01 Getting Started with the ATMEGA328PB

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1. COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS

We used Microchip studio to run and simulate our assembly code

2. Tasks 1-3

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; Design Assignment 1.asm
;
; Created: 2/11/2022 6:58:13 PM
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;
.ORG $0 ; starting at 0

; Question 1: Storing 16-bit number 0x1234 in SRAM location 0x402
LDI r16, 0x12 ; r16 = 0x12 upper bytes
LDI r17, 0x34 ; r17 = 0x34 lower bytes
STS 0x402, r16 ; storing r16 into data 0x402
STS 0x403, r17 ; storing r17 into data 0x403

; Question 2: Storing 16-bit number 0x5678 in SRAM location 0x410
LDI r26, 0x56 ; r16 = 0x56 upper bytes
LDI r27, 0x78 ; r17 = 0x78 lower bytes
STS 0x410, r26 ; storing r16 into data 0x402
STS 0x411, r27 ; storing r17 into data 0x403

; Question 3: Sum of two numbers stored in EEPROM starting location
ADD r17, r27 ; r17 = r17 + r27 = 0x34 + 0x78 = 0xAC adds lower bytes
ADC r16, r26 ; r16 = r16 + r26 = 0x12 + 0x56 = 0x68 adds upper bytes

LDI R20,HIGH(RAMEND) ; initializing the stack
OUT SPH,R20
LDI R20,LOW(RAMEND)
OUT SPL,R20

LDI XH,HIGH(0x40) ;XH POINTER HIGH VALUE 00
LDI XL,LOW(0x40) ;XL POINTER LOW VALUE 00

CALL STORE_IN_EEPROM ;XH POINTER HIGH VALUE 00
INC XL ;increment XL
MOV r21, r17 ;Copy value in R21 into R17

CALL STORE_IN_EEPROM
INC XL ;increment XL
```

```
MOV r22, r16 ;Copy value in R16 into R22

STORE_IN_EEPROM:
SBIC EECR, EEPE ;wait for write process to complete
RJMP STORE_IN_EEPROM ;wait for write process to complete
OUT EEARH,XH ;set the value of the address
OUT EEARL,XL ;set the value of the address
OUT EEDR,r17 ;R17 goes to the data register
SBI EECR,EEMPE ;master is enabled
SBI EECR,EEPE ;protection is enabled
RET

; Question 4: Storing 10 16-bit numbers from 0x0910 at Program Memory location and
; retrieving them to 0x500 SRAM location using X pointer. Sum the 10 numbers and
; store them in SRAM location 0x406
```

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

```
; Question 4: Storing 10 16-bit numbers from 0x0910 at Program Memory location and
; retrieving them to 0x500 SRAM location using X pointer. Sum the 10 numbers and
; store them in SRAM location 0x406
```

4. SCHEMATICS

NONE

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

Name	Value
X Register	0x7856
Y Register	0x0000
Z Register	0x0000
Status Register	I T H S V N Z C
Cycle Counter	10
Frequency	1.000 MHz
Stop Watch	10.00 µs
⊟ Registers	
R00	0x00
R01	0x00
R02	0x00
R03	0x00
R04	0x00
R05	0x00
R06	0x00
R07	0x00
R08	0x00
R09	0x00
R10	0x00
R11	0x00
R12	0x00
R13	0x00
R14	0x00
R15	0x00
R16	0x12
R17	0x34
R18	0x00
R19	0x00
R20	0x00
R21	0x00
R22	0x00
R23	0x00
R24	0x00
R25	0x00
R26	0x56
R27	0x78
R28	0x00
R29	0x00
R30	0x00
R31	0x00

Processor Status

Task 1-2
Values being store in registers
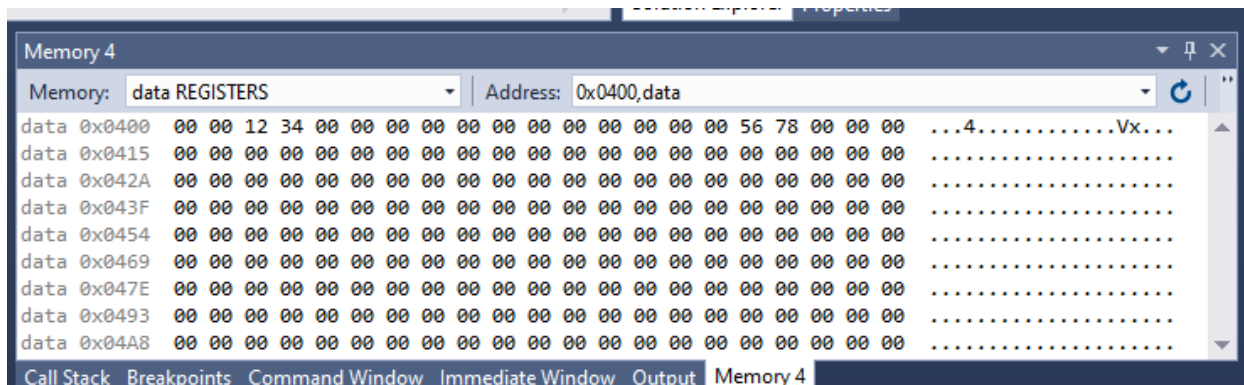
- Registers being stored in SRAM

R12	0x00
R13	0x00
R14	0x00
R15	0x00
R16	0x68
R17	0xAC
R18	0x00

- Registers being added for Task 3

Task 3
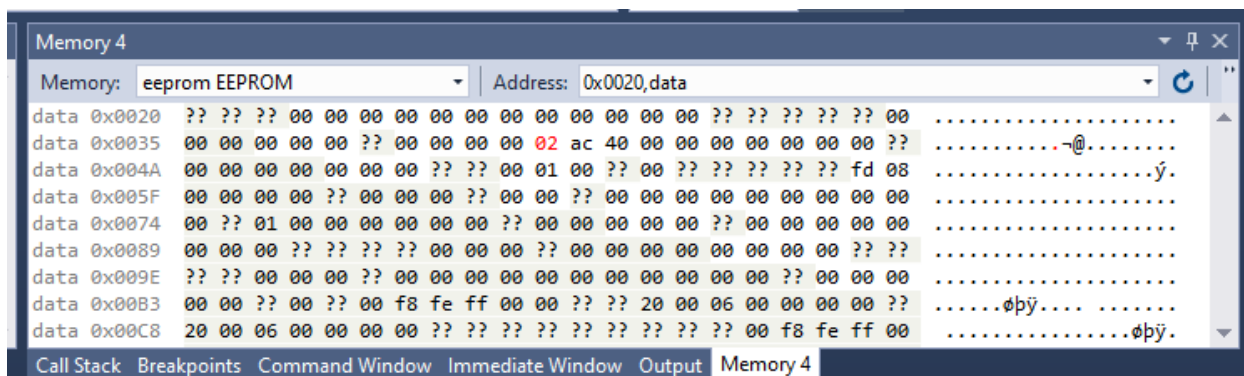
- Register values being stored in EEPROM

6.   SCREENSHOT OF EACH DEMO (BOARD SETUP)
NONE

7.   VIDEO LINKS OF EACH DEMO
NONE

8.   GITHUB LINK OF THIS DA
https://github.com/DylanCaz/Submission_DA/tree/main/Debug

Student Academic Misconduct Policy

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

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