**Comprehensive Exam – Feedback for Christopher Duarte**

Grade: 6.34/10

Question 1: (0.31/1)

(a) When you insert an element in an ordered (sorted) array, you may need to sort everything to keep the array sorted. Thus, the complexity is O(n).

(b) You can’t use binary search because in the ordered doubly linked list you have to traverse the list to go to the next element. The upper bound for the search and insertion is O(n).

A doubly linked list has a pointer to the predecessor and the successor, therefore if you are given an element you can immediately access both, making the complexity O(1).

(c) The insert in the min-heap swaps at most once per level (the tree is “somewhat ordered”), thus the complexity is O(log n).

For the successor and predecessor, you may need to traverse everything, thus the upper bound would be O(n).

(d) For the hash table, on average you would expect a complexity of 1 for search and insert. However, the Big-O notation represents the worst-case scenario or upper bound, which would be O(n).

Hash tables aren’t ordered, so the successor and predecessor would be O(n).

Question 2: (0.33/1)

(a) In call-by-value, the values of variables can’t be altered through function calls.

(c) In call-by-value-result, the variable isn’t modified until the end.

Question 3: (0.9/1)

(e) There are many types of tests and not only unit tests. You must test the system components separately and then everything working together, as well as interacting within the target environment.

Question 4: (0.5/1)

(b) Relocatable.

(c) As per the man information of fork(), the pid of the child is returned in the parent and zero is returned in the child.

(e) This issue never happens in optimal and LRU.

(f) Direct.

(g) Asynchronous I/O.

Question 5: (1/1)

Question 6: (0.1/1)

IP stack has five layers: application, transport, network, link and physical.

(a) OSI is not TCP/IP, they are two different things. OSI has seven layers. What is shown here doesn’t correspond to anything, it’s a mix of OSI, IP stack and non-existent layers.

(b) Hardware layer doesn’t exist.

Question 7: (0.7/1)

The way the answer is written makes it very confusing at times. The sorting of B should be outside the loop, as it is only required once. Additionally, the complexity should be expressed in terms of n and m, A and B may not have the same length.

Question 8: (0.5/1)

(a) You can also have only ‘a’.

(b) What is shown is not really a parse tree. In any case, if you choose to keep the M until the end, then show the step converting it at the end (abaAM 🡪 abaaEM 🡪 abaaM 🡪 abaa).

(c) An LL(1) grammar has no multiple entry in the parsing table. You aren’t showing this here.

Question 9: (1/1)

Question 10: (1/1)