Trabalho de Arquitetura

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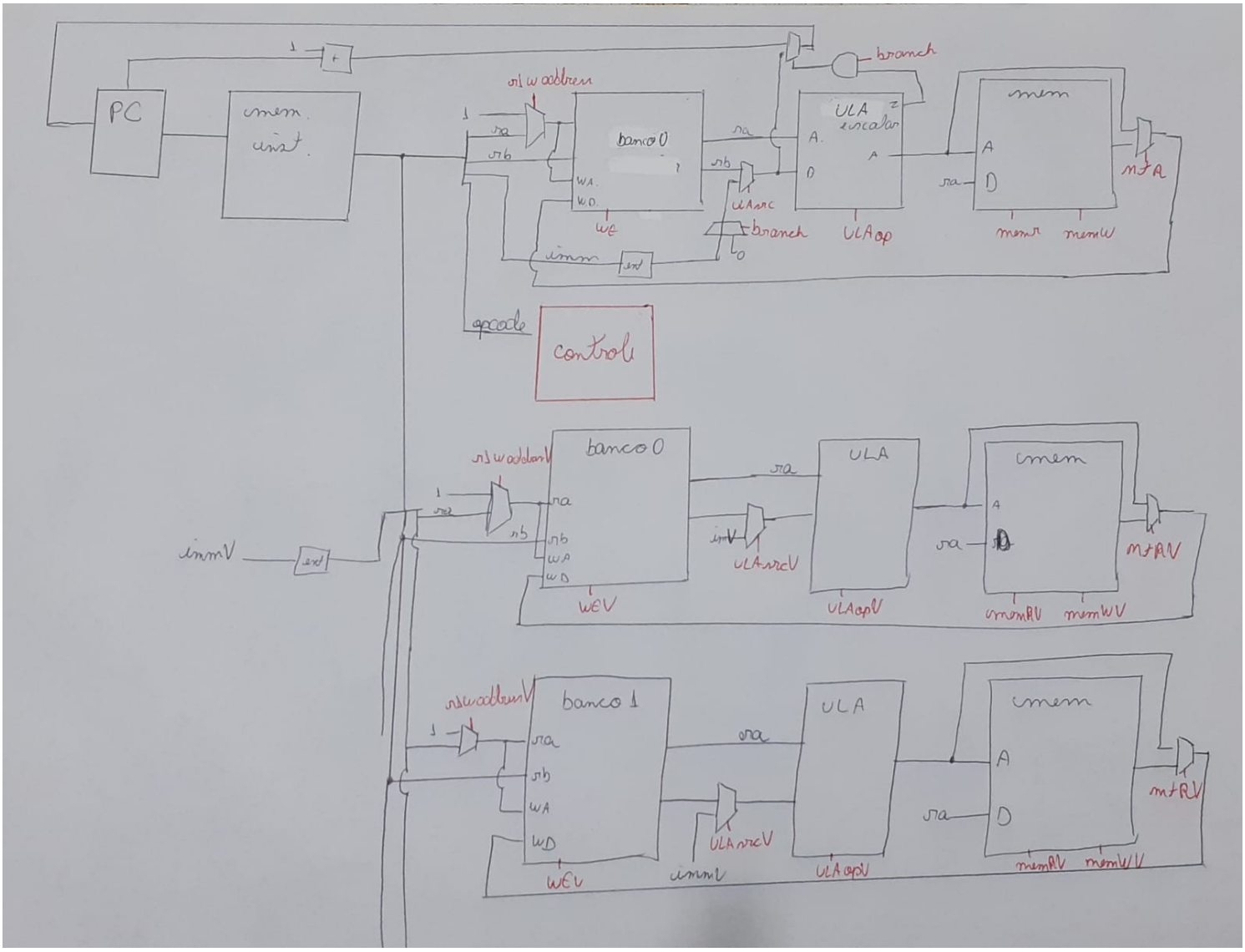
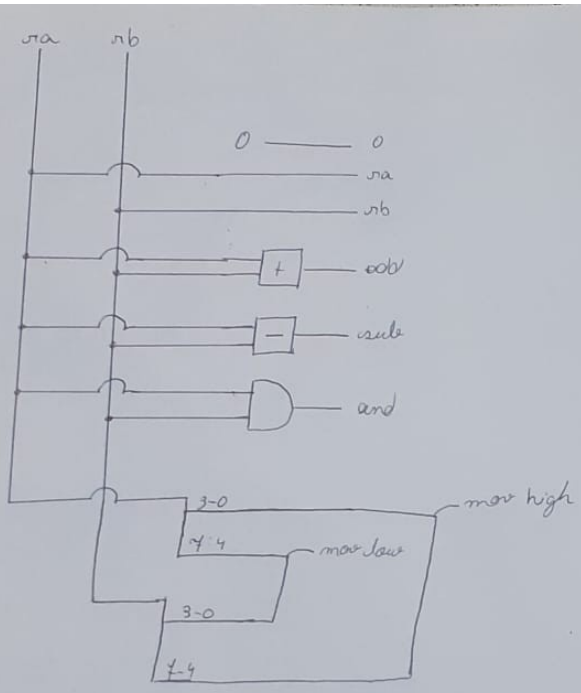
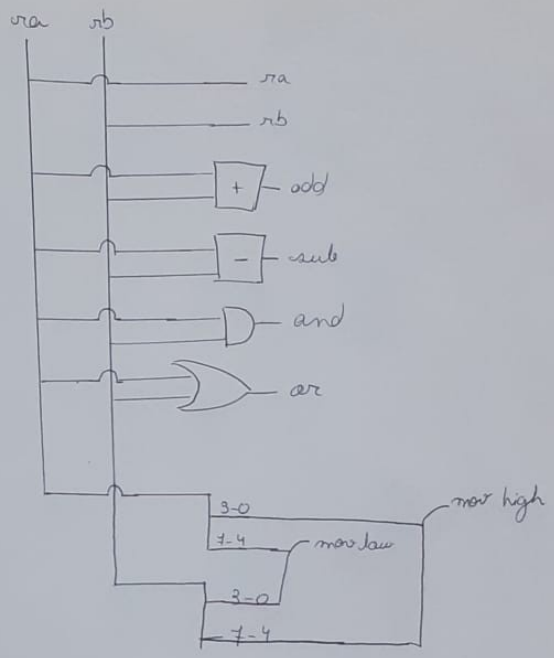




