Prelab 3

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Pre 3.1) sudo is a program that allows user to run programs with the security privilege of another user. Root can cause some damage whereas sudo won’t.

* First, we don’t need give out our root password.
* Second, we can give part of root rights to protect the whole system.
* Third, sudo supports LDAP configuration which can help manage authorization centrally.
* Forth, there’s an audit trail that sudo can produce an audit trail of which user ran.

Pre 3.2) Memory mapped I/P is mapped into the same address space as program memory anduser memory, and its accessed in the same way. It uses the same address bus to address both memory and I/O devices – the memory and registers of the I/O devices are mapped to address values.

Pre 3.3)

1. This program is managing all the LED together by memory-mapped I/O. It firstly defines address of 8 LEDs and their switches. Then, the program can turn on or off LEDs by this program. According to the main function, the program starts initializing userio module by userio\_init. It opens access to physical memory and map memory at offset ‘physicaAddress’ into virtual address space. After that, the program is using userio\_ledSetAll to write to the memory location of all LEDs. After these, userio\_deinit is used to close userio module. It uses munmap() to remove mappings that contain pages located in the process address apace.
   1. Open – It’s a system call that open or create file descriptor. It is used to initializes access to a file. In the program, it returens an integer pointed by \*fd which refers to the file.
   2. REG\_WRITE. This is used to write value to each LEDs location to manage them on or off. The casting volatile is used for the case that the variable may change outside the program’s control.
   3. Mmap — Asks the kenel to map some bytes of the object represented by the given file. In this program, it is used to find the base address to virtual memory which is mapped to physical, or failed on error.
   4. Munmap – This is used to removes any mappings that contain pages located anywhere in the process address space starting at addr. In this program, it is used to free resource after closing userio module.

Pre 3.4)

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\* Show lower 8 bits of integer value on LEDs

\*@param pBase base address of userio

\*@param ledNr the ID of individual LED.

\*@param state either 0(off) or 1(on) to represent the state of selected LED

\*/

void userio\_ledSet(unsigned char \*pBase, unsigned int ledNr, unsigned int state)

{

/\*Address distance between two LED offsets\*/

int distance = 4;

/\*the offset of slected LED\*/

unsigned int ledOffset = pBase + LED1\_OFFSET + ledNr \* distance

REG\_WRITE(pBase, ledOffset, state);

}

3.5

unsigned int userio\_switchGet(unsigned char \*pBase, int ledNR);