UNIVERSITY OF SCIENCE AND TECHNOLOGY OF HANOI

Information and Communication Technology Department

- REPORT LABWORK 2-

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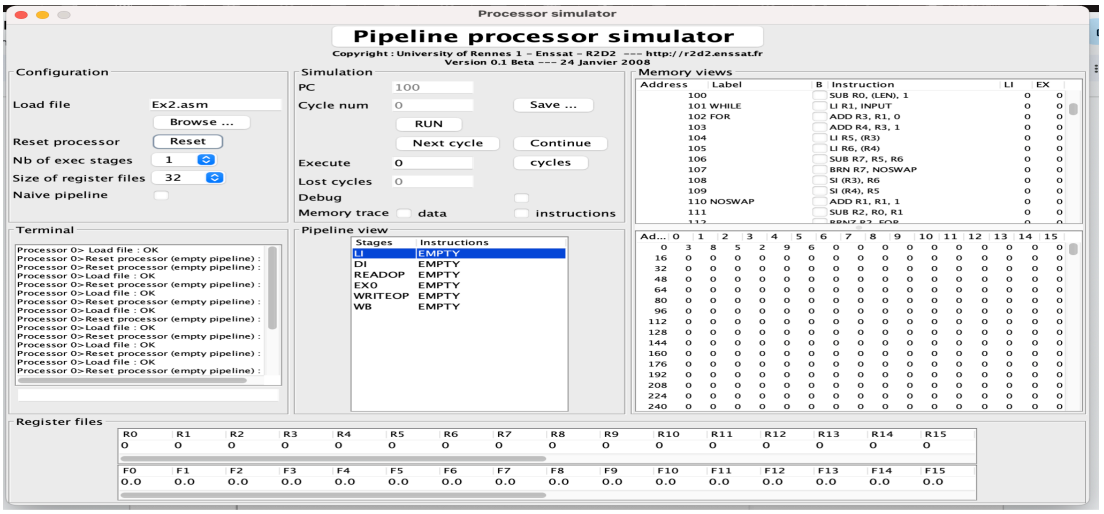
Major : Cyber Security

