Lab 4: Memory Management

1. What to turn in

Submit a zipped file to blackboard that includes the source code that you have changed along with the answers to the questions below (.txt or .pdf).

2. Background

When we run user programs in JNachos we are running executables that were compiled from C-code into the MIPS instruction set. The executable code is loaded into our emulated RAM. In class we discussed what the virtual address space of a process looks like (see
`https://en.wikipedia.org/wiki/Virtual_address_space`
for a reminder).

- Download a slightly modified JNachos zip file from the website:

  `http://web.ecs.syr.edu/~pjmcswee/cis486/lab4.zip`
- Create a new Eclipse project around that download, take a look at lab 1 if you need to see the instructions again.

3. Code Investigation

Answer all of the following questions by examining the jnachos source directories.

(1) What address space segments are loaded from the executable JNachos? Take a look at the AddrSpace constructor.

(2) What segments contribute to the overall size of an address space?

(3) Which segments are created in AddrSpace constructor but are not loaded from the file? Hypothesize as to why this is.

(4) What does the class NoffHeader tell us about the executable?

(5) Read the TranslationEntry class. Based on the AddrSpace constructor code what can we say about the relationship between the virtual address in JNachos and the physical page in JNachos in our current version?

(6) What does this relationship suggest about the total number of processes that can be concurrently run within JNachos?

(7) Run the new JNachos download with the following run configuration:
-x test/matmult
Record what you see as the output for x:

"Current Process test/matmult exiting with code **X**"

(8) Now change the runtime configuration to:
-x test/matmult,test/sort
and re-run (it takes a minute or two to complete). Record what you see for X and Y below:
"Current Process test/matmult exiting with code **X**"
"Current Process test/sort exiting with code **Y**"

Can you explain what the output changed for matmult?