Operator sizeof in C++

The sizeof operator is a unary compile-time operator used to determine the size of variables, data types, and constants in bytes at compile time. It can also determine the size of classes, structures, and unions.

Syntax:

> sizeof (data type)
>
> or
>
> sizeof (expression)

▼ Example 1: Number of bytes taken by different data types.

Below is the C++ program to implement sizeof operator to determine the number of bytes taken by different data types:

```
// C++ program to implement sizeof
// to determine the number of bytes
// taken by different data types
#include <bits/stdc++.h>
using namespace std;

// Driver codeint main()
{
  cout << "No of Bytes taken up by char is " <<
          sizeof(char) << endl;
  cout << "No of Bytes taken up by int is " <<
```

```
            sizeof(int) << endl;
  cout << "No of Bytes taken up by float is " <<
            sizeof(float) << endl;
  cout << "No of Bytes taken up by double is " <<
            sizeof(double) << endl;
  cout << "No of Bytes taken up by long is " <<
            sizeof(long) << endl;
}
```

Output

```
No of Bytes taken up by char is 1
No of Bytes taken up by int is 4
No of Bytes taken up by float is 4
No of Bytes taken up by double is 8
No of Bytes taken up by long is 8
```

▼ Example 2: Number of bytes taken by variables of different data types.

Below is the C++ program to implement sizeof to determine the number of bytes taken by variables of different data types:

```
// C++ program to implement sizeof
// to determine the number of bytes
// taken by variables of different
// data types
#include <bits/stdc++.h>
using namespace std;

// Driver codeint main()
{
  int a;
  float b;
  char g;
  cout << "No of Bytes taken up by a is " <<
            sizeof(a) << endl;
  cout << "No of Bytes taken up by b is " <<
            sizeof(b) << endl;
  cout << "No of Bytes taken up by g is " <<
            sizeof(g) << endl;
```

```
  return 0;
}
```

Output

```
No of Bytes taken up by a is 4
No of Bytes taken up by b is 4
No of Bytes taken up by g is 1
```

▼ Example 3: Number of bytes taken by an expression.

Below is the C++ program to implement sizeof to determine the number of bytes taken by an expression:

```
// C++ program to implement sizeof
// to determine the number of bytes
// taken by an expression:
#include <bits/stdc++.h>
using namespace std;

// Driver codeint main()
{
  int a = 5;
  long x = 9;
  double p = 10.2;
  float g = 2.5;

  cout << "No of Bytes taken up by (a+g) is " <<
          sizeof(a + g) << endl;
  cout << "No of Bytes taken up by (a+x) is " <<
          sizeof(a + x) << endl;
  cout << "No of Bytes taken up by (a+p) is " <<
          sizeof(a + p) << endl;
  cout << "No of Bytes taken up by (x+p) is " <<
          sizeof(x + p) << endl;
  return 0;
}
```

Output

```
No of Bytes taken up by (a+g) is 4
```

```
No of Bytes taken up by (a+x) is 8
No of Bytes taken up by (a+p) is 8
No of Bytes taken up by (x+p) is 8
```

▼ Example 4: Find the size of an array using sizeof( ).

Below is the C++ program to implement sizeof to determine the size of an array:

```
// C++ program to implement sizeof
// to determine the size of an array
#include <bits/stdc++.h>
using namespace std;

// Driver codeint main()
{
  int x[] = {1, 2, 3, 5, 6, 7, 8, 9};
  int length = sizeof(x) / sizeof(x[0]);
  cout << "Length of the array is " <<
           length << endl;
  return 0;
}
```

Output

```
Length of the array is 8
```

▼ Example 5: Find the size of class.

Below is the C++ program to implement sizeof to find the size of the class:

```
// C++ program to implement sizeof
// to find the size of the class
#include <bits/stdc++.h>
using namespace std;

class GFG{
  int x;
};

// Driver codeint main()
{
  GFG g;
```

```
  cout << "Size of class gfg is in bytes  : " <<
          sizeof(g) << endl;
  return 0;
}
```

Output

```
Size of class gfg is in bytes  : 4
```

▼ Example 6: Find the size of pointers.

Below is the C++ program to implement sizeof to find the size of pointers:

```
// C++ program to implement sizeof
// to find the size of pointers
#include <bits/stdc++.h>
using namespace std;

// Driver codeint main()
{
  int *a = new int(10);
  char *g = new char('g');
  double *d = new double(7.5);
  cout << "size of pointer a is " <<
          sizeof(a) << endl;
  cout << "size of pointer *a is " <<
          sizeof(*a) << endl;
  cout << "size of pointer g is " <<
          sizeof(g) << endl;
  cout << "size of pointer *g is " <<
          sizeof(*g) << endl;
  cout << "size of pointer d is " <<
          sizeof(d) << endl;
  cout << "size of pointer *d is " <<
          sizeof(*d) << endl;
  return 0;
}
```

Output

```
size of pointer a is 8
```

```
size of pointer *a is 4
size of pointer g is 8
size of pointer *g is 1
size of pointer d is 8
size of pointer *d is 8
```

▼ Example 7: Nesting of sizeof( ) operator.

Below is the C++ program to show the nesting of sizeof operator:

```
// C++ program to show the
// nesting of sizeof operator
#include <bits/stdc++.h>
using namespace std;

// Driver codeint main()
{
  int x;
  double y;
  cout << "Nesting of sizeof operator is implemented " <<
          "as sizeof(x*sizeof(y)) :" <<
           sizeof(x * sizeof(y)) << endl;
  return 0;
}
```

Output

```
Nesting of sizeof operator is implemented as sizeof(x*sizeof(y)) :8
```

▼ Example 8: Find the size of the structure.

Below is the C++ program to implement the sizeof operator to find the size of the structure:

```
// C++ program to implement the
// sizeof operator to find the
// size of structure
#include <bits/stdc++.h>
using namespace std;

struct gfg{
  int z;
  float d;
```

```
  char s[20];
}g;

// Driver codeint main()
{
  cout << "size of structure is " <<
          sizeof(g) << endl;
  return 0;
}
```

Output

```
size of structure is 28
```

▼ Example 9: Find the size of the union.

Below is the C++ program to implement the sizeof operator to find the size of the union:

```
// C++ program to implement the
// sizeof operator to find the
// size of the union
#include <bits/stdc++.h>
using namespace std;

union gfg{
  int z;
  double d;
}g;

// Driver codeint main()
{
  cout << "size of union is " <<
          sizeof(g) << endl;
  return 0;
}
```

Output

```
size of union is 8
```