I. Execute bubble sort algorithm by pipeline simulator

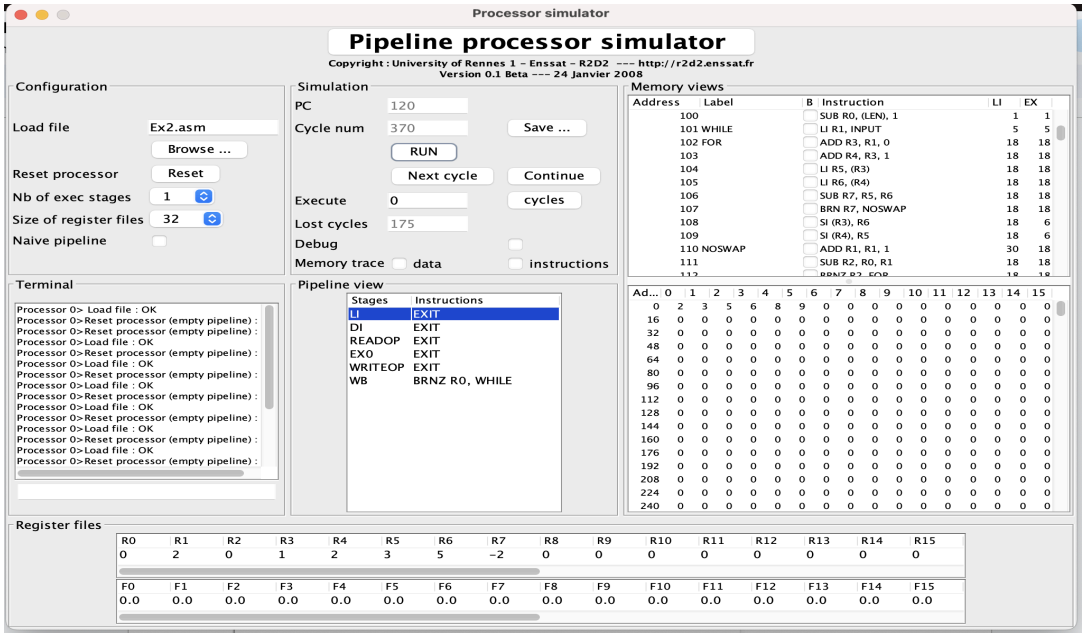
A.Input



The input is the sequence of numbers 3,8,5,2,9,6

B.Output

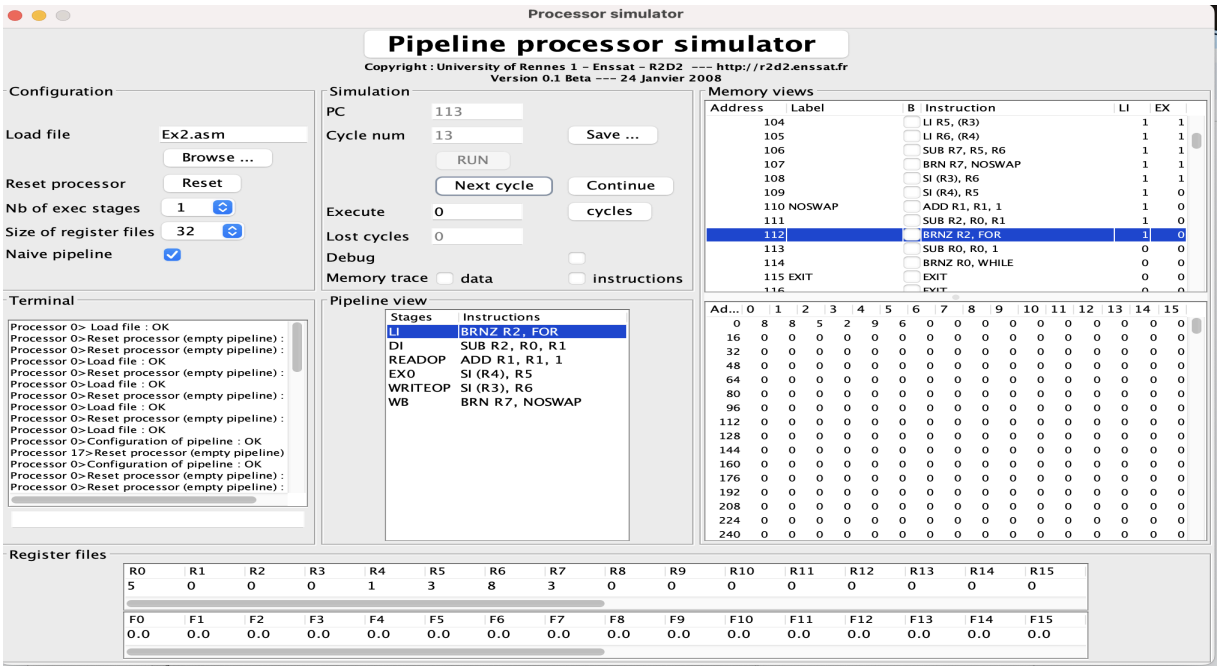
The output is the sequence of numbers 2,3,5,6,8,9



II. Validate the correctness of program with and without naive mode

Because everything is executed at the same time, there will be risks

In this example, R5 - R6 = R7 = 3 is wrong but the program still continues and performs the swap.



