General questions

1. Explain relations among three files under the code directory: Makefile, Makefile.common, Makefile.dep. Explain what each file does.

2. Explain what each sub-directory is for, under the code directory. They directories you should consider are: bin, filesys, machine, network, test, threads, userprog, and vm.

Nachos time

1. Find the variable responsible for keep tracking the time in Nachos. What is it?
2. Explain how Nachos time advances. Is it the same as the real-time?
3. What is the purpose of the private variable “randomize” in class Timer?

List Questions

1. Find in Nachos code an example of constructing a list object using the List class defined in list.[cc,h]. Describe how the object is instantiated, whether it is sorted list or non-sorted list.

2. Study list.[h,cc].. How is the list sorted by SortedInsert()?

3. Write the code (no programming needed) for instantiating a list object that can sort items in the increasing order of integer number using the List class.

Main

1. What does the –rs flag do?
2. What does the "-d" flag do? How do we enable all flags (besides writing them all out)?
3. Explain DEBUG('t', "Entering main") at line 84 of main.cc
4. Explain #ifdef THREAD ThreadTest(); #endif at line 87 of main.cc
5. Run nachos under the threads directory. It will print out “*** Thread 0 looped 0 times, *** Thread 1 looped 0 times, etc…” Give names of Thread 0 and Thread 1. I.e., what are Thread 0 and Thread 1?
Thread questions

1. What are the PCB contents in Nachos?
2. Explain the functionalities of Thread.Yield() and Thread.Sleep(). Differences?
3. How do Thread::RestoreUserState() and AddressSpace::RestoreState() differ?

Scheduler Questions

1. What does currentThread->space->RestoreState() do?
2. What is the scope of the variable currentThread?
3. What is the name of ready queue in Nachos?
4. How Scheduler::ReadyToRun and Scheduler::Run differ in functionality?

Switch Questions

1. What information do we need to save for a context switch (for the DEC MIPS)?
2. Explain (in a brief paragraph) what happens in SWITCH().

Synch Questions

1. The implementation of semaphore in synch.cc has a while-loop, which is different from the one in the textbook. Why do we need this while loop?
2. Explain the following code in synch.cc:
   ```
   IntStatus oldLevel = interrupt->SetLevel(IntOff);
   … some code
   (void) interrupt->SetLevel(oldLevel)
   ```
3. Study the constructor and destructor functions for the Semaphore class. A queue is created and deleted in the respective functions. Why do we need a queue? i.e., what is the purpose of the queue? What are the items stored in the queue?

System Questions

1. Explain the usage of TimerInterruptHandler() by Nachos?
2. How can we use TimerInterruptHandler() as an operating system CPU scheduler?
3. What does the "-s" flag do?
4. Where are the debug flags finally stored?
ThreadTest Questions

1. Trace SimpleTest and ThreadTest in threadtest.cc
2. Who calls ThreadTest()? 
3. What does the Fork function call do? 
4. In the line "t->Fork(SimpleThread, 1)", what does the 1 represent? 
5. How do you instantiate a mutex semaphore in ThreadTest.cc? 
6. What does Thread::Yield() do? 
7. What does Thread::Sleep() do? How is this function different from Thread::Yield()? 

Utility Questions

1. What is enableFlags? 

2. What does ASSERT do if the condition is FALSE?