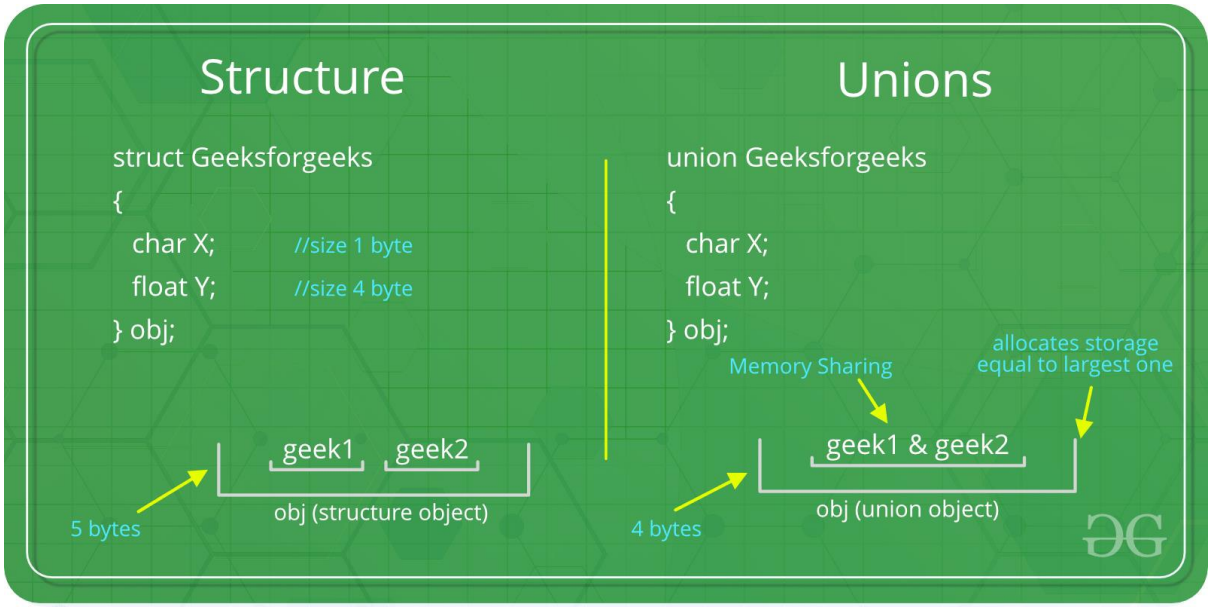
UNIONS :



->union is a user defined data type. In union, all members share the same memory location.

->" UNION " key word is used to define unions.

->We use the "." operator to access members of a union. And to access pointer variables, we use the "->" operator.

Ex:

union car

{

char name[50];

int price;

};

int main()

{

union car car1, car2, *car3;

return 0;

}

-> To access price for car1, car1.price is used.

-> To access price using car3, either (*car3).price or car3->price can be used.

EX:

```
 #include <stdio.h>

// Declaration of union is same as structures
union test {
        int x, y;
};

int main()
{
        // A union variable t
        union test t;

        t.x = 2; // t.y also gets value 2
        printf("After making x = 2:\n x = %d, y = %d\n\n",
                t.x, t.y);

        t.y = 10; // t.x is also updated to 10
        printf("After making y = 10:\n x = %d, y = %d\n\n",
                t.x, t.y);
        return 0;
}
```

OUTPUT:

```
After making x = 2:
 x = 2, y = 2

After making y = 10:
 x = 10, y = 10
```

How is the size of union decided by compiler?

