# Linked List in Data Structure

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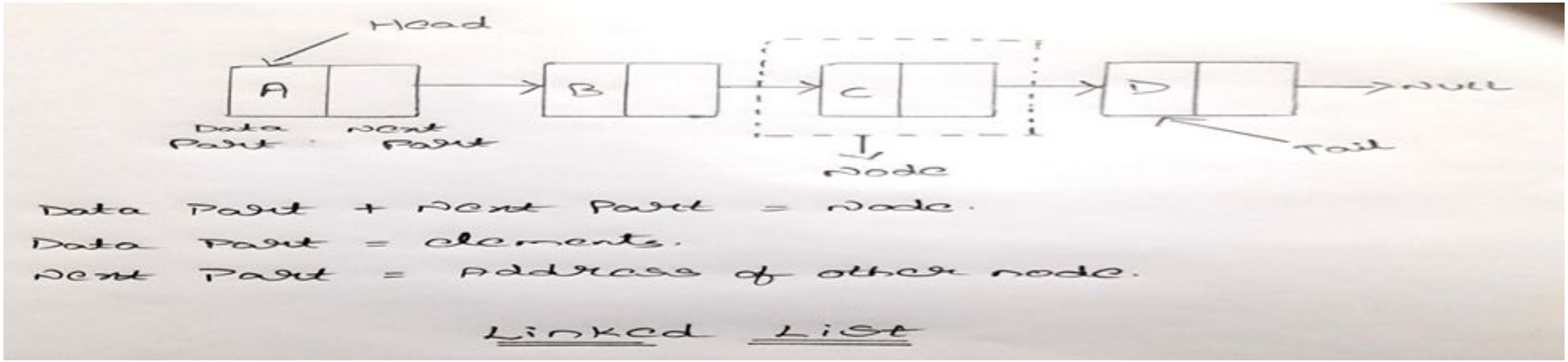
# Defining Linked List

- Linked List is an ordered collection of elements called nodes which has two parts.
- The Data part and Next part.
- The data contains elements.
- Next contains address of another node.



# Array vs. Linked List

## Differences:

| Array | Linked List |
| --- | --- |
| It is of fixed size. | It is dynamic and flexible. |
| Memory is assigned during compile time. | Allocated during runtime. |
| Operations like insertion and deletion consume a lot of time. | Consumes less time compared to that of an array. |
| Elements are stored consecutively in arrays. | Stored randomly. |

# Requirements & Terminologies

Requirements :

- Ability to grow - Add or Insert elements.
- Ability to shrink - Remove or Delete elements.
- Accessing list item - Access (or read) any element and to modify items (contents of node).
- Initialize - Clear or re-initialize list and to create an empty list.

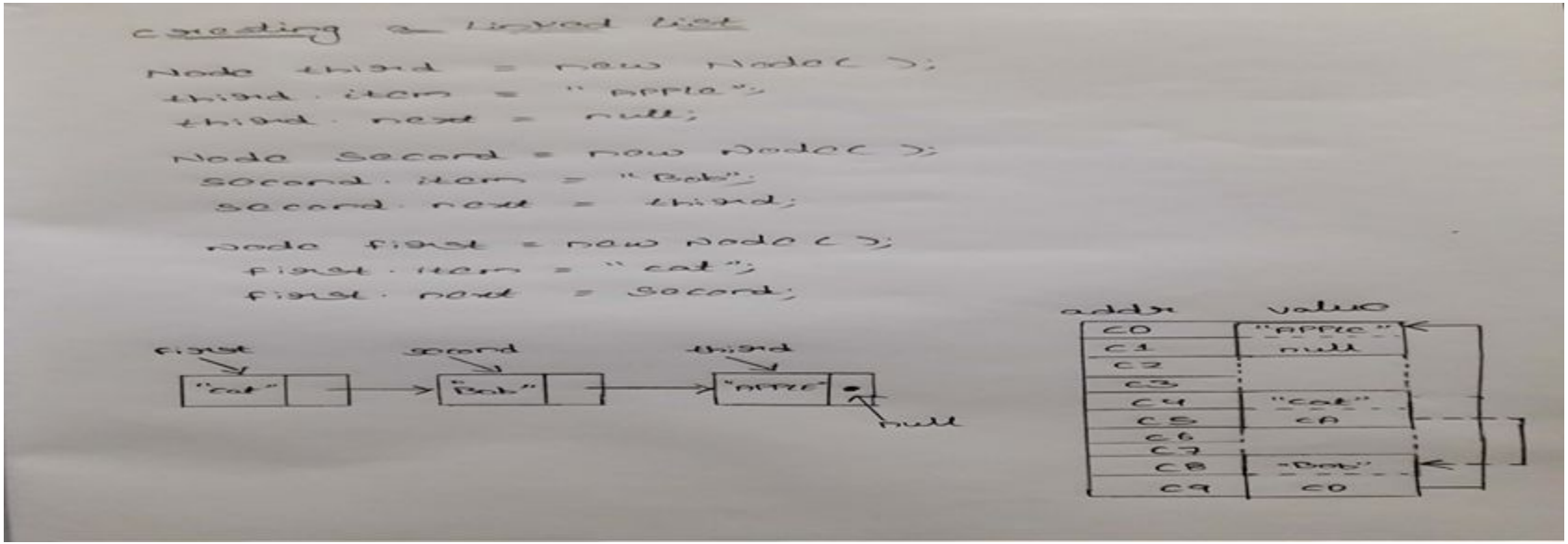
Terminologies :

- Empty List.
- List Size.
- Head and Tail.
- Node.

