Tarefa Aula 5

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Projetar o controle de um display de 7 segmentos (mostrando em hexadecimal) para entradas (4bits).

Número em Hexa	a	b	c	d	e	f	g
0	1	1	1	1	1	1	0
1		1	1				
2	1	1		1	1		1
3	1	1	1	1			1
4		1	1			1	1
5	1		1	1		1	1
6	1		1	1	1	1	1
7	1	1	1	0	0	0	0
8	1	1	1	1	1	1	1
9	1	1	1	1		1	1
A	1	1	1		1	1	1
b			1	1	1	1	1
c	1	0	0	1	1	1	0
d		1	1	1	1		1
E	1			1	1	1	1
F	1				1	1	1

A - D

A	e0	e1	e2	e3	a
	0	0	0	0	**1**
	0	0	0	1	**0**
	0	0	1	0	**1**
	0	0	1	1	**1**
	0	1	0	0	**0**
	0	1	0	1	**1**
	0	1	1	0	**1**
	0	1	1	1	**1**
	1	0	0	0	**1**
	1	0	0	1	**1**
	1	0	1	0	**1**
	1	0	1	1	**0**
	1	1	0	0	**1**
	1	1	0	1	**0**
	1	1	1	0	**1**
	1	1	1	1	**1**

e - g

E	e0	e1	e2	e3	e
	0	0	0	0	**1**
	0	0	0	1	**0**
	0	0	1	0	**1**
	0	0	1	1	**0**
	0	1	0	0	**0**
	0	1	0	1	**0**
	0	1	1	0	**1**
	0	1	1	1	**0**
	1	0	0	0	**1**
	1	0	0	1	**0**
	1	0	1	0	**1**
	1	0	1	1	**1**
	1	1	0	0	**1**
	1	1	0	1	**1**
	1	1	1	0	**1**
	1	1	1	1	**1**

A = e0	Expressões para cada LED
B = e1	a = B'D' + A'C + BC + AD' + A'BD + AB'C'
C = e2	
D = e3	b = A'B' + B'D' + A'C'D' + A'CD + AC'D
	c = A'C' + A'D + C'D + A'B + AB'
	d = AC' + A'B'D' + B'CD + BC'D + BCD'
	e = B'D' + CD' + AC + AB
	f = C'D' + BD' + AB' + AC + A'BC'
	g = B'C + CD' + AB' + AD + A'BC'

B	e0	e1	e2	e3	b
	0	0	0	0	**1**
	0	0	0	1	**1**
	0	0	1	0	**1**
	0	0	1	1	**1**
	0	1	0	0	**1**
	0	1	0	1	**0**
	0	1	1	0	**0**
	0	1	1	1	**1**
	1	0	0	0	**1**
	1	0	0	1	**1**
	1	0	1	0	**1**
	1	0	1	1	**0**
	1	1	0	0	**0**
	1	1	0	1	**1**
	1	1	1	0	**0**
	1	1	1	1	**0**

F	e0	e1	e2	e3	f
	0	0	0	0	**1**
	0	0	0	1	**0**
	0	0	1	0	**0**
	0	0	1	1	**0**
	0	1	0	0	**1**
	0	1	0	1	**1**
	0	1	1	0	**1**
	0	1	1	1	**0**
	1	0	0	0	**1**
	1	0	0	1	**1**
	1	0	1	0	**1**
	1	0	1	1	**1**
	1	1	0	0	**1**
	1	1	0	1	**0**
	1	1	1	0	**1**
	1	1	1	1	**1**

D	e0	e1	e2	e3	d
	0	0	0	0	**1**
	0	0	0	1	**0**
	0	0	1	0	**1**
	0	0	1	1	**1**
	0	1	0	0	**0**
	0	1	0	1	**1**
	0	1	1	0	**1**
	0	1	1	1	**0**
	1	0	0	0	**1**
	1	0	0	1	**1**
	1	0	1	0	**0**
	1	0	1	1	**1**
	1	1	0	0	**1**
	1	1	0	1	**1**
	1	1	1	0	**1**
	1	1	1	1	**0**