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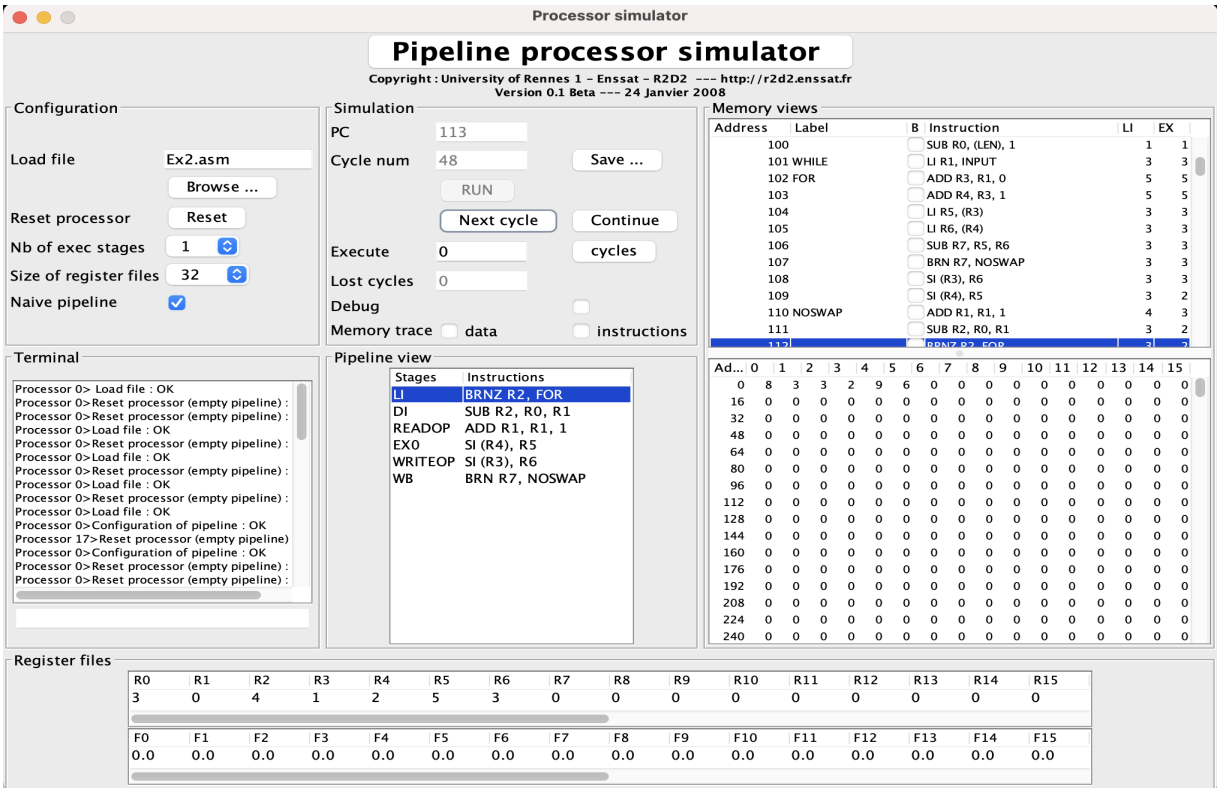

