38] | in[39] | in[44] | in[45] |
in[46] | in[47] | in[52] | in[53] | in[54] | in[55] | in[60] | in[61] |
in[62] | in[63] | in[68] | in[69] | in[70] | in[71] | in[76] | in[77] |
in[78] | in[79] | in[84] | in[85] | in[86] | in[87] | in[92] | in[93] |
in[94] | in[95] | in[100] | in[101] | in[102] | in[103] | in[108] |
in[109] | in[110] | in[111] | in[116] | in[117] | in[118] | in[119]
| in[124] | in[125] | in[126] | in[127] | in[132] | in[133] |
in[134] | in[135] | in[140] | in[141] | in[142] | in[143] | in[148]
| in[149] | in[150] | in[151] | in[156] | in[157] | in[158] |
in[159] | in[164] | in[165] | in[166] | in[167] | in[172] | in[173]
| in[174] | in[175] | in[180] | in[181] | in[182] | in[183] |
in[188] | in[189] | in[190] | in[191] | in[196] | in[197] | in[198]
| in[199] | in[204] | in[205] | in[206] | in[207] | in[212] |
in[213] | in[214] | in[215] | in[220] | in[221] | in[222] | in[223]
| in[228] | in[229] | in[230] | in[231] | in[236] | in[237] |
in[238] | in[239] | in[244] | in[245] | in[246] | in[247] | in[252]
| in[253] | in[254] | in[255];
```

```
assign out[3] = in[8] | in[9] | in[10] | in[11] | in[12] | in[13] | in[14] | in[15] | in[24] | in[25] | in[26] | in[27] | in[28] | in[29] |
```

```
in[30] | in[31] | in[40] | in[41] | in[42] | in[43] | in[44] | in[45] |
in[46] | in[47] | in[56] | in[57] | in[58] | in[59] | in[60] | in[61] |
in[62] | in[63] | in[72] | in[73] | in[74] | in[75] | in[76] | in[77] |
in[78] \mid in[79] \mid in[88] \mid in[89] \mid in[90] \mid in[91] \mid in[92] \mid in[93] \mid
in[94] | in[95] | in[104] | in[105] | in[106] | in[107] | in[108] |
in[109] | in[110] | in[111] | in[120] | in[121] | in[122] | in[123]
| in[124] | in[125] | in[126] | in[127] | in[136] | in[137] |
in[138] | in[139] | in[140] | in[141] | in[142] | in[143] | in[152]
| in[153] | in[154] | in[155] | in[156] | in[157] | in[158] |
in[159] | in[168] | in[169] | in[170] | in[171] | in[172] | in[173]
| in[174] | in[175] | in[184] | in[185] | in[186] | in[187] |
in[188] | in[189] | in[190] | in[191] | in[200] | in[201] | in[202]
| in[203] | in[204] | in[205] | in[206] | in[207] | in[216] |
in[217] | in[218] | in[219] | in[220] | in[221] | in[222] | in[223]
| in[232] | in[233] | in[234] | in[235] | in[236] | in[237] |
in[238] | in[239] | in[248] | in[249] | in[250] | in[251] | in[252]
| in[253] | in[254] | in[255];
```

```
assign out[4] = in[16] | in[17] | in[18] | in[19] | in[20] |
in[21] | in[22] | in[23] | in[24] | in[25] | in[26] | in[27] | in[28] |
in[29] | in[30] | in[31] | in[48] | in[49] | in[50] | in[51] | in[52] |
in[53] | in[54] | in[55] | in[56] | in[57] | in[58] | in[59] | in[60] |
in[61] | in[62] | in[63] | in[80] | in[81] | in[82] | in[83] | in[84] |
in[85] | in[86] | in[87] | in[88] | in[89] | in[90] | in[91] | in[92] |
in[93] | in[94] | in[95] | in[112] | in[113] | in[114] | in[115] |
in[116] | in[117] | in[118] | in[119] | in[120] | in[121] | in[122] |
in[123] | in[124] | in[125] | in[126] | in[127] | in[144] |
in[145] | in[146] | in[147] | in[148] | in[149] | in[150] | in[151] |
in[158] | in[159] | in[176] | in[177] | in[178] | in[179] | in[180]
```

```
| in[181] | in[182] | in[183] | in[184] | in[185] | in[186] | in[187] | in[188] | in[189] | in[190] | in[191] | in[208] | in[209] | in[210] | in[211] | in[212] | in[213] | in[214] | in[215] | in[216] | in[217] | in[218] | in[219] | in[220] | in[221] | in[222] | in[223] | in[240] | in[241] | in[242] | in[243] | in[244] | in[245] | in[246] | in[247] | in[248] | in[249] | in[250] | in[251] | in[252] | in[253] | in[254] | in[255];
```

```
assign out[5] = in[32] | in[33] | in[34] | in[35] | in[36] |
in[37] | in[38] | in[39] | in[40] | in[41] | in[42] | in[43] | in[44] |
in[45] | in[46] | in[47] | in[48] | in[49] | in[50] | in[51] | in[52] |
in[53] | in[54] | in[55] | in[56] | in[57] | in[58] | in[59] | in[60] |
in[61] | in[62] | in[63] | in[96] | in[97] | in[98] | in[99] | in[100]
| in[101] | in[102] | in[103] | in[104] | in[105] | in[106] |
in[107] | in[108] | in[109] | in[110] | in[111] | in[112] | in[113]
| in[114] | in[115] | in[116] | in[117] | in[118] | in[119] |
in[120] | in[121] | in[122] | in[123] | in[124] | in[125] | in[126]
| in[127] | in[160] | in[161] | in[162] | in[163] | in[164] |
in[165] | in[166] | in[167] | in[168] | in[169] | in[170] | in[171]
| in[172] | in[173] | in[174] | in[175] | in[176] | in[177] |
in[178] | in[179] | in[180] | in[181] | in[182] | in[183] | in[184]
| in[185] | in[186] | in[187] | in[188] | in[189] | in[190] |
in[191] | in[224] | in[225] | in[226] | in[227] | in[228] | in[229]
| in[230] | in[231] | in[232] | in[233] | in[234] | in[235] |
in[236] | in[237] | in[238] | in[239] | in[240] | in[241] | in[242]
| in[243] | in[244] | in[245] | in[246] | in[247] | in[248] |
in[249] | in[250] | in[251] | in[252] | in[253] | in[254] |
in[255];
```

```
assign out[6] = in[64] | in[65] | in[66] | in[67] | in[68] |
in[69] | in[70] | in[71] | in[72] | in[73] | in[74] | in[75] | in[76] |
in[77] | in[78] | in[79] | in[80] | in[81] | in[82] | in[83] | in[84] |
in[85] | in[86] | in[87] | in[88] | in[89] | in[90] | in[91] | in[92] |
in[93] | in[94] | in[95] | in[96] | in[97] | in[98] | in[99] | in[100]
| in[101] | in[102] | in[103] | in[104] | in[105] | in[106] |
in[107] | in[108] | in[109] | in[110] | in[111] | in[112] | in[113]
| in[114] | in[115] | in[116] | in[117] | in[118] | in[119] |
in[120] | in[121] | in[122] | in[123] | in[124] | in[125] | in[126]
| in[127] | in[192] | in[193] | in[194] | in[195] | in[196] |
in[197] | in[198] | in[199] | in[200] | in[201] | in[202] | in[203]
| in[204] | in[205] | in[206] | in[207] | in[208] | in[209] |
in[210] | in[211] | in[212] | in[213] | in[214] | in[215] | in[216]
| in[217] | in[218] | in[219] | in[220] | in[221] | in[222] |
in[223] | in[224] | in[225] | in[226] | in[227] | in[228] | in[229]
| in[230] | in[231] | in[232] | in[233] | in[234] | in[235] |
in[236] | in[237] | in[238] | in[239] | in[240] | in[241] | in[242]
| in[243] | in[244] | in[245] | in[246] | in[247] | in[248] |
in[249] | in[250] | in[251] | in[252] | in[253] | in[254] |
in[255];
```

```
assign out[7] = in[128] | in[129] | in[130] | in[131] | in[132] | in[133] | in[134] | in[135] | in[136] | in[137] | in[138] | in[139] | in[140] | in[141] | in[142] | in[143] | in[144] | in[145] | in[146] | in[147] | in[148] | in[149] | in[150] | in[151] | in[152] | in[153] | in[154] | in[155] | in[156] | in[157] | in[158] | in[159] | in[160] | in[161] | in[162] | in[163] | in[164] | in[165] | in[166] | in[167] | in[168] | in[169] | in[170] | in[171] | in[172] | in[173] | in[174] | in[175] | in[176] | in[183] | in[184]
```

```
| in[185] | in[186] | in[187] | in[188] | in[189] | in[190] |
in[191] | in[192] | in[193] | in[194] | in[195] | in[196] | in[197]
| in[198] | in[199] | in[200] | in[201] | in[202] | in[203] |
in[204] | in[205] | in[206] | in[207] | in[208] | in[209] | in[210]
| in[211] | in[212] | in[213] | in[214] | in[215] | in[216] |
in[217] | in[218] | in[219] | in[220] | in[221] | in[222] | in[223]
| in[224] | in[225] | in[226] | in[227] | in[228] | in[229] |
in[230] | in[231] | in[232] | in[233] | in[234] | in[235] | in[236]
| in[237] | in[238] | in[239] | in[240] | in[241] | in[242] |
in[243] | in[244] | in[245] | in[246] | in[247] | in[248] | in[249]
| in[250] | in[251] | in[252] | in[253] | in[254] | in[255];
endmodule
     rca.v
module rca3(s,cout,a,b,c);
input [2:0]a,b;
input c;
output [2:0]s;
output cout;
wire [1:0]w;
fulladder f1(s[0],w[0],a[0],b[0],c);
fulladder f2(s[1],w[1],a[1],b[1],w[0]);
```

```
fulladder f3(s[2],cout,a[2],b[2],w[1]);
endmodule
     cu.v
module cu(out,in,clk);
input clk;
input [31:0]in;
output [31:0]out;
assign out[31:0]=in[31:0];
     adder.v
module fulladder(s,cout,a,b,c);
input a,b,c;
output s,cout;
assign s=a^b^c;
assign cout=(a&b) | (b&c) | (c&a);
endmodule
```

## controlunit.v (top module)

```
/*
Initializing BRAM in .coe file
*/
module pe_cu(a,d,clk,ena,wea);
output [7:0]d;
input clk;
input ena;
input wea;
input [31:0]a;
wire [255:0]r,out,m;
wire [31:0]out1;
//BRAM(clk,ena,wea,addra,dina,douta);
wire [31:0]k[7:0];
wire cout;
wire [2:0]s;
wire [2:0]s1;
wire [2:0]s2;
```

```
wire [2:0]s3;
wire [2:0]s4;
wire [2:0]s5;
wire [2:0]s6;
blk_mem_gen_0 y1(clk,ena,wea,var1,a,k[0]);
rca3 z1(s,cout,var1);
blk_mem_gen_0 y2(clk,ena,wea,s,a,k[1]);
rca3 z2(s1,cout,s);
blk_mem_gen_0 y3(clk,ena,wea,s1,a,k[2]);
rca3 z3(s2,cout,s1);
blk_mem_gen_0 y4(clk,ena,wea,s2,a,k[3]);
rca3 z4(s3,cout,s2);
blk mem gen 0 y5(clk,ena,wea,s3,a,k[4]);
rca3 z5(s4,cout,s3);
```

```
blk mem gen 0 y6(clk,ena,wea,s4,a,k[5]);
rca3 z6(s5,cout,s4);
blk_mem_gen_0 y7(clk,ena,wea,s5,a,k[6]);
rca3 z7(s6,cout,s5);
blk_mem_gen_0 y8(clk,ena,wea,s6,a,k[7]);
//CU
cu fr0(m[31:0],k[0],clk);
cu fr1(m[63:32],k[1],clk);
cu fr2(m[95:64],k[2],clk);
cu fr3(m[127:96],k[3],clk);
cu fr4(m[159:128],k[4],clk);
cu fr5(m[191:160],k[5],clk);
cu fr6(m[223:192],k[6],clk);
cu fr7(m[255:224],k[7],clk);
```

wire v;

```
pe_256 p1(m[255:0],d[7:0],v,clk); endmodule
```

## Output:

Mapped the output on the FPGA Zedboard.

# **Experiment no. 10:**

<u>Aim</u>: To synthesize the TCAM using SRAM and map it onto the FPGA.

#### Code:

## controlunit.v (top module)

```
module pe_cu(a,var,d,clk,ena,wea);
output [7:0]d;
```

input clk;

input ena;

input wea;

wire [255:0]r;

wire [143:0]m;

wire cout;

```
wire [1:0]s;
wire [1:0]s1;
wire [1:0]s2;
wire [1:0]s3;
input [1:0]var;
input [35:0]a;
wire [35:0]k[3:0];
blk mem gen 0 y1(clk,ena,wea,var,a,k[0]);
rca2 z1(s,cout,var);
blk_mem_gen_0 y2(clk,ena,wea,s,a,k[1]);
rca2 z2(s1,cout,s);
blk_mem_gen_0 y3(clk,ena,wea,s1,a,k[2]);
rca2 z3(s2,cout,s1);
blk_mem_gen_0 y4(clk,ena,wea,s2,a,k[3]);
//CU
cu fr0(m[35:0],k[0],clk);
cu fr1(m[71:36],k[1],clk);
cu fr2(m[107:72],k[2],clk);
```

```
cu fr3(m[143:108],k[3],clk);
//TCAM
tcam t1(m,r);
wire v;
pe_256 p1(r[255:0],d[7:0],v,clk);
endmodule
tcam.v
module tcam(W,N);
input [143:0]W;
output [255:0]N;
wire [255:0]d1[3:0];
assign d1[0][255:0] = 256'd120;
assign d1[1][255:0] = 256'd121;
assign d1[2][255:0] = 256'd122;
assign d1[3][255:0] = 256'd123;
wire [255:0]d2[3:0];
assign d2[0][255:0] = 256'd120;
assign d2[1][255:0] = 256'd121;
assign d2[2][255:0] = 256'd122;
assign d2[3][255:0] = 256'd123;
```

```
wire [255:0]d3[3:0];
assign d3[0][255:0] = 256'd120;
assign d3[1][255:0] = 256'd121;
assign d3[2][255:0] = 256'd122;
assign d3[3][255:0] = 256'd123;
wire [255:0]d4[3:0];
assign d4[0][255:0] = 256'd120;
assign d4[1][255:0] = 256'd121;
assign d4[2][255:0] = 256'd122;
assign d4[3][255:0] = 256'd123;
wire [255:0]d5[3:0];
assign d5[0][255:0] = 256'd120;
assign d5[1][255:0] = 256'd121;
assign d5[2][255:0] = 256'd122;
assign d5[3][255:0] = 256'd123;
wire [255:0]d6[3:0];
assign d6[0][255:0] = 256'd120;
assign d6[1][255:0] = 256'd121;
assign d6[2][255:0] = 256'd122;
assign d6[3][255:0] = 256'd123;
wire [255:0]d7[3:0];
assign d7[0][255:0] = 256'd120;
```

```
assign d7[1][255:0] = 256'd121;
assign d7[2][255:0] = 256'd122;
assign d7[3][255:0] = 256'd123;
wire [255:0]d8[3:0];
assign d8[0][255:0] = 256'd120;
assign d8[1][255:0] = 256'd121;
assign d8[2][255:0] = 256'd122;
assign d8[3][255:0] = 256'd123;
wire [255:0]d9[3:0];
assign d9[0][255:0] = 256'd120;
assign d9[1][255:0] = 256'd121;
assign d9[2][255:0] = 256'd122;
assign d9[3][255:0] = 256'd123;
wire [255:0]d10[3:0];
assign d10[0][255:0] = 256'd120;
assign d10[1][255:0] = 256'd121;
assign d10[2][255:0] = 256'd122;
assign d10[3][255:0] = 256'd123;
wire [255:0]d11[3:0];
assign d11[0][255:0] = 256'd120;
assign d11[1][255:0] = 256'd121;
assign d11[2][255:0] = 256'd122;
```