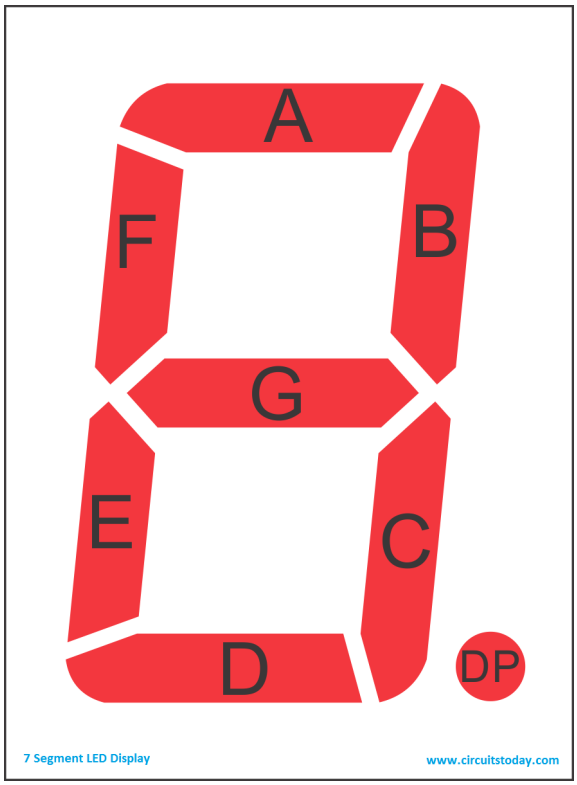
C	e0	e1	e2	e3	c
	0	0	0	0	**1**
	0	0	0	1	**1**
	0	0	1	0	**0**
	0	0	1	1	**1**
	0	1	0	0	**1**
	0	1	0	1	**1**
	0	1	1	0	**1**
	0	1	1	1	**1**
	1	0	0	0	**1**
	1	0	0	1	**1**
	1	0	1	0	**1**
	1	0	1	1	**1**
	1	1	0	0	**0**
	1	1	0	1	**1**
	1	1	1	0	**0**
	1	1	1	1	**0**

G	e0	e1	e2	e3	g
	0	0	0	0	**0**
	0	0	0	1	**0**
	0	0	1	0	**1**
	0	0	1	1	**1**
	0	1	0	0	**1**
	0	1	0	1	**1**
	0	1	1	0	**1**
	0	1	1	1	**0**
	1	0	0	0	**1**
	1	0	0	1	**1**
	1	0	1	0	**1**
	1	0	1	1	**1**
	1	1	0	0	**0**
	1	1	0	1	**1**
	1	1	1	0	**1**
	1	1	1	1	**1**

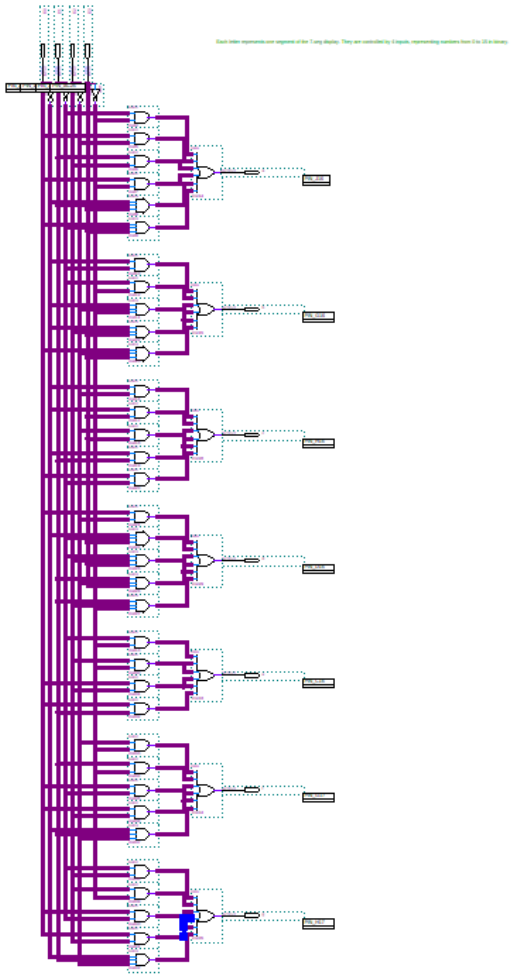
Projeto inicial do trabalho

No rascunho podem ser observadas as tabelas verdades para cada segmento do display (a-g), como representado na figura ao lado. Os leds ligados são representados pelo estado 1.

