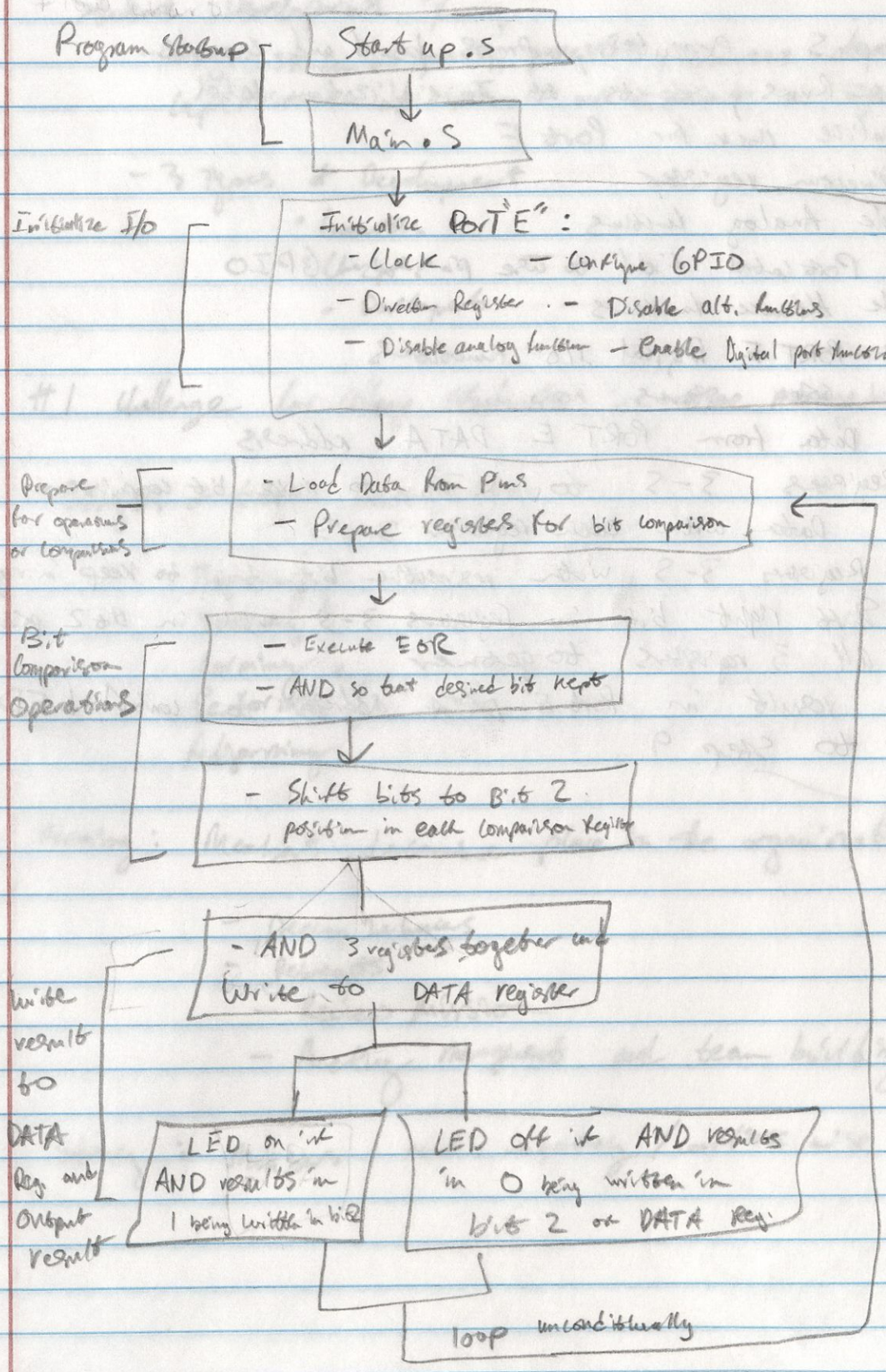
HYDER SHAD
hs25796
2/3/16
Prof. VJ

