STUDENTS IDENTIFICATION:

Number:	Name:	
105894	Eduardo Cardoso	2.4 Sopree code optimization: loop unrolling
106329	Tiago Santos	a). Attach access of the new assembly program
106427	Martin Rito	

# 2.1 Simple execution, without data forwarding techniques

f)	Clock cycles	377
	Instructions	166
	Average CPI	2-275

Stalls: - Data	192
- Structural	0
- Branch Taken	15

g) Ao aralisar a execução do programa, podemos concluir que a branch prediction polícy é branch not taken porque, pela pipeline, antes de saleur o resultado do branch, consegamos a executor o instrução halt' que é a instrução que se executoria caso o salto não fosse tomado.

### 2.2 Application of data forwarding techniques

c)	Clock cycles	297
	Instructions	166
	Average CPI	1.789

Stalls: - Data	112
- Structural	16
- Branch Taken	15

# 2.3 Source code optimization: minimization of data and structural hazards

a) Attach a copy of the new assembly program.

Stalls: - Data	48
- Structural	16
- Branch Taken	15

#### 2.4 Source code optimization: loop unrolling

a) Attach a copy of the new assembly program.

Clock cycles	153
Instructions	126
Average CPI	1.214

Stalls:	- Data	0
. and bear	- Structural	16
	- Branch Taken	4

#### 2.5 Source code optimization: branch delay slot

a) Attach a copy of the new assembly program.

Clock cycles	218
Instructions	166
Average CPI	1.313

Stalls: - Data	48
- Structural	16
- Branch Taken	0

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Table 2: Pipeline time diagram, with data forwarding techniques.

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Table 3: Pipeline time diagram, with minimization techniques to reduce the data and structural hazards.

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Table 4: Pipeline time diagram: usage of loop unrolling minimization techniques to reduce the control hazards.

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Table 5: Pipeline time diagram: usage of branch delay slot techniques to reduce the control hazards.

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