SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME : 23CST101 C PROGRAMMING AND DATA STRUCTURES

I YEAR / II SEMESTER

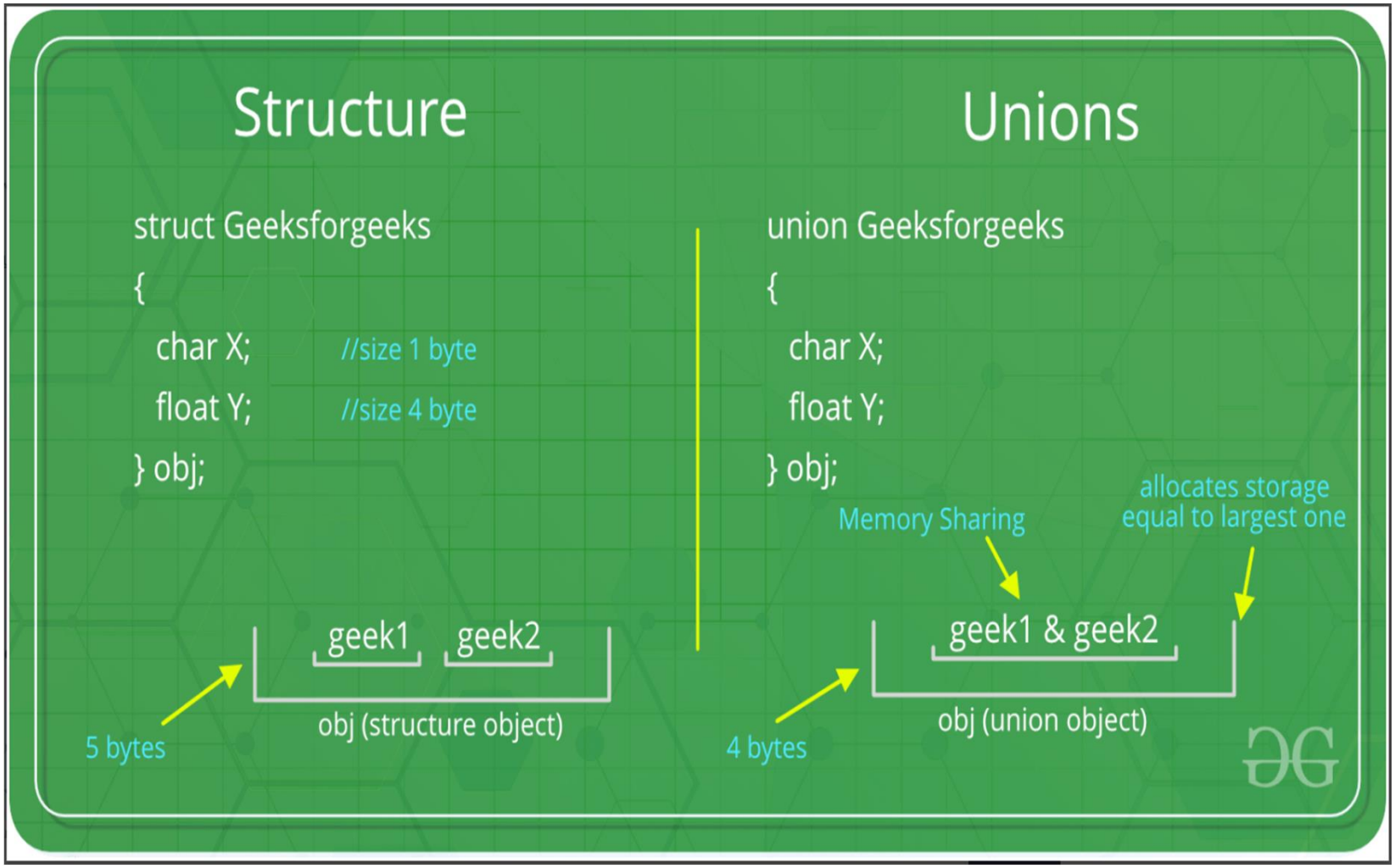
Unit 2- C PROGRAMMING ADVANCED FEATURES

Topic 2: Union

Brain Storming

1. What is union?

Union

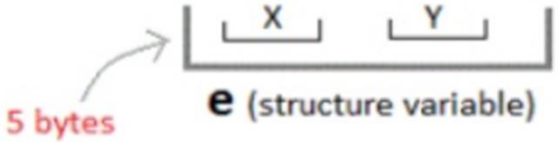

Structure
struct Geeksforgeeks
{
char X; //size 1 byte
float Y; //size 4 byte
} obj;
geek1 geek2
obj (structure object)