```
assign d11[3][255:0] = 256'd123;
wire [255:0]d12[3:0];
assign d12[0][255:0] = 256'd120;
assign d12[1][255:0] = 256'd121;
assign d12[2][255:0] = 256'd122;
assign d12[3][255:0] = 256'd123;
wire [255:0]d13[3:0];
assign d13[0][255:0] = 256'd120;
assign d13[1][255:0] = 256'd121;
assign d13[2][255:0] = 256'd122;
assign d13[3][255:0] = 256'd123;
wire [255:0]d14[3:0];
assign d14[0][255:0] = 256'd120;
assign d14[1][255:0] = 256'd121;
assign d14[2][255:0] = 256'd122;
assign d14[3][255:0] = 256'd123;
wire [255:0]d15[3:0];
assign d15[0][255:0] = 256'd120;
assign d15[1][255:0] = 256'd121;
assign d15[2][255:0] = 256'd122;
assign d15[3][255:0] = 256'd123;
wire [255:0]d16[3:0];
```

```
assign d16[0][255:0] = 256'd120;
assign d16[1][255:0] = 256'd121;
assign d16[2][255:0] = 256'd122;
assign d16[3][255:0] = 256'd123;
wire [255:0]d17[3:0];
assign d17[0][255:0] = 256'd120;
assign d17[1][255:0] = 256'd121;
assign d17[2][255:0] = 256'd122;
assign d17[3][255:0] = 256'd123;
wire [255:0]d18[3:0];
assign d18[0][255:0] = 256'd120;
assign d18[1][255:0] = 256'd121;
assign d18[2][255:0] = 256'd122;
assign d18[3][255:0] = 256'd123;
wire [255:0]d19[3:0];
assign d19[0][255:0] = 256'd120;
assign d19[1][255:0] = 256'd121;
assign d19[2][255:0] = 256'd122;
assign d19[3][255:0] = 256'd123;
wire [255:0]d20[3:0];
assign d20[0][255:0] = 256'd120;
assign d20[1][255:0] = 256'd121;
```

```
assign d20[2][255:0] = 256'd122;
assign d20[3][255:0] = 256'd123;
wire [255:0]d21[3:0];
assign d21[0][255:0] = 256'd120;
assign d21[1][255:0] = 256'd121;
assign d21[2][255:0] = 256'd122;
assign d21[3][255:0] = 256'd123;
wire [255:0]d22[3:0];
assign d22[0][255:0] = 256'd120;
assign d22[1][255:0] = 256'd121;
assign d22[2][255:0] = 256'd122;
assign d22[3][255:0] = 256'd123;
wire [255:0]d23[3:0];
assign d23[0][255:0] = 256'd120;
assign d23[1][255:0] = 256'd121;
assign d23[2][255:0] = 256'd122;
assign d23[3][255:0] = 256'd123;
wire [255:0]d24[3:0];
assign d24[0][255:0] = 256'd120;
assign d24[1][255:0] = 256'd121;
assign d24[2][255:0] = 256'd122;
assign d24[3][255:0] = 256'd123;
```

```
wire [255:0]d25[3:0];
assign d25[0][255:0] = 256'd120;
assign d25[1][255:0] = 256'd121;
assign d25[2][255:0] = 256'd122;
assign d25[3][255:0] = 256'd123;
wire [255:0]d26[3:0];
assign d26[0][255:0] = 256'd120;
assign d26[1][255:0] = 256'd121;
assign d26[2][255:0] = 256'd122;
assign d26[3][255:0] = 256'd123;
wire [255:0]d27[3:0];
assign d27[0][255:0] = 256'd120;
assign d27[1][255:0] = 256'd121;
assign d27[2][255:0] = 256'd122;
assign d27[3][255:0] = 256'd123;
wire [255:0]d28[3:0];
assign d28[0][255:0] = 256'd120;
assign d28[1][255:0] = 256'd121;
assign d28[2][255:0] = 256'd122;
assign d28[3][255:0] = 256'd123;
wire [255:0]d29[3:0];
assign d29[0][255:0] = 256'd120;
```

```
assign d29[1][255:0] = 256'd121;
assign d29[2][255:0] = 256'd122;
assign d29[3][255:0] = 256'd123;
wire [255:0]d30[3:0];
assign d30[0][255:0] = 256'd120;
assign d30[1][255:0] = 256'd121;
assign d30[2][255:0] = 256'd122;
assign d30[3][255:0] = 256'd123;
wire [255:0]d31[3:0];
assign d31[0][255:0] = 256'd120;
assign d31[1][255:0] = 256'd121;
assign d31[2][255:0] = 256'd122;
assign d31[3][255:0] = 256'd123;
wire [255:0]d32[3:0];
assign d32[0][255:0] = 256'd120;
assign d32[1][255:0] = 256'd121;
assign d32[2][255:0] = 256'd122;
assign d32[3][255:0] = 256'd123;
wire [255:0]d33[3:0];
assign d33[0][255:0] = 256'd120;
assign d33[1][255:0] = 256'd121;
assign d33[2][255:0] = 256'd122;
```

```
assign d33[3][255:0] = 256'd123;
wire [255:0]d34[3:0];
assign d34[0][255:0] = 256'd120;
assign d34[1][255:0] = 256'd121;
assign d34[2][255:0] = 256'd122;
assign d34[3][255:0] = 256'd123;
wire [255:0]d35[3:0];
assign d35[0][255:0] = 256'd120;
assign d35[1][255:0] = 256'd121;
assign d35[2][255:0] = 256'd122;
assign d35[3][255:0] = 256'd123;
wire [255:0]d36[3:0];
assign d36[0][255:0] = 256'd120;
assign d36[1][255:0] = 256'd121;
assign d36[2][255:0] = 256'd122;
assign d36[3][255:0] = 256'd123;
wire [255:0]d37[3:0];
assign d37[0][255:0] = 256'd120;
assign d37[1][255:0] = 256'd121;
assign d37[2][255:0] = 256'd122;
assign d37[3][255:0] = 256'd123;
wire [255:0]d38[3:0];
```

```
assign d38[0][255:0] = 256'd120;
assign d38[1][255:0] = 256'd121;
assign d38[2][255:0] = 256'd122;
assign d38[3][255:0] = 256'd123;
wire [255:0]d39[3:0];
assign d39[0][255:0] = 256'd120;
assign d39[1][255:0] = 256'd121;
assign d39[2][255:0] = 256'd122;
assign d39[3][255:0] = 256'd123;
wire [255:0]d40[3:0];
assign d40[0][255:0] = 256'd120;
assign d40[1][255:0] = 256'd121;
assign d40[2][255:0] = 256'd122;
assign d40[3][255:0] = 256'd123;
wire [255:0]d41[3:0];
assign d41[0][255:0] = 256'd120;
assign d41[1][255:0] = 256'd121;
assign d41[2][255:0] = 256'd122;
assign d41[3][255:0] = 256'd123;
wire [255:0]d42[3:0];
assign d42[0][255:0] = 256'd120;
assign d42[1][255:0] = 256'd121;
```

```
assign d42[2][255:0] = 256'd122;
assign d42[3][255:0] = 256'd123;
wire [255:0]d43[3:0];
assign d43[0][255:0] = 256'd120;
assign d43[1][255:0] = 256'd121;
assign d43[2][255:0] = 256'd122;
assign d43[3][255:0] = 256'd123;
wire [255:0]d44[3:0];
assign d44[0][255:0] = 256'd120;
assign d44[1][255:0] = 256'd121;
assign d44[2][255:0] = 256'd122;
assign d44[3][255:0] = 256'd123;
wire [255:0]d45[3:0];
assign d45[0][255:0] = 256'd120;
assign d45[1][255:0] = 256'd121;
assign d45[2][255:0] = 256'd122;
assign d45[3][255:0] = 256'd123;
wire [255:0]d46[3:0];
assign d46[0][255:0] = 256'd120;
assign d46[1][255:0] = 256'd121;
assign d46[2][255:0] = 256'd122;
assign d46[3][255:0] = 256'd123;
```

```
wire [255:0]d47[3:0];
assign d47[0][255:0] = 256'd120;
assign d47[1][255:0] = 256'd121;
assign d47[2][255:0] = 256'd122;
assign d47[3][255:0] = 256'd123;
wire [255:0]d48[3:0];
assign d48[0][255:0] = 256'd120;
assign d48[1][255:0] = 256'd121;
assign d48[2][255:0] = 256'd122;
assign d48[3][255:0] = 256'd123;
wire [255:0]d49[3:0];
assign d49[0][255:0] = 256'd120;
assign d49[1][255:0] = 256'd121;
assign d49[2][255:0] = 256'd122;
assign d49[3][255:0] = 256'd123;
wire [255:0]d50[3:0];
assign d50[0][255:0] = 256'd120;
assign d50[1][255:0] = 256'd121;
assign d50[2][255:0] = 256'd122;
assign d50[3][255:0] = 256'd123;
wire [255:0]d51[3:0];
assign d51[0][255:0] = 256'd120;
```

```
assign d51[1][255:0] = 256'd121;
assign d51[2][255:0] = 256'd122;
assign d51[3][255:0] = 256'd123;
wire [255:0]d52[3:0];
assign d52[0][255:0] = 256'd120;
assign d52[1][255:0] = 256'd121;
assign d52[2][255:0] = 256'd122;
assign d52[3][255:0] = 256'd123;
wire [255:0]d53[3:0];
assign d53[0][255:0] = 256'd120;
assign d53[1][255:0] = 256'd121;
assign d53[2][255:0] = 256'd122;
assign d53[3][255:0] = 256'd123;
wire [255:0]d54[3:0];
assign d54[0][255:0] = 256'd120;
assign d54[1][255:0] = 256'd121;
assign d54[2][255:0] = 256'd122;
assign d54[3][255:0] = 256'd123;
wire [255:0]d55[3:0];
assign d55[0][255:0] = 256'd120;
assign d55[1][255:0] = 256'd121;
assign d55[2][255:0] = 256'd122;
```

```
assign d55[3][255:0] = 256'd123;
wire [255:0]d56[3:0];
assign d56[0][255:0] = 256'd120;
assign d56[1][255:0] = 256'd121;
assign d56[2][255:0] = 256'd122;
assign d56[3][255:0] = 256'd123;
wire [255:0]d57[3:0];
assign d57[0][255:0] = 256'd120;
assign d57[1][255:0] = 256'd121;
assign d57[2][255:0] = 256'd122;
assign d57[3][255:0] = 256'd123;
wire [255:0]d58[3:0];
assign d58[0][255:0] = 256'd120;
assign d58[1][255:0] = 256'd121;
assign d58[2][255:0] = 256'd122;
assign d58[3][255:0] = 256'd123;
wire [255:0]d59[3:0];
assign d59[0][255:0] = 256'd120;
assign d59[1][255:0] = 256'd121;
assign d59[2][255:0] = 256'd122;
assign d59[3][255:0] = 256'd123;
wire [255:0]d60[3:0];
```

```
assign d60[0][255:0] = 256'd120;
assign d60[1][255:0] = 256'd121;
assign d60[2][255:0] = 256'd122;
assign d60[3][255:0] = 256'd123;
wire [255:0]d61[3:0];
assign d61[0][255:0] = 256'd120;
assign d61[1][255:0] = 256'd121;
assign d61[2][255:0] = 256'd122;
assign d61[3][255:0] = 256'd123;
wire [255:0]d62[3:0];
assign d62[0][255:0] = 256'd120;
assign d62[1][255:0] = 256'd121;
assign d62[2][255:0] = 256'd122;
assign d62[3][255:0] = 256'd123;
wire [255:0]d63[3:0];
assign d63[0][255:0] = 256'd120;
assign d63[1][255:0] = 256'd121;
assign d63[2][255:0] = 256'd122;
assign d63[3][255:0] = 256'd123;
wire [255:0]d64[3:0];
assign d64[0][255:0] = 256'd120;
assign d64[1][255:0] = 256'd121;
```

```
assign d64[2][255:0] = 256'd122;
assign d64[3][255:0] = 256'd123;
wire [255:0]d65[3:0];
assign d65[0][255:0] = 256'd120;
assign d65[1][255:0] = 256'd121;
assign d65[2][255:0] = 256'd122;
assign d65[3][255:0] = 256'd123;
wire [255:0]d66[3:0];
assign d66[0][255:0] = 256'd120;
assign d66[1][255:0] = 256'd121;
assign d66[2][255:0] = 256'd122;
assign d66[3][255:0] = 256'd123;
wire [255:0]d67[3:0];
assign d67[0][255:0] = 256'd120;
assign d67[1][255:0] = 256'd121;
assign d67[2][255:0] = 256'd122;
assign d67[3][255:0] = 256'd123;
wire [255:0]d68[3:0];
assign d68[0][255:0] = 256'd120;
assign d68[1][255:0] = 256'd121;
assign d68[2][255:0] = 256'd122;
assign d68[3][255:0] = 256'd123;
```

```
wire [255:0]d69[3:0];
assign d69[0][255:0] = 256'd120;
assign d69[1][255:0] = 256'd121;
assign d69[2][255:0] = 256'd122;
assign d69[3][255:0] = 256'd123;
wire [255:0]d70[3:0];
assign d70[0][255:0] = 256'd120;
assign d70[1][255:0] = 256'd121;
assign d70[2][255:0] = 256'd122;
assign d70[3][255:0] = 256'd123;
wire [255:0]d71[3:0];
assign d71[0][255:0] = 256'd120;
assign d71[1][255:0] = 256'd121;
assign d71[2][255:0] = 256'd122;
assign d71[3][255:0] = 256'd123;
wire [255:0]d72[3:0];
assign d72[0][255:0] = 256'd120;
assign d72[1][255:0] = 256'd121;
assign d72[2][255:0] = 256'd122;
assign d72[3][255:0] = 256'd123;
```

wire [255:0]out1;

```
wire [255:0]out2;
```

```
wire [255:0]out24;
```

```
wire [255:0]out46;
```

```
wire [255:0]out68;
wire [255:0]out69;
wire [255:0]out70;
wire [255:0]out71;
wire [255:0]out72;
integer i1;
mux m1(W[1:0],d1[0],d1[1],d1[2],d1[3],out1);
//assign N[255:0] = out1[255:0];
mux m2(W[3:2],d2[0],d2[1],d2[2],d2[3],out2);
mux m3(W[5:4],d3[0],d3[1],d3[2],d3[3],out3);
mux m4(W[7:6],d4[0],d4[1],d4[2],d4[3],out4);
mux m5(W[9:8],d5[0],d5[1],d5[2],d5[3],out5);
mux m6(W[11:10],d6[0],d6[1],d6[2],d6[3],out6);
mux m7(W[13:12],d7[0],d7[1],d7[2],d7[3],out7);
mux m8(W[15:14],d8[0],d8[1],d8[2],d8[3],out8);
mux m9(W[17:16],d9[0],d9[1],d9[2],d9[3],out9);
mux m10(W[19:18],d10[0],d10[1],d10[2],d10[3],out10);
mux m11(W[21:20],d11[0],d11[1],d11[2],d11[3],out11);
mux m12(W[23:22],d12[0],d12[1],d12[2],d12[3],out12);
mux m13(W[25:24],d13[0],d13[1],d13[2],d13[3],out13);
mux m14(W[27:26],d14[0],d14[1],d14[2],d14[3],out14);
```

mux m15(W[29:28],d15[0],d15[1],d15[2],d15[3],out15); mux m16(W[31:30],d16[0],d16[1],d16[2],d16[3],out16); mux m17(W[33:32],d17[0],d17[1],d17[2],d17[3],out17); mux m18(W[35:34],d18[0],d18[1],d18[2],d18[3],out18); mux m19(W[37:36],d19[0],d19[1],d19[2],d19[3],out19); mux m20(W[39:38],d20[0],d20[1],d20[2],d20[3],out20); mux m21(W[41:40],d21[0],d21[1],d21[2],d21[3],out21); mux m22(W[43:42],d22[0],d22[1],d22[2],d22[3],out22); mux m23(W[45:44],d23[0],d23[1],d23[2],d23[3],out23); mux m24(W[47:46],d24[0],d24[1],d24[2],d24[3],out24); mux m25(W[49:48],d25[0],d25[1],d25[2],d25[3],out25); mux m26(W[51:50],d26[0],d26[1],d26[2],d26[3],out26); mux m27(W[53:52],d27[0],d27[1],d27[2],d27[3],out27); mux m28(W[55:54],d28[0],d28[1],d28[2],d28[3],out28); mux m29(W[57:56],d29[0],d29[1],d29[2],d29[3],out29); mux m30(W[59:58],d30[0],d30[1],d30[2],d30[3],out30); mux m31(W[61:60],d31[0],d31[1],d31[2],d31[3],out31); mux m32(W[63:62],d32[0],d32[1],d32[2],d32[3],out32); mux m33(W[65:64],d33[0],d33[1],d33[2],d33[3],out33); mux m34(W[67:66],d34[0],d34[1],d34[2],d34[3],out34); mux m35(W[69:68],d35[0],d35[1],d35[2],d35[3],out35); mux m36(W[71:70],d36[0],d36[1],d36[2],d36[3],out36);