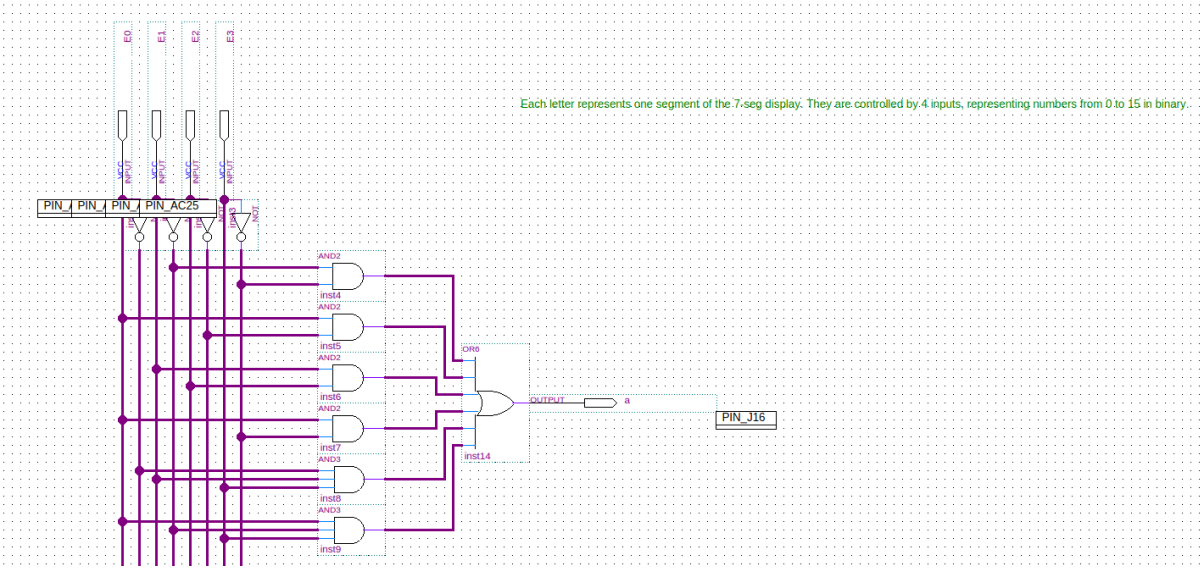
Com esse material pronto basta montar o circuito no Quartus.



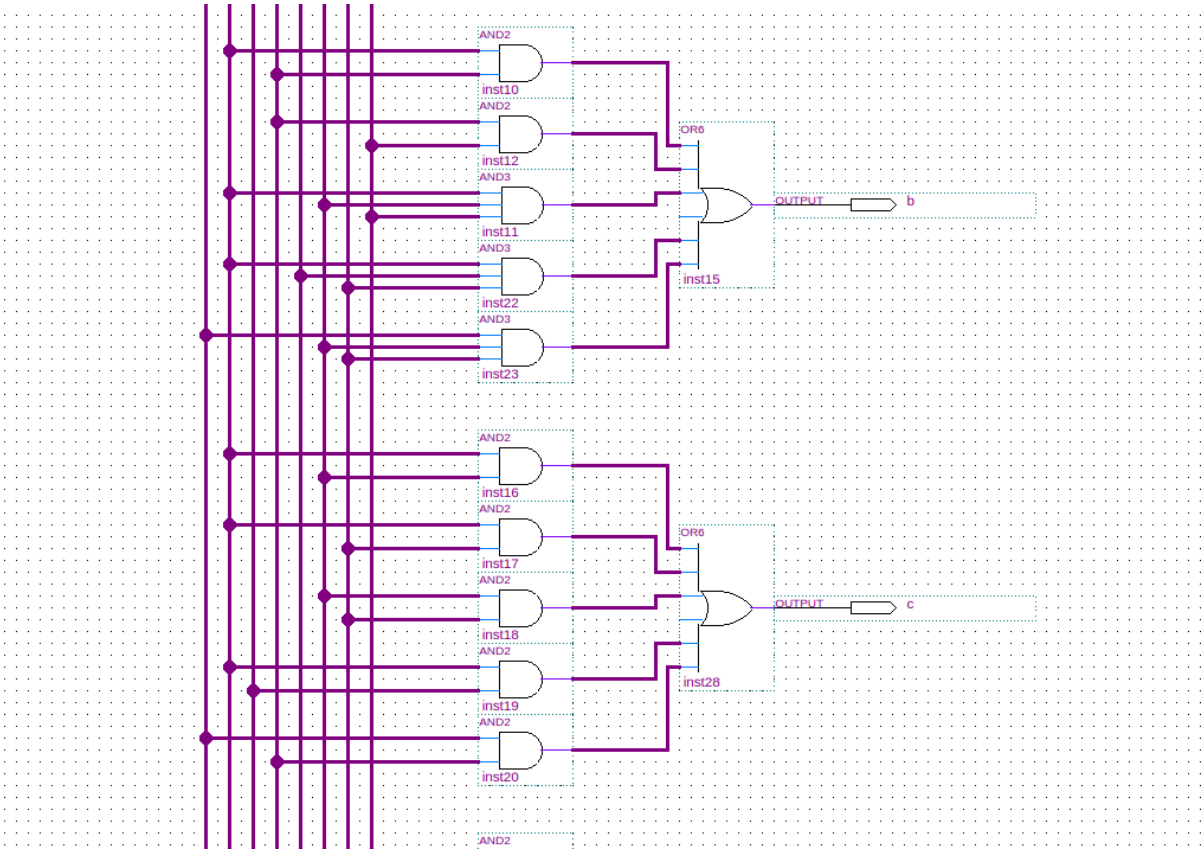
Display de 7 segmentos e alcunha de cada LED.



