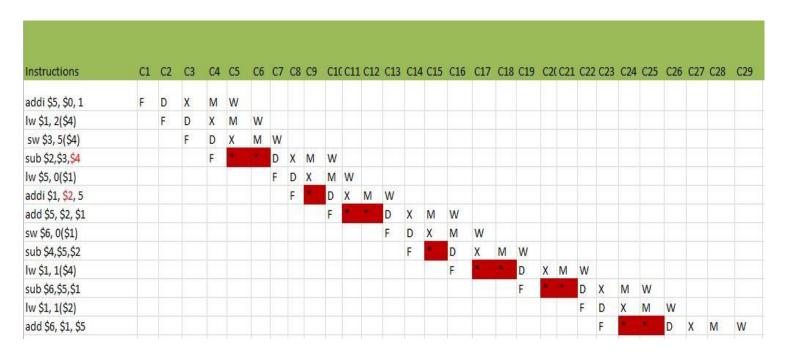
Lab - 1 Report

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The first question requires us to calculate the slowdown in a 5-stage pipeline. Considering No-Forwarding and Bypassing (Only Internal Forwarding is considered), while second is a 6-stage pipeline with full forwarding. Following is the detailed 5-stage pipeline cycles of the instructions being executed in our benchmark for Q1.



In the code we discriminate between single cycle and double cycle stalls. Also the ideal CPI given is 1

CPI = CPI(IDEAL) + Delay due to stalls

= 1 + (Number of Single cycle stalls + 2 * Number of Double Cycle Stalls / Total number of instructions)

For Q1(using the above diagram) CPI = 1 + 2/13 + 10/13 = 1.923And similarly, for Q2 CPI = 1.4

Using sim-safe simulation for our microbenchmark we get the CPI = 1.9563 and 1.52 for Q1 and Q2 respectively and hence our code is verified.

Further, using the sim-safe /cad2/ece552f/benchmarks/gcc.eio we get the CPI = 1.6633 for Q1

So the Slowdown (Q1) = (CPI(new) – CPI(ideal))/ CPI(ideal)

=66.33%

Using the sim-safe /cad2/ece552f/benchmarks/gcc.eio we get the CPI = 1.3903 for Q2 So, Slowdown(Q2) = 39.03 %

We used flag **-00** to compile our Microbenchmark and our loop is iterated 1000000 times to get accurate statistics.