Homework #4

Out:	May 23, 2023
Outline Due:	May 27, 2023
Due:	June 3, 2023
Value:	Outline: 70 points Correctness: 250 points

Hexer Sound and SD Card Routines

Write the sound and SD card functions for the Hexer game. The functions to write are:

PlayNote(*f*)	plays the note with frequency *f*
InitSDCard()	initialize the SD card to prepare it for reading and writing
ReadSDCard(*b*, *p*, *n*)	read 2*n* bytes from block number *b* in the SD card and store it at *p*
WriteSDCard(*b*, *p*, *n*)	write 2*n* bytes of data stored at *p* to block number *b* in the SD Card

These functions are described in more detail below.

PlayNote(*f*)

> The function plays the note with the passed frequency (*f*, in Hz) on the speaker. This tone is output until a new tone is output via this function. A frequency of 0 Hz (passed value is 0) turns off the speaker output. The frequency (*f*) is a 16-bit value passed by value in R17|R16 (R17 is the high byte).

InitSDCard()

> The function initializes the SD card. After the function is called the SD card will be ready for read and write operations. The function returns 0 if the SD card is successfully initialized and a non-zero error code otherwise.

ReadSDCard(*b*, *p*, *n*)

> The function is reads 2*n* bytes of data from the SD card at the passed block number (*b*). The data is stored at the passed data address (*p*). The number of words (*n*) is passed in R16 by value(0 means 256 words), the SD card block number (*b*) is passed in R20..R17 by value, and the address at which to store the data (*p*) is passed in Y (R29|R28) by value (in other words the buffer is passed by reference). It is assumed that there is enough free memory at the passed address to store the bytes read by the procedure. If the number of bytes is less than the block size (512 bytes) the remaining bytes are read by the function, but not stored. The function returns (in R16) 0 if it successfully reads the bytes and a non-zero error code otherwise.

WriteSDCard(*b*, *p*, *n*)

> The function is writes 2*n* bytes of data to the SD card at the passed block number (*b*). The data to write is stored at the passed data address (*p*). The number of words (*n*) is passed in R16 by value (0 means 256 words), the SD card block number (*b*) is passed in R20..R17 by value, and the address at which the data to write is stored (*p*) is passed in Y (R29|R28) by value (in other words the buffer is passed by reference). If the number of bytes is less than the block size (512 bytes) the remaining bytes are filled with

any value so the function always writes 512 bytes. The function returns (in `R16`) 0 if it successfully writes the bytes and a non-zero error code otherwise.

Additionally you will need to write any initialization and support routines (*i.e.* SPI read/write functions) needed to implement these functions.

To test and demonstrate your code you **must** use the procedure `SDCardSoundTest`. This procedure is in the segment `cseg`. It is defined in the file HW4TEST.ASM (in the directory U:\EE10b). The procedure makes a number of calls to the procedures listed above in order to test the functions. You **cannot** modify this program.

When you demonstrate your code you must turn in a printout of all new or changed code and you must **also** submit your complete program electronically via the website. The file submitted electronically should be a zip file containing all files needed to build your program, including any make or batch files.

Notes

You will need to write a main loop to test your code. This just initializes the I/O ports, timers, SPI, and sound and SD card code then calls the `SDCardSoundTest` procedure.

The sound and SD card access functions should be in their own files, separate from the system initialization functions and the main loop and test functions. You should create **at least** 5 files: a file with the main loop; a file with the sound routines; a file with the SD card access routines, a file with the system (hardware) initialization; and **at least** one include file with your symbol definitions.

Resources

- Hexer board schematic
- SD Specification Part 1 - Physical Layer Specification v3.00
- test code
- test code description
- Homework Q&A
- Electronic Submission

Last updated April 13, 2023 05:26 PM by glen@caltech.edu