EHB326E – INTRODUCTION TO EMBEDDED SYSTEMS HW4

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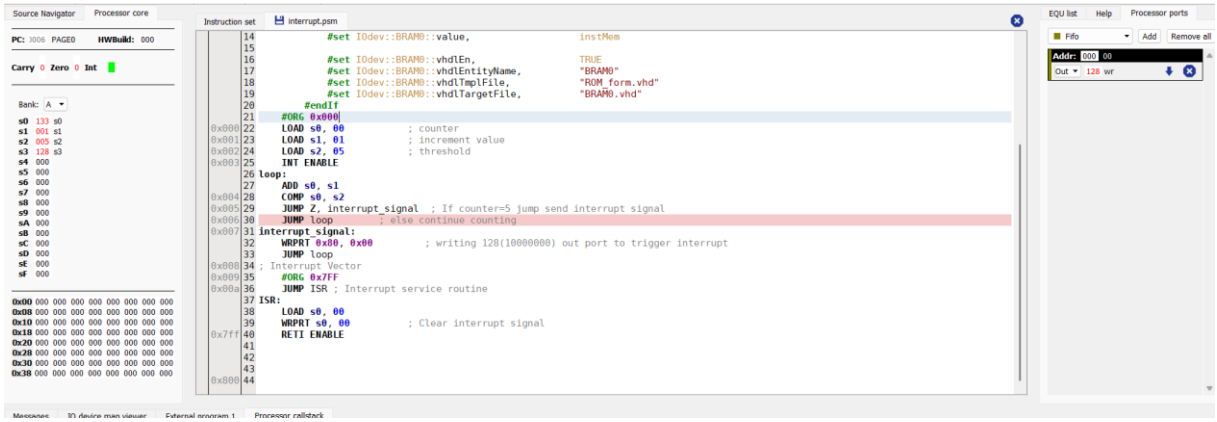
Call/Return Stack:

The call/return stack is feature that enables efficient function calls and handling of interrupts. It operates as a Last In, First Out (LIFO) structure, storing return addresses when subroutines or interrupts are called. The Picoblaze stack has a finite depth of 31 levels. Exceeding this depth results in stack overflow, potentially causing loss of return addresses or incorrect program behavior.

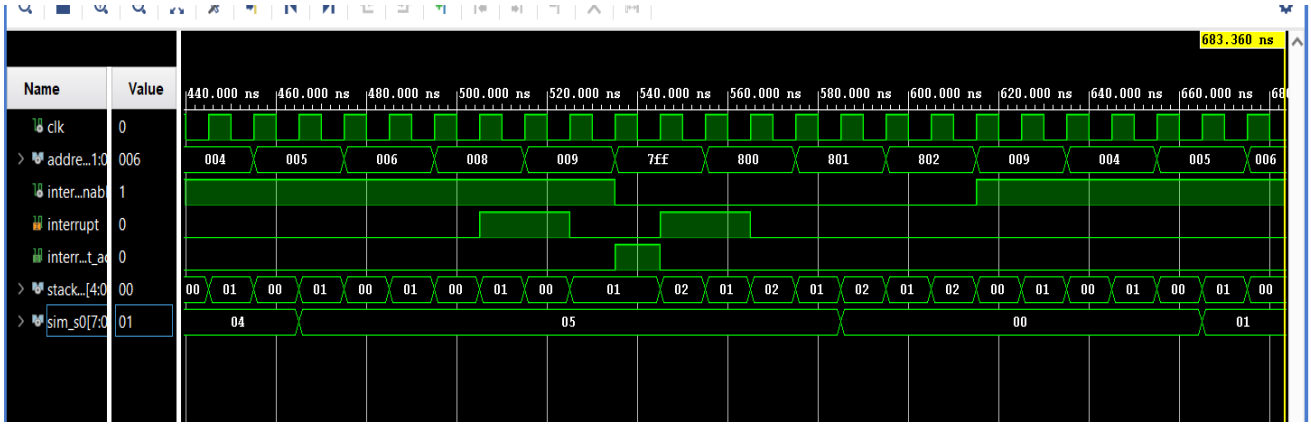
Interrupt:

Interrupts allow the Picoblaze processor to temporarily pause its current task to handle critical or time-sensitive events, such as external signals or internal conditions.

