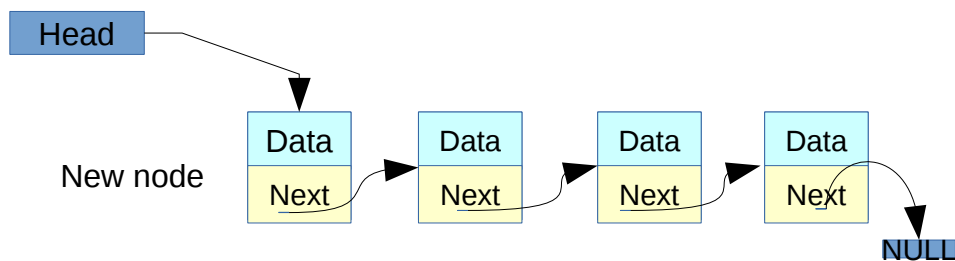


**Aim:** The aim of this laboratory is to implement a linked list which can store pointers to other data items. You will be using *malloc* and *free* for this implementation.

**Description:** A linked list is a data structure which can grow and shrink as and when the need comes. When a new node is to be added, one would allocate memory; by calling *malloc* and store the new data item in this newly allocated memory. The newly allocated item can then be added to the already existing list. The addition can be done to the head or the tail of the existing list. For simplicity we will add the new item to the head of the list. The following diagram shows how this addition is done.



For this particular implementation, the data is a pointer to a string where a name of a city is stored. You should use the provided skeleton code. The interface provided by the linked list is defined in the *linked.h* header file and the implementation of it is in *linked.c* file. The *Makefile* defines how the files should be compiled to build the final program. You will learn about make and such build systems at a later stage. The *main.c* is a simple test program that would ask the user to enter a unknown number of cities (until the user types END) and would store them in the linked list. Then it would traverse the linked list and display all the names.

**Questions:** Answer the following questions. They do not carry any marks but will be useful in future (not just for this laboratory class);

1. What does *assert* do? Why is it important use?
2. Why do you have *void \** as the data type stored in the linked list?
3. What is the type of *list\_t*? (see *linked.h*)
4. Why should you pass address of list to insert?
5. Can you use an array to store the data?
6. If you did not change the main, what will you see?
7. Type *make* on the shell. Type *make* again. What do you see?
8. Now type *touch linked.h* and type *make* again. What do you see?

**Task:** Implement the functions in the *linked.c* file and run the code. Try explaining the output you see. Modify the *main.c* to correct the issue.

**Submission:** Submit your answer via Moodle. You should submit a tarball with the *linked.c*, *main.c* *Makefile* and *linked.h* Deadline is 18<sup>th</sup> September 2019.