7. Recursion; Data Types

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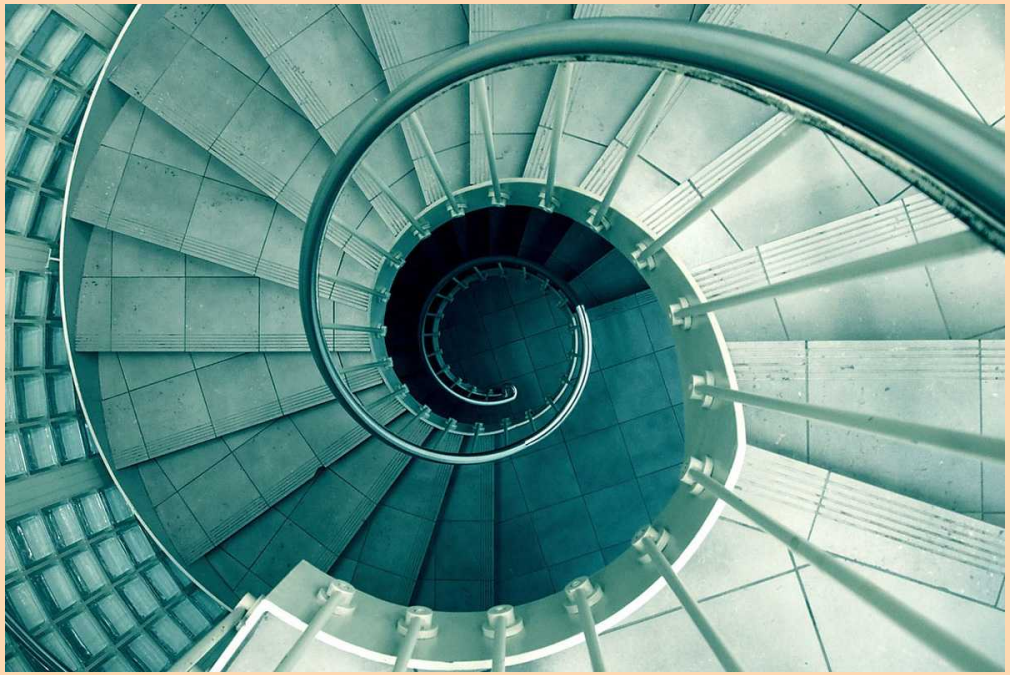
Review

Recursive Functions (Recursion)



