Example of Java class

```
class LinkedList {
    Node head; // head of list

    /* Linked list Node*/
    class Node {
        int data;
        Node next;

        // Constructor to create a new node
        // Next is by default initialized
        // as null
        Node(int d) { data = d; }
    }
}
```

A Java class has multiple members and member functions

Creating composite data types in C

- C programming language does not have ‘class’
- Note: C++ supports OOP
- In C language, we can create user-defined composite data types as **structures**.

Structures in C

- A structure is a user defined composite data type in C
- A structure is used to group items of possibly different types into a single type
- Unlike Java/C++ classes, structures do not have member functions.
- Syntax is

```
struct tag_name {
   T1 member1;
   T2 member2;
   /* declare as many members as desired,
      but the entire structure size must be
      known to the compiler. */
};
```

Example1: Points with x and y coordinates

- A point has two coordinates: ‘x’ and ‘y’

- In C we can create a new data-type ‘Point’ as

```
struct Point
{
   int x, y;
};
```

- Objects of type ‘Point’ can be created as

```
int main()
{
   struct Point p1; // p1 is an object of type Point
}
```

Example1: Points with x and y coordinates

- There is a shortcut for ‘struct Point p1’

```
typedef struct Point
{
   int x, y;
} Point;
```

add **typedef** before struct

- Now, objects of type ‘Point’ can be created as

```
int main()
{
    Point p1; // p1 is an object of type Point
}
```

Accessing the members of a structure

- Structure members are accessed using dot (.) operator.

```
Point p1;
// For p1(2,3)
 p1.x = 2;
 p1.y = 3;
```

Pointer to a structure object

- We can create pointers to point to structure objects.

- If we have a pointer to structure, members are accessed using arrow (->) operator. s→x is a shortcut for (*s).x

- Example: Lists

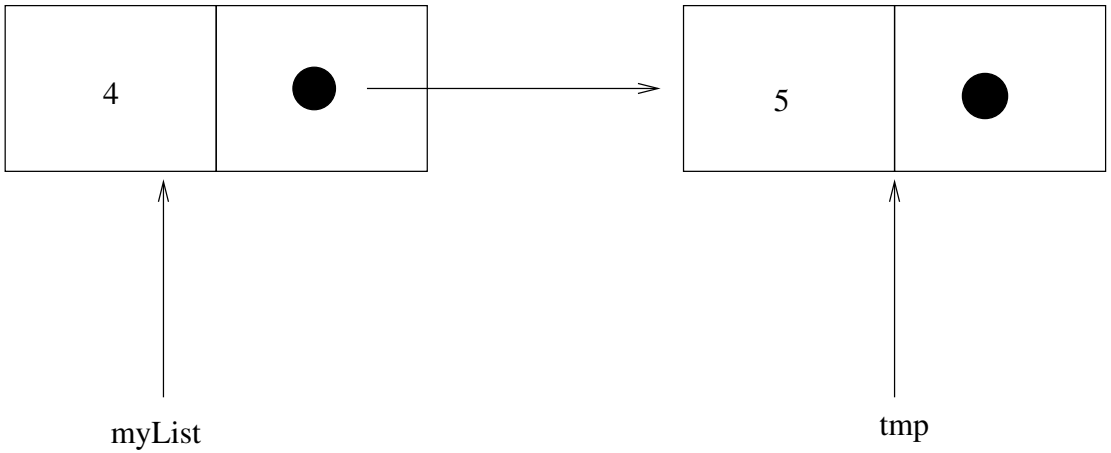
```
struct list_t {
  int elem;
  struct list *next;
}

struct list_t *myList;
myList = malloc(sizeof(struct list_t));  // allocate memory
myList→elem = 4;
myList→next = NULL;
```

Memory layout of a list

Example code:

```
myList = malloc(sizeof (struct list_t));
myList→elem = 4;
tmp = malloc(sizeof (struct list_t));
tmp→elem = 5;
myList→next = tmp;
tmp→next = NULL; // indicates end of list
```

Memory layout looks like



When debugging codes with pointers, such diagrams are important