000 - 0
001 - ra
010 - rb
011 - add
100 - sub
101 - and
110 - mov high
111 - mov low

ULA
escalar



000 - ra
001 - rb
010 - add
011 - sub
100 - and
101 - or
110 - mov high
111 - mov low

ULA
vetorial

Controle Escalar								
Opcode	R1_W_Address	WE	ULAsrc	ULAop	MEMr	MEMw	MEMtoREG	branch
0000	0	1	0	010	1	0	1	0
0001	0	0	0	010	0	1	0	0
0010	1	1	1	110	0	0	0	0
0011	1	1	1	111	0	0	0	0
0100	0	1	0	011	0	0	0	0
0101	0	1	0	100	0	0	0	0
0110	0	1	0	101	0	0	0	0
0111	0	0	1	100	0	0	0	1
1000	-	0	-	-	-	0	-	0
1001	-	0	-	-	-	0	-	0
1010	-	0	-	-	-	0	-	0
1011	-	0	-	-	-	0	-	0
1100	-	0	-	-	-	0	-	0
1101	-	0	-	-	-	0	-	0
1110	-	0	-	-	-	0	-	0
1111	-	0	-	-	-	0	-	0

Controle Vetorial							
Opcode	R1_W_Addressv	Wev	ULAsrcv	ULAopv	MEMrv	MEMwv	MEMtoREGv
0000	-	0	-	-	-	0	-
0001	-	0	-	-	-	0	-
0010	-	0	-	-	-	0	-
0011	-	0	-	-	-	0	-
0100	-	0	-	-	-	0	-
0101	-	0	-	-	-	0	-
0110	-	0	-	-	-	0	-
0111	-	0	-	-	-	0	-
1000	0	1	0	001	1	0	1
1001	0	0	0	001	0	1	0
1010	1	1	1	110	0	0	0
1011	1	1	1	111	0	0	0
1100	0	1	0	010	0	0	0
1101	0	1	0	011	0	0	0
1110	0	1	0	100	0	0	0
1111	0	1	0	101	0	0	0

