- **Assignments 2.1**

Memory

Given the equation: taxableIncome = salary - exempts - percent401k / 100 * salary

And the variables:

salary = 50000, exempts = 7000, percent401k = 4.5

Show how the value in taxableIncome will be stored in memory (in hexadecimal format) on a system with an Intel Core i7 processor if the next available memory address is 0x013A32A8h

Intel CPUs are little-endian

1. The 401kpercentage is 2250
2. (50,000-7000-2250)= 40750
3. 40750 decimal -> 9F2E hex
4. 9f2e reversed since its little-endian

Address	Value
0x013A32A8h	2E 9F 00 00
0x013A32B0h	2E 9F 00 00

- **2.3 Input/Output (Challenge Assignment)**

When performing a long listing (ls -la) in the /dev/ directory of a Linux system, you will see the special files for all connected devices and important information about each. Use the Web to research the different classes of I/O devices and how they are represented in the long listing.

There are three types of I/O operations:

Sensory input	Control output	Data transfer
Digital input	Direct digital output	Parallel
Analog input	Modulated digital output	Serial
	Analog output	

- **Memory devices**

/dev/mem Physical memory access

/dev/kmem Kernel virtual memory access

/dev/null Null device

/dev/port I/O port access

/dev/zero Null byte source

/dev/core OBSOLETE - replaced by /proc/kcore

/dev/full Returns ENOSPC on write

/dev/random Nondeterministic random number gen.

/dev/urandom Faster, less secure random number gen.

/dev/aio Asynchronous I/O notification interface

/dev/kmsg Writes to this come out as printk's, reads export the buffered printk records.

- **Pseudo-TTY masters**

/dev/ptyp0 First PTY master

/dev/ptyp1 Second PTY master

...

/dev/ptyef 256th PTY master

Pseudo-tty's are named as follows:

- Masters are "pty", slaves are "tty";
- the fourth letter is one of pqrstuvwxyzabcde indicating the 1st through 16th series of 16 pseudo-ttys each, and
- the fifth letter is one of 0123456789abcdef indicating the position within the series.

These are the old-style (BSD) PTY devices; Unix98 devices are on major 128 and above and use the PTY master multiplex (/dev/ptmx) to acquire a PTY on demand.

- **Pseudo-TTY slaves**

/dev/ttyp0 First PTY slave

/dev/ttyp1 Second PTY slave

...

/dev/ttyef 256th PTY slave

These are the old-style (BSD) PTY devices; Unix98 devices are on major 136 and above.

- **TTY devices**

/dev/tty0 Current virtual console

/dev/tty1 First virtual console

...

/dev/tty63 63rd virtual console

/dev/ttyS0 First UART serial port

...

/dev/ttyS191 192nd UART serial port

UART serial ports refer to 8250/16450/16550 series devices.

Older versions of the Linux kernel used this major number for BSD PTY devices. As of Linux 2.1.115, this is no longer supported. Use major numbers 2 and 3.

Aliases for dynamically allocated major devices to be used when its not possible to create the real device nodes because the root filesystem is mounted read-only.

- **Alternate TTY devices**

/dev/tty Current TTY device

/dev/console System console

/dev/ptmx PTY master multiplex

/dev/ttyprintk User messages via printk TTY device

/dev/cua0 Callout device for ttyS0

...

/dev/cua191 Callout device for ttyS191

(5,1) is /dev/console starting with Linux 2.1.71. See the section on terminal devices for more information on /dev/console.

- **Virtual console capture devices**

/dev/vcs Current vc text contents

/dev/vcs1 tty1 text contents

...

/dev/vcs63 tty63 text contents

/dev/vcsa Current vc text/attribute contents

/dev/vcsa1 tty1 text/attribute contents

...

/dev/vcsa63 tty63 text/attribute contents

These devices permit both read and write access.

- **Loopback devices**

/dev/loop0 First loop device

/dev/loop1 Second loop device

...

The loop devices are used to mount filesystems not associated with block devices. The binding to the loop devices is handled by mount(8) or losetup(8).

- **Serial Mux device (Linux/PA-RISC only)**

/dev/ttyB0 First mux port

/dev/ttyB1 Second mux port

- **Testing Your Basic Development Environment:**