ECED3403 – Lab 3

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# Design

## Problem Introduction

This lab aims to develop additional menu commands for the XM23p pipeline. These commands will act as debugger tools. They will allow for changing and display the contents of the register file, changing the contents at a specified data or instruction memory location, and setting a breakpoint at which the code stops execution.

## Design Section

**PSEUDOCODE:**

MAIN:

ADDED menu options in switch:

CASE ‘c’ or ‘C’

CALL mem\_change

BREAK

CASE ‘b’ or ‘B’

CALL breakpoint\_set

BREAK

CASE ‘r’ or ‘R’

CALL reg\_display

BREAK

CASE ‘s’ or ‘S’

CALL reg\_set

BREAK

END SWITCH

END MAIN

FUNCTION mem\_change

PRINT “Change instruction or data memory?”

SCAN user input into MEMTYPE

PRINT “Enter address and contents”

SCAN user input into ADDRESS and CONTENTS

address <- address / 2

IF CONTENT OR ADDRESS is not between 0x0000 and 0xffff

RETURN

END IF

SWITCH MEMTYPE

CASE ‘I’ or ‘i’

imem.word\_mem[ADDRESS] <- CONTENTS

BREAK

CASE “D’ or ‘d’

dmem.word\_mem[ADDRESS] <- CONTENTS

BREAK

END SWITCH  
END FUNCTION

FUNCTION breakpoint\_set

PRINT “Current breakpoint”

PRINT “Set new breakpoint”

SCAN user input into BREAKPOINT

RETURN  
END FUNCTION

FUNCTION reg\_display

FOR i from 0 to 7

PRINT register i and its corresponding value

END FOR

END FUNCTION

FUNCTION reg\_set

PRINT “Enter reg no and new value”

SCAN user input into REGNO and VALUE

srcconarray[REGISTER][REGNO] <- VALUE

END FUNCTION

## Data Dictionary

memtype = [‘i’ | ‘I’ | ‘d’ | ‘D’] \* imem or dmem \*

address = [0x0000 – 0xFFFF] \* valid memory addresses \*

contents = [0x0000 – 0xFFFF] \* valid content values \*

breakpoint = [0x0000 – 0xFFFF] \* valid content values \*

regno = [0 – 7] \* valid register numbers \*

value = [0x0000 – 0xFFFF] \* valid register content values \*

regprintarray = [“R0: “ | “R1: “ | “R2: “ | “R3: “ | “R4 (BP): “ | “R5 (LR): “ | “R6 (SP): “ | “R7 (PC): “] \* array of register names \*

srcconarray = [register | constant]

register = [0x0000 – 0xFFFF] \*valid register values

constant = [0 | 1 | 2 | 4 | 8 | 16 | 32 | -1] \* valid constant values \*