

Lesson 6

Fundamental Data Types — Integer (Part 1)

• Size of Integer

1 byte = 8 bits

2 bytes = 16 bits

4 bytes = 32 bits

more the size, more content it can hold

Wanna Know Size Programmatically

use " sizeof " operator (使用 sizeof 运算符)

Note: sizeof is a unary operator and not a function (sizeof 是运算符而不是函数)

```
#include <stdio.h>

int main(){
    printf("%d",sizeof(int));
    return 0;
}
//output: 4 or 2 (different machines get different results)
```

• Range

range: upper and lower limit of some set of data (范围是一组数据的上限和下限)

prerequisites(先决条件):

Decimal number system: Human Understandable number system.

Also called as base 10 number system.

range: 0 to 9

Binary number system: Machine Understandable number system.

Also called as base 2 number system.

range: 0 to 1

Range of 4 Bit Data

4 bit data: $\begin{matrix} & 3 & 2 & 1 & 0 \\ & 2^3 & 2^2 & 2^1 & 2^0 \end{matrix}$
0 0 0 0 Minimum Value = 0

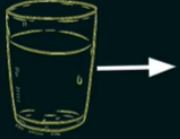
1 1 1 1 Maximum Value = 15

Range of 4 bit data: 0 0 0 0 to 1 1 1 1
0 to 15

range of 4 bit data: 0000 (0) to 1111 (15)

Formula: $2^n - 1$

Range of Integer

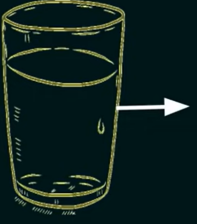
 →

2 bytes
[16 bits]

Unsigned range: 0 to 65535 (by applying: $2^n - 1$)

Signed range: -32768 to +32767

2's complement range: $-(2^{n-1})$ to $+(2^{n-1} - 1)$

 →

4 bytes
[32 bits]

Unsigned range: 0 to 4294967295 (by applying: $2^n - 1$)

Signed range: -2147483648 to +2147483647