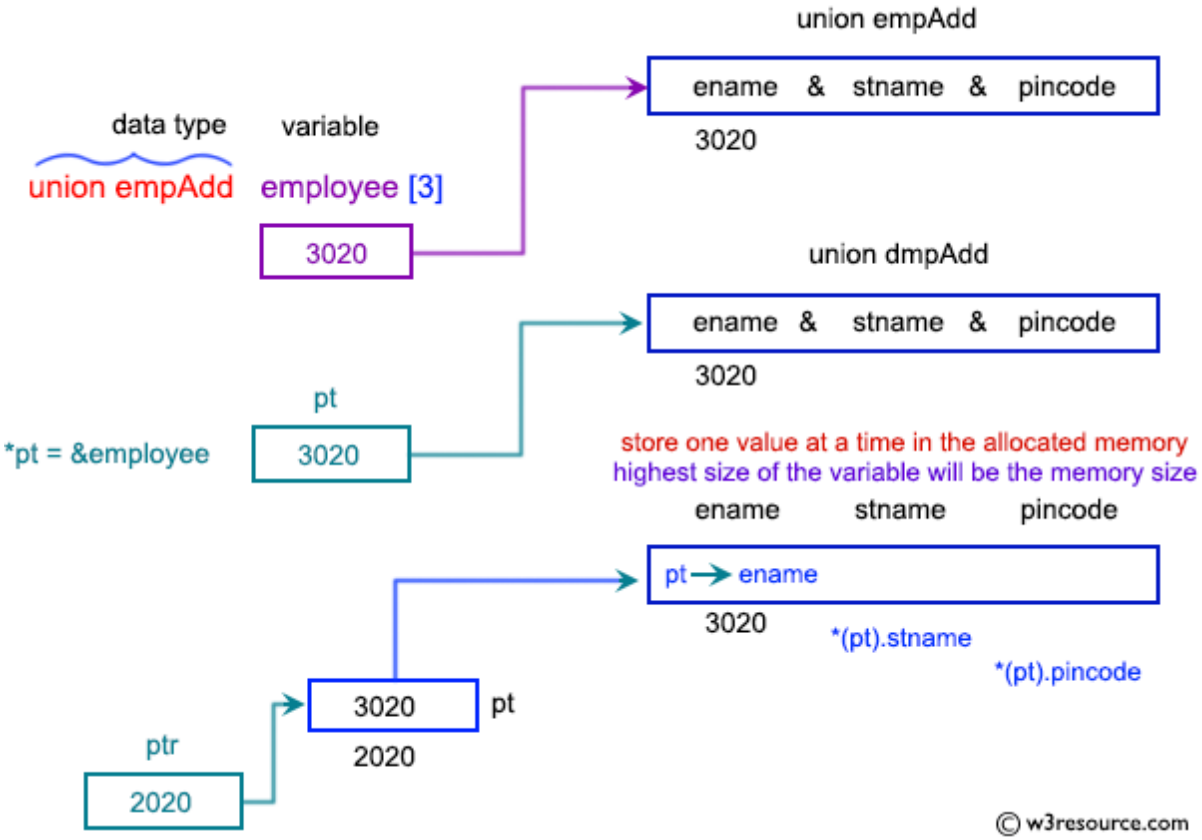
->Size of a union is taken according the size of largest member in union.

EX:

```
    #include <stdio.h>


union test1 {
        int x;
        int y;
} Test1;

union test2 {
        int x;
        char y;
} Test2;

union test3 {
        int arr[10];
        char y;
} Test3;

int main()
{
        printf("sizeof(test1) = %lu, sizeof(test2) = %lu, "
                "sizeof(test3) = %lu",
                sizeof(Test1),
                sizeof(Test2), sizeof(Test3));
        return 0;
}
```

OUTPUT : sizeof(test1) = 4, sizeof(test2) = 4, sizeof(test3) = 40

Pointers to unions?



->Like structures, we can have pointers to unions and can access members using the arrow operator (->). The following example demonstrates the same.

EX:

```
 #include <stdio.h>


union test {
        int x;
        char y;
};


int main()
```

```
{
        union test p1;
        p1.x = 65;

        // p2 is a pointer to union p1
        union test* p2 = &p1;

        // Accessing union members using pointer
        printf("%d %c", p2->x, p2->y);
        return 0;
}
```

OUTPUT: 65 A

What are the applications of the unions ?

Unions can be useful in many situations where we want to use the same memory for two or more members. For example, suppose we want to implement a binary tree data structure where each leaf node has a double data value, while each internal node has pointers to two children, but no data. If we declare this as:

```
struct NODE {
    struct NODE* left;
    struct NODE* right;
    double data;
};
```

then every node requires 16 bytes, with half the bytes wasted for each type of node. On the other hand, if we declare a node as following, then we can save space.

Ex:

```
struct NODE {
        bool is_leaf;
        union {
                struct
```

```
        {
            struct NODE* left;
            struct NODE* right;
        } internal;
        double data;
    } info;
};
```