while Loop

Example – `while` Loop

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

input:

```cpp
// Input
unsigned int input;
std::cin >> input;
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input:

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unsigned int input;
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// Determine number of bits
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    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

Input:

6

input: 6

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
input:    6
nbits:    0
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
input:    6
nbits:    0
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}


// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
// Input
unsigned int input;
std::cin ...
unsigned       ...   0;

// Determine ... of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

input: 6
nbits: 0

6 != 0

true

Example – `while` Loop

input: 3
nbits: 0

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
input:    3
nbits:    1
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
input:    3
nbits:    1
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

input: 3
nbits: 1

```
// Input
unsigned int input;
std::cin          3 != 0
unsigned                    0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

3 != 0

true

Example – `while` Loop

```
input:    1
nbits:    1
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
input:    1
nbits:    2
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
input:    1
nbits:    2
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

```
input:   1
nbits:   2
```

```cpp
// Input
unsigned int input;
std::cin      1 != 0
unsigned              0;
                   true
// Determine        of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}


// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

```
input:    0
nbits:    2
```

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

Example – `while` Loop

input: 0
nbits: 3

```cpp
// Input
unsigned int input;
std::cin >> input;
unsigned int nbits = 0;

// Determine number of bits
while (input != 0) {
    input /= 2;
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Example – `while` Loop

```
// Input
unsigned int input;
std::cin ...
unsigned ...        0;

// Determine ... of bits
while (input != 0) {
    input /= 2;
    ++nbits;
}

// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

input: 0
nbits: 3

0 != 0

false

Example – `while` Loop

```
input:    0
nbits:    3
```

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// Determine number of bits
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// Output
std::cout << "Number of bits: "
          << nbits << "\n";
```

```
input:    0
nbits:    3
```

Output:

Number of bits: 3