Ejercicio

- Ventana centralizada / Estaciones de reserva
- Emisión ordenada/desordenada
- Recursos: 1 lw/sw, 1 add/sub, 1 mult/div
- Recursos: 1 lw/sw, 2 add/sub, 2 mult/div
- Latencia: lw/sw (5 ciclos), add/sub (2 ciclos), mult/div (5 ciclos)

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[1] - LW R1, 0(R2) - (5)Ciclos

[2] - ADD R2, R1, R3 - (2)Ciclos

[3] - MULT R3, R1, R2 - (5)Ciclos

[4] - SUB R4, R1, R2 - (2)Ciclos

[5] - ADD R4, R1, R2 - (2)Ciclos

[6] - DIV R4, R5, R6 - (5)Ciclos
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Casos:

- VC, EO, R1
- VC, EO, R2
- VC, ED, R1
- VC, ED, R2
- ER, EO, R1
- ER, EO, R2
- ER, ED, R1
- ER, ED, R2

VC, EO, R1

Ventana Centralizada Emision Ordenada Grupo de Recursos 1

Ve	ntana (Centralia	zada, E	mision	Ordena	da, Gru	po de R	ecursos	1				
			VENT	ANA CE	NTRALI	ZADA					LW/SW	I .	
	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2			ADD / SI		
	DIV	R4	R5	1	-	R6	1	-	[1]	- LW	R1,	0(R2) -	(5)
	ADD	R4	R1	0	LW	R2	0	ADD	[2]	- ADD		R1, R3 -	
	SUB	R4	R1	0	LW	R2	0	ADD	[3]	- MUL	ΓR3,	R1, R2 -	(5)
	MULT	R3	R1	0	LW	R2	0	ADD	[4]	- SUB	R4,	R1, R2 -	(2)
	ADD	R2	R1	0	LW	R3	1	-	[5]	- ADD	R4,	R1, R2 -	(2)
	LW	R1	R2	1	-	-	-	-	[6]	- DIV	R4,	R5, R6 -	(5)
									_				
	П				nite [1]					INSTR	ISS	EXE	
	⊕ [6]	Queda	prepara	ado para	a cuand	o le toq	ue el tu	rno ∜	·	LW	(1)	(2) - (6)	
									1				
			VENT	ANA CE	NTRALI	ZADA							
	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2					
	DIV	R4	R5	1	-	R6	1	-					
	ADD	R4	R1	1	-	R2	0	ADD					
	SUB	R4	R1	1	-	R2	0	ADD					
	MULT	R3	R1	1	-	R2	0	ADD					
	ADD	R2	R1	1	-	R3	1	-					
				Se en	nite [2]	1.			→	INSTR	ISS	EXE	
			45		[-]	45				LW	(1)	(2) - (6)	
			VENT	ANA CE	NTRALI	ZADA] <u> </u>	ADD	(7)	(8) - (9)	
	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2					
	DIV	R4	R5	1	-	R6	1	-					
	ADD	R4	R1	1	-	R2	1	-					
	SUB	R4	R1	1	-	R2	1	-					
	MULT	R3	R1	1	-	R2	1	-					
	Se	emite [3	3] y [4],	el resto	se que	dan pre	parado	S. 📗	→	INSTR	ISS	EXE	
) /ENT	***** OF	NTDALI	7404			, }	LW	(1)	(2) - (6)	
	0.00	DECT		ANA CE	I		OKO	FLINIO	-	ADD	(7)	(8) - (9)	
	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2	-	MULT	(10)	(11) - (15)	.
	ADD	R4	R5	1	- 134/	R6	1	4 D D	L	SUB	(10)	(11) - (12)	•
	ADD	R4	R1	1	LW	R2	'	ADD	_				
	пп							п		INSTR	ISS	EXE	
	∯ [Se emit	te [5], [6	i] se es	pera a c	ue [3] a	icabe.	1	→	LW	(1)	(2) - (6)	
									.	ADD	(7)	(8) - (9)	
			VENT	ANA CE	NTRALI	ZADA				MULT	(10)	(11) - (15)	
	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2		SUB	(10)	(11) - (12)	\neg
	DIV	R4	R5	1	-	R6	1	-		ADD	(13)	(14) - (15)	←
	П			00.00	ito (C)			П					
	Ψ			Se em	ite [o]			Ψ	-	INSTR	ISS	EXE	
									,	LW	(1)	(2) - (6)	
				ANA CE						ADD	(7)	(8) - (9)	
	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2		MULT	(10)	(11) - (15)	

