**Nachos 2 (Task Summary)**

**Task – 01 (Address Space : Virtual Memory Support)**Provide an interface **PageTable** to do the following tasks

* Keep track of free pages
* Allocate from free pages
* De-allocate pages

You also need to do the followings:

1. Edit constructor of AddrSpace to link virtual address/ virtual page number(vpn) and physical address/physical page number(ppn) properly
2. Write functions for reading from and writing to virtual memory.

* First, convert virtual address to its physical address
* Then read/write in physical address using Machine::ReadMem() and Machine::WriteMem()

Save the <processId, PageTable> pair inside kernel.

**Task – 02 (System Call: Exec and Exit)**

***Exec***

* Implement with standard arguments provided in **syscall.h**
* Carefully review the code inside **userprog/progtest.cc (**Startprocess() function to be precise)
* A new pageTable must be created when Exec is called. Implement First Come First Serve Page Replacement Policy.
* If you find that there are not enough pages to run the new process and you have already allocated some pages for it, **de-allocate** them. Anyway, it is suggested to keep track of **Number of free pages** inside the **PageTable** data structure.

***Exit***

* Implement with standard arguments provided in **syscall.h**
* Print status value (argument of Exit) for debugging purpose.
* You must **free the allocated pages** once a process is done executing.

**Task – 03 (System Call: Read and Write**

* Implement **Read** and **Write** system calls as in **syscall.h**

**Advice regarding System Call Implementation**

* Create a separate function for each system call inside **exception.cc .** Call this function from the exception handler.
* Increment **PC** properly. (You will get the instructions inside the slide provided)

**Running User Programs**

Those who are having hard time running nachos –x command, use the following after you are in **userprog** directory and **make** is complete

./nachos –x ../test/matmult

Here, **matmult** is a test program provided with nachos. Use other programs if you wish.