ECE 375 PRELAB 4

Lab Time: Friday 2-4

Hao Truong

QUESTIONS

1. What is the stack pointer? How is the stack pointer used, and how do you initialize it? Provide pseudocode (not actual assembly code) that illustrates how to initialize stack pointer.

Stack Pointer is implemented as two 8-bit special function registers (SPH and SPL), used for storing temporary data, for storing local variables and for storing return addresses after interrupts and subroutine calls. In order to initialize SP, we load low and high bytes of End SRAM Address to SPL and SPH.

```
LDI     R16,    LOW(RAMEND)

OUT     SPL,    R16

LDI     R16,    HIGH(RAMEND)

OUT     SPH,    R16
```

2. What does the AVR instruction LPM do, and how do you use it? Provide pseudocode (not actual assembly code) that shows how to set up the use of LPM instruction.

LPM (Load Program Memory) is used to access Program Memory rather Data Memory. LPM can be used to access either 8-bit or 16-bit constants stored in the Pro- gram Memory. LPM relies on Z- register as a pointer to the Program Memory and can be combined with the post-increment capability.

```
LPM     Rd,     Z

LPM     Rd,     Z+
```

3. Take a look at the definition file m128def.inc (This file can be found in the Solution Explorer → Dependencies folder in Atmel Studio, assuming you have an Assembler project open and you have already built an assembly program that includes this definition file. Two good examples of such a project would be your Lab 1 and Lab 3 projects.) What is contained within this definition file? What are some of the benefits of using a definition file like this? Please be specific, and give a couple examples if possible.

The definition file m123def.inc contains all the I/O register names, I/O register bit names, names of high and low bytes of X, Y, and X address registers, and the highest address for the internal SRAM for the ATmega128 microcontroller. Some of the benefits of using a definition like this are when including this file in the assembly program file, all I/O register names and I/O register bit names appearing in the data book can be used. In addition, the six registers forming the three data pointers X, Y and Z have been assigned names XL - ZH. Highest RAM address for Internal SRAM is also defined

REFERENCE

AVR Starter Guide

Computer Organization and Assembly Language Programming: Embedded Systems Perspective