SUB

ADD

(10)

(13)

(16)

(11) - (12)

(14) - (15)

(17) - (21)

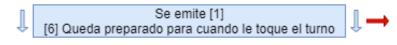
VC, EO, R2

Ventana Centralizada, Emision Ordenada, Grupo de Recursos 2

		VENT	ANA CE	NTRALI	ZADA		
OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2
DIV	R4	R5	1	-	R6	1	-
ADD	R4	R1	0	LW	R2	0	ADD
SUB	R4	R1	0	LW	R2	0	ADD
MULT	R3	R1	0	LW	R2	0	ADD
ADD	R2	R1	0	LW	R3	1	-
LW	R1	R2	1	-	-	-	-

1 LW / SW 2 ADD / SUB 2 MULT / DIV

[1]	LW	R1,	0(R2	2)	(5)
[2]	ADD	R2,	R1,	R3	(2)
[3]	MULT	R3,	R1,	R2	(5)
[4]	SUB	R4,	R1,	R2	(2)
[5]	ADD	R4,	R1,	R2	(2)
[6]	DIV	R4,	R5,	R6	(5)



INSTR	ISS	EXE
LW	(1)	(2) - (6)

		VENT	ANA CE	NTRALI	ZADA		
OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2
DIV	R4	R5	1	-	R6	1	-
ADD	R4	R1	1	-	R2	0	ADD
SUB	R4	R1	1	-	R2	0	ADD
MULT	R3	R1	1	-	R2	0	ADD
ADD	R2	R1	1	-	R3	1	-



INSTR	ISS	EXE
LW	(1)	(2) - (6)
ADD	(7)	(8) - (9)

		VENT	ANA CE	NTRALI	ZADA		
OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2
DIV	R4	R5	1	-	R6	1	-
ADD	R4	R1	1	-	R2	1	-
SUB	R4	R1	1	-	R2	1	-
MULT	R3	R1	1	-	R2	1	-

1		Se ei	mite [3],	[6]	1 -					
	VENTANA CENTRALIZADA									
OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2			

INSTR	ISS	EXE
LW	(1)	(2) - (6)
ADD	(7)	(8) - (9)
MULT	(10)	(11) - (15)
SUB	(10)	(11) - (12)
ADD	(10)	(11) - (12)
DIV	(10)	(11) - (15)