5 bytes
Unions
union Geeksforgeeks
{
char X;
float Y;
} obj;
Memory Sharing
allocates storage equal to largest one
geek1 & geek2
obj (union object)
4 bytes

Conti...

EXAMPLE
UNION Vs STRUCTURE

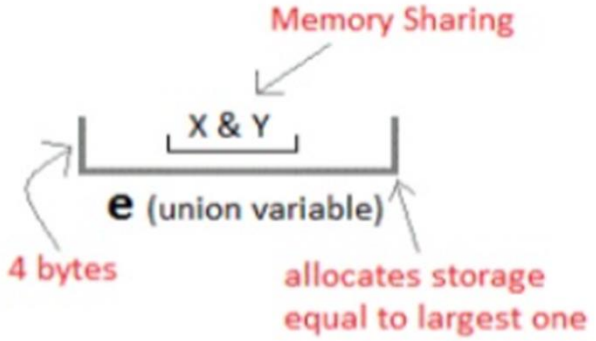
Structure

```
struct Emp
{
 char X ;     // size 1 byte
 float Y ;    // size 4 byte
} e ;
```



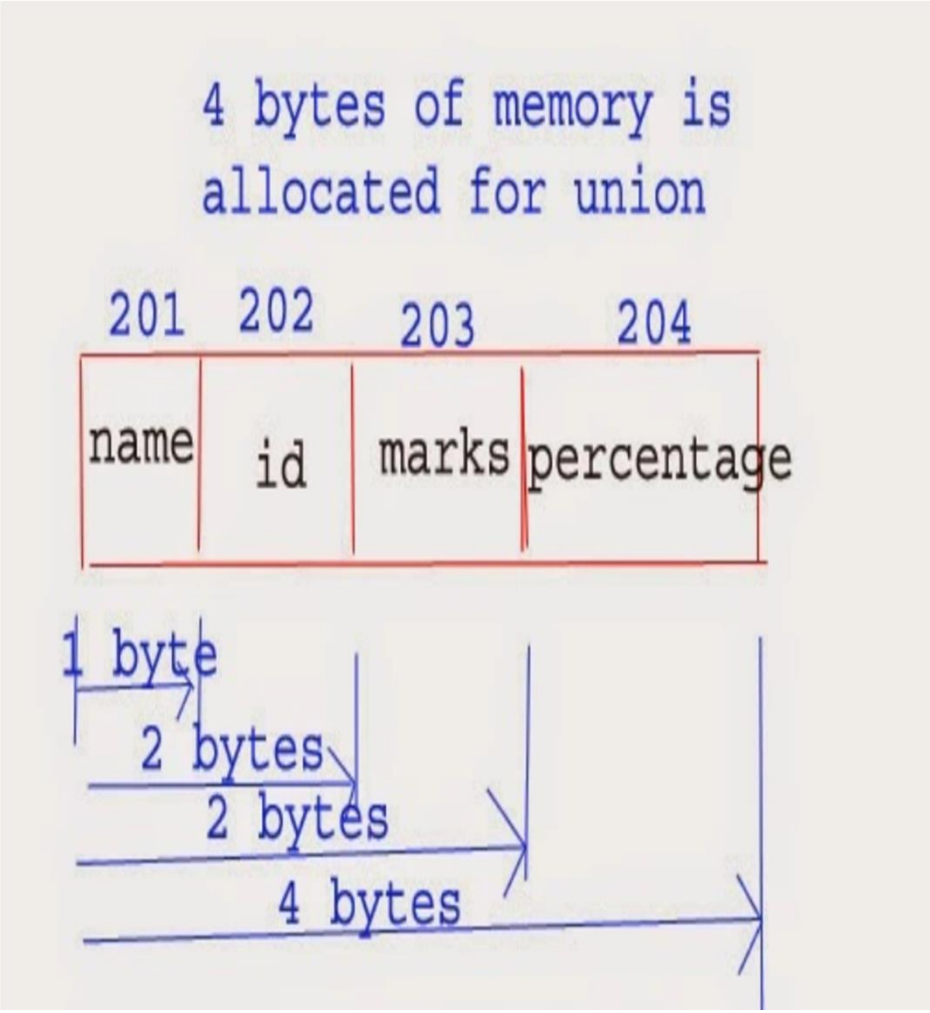
Unions

```
union Emp
{
 char X ;
 float Y ;
} e ;
```



