Lab 3
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Section: 112D

Initial Pseudocode (Lab 3)

Part A Pseudocode:

Initialize stack pointer address at 0x3FFF

Load stack pointer address to CPU_SPL and CPU_SPH

Initialize r17 to be 0x14 to divide by 8 later in the subroutine

Configure pin 7 of PORT C to be output

rcall CLK (subroutine to set the clock frequency to 32 MHZ)

Output to PORTCFG_CLKEVOUT (Pin 7 of Port C)

Infinite loop to end program

CLK (32 MHZ subroutine)

push r16

set OSC_CTRL to be the 32 MHZ oscillator

NSTABLE:

Check if 32MHZ oscillator is stable

If stable, go to STABLE

If not stable, go back to NSTABLE

STABLE:

Write IOREG (0xD8) to CPU_CCP to enable change

Select the 32 MHZ oscillator

Write IOREG (0XD8) to CPU_CCP to use prescaler

Use r17 (initialized outside the subroutine) to divide 32MHZ by 8 to get 4MHZ (or set up no change to remain 32MHZ)

pop r16

ret

Part B Pseudocode

Load low byte of decimal 255 to TCCO_PER

Load high byte of decimal 255 to TCCO_PER+1

Ldi r17, 0b00000111 ;prescaler CLK/1024

Transfer value in r17 to TCC0_CTRLA

Use PORTC_DIRSET to set PORTC as output

REPEAT:

Ldi r17, TCC0_CNT

sts PORTC_OUT, r17

rjmp REPEAT ;infinite loop to output count value to PORTC

Part C Pseudocode

Load 0x17 into r16

Transfer value in r16 to PORTH_DIRSET ;set CS0, RE, WE, ALE1 as output

Load 0x13 into r16

Transfer value in r16 to PORTH_OUTSET ;set false value to active-low CS0, WE, RE

Load 0x04 into r16

Transfer value in r16 to PORTH_OUTCLR ;set falue value to active high ALE1

Initialize Y Pointer

Set up EBI for the SRAM 3-PORT ALE1 configuration

Place the SRAM at external memory 0x200000 using Y Pointer

Ldi r16, 0x45

Transfer data from r16 to 0x200000 (Pointed to by Y-Pointer)

Write value at 0x200000 (Pointed to by Y-pointer) back to r17 to verify that the value is properly written

Part D Pseudocode

Initialize stack pointer address at 0x3FFF

Load stack pointer address to CPU_SPL and CPU_SPH

Set up r17 to stay at 32 MHZ (used in the subroutine)

rcall CLK ;change CLK frequency to 32MHZ

Initialize Y-Pointer

Configure EBI system

Place external SRAM at memory location 0x300000

Set up timer in normal mode with period that corresponds to 1 second

LOOP:

Initialize PORTA switches to be input

Load value at PORTA_IN to Register 16

Store value at Register 16 to external memory at 0x300000 using Y-pointer

Read value from memory address pointed to by Y-pointer back to LED Bank

Verify the value is the same

Increment Y-Pointer

Use timer to delay 1 second (potentially subroutine timer)

rjmp LOOP ;infinite loop

CLK (32 MHZ subroutine)

push r16

set OSC_CTRL to be the 32 MHZ oscillator

NSTABLE:

Check if 32MHZ oscillator is stable

If stable, go to STABLE

If not stable, go back to NSTABLE

STABLE:

Write IOREG (0xD8) to CPU_CCP to enable change

Select the 32 MHZ oscillator

Write IOREG (0XD8) to CPU_CCP to use prescaler

Use r17 (initialized outside the subroutine) to set up CLK to stay 32 MHZ

pop r16

ret