# Basic Operations

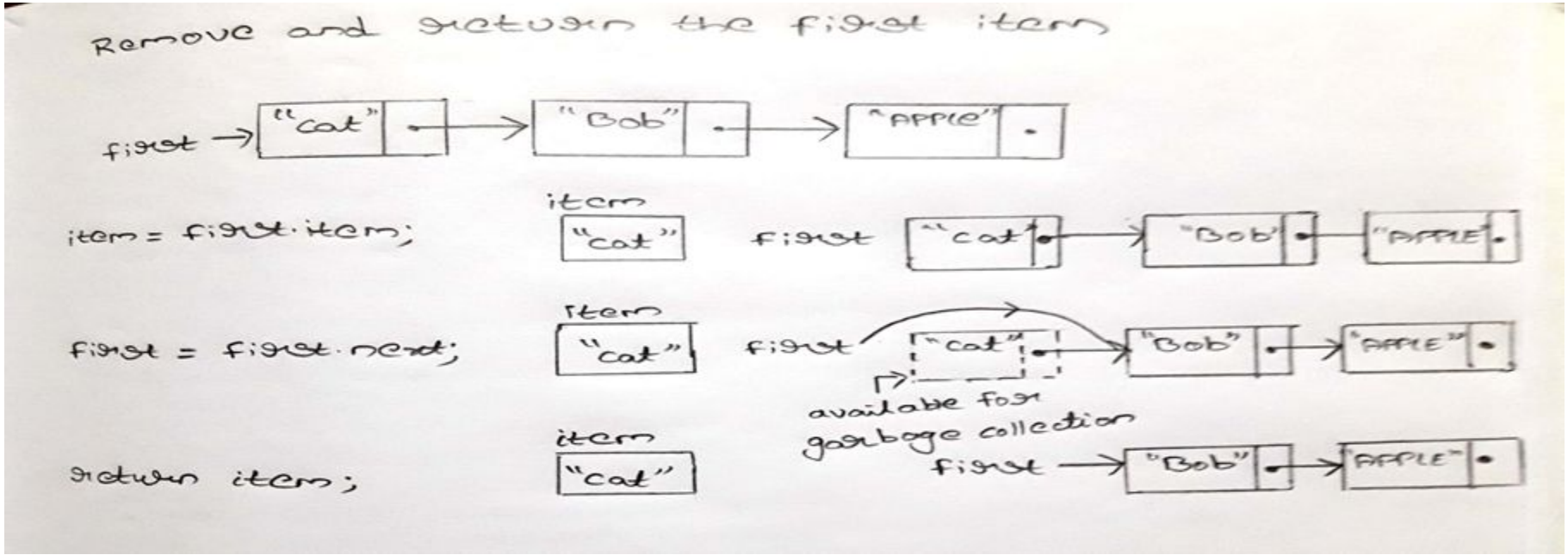
The basic operations on linked lists are:

•Creation - The creation operation is used to create a linked list.



