LAB 3-A

STACK MEMORY

OBJECTIVES:

- To examine the stack.

MATERIAL:

- Atmel Studio.

WEB SITES:

- www.microchip.com for Atmel Studio Software

ACTIVITY 1

Write and assemble a program to load values $20, $31, $42, $53, and $64 into each of registers R20 to R24 and then push each of these registers onto the stack. Single-step the program, and examine the stack and the SP register after the execution of each instruction.

ACTIVITY 2

Write and assemble a program to:

a) Set SP = $29D,
b) Store (without using push operation) a different value 6, 5, 4, 3, 2 ,1 in RAM locations $29D, $29C, $29B, $29A, $299, and $298, respectively
c) POP each stack location into registers R20 – R24.
d) Use the simulator to single-step and examine the registers, the stack, and the stack pointer.

From Activity 1 and 2, answer the following questions:

1) Upon reset, what is the value in the SP register? **RAMEND**
2) Upon pushing data onto the stack, the SP register is ___ **Decremented**.__ (decremented, incremented).
3) Upon popping data from the stack, the SP register is __ **Incremented**._ (decremented, incremented).

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4) Can you change the value of the SP register? If yes, explain why you would want to do that.

Yes, you can change it by writing to the SPH and SPL registers To support multitasking in operating systems where each task needs its own separate stack for context switching. It is also used to organize memory by placing the stack in a safe, reserved area to prevent it from accidentally overwriting critical variables.