Individual

INSTRUÇÃO	TIPO	MENEMONICO	OPCODE	RA	RB	IMM	BINÁRIO	HEXADECIMAL
0	E	movh	0010			0011	00100011	23
1	E	movl	0011			0010	00110010	32
2	E	add	0100	10	01		01001001	49
3	E	movh	0010			0000	00100000	20
4	E	movl	0011			0101	00110101	35
5	E	add	0100	11	10		01001110	4e
6	E	sub	0101	11	01		01011101	5d
7	E	and	0110	10	01		01101001	69
8	E	st	0001	10	01		00011001	19
9	E	load	0000	11	01		00001101	d
10	V	movh	1010			0011	10100011	a3
11	V	movl	1011			0010	10110010	b2
12	V	add	1100	10	01		11001001	c9
13	V	movh	1010			0000	10100000	a0
14	V	movl	1011			0101	10110101	b5
15	V	add	1100	11	10		11001110	ce
16	V	sub	1101	11	01		11011101	dd
17	V	and	1110	10	01		11101001	e9
18	V	or	1111	01	11		11110111	f7
19	V	st	1001	10	00		10011000	98
20	V	ld	1000	11	00		10001100	8c
21	E	brzr	0111	00	01		01110001	71

Vetor

INSTRUÇÃO		TIPO	MENEMONICO	OPCODE	RA	RB	IMM	BINÁRIO	HEXADECIMAL	COMENTÁRIO
Preenche Vetor 1										
0		V	movh	1010			0000	10100000	a0	VR[3] = 4 (incremento)
1		V	movl	1011			0100	10110100	b4	
2		V	add	1100	11	01		11001101	cd	
3		V	add	1100	10	00		11001000	c8	VR[2] = endereço e valor do vetor (0-11)
4		E	movh	0010			0001	00100001	21	SR[3] = endereço do fim do loop (19)
5		E	movl	0011			0011	00110011	33	
6		E	add	0100	11	01		01001101	4d	
7		E	movh	0010			0000	00100000	20	SR[2] = controle do laco (3)
8		E	movl	0011			0011	00110011	33	
9		E	add	0100	10	01		01001001	49	
10	**LOOP:**	**E**	**brzr**	**0111**	**10**	**11**		**01111011**	**7b**	Condição para o loop
11		**V**	**st**	**1001**	**10**	**10**		**10011010**	**9A**	MEM[VR[2]] = VR[2]
12		**V**	**add**	**1100**	**10**	**11**		**11001011**	**cb**	VR[2] = VR[2] + VR[3] (4)
13		**E**	**movh**	**0010**			**0000**	**00100000**	**20**	SR[2] = SR[2] – SR[1] (1) Atualiza o controle
14		**E**	**movl**	**0011**			**0001**	**00110001**	**31**	
15		**E**	**sub**	**0101**	**10**	**01**		**01011001**	**59**	
16		**E**	**movh**	**0010**			**0000**	**00100000**	**20**	SR[1] = endereço do inicio do loop (10)
17		**E**	**movl**	**0011**			**1010**	**00111010**	**3A**	
18		**E**	**brzr**	**0111**	**00**	**01**		**01110001**	**71**	Jump para o inicio do loop

Zera Registradores									
19		E	and	0110	11	00		01101100	6c	SR[3] = 0
20		V	movh	1010			0000	10100000	a0	VR[1] = 0
21		V	movl	1011			0000	10110000	b0	
22		V	and	1110	10	01		11101001	e9	VR[2] = 0
23		V	and	1110	11	01		11101101	ed	VR[3] = 0

