ME 333 Homework 4

Marshall Johnson

January 31, 2022

Chapter 3 Exercises

4) Modify simplePIC.c so that both lights are on or off at the same time, instead of opposite each other. Turn in only the code that changed.

See simplePIC_simul.c

5) Modify simplePIC.c so that the function delay takes an int cycles as an argument. The for loop in delay executes cycles times, not a fixed value of 1,000,000. Then modify main so that the first time it calls delay, it passes a value equal to MAXCYCLES. The next time it calls delay with a value decreased by DELTACYCLES, and so on, until the value is less than zero, at which time it resets the value to MAXCYCLES. Use #define to define the constants MAXCYCLES as 1,000,000 and DELTACYCLES as 100,000. Turn in your code.

See simplePIC_cycles.c

Chapter 4 Exercises

1) Identify which functions, constants, and global variables in NU32.c are private to NU32.c and which are meant to be used in other C fles.

Private to NU32.c:

- DEBUG
- FWDTEN
- WDTPS
- POSCMOD
- FNOSC
- FPLLMUL
- FPLLIDIV
- FPLLODIV
- FPBDIV
- UPLLEN
- UPLLIDIV
- FUSBIDIO
- FVBUSONIO
- FSOSCEN
- BWP
- ICESEL
- FCANIO
- FMIIEN
- FSRSSEL
- NU32_DESIRED_BAUD

Meant for use in other files:

- NU32_LED1 LATFbits.LATF0
- NU32_LED2 LATFbits.LATF1
- NU32_USER PORTDbits.RD7
- NU32_SYS_FREQ
- NU32_Startup(void)
- NU32_ReadUART3(char * string, int maxLength)
- NU32_WriteUART3(const char * string)

2) You will create your own libraries.

a. See invest.c

b. Code: helper.c, helper.h, main_2b.c

All of the constant definitions, struct, and function prototypes were placed in the helper.h file to separate them from the implementation. The functions are implemented in the helper.c file. This allows them to be accessed by users of the library, but the implementation of the functions is kept private. The MAX_YEARS constant is public, however, and can be modified by potential users.

c. Code: calculate.c, calculate.h, io.c, io.h, main_2c.c

Both io.c and calculate.c have their corresponding header files io.h and calculate.h. The functions that deal with input/output were placed in the io header file, with the implementation in the c file. Similarly, the function dealing with calculations is found in the calculations header file, with its implementation in the c file. The calculations.h file includes the io.h file, so the MAX_YEARS constant and Investment struct do not need to be redefined in the calculations header file.

4) **Write a function, void LCD_ClearLine(int ln), that clears a single line of the LCD (either line zero or line one). You can clear a line by writing enough space (' ') characters to fill it.**

Modified LCDwrite.c file has been uploaded to Canvas with implementation of LCD_ClearLine function. Function is also included below:

```
// Clears a line of the LCD screen
void LCD_ClearLine(int ln) {
    char str[16] = "                ";

    if (ln == 1 || ln == 0) {

        LCD_Move(ln,0);
        LCD_WriteString(str); // clear desired
            column
        NU32_WriteUART3("\r\n");

    }
    else {
        NU32_WriteUART3("Invalid input line for
            clear.");
        return;
    }
```