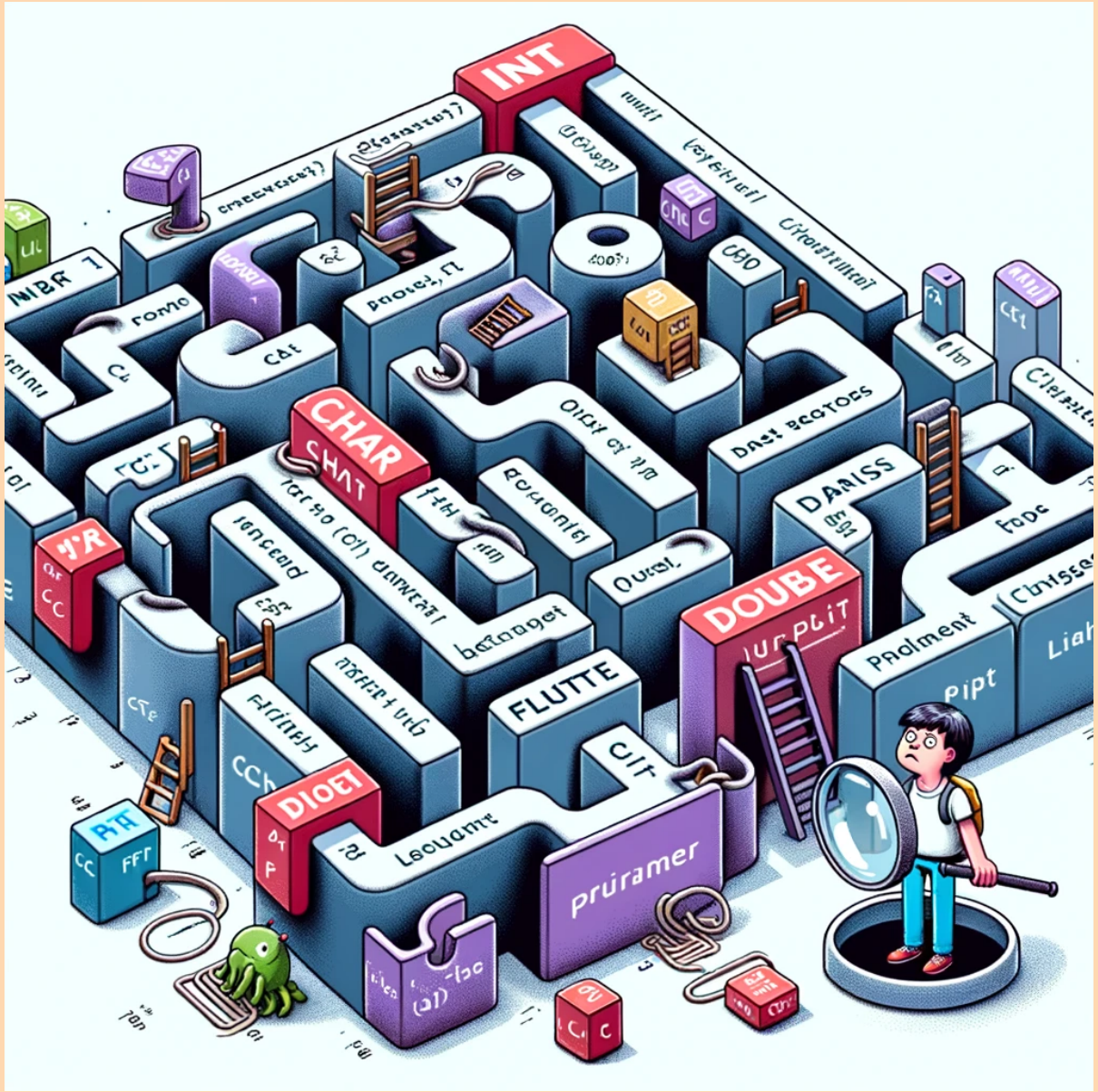
Overview

Recursion (mergesort.c)

(Basic) Data Types

TI **You**

C 语言中的基本数据类型多种多样，用法也非常复杂，到处都是陷阱，一不小心代码就会出错。请以此为主题，创作一幅图片。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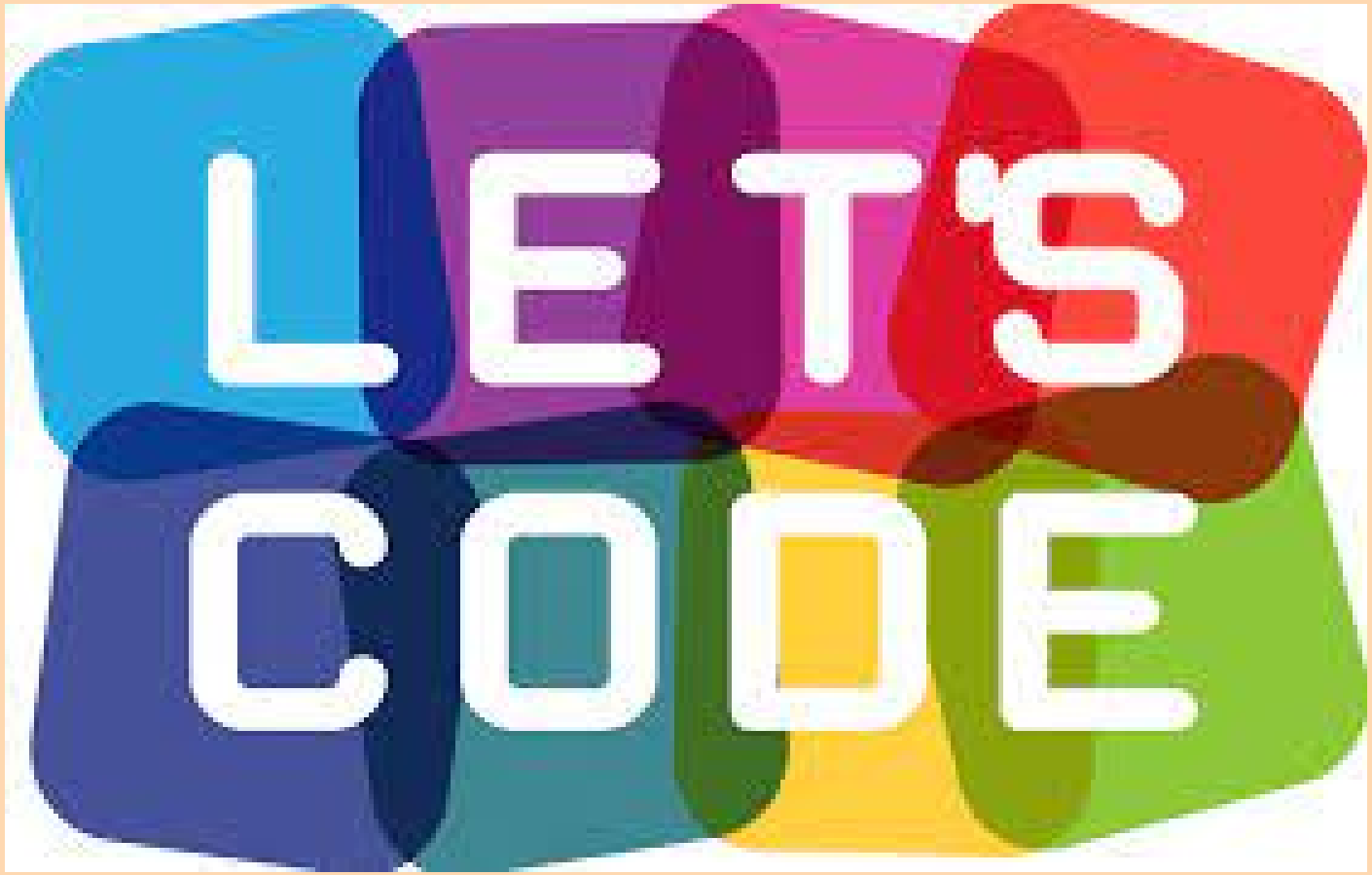
