Programming with C and C++

CSC-101 (Lecture 25)

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Function Pointers

```
1   #include<stdio.h>
2   int *larger(int *, int *);
3
4   int main() {
5       int a = 10, b = 15;
6       int *greater;
7       // passing address of variables to function
8       greater = larger(&a, &b);
9       printf("Larger value = %d", *greater);
10      return 0;
11  }
12
```

https://ideone.com/6TUUGe

Function Pointers

```
13  int *larger(int *a, int *b) {
14      if (*a > *b) {
15          return a;
16      }
17      // returning address of greater value
18      return b;
19  }
20
```

stdout

```
Larger value = 15
```

Function Pointers

```c
#include <stdio.h>

int *arraymanip()
{
  static int arr[7];
  printf("Enter the elements in an array : ");
  for(int i=0;i<7;i++)
  {
      scanf("%d",&arr[i]);
  }
  for(int i=0;i<7;i++)
  {
      arr[i]*=2;
  }
  return arr;
}

```

https://ideone.com/5EHf3J

```c
int main()
{
   int *ptr;
   ptr=arraymanip();
   printf("\nThe manipulated elements are :");
   for(int i=0;i<7;i++)
   {
      printf("%d ", ptr[i]);
   }
}
```

stdin

```
1 2 3 4 5 6 7
```

stdout

```
Enter the elements in an array :
The manipulated elements are :2 4 6 8 10 12 14
```

Structures in C

- Structure is another user defined data type available in C that allows to combine data items of different kinds.

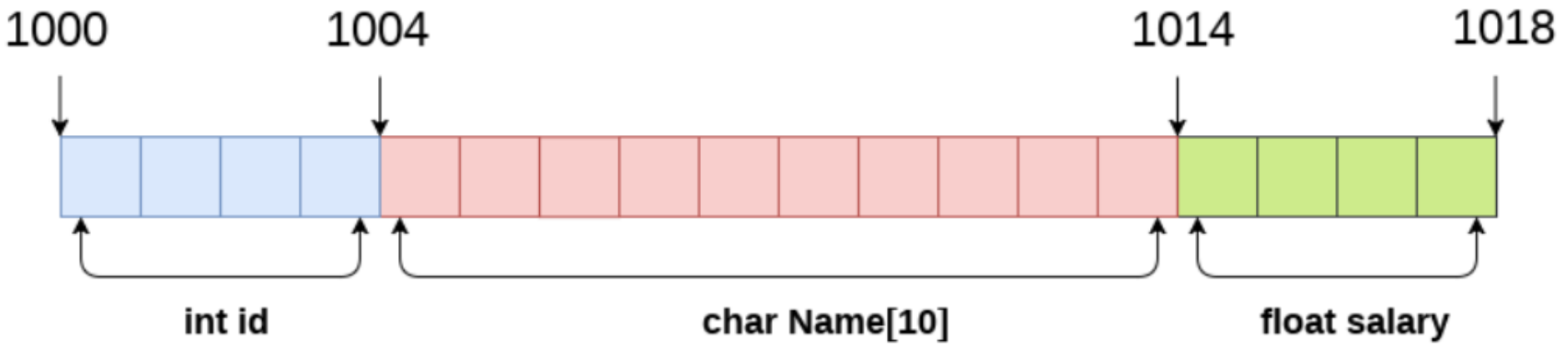
```
struct [structure tag] {

   member definition;
   member definition;
   ...
   member definition;
} [one or more structure variables];
```

Example 1

```
struct Books {
    char  title[50];
    char  author[50];
    char  subject[100];
    int   book_id;
} book;
```

Example 2

```
struct employee
{    int id;
     char name[10];
     float salary;
};
```



Declaring structure variables

- There are two ways to declare structure variable:
  - By **`struct`** keyword within **`main()`** function
  - By declaring a variable at the time of defining the structure.