```
mux m37(W[73:72],d37[0],d37[1],d37[2],d37[3],out37);
mux m38(W[75:74],d38[0],d38[1],d38[2],d38[3],out38);
mux m39(W[77:76],d39[0],d39[1],d39[2],d39[3],out39);
mux m40(W[79:78],d40[0],d40[1],d40[2],d40[3],out40);
mux m41(W[81:80],d41[0],d41[1],d41[2],d41[3],out41);
mux m42(W[83:82],d42[0],d42[1],d42[2],d42[3],out42);
mux m43(W[85:84],d43[0],d43[1],d43[2],d43[3],out43);
mux m44(W[87:86],d44[0],d44[1],d44[2],d44[3],out44);
mux m45(W[89:88],d45[0],d45[1],d45[2],d45[3],out45);
mux m46(W[91:90],d46[0],d46[1],d46[2],d46[3],out46);
mux m47(W[93:92],d47[0],d47[1],d47[2],d47[3],out47);
mux m48(W[95:94],d48[0],d48[1],d48[2],d48[3],out48);
mux m49(W[97:96],d49[0],d49[1],d49[2],d49[3],out49);
mux m50(W[99:98],d50[0],d50[1],d50[2],d50[3],out50);
mux m51(W[101:100],d51[0],d51[1],d51[2],d51[3],out51);
mux m52(W[103:102],d52[0],d52[1],d52[2],d52[3],out52);
mux m53(W[105:104],d53[0],d53[1],d53[2],d53[3],out53);
mux m54(W[107:106],d54[0],d54[1],d54[2],d54[3],out54);
mux m55(W[109:108],d55[0],d55[1],d55[2],d55[3],out55);
mux m56(W[111:110],d56[0],d56[1],d56[2],d56[3],out56);
mux m57(W[113:112],d57[0],d57[1],d57[2],d57[3],out57);
mux m58(W[115:114],d58[0],d58[1],d58[2],d58[3],out58);
```

```
mux m59(W[117:116],d59[0],d59[1],d59[2],d59[3],out59);
mux m60(W[119:118],d60[0],d60[1],d60[2],d60[3],out60);
mux m61(W[121:120],d61[0],d61[1],d61[2],d61[3],out61);
mux m62(W[123:122],d62[0],d62[1],d62[2],d62[3],out62);
mux m63(W[125:124],d63[0],d63[1],d63[2],d63[3],out63);
mux m64(W[127:126],d64[0],d64[1],d64[2],d64[3],out64);
mux m65(W[129:128],d65[0],d65[1],d65[2],d65[3],out65);
mux m66(W[131:130],d66[0],d66[1],d66[2],d66[3],out66);
mux m67(W[133:132],d67[0],d67[1],d67[2],d67[3],out67);
mux m68(W[135:134],d68[0],d68[1],d68[2],d68[3],out68);
mux m69(W[137:136],d69[0],d69[1],d69[2],d69[3],out69);
mux m70(W[139:138],d70[0],d70[1],d70[2],d70[3],out70);
mux m71(W[141:140],d71[0],d71[1],d71[2],d71[3],out71);
mux m72(W[143:142],d72[0],d72[1],d72[2],d72[3],out72);
```

wire [255:0]and1;

wire [255:0]and2;

assign and1 = out1 & out2 & out3 & out4 & out5 & out6 & out7 & out8 & out9 & out10 & out11 & out12 & out13 & out14 & out15 & out16 & out17 & out18 & out19 & out20 & out21 & out22 & out23 & out24 & out25 & out26 & out27 & out28 & out29 & out30 & out31 & out32 & out33 & out34 & out35 & out36 & out37 & out38 & out39 & out40 & out41 &

```
out42 & out43 & out44 & out45 & out46 & out47 & out48 &
out49 & out50 & out51 & out52 & out53 & out54 & out55 &
out56 & out57 & out58 & out59 & out60 & out61 & out62 &
out63 & out64 & out65 & out66 & out67 & out68 & out69 &
out70 & out71 & out72;
wire u;
pe_256 mn(and1,and2,u);
endmodule
priority256.v
module pe 256(D, result, 14, clk);
input clk;
input[255:0]D;
wire [3:0] w [84:0]; // stage outputs
wire [63:0]o;//or output 1st stage
wire [16:0]o1;
wire [3:0]o2;
wire [63:0]11;
wire [15:0]12;
wire [3:0]13;
output 14;
wire [3:0]cout[127:0];
wire [3:0]fin[63:0];
```

```
wire [255:0]outfi;
real result1;
integer n,p;
//real result1;
output [7:0]result;
//output [7:0]result1;
//stage1
priority4bit a(D[3:0],w[0],l1[0]);
priority4bit a1(D[7:4],w[1],l1[1]);
priority4bit a2(D[11:8],w[2],11[2]);
priority4bit a3(D[15:12],w[3],11[3]);
priority4bit a4(D[19:16],w[4],l1[4]);
priority4bit a5(D[23:20],w[5],l1[5]);
priority4bit a6(D[27:24],w[6],l1[6]);
priority4bit a7(D[31:28],w[7],l1[7]);
priority4bit a8(D[35:32],w[8],11[8]);
priority4bit a9(D[39:36],w[9],11[9]);
priority4bit a10(D[43:40],w[10],l1[10]);
priority4bit a11(D[47:44],w[11],l1[11]);
priority4bit a12(D[51:48],w[12],l1[12]);
priority4bit a13(D[55:52],w[13],l1[13]);
```

```
priority4bit a14(D[59:56],w[14],l1[14]);
priority4bit a15(D[63:60],w[15],l1[15]);
priority4bit a16(D[67:64],w[16],l1[16]);
priority4bit a17(D[71:68],w[17],l1[17]);
priority4bit a18(D[75:72],w[18],l1[18]);
priority4bit a19(D[79:76],w[19],l1[19]);
priority4bit a20(D[83:80],w[20],11[20]);
priority4bit a21(D[87:84],w[21],l1[21]);
priority4bit a22(D[91:88],w[22],l1[22]);
priority4bit a23(D[95:92],w[23],l1[23]);
priority4bit a24(D[99:96],w[24],l1[24]);
priority4bit a25(D[103:100],w[25],l1[25]);
priority4bit a26(D[107:104],w[26],l1[26]);
priority4bit a27(D[111:108],w[27],l1[27]);
priority4bit a28(D[115:112],w[28],l1[28]);
priority4bit a29(D[119:116],w[29],l1[29]);
priority4bit a30(D[123:120],w[30],l1[30]);
priority4bit a31(D[127:124],w[31],l1[31]);
priority4bit a32(D[131:128],w[32],l1[32]);
priority4bit a33(D[135:132],w[33],l1[33]);
priority4bit a34(D[139:136],w[34],l1[34]);
priority4bit a35(D[143:140],w[35],11[35]);
```

```
priority4bit a36(D[147:144],w[36],l1[36]);
priority4bit a37(D[151:148],w[37],l1[37]);
priority4bit a38(D[155:152],w[38],l1[38]);
priority4bit a39(D[159:156],w[39],11[39]);
priority4bit a40(D[163:160],w[40],11[40]);
priority4bit a41(D[167:164],w[41],l1[41]);
priority4bit a42(D[171:168],w[42],l1[42]);
priority4bit a43(D[175:172],w[43],11[43]);
priority4bit a44(D[179:176],w[44],l1[44]);
priority4bit a45(D[183:180],w[45],l1[45]);
priority4bit a46(D[187:184],w[46],l1[46]);
priority4bit a47(D[191:188],w[47],l1[47]);
priority4bit a48(D[195:192],w[48],l1[48]);
priority4bit a49(D[199:196],w[49],l1[49]);
priority4bit a50(D[203:200],w[50],l1[50]);
priority4bit a51(D[207:204],w[51],l1[51]);
priority4bit a52(D[211:208],w[52],l1[52]);
priority4bit a53(D[215:212],w[53],l1[53]);
priority4bit a54(D[219:216],w[54],l1[54]);
priority4bit a55(D[223:220],w[55],l1[55]);
priority4bit a56(D[227:224],w[56],l1[56]);
priority4bit a57(D[231:228],w[57],l1[57]);
```

```
priority4bit a58(D[235:232],w[58],11[58]);
priority4bit a59(D[239:236],w[59],11[59]);
priority4bit a60(D[243:240],w[60],11[60]);
priority4bit a61(D[247:244],w[61],11[61]);
priority4bit a62(D[251:248],w[62],11[62]);
priority4bit a63(D[255:252],w[63],11[63]);
```

//stage 1 or

assign o[ 8 8 ][3]	][0] w[	8	][1] w[	8	][2] w[
assign o[ 9 9 ][3]	][0] w[	9	][1] w[	9	][2] w[
assign o[ 10 10 ][3]	 ][0] w[	10	][1] w[	10	][2] w[
assign o[ 11 11 ][3]	][0] w[	11	][1] w[	11	][2] w[
assign o[ 12 12 ][3]	][0] w[	12	][1] w[	12	][2] w[
assign o[ 13 13 ][3]	][0] w[	13	][1] w[	13	][2] w[
assign o[ 14 14 ][3]	][0] w[	14	][1] w[	14	][2] w[
assign o[ 15 15 ][3]	 ][0] w[	15	][1] w[	15	][2] w[
assign o[ 16 16 ][3]	 ][0] w[	16	][1] w[	16	][2] w[
assign o[ 17 17 ][3]	 ][0] w[	17	][1] w[	17	][2] w[
assign o[ 18 18 ][3]	][0] w[	18	][1] w[	18	][2] w[
assign o[ 19 19 ][3]	][0] w[	19	][1] w[	19	][2] w[

	20 ]=w[20 ][3];	][0] w[	20	][1] w[	20	][2] w[
	21 ]=w[21 ][3];	][0] w[	21	][1] w[	21	][2] w[
	22 ]=w[22 ][3];	][0] w[	22	][1] w[	22	][2] w[
	23 ]=w[23 ][3];	][0] w[	23	][1] w[	23	][2] w[
	24 ]=w[24 ][3];	][0] w[	24	][1] w[	24	][2] w[
	25 ]=w[25 ][3];	][0] w[	25	][1] w[	25	][2] w[
	26 ]=w[26 ][3];	][0] w[	26	][1] w[	26	][2] w[
	27 ]=w[27 ][3];	][0] w[	27	][1] w[	27	][2] w[
_	28 ]=w[28 ][3];	][0] w[	28	][1] w[	28	][2] w[
	29 ]=w[29 ][3];	][0] w[	29	][1] w[	29	][2] w[
_	30 ]=w[30 ][3];	][0] w[	30	][1] w[	30	][2] w[
	31 ]=w[31 ][3];	][0] w[	31	][1] w[	31	][2] w[

	32 ]=w[32 ][3];	][0] w[	32	][1] w[	32	][2] w[
	33 ]=w[33 ][3];	][0] w[	33	][1] w[	33	][2] w[
	34 ]=w[34 ][3];	][0] w[	34	][1] w[	34	][2] w[
	35 ]=w[35 ][3];	][0] w[	35	][1] w[	35	][2] w[
	36 ]=w[36 ][3];	][0] w[	36	][1] w[	36	][2] w[
	37 ]=w[37 ][3];	][0] w[	37	][1] w[	37	][2] w[
	38 ]=w[38 ][3];	][0] w[	38	][1] w[	38	][2] w[
_	39 ]=w[39 ][3];	][0] w[	39	][1] w[	39	][2] w[
_	40 ]=w[40 ][3];	][0] w[	40	][1] w[	40	][2] w[
	41 ]=w[41 ][3];	][0] w[	41	][1] w[	41	][2] w[
	42 ]=w[42 ][3];	][0] w[	42	][1] w[	42	][2] w[
	43 ]=w[43 ][3];	][0] w[	43	][1] w[	43	][2] w[

	44 ]=w[44 ][3];	][0] w[	44	][1] w[	44	][2] w[
	45 ]=w[45 ][3];	][0] w[	45	][1] w[	45	][2] w[
	46 ]=w[46 ][3];	][0] w[	46	][1] w[	46	][2] w[
_	47 ]=w[47 ][3];	][0] w[	47	][1] w[	47	][2] w[
_	48 ]=w[48 ][3];	][0] w[	48	][1] w[	48	][2] w[
	49 ]=w[49 ][3];	][0] w[	49	][1] w[	49	][2] w[
_	50 ]=w[50 ][3];	][0] w[	50	][1] w[	50	][2] w[
	51 ]=w[51 ][3];	][0] w[	51	][1] w[	51	][2] w[
	52 ]=w[52 ][3];	][0] w[	52	][1] w[	52	][2] w[
_	53 ]=w[53 ][3];	][0] w[	53	][1] w[	53	][2] w[
	54 ]=w[54 ][3];	][0] w[	54	][1] w[	54	][2] w[
	55 ]=w[55 ][3];	][0] w[	55	][1] w[	55	][2] w[

## //stage 2

```
priority4bit b(o[3:0],w[64],l2[0]);

priority4bit b1(o[7:4],w[65],l2[1]);

priority4bit b2(o[11:8],w[66],l2[2]);

priority4bit b3(o[15:12],w[67],l2[3]);

priority4bit b4(o[19:16],w[68],l2[4]);

priority4bit b5(o[23:20],w[69],l2[5]);
```

```
b6(o[27:24],w[70],12[6]);
priority4bit
               b7(o[31:28],w[71],l2[7]);
priority4bit
               b8(o[35:32],w[72],12[8]);
priority4bit
               b9(o[39:36],w[73],l2[9]);
priority4bit
priority4bit
               b10(o[43:40],w[74],l2[10]);
priority4bit
               b11(o[47:44],w[75],12[11]);
priority4bit
               b12(o[51:48],w[76],l2[12]);
               b13(o[55:52],w[77],l2[13]);
priority4bit
priority4bit
               b14(o[59:56],w[78],12[14]);
priority4bit
               b15(o[63:60],w[79],l2[15]);
//ce
    e (w[0 ],w[64 ][0 ],cout[0
                                    1);
          (w[1],w[64])
                          ][1
ce
    e1
                               ],cout[1
                                         1);
          (w[2],w[64])
                         ][2
    e2
                                         ]);
ce
                               ],cout[2
                         ][3
          (w[3],w[64])
                               ],cout[3
                                         ]);
    e3
ce
          (w[4],w[65])
                          ][0
                                         ]);
    e4
                               ],cout[4
ce
          (w[5],w[65])
                          ][1
                               ],cout[5
                                         ]);
    e5
ce
          (w[6],w[65])
                          ][2
                               ],cout[6
                                         ]);
ce
    e6
          (w[7],w[65])
                          ][3
                               ],cout[7
    e7
                                         ]);
ce
                         ||0||
                               ],cout[8
          (w[8],w[66])
                                         ]);
    e8
ce
          (w[9],w[66])
                          |[1
    e9
                               ],cout[9
                                         ]);
ce
```