Output

```
union student
 {
 char name[];
int id;
int marks;
float percentage;
}std;
```



Conti...

A **union** is a special data type available in C that allows to store different data types in the same memory location. You can define a union with many members, but only one member can contain a value at any given time. Unions provide an efficient way of using the same memory location for multiple-purpose.

Defining a Union

To define a union, you must use the **union** statement in the same way as you did while defining a structure. The union statement defines a new data type with more than one member for your program.

The highest union member size is the size of the union

Example- How to declare Union members

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

union Data {
   int i;
   float f;
   char str[20];
};

int main( ) {

   union Data data;

   data.i = 10;
   printf( "data.i : %d\n", data.i);

   data.f = 220.5;
   printf( "data.f : %f\n", data.f);

   strcpy( data.str, "C Programming");
   printf( "data.str : %s\n", data.str);

   return 0;
}
```

OUTPUT

When the above code is compiled and executed, it produces the following result –

```
data.i : 10
data.f : 220.500000
data.str : C Programming
```

Here, all the members are getting printed very well because one member is being used at a time.

Example- Don'ts

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

union Data {
   int i;
   float f;
   char str[20];
};

int main( ) {

   union Data data;

   data.i = 10;
   data.f = 220.5;
   strcpy( data.str, "C Programming");

   printf( "data.i : %d\n", data.i);
   printf( "data.f : %f\n", data.f);
   printf( "data.str : %s\n", data.str);

   return 0;
}
```

Output

When the above code is compiled and executed, it produces the following result –

```
data.i : 1917853763
data.f : 4122360580327794860452759994368.000000
data.str : C Programming
```

Here, we can see that the values of **i** and **f** members of union got corrupted because the final value assigned to the variable has occupied the memory location and this is the reason that the value of **str** member is getting printed very well.

Accessing Nested Structure

	STRUCTURE	UNION
Keyword	The keyword **struct** is used to define a structure	The keyword **union** is used to define a union.
Size	When a variable is associated with a structure, the compiler allocates the memory for each member. The size of structure is **greater than or equal to the sum of sizes of its members.**	when a variable is associated with a union, the compiler allocates the memory by considering the size of the largest memory. So, size of **union is equal to the size of largest member.**
Memory	Each member within a structure is assigned unique storage area of location.	Memory allocated is shared by individual members of union.
Value Altering	Altering the value of a member will not affect other members of the structure.	Altering the value of any of the member will alter other member values.
Accessing members	Individual member can be accessed at a time.	Only one member can be accessed at a time.
Initialization of Members	Several members of a structure can initialize at once.	Only the first member of a union can be initialized.

Assessment 1

1. What is union?

Ans : _____

2. Differentiate structure and union.

Ans : _____

References

1. Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2016

Thank You