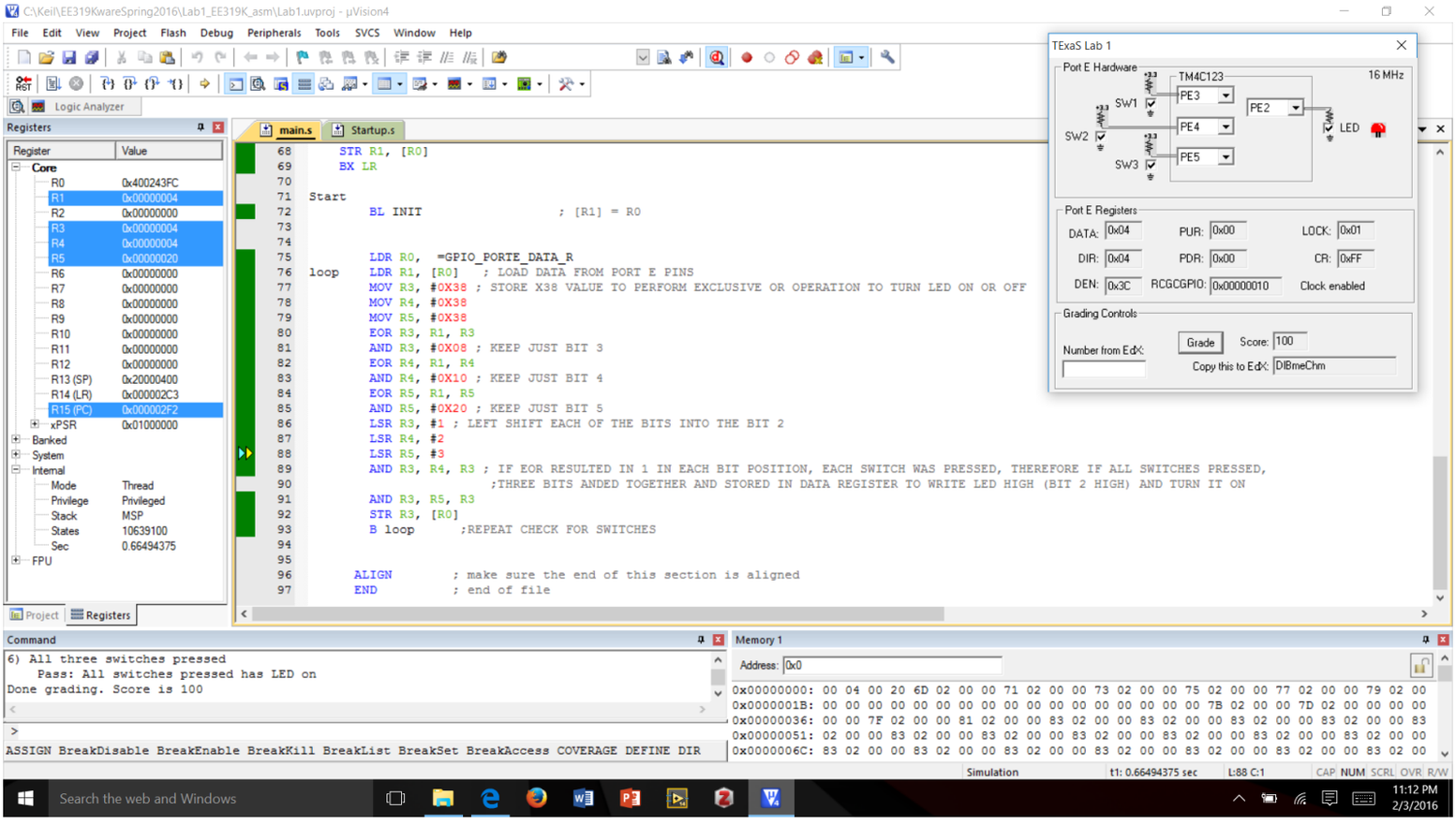
EE 319K Lab1 Deliverables

Flow Chart, Lab 1



Pseudo Code, Lab 1