```
][2
    e10
          (w[10]
                    ],w[66
                                    ],cout[10]);
ce
                               ][3
                    ],w[66]
    e11
          (w[11]
                                    ],cout[11]);
ce
          (w[12]
                    ],w[67
                               ][0
                                    ],cout[12 ]);
    e12
ce
                               ][1
          (w[13]
                    ],w[67]
                                    ],cout[13 ]);
    e13
ce
                               ][2
    e14
          (w[14]
                    ],w[67]
                                    ],cout[14]);
ce
                               ][3
          (w[15]
                    ],w[67]
    e15
                                    ],cout[15]);
ce
                               ][0
    e16
          (w[16]
                    ],w[68]
                                    ],cout[16]);
ce
                               ][1
          (w[17]
                    ],w[68]
    e17
                                    ],cout[17]);
ce
    e18
                               ][2
ce
          (w[18]
                    ],w[68]
                                    ],cout[18]);
          (w[19]
                    ],w[68]
                               ][3
                                    ],cout[19]);
    e19
ce
                               ][0
          (w[20]
                    ],w[69
                                    ],cout[20 ]);
    e20
ce
          (w[21
                    ],w[69
                               ][1
    e21
                                    ],cout[21]);
ce
                               ][2
          (w[22]
                    ],w[69
    e22
                                    ],cout[22]);
ce
                               ][3
ce
    e23
          (w[23]
                    ],w[69]
                                    ],cout[23]);
    e24
          (w[24]
                    ],w[70]
                               ||0||
                                    ],cout[24]);
ce
          (w[25]
                    ],w[70]
                               ][1
                                    ],cout[25 ]);
    e25
ce
          (w[26]
                               ][2
    e26
                    ],w[70]
                                    ],cout[26 ]);
ce
                               ][3
          (w[27]
                    ],w[70]
    e27
                                    ],cout[27]);
ce
                               ][0
                                    ],cout[28]);
          (w[28]
                    ],w[71]
    e28
ce
                               ][1
    e29
          (w[29]
                    ],w[71]
                                    ],cout[29]);
ce
                               ][2
          (w[30]
                    ],w[71]
                                    ],cout[30 ]);
    e30
ce
                               ][3
    e31
          (w[31]
                    ],w[71]
                                    ],cout[31]);
ce
```

```
],cout[32 ]);
    e32
          (w[32]
                    ],w[72]
                               ][0]
ce
                                    ],cout[33 ]);
          (w[33]
                               ][1
    e33
                    ],w[72]
ce
          (w[34]
                    ],w[72
                               ][2
                                    ],cout[34]);
    e34
ce
                               ][3
          (w[35]
                    ],w[72]
                                    ],cout[35]);
    e35
ce
                               ][0
    e36
          (w[36]
                    ],w[73]
                                    ],cout[36]);
ce
          (w[37]
                    ],w[73]
                               ][1
                                    ],cout[37]);
    e37
ce
    e38
          (w[38]
                    ],w[73]
                               ][2
                                    ],cout[38]);
ce
                               ][3
          (w[39]
                    ],w[73]
    e39
                                    ],cout[39]);
ce
                               ][0
    e40
          (w[40]
                    ],w[74]
                                    ],cout[40 ]);
ce
          (w[41
                    ],w[74]
                               ][1
    e41
                                    ],cout[41 ]);
ce
          (w[42]
                               ][2
                    ],w[74]
    e42
                                    ],cout[42]);
ce
                               ][3
          (w[43]
                                    ],cout[43 ]);
    e43
                    ],w[74]
ce
                               ][0
          (w[44]
                    ],w[75]
    e44
                                    ],cout[44 ]);
ce
                               ][1
          (w[45]
    e45
                    ],w[75]
                                    ],cout[45]);
ce
                               ][2
    e46
          (w[46]
                    ],w[75]
                                    ],cout[46 ]);
ce
                               ][3
          (w[47]
                    ],w[75
                                    ],cout[47]);
    e47
ce
          (w[48]
                               ][0
    e48
                    ],w[76]
                                    ],cout[48]);
ce
                               ][1
          (w[49]
                    ],w[76]
    e49
                                    ],cout[49]);
ce
          (w[50]
                               ][2
                                    ],cout[50]);
    e50
                    ],w[76
ce
                               ][3
    e51
          (w[51]
                    ],w[76]
                                    ],cout[51]);
ce
                               ||0
          (w[52]
                    ],w[77]
    e52
                                    ],cout[52]);
ce
          (w[53]
                               ][1
                                    ],cout[53 ]);
    e53
                    ],w[77]
ce
```

```
(w[54]
                   ],w[77
   e54
                             ][2
ce
                                 ],cout[54 ]);
                   ],w[77
                             ][3
         (w[55]
                                  ],cout[55]);
   e55
ce
         (w[56]
                   ],w[78
                             ][0
                                  ],cout[56 ]);
   e56
ce
                             ][1
         (w[57]
                   ],w[78
                                  ],cout[57]);
   e57
ce
         (w[58]
                   ],w[78]
                             ][2
                                  ],cout[58 ]);
   e58
ce
         (w[59]
                             ][3
                                  ],cout[59]);
   e59
                   ],w[78
ce
   e60
         (w[60]
                   ],w[79
                             ][0
                                 ],cout[60 ]);
ce
                             ][1
                   ],w[79
   e61
         (w[61]
                                  ],cout[61]);
ce
                             ][2
         (w[62]
                   ],w[79
                                 ],cout[62]);
ce
   e62
         (w[63
                   ],w[79
                             ][3
                                  ],cout[63 ]);
   e63
ce
```

## //or stage2

```
4 = w[68]
                                                68
                          ||0||w|
                                 68
                                       |[1]|w[
assign o1
][2]|w[
            ][3];
      68
assign o1[ 5 ]=w[69
                          |0|w
                                   69
                                       ||1||w||
                                                69
][2]|w[ 69
            ][3];
assign o1[ 6 ]=w[70
                                   70
                                                70
                          ||0||w|
                                       |[1]|w[
][2]|w[ 70
            ][3];
            7 = w[71]
assign o1[
                          ][0]|w[
                                   71
                                       ][1]|w[
                                                71
            ][3];
][2]|w[
      71
assign o1[ 8 ]=w[72
                                   72
                          ][0]|w[
                                       ||1||w||
                                                72
            ][3];
][2]|w[ 72
            9 = w[73]
                                   73
assign o1[
                          ][0]|w[
                                       ][1]|w[
                                                73
][2]|w[ 73
            ][3];
assign o1[ 10 ]=w[74
                          ][0]|w[
                                       ][1]|w[
                                   74
                                                74
            ][3];
][2]|w[ 74
            11 = w[75]
                                   75
assign o1[
                          ][0]|w[
                                       ][1]|w[
                                                75
][2]|w[ 75
            ][3];
assign o1[ 12 ]=w[76
                                   76
                          ][0]|w[
                                       ][1]|w[
                                                76
            ][3];
][2]|w[ 76
            13 = w[77]
                                   77
assign o1[
                          ][0]|w[
                                       ][1]|w[
                                                77
][2]|w[ 77
            ][3];
assign o1[ 14 ]=w[78
                         ][0]|w[
                                 78
                                       ][1]|w[
                                                78
][2]|w[ 78
            ][3];
assign o1[ 15 ]=w[ 79 ][0]|w[ 79 ][1]|w[ 79 ][2]|w[ 79
][3];
```

```
//stage3
              c(o1[3:0],w[80],13[0]);
priority4bit
priority4bit
               c1(o1[7:4],w[81],l3[1]);
               c2(o1[11:8],w[82],13[2]);
priority4bit
priority4bit
               c3(o1[15:12],w[83],l3[3]);
//ce
    f (cout[0],w[80][0],cout[64]);
                              ][0 ],cout[65 ]);
    f1
          (cout[1
                   ],w[80
ce
                                  ],cout[66 ]);
                   ],w[80
ce
    f2
          (cout[2
                              ][0]
          (cout[3
                   ],w[80
                              ][0
                                  ],cout[67]);
    f3
ce
                  ],w[80
                              ][1
    f4
          (cout[4
                                  ],cout[68 ]);
ce
                              ][1
    f5
          (cout[5
                   ],w[80
                                   ],cout[69 ]);
ce
                              ][1],cout[70
          (cout[6
                   ],w[80]
    f6
                                             1);
ce
                   ],w[80]
                                  ],cout[71 ]);
ce
    f7
          (cout[7
                              ||1|
    f8
                   ],w[80]
                              ][2
                                  ],cout[72]);
          (cout[8]
ce
                              ][2
    f9
                   ],w[80
                                  ],cout[73 ]);
          (cout[9
ce
    f10(cout[10],w[80
                         ][2
                              ],cout[74 ]);
ce
                         ][2
    f11(cout[11],w[80
                              ],cout[75 ]);
ce
                         ][3
    f12(cout[12],w[80
                              ],cout[76 ]);
ce
                         ][3
    f13(cout[13],w[80
                              ],cout[77]);
ce
                         ][3
    f14(cout[14],w[80
                              ],cout[78]);
ce
                         ][3
    f15(cout[15],w[80]
                              ],cout[79]);
ce
```

```
f16(cout[16],w[81
                         ||0||
                              ],cout[80 ]);
    f17(cout[17],w[81
                         ||0||
                              ],cout[81]);
ce
    f18(cout[18],w[81
                         ||0||
                              ],cout[82 ]);
ce
                         ][0]
    f19(cout[19],w[81
                              ],cout[83 ]);
ce
                              ],cout[84 ]);
    f20(cout[20],w[81
                         ][1
ce
    f21(cout[21],w[81
                         ][1
                              ],cout[85]);
ce
    f22(cout[22],w[81
                         ][1
                              ],cout[86 ]);
ce
    f23(cout[23],w[81]
                         ][1
                              ],cout[87]);
ce
                         ][2
    f24(cout[24],w[81
                              ],cout[88]);
ce
    f25(cout[25],w[81
                         ][2
                              ],cout[89 ]);
ce
                         ][2
    f26(cout[26],w[81
                              ],cout[90 ]);
ce
    f27(cout[27],w[81
                         ][2
                              ],cout[91 ]);
ce
    f28(cout[28],w[81
                              ],cout[92 ]);
                         ][3
ce
                         ][3
    f29(cout[29],w[81
                              ],cout[93]);
ce
    f30(cout[30],w[81
                         ][3
                              ],cout[94]);
ce
                         ][3
    f31(cout[31],w[81
                              ],cout[95 ]);
ce
                         ][0
    f32(cout[32],w[82
                              ],cout[96 ]);
ce
                         ][0
    f33(cout[33],w[82
                              ],cout[97]);
ce
                         ][0
    f34(cout[34],w[82
                              ],cout[98 ]);
ce
                         ][0]
    f35(cout[35],w[82]
                              ],cout[99]);
ce
```

][1

][1

],cout[100

],cout[101

]);

]);

f36(cout[36],w[82

f37(cout[37],w[82]

ce

ce

```
ce f38(cout[38],w[82 ][1 ],cout[102 ]);
```

```
f62(cout[62],w[83
                       ][3
                            ],cout[126
                                           ]);
ce
    f63(cout[63],w[83
                       ][3
                                           ]);
                            ],cout[127
ce
//or stage3
                   ]=w[80]
assign o2[
              0
                            ||0||w||
                                      80
                                           ||1||w||
                                                     80
][2]|w[
        80
              ][3];
assign o2[ 1
                  ]=w[81]
                            ][0]|w[
                                      81
                                           ][1]|w[
                                                     81
][2]|w[ 81
              ][3];
assign o2[
              2
                   ]=w[82]
                            ][0]|w[
                                      82
                                           ][1]|w[
                                                     82
][2]|w[
       82
              ][3];
              3 = w[83]
assign o2[
                            ][0]|w[
                                      83
                                           ][1]|w[
                                                     83
              ][3];
][2]|w[
       83
//stage 4
priority4bit
             d(o2[3:0],w[84],l4);
//
         (cout[64],w[84
                            ][0]
                                 ],fin[0
                                           ]);
ce
                            ][0
                                 ],fin[1
         (cout[65],w[84]
   g1
                                           ]);
ce
                            ][0
         (cout[66],w[84]
                                ],fin[2
                                           ]);
ce
   g2
```

],cout[124

],cout[125

][3

][3

]);

]);

f60(cout[60],w[83

f61(cout[61],w[83

ce

```
(cout[67], w[84]
                                ][0]
                                     ],fin[3
                                                ]);
ce
    g3
                                ][0
                                     ],fin[4
          (cout[68]
                    ],w[84]
                                                ]);
    g4
ce
          (cout[69],w[84]
                               ][0
                                     ],fin[5
                                                ]);
    g5
ce
                                ][0
          (cout[70],w[84]
                                     ],fin[6
                                                ]);
ce
    g6
                                ][0
                                     ],fin[7
          (cout[71]
                    ],w[84]
                                                ]);
ce
    g7
                                ][0
                                     ],fin[8
          (cout[72]
                    ],w[84]
                                                ]);
    g8
ce
          (cout[73
                                ][0
    g9
                    ],w[84
                                     ],fin[9
                                                ]);
ce
                               ][0
                     ],w[84]
                                     ],fin[10
                                                ]);
    g10(cout[74]
ce
                                ][0
                    ],w[84
                                     ],fin[11
    g11(cout[75
                                                ]);
ce
                    ],w[84
                               ][0
                                     ],fin[12
                                                ]);
    g12(cout[76
ce
                   ],w[84
                                ][0
                                     ],fin[13
    g13(cout[77]
                                                ]);
ce
                    ],w[84
                                ][0
                                     ],fin[14
    g14(cout[78]
                                                ]);
ce
                                ][0
                                     ],fin[15
    g15(cout[79]
                    ],w[84
                                                ]);
ce
                                ][1
                    ],w[84
                                     ],fin[16
    g16(cout[80]
                                                ]);
                               ][1
                    ],w[84]
                                     ],fin[17
    g17(cout[81]
                                                ]);
ce
                                     ],fin[18
                    ],w[84]
                                ][1
    g18(cout[82]
                                                ]);
ce
                     ],w[84]
                                ][1
                                     ],fin[19
    g19(cout[83
                                                ]);
ce
                                ][1
                                     ],fin[20
    g20(cout[84
                     ],w[84]
                                                ]);
ce
                    ],w[84
                                ][1
                                                ]);
    g21(cout[85]
                                     ],fin[21
ce
    g22(cout[86
                               ][1
                                     ],fin[22
                                                ]);
                    ],w[84]
ce
                               ][1
                    ],w[84]
    g23(cout[87]
                                     ],fin[23
                                                ]);
ce
                                     ],fin[24
                               ][1
    g24(cout[88]
                    ],w[84]
                                                ]);
```

```
g25(cout[89
                               ][1
                                    ],fin[25
                    ],w[84]
                                               1);
ce
                               ][1
                    ],w[84]
                                    ],fin[26
                                               ]);
    g26(cout[90
ce
    g27(cout[91
                    ],w[84
                               ][1
                                    ],fin[27
                                               ]);
ce
                               ][1
                                    ],fin[28
                                               ]);
    g28(cout[92
                    ],w[84
ce
                               ][1
    g29(cout[93
                    ],w[84
                                    ],fin[29
                                               ]);
                               ][1
                   ],w[84
                                    ],fin[30
                                               ]);
    g30(cout[94
ce
                                    ],fin[31
                               ][1
    g31(cout[95
                   ],w[84
                                               ]);
ce
                               ][2
    g32(cout[96
                    ],w[84
                                    ],fin[32
                                               ]);
ce
                               ][2
                                    ],fin[33
                                               ]);
    g33(cout[97
                    ],w[84
ce
                               ][2
    g34(cout[98
                    ],w[84
                                    ],fin[34
                                               ]);
ce
                               ][2
                    ],w[84
                                    ],fin[35
                                               ]);
    g35(cout[99
ce
                               ][2
                    ],w[84]
                                    ],fin[36
                                               ]);
    g36(cout[100
                               ][2
                                    ],fin[37
    g37(cout[101
                    ],w[84
                                               ]);
ce
                               ][2
                                               ]);
    g38(cout[102
                    ],w[84
                                    ],fin[38
    g39(cout[103
                               ][2
                                    ],fin[39
                                               ]);
                    ],w[84]
ce
                               ][2
                                    ],fin[40
                    ],w[84]
    g40(cout[104
                                               ]);
ce
                               ][2
                    ],w[84]
                                    ],fin[41
                                               ]);
    g41(cout[105
ce
                               ][2
                                    ],fin[42
                                               ]);
    g42(cout[106
                    ],w[84
ce
                    ],w[84]
                               ][2
                                    ],fin[43
                                               ]);
    g43(cout[107
                               ][2
    g44(cout[108
                                    ],fin[44
                    ],w[84]
                                               ]);
ce
                                    ],fin[45
                               ][2
                    ],w[84]
                                               ]);
    g45(cout[109
ce
                                    ],fin[46
                               ][2
                                               ]);
    g46(cout[110]
                    ],w[84]
```

