Problem Solving With C - UE24CS151B

List

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PROBLEM SOLVING WITH C

List

1. Introduction
2. Self Referential Structures
3. Characteristics
4. Pictorial Representation
5. Operations
6. Different Types
7. Applications

List

Introduction

- Collection of nodes connected via links.
- The node and link has a special meaning in C.
- Few points to think!!

  - Can we have pointer data member inside a structure? - Yes

  - Can we have structure variable inside another structure? - Yes

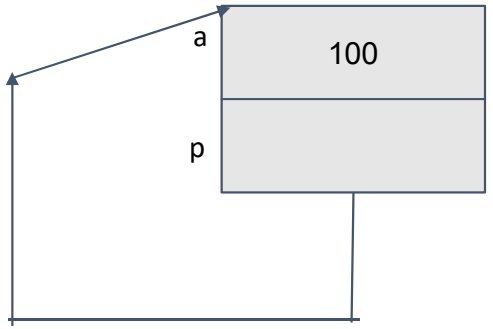
  - Can we have structure variable inside the same structure ? – No

    Solution is: Have a pointer of same type inside the structure

Self Referential Structures

- A structure which has a pointer to itself as a data member

```
struct node
{
        int a;
        struct node *p;
} ; // defines a type struct node
// memory not allocated for type declaration
```



- Variable declaration to allocate memory and assigning values to data members

```
struct node s;    s.a = 100;          s.p = &s;
```

List

Characteristics

- A data structure which consists of zero or more nodes.
- Every node is composed of two fields: data/component field and a pointer field
- The pointer field of every node points to the next node in the sequence
- Accessing the the nodes is always one after the other. There is no way to access the node directly as random access is not possible in linked list. Lists have sequential access
- Insertion and deletion in a list at a given position requires no shifting of element

Operations on List

- Insertion
- Deletion
- Search
- Display
- Merge
- Concatenate
- ..

Pictorial Representation

- Structure definition of a node

```
struct node {
        int info; // component field
        struct node *link; // pointer field
};
typedef struct node NODE_T;
```

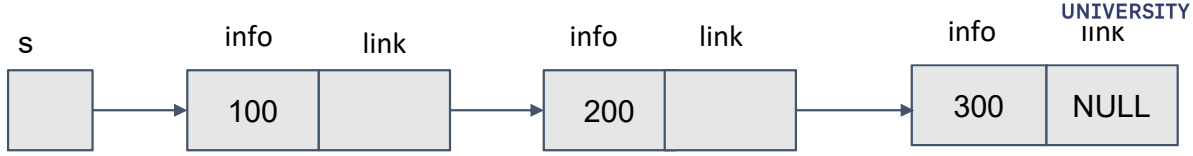


Fig1: Linked list Representation

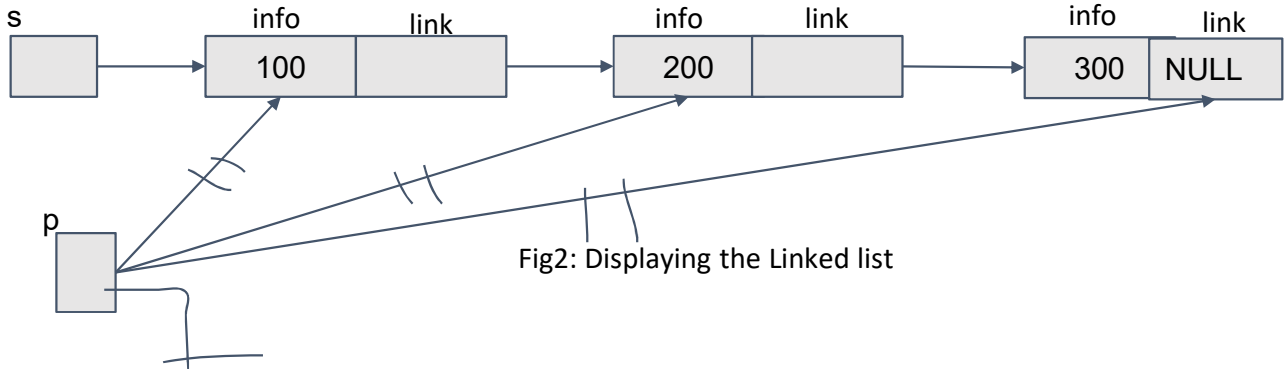


Fig2: Displaying the Linked list

- Demo of C code to create, display and free the list shown in pictorial representation

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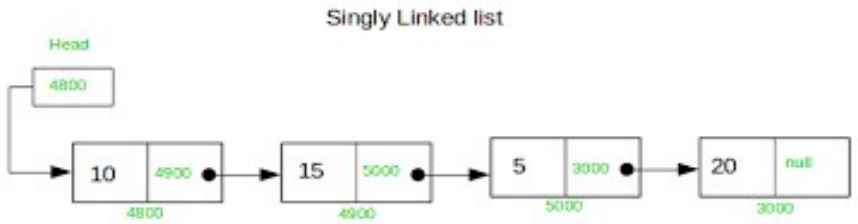
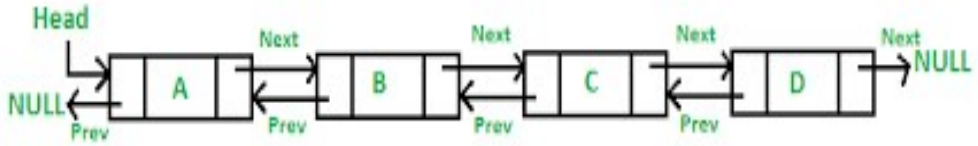
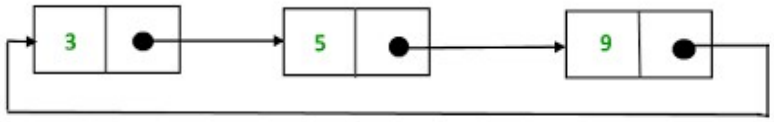
Different Types

- Singly Linked List
- Doubly Linked List
- Circular Linked List







Applications

- Implementation of Stacks & Queues
- Implementation of Graphs
- Maintaining dictionary
- Gaming
- Evaluation of Arithmetic Expression

THANK YOU

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