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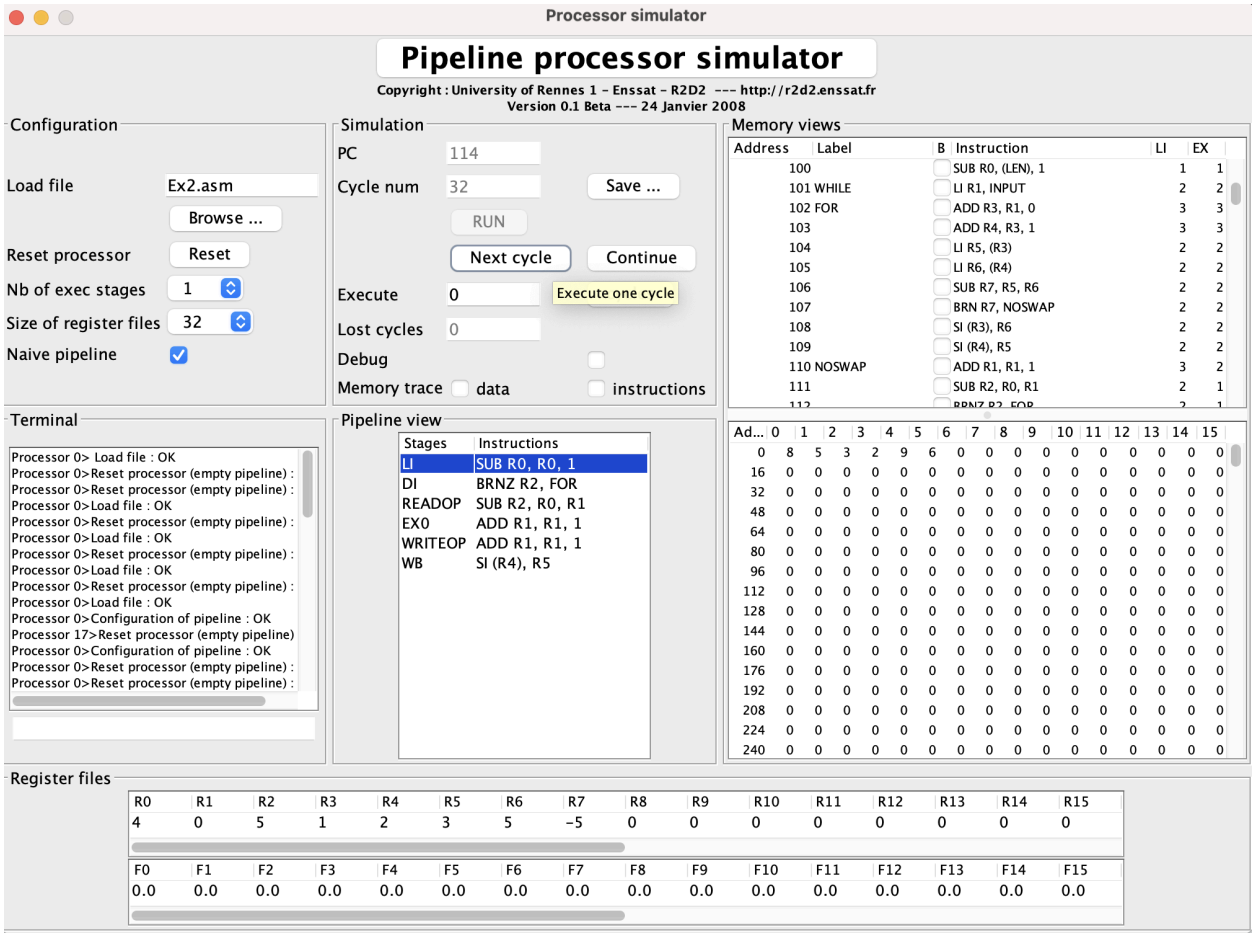