```
g47(cout[111
                               ||2|
                    ],w[84]
                                    ],fin[47
                                              ]);
                               ][3
                    ],w[84]
                                    ],fin[48
    g48(cout[112
                                              ]);
ce
                    ],w[84
                               ][3
                                    ],fin[49
                                              ]);
    g49(cout[113
ce
                               ][3
                    ],w[84
                                    ],fin[50
                                              ]);
    g50(cout[114
ce
                               ][3
    g51(cout[115
                    ],w[84]
                                    ],fin[51
                                              ]);
                               ][3
                    ],w[84]
                                    ],fin[52
                                              ]);
    g52(cout[116
                                    ],fin[53
                               ][3
    g53(cout[117
                    ],w[84]
                                              ]);
                               ][3
                    ],w[84
                                    ],fin[54
                                              ]);
    g54(cout[118
ce
                               ][3
                                              ]);
    g55(cout[119
                    ],w[84
                                    ],fin[55
                               ][3
    g56(cout[120
                    ],w[84
                                    ],fin[56
                                              ]);
ce
                               ][3
                    ],w[84]
                                    ],fin[57
    g57(cout[121
                                              ]);
                               ][3
                    ],w[84]
                                    ],fin[58
                                              ]);
    g58(cout[122
ce
                               ][3
                                    ],fin[59
    g59(cout[123
                    ],w[84
                                              ]);
ce
                               ][3
                    ],w[84
                                    ],fin[60
                                              ]);
    g60(cout[124
                    ],w[84
                               ][3
                                    ],fin[61
                                              ]);
    g61(cout[125
ce
                               ][3
                    ],w[84
                                    ],fin[62
    g62(cout[126
                                              ]);
ce
                               ][3
                                    ],fin[63
    g63(cout[127
                    ],w[84
                                              ]);
ce
```

```
assign outfi[0]=fin[0][0]; assign outfi[1]=fin[0][1]; assign outfi[2]=fin[0][2];
```

```
assign outfi[3 ]=fin[0
                          ][3
                               ];
                               ];
                          ||0||
assign outfi[4]=fin[1
assign outfi[5]=fin[1
                          ][1
                               ];
                          ][2
                               ];
assign outfi[6]=fin[1
                               ];
assign outfi[7]=fin[1
                          ][3
                          ][0
                               ];
assign outfi[8]=fin[2]
assign outfi[9]=fin[2
                          ][1
                               ];
                          ][2
assign outfi[10]=fin[2
                               ];
                          ][3
                               ];
assign outfi[11]=fin[2
assign outfi[12]=fin[3
                          ][0
                               ];
                          ][1
                               ];
assign outfi[13]=fin[3
                          ][2
                               ];
assign outfi[14]=fin[3
                          ][3
assign outfi[15]=fin[3
                               ];
                          ][0
assign outfi[16]=fin[4
                               ];
assign outfi[17]=fin[4
                          ][1
                               ];
                          ][2
                               ];
assign outfi[18]=fin[4
                               ];
                          ][3
assign outfi[19]=fin[4
                          ][0
                               ];
assign outfi[20]=fin[5
                          ][1
                               ];
assign outfi[21]=fin[5
                          ][2
                               ];
assign outfi[22]=fin[5
                          ][3
assign outfi[23]=fin[5
                               ];
                               ];
assign outfi[24]=fin[6
                          ||0||
```

```
assign outfi[25]=fin[6
                          ][1
                               ];
                               ];
                          ][2
assign outfi[26]=fin[6
                          ][3
                               ];
assign outfi[27]=fin[6
                          ][0
                               ];
assign outfi[28]=fin[7
                          ][1
                               ];
assign outfi[29]=fin[7
                          ][2
                               ];
assign outfi[30]=fin[7
                          ][3
                               ];
assign outfi[31]=fin[7
                          ][0
assign outfi[32]=fin[8
                               ];
                          ][1
assign outfi[33]=fin[8
                               ];
                               ];
assign outfi[34]=fin[8
                          ][2
                          ][3
                               ];
assign outfi[35]=fin[8
                               ];
                          ][0
assign outfi[36]=fin[9
assign outfi[37]=fin[9
                          ][1
                               ];
                          ][2
                               ];
assign outfi[38]=fin[9
assign outfi[39]=fin[9
                          ][3
                               ];
                               ];
                          ][0
assign outfi[40]=fin[10
                               ];
assign outfi[41]=fin[10
                          ][1
                          ][2
                               ];
assign outfi[42]=fin[10
                          ][3
                               ];
assign outfi[43]=fin[10
assign outfi[44]=fin[11
                               ];
                          ][0
assign outfi[45]=fin[11
                          ][1
                               ];
assign outfi[46]=fin[11
                         ][2
```

```
assign outfi[47]=fin[11 ][3
assign outfi[48]=fin[12
                        ][0
assign outfi[49]=fin[12
                        ][1
assign outfi[50]=fin[12
                        1[2
assign outfi[51]=fin[12
                        ][3
                              ];
                        ][0
assign outfi[52]=fin[13
                              ];
assign outfi[53]=fin[13
                         \prod 1
                              ];
assign outfi[54]=fin[13
                        1[2
                        ][3
assign outfi[55]=fin[13
                              ];
assign outfi[56]=fin[14][0
assign outfi[57]=fin[14
                        ][1
                              ];
assign outfi[58]=fin[14
                         1/2
assign outfi[59]=fin[14 ][3
assign outfi[60]=fin[15
                        ][0
assign outfi[61]=fin[15
                        1[1
                              ];
assign outfi[62]=fin[15
                        ||2|
                              ];
                        ][3
assign outfi[63]=fin[15
                              ];
assign outfi[64]=fin[16
                        ][0
assign outfi[65]=fin[16
                        \Pi 1
                              ];
assign outfi[66]=fin[16][2
assign outfi[67]=fin[16][3
                              ];
assign outfi[68]=fin[17][0
```

```
assign outfi[69]=fin[17][1
assign outfi[70]=fin[17
                         1[2
assign outfi[71]=fin[17][3
assign outfi[72]=fin[18
                         ][0
                              ];
assign outfi[73]=fin[18
                         ][1
                              ];
assign outfi[74]=fin[18
                              ];
                         ||2|
assign outfi[75]=fin[18
                         113
                              ];
                        ][0
assign outfi[76]=fin[19
assign outfi[77]=fin[19
                         ][1
                              ];
assign outfi[78]=fin[19
                              ];
                         ][2
                              ];
assign outfi[79]=fin[19
                        ][3
assign outfi[80]=fin[20
                         ][0
assign outfi[81]=fin[20
                         ][1
                              ];
assign outfi[82]=fin[20
                        1[2
                              ];
assign outfi[83]=fin[20 ][3
                              ];
                              ];
assign outfi[84]=fin[21
                         ][0
                              ];
assign outfi[85]=fin[21
                         \prod 1
assign outfi[86]=fin[21
                        ][2
                              ];
                         ][3
assign outfi[87]=fin[21
                              ];
assign outfi[88]=fin[22 ][0
assign outfi[89]=fin[22
                        ][1
                              ];
assign outfi[90]=fin[22 ][2
```

```
assign outfi[91]=fin[22 ][3
assign outfi[92]=fin[23
                        ||0||
assign outfi[93]=fin[23
                        ][1
assign outfi[94]=fin[23 ][2
assign outfi[95]=fin[23
                        ][3
assign outfi[96]=fin[24 ][0
assign outfi[97]=fin[24
                        ][1
assign outfi[98]=fin[24 ][2
assign outfi[99]=fin[24 ][3
assign outfi[100
                   ]=fin[25][0
                                  ];
                             ][1
assign outfi[101 ]=fin[25
                                  ];
                 ]=fin[25
                            ][2
                                  ];
assign outfi[102
                   ]=fin[25][3
assign outfi[103
                                  ];
                   ]=fin[26
assign outfi[104
                            ][0
                                 ];
                   ]=fin[26][1
assign outfi[105
                                  ];
                   ]=fin[26 ][2
assign outfi[106
                                  ];
                   ]=fin[26 ][3
                                  ];
assign outfi[107
                            ][0
                   ]=fin[27
assign outfi[108
                                  ];
                   ]=fin[27
                             ][1
assign outfi[109
                                  ];
                   ]=fin[27 ][2
                                  ];
assign outfi[110
                   ]=fin[27][3
                                  ];
assign outfi[111
assign outfi[112
                   = \sin[28][0]
                                  ];
```

```
]=fin[28 ][1
assign outfi[113
                                   ];
                   ]=fin[28
                             ][2
                                   ];
assign outfi[114
assign outfi[115
                   ]=fin[28 ][3
                                  ];
                   ]=fin[29 ][0
                                  ];
assign outfi[116
assign outfi[117
                    ]=fin[29
                             ][1
                                  ];
                    ]=fin[29
                             ][2
                                  ];
assign outfi[118
assign outfi[119
                    ]=fin[29
                             ][3
                                   ];
                   ]=fin[30 ][0
assign outfi[120
                                  ];
                   ]=fin[30
assign outfi[121
                             ][1
                                  ];
assign outfi[122
                   ]=fin[30 ][2
                                  ];
                             ][3
                   ]=fin[30
                                  ];
assign outfi[123
assign outfi[124
                   ]=fin[31
                             ][0
                                   ];
                   ]=fin[31
                             ][1
                                  ];
assign outfi[125
assign outfi[126
                   =fin[31
                             ][2
                                  ];
                   ]=fin[31
assign outfi[127
                             ][3
                                  ];
                    ]=fin[32
                             ][0
                                  ];
assign outfi[128
                    ]=fin[32
assign outfi[129
                             ][1
                                   ];
                             ][2
                    ]=fin[32
                                  ];
assign outfi[130
                   ]=fin[32
                             ][3
assign outfi[131
                                  ];
                   = \sin[33][0]
                                  ];
assign outfi[132
                   ]=fin[33
                             ][1
assign outfi[133
                                  ];
assign outfi[134
                   ]=fin[33 ][2
                                   ];
```

```
assign outfi[135
                   = \sin[33][3]
                                  ];
                   = \sin[34][0]
                                  ];
assign outfi[136
                   ]=fin[34 ][1
assign outfi[137
                                  ];
assign outfi[138
                   ]=fin[34][2
                                  ];
assign outfi[139
                   ]=fin[34 ][3
                                  ];
                   ]=fin[35
                             ][0
assign outfi[140
                                  ];
assign outfi[141
                   ]=fin[35
                             ][1
                                  ];
                   ]=fin[35
assign outfi[142
                             ][2
                                  ];
                   ]=fin[35
assign outfi[143
                             ][3
                                  ];
assign outfi[144
                   ]=fin[36][0
                                  ];
                   ]=fin[36
                             ][1
                                  ];
assign outfi[145
                   ]=fin[36
assign outfi[146
                             ][2
                                  ];
                   ]=fin[36 ][3
assign outfi[147
                                  ];
                   ]=fin[37
assign outfi[148
                             ][0
                                  ];
                   ]=fin[37
assign outfi[149
                                  ];
                             ][1
                   ]=fin[37
                             ][2
                                  ];
assign outfi[150
                   ]=fin[37
assign outfi[151
                             ][3
                                  ];
                             ][0
                   ]=fin[38
                                  ];
assign outfi[152
                   ]=fin[38
assign outfi[153
                             ][1
                                  ];
                                  ];
                   ]=fin[38
                             ][2
assign outfi[154
                   ]=fin[38
                             ][3
assign outfi[155
                                  ];
assign outfi[156
                   ]=fin[39 ][0
                                  ];
```

```
= \sin[39][1]
                                   ];
assign outfi[157
                    ]=fin[39
                              ][2
                                    ];
assign outfi[158
                    ]=fin[39 ][3
                                   ];
assign outfi[159
                    ]=fin[40
                              ][0
                                   ];
assign outfi[160
assign outfi[161
                    ]=fin[40
                              ][1
                                   ];
                              ][2
assign outfi[162
                    ]=fin[40
                                   ];
assign outfi[163
                    ]=fin[40
                              ][3
                                    ];
                    ]=fin[41
assign outfi[164
                              ][0
                                   ];
                    ]=fin[41
assign outfi[165
                              ][1
                                   ];
                    ]=fin[41
                              ][2
                                   ];
assign outfi[166
                              ][3
                    ]=fin[41
                                   ];
assign outfi[167
                    ]=fin[42
assign outfi[168
                              ][0
                                   ];
                    ]=fin[42
                              ][1
                                   ];
assign outfi[169
                    ]=fin[42
assign outfi[170
                              \parallel 2
                                   ];
                    ]=fin[42
assign outfi[171
                              ][3
                                   ];
                    ]=fin[43
                              ][0
                                   ];
assign outfi[172
                    ]=fin[43
assign outfi[173
                              ][1
                                    ];
                              ][2
                    ]=fin[43
                                   ];
assign outfi[174
                    ]=fin[43
                              ][3
                                   ];
assign outfi[175
                    ]=fin[44 ][0
                                   ];
assign outfi[176
                    ]=fin[44 ][1
assign outfi[177
                                   ];
assign outfi[178
                    = \sin[44][2]
                                   ];
```

```
]=fin[44 ][3
                                   ];
assign outfi[179
                    ]=fin[45
                             ][0
                                   ];
assign outfi[180
                   ]=fin[45
                             ][1
assign outfi[181
                                   ];
                   ]=fin[45][2
                                  ];
assign outfi[182
assign outfi[183
                    ]=fin[45
                             ][3
                                   ];
                    ]=fin[46
                             ][0
assign outfi[184
                                   ];
assign outfi[185
                    ]=fin[46
                             ][1
                                   ];
                    ]=fin[46 ][2
assign outfi[186
                                   ];
                   ]=fin[46
assign outfi[187
                             ][3
                                  ];
assign outfi[188
                    ]=fin[47][0
                                  ];
                    ]=fin[47
                             ][1
                                   ];
assign outfi[189
                    ]=fin[47
                                   ];
assign outfi[190
                             ][2
                    ]=fin[47
assign outfi[191
                             ][3
                                   ];
                   ]=fin[48
assign outfi[192
                             ][0
                                  ];
                    ]=fin[48
assign outfi[193
                             ][1
                                   ];
                    ]=fin[48
                             ][2
                                   ];
assign outfi[194
                    ]=fin[48
                             ][3
assign outfi[195
                                   ];
                             ][0
                    ]=fin[49
                                   ];
assign outfi[196
                   ]=fin[49
assign outfi[197
                             ][1
                                   ];
                    ]=fin[49 ][2
                                   ];
assign outfi[198
                   ]=fin[49
                             ][3
assign outfi[199
                                   ];
assign outfi[200
                   = \sin[50][0]
                                   ];
```

```
= \sin[50]
assign outfi[201
                                   ];
                    ]=fin[50
                             ][2
                                   ];
assign outfi[202
                   ]=fin[50 ][3
                                   ];
assign outfi[203
                   ]=fin[51
                             ][0
                                   ];
assign outfi[204
assign outfi[205
                    ]=fin[51
                              ][1
                                   ];
                    ]=fin[51
                              ][2
                                   ];
assign outfi[206
assign outfi[207
                    ]=fin[51
                              ][3
                                   ];
                    ]=fin[52
assign outfi[208
                             ][0
                                   ];
                    ]=fin[52
assign outfi[209
                             ][1
                                   ];
assign outfi[210
                    ]=fin[52
                             ][2
                                   ];
                    ]=fin[52
                             ][3
                                   ];
assign outfi[211
                    ]=fin[53
assign outfi[212
                             ][0
                                   ];
assign outfi[213
                    ]=fin[53
                             ][1
                                   ];
                    ]=fin[53
assign outfi[214
                             \parallel 2
                                   ];
assign outfi[215
                    ]=fin[53][3
                                   ];
                    ]=fin[54
assign outfi[216
                             ][0
                                   ];
                    ]=fin[54 ][1
assign outfi[217
                                   ];
assign outfi[218
                    ]=fin[54][2
                                   ];
                   ]=fin[54 ][3
assign outfi[219
                                   ];
                    = \sin[55][0]
assign outfi[220
                                   ];
                   ]=fin[55
                             ][1
assign outfi[221
                                   ];
assign outfi[222
                   ]=fin[55][2
                                   ];
```