Interrupt Implementation

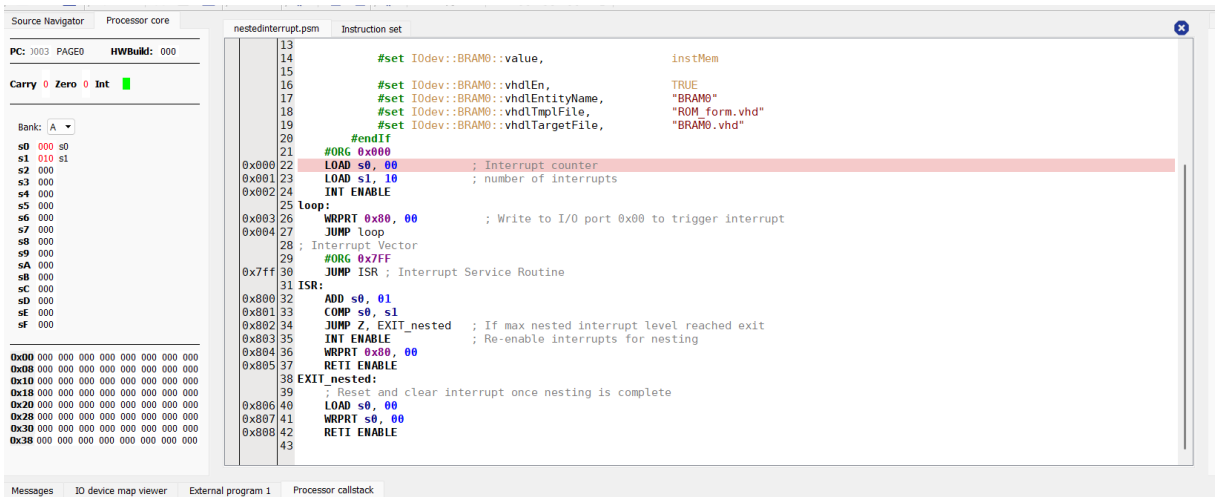


For the assembly part I wrote a simple counter code including interrupt. It starts counting then being interrupted after reaching 5.



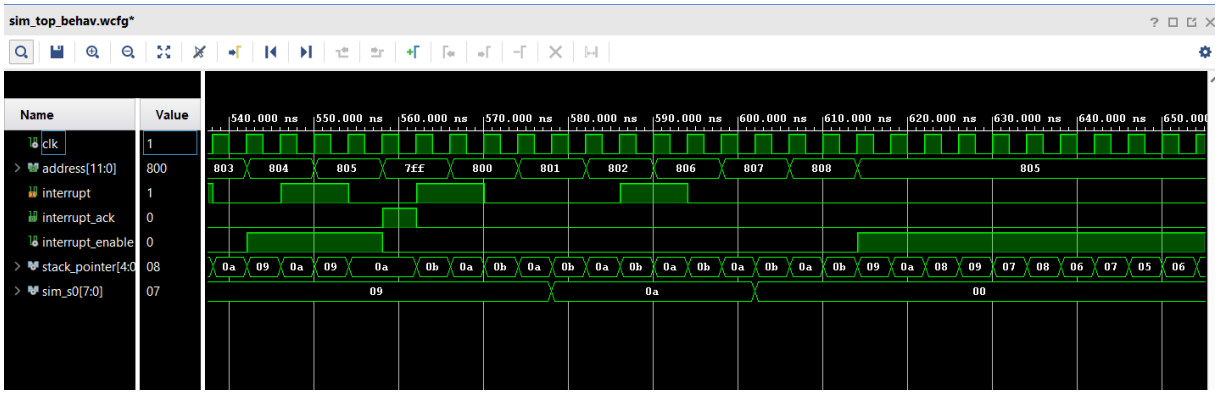
Address instruction goes to interrupt address while interrupted. Then continues from where it left.