Preenche Vetor 2										
24		E	movh	0010			0011	00100011	23	SR[3] = endereço do fim do loop (53)
25		E	movl	0011			0101	00110101	35	
26		E	add	0100	11	01		01001101	4d	
27		E	movh	0010			0000	00100000	20	SR[2] = 3 Controle do loop
28		E	movl	0011			0011	00110011	33	
29		E	add	0100	10	01		01001001	49	
30	**LOOP:**	**E**	**brzr**	**0111**	**10**	**11**		**01111011**	**7b**	**Condição para o loop**
31		**V**	**movh**	**1010**			**0000**	**10100000**	**a0**	**Zera SR[2]**
32		**V**	**movl**	**1011**			**0000**	**10110000**	**b0**	
33		**V**	**and**	**1110**	**10**	**01**		**11101001**	**e9**	
34		**V**	**movh**	**1010**			**0000**	**10100000**	**a0**	**VR[2] = 12 Endereço Inicial**
35		**V**	**movl**	**1011**			**1100**	**10111100**	**bc**	
36		**V**	**add**	**1100**	**10**	**01**		**11001001**	**c9**	
37		**V**	**movh**	**1010**			**0001**	**10100001**	**a1**	**VR[1] = 20 Valor Inicial**
38		**V**	**movl**	**1011**			**0100**	**10110100**	**b4**	
39		**V**	**add**	**1100**	**01**	**00**		**11000100**	**c4**	**VR[1] = VR[1] + VR[0] + VR[3] Acrescenta ID e incremento**
40		**V**	**add**	**1100**	**01**	**11**		**11000111**	**c7**	
41		**V**	**add**	**1100**	**10**	**00**		**11001000**	**c8**	**VR[2] = VR[2] + VR[0] + VR[3] Acrescenta ID e incremento**
42		**V**	**add**	**1100**	**10**	**11**		**11001011**	**cb**	
43		**V**	**st**	**1001**	**01**	**10**		**10010110**	**96**	**MEM[VR[2]] = VR[1]**
44		**V**	**movh**	**1010**			**0000**	**10100000**	**a0**	**VR[3] = VR[3] + 4 Atualiza o incremento**
45		**V**	**movl**	**1011**			**0100**	**10110100**	**b4**	
46		**V**	**add**	**1100**	**11**	**01**		**11001101**	**cd**	
47		**E**	**movh**	**0010**			**0000**	**00100000**	**20**	**SR[2] = SR[2] – SR[1] (1) Atualiza o controle**
48		**E**	**movl**	**0011**			**0001**	**00110001**	**31**	
49		**E**	**sub**	**0101**	**10**	**01**		**01011001**	**59**	
50		**E**	**movh**	**0010**			**0001**	**00100001**	**21**	**SR[1] = endereço do inicio do loop (30)**
51		**E**	**movl**	**0011**			**1110**	**00111110**	**3e**	
52		**E**	**brzr**	**0111**	**00**	**01**		**01110001**	**71**	**Jump para o inicio do loop**

Zera Registradores									
53		E	and	0110	11	00		01101100	6c	SR[3] = 0
54		V	movh	1010			0000	10100000	a0	VR[1] = 0
55		V	movl	1011			0000	10110000	b0	
56		V	and	1110	10	01		11101001	e9	VR[2] = 0
57		V	and	1110	11	01		11101101	ed	VR[3] = 0

Preenche Vetor 3										
58		E	movh	0010			0101	00100101	25	SR[3] = endereço do fim do loop (82)
59		E	movl	0011			0010	00110010	32	
60		E	add	0100	11	01		01001101	4d	
61		E	movh	0010			0000	00100000	20	SR[2] = 3 Controle do loop
62		E	movl	0011			0011	00110011	33	
63		E	add	0100	10	01		01001001	49	
64		V	movh	1010			0000	10100000	a0	VR[2] = 0
65		V	movl	1011			0000	10110000	b0	
66		V	add	1100	10	01		11001001	c9	
67	**LOOP:**	**E**	**brzr**	**0111**	**10**	**11**		**01111011**	**7b**	**Condição para o loop**
68		**V**	**movh**	**1010**			**0001**	**10100001**	**a1**	**VR[1] = 24 Endereço Inicial**
69		**V**	**movl**	**1011**			**1000**	**10111000**	**b8**	
70		**V**	**add**	**1100**	**01**	**11**		**11000111**	**c7**	**VR[1] = VR[1] + VR[0] + VR[3] Acrescenta ID e incremento**
71		**V**	**add**	**1100**	**01**	**00**		**11000100**	**c4**	
72		**V**	**st**	**1001**	**10**	**01**		**10011001**	**99**	**MEM[VR[1]] = VR[2]**
73		**V**	**movh**	**1010**			**0000**	**10100000**	**a0**	**VR[3] = VR[3] + 4 Atualiza o incremento**
74		**V**	**movl**	**1011**			**0100**	**10110100**	**b4**	
75		**V**	**add**	**1100**	**11**	**01**		**11001101**	**cd**	