VC, ED, R1

Ventana Centralizada, Emision Desordenada, Grupo de Recursos 1

Dest			VENT	ANA CE	NTRALI	ZADA				1	LW/SW	/	
DIV R4 R5 1 - R6 1 - ADD R4 R1 00 LW R2 00 ADD SUB R4 R1 0 LW R2 0 ADD MULT R3 R1 0 LW R2 0 ADD ADD R2 R1 0 LW R3 1 - LW R1 R2 1 LW R1 R2 1 WENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R2 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 1 - Se emite [2]	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2				I	
ADD R4 R1 0 LW R2 0 ADD SUB R4 R1 0 LW R2 0 ADD SUB R4 R1 0 LW R2 0 ADD MULT R3 R1 0 LW R2 0 ADD ADD R2 R1 0 LW R3 1 . LW R1 R2 1	DIV	R4	R5	1	-	R6	1	-	[1]				
Sub	ADD	R4	R1	0	LW	R2	0	ADD		•			
MULT R3	SUB	R4	R1	0	LW	R2	0	ADD		•			
Se emite [1] y [6]	MULT	R3	R1	0	LW	R2	0	ADD					
Se emite [1] y [6]	ADD	R2	R1	0	LW	R3	1	-	[5]] - ADD			
Se emite [1] y [6]	LW	R1	R2	1	-	-	-	-	[6]	- DIV	R4,	R5, R6 -	
Se emite [1] y [6]									•				
VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 0 ADD SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - R3 1 - INSTR ISS EXE LW (1) (2)-(6) DIV (1) (2)-(6) DIV (1) (2)-(6) ADD R2 R1 1 - R2	П			Sa amita	111 v [6	21				INSTR	ISS	EXE	
VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 0 ADD SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R2 0 ADD VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - MULT R3 R1 1 - R2 1 - VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - <td col<="" td=""><td>ĴĻ</td><td></td><td></td><td>oe emili</td><td>2 [1] y [c</td><td>7]</td><td></td><td>-</td><td>_</td><td>LW</td><td>(1)</td><td>(2) - (6)</td></td>	<td>ĴĻ</td> <td></td> <td></td> <td>oe emili</td> <td>2 [1] y [c</td> <td>7]</td> <td></td> <td>-</td> <td>_</td> <td>LW</td> <td>(1)</td> <td>(2) - (6)</td>	ĴĻ			oe emili	2 [1] y [c	7]		-	_	LW	(1)	(2) - (6)
OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 0 ADD SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R2 0 ADD VENTANA CENTRALIZADA MULT R3 R1 1 - R2 1 - Se emite [3] y [4], [5] se espera a que acabe [4] INSTR ISS EXE LW (1) (2) - (6) DIV (1) (2) - (6) DIV (1) (2) - (6) DIV (1) (2) - (6) DIV (1) (2) - (6) DIV (1) (2) - (6) DIV (1) (2) - (6) DIV (1) (2) - (6) ADD R4 R1 1 -									,	DIV	(1)	(2) - (6)	
ADD R4 R1 1 - R2 0 ADD SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - SUB R4 R1 1 - R2 1 - MULT R3 R1 1 - R2 1 - SUB R4 R1 1 - R2 1 - MULT R3 R1 1 - R2 1 - SE emite [3] y [4], [5] se espera a que acabe [4] VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - WENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD (7) (8)-(9) MULT (7) (8)-(12) SUB (10) (11)-(12) WENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD (7) (8)-(9) MULT (7) (8)-(12) MULT (7) (8)-(12) MULT (7) (8)-(12) WENTANA CENTRALIZADA			VENT	ANA CE	NTRALI	ZADA							
SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - Sub R4 R1 1 - R2 1 - MULT R3 R1 1 - R2 1 - WENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - VENTANA CENTRALIZADA VENTANA CENTRALIZADA VENTANA CENTRALIZADA VENTANA CENTRALIZADA													

ADD

(13)

(14) - (15)