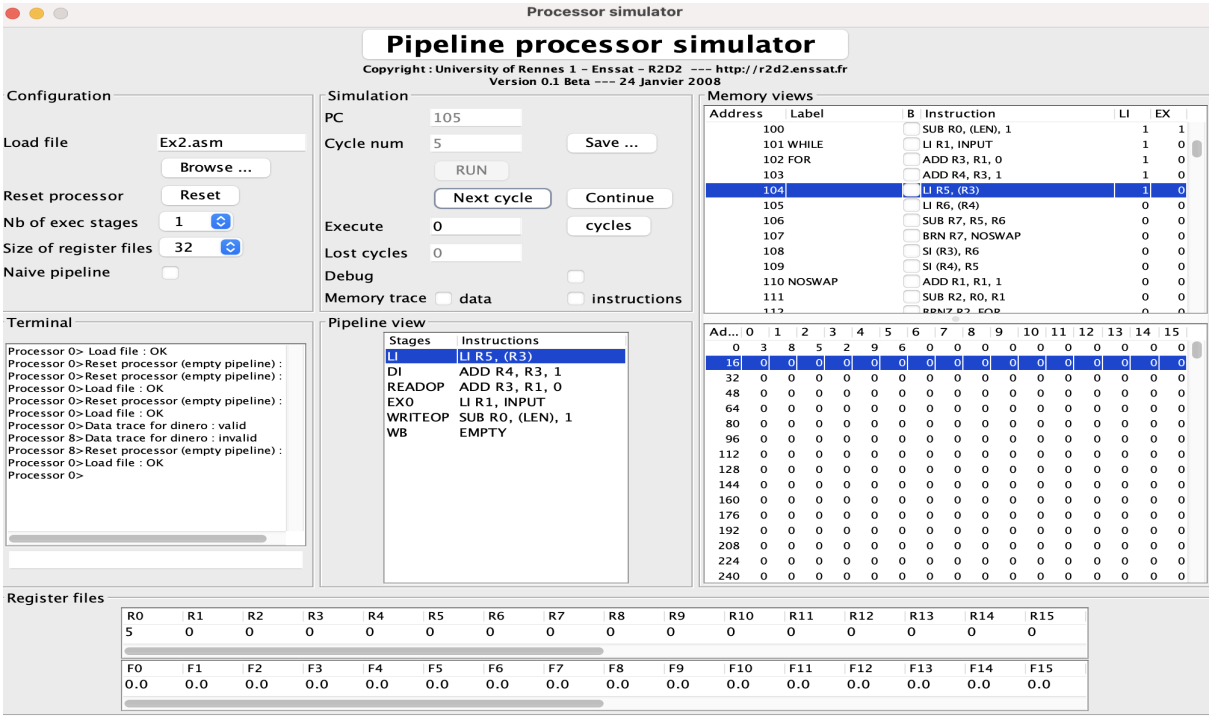
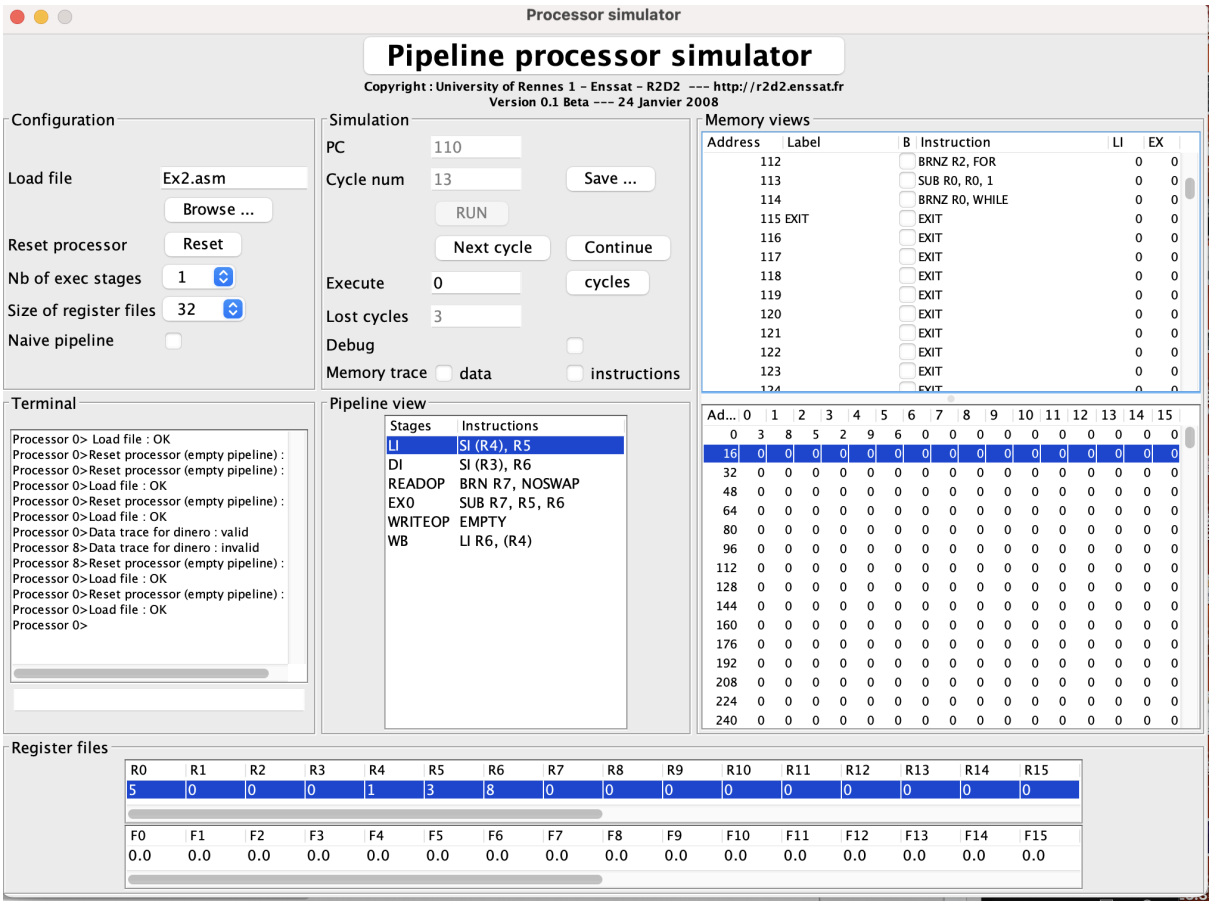