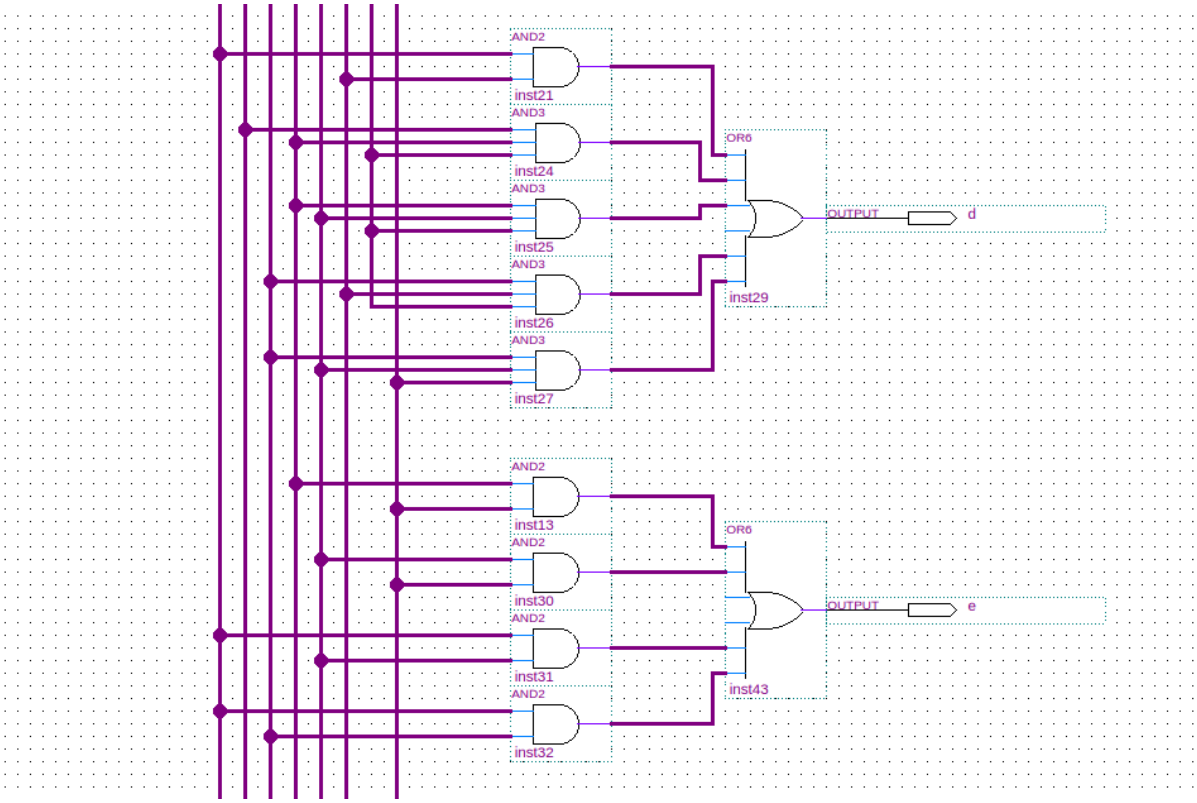
O circuito inteiro. As saídas de a-g estão em ordem alfabética.