```
]=fin[55][3
                                  ];
assign outfi[223
                   ]=fin[56
                             ][0
                                  ];
assign outfi[224
                   ]=fin[56][1
assign outfi[225
                                  ];
assign outfi[226
                   ]=fin[56][2
                                  ];
assign outfi[227
                   ]=fin[56][3
                                  ];
                   ]=fin[57
                             ][0
assign outfi[228
                                  ];
assign outfi[229
                   ]=fin[57
                             ][1
                                  ];
                   ]=fin[57
assign outfi[230
                             \parallel 2
                                  ];
                   ]=fin[57
assign outfi[231
                             ][3
                                  ];
assign outfi[232
                   ]=fin[58
                             ][0
                                  ];
                   ]=fin[58
assign outfi[233
                             ][1
                                  ];
                   ]=fin[58
assign outfi[234
                             ][2
                                  ];
                   ]=fin[58
assign outfi[235
                             ][3
                                  ];
                   ]=fin[59
assign outfi[236
                             ][0
                                  ];
assign outfi[237
                   ]=fin[59
                             ][1
                                  ];
                   ]=fin[59
assign outfi[238
                             ][2
                                  ];
                   ]=fin[59
assign outfi[239
                             ][3
                                  ];
                             ][0
assign outfi[240
                   ]=fin[60
                                  ];
                   ]=fin[60
assign outfi[241
                             ][1
                                  ];
assign outfi[242
                   = \sin[60]
                                  ];
assign outfi[243
                   ]=fin[60
                             ][3
                                  ];
assign outfi[244
                   ]=fin[61
                             ][0
                                  ];
```

```
assign outfi[245 ]=fin[61 ][1
assign outfi[246 ]=fin[61
                          ][2
                               ];
assign outfi[247 ]=fin[61 ][3
                               ];
assign outfi[248 ]=fin[62 ][0
                               ];
assign outfi[249
                 ]=fin[62][1
                               ];
assign outfi[250 ]=fin[62 ][2
                               ];
assign outfi[251
                 ]=fin[62
                          ][3
                               ];
assign outfi[252 ]=fin[63 ][0
                               ];
assign outfi[253 ]=fin[63 ][1
                               ];
assign outfi[254 ]=fin[63 ][2
                               ];
assign outfi[255 ]=fin[63 ][3
                               ];
```

encoder\_256 prrr(outfi,result,clk);

## endmodule

## priority4.v

```
module pe_256(D, result,14,clk);
input clk;
input[255:0]D;
wire[3:0]w[84:0];// stage outputs
wire [63:0]o;//or output 1st stage
```

```
wire [16:0]o1;
wire [3:0]o2;
wire [63:0]11;
wire [15:0]12;
wire [3:0]13;
output 14;
wire [3:0]cout[127:0];
wire [3:0]fin[63:0];
wire [255:0]outfi;
real result1;
integer n,p;
//real result1;
output [7:0]result;
//output [7:0]result1;
//stage1
priority4bit a(D[3:0],w[0],l1[0]);
priority4bit a1(D[7:4],w[1],l1[1]);
priority4bit a2(D[11:8],w[2],11[2]);
priority4bit a3(D[15:12],w[3],l1[3]);
priority4bit a4(D[19:16],w[4],l1[4]);
priority4bit a5(D[23:20],w[5],11[5]);
```

```
priority4bit a6(D[27:24],w[6],l1[6]);
priority4bit a7(D[31:28],w[7],l1[7]);
priority4bit a8(D[35:32],w[8],11[8]);
priority4bit a9(D[39:36],w[9],11[9]);
priority4bit a10(D[43:40],w[10],l1[10]);
priority4bit a11(D[47:44],w[11],l1[11]);
priority4bit a12(D[51:48],w[12],l1[12]);
priority4bit a13(D[55:52],w[13],l1[13]);
priority4bit a14(D[59:56],w[14],l1[14]);
priority4bit a15(D[63:60],w[15],l1[15]);
priority4bit a16(D[67:64],w[16],l1[16]);
priority4bit a17(D[71:68],w[17],l1[17]);
priority4bit a18(D[75:72],w[18],l1[18]);
priority4bit a19(D[79:76],w[19],l1[19]);
priority4bit a20(D[83:80],w[20],l1[20]);
priority4bit a21(D[87:84],w[21],l1[21]);
priority4bit a22(D[91:88],w[22],11[22]);
priority4bit a23(D[95:92],w[23],l1[23]);
priority4bit a24(D[99:96],w[24],l1[24]);
priority4bit a25(D[103:100],w[25],l1[25]);
priority4bit a26(D[107:104],w[26],l1[26]);
priority4bit a27(D[111:108],w[27],l1[27]);
```

```
priority4bit a28(D[115:112],w[28],l1[28]);
priority4bit a29(D[119:116],w[29],l1[29]);
priority4bit a30(D[123:120],w[30],l1[30]);
priority4bit a31(D[127:124],w[31],l1[31]);
priority4bit a32(D[131:128],w[32],l1[32]);
priority4bit a33(D[135:132],w[33],11[33]);
priority4bit a34(D[139:136],w[34],l1[34]);
priority4bit a35(D[143:140],w[35],l1[35]);
priority4bit a36(D[147:144],w[36],l1[36]);
priority4bit a37(D[151:148],w[37],l1[37]);
priority4bit a38(D[155:152],w[38],l1[38]);
priority4bit a39(D[159:156],w[39],l1[39]);
priority4bit a40(D[163:160],w[40],l1[40]);
priority4bit a41(D[167:164],w[41],l1[41]);
priority4bit a42(D[171:168],w[42],l1[42]);
priority4bit a43(D[175:172],w[43],11[43]);
priority4bit a44(D[179:176],w[44],l1[44]);
priority4bit a45(D[183:180],w[45],l1[45]);
priority4bit a46(D[187:184],w[46],l1[46]);
priority4bit a47(D[191:188],w[47],l1[47]);
priority4bit a48(D[195:192],w[48],l1[48]);
priority4bit a49(D[199:196],w[49],11[49]);
```

```
priority4bit a50(D[203:200],w[50],l1[50]);
priority4bit a51(D[207:204],w[51],l1[51]);
priority4bit a52(D[211:208],w[52],l1[52]);
priority4bit a53(D[215:212],w[53],l1[53]);
priority4bit a54(D[219:216],w[54],l1[54]);
priority4bit a55(D[223:220],w[55],l1[55]);
priority4bit a56(D[227:224],w[56],l1[56]);
priority4bit a57(D[231:228],w[57],l1[57]);
priority4bit a58(D[235:232],w[58],l1[58]);
priority4bit a59(D[239:236],w[59],l1[59]);
priority4bit a60(D[243:240],w[60],l1[60]);
priority4bit a61(D[247:244],w[61],l1[61]);
priority4bit a62(D[251:248],w[62],l1[62]);
priority4bit a63(D[255:252],w[63],l1[63]);
//stage 1 or
assign of [0] = w[0] |w[0]| |w[0] |[1]| |w[0]| |w[0]|
                                                     ][3];
assign o[ 1 ]=w[1
                       ][0]|w[ 1
                                     ][1]|w[1]
                                                    ][2]|w[
         ][3];
assign o[ 2 ]=w[2
                       ][0]|w[
                                     ][1]|w[
                                               2
                                                    ||2||w||
                                 2
         ][3];
```

assign of 3 
$$]=w[3]$$
  $][0]|w[$  3  $][1]|w[$  3  $][2]|w[$  3  $][3];$ 
assign of 4  $]=w[4]$   $][0]|w[$  4  $][1]|w[$  4  $][2]|w[$  4  $][3];$ 
assign of 5  $]=w[5]$   $][0]|w[$  5  $][1]|w[$  5  $][2]|w[$  5  $][3];$ 
assign of 6  $]=w[6]$   $][0]|w[$  6  $][1]|w[$  6  $][2]|w[$  6  $][3];$ 
assign of 7  $]=w[7]$   $][0]|w[$  7  $][1]|w[$  7  $][2]|w[$  7  $][3];$ 
assign of 8  $]=w[8]$   $][0]|w[$  8  $][1]|w[$  8  $][2]|w[$  8  $][3];$ 
assign of 9  $]=w[9]$   $][0]|w[$  9  $][1]|w[$  9  $][2]|w[$  9  $][3];$ 
assign of 10  $]=w[10]$   $][0]|w[$  10  $][1]|w[$  10  $][2]|w[$  10  $][3];$ 
assign of 11  $]=w[11]$   $][0]|w[$  11  $][1]|w[$  11  $][2]|w[$  12  $][3];$ 
assign of 12  $]=w[12]$   $][0]|w[$  12  $][1]|w[$  13  $][2]|w[$  13  $][3];$ 
assign of 13  $]=w[13]$   $][0]|w[$  13  $][1]|w[$  13  $][2]|w[$  14  $][3];$ 

	15 ]=w[15 ][3];	][0] w[	15	][1] w[	15	][2] w[
	16 ]=w[16 ][3];	][0] w[	16	][1] w[	16	][2] w[
	17 ]=w[17 ][3];	][0] w[	17	][1] w[	17	][2] w[
	18 ]=w[18 ][3];	][0] w[	18	][1] w[	18	][2] w[
_	19 ]=w[19 ][3];	][0] w[	19	][1] w[	19	][2] w[
	20 ]=w[20 ][3];	][0] w[	20	][1] w[	20	][2] w[
_	21 ]=w[21 ][3];	][0] w[	21	][1] w[	21	][2] w[
	22 ]=w[22 ][3];	][0] w[	22	][1] w[	22	][2] w[
	23 ]=w[23 ][3];	][0] w[	23	][1] w[	23	][2] w[
_	24 ]=w[24 ][3];	][0] w[	24	][1] w[	24	][2] w[
_	25 ]=w[25 ][3];	][0] w[	25	][1] w[	25	][2] w[
_	26 ]=w[26 ][3];	][0] w[	26	][1] w[	26	][2] w[

	27 ]=w[27 ][3];	][0] w[	27	][1] w[	27	][2] w[
	28 ]=w[28 ][3];	][0] w[	28	][1] w[	28	][2] w[
	29 ]=w[29 ][3];	][0] w[	29	][1] w[	29	][2] w[
	30 ]=w[30 ][3];	][0] w[	30	][1] w[	30	][2] w[
	31 ]=w[31 ][3];	][0] w[	31	][1] w[	31	][2] w[
	32 ]=w[32 ][3];	][0] w[	32	][1] w[	32	][2] w[
_	33 ]=w[33 ][3];	][0] w[	33	][1] w[	33	][2] w[
_	34 ]=w[34 ][3];	][0] w[	34	][1] w[	34	][2] w[
	35 ]=w[35 ][3];	][0] w[	35	][1] w[	35	][2] w[
	36 ]=w[36 ][3];	][0] w[	36	][1] w[	36	][2] w[
_	37 ]=w[37 ][3];	][0] w[	37	][1] w[	37	][2] w[
	38 ]=w[38 ][3];	][0] w[	38	][1] w[	38	][2] w[

	51 ]=w[51 ][3];	][0] w[	51	][1] w[	51	][2] w[
	52 ]=w[52 ][3];	][0] w[	52	][1] w[	52	][2] w[
	53 ]=w[53 ][3];	][0] w[	53	][1] w[	53	][2] w[
	54 ]=w[54 ][3];	][0] w[	54	][1] w[	54	][2] w[
	55 ]=w[55 ][3];	][0] w[	55	][1] w[	55	][2] w[
	56 ]=w[56 ][3];	][0] w[	56	][1] w[	56	][2] w[
	57 ]=w[57 ][3];	][0] w[	57	][1] w[	57	][2] w[
	58 ]=w[58 ][3];	][0] w[	58	][1] w[	58	][2] w[
_	59 ]=w[59 ][3];	][0] w[	59	][1] w[	59	][2] w[
	60 ]=w[60 ][3];	][0] w[	60	][1] w[	60	][2] w[
- 4	61 ]=w[61 ][3];	][0] w[	61	][1] w[	61	][2] w[
	62 ]=w[62 ][3];	][0] w[	62	][1] w[	62	][2] w[

```
assign o[ 63 ]=w[63 ][0]|w[ 63 ][1]|w[ 63 ][2]|w[ 63 ][3];
```

```
//stage 2
priority4bit
              b(o[3:0],w[64],12[0]);
priority4bit
               b1(o[7:4],w[65],l2[1]);
priority4bit
               b2(o[11:8],w[66],l2[2]);
priority4bit
               b3(o[15:12],w[67],12[3]);
               b4(o[19:16],w[68],12[4]);
priority4bit
priority4bit
               b5(o[23:20],w[69],12[5]);
               b6(o[27:24],w[70],l2[6]);
priority4bit
priority4bit
               b7(o[31:28],w[71],12[7]);
priority4bit
               b8(o[35:32],w[72],12[8]);
               b9(o[39:36],w[73],12[9]);
priority4bit
priority4bit
               b10(o[43:40],w[74],l2[10]);
               b11(o[47:44],w[75],12[11]);
priority4bit
               b12(o[51:48],w[76],l2[12]);
priority4bit
               b13(o[55:52],w[77],l2[13]);
priority4bit
priority4bit
               b14(o[59:56],w[78],l2[14]);
priority4bit
               b15(o[63:60],w[79],l2[15]);
```

```
],w[64 ][0 ],cout[0
    e (w[0
                          ][1
    e1
          (w[1],w[64])
                               ],cout[1
                                          1);
ce
          (w[2],w[64])
                          ][2
                               ],cout[2
    e2
                                          ]);
ce
          (w[3],w[64])
                          ][3
                               ],cout[3
                                          ]);
    e3
ce
                          ][0
          (w[4],w[65])
                               ],cout[4
    e4
                                          ]);
ce
                          ][1
          (w[5],w[65])
    e5
ce
                               ],cout[5
                                          ]);
                          ][2
ce
    e6
          (w[6],w[65])
                               ],cout[6
                                          ]);
                          ][3
          (w[7],w[65])
                                          ]);
    e7
                               ],cout[7
ce
          (w[8],w[66])
                          ][0
                                          ]);
ce
    e8
                               ],cout[8
          (w[9],w[66])
                          ][1
    e9
                               ],cout[9
                                         ]);
ce
          (w[10]
                               ][2
                                    ],cout[10 ]);
    e10
                    ],w[66
ce
                               ][3
                    ],w[66
    e11
          (w[11]
                                    ],cout[11 ]);
ce
                               ][0
          (w[12]
                    ],w[67]
                                    ],cout[12 ]);
    e12
ce
                               ][1
          (w[13
                    ],w[67]
ce
    e13
                                    ],cout[13 ]);
                               ][2
    e14
          (w[14]
                    ],w[67]
                                    ],cout[14]);
ce
                               ][3
          (w[15
                    ],w[67]
    e15
                                    ],cout[15 ]);
ce
                               ][0
          (w[16
                     ],w[68
    e16
                                    ],cout[16]);
ce
                               ][1
          (w[17]
                     ],w[68]
                                    ],cout[17]);
    e17
ce
                    ],w[68]
                               ][2
    e18
          (w[18
                                    ],cout[18 ]);
ce
                               ][3
    e19
          (w[19]
                     ],w[68]
                                    ],cout[19]);
ce
                               ||0
          (w[20
                    ],w[69]
                                    ],cout[20]);
    e20
ce
                               ][1
          (w[21]
                                    ],cout[21]);
    e21
                    ],w[69]
ce
```

```
],cout[22 ]);
    e22
          (w[22]
                    ],w[69
                               ][2
ce
                               ][3
          (w[23]
                    ],w[69
    e23
                                    ],cout[23]);
ce
          (w[24]
                    ],w[70]
                               ][0
                                    ],cout[24]);
    e24
ce
                               ][1
          (w[25]
                    ],w[70]
                                    ],cout[25]);
    e25
ce
    e26
          (w[26]
                    ],w[70]
                               ][2
                                    ],cout[26]);
ce
          (w[27]
                               ][3
                    ],w[70]
    e27
                                    ],cout[27]);
ce
    e28
          (w[28]
                    ],w[71]
                               ][0
                                    ],cout[28]);
ce
                               ][1
          (w[29]
    e29
                                    ],cout[29]);
                    ],w[71]
ce
                               ][2
    e30
          (w[30]
                    ],w[71]
                                    ],cout[30 ]);
ce
          (w[31
                    ],w[71]
                               ][3
                                    ],cout[31 ]);
    e31
ce
          (w[32]
                               ][0
                    ],w[72]
                                    ],cout[32 ]);
    e32
ce
          (w[33]
                               ][1
    e33
                    ],w[72]
                                    ],cout[33 ]);
ce
                               ][2
          (w[34]
                    ],w[72]
    e34
                                    ],cout[34]);
ce
                               ][3
          (w[35]
    e35
                    ],w[72]
                                    ],cout[35]);
ce
    e36
          (w[36]
                    ],w[73]
                               ||0||
                                    ],cout[36]);
ce
          (w[37]
                               ][1
                    ],w[73]
                                    ],cout[37]);
    e37
ce
                               ][2
    e38
          (w[38]
                    ],w[73]
                                    ],cout[38 ]);
ce
                               ][3
          (w[39]
                    ],w[73]
    e39
                                    ],cout[39]);
ce
                               ||0||
          (w[40]
                    ],w[74]
                                    ],cout[40 ]);
    e40
ce
                               ][1
    e41
          (w[41]
                    ],w[74]
                                    ],cout[41]);
ce
                               ][2
                    ],w[74]
    e42
          (w[42]
                                    ],cout[42]);
ce
                               ][3
                                    ],cout[43 ]);
    e43
          (w[43]
                    ],w[74]
ce
```

