

Design Assignment X

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Submit the following for all Labs:

1. In the document, for each task submit the modified or included code (only) with highlights and justifications of the modifications. Also, include the comments.
2. Use the previously create a Github repository with a random name (no CPE/301, Lastname, Firstname). Place all labs under the root folder ESD301/DA, sub-folder named LABXX, with one document and one video link file for each lab, place modified asm/c files named as LabXX-TYY.asm/c.
3. If multiple asm/c files or other libraries are used, create a folder LabXX-TYY and place these files inside the folder.
4. The folder should have a) Word document (see template), b) source code file(s) and other include files, c) text file with youtube video links (see template).

1. COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS

List of Components used

Block diagram with pins used in the Atmega328P

2. INITIAL/MODIFIED/DEVELOPED CODE OF TASK 1/A

```
LDI R25,0x11 ;holds the first high bit values of the 16 bit multiplicand
LDI R24,0x11 ;holds the first low bit values of the the 16 bit multiplicand

;Multiplicand holds the value of 4369

LDI R23,0x01 ;holds the first high bit valules of the 16 bit multiplier
LDI R22,0x01 ;holds the first low bit values of the 16 bit multiplier

;Multiplier holds the value of 257

LDI R20,0 ;initializes the register to 0
LDI R19,0 ;initializes the register to 0
LDI R18,0 ;initializes the register to 0
LDI R17,0 ;initializes the register to 0
LDI R16,0 ;initializes the register to 0
LDI R21,0 ;initializes the register to 0

INC R22

Loop1: ;loop that decrements the value of the multiplier
;and adds the value of the multiplicand by that many times
;for R22

ADD R17,R24 ;holds the last 8 bit result
ADC R18,R25 ;holds the second to the last 8 bits of the result with the carry
ADC R19,R16 ;holds the second highest 8 bits of the result with the carry
ADC R20,R21 ;holds the highest 8 bits of the result with the carry
DEC R22 ;decrements the multiplier

DEC R22 ;decrements the multiplier
BRNE LOOP1 ;checks if the multiplier is 0 if not then keep looping
;till the multiplier is 0

COM R23 ;ones complements R23
INC R23

Loop2: ;loop that decrements the value of the multiplier
;and adds the value of the multiplicand by that many times
;For R23

ADD R17,R24 ;holds the last 8 bit result
ADC R18,R25 ;holds the second to the last 8 bits of the result with the carry
ADC R19,R16 ;holds the second highest 8 bits of the result with the carry
ADC R20,R21 ;holds the highest 8 bits of the result with the carry
DEC R23 ;decrements the multiplier
BRNE LOOP2 ;checks if the multiplier is 0 if not then keep looping
;till the multiplier is 0

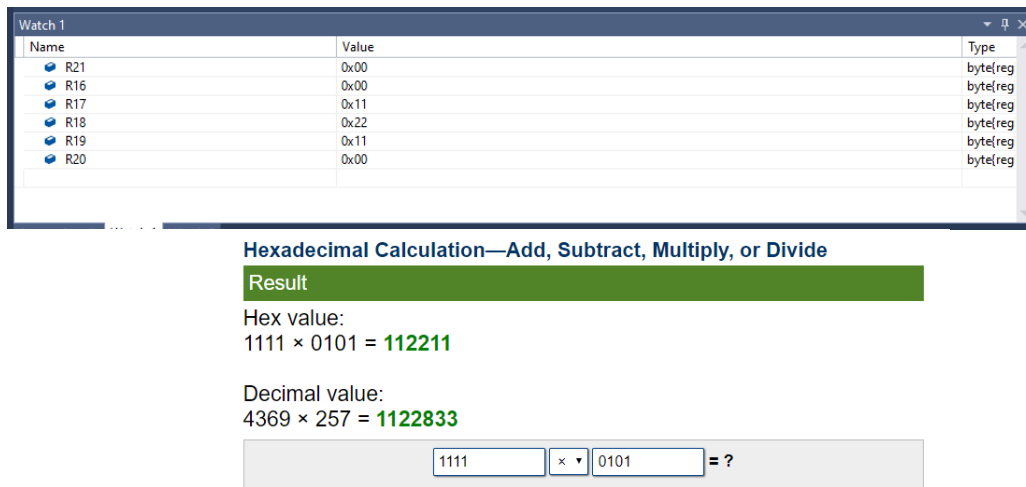
END: JMP END
```

3. DEVELOPED MODIFIED CODE OF TASK 2/A from TASK 1/A

4. SCHEMATICS

N/A

5. SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)



6. SCREENSHOT OF EACH DEMO (BOARD SETUP)

N/A

7. VIDEO LINKS OF EACH DEMO

N/A

8. GITHUB LINK OF THIS DA

<https://github.com/jebmarinas/cpe301.git>

Student Academic Misconduct Policy

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

"This assignment submission is my own, original work".

Jeb Marinas