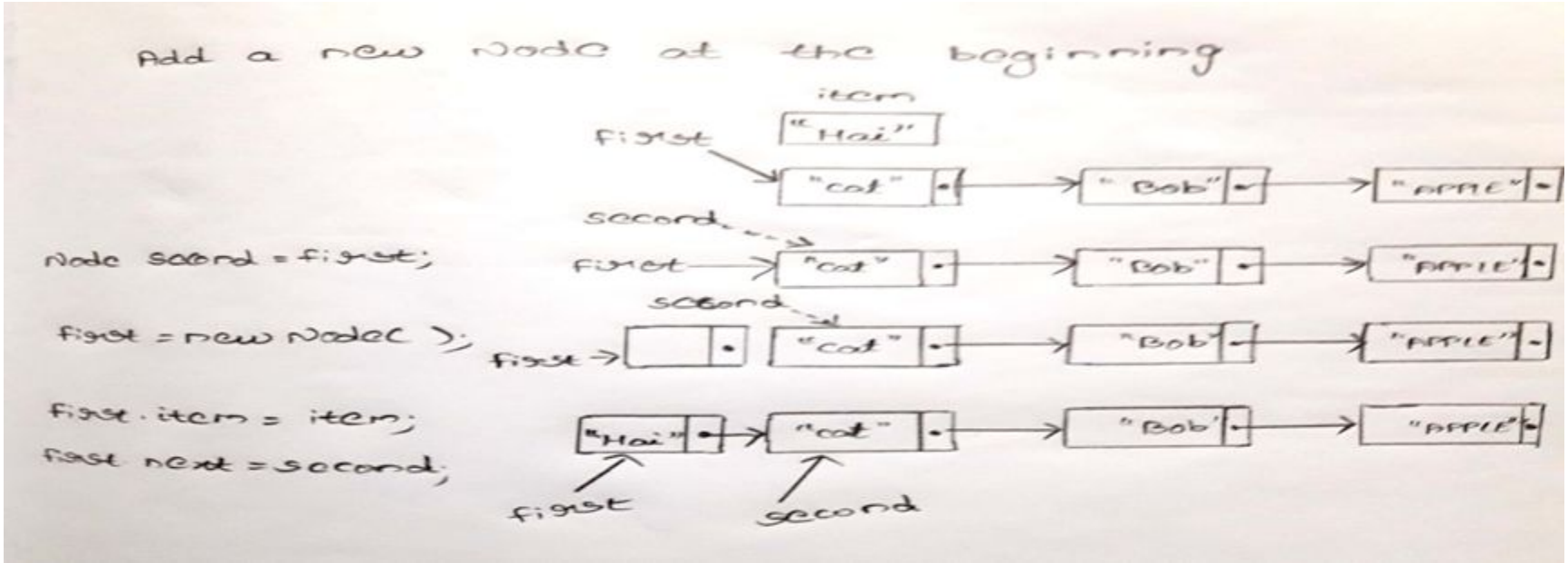
# Basic Operations

- Remove - The remove operation is used to remove an item from the linked list.



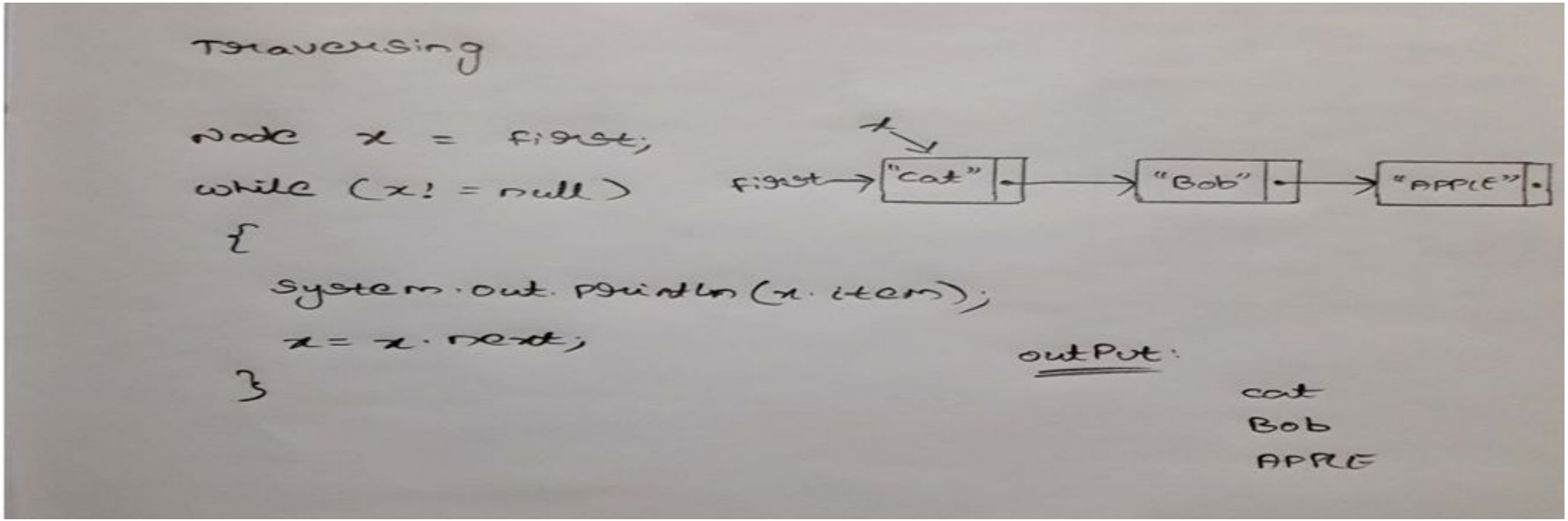
# Basic Operations

- Insertion - The insertion operation is used to insert a new node in the linked list at the specified position.



# Basic Operations

•Traversing - The traversing operation is a process of going through all the nodes of a linked list from one end to another end.



# Advantages of Linked Lists

- We can dynamically allocate memory space as needed.
- We can release the unused space in the situation where the allocated space seems to be more.
- Operation related to data elements like insertions or deletion are more simplified.
- Operation like insertion or deletion are less time consuming.
- Linked lists provide flexibility in allowing the items to be arranged efficiently.

# Applications

In Computer Science:

- Implementation of stacks and queues.
- Dynamic memory allocation :  We use linked list of free blocks.
- Maintaining directory of names.

In Real World:

- Image viewer – Previous and next images are linked, hence can be accessed by next and previous button.
- Previous and next page in web browser – We can access previous and next URL searched in web browser by pressing back and next button since, they are linked as linked list.
- Music Player – Songs in music player are linked to previous and next song. you can play songs either from starting or ending of the list.

# Thank you

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