

CSci223
Spring 2005
Exam III Study Guide

Exam III will cover the following material:

Chapter 4 – pp. 256-258, 263-265, 281-283, 309-317

Chapter 5 – pp. 378-382, 387-392

Chapter 6 – pp. 456-464, 482-487

Chapter 7 – pp. 540-543, 553-557, 566-568

Chapter 8 – pp. 586-592, 594-598, 600-617

Chapter 10 – pp. 692-704, 730-743, 755-759

1) What are three differences between pure CISC instruction sets and pure RISC instruction sets?

2) Are modern processors RISC or CISC?

3) What is pipelining? What trade off does pipelining involve?

4) What are some of the limitations of pipelining?

5) Define data dependency and control dependency in the context of pipelining.

6) What is the most important aspect of optimization?

7) Describe one of the three limitations of optimizing compilers.

8) What are the two basic types of compiler optimizations?

9) Rewrite the following C code to make it more efficient:

```
Vector v = new Vector();  
...  
for( int i = 0; i < v.size(); i++ ) {  
    System.out.println( v[i] );  
}
```

10) Static RAM used for cache memory is dozens of times faster than dynamic RAM used for main memory. Why don't computer manufacturers use static RAM for main memory instead?

11) In the memory hierarchy, level k serves as a cache for which level?

12) What is a "cold miss?"

13) Linkers play a crucial role in software development by allowing: (two words)

14) The linker on most UNIX systems is called `ld`. Why have we never called `ld` directly?

15)What are the two main tasks that a linker performs to create an executable?

16)What are the two main disadvantages of static libraries that dynamic libraries solve?

17)When a low-level exception occurs, what three things can happen after the exception handler has finished?

18)Name two events that can cause an interrupt.

19) Define a process.

20) A process “thinks” it has exclusive access to what two system resources?

21) What happens when a context switch occurs?

22) Explain how a UNIX shell might use fork and execve to run another program.

23) Explain the difference between a program and a process.

24) Most modern computers have a piece of dedicated hardware that translates virtual addresses to physical addresses. What is the name of this piece of hardware?

25) When discussing virtual memory, what do we mean by “swapping out.”

26) UNIX uses `malloc` and `free` to dynamically allocate and free chunks of memory. Why do programmers need to be able to dynamically allocate memory? What can't they declare everything statically?

27) Explain internal and external fragmentation with regard to dynamic memory allocation.

28) Briefly describe the operation of a mark and sweep garbage collector.