

ITEC324 - Exam 2 Study Guide

- Each of these topics is described in more detail below:
 - Pattern
 - Multithreading
 - Recursion
 - Binary Search
 - Sorting
 - Performance (Time Complexity)
- Class Notes:
 - Chapter 5, 8, and 9
 - Recursion and Time Complexity
 - Advanced Sorting and Time Complexity

Patterns

- ✚ Concept
- ✚ For each of 5 patterns in Chapter 5:
 - ✓ Intent
 - ✓ Context and Solution
 - ✓ Diagram
 - ✓ Examples

Multithreading

- ✚ Multithread Programming
- ✚ Thread Synchronization
 - Race Condition
 - Deadlock

Recursion

- ✚ Describe the performance penalties incurred by using recursion and why they occur
- ✚ Describe and illustrate the stack model of execution of recursive routines
- ✚ Give an argument that a recursive routine is correct
- ✚ Write simple recursive routines (including mathematical routines and list routines)
- ✚ Describe the value of recursive routines
- ✚ Contrast the power of recursive routines with non recursive code wrt speed, ease of programming, and what can be programmed recursively vs non-recursively

Binary Search

- ✚ Know the advantages and limitations of binary search
- ✚ Explain why the performance of binary searching is $O(\log n)$
- ✚ Be able to write a binary search routine, recursively and non-recursively

Sorting

- ✚ Merge Sort
 - Hand execute and describe the operation of quick sort
 - Write the routines, recursive as appropriate, to perform merge and merge sort
 - Explain why the performance of mergesort routine is $O(n * \log n)$
 - State the best/worst case performance of mergesort and explain why each is what it is
- ✚ Quick Sort
 - Hand execute and describe the operation of quick sort
 - Write the routines, recursive as appropriate, to perform partition and quick sort
 - Explain why the performance of quicksort is $O(n * \log n)$
 - Explain when the performance of quicksort is degenerated to $O(n^2)$ and prove it.
- ✚ Shell Sort
 - Hand execute and describe the operation of shell sort
 - Discuss the performance of shell sort.
- ✚ Radix sort
 - Hand execute and describe the operation of radix sort
 - Give the performance of radix sort

Performance (Time Complexity)

- ✚ Understand the summary table of sorting algorithms
 - State the worst case performance of common sorting algorithms: bubble, insertion, selection
 - State best/worst case performance of merge, quick, and radix sort
 - Give basic operation(s) of each sorts