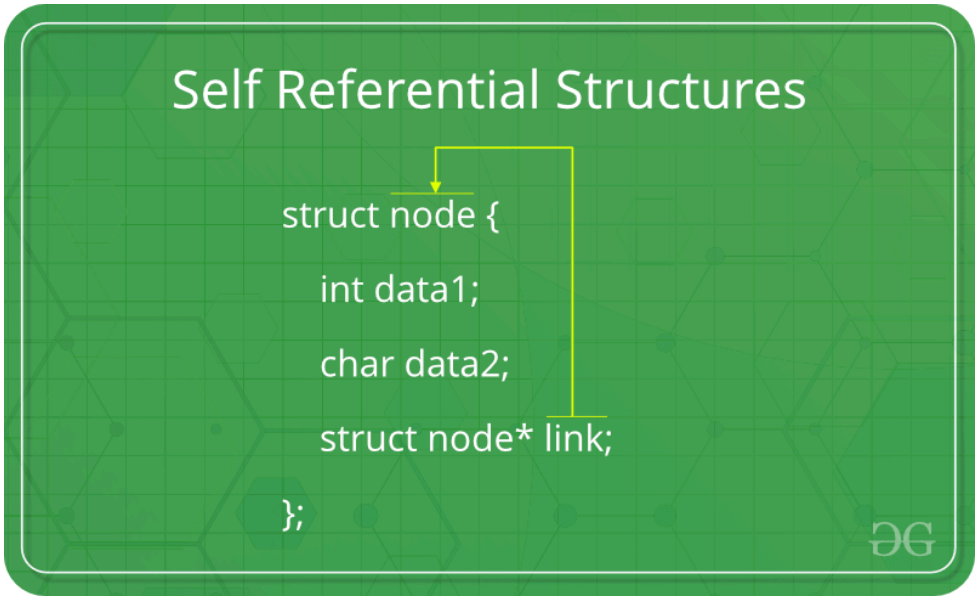
Self Referential Structures

Last Updated : 11 Jul, 2025

Self Referential structures are those structures that have one or more pointers which point to the same type of structure, as their member.



In other words, structures pointing to the same type of structures are self-referential in nature

Example:

CPP Java Python JavaScript

```cpp
struct node {
    int data1;
    char data2;
    struct node* link;
};

int main()
{
    struct node ob;
```

```
11  }
```

```
No Output
```

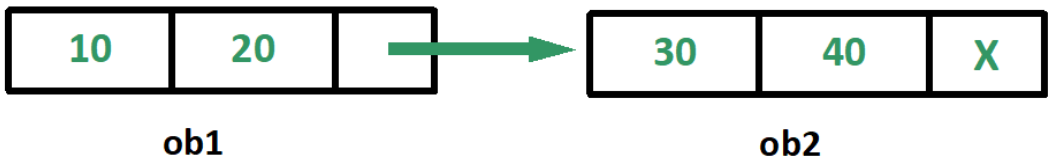
Output

In the above example 'link' is a pointer to a structure of type 'node'. Hence, the structure 'node' is a self-referential structure with 'link' as the referencing pointer.
An important point to consider is that the pointer should be initialized properly before accessing, as by default it contains garbage value.

Types of Self Referential Structures

1. Self Referential Structure with Single Link
2. Self Referential Structure with Multiple Links

Self Referential Structure with Single Link: These structures can have only one self-pointer as their member. The following example will show us how to connect the objects of a self-referential structure with the single link and access the corresponding data members. The connection formed is shown in the following figure.



Implementation:

C++ Java Python C# JavaScript

```
#include <stdio.h>
```

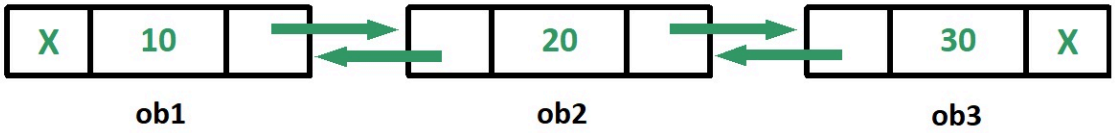
```
    char data2;
    struct node* link;
};

int main()
{
    struct node ob1; // Node1

    // Initialization
    ob1.link = NULL;
    ob1.data1 = 10;
    ob1.data2 = 20;

    struct node ob2; // Node2

    // Initialization
    ob2.link = NULL;
    ob2.data1 = 30;
    ob2.data2 = 40;

    // Linking ob1 and ob2
    ob1.link = &ob2;

    // Accessing data members of  ob2 using ob1
    printf("%d", ob1.link->data1);
    printf("\n%d", ob1.link->data2);
    return 0;
}
```

Output

```
30
40
```

Self Referential Structure with Multiple Links: Self referential structures with multiple links can have more than one self-pointers. Many complicated data structures can be easily constructed using these structures. Such structures can easily connect to more than one nodes at

the following figure.



Implementation:

CPP Java Python JavaScript

```cpp
#include <stdio.h>

struct node {
    int data;
    struct node* prev_link;
    struct node* next_link;
};

int main()
{
    struct node ob1; // Node1

    // Initialization
    ob1.prev_link = NULL;
    ob1.next_link = NULL;
    ob1.data = 10;

    struct node ob2; // Node2

    // Initialization
    ob2.prev_link = NULL;
    ob2.next_link = NULL;
    ob2.data = 20;

    struct node ob3; // Node3

    // Initialization
    ob3.prev_link = NULL;
```

```
    // Forward links
    ob1.next_link = &ob2;
    ob2.next_link = &ob3;

    // Backward links
    ob2.prev_link = &ob1;
    ob3.prev_link = &ob2;

    // Accessing  data of ob1, ob2 and ob3 by ob1
    printf("%d\t", ob1.data);
    printf("%d\t", ob1.next_link->data);
    printf("%d\n", ob1.next_link->next_link->data);

    // Accessing data of ob1, ob2 and ob3 by ob2
    printf("%d\t", ob2.prev_link->data);
    printf("%d\t", ob2.data);
    printf("%d\n", ob2.next_link->data);

    // Accessing data of ob1, ob2 and ob3 by ob3
    printf("%d\t", ob3.prev_link->prev_link->data);
    printf("%d\t", ob3.prev_link->data);
    printf("%d", ob3.data);
    return 0;
}
```

Output

```
10    20    30
10    20    30
10    20    30
```

In the above example we can see that 'ob1', 'ob2' and 'ob3' are three objects of the self referential structure 'node'. And they are connected using their links in such a way that any of them can easily access each other's data. This is the beauty of the self referential structures. The connections can be manipulated according to the requirements of the programmer.

- Stacks
- Queues
- Trees
- Graphs etc.

Comment More info

Campus Training Program