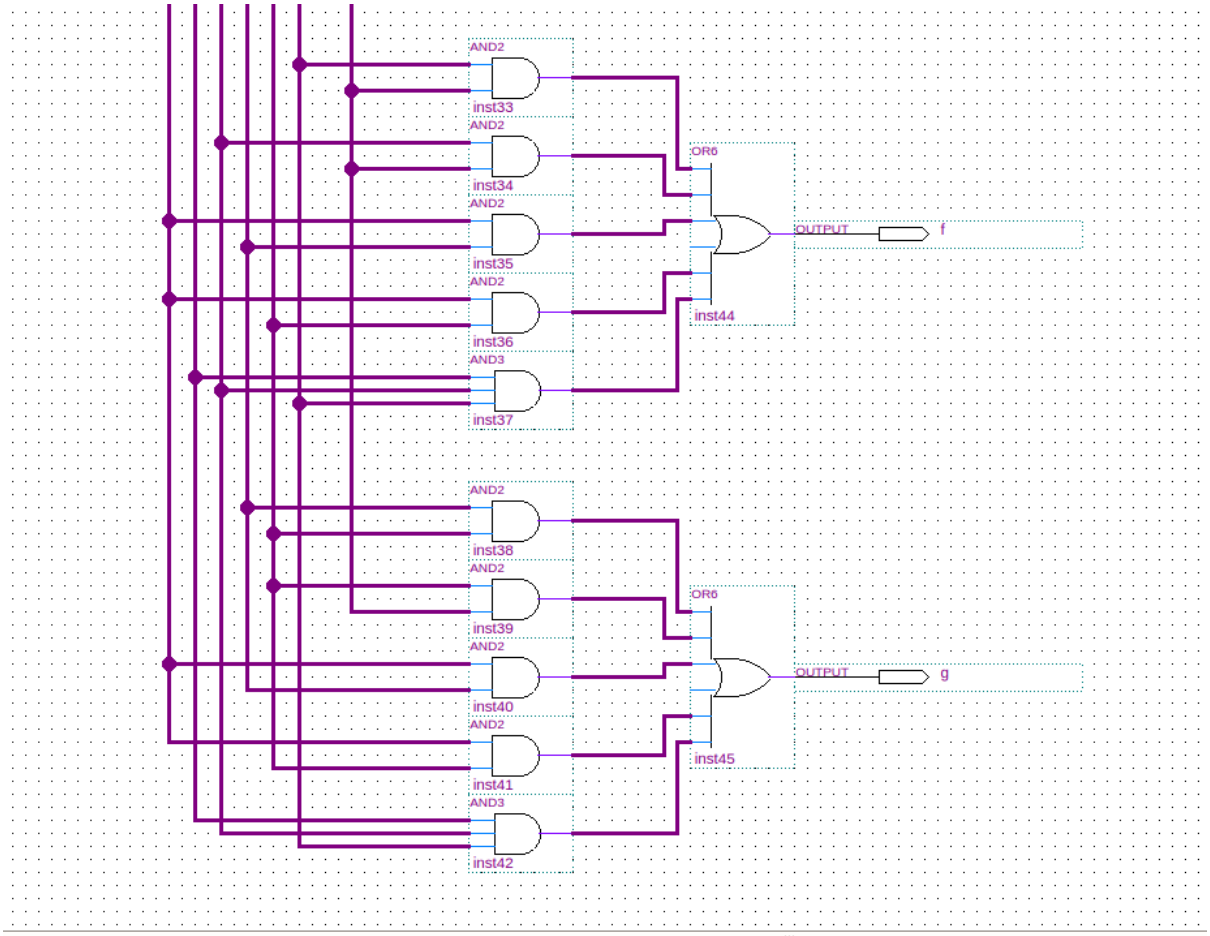
Entradas e saída **a**



Saídas **b** e **c**


AND2
inst21
AND3
inst24
AND3
inst25
AND3
inst26
AND3
inst27
OR6
inst29
OUTPUT
d
AND2
inst13
AND2
inst30
AND2
inst31
AND2
inst32
OR6
inst43
OUTPUT
e

