

W04 - Linked Lists/Skip Lists

Due 17 Feb at 23:59 **Points** 20 **Questions** 10
Available 13 Feb at 8:00 - 17 Feb at 23:59 **Time limit** None
Allowed attempts Unlimited

Instructions

Content and Background

This quiz relates to the content covered in the course up till now. It may also draw upon supporting knowledge and skills expected from a CS sophomore. Please make sure that you are up to date on the course work before attempting the quiz.

Difficulty

This quiz is equivalent to an in-class exercise. Have pen and paper ready and be prepared to work on challenging problems.

Take the quiz again

Attempt history

	Attempt	Time	Score
KEPT	Attempt 2	less than 1 minute	20 out of 20
LATEST	Attempt 2	less than 1 minute	20 out of 20
	Attempt 1	9 minutes	19.6 out of 20

! Correct answers are hidden.

Score for this attempt: **20** out of 20

Submitted 16 Feb at 22:14

This attempt took less than 1 minute.

Question 1

2 / 2 pts

The time complexity of forward traversal of SLList with n nodes is

☐ $O(n \log(n))$

☐ $O(n^2)$

☐ $O(1)$

☒ $O(n)$

Question 2

2 / 2 pts

What will happen if we do not use a temp pointer but instead use the head pointer for forward traversal like this,

```
while (head != nullptr)
{
    head = head->next;
}
```

☐ Head pointer will be pointing to the last node of the linked list.

☐ Head pointer will be pointing to the first node of the linked list.

☐ Head pointer will be pointing to the middle node of the linked list.

☒ We will not be able to track the linked list any more since the head pointer will point to null after this operation.

Question 3**2 / 2 pts**

What is the role of the dummy node in a DLList?

- ☐ Its useless no wonder its called dummy
- ☐ It acts as a dummy for the head node to help in offloading head node memory.
- ☒ Helps in identifying the start of the DLList as well as helps during traversal and other operations.

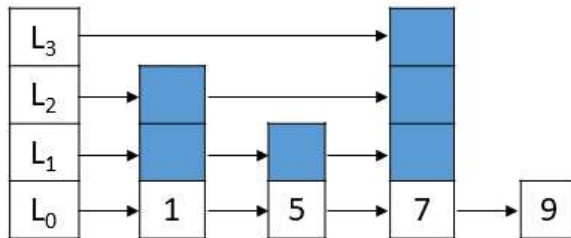
Question 4**2 / 2 pts**

Why does the `get_node(i)` function of DLList has a factor `min(i, n-i)` in its time complexity `O(1+min(i, n-i))`?

- ☐ To keep the total complexity the most.
- ☐ It reduces the complexity of data access.
- ☐ To keep the total complexity the least.
- ☒ DLList can use either next or pre pointers to start traversal in forward or reverse direction from the dummy node depending on which is nearest to the dummy node that's why `min(i, n-i)`.

Question 5**2 / 2 pts**

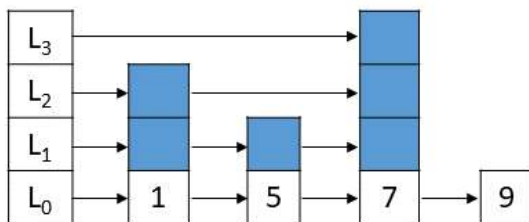
Considering the following skip list. What is the height of the element 1?



- ☐ 0
- ☐ 1
- ☐ cannot be determined
- ☒ 2

Question 6**2 / 2 pts**

What is the height of the following skip list?



- ☒ 3
- ☐ 2
- ☐ 1

☐ 0**Question 7****1 / 1 pts**

The expected length of a search path from one node at any given level in skip list to level 0 is

- ☒ $O(\log(n))$
- ☐ $O(n)$
- ☐ $O(1)$
- ☐ $O(n\log(n))$

Question 8**2 / 2 pts**

The search path of a skip list from any given node at higher level to a node at L_0 has an expected length of $O(\log(n))$ because?



A significant amount (half or more) of nodes are skipped when we traverse the skip list.

- ☐ Every node is connected to every other node.
- ☐ Every node is visited at least once.
- ☐ Every node is only connected at level zero.

Question 9

1 / 1 pts

What is the significance of finding the predecessor node of a given node in a skip list?

☐ It does not affect anything.

☒ Most operations become easy as they require information of the predecessor node to make connections during insert or delete.

☐ Its a matter of choice.

☐ It reduces the memory footprint of the skip list.

Question 10

4 / 4 pts

You are given following numbers to be entered (in the given order) in an initially empty skiplist.

10 4 18 5 11 7 3 1 15

The outcome of a series of dice rolls is sampled below. You will keep entering new nodes to upper levels **until you get an even number** on the die.

1	5	3	6	3	2	4	1	5	2	6	4
3	1	5	6	1	6	5	5	3	6		

Build the skiplist and answer the following questions:

- What is the total number of nodes in this skiplist? This will include nodes at all levels excluding the sentinel nodes.

◦ Total number of nodes:

- In how many levels (including level 0) do we have the following nodes?

10	4
4	2
18	1
5	3
11	1
7	1
3	4
1	2
15	4

Answer 1:

22

Answer 2:

4

Answer 3:

2

Answer 4:

1

Answer 5:

3

Answer 6:

1

Answer 7:

1

Answer 8:

4

Answer 9:

2

Answer 10:

4

Quiz score: **20** out of 20