```
||0
    e44
          (w[44]
                    ],w[75]
                                    ],cout[44 ]);
ce
                               ][1
          (w[45]
                    ],w[75]
    e45
                                    ],cout[45]);
ce
          (w[46]
                    ],w[75
                               ][2
                                    ],cout[46]);
    e46
ce
                               ][3
          (w[47]
                    ],w[75]
                                    ],cout[47]);
    e47
ce
                               ][0
    e48
          (w[48]
                    ],w[76]
                                    ],cout[48]);
ce
                               ][1
          (w[49]
                    ],w[76]
                                    ],cout[49]);
    e49
ce
                               ][2
    e50
          (w[50]
                    ],w[76
                                    ],cout[50]);
ce
                               ][3
          (w[51]
                    ],w[76
    e51
                                    ],cout[51]);
ce
                               ][0
                                    ],cout[52]);
ce
    e52
          (w[52]
                    ],w[77]
    e53
          (w[53]
                    ],w[77]
                               ][1
                                    ],cout[53 ]);
ce
          (w[54]
                    ],w[77
                               ][2
                                    ],cout[54 ]);
    e54
ce
                               ][3
          (w[55]
                                    ],cout[55 ]);
    e55
                    ],w[77]
ce
                               ][0
          (w[56]
                    ],w[78]
                                    ],cout[56 ]);
    e56
ce
                               ][1
          (w[57]
ce
    e57
                    ],w[78]
                                    ],cout[57]);
                               ][2
    e58
          (w[58]
                    ],w[78]
                                    ],cout[58]);
ce
                               ][3
          (w[59]
                    ],w[78]
                                    ],cout[59]);
    e59
ce
          (w[60]
                    ],w[79
                               ][0
    e60
                                    ],cout[60 ]);
ce
                    ],w[79
                               ][1
          (w[61]
                                    ],cout[61 ]);
    e61
ce
                                    ],cout[62 ]);
                    ],w[79
                               ][2
    e62
          (w[62]
ce
                               ][3
    e63
          (w[63]
                    ],w[79
                                    ],cout[63]);
ce
```

assign o1[ ][2] w[ 64	0 ]=w[64 ][3];	][0] w[	64	][1] w[	64
assign o1[ ][2] w[ 65	1 ]=w[65] ][3];	][0] w[	65	][1] w[	65
assign o1[ ][2] w[ 66	2 ]=w[66 ][3];	][0] w[	66	][1] w[	66
assign o1[ ][2] w[ 67	3 ]=w[67 ][3];	][0] w[	67	][1] w[	67
assign o1[ ][2] w[ 68	4 ]=w[68 ][3];	][0] w[	68	][1] w[	68
assign o1[ ][2] w[ 69	5 ]=w[69 ][3];	][0] w[	69	][1] w[	69
assign o1[ ][2] w[ 70	6 ]=w[70 ][3];	][0] w[	70	][1] w[	70
assign o1[ ][2] w[ 71	7 ]=w[71 ][3];	][0] w[	71	][1] w[	71
assign o1[ ][2] w[ 72	8 ]=w[72 ][3];	][0] w[	72	][1] w[	72
assign o1[ ][2] w[ 73		][0] w[	73	][1] w[	73
assign o1[ ][2] w[ 74	10 ]=w[74 ][3];	][0] w[	74	][1] w[	74

```
]=w[75]
              11
                             ||0||w|
                                      75
                                           ||1||w||
                                                     75
assign o1
][2]|w[
              ][3];
        75
assign o1[
              |=w[76]
                             |0|w
                                       76
                                           ||1||w||
                                                     76
        76
][2]|w[
              ][3];
              13 = w[77]
assign ol[
                             ][0]|w[
                                       77
                                           ||1||w||
                                                     77
][2]|w[
              ][3];
        77
             14 = w[78]
assign o1[
                             ][0]|w[
                                       78
                                                     78
                                           ||1||w||
][2]|w[
        78
              ][3];
assign o1[ 15 ]=w[ 79 ][0]|w[ 79 ][1]|w[ 79 ][2]|w[ 79
][3];
//stage3
priority4bit
             c(o1[3:0],w[80],13[0]);
              c1(o1[7:4],w[81],l3[1]);
priority4bit
             c2(o1[11:8],w[82],13[2]);
priority4bit
              c3(o1[15:12],w[83],13[3]);
priority4bit
//ce
   f (cout[0],w[80][0],cout[64]);
    f1
                   ],w[80
                             ][0 ],cout[65 ]);
         (cout[1
ce
    f2
                   ],w[80]
                             ][0
                                 ],cout[66 ]);
         (cout[2
ce
         (cout[3
                   ],w[80]
                             ][0
    f3
                                 ],cout[67]);
ce
    f4
                   ],w[80]
                             ||1|
ce
         (cout[4
                                 ],cout[68]);
                             ||1|
    f5
                   ],w[80]
                                 ],cout[69]);
ce
         (cout[5
```

```
][1],cout[70
    f6
                    ],w[80]
ce
          (cout 6
                                              ]);
                              ][1
                                   ],cout[71 ]);
    f7
          (cout[7
                    ],w[80]
ce
                    ],w[80
                              ][2
    f8
          (cout[8
                                   ],cout[72 ]);
ce
                              ][2
    f9
                    ],w[80]
                                   ],cout[73]);
          (cout[9
ce
    f10(cout[10],w[80
                         ][2
                              ],cout[74 ]);
ce
                         ][2
                              ],cout[75]);
    f11(cout[11],w[80
ce
    f12(cout[12],w[80
                         ][3
                              ],cout[76 ]);
ce
                         ][3
    f13(cout[13],w[80
                              ],cout[77]);
ce
                         ][3
    f14(cout[14],w[80
                              ],cout[78]);
ce
    f15(cout[15],w[80
                         ][3
                              ],cout[79]);
ce
                         ][0
    f16(cout[16],w[81
                              ],cout[80 ]);
ce
                         ][0
    f17(cout[17],w[81
                              ],cout[81 ]);
ce
    f18(cout[18],w[81
                         ][0
                              ],cout[82 ]);
ce
                         ][0
                              ],cout[83 ]);
    f19(cout[19],w[81
ce
    f20(cout[20],w[81
                         ][1
                              ],cout[84]);
ce
                         ][1
    f21(cout[21],w[81
                              ],cout[85 ]);
ce
                         ][1
    f22(cout[22],w[81
                              ],cout[86 ]);
ce
                         ][1
    f23(cout[23],w[81
                              ],cout[87]);
ce
                         ][2
    f24(cout[24],w[81
                              ],cout[88 ]);
ce
                         ][2
    f25(cout[25],w[81]
                              ],cout[89]);
ce
                         ][2
    f26(cout[26],w[81
                              ],cout[90 ]);
ce
                         ][2
    f27(cout[27],w[81]
                              ],cout[91]);
ce
```

```
ce f28(cout[28],w[81 ][3 ],cout[92 ]);
```

```
],cout[114
    f50(cout[50],w[83]
                          ][0]
                                               ]);
    f51(cout[51],w[83
                          ||0||
                               ],cout[115
                                               ]);
ce
    f52(cout[52],w[83
                          ][1
                               ],cout[116
                                               ]);
ce
                          ][1
    f53(cout[53],w[83
                               ],cout[117
                                               ]);
ce
    f54(cout[54],w[83
                          ][1
                               ],cout[118
                                               ]);
ce
    f55(cout[55],w[83
                          ][1
                               ],cout[119
                                               ]);
ce
    f56(cout[56],w[83
                          ][2
                               ],cout[120
                                               ]);
ce
                          ][2
    f57(cout[57],w[83
                                               ]);
                               ],cout[121
ce
                          ][2
    f58(cout[58],w[83
                               ],cout[122
                                               ]);
ce
    f59(cout[59],w[83
                          ][2
                               ],cout[123
                                               ]);
ce
                          ][3
    f60(cout[60],w[83
                               ],cout[124
                                               ]);
ce
                          ][3
    f61(cout[61],w[83
                               ],cout[125
                                               ]);
ce
                          ][3
    f62(cout[62],w[83
                               ],cout[126
                                               ]);
ce
                          ][3
    f63(cout[63],w[83
                                               ]);
                               ],cout[127
ce
```

```
//or stage3
```

```
=w[80]
                               ][0]|w[
                                          80
assign o2[
               0
                                                ][1]|w[
                                                          80
][2]|w[
          80
               ][3];
                     =w[81]
assign o2[
                               ||0||w||
                                                ||1||w||
                1
                                          81
                                                          81
          81
               ][3];
][2]|w[
```

```
2
                    =w[82
                              ||0||w||
                                         82
                                              ||1||w||
                                                        82
assign o2
][2]|w[
         82
               [3];
               3 = w[83]
assign o2[
                              ||0||w||
                                         83
                                              ||1||w||
                                                        83
][2]|w[
          83
               [3];
//stage 4
             d(o2[3:0],w[84],l4);
priority4bit
//
          (cout[64],w[84]
                              ][0
                                   ],fin[0
                                              ]);
ce
    g
          (cout[65],w[84]
                              ][0
                                   ],fin[1
                                              ]);
    g1
ce
          (cout[66],w[84]
                              ][0
                                   ],fin[2
                                              ]);
ce
    g2
                              ][0
                                   ],fin[3
ce
    g3
          (cout[67],w[84]
                                              ]);
                              ][0
          (cout[68],w[84]
                                   ],fin[4
                                              ]);
    g4
ce
                              ][0
          (cout[69],w[84]
                                   ],fin[5
                                              ]);
ce
    g5
                              ][0
          (cout[70],w[84]
                                   ],fin[6
                                              ]);
    g6
ce
          (cout[71],w[84]
                              ][0
                                   ],fin[7
                                              ]);
ce
    g7
                              ][0
    g8
          (cout[72]
                   ],w[84]
                                   ],fin[8
                                              ]);
ce
          (cout[73]
                   ],w[84]
                              ][0
                                   ],fin[9
                                              ]);
    g9
ce
                                   ],fin[10
                    ],w[84]
                              ][0
    g10(cout[74
                                              ]);
ce
                              ][0
                                   ],fin[11
                    ],w[84
    g11(cout[75
                                              ]);
ce
                              ][0
    g12(cout[76
                    ],w[84
                                   ],fin[12
                                              ]);
ce
                              ||0||
                    ],w[84]
                                   ],fin[13
                                              ]);
    g13(cout[77
ce
```

```
],fin[14
                                ||0
                     ],w[84]
                                                ]);
ce
    g14(cout[78]
                     ],w[84]
                                ||0
                                     ],fin[15
    g15(cout[79]
                                                ]);
ce
                     ],w[84
                                ][1
                                     ],fin[16
                                                ]);
    g16(cout[80]
ce
                                ][1
                     ],w[84
                                     ],fin[17
                                                ]);
    g17(cout[81
ce
    g18(cout[82
                     ],w[84
                                ][1
                                     ],fin[18
                                                ]);
                     ],w[84]
                                ][1
                                     ],fin[19
    g19(cout[83
                                                ]);
ce
    g20(cout[84
                     ],w[84
                                ][1
                                     ],fin[20
                                                ]);
ce
                                ][1
                     ],w[84]
                                     ],fin[21
                                                ]);
    g21(cout[85]
ce
                                ][1
    g22(cout[86
                     ],w[84
                                     ],fin[22
                                                ]);
ce
    g23(cout[87
                     ],w[84
                                ][1
                                     ],fin[23
                                                ]);
ce
                    ],w[84
                                ][1
                                     ],fin[24
    g24(cout[88
                                                ]);
ce
                     ],w[84]
                                ][1
                                     ],fin[25
    g25(cout[89
                                                ]);
ce
    g26(cout[90
                     ],w[84]
                                ][1
                                     ],fin[26
                                                ]);
ce
                                ][1
    g27(cout[91
                     ],w[84
                                     ],fin[27
                                                ]);
ce
                                ][1
                                                ]);
                     ],w[84]
                                     ],fin[28
    g28(cout[92
ce
                     ],w[84]
                                ][1
                                     ],fin[29
    g29(cout[93
                                                ]);
ce
                     ],w[84]
                                ][1
                                     ],fin[30
    g30(cout[94
                                                ]);
ce
                                ][1
                                     ],fin[31
                                                ]);
    g31(cout[95
                     ],w[84]
ce
                     ],w[84]
                                ][2
                                     ],fin[32
                                                ]);
    g32(cout[96
ce
                                ||2|
                                     ],fin[33
    g33(cout[97
                     ],w[84]
                                                ]);
ce
                                ][2
                    ],w[84]
    g34(cout[98]
                                     ],fin[34
                                                ]);
ce
                                     ],fin[35
                                ||2|
                                                ]);
    g35(cout[99]
                     ],w[84]
```

```
],fin[36
                               ||2|
    g36(cout[100
                    ],w[84]
                                               ]);
                                    ],fin[37
                               ][2
                    ],w[84]
                                               ]);
    g37(cout[101
ce
                               ][2
                                    ],fin[38
    g38(cout[102
                    ],w[84
                                               ]);
ce
                               ][2
                                    ],fin[39
                                               ]);
    g39(cout[103
                    ],w[84
ce
```

```
g58(cout[122
                            ][3
                 ],w[84]
                                 ],fin[58
                                           ]);
ce
                            ][3
                  ],w[84
                                 ],fin[59
   g59(cout[123]
                                           ]);
ce
   g60(cout[124],w[84]
                            ][3
                                 ],fin[60
                                           ]);
ce
                            ][3
   g61(cout[125],w[84]
                                 ],fin[61
                                           ]);
ce
                            ][3
   g62(cout[126
                  ],w[84
                                 ],fin[62
                                           ]);
ce
                            ][3
                                 ],fin[63
   g63(cout[127
                 ],w[84
                                           ]);
ce
```

```
assign outfi[0 ]=fin[0
                          ][0
                               ];
assign outfi[1]=fin[0]
                          ][1
                               ];
                          ][2
                               ];
assign outfi[2]=fin[0]
                          ][3
                               ];
assign outfi[3]=fin[0
                          ][0
assign outfi[4 ]=fin[1
                               ];
                          ][1
assign outfi[5]=fin[1
                               ];
assign outfi[6]=fin[1
                          ][2
                               ];
                          ][3
                               ];
assign outfi[7]=fin[1
                          ][0
                               ];
assign outfi[8]=fin[2
                          ][1
                               ];
assign outfi[9]=fin[2
                          ][2
                               ];
assign outfi[10]=fin[2
                          ][3
                               ];
assign outfi[11]=fin[2
                          ||0||
                               ];
assign outfi[12]=fin[3
                               ];
                          ][1
assign outfi[13]=fin[3]
```

```
assign outfi[14]=fin[3
                          ][2
                               ];
                               ];
assign outfi[15]=fin[3
                          ][3
                          ][0
                               ];
assign outfi[16]=fin[4
                          ][1
                               ];
assign outfi[17]=fin[4
                               ];
assign outfi[18]=fin[4
                          ][2
                          ][3
                               ];
assign outfi[19]=fin[4
assign outfi[20]=fin[5
                          ][0
                               ];
                          ][1
assign outfi[21]=fin[5
                               ];
                          ][2
                               ];
assign outfi[22]=fin[5
                               ];
assign outfi[23]=fin[5
                          ][3
                          ][0
                               ];
assign outfi[24]=fin[6
```

assign outfi[25]=fin[6

assign outfi[26]=fin[6

assign outfi[27]=fin[6

assign outfi[28]=fin[7

assign outfi[29]=fin[7

assign outfi[30]=fin[7

assign outfi[31]=fin[7

assign outfi[32]=fin[8

assign outfi[33]=fin[8

assign outfi[34]=fin[8

assign outfi[35]=fin[8

][1

][2

][3

][0

][1

][2

][3

][0

][1

][2

][3

];

];

];

];

];

];

];

];

];

];

];

