ELEC-H-473 : Lab 2

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1 Question 4

The CPI number is 1.45 for the initial version of the program (with data hazards) using the pipelined architecture.
The CPI number is 1.27 for the modified version of the program (without data hazards) using the pipelined architecture.
If we consider that the processor of the first lab uses the same five stages as those of the pipelined version and an instruction cannot enter the first stage until the previous one has left the last stage, each instruction needs 5 cycles (one for each stage) to complete. So the number of cycles per instruction is equal to 5 in this version (without using the pipeline).
As we can see, the pipeline allows us to increase the performance. By removing different kind of problem that break the pipeline, we can make CPI approaching 1.

2 Question 5

Pipeline depth $\equiv$ *depth*
Instruction fully executed $\equiv$ *instruction*
Number of stall events $\equiv$ *stall*
Number of stomp events $\equiv$ *stomp*

$$CPI = \frac{instruction+(depth-1)+stall+2*stomp}{instruction}$$