III. Analyze the execution of bubble algorithm in pipeline

A. Case when two instructions are dependents

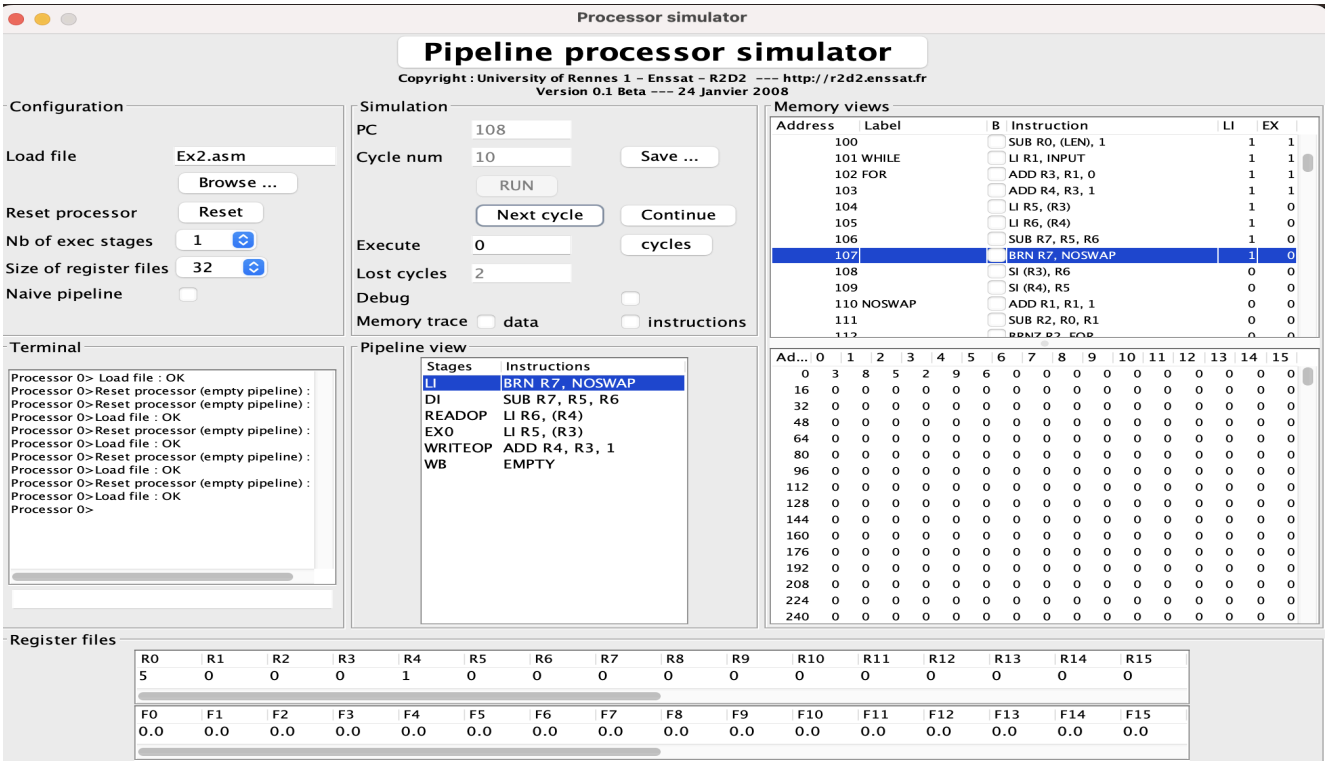
When two dependent instructions are executed in a pipelined processor, the processor must handle any arising data hazards to ensure correct operation and maintain efficiency.

