

Problema 3.1

a)

Desarrollo de 4 iteraciones y renombramiento de registros

```
foo: LD      F2, 0(R1)
      MULTD  F4, F2, F0
      LD      F6, 0(R2)
      ADDD   F6, F4, F6
      SD     0(R2), F6

      LD      F8, 8(R1)      ; Renombrado: F(i+6) ← F(i)
      MULTD  F10, F8, F0
      LD      F12, 8(R2)
      ADDD   F12, F10, F12
      SD     8(R2), F12

      LD      F14, 16(R1)   ; Renombrado: F(i+12) ← F(i)
      MULTD  F16, F14, F0
      LD      F18, 16(R2)
      ADDD   F18, F16, F18
      SD     16(R2), F18

      LD      F20, 24(R1)  ; Renombrado: F(i+18) ← F(i)
      MULTD  F22, F20, F0
      LD      F24, 24(R2)
      ADDD   F24, F22, F24
      SD     24(R2), F24

      ADDI   R1, R1, #32
      ADDI   R2, R2, #32
      SGTI   R3, R1, done
      BEQZ  R3, foo
```

The logo for Cartagena99 features the text 'Cartagena99' in a stylized, blue, serif font. The '99' is significantly larger and more prominent than the rest of the text. The logo is set against a light blue background with a white arrow pointing to the right, and a yellow and orange gradient bar at the bottom.

CLASES PARTICULARES, TUTORÍAS TÉCNICAS ONLINE
LLAMA O ENVÍA WHATSAPP: 689 45 44 70

ONLINE PRIVATE LESSONS FOR SCIENCE STUDENTS
CALL OR WHATSAPP:689 45 44 70

Reordenar para que sean independientes 2 a dos (suponemos suficientes estaciones de reserva)

foo: LD	F2, 0(R1)
LD	F8, 8(R1)
MULTD	F4, F2, F0
MULTD	F10, F8, F0
LD	F6, 0(R2)
LD	F12, 8(R2)
ADDD	F6, F4, F6
ADDD	F12, F10, F12
SD	0(R2), F6
SD	8(R2), F12
LD	F14, 16(R1)
LD	F20, 24(R1)
MULTD	F16, F14, F0
MULTD	F22, F20, F0
LD	F18, 16(R2)
LD	F24, 2(R2)
ADDD	F18, F16, F18
ADDD	F24, F22, F24
SD	16(R2), F18
ADDI	R1, R1, #32
SD	24(R2), F24
SGTI	R3, R1, done
ADDI	R2, R2, #32
BEQZ	R3, foo

Podemos suponer que hay predicción de saltos.

Si hay suficientes recursos de planificación → no se para el pipe

The logo for Cartagena99 features the text 'Cartagena99' in a stylized, blue, serif font. The '99' is significantly larger and more prominent than the rest of the text. The logo is set against a light blue background with a white arrow pointing to the right, and a yellow and orange gradient bar at the bottom.

**CLASES PARTICULARES, TUTORÍAS TÉCNICAS ONLINE
LLAMA O ENVÍA WHATSAPP: 689 45 44 70**

**ONLINE PRIVATE LESSONS FOR SCIENCE STUDENTS
CALL OR WHATSAPP:689 45 44 70**

b)

			Issue	Exec	Mem	Write
foo: LD	F2, 0(R1)		1	-		
MULTD	F4, F2, F0		2	-		
LD	F6, 0(R2)		2	-		
ADDD	F6, F4, F6		3	-		
SD	0(R2), F6		4	-		
ADDI	R1, R1, #8		4			
ADDI	R2, R2, #8		5	-		
SGTI	R3, R1, done		5	-		
BEQZ	R3, foo		6	-		

Suponiendo suficientes estaciones de reserva, tan solo es relevante cuando se hace el "issue" → 6 ciclos por iteración (CPI = 6/9)

c)

$T_a = 25 \text{ iter} \times 24 \text{ instr/iter} \times 0,5 \text{ ciclos/instr} = 300 \text{ ciclos}$

$T_b = 100 \text{ iter} \times 9 \text{ instr/iter} \times 6/9 \text{ ciclos/instr} = 600 \text{ ciclos}$

$\text{Speedup} = T_b / T_a = 2$

Es decir, se obtiene una mejora de rendimiento del 100%

The logo for Cartagena99 features the text "Cartagena99" in a stylized, blue, serif font. The "99" is significantly larger and more prominent than the "Cartagena" part. The text is set against a light blue background with a white, stylized arrow pointing to the right. Below the text, there is a horizontal orange and yellow gradient bar.

CLASES PARTICULARES, TUTORÍAS TÉCNICAS ONLINE
LLAMA O ENVÍA WHATSAPP: 689 45 44 70

ONLINE PRIVATE LESSONS FOR SCIENCE STUDENTS
CALL OR WHATSAPP:689 45 44 70