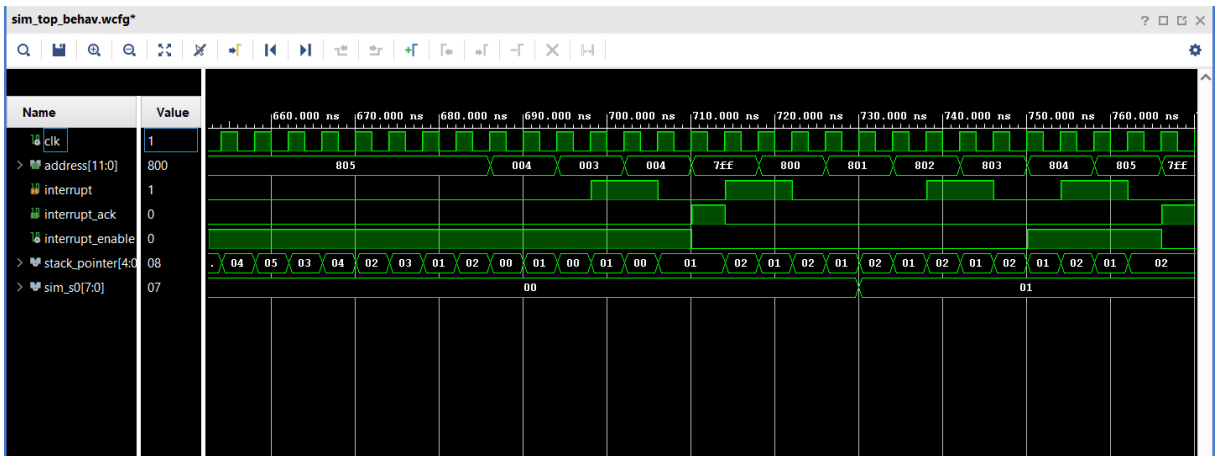
Nested Interrupts



For nested interrupts I enabled another interrupt in the ISR until it reaches to number of interrupts registered.

Here are the simulation results:

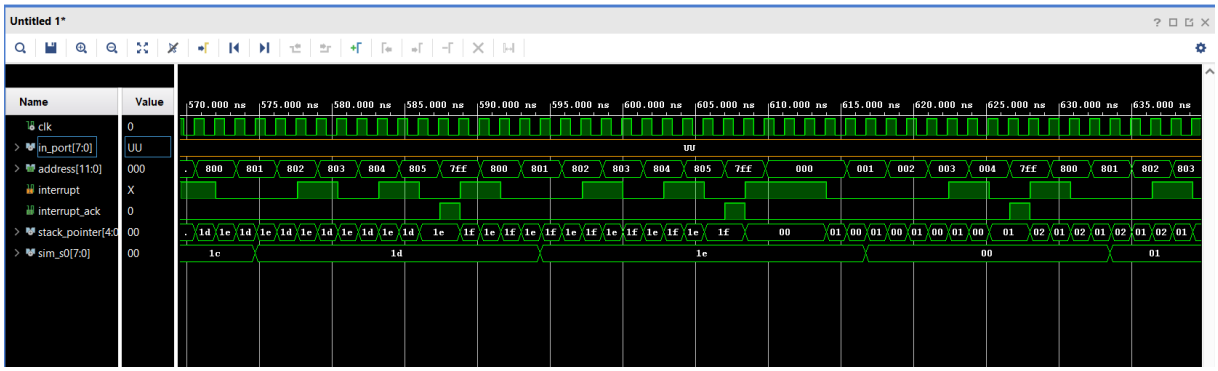




Program counter goes to its initial instruction address after 10 returns. Stack counter pointer to

0b which is 1+ (#of interrupts)

Simulation results for 32 interrupts. (Only changed s1 value to 32.)



After interrupt 31 the program overflows before reaching interrupt 32. Because stack pointer reaches its maximum 1f = 1+ 31. Which is why 32 nested interrupts are not possible in PicoBlaze. Program counter does not return to its initial place.