CPE301 – SPRING 2019

Design Assignment 1A

Student Name: Prachi Patel

Student #: 5002380222

Student Email: patelp3@unlv.nevada.edu

Primary Github address: https://github.com/prachi173/da\_sp18

Directory: https://github.com/prachi173/da\_sp18/tree/master/Design%20Assignments/DA1A

The following are required for successful completion of the design assignment:

* 1. a. AVR assembly code that has been assembled and working. Only the source files required.
  2. b. The assembly code should be well documented with explanation of every instruction.
  3. c. A word document that contains the assembly code along with the screenshots of the Atmel Studio 7 during debugging at the beginning and end of Task 1.
  4. d. Submit one solution folder, with doc and video/snapshot file. See assignment submission guidelines through github posted in the class website.

Insert initial code here

;

; da1a\_patelp3.asm

;

; Created: 2/16/2019 6:54:07 PM

; Author : patel

;

; PRACHI PATEL Design Assignment 1A

.include<m328pdef.inc>

.cseg

.ORG 0

LDI R22, 0x10 ; Load Immediate 0x10 into R22, this is the 8-bit number. 16 in decimal value.

LDI R16, 0x2C ; Load Immediate 0x2C into R25, this is the higher 8-bits of 16-bit number

LDI R17, 0x3A ; Load Immediate 0x3A into R24, this is the lower 8-bits of the 16-bit number

LDI R24, 0x2C ; Load Immediate 0x2C into R16, this is the lower 8-bit of the 16-bit that won't change

LDI R25, 0x3A ; Load Immediate 0x3A into R17, this is the lower 8-bit of the 16-bit that won't change

DEC R22 ; Decrementing once since the number is already multiplied with 1.

L1: ; Label L1

LDI R18, 0x00 ; Load 0x00 into R18

LDI R19, 0x00 ; Load 0x00 into R19

LDI R21, 0x00 ; Load 0x00 into R21

LDI R23, 0x00 ; Load 0x00 into R23

ADD R16, R24 ; R16 = R16 + R24 (R16 keeps value from previous loop)

ADC R21, R18 ; R21 = R21 + Carry from (R16 + R24) + R18 (0x00)

ADD R17, R21 ; R17 = R17 + R21 (R17 keeps value from previous loop)

ADC R23, R18 ; R23 = R23 + Carry from (R17 + R21) + R18 (0x00)

ADD R17, R25 ; R17 = R17 + R21

ADC R20, R23 ; R20 = 0x00 + Carry from R17 + R21 (R20 keeps value calculate in previous loop)

ADD R18, R16 ; R18 = R18 + R16 = R16 since R18 is 0

ADD R19, R17 ; R19 = R19 + R17 = R17 since R19 is 0

DEC R22 ; Decrement R22

BRNE L1 ; If R22 is not equal to 0, jump to label L1

END: JMP END ; Else stay here forever

**Beginning of Debugging**

**A screenshot of a computer

Description automatically generated**

**After Debugging**

(Answer)

A screenshot of a computer

Description automatically generated

**Execution time, as seen in the screenshot above, is 14.31 microseconds with 229 cycles at 16MHz.**

**Student Academic Misconduct Policy**

<http://studentconduct.unlv.edu/misconduct/policy.html>

“This assignment submission is my own, original work”.

Prachi Patel