1.
```
struct employee
{    int id;
     char name[50];
     float salary;
};
```

Now write given code inside the **`main()`** function.

```
struct employee e1, e2;
```

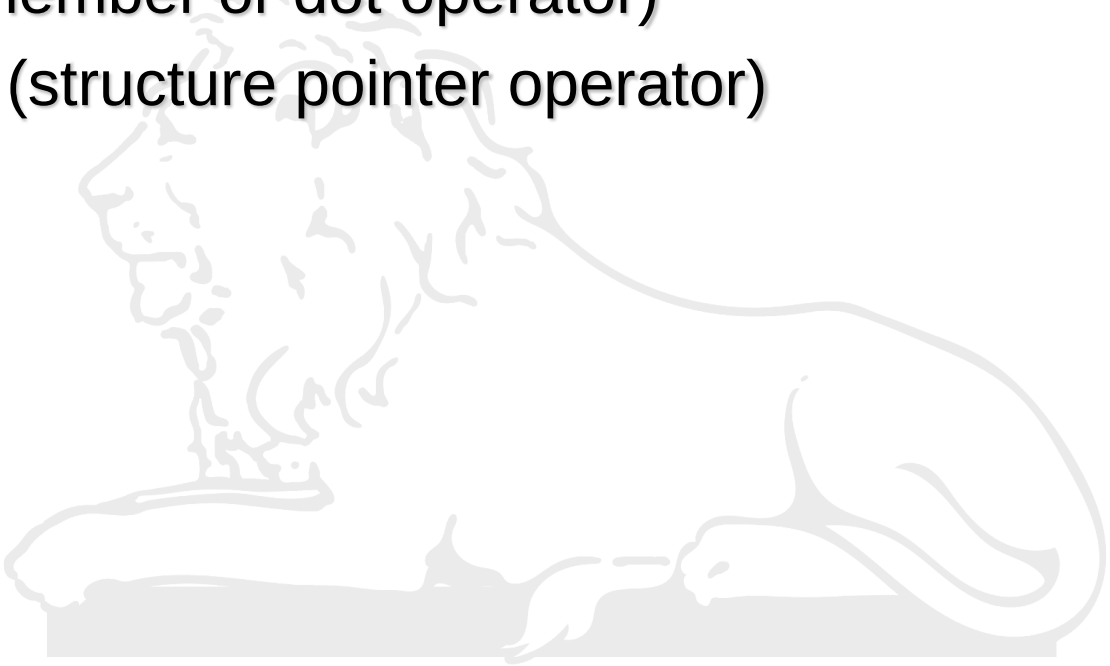
Declaring structure variables

```
2. struct employee
     {    int id;
          char name[50];
          float salary;
     } e1,e2;
```

- If number of variables are not fixed, use the 1st approach. It provides you the flexibility to declare the structure variable many times.
- If number of variables are fixed, use 2nd approach. It saves your code to declare a variable in **`main()`** function.

Accessing members of the structure

- There are two ways to access structure members:
  - By . (member or dot operator)
  - By --> (structure pointer operator)



Structures in C

```
1   #include<stdio.h>
2   #include <string.h>
3
4   struct employee
5   {    int id;
6        char name[50];
7   } e1;  //declaring e1 variable for structure
8
```

https://ideone.com/y7p3H5

```
 9  int main( )
10  {
11     //store first employee information
12     e1.id=1;
13     strcpy(e1.name, "KL Rahul");//copying string into char array
14     //printing first employee information
15     printf( "employee 1 id : %d\n", e1.id);
16     printf( "employee 1 name : %s\n", e1.name);
17  return 0;
18  }
19
```

```
Success #stdin #stdout 0s 5412KB
employee 1 id : 1
employee 1 name : KL Rahul
```

Size of struct variable

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

struct employee
{    int id;
     char name[50];
     float salary;
} e1;  //declaring e1 variable for structure

int main( )
{
   printf( "Size of the structure employee: %d\n", sizeof(e1));

return 0;
}
```

https://ideone.com/LuJxAi

```
Success #stdin #stdout 0.01s 5460KB
Size of the structure employee: 60
```

- Why does the structure's area differ from each member's?

  - The size of a structure is not always equal to the sum of the sizes of its members.
  - Compilers may add padding between members to ensure that they are aligned properly in memory.
  - Alignment requirements can vary depending on the CPU architecture and compiler options.
  - The amount of padding between members can affect the structure's size.

Thank You!