76		**E**	**movh**	**0010**			**0000**	**00100000**	**20**	**SR[2] = SR[2] – SR[1] (1) Atualiza o controle**
77		**E**	**movl**	**0011**			**0001**	**00110001**	**31**	
78		**E**	**sub**	**0101**	**10**	**01**		**01011001**	**59**	
79		**E**	**movh**	**0010**			**0100**	**00100100**	**24**	**SR[1] = endereço do inicio do loop (67)**
80		**E**	**movl**	**0011**			**0011**	**00110011**	**33**	
81		**E**	**brzr**	**0111**	**00**	**01**		**01110001**	**71**	**Jump para o inicio do loop**
										Zera Registradores
82		E	and	0110	11	00		01101100	6c	SR[3] = 0
83		V	and	1110	11	10		11101110	ee	VR[3] = 0

										Soma Vetores
84		E	movh	0010			0111	00100111	27	SR[3] = endereço do fim do loop (118)
85		E	movl	0011			0110	00110110	36	
86		E	add	0100	11	01		01001101	4d	
87		E	movh	0010			0000	00100000	20	SR[2] = 3 Controle do loop
88		E	movl	0011			0011	00110011	33	
89		E	add	0100	10	01		01001001	49	
90	**LOOP:**	**E**	**brzr**	**0111**	**10**	**11**		**01111011**	**7b**	**Condição para o loop**
91		**V**	**movh**	**1010**			**0000**	**10100000**	**a0**	**VR[2] = 12 Endereço Inicial do Vetor 2**
92		**V**	**movl**	**1011**			**1100**	**10111100**	**bc**	
93		**V**	**add**	**1100**	**10**	**00**		**11001000**	**c8**	
94		**V**	**add**	**1100**	**10**	**01**		**11001001**	**c9**	**VR[2] = VR[2] + VR[0] + VR[3] Acrescenta ID e incremento**
95		**V**	**add**	**1100**	**10**	**11**		**11001011**	**cb**	
96		**V**	**movl**	**1011**			**0000**	**10110000**	**b0**	**VR[1] = 0 Endereço Inicial do Vetor 1**
97		**V**	**add**	**1100**	**01**	**00**		**11000100**	**c4**	**VR[1] = VR[1] + VR[0] + VR[3] Acrescenta ID e incremento**
98		**V**	**add**	**1100**	**01**	**11**		**11000111**	**c7**	
99		**V**	**ld**	**1000**	**01**	**01**		**10000101**	**85**	**VR[1] = MEM[VR[1]]**
100		**V**	**ld**	**1000**	**10**	**10**		**10001010**	**8A**	**VR[2] = MEM[VR[2]]**
101		**V**	**add**	**1100**	**10**	**01**		**11001001**	**c9**	**VR[2] = VR[2] + VR[1] Soma dos Vetores**
102		**V**	**movh**	**1010**			**0001**	**10100001**	**a1**	**VR[1] = 24 Endereço Inicial do Vetor 3**
103		**V**	**movl**	**1011**			**1000**	**10111000**	**b8**	

104		**V**	**add**	**1100**	**01**	**00**		**11000100**	**c4**	**VR[1] = VR[1] + VR[0] + VR[3] Acrescenta ID e incremento**
105		**V**	**add**	**1100**	**01**	**11**		**11000111**	**c7**	
106		**V**	**st**	**1001**	**10**	**01**		**10011001**	**99**	**MEM[VR[1]] = VR[2]**
107		**V**	**movh**	**1010**			**0000**	**10100000**	**a0**	**VR[3] = VR[3] + 4 Atualiza o incremento**
108		**V**	**movl**	**1011**			**0100**	**10110100**	**b4**	
109		**V**	**add**	**1100**	**11**	**01**		**11001101**	**cd**	
110		**V**	**movl**	**1011**			**0000**	**10110000**	**b0**	**VR[2] = 0**
111		**V**	**and**	**1110**	**10**	**01**		**11101001**	**e9**	
112		**E**	**movh**	**0010**			**0000**	**00100000**	**20**	**SR[2] = SR[2] – SR[1] (1) Atualiza o controle**
113		**E**	**movl**	**0011**			**0001**	**00110001**	**31**	
114		**E**	**sub**	**0101**	**10**	**01**		**01011001**	**59**	
115		**E**	**movh**	**0010**			**0101**	**00100101**	**25**	**SR[1] = endereço do inicio do loop (90)**
116		**E**	**movl**	**0011**			**1010**	**00111010**	**3A**	
117		**E**	**brzr**	**0111**	**00**	**01**		**01110001**	**71**	**Jump para o inicio do loop**
118										