VC, ED, R2

Ventana Centralizada, Emision Desodenada, Grupo de Recursos 2

DIV R4 R5 1 - R6 1 - ADD R4 R1 0 LW R2 0 ADD SUB R4 R1 0 LW R2 0 ADD MULT R3 R1 0 LW R2 0 ADD ADD R2 R1 0 LW R3 1 - LW R1 R2 1 Se emite [1] y [6] VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R2 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 1 - SE emite [2]												
DPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 DIV R4 R5 1 - R6 1 - ADD R4 R1 0 LW R2 0 ADD SUB R4 R1 0 LW R2 0 ADD MULT R3 R1 0 LW R2 0 ADD ADD R2 R1 0 LW R3 1 - LW R1 R2 1 Se emite [1] y [6] VENTANA CENTRALIZADA DPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R2 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - Se emite [2] VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - Se emite [2] VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - SUB R4 R1 1 - R2 1 - SUB R4 R1 1 - R2 1 - MULT R3 R1 1 1 - R2 1 - MULT R3 R1 1 1 - R2 1 - MULT R3 R1 1 1 - R2 1 - MULT R3 R1 1 1 - R2 1 - MULT R3 R1 1 1 - R2 1 - MULT R3 R1 1 1 - R2 1 - MULT R3 R1			VENT	ANA CE	NTRALI	ZADA						
ADD R4 R1 0 LW R2 0 ADD SUB R4 R1 0 LW R2 0 ADD SUB R4 R1 0 LW R2 0 ADD ADD R2 R1 0 LW R3 1 - LW R1 R2 1	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2				
SUB	DIV	R4	R5	1	-	R6	1	-	[1] - LW	R1,	6
MULT R3 R1 0 LW R2 0 ADD ADD R2 R1 0 LW R3 1 - LW R1 R2 1 Se emite [1] y [6] VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - Se emite [2]	ADD	R4	R1	0	LW	R2	0	ADD	[2	-] - ADD		
ADD R2 R1 0 LW R3 1 - LW R1 R2 1	SUB	R4	R1	0	LW	R2	0	ADD	[3] - MUL.	T R3,	R
Se emite [1] y [6]	MULT	R3	R1	0	LW	R2	0	ADD	[4] - SUB	R4,	R
Se emite [1] y [6]	ADD	R2	R1	0	LW	R3	1	-	[5] - ADD	R4,	R
Se emite [1] y [6]	LW	R1	R2	1	-	-	-	-	[6] - DIV	R4,	R
Se emite [1] y [6]										INSTR	221	
VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 0 ADD SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - VENTANA CENTRALIZADA MULT R3 R1 1 - R2 1 - MULT R1 R1 R2 1 - R2 1 - MULT R1 R1 R1	ļ		5	Se emite	e [1] y [6	6]		1	\rightarrow			
DPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - Se emite [2]			VENT	ANA CE	NTRALI	ZADA]			
SUB R4 R1 1 - R2 0 ADD MULT R3 R1 1 - R2 0 ADD ADD R2 R1 1 - R3 1 - Se emite [2]	OPC	DEST					OK2	FUN2	-		(-)	
NULT R3 R1 1 - R2 0 ADD	ADD	R4	R1	1	-	R2	0	ADD				
ADD R2 R1 1 - R3 1 - Se emite [2]	SUB	R4	R1	1	-	R2	0	ADD				
Se emite [2]	MULT	R3	R1	1	-	R2	0	ADD				
Se emite [2] LW (1)	ADD	R2	R1	1	-	R3	1	-				
Se emite [2]										INICTO	ICC	
VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD R4 R1 1 - R2 1 - SUB R4 R1 1 - R2 1 - MULT R3 R1 1 - R2 1 - Se emite [3], [4], [5] INSTR ISS LW (1) DIV (1) ADD (7) MULT (10) SUB (10)			Į.	Se en	nite [2]				\rightarrow			
OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2									1			_
ADD R4 R1 1 - R2 1 - SUB R4 R1 1 - R2 1 - MULT R3 R1 1 - R2 1 - Se emite [3], [4], [5] VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 MULT (10) SUB (10)							1					_
SUB R4 R1 1 - R2 1 - MULT R3 R1 1 - R2 1 - Se emite [3], [4], [5] VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 NSTR ISS					FUN1			FUN2		ADD	(/)	
NULT R3 R1 1 - R2 1 - NSTR ISS	ADD			-	-		-	-				
Se emite [3], [4], [5]				-	-		-	-				
Se emite [3], [4], [5]	MULI	R3	R1	1	-	R2	1	-		INSTR	ISS	
VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 MULT (10) SUB (10)	ļ		Se	emite [3], [4], [5]		1	→			
VENTANA CENTRALIZADA OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 ADD (7) MULT (10) SUB (10)									1		· · ·	
OPC DEST OP1 OK1 FUN1 OP2 OK2 FUN2 MULT (10) SUB (10)												
	OPC	DEST	OP1	OK1	FUN1	OP2	OK2	FUN2		MULT		
ADD (10)										SUB	(10)	
										ADD		