CST 334 (Operating Systems)

Dr. Glenn Bruns

# Lab: Address Spaces

Try to answer these problems without referring to the lecture slides or the text.

1. What is an address space? Write the answer in your own words.

A place for a program to store their location.

1. The concept of address space is very general. The internet is a networked collection of computers. What is a virtual address in the internet? What is a physical address?

What is a virtual address in the internet? – IP addresses.

What is a physical address? – Where the devices are stored to provide services on the Internet.

1. Do you know anything about how a region of storage on a disk drive is addressed? What is a physical address for disk storage? What is a virtual address?
2. What is the size of the virtual memory address space in 32-bit Windows processes? Do some web research to get the answer. What is the size of the virtual memory space in 64-bit Windows processes?
3. In lecture I said that we will usually assume that memory is "byte-addressable". This means that if you read from a location in memory, you get 1 byte of data. In x86 processors, is memory "byte-addressable"? Do a little web research.
4. Answer the following question, which is question 1 at the end of Chapter 14 in our text:

*Write a simple program called null.c that creates a pointer to an integer, sets it to NULL, and then tries to dereference it. Compile this into an executable called null. What happens when you run this program?*

Here is some code to help you get started quickly:

#include <stdio.h>

// test to see what happens when a NULL-valued pointer is dereferenced

int main() {

int \*ip; // a pointer to an int

// YOUR CODE HERE

}

1. If you still have time, think about doing address translation in software. Sketch out the algorithms and data structures you would use.