Saídas **d** e **e**

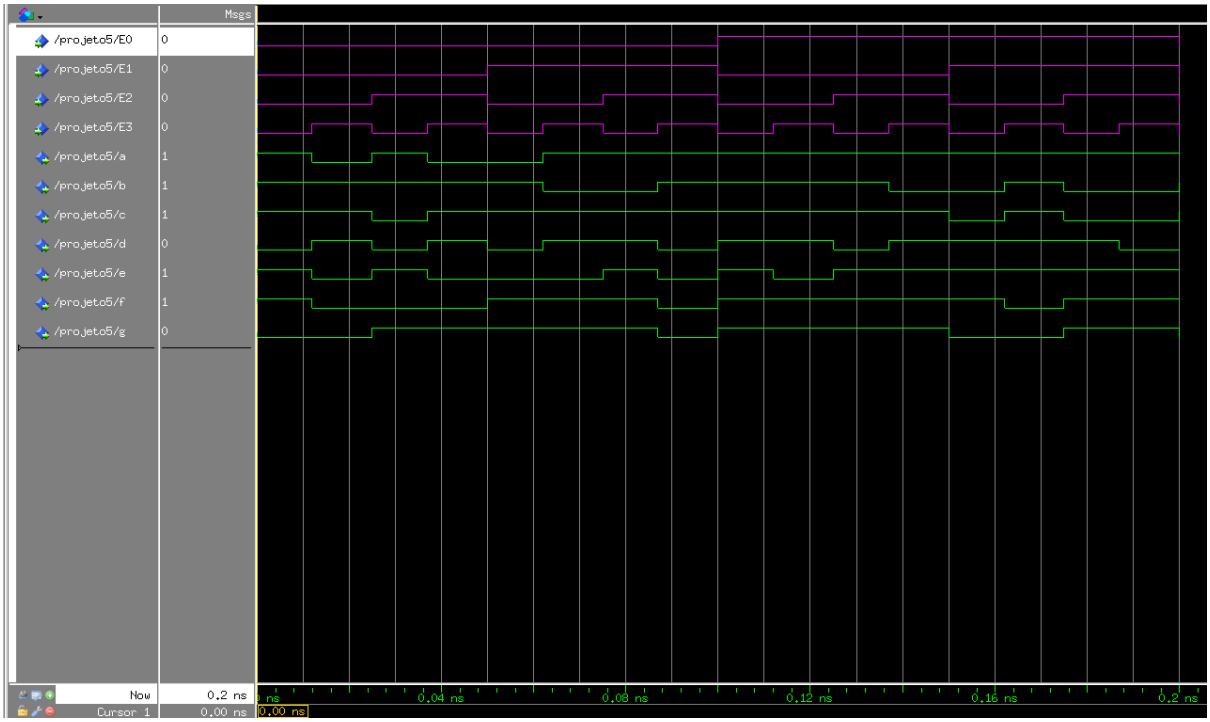


Saídas **f** e **g**

in E0	Location	PIN_AC28	Yes
From	Location	PIN_AC27	Yes
in E2	Location	PIN_AC26	Yes
in E3	Location	PIN_AC25	Yes
out a	Location	PIN_J16	Yes
out b	Location	PIN_G16	Yes
out c	Location	PIN_H16	Yes
out d	Location	PIN_D16	Yes
out e	Location	PIN_C16	Yes
out f	Location	PIN_G17	Yes
out g	Location	PIN_H17	Yes

Pinagem do circuito

Ao simular o circuito no ModelSim, obtém-se as seguintes formas de onda.



Formas de onda

Tais formas de onda batem com os resultados calculados no rascunho. Assim, confirma que o circuito está certo.