# BUPT Compilers Lab1 2023Fall

Overview

   Welcome to the lab class! In this course, you will be completing the programming assignments. Lab 1 is a C language exercise with the objective of implementing a linked list structure using the C programming language. This lab serves as a preparatory exercise and will help you familiarize yourself with pointer operations and memory management. In the context of compiler development, linked lists are instrumental in efficiently organizing and managing data structures such as symbol tables and syntax trees, which is crucial for subsequent compiler experiments.

Linked List

For beginners:

C-language interactive tutorial: https://www.learn-c.org/
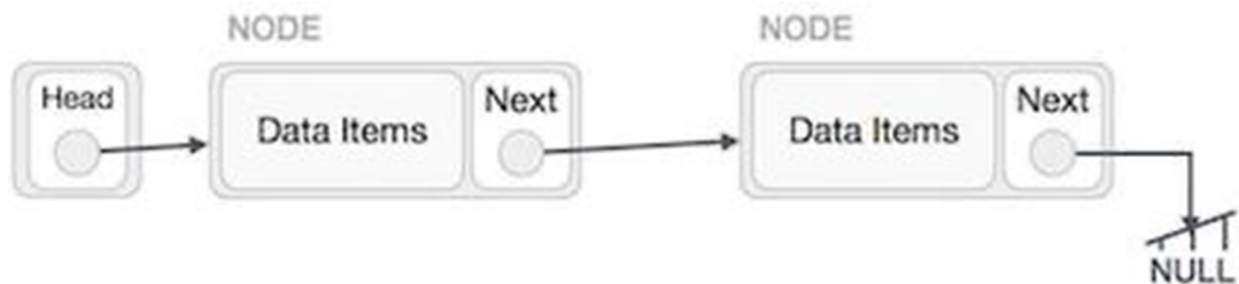
•Each node contains two fields.

•For header node, the first field contains the number of nodes in the linked list, excluding itself.

•For other nodes, the first filed contains an *int* value.

•The second field is a pointer, points to the next node.

Coding

   1. You will complete the following functions (declared in header file) in the *linked_list.c* file!

```c
/* insert val at position index */
void linked_list_insert(node *head, int val, int index);

/* delete node at position index */
void linked_list_delete(node *head, int index);

/* remove the first occurence node of val */
void linked_list_remove(node *head, int val);

/* remove all occurences of val */
void linked_list_remove_all(node *head, int val);

/* get value at position index */
int linked_list_get(node *head, int index);

/* search the first index of val */
int linked_list_search(node *head, int val);

/* search all indexes of val */
node *linked_list_search_all(node *head, int val);
```

2. Make the libll target

```
root@8d8d6a7d0f25:/mnt/Workspace/BUPT-Compiler-Lab/Lab1# make libll
gcc linked_list.c --shared -fPIC -o libll.so
root@8d8d6a7d0f25:/mnt/Workspace/BUPT-Compiler-Lab/Lab1#
```

3. Run self-test examples in python3

Most tests failed, try to pass them!

```
root@8d8d6a7d0f25:/mnt/Workspace/BUPT-Compiler-Lab/Lab1# python3 ll_test.py
..F.....
======================================================================
FAIL: test_get (__main__.LinkedListTest)
----------------------------------------------------------------------
Traceback (most recent call last):
  File "ll_test.py", line 128, in test_get
    self.assertEqual(val, -0x80000000)
AssertionError: -1 != -2147483648


----------------------------------------------------------------------
Ran 8 tests in 0.001s

FAILED (failures=1)
root@8d8d6a7d0f25:/mnt/Workspace/BUPT-Compiler-Lab/Lab1# ▊
```

Report

    Additionally, you will need to submit a pdf report(name_studentID.pdf) documenting your work for assignment. Please carefully follow the instructions outlined below:

1. Academic Integrity: Plagiarism or any form of cheating is strictly prohibited. Your work should be original, and any external sources should be appropriately cited.

2. Programming Assignments: Feel free to ask questions and seek assistance from the teaching assistant if needed.

3. Report:

   - Pdf type

   - Naming like **name_studentID.pdf**

   - Include any relevant diagrams, charts, or screenshots to enhance your explanations.

   - Make sure your report is well-structured, with appropriate headings and subheadings.

4. Submission Guidelines:

   - Include your **name, student ID, class number** and **container number** in the report's header. For Docker on Windows systems, you can view the container numbers in the containers of the Docker Desktop.

   - Commit the compressed package of the lab1 folder (**lab1.zip**), which should include the code you wrote, the compilation results, and your PDF report.

5. Deadline:

   September 17, 2023, 24:00

6. Submission Platform:

   Teaching cloud platform

Report format

Name: xxx

Student ID: xxxxxxxxxx

Class Number: xxxxxxxxxx

Container Number: 04c56e0ced1b3944f2eeee027840f5210f54efecc49b3377166c9a7a32ff119