```
assign outfi[36]=fin[9
                          ||0||
                               ];
                               ];
                          ][1
assign outfi[37]=fin[9
                          ][2
                               ];
assign outfi[38]=fin[9
                          ][3
                               ];
assign outfi[39]=fin[9
                               ];
assign outfi[40]=fin[10
                          ||0||
                          ][1
                               ];
assign outfi[41]=fin[10
                               ];
assign outfi[42]=fin[10
                          ][2
                               ];
assign outfi[43]=fin[10
                         ][3
                          ||0||
assign outfi[44]=fin[11
                               ];
assign outfi[45]=fin[11
                          ][1
                               ];
                               ];
assign outfi[46]=fin[11
                          ||2|
                          ][3
                               ];
assign outfi[47]=fin[11
assign outfi[48]=fin[12
                         ][0
                               ];
assign outfi[49]=fin[12
                          \Pi
                               ];
assign outfi[50]=fin[12
                         1[2
                               ];
assign outfi[51]=fin[12
                          ][3
                               ];
                               ];
assign outfi[52]=fin[13
                          ||0||
                          ][1
                               ];
assign outfi[53]=fin[13
assign outfi[54]=fin[13
                          ][2
                               ];
assign outfi[55]=fin[13
                          1[3
                               ];
assign outfi[56]=fin[14
                         1[0
                               ];
assign outfi[57]=fin[14][1
```

```
assign outfi[58]=fin[14][2
assign outfi[59]=fin[14
                         1[3
assign outfi[60]=fin[15
                         ][0
assign outfi[61]=fin[15
                         \parallel 1
                              ];
                              ];
assign outfi[62]=fin[15
                         ][2
assign outfi[63]=fin[15
                         ][3
                              ];
assign outfi[64]=fin[16
                         ][0
assign outfi[65]=fin[16 ][1
assign outfi[66]=fin[16
                         1[2
assign outfi[67]=fin[16][3
                              ];
assign outfi[68]=fin[17][0
                              ];
                              ];
assign outfi[69]=fin[17
                         ][1
assign outfi[70]=fin[17][2
assign outfi[71]=fin[17
                         ][3
                              ];
assign outfi[72]=fin[18
                         ][0
                              ];
assign outfi[73]=fin[18
                         ][1
                              ];
                         ][2
                              ];
assign outfi[74]=fin[18
                         ][3
                              ];
assign outfi[75]=fin[18
assign outfi[76]=fin[19
                         ||0||
                              ];
assign outfi[77]=fin[19
                              ];
                         \Pi
```

assign outfi[78]=fin[19][2

assign outfi[79]=fin[19 ][3

];

```
assign outfi[80]=fin[20 ][0
assign outfi[81]=fin[20
                        ][1
assign outfi[82]=fin[20 ][2
assign outfi[83]=fin[20 ][3
                             ];
assign outfi[84]=fin[21
                        ][0
                             ];
                             ];
assign outfi[85]=fin[21
                        ][1
assign outfi[86]=fin[21
                        1/2
                             ];
assign outfi[87]=fin[21
                        ][3
assign outfi[88]=fin[22
                        ][0
assign outfi[89]=fin[22
                        ][1
assign outfi[90]=fin[22 ][2
assign outfi[91]=fin[22
                        ][3
assign outfi[92]=fin[23 ][0
assign outfi[93]=fin[23
                        1[1
                             ];
assign outfi[94]=fin[23 ][2
assign outfi[95]=fin[23][3
                             ];
assign outfi[96]=fin[24 ][0
assign outfi[97]=fin[24 ][1
assign outfi[98]=fin[24][2
assign outfi[99]=fin[24 ][3
assign outfi[100
                   ]=fin[25
                             ][0
                                  ];
assign outfi[101
                 ]=fin[25 ][1
                                  ];
```

```
]=fin[25][2
assign outfi[102
                                   ];
                    ]=fin[25
                             ][3
                                   ];
assign outfi[103
assign outfi[104
                   ]=fin[26][0
                                   ];
                    ]=fin[26
                             ][1
                                   ];
assign outfi[105
assign outfi[106
                    ]=fin[26][2
                                   ];
                    ]=fin[26
                             ][3
assign outfi[107
                                   ];
assign outfi[108
                    ]=fin[27
                             ][0
                                   ];
assign outfi[109
                    ]=fin[27
                             ][1
                                   ];
                    ]=fin[27
assign outfi[110
                             \parallel 2
                                   ];
                    ]=fin[27
                             ][3
                                   ];
assign outfi[111
                              ][0
                    ]=fin[28
                                   ];
assign outfi[112
                    ]=fin[28
assign outfi[113
                              ][1
                                   ];
                    ]=fin[28
                             ][2
assign outfi[114
                                   ];
                    ]=fin[28
assign outfi[115
                             ][3
                                   ];
                    ]=fin[29][0
assign outfi[116
                                   ];
                    ]=fin[29
                              ][1
                                   ];
assign outfi[117
                    ]=fin[29
assign outfi[118
                              ][2
                                   ];
                    ]=fin[29
                             ][3
                                   ];
assign outfi[119
                    ]=fin[30
                                   ];
assign outfi[120
                             ][0
                    ]=fin[30 ][1
                                   ];
assign outfi[121
                   ]=fin[30 ][2
assign outfi[122
                                   ];
assign outfi[123
                   ]=fin[30 ][3
                                   ];
```

```
=fin[31
                             ||0||
assign outfi[124
                                  ];
                   ]=fin[31
                             ][1
                                  ];
assign outfi[125
                   ]=fin[31
                             ][2
                                  ];
assign outfi[126
                             ][3
                   ]=fin[31
                                  ];
assign outfi[127
assign outfi[128
                   ]=fin[32
                             ][0
                                  ];
                   ]=fin[32
assign outfi[129
                             ][1
                                  ];
assign outfi[130
                   ]=fin[32
                             \parallel 2
                                  ];
                   ]=fin[32 ][3
assign outfi[131
                                  ];
                   ]=fin[33
assign outfi[132
                             ][0
                                  ];
assign outfi[133
                   ]=fin[33
                             ][1
                                  ];
                   ]=fin[33
                             ][2
                                  ];
assign outfi[134
                   ]=fin[33
                             ][3
                                  ];
assign outfi[135
assign outfi[136
                   ]=fin[34 ][0
                                  ];
                   ]=fin[34 ][1
assign outfi[137
                                  ];
                   ]=fin[34][2
assign outfi[138
                                  ];
                   ]=fin[34 ][3
                                  ];
assign outfi[139
                   ]=fin[35][0
assign outfi[140
                                  ];
                             ][1
                   ]=fin[35
                                  ];
assign outfi[141
                   ]=fin[35
                             ][2
assign outfi[142
                                  ];
                   ]=fin[35][3
                                  ];
assign outfi[143
                   ]=fin[36][0
assign outfi[144
                                  ];
assign outfi[145
                   ]=fin[36 ][1
                                  ];
```

```
]=fin[36][2
assign outfi[146
                                   ];
                    ]=fin[36
                             ][3
assign outfi[147
                                   ];
assign outfi[148
                    ]=fin[37][0
                                   ];
                    ]=fin[37
                              ][1
                                   ];
assign outfi[149
assign outfi[150
                    ]=fin[37
                              ][2
                                   ];
                    ]=fin[37
                              ][3
                                   ];
assign outfi[151
assign outfi[152
                    ]=fin[38
                              ][0
                                   ];
                    ]=fin[38
assign outfi[153
                              ][1
                                   ];
                    ]=fin[38
assign outfi[154
                              \parallel 2
                                   ];
assign outfi[155
                    ]=fin[38
                             ][3
                                   ];
                    ]=fin[39
                              ][0
                                   ];
assign outfi[156
                    ]=fin[39
assign outfi[157
                              ][1
                                   ];
assign outfi[158
                    ]=fin[39
                             ][2
                                   ];
                    ]=fin[39
assign outfi[159
                              ][3
                                   ];
                    ]=fin[40 ][0
assign outfi[160
                                   ];
                    ]=fin[40
                              ][1
                                   ];
assign outfi[161
                    ]=fin[40
assign outfi[162
                              ][2
                                   ];
                              ][3
                    ]=fin[40
                                   ];
assign outfi[163
                    ]=fin[41
assign outfi[164
                              ][0
                                   ];
                    =fin[41
                              ][1
                                   ];
assign outfi[165]
                    ]=fin[41
                              ][2
assign outfi[166
                                   ];
assign outfi[167
                    =fin[41
                             ][3
                                   ];
```

```
]=fin[42 ][0
assign outfi[168
                                  ];
                   =fin[42
                             ][1
                                  ];
assign outfi[169
                   ]=fin[42 ][2
assign outfi[170
                                  ];
                             ][3
                   ]=fin[42
                                  ];
assign outfi[171
assign outfi[172
                   ]=fin[43
                             ][0
                                  ];
assign outfi[173
                   ]=fin[43
                             ][1
                                  ];
assign outfi[174
                   ]=fin[43
                             ][2
                                  ];
                   ]=fin[43
assign outfi[175
                             ][3
                                  ];
                   ]=fin[44 ][0
assign outfi[176
                                  ];
assign outfi[177
                   ]=fin[44 ][1
                                  ];
                   ]=fin[44 ][2
assign outfi[178
                                  ];
                   ]=fin[44 ][3
                                  ];
assign outfi[179
assign outfi[180
                   ]=fin[45
                             ][0
                                  ];
                   ]=fin[45
assign outfi[181
                             ][1
                                  ];
                   ]=fin[45][2
assign outfi[182
                                  ];
                   ]=fin[45
                             ][3
                                  ];
assign outfi[183
                   ]=fin[46 ][0
assign outfi[184
                                  ];
                   ]=fin[46
                             ][1
                                  ];
assign outfi[185
                   ]=fin[46 ][2
assign outfi[186
                                  ];
                                  ];
                   ]=fin[46][3
assign outfi[187
                   ]=fin[47][0
assign outfi[188
                                  ];
assign outfi[189
                   ]=fin[47 ][1
                                  ];
```

```
]=fin[47][2
assign outfi[190
                                   ];
                    ]=fin[47
                              ][3
                                   ];
assign outfi[191
assign outfi[192
                   ]=fin[48
                             ][0
                                   ];
                    ]=fin[48
                             ][1
                                   ];
assign outfi[193
assign outfi[194
                    ]=fin[48
                             ][2
                                   ];
                    ]=fin[48
                             ][3
assign outfi[195
                                   ];
assign outfi[196
                    ]=fin[49
                             ][0
                                   ];
                    ]=fin[49
assign outfi[197
                             ][1
                                   ];
                    ]=fin[49
assign outfi[198
                             ][2
                                  ];
assign outfi[199
                    ]=fin[49 ][3
                                   ];
                    ]=fin[50
                             ][0
                                   ];
assign outfi[200
                    ]=fin[50
assign outfi[201
                              ][1
                                   ];
assign outfi[202
                    ]=fin[50
                             ][2
                                   ];
                    ]=fin[50
assign outfi[203
                             ][3
                                   ];
                    ]=fin[51
assign outfi[204
                              ][0
                                  ];
                    ]=fin[51
                              ][1
                                   ];
assign outfi[205
                              ][2
assign outfi[206
                    ]=fin[51
                                   ];
                              ][3
                    ]=fin[51
                                   ];
assign outfi[207
                    ]=fin[52
assign outfi[208
                                   ];
                             ][0
                    ]=fin[52
                             ][1
                                   ];
assign outfi[209
                    ]=fin[52][2
assign outfi[210
                                   ];
assign outfi[211
                   ]=fin[52][3
                                   ];
```

```
= \sin[53][0]
assign outfi[212
                                  ];
                   ]=fin[53
                            ][1
                                  ];
assign outfi[213
                   ]=fin[53][2
                                 ];
assign outfi[214
                   ]=fin[53
                            ][3
                                 ];
assign outfi[215
assign outfi[216
                   ]=fin[54][0
                                 ];
                   ]=fin[54
                            ][1
assign outfi[217
                                  ];
assign outfi[218
                   ]=fin[54
                            ][2
                                  ];
                   ]=fin[54][3
assign outfi[219
                                 ];
                   ]=fin[55][0
assign outfi[220
                                 ];
assign outfi[221
                   ]=fin[55
                            ][1
                                 ];
                   ]=fin[55
assign outfi[222
                            ][2
                                 ];
                   ]=fin[55
assign outfi[223
                            ][3
                                  ];
                   ]=fin[56 ][0
assign outfi[224
                                 ];
                   ]=fin[56
assign outfi[225
                            ][1
                                 ];
                   ]=fin[56][2
assign outfi[226
                                 ];
                   ]=fin[56
                            ][3
                                 ];
assign outfi[227
                   ]=fin[57
assign outfi[228
                            ][0
                                  ];
assign outfi[229
                   ]=fin[57
                            ][1
                                  ];
                   ]=fin[57
                            ][2
assign outfi[230
                                 ];
                   ]=fin[57][3
                                 ];
assign outfi[231
assign outfi[232
                   ]=fin[58
                            ][0
                                 ];
assign outfi[233
                   ]=fin[58 ][1
                                  ];
```

```
]=fin[58][2
                                   ];
assign outfi[234
                   ]=fin[58
                             ][3
                                   ];
assign outfi[235
                   ]=fin[59][0
assign outfi[236
                                   ];
                   ]=fin[59
                             ][1
                                   ];
assign outfi[237
assign outfi[238
                    ]=fin[59
                             ][2
                                   ];
                    ]=fin[59
                             ][3
                                   ];
assign outfi[239
assign outfi[240
                    ]=fin[60
                             ][0
                                   ];
                             ][1
assign outfi[241
                    ]=fin[60
                                   ];
                   ]=fin[60
assign outfi[242
                             \parallel 2
                                   ];
assign outfi[243
                    ]=fin[60
                             ][3
                                   ];
                              ][0
assign outfi[244
                    ]=fin[61
                                   ];
assign outfi[245
                    ]=fin[61
                              ][1
                                   ];
assign outfi[246
                    ]=fin[61
                              ][2
                                   ];
                   ]=fin[61
assign outfi[247
                              ][3
                                   ];
assign outfi[248
                    ]=fin[62
                                   ];
                             ][0
assign outfi[249
                    ]=fin[62
                              ][1
                                   ];
assign outfi[250
                    ]=fin[62
                             ][2
                                   ];
                             ][3
assign outfi[251
                    ]=fin[62
                                   ];
assign outfi[252
                   ]=fin[63
                             ][0
                                   ];
assign outfi[253
                    ]=fin[63
                             ][1
                                   ];
                   ]=fin[63
                             ][2
assign outfi[254
                                   ];
assign outfi[255
                   ]=fin[63][3
                                   ];
```

```
encoder 256 prrr(outfi,result,clk);
endmodule
priority4.v
module priority4bit(D,Y,V);
input [3:0] D;
output [3:0] Y;
output V;
assign Y[0]=1&D[0];
assign Y[1]=1&D[1]&~D[0];
assign Y[2]=1&D[2]&~D[0]&~D[1];
assign Y[3]=1&D[3]&~D[0]&~D[1]&~D[2];
assign V = D[0]|D[1]|D[2]|D[3];
endmodule
mux.v
module mux(a,b,d,e,f,c);
input [1:0]a;
input [255:0]b;
input [255:0]d;
```

```
input [255:0]e;
input [255:0]f;
output [255:0]c;
reg [255:0]c;
always@*
begin
     if(a[0] == 0 \&\& a[1] == 0)
          c[255:0] = b[255:0];
     if(a[0] == 1 \&\& a[1] == 0)
          c[255:0] = d[255:0];
     if(a[0] == 0 \&\& a[1] == 1)
          c[255:0] = e[255:0];
     if(a[0] == 1 \&\& a[1] == 1)
          c[255:0] = f[255:0];
end
endmodule
rca3.v
adder.v
```

## Output:

Mapped the output on the FPGA Zedboard.