1. Startup.S executes, preps board and commands
2. Main: Runs, starts at Initialization label
3. Initialize clock for Port E
4. Set Direction register
5. Disable Analog functions
6. Clear Port control field to use pins as GPIO
7. Disable Alternate functions
8. Enable PORT E Digital I/O Functions.
   ↓ actual code starts now
9. Load Data from PORT E DATA address
10. Set Registers 3-5 to x38 to make bit comparison
11. EOR Data with each register 3-5.
12. AND Registers 3-5 with respective bit trying to keep in register
13. Logic Shifts right bit in registers 3-5 until in Bit 2 position
14. AND all 3 registers together
15. Store results in Port E DATA address to control LED
16. loop to step 9


C:\Keil\EE319KwareSpring2016\Lab1_EE319K_asm\Lab1.uvproj - µVision4
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Logic Analyzer
Registers
Register Value
Core
R0 0x400243FC
R1 0x00000004
R2 0x00000000
R3 0x00000004
R4 0x00000004
R5 0x00000020
R6 0x00000000
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x20000400
R14 (LR) 0x000002C3
R15 (PC) 0x000002F2
xPSR 0x01000000
Banked
System
Internal
Mode Thread
Privilege Privileged
Stack MSP
States 10639100
Sec 0.66494375
FPU
Project Registers
main.s Startup.s
68 STR R1, [R0]
69 BX LR
70
71 Start
72 BL INIT ; [R1] = R0
73
74
75 LDR R0, =GPIO_PORTE_DATA_R
76 loop LDR R1, [R0] ; LOAD DATA FROM PORT E PINS
77 MOV R3, #0X38 ; STORE X38 VALUE TO PERFORM EXCLUSIVE OR OPERATION TO TURN LED ON OR OFF
78 MOV R4, #0X38
79 MOV R5, #0X38
80 EOR R3, R1, R3
81 AND R3, #0X08 ; KEEP JUST BIT 3
82 EOR R4, R1, R4
83 AND R4, #0X10 ; KEEP JUST BIT 4
84 EOR R5, R1, R5
85 AND R5, #0X20 ; KEEP JUST BIT 5
86 LSR R3, #1 ; LEFT SHIFT EACH OF THE BITS INTO THE BIT 2
87 LSR R4, #2
88 LSR R5, #3
89 AND R3, R4, R3 ; IF EOR RESULTED IN 1 IN EACH BIT POSITION, EACH SWITCH WAS PRESSED, THEREFORE IF ALL SWITCHES PRESSED,
90 ;THREE BITS ANDED TOGETHER AND STORED IN DATA REGISTER TO WRITE LED HIGH (BIT 2 HIGH) AND TURN IT ON
91 AND R3, R5, R3
92 STR R3, [R0]
93 B loop ;REPEAT CHECK FOR SWITCHES
94
95
96 ALIGN ; make sure the end of this section is aligned
97 END ; end of file
TExaS Lab 1
Port E Hardware
TM4C123
16 MHz
SW1
SW2
SW3
PE3
PE4
PE5
PE2
LED
Port E Registers
DATA: 0x04 PUR: 0x00 LOCK: 0x01
DIR: 0x04 PDR: 0x00 CR: 0xFF
DEN: 0x3C RCGCGPIO: 0x00000010 Clock enabled
Grading Controls
Number from EdX:
Grade
Score: 100
Copy this to EdX: DlBmeChm
Command
6) All three switches pressed
Pass: All switches pressed has LED on
Done grading. Score is 100
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE DEFINE DIR
Memory 1
Address: 0x0
0x00000000: 00 04 00 20 6D 02 00 00 71 02 00 00 73 02 00 00 75 02 00 00 77 02 00 00 79 02 00
0x0000001B: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 7B 02 00 00 7D 02 00 00 00 00
0x00000036: 00 00 7F 02 00 00 81 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83