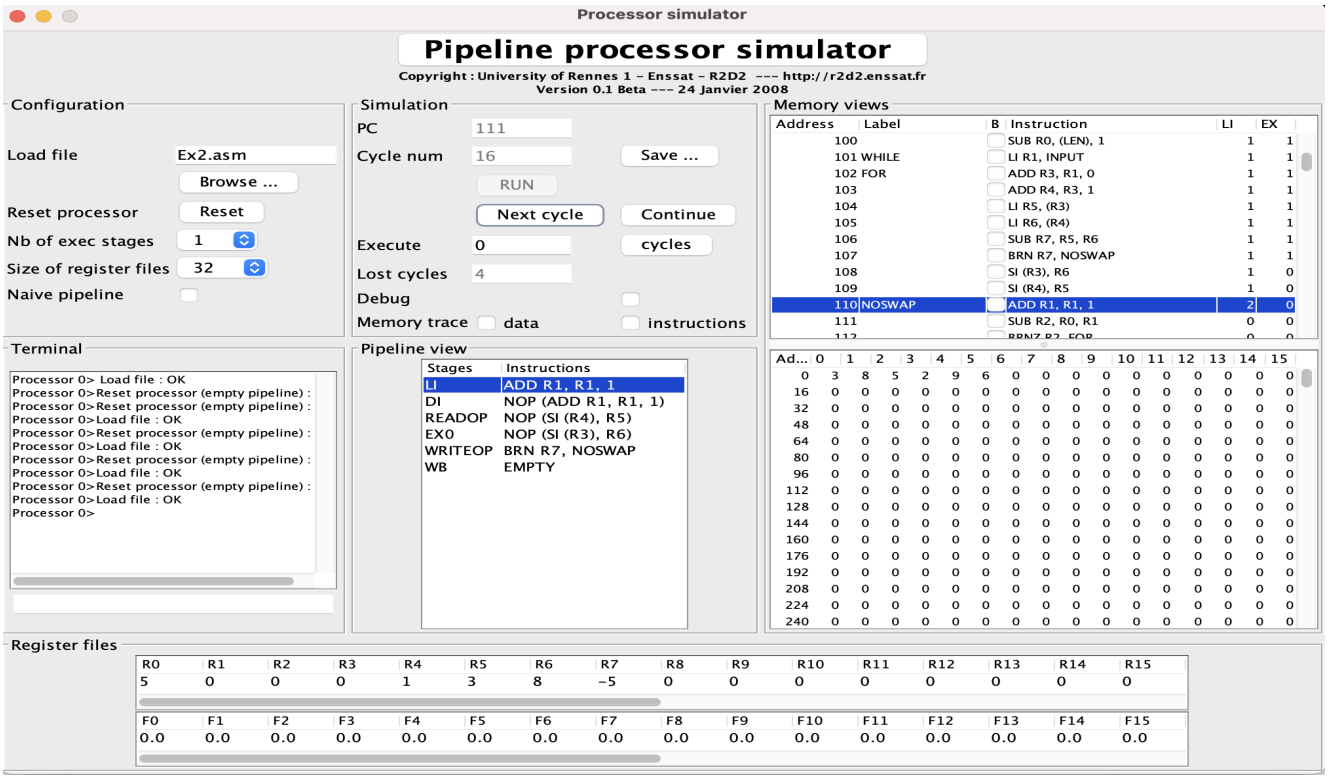




In this example, R5 is loaded with the value from memory at the address contained in R3, and then R5's value is used to store into another memory location at the address contained in R4. The second instruction depends directly on the result of the first:

B. Case when a branch is executed





In this example,Subtract R6 from R5, result in R7 after that Branch if result is negative (R7 < 0)

R5 - R6 = R7 = 3 - 8 = -5 < 0

hence "noswap" , execute R1=R1+1, R2= R0 - R1

C. The number of cycles which are lost during the execution with different number of pipeline stages

- *Number of pipeline stage equal 4, the number of lost cycle equal 542*
- *Number of pipeline stage equal 4, the number of lost cycle equal 665*