0x00000051: 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00
0x0000006C: 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00 00 83 02 00
Simulation t1: 0.66494375 sec L:88 C:1 CAP NUM SCRL OVR R/W
Search the web and Windows
11:12 PM
2/3/2016

```
;****************** main.s ***************
; Program written by: HYDER SHAD
; Date Created: 1/22/2016
; Last Modified: 2/2/2016 6:38 PM
; Section: THURSDAY 2-3 PM
; Instructor: V. JANAPA
; Lab number: 1
; Brief description of the program
; The overall objective of this system is a digital lock
; Hardware connections
;  PE3 is switch input  (1 means switch is not pressed, 0 means switch is pressed)
;  PE4 is switch input  (1 means switch is not pressed, 0 means switch is pressed)
;  PE5 is switch input  (1 means switch is not pressed, 0 means switch is pressed)
;  PE2 is LED output (0 means door is locked, 1 means door is unlocked)
; The specific operation of this system is to
;   unlock if all three switches are pressed

GPIO_PORTE_DATA_R       EQU   0x400243FC
GPIO_PORTE_DIR_R        EQU   0x40024400
GPIO_PORTE_AFSEL_R      EQU   0x40024420
GPIO_PORTE_DEN_R        EQU   0x4002451C
GPIO_PORTE_AMSEL_R      EQU   0x40024528
GPIO_PORTE_PCTL_R       EQU   0x4002452C
SYSCTL_RCGCGPIO_R       EQU   0x400FE608

      AREA    |.text|, CODE, READONLY, ALIGN=2
      THUMB
      EXPORT  Start

INIT    ; 1) activate clock for Port E
    LDR R0, =SYSCTL_RCGCGPIO_R
    LDR R1, [R0]
    MOV R1, #0X10                   ;SET BIT 4 HIGH TO ENABLE PORT E CLOCK
    STR R1, [R0]
    NOP
    NOP                             ; allow time to finish activating
    NOP

    ; 2) set direction register

    LDR R0, =GPIO_PORTE_DIR_R      ;SET BIT 2 HIGH FOR PE2 TO BE OUTPUT
    MOV R1, #0X04
    STR R1, [R0]

    ; 3) disable analog functionality

    LDR R0, =GPIO_PORTE_AMSEL_R     ; DISABLE ANALOG CAPABILITIES, SOLEY DIGITAL I/O
    MOV R1, #0x0
    STR R1, [R0]

    ; 4) configure as GPIO

    LDR R0, =GPIO_PORTE_PCTL_R

    MOV R2, #0x0             ; CLEAR PORT CONTROL FIELD TO SET UP PINS FOR GPIO
    STR R2, [R0]

    ;5) regular port function

    LDR R0, =GPIO_PORTE_AFSEL_R     ; DISABLE ALT FUNCTIONS FOR BIN BY SETTING BITS TO ZERO
    MOV R1, #0
    STR R1, [R0]

    ;6) enable digital port

    LDR R0, =GPIO_PORTE_DEN_R       ; R1 = &GPIO_PORTD_DEN_R
    MOV R1, #0x3C               ;ENABLE DIGITAL I/O ON PINS 5-2
    STR R1, [R0]
    BX LR

Start
        BL INIT                 ; [R1] = R0
```

```
73
74
75          LDR R0,  =GPIO_PORTE_DATA_R
76  loop    LDR R1, [R0]    ; LOAD DATA FROM PORT E PINS
77          MOV R3, #0X38 ; STORE X38 VALUE TO PERFORM EXCLUSIVE OR OPERATION TO TURN LED ON OR OFF
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79          MOV R5, #0X38
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96        ALIGN        ; make sure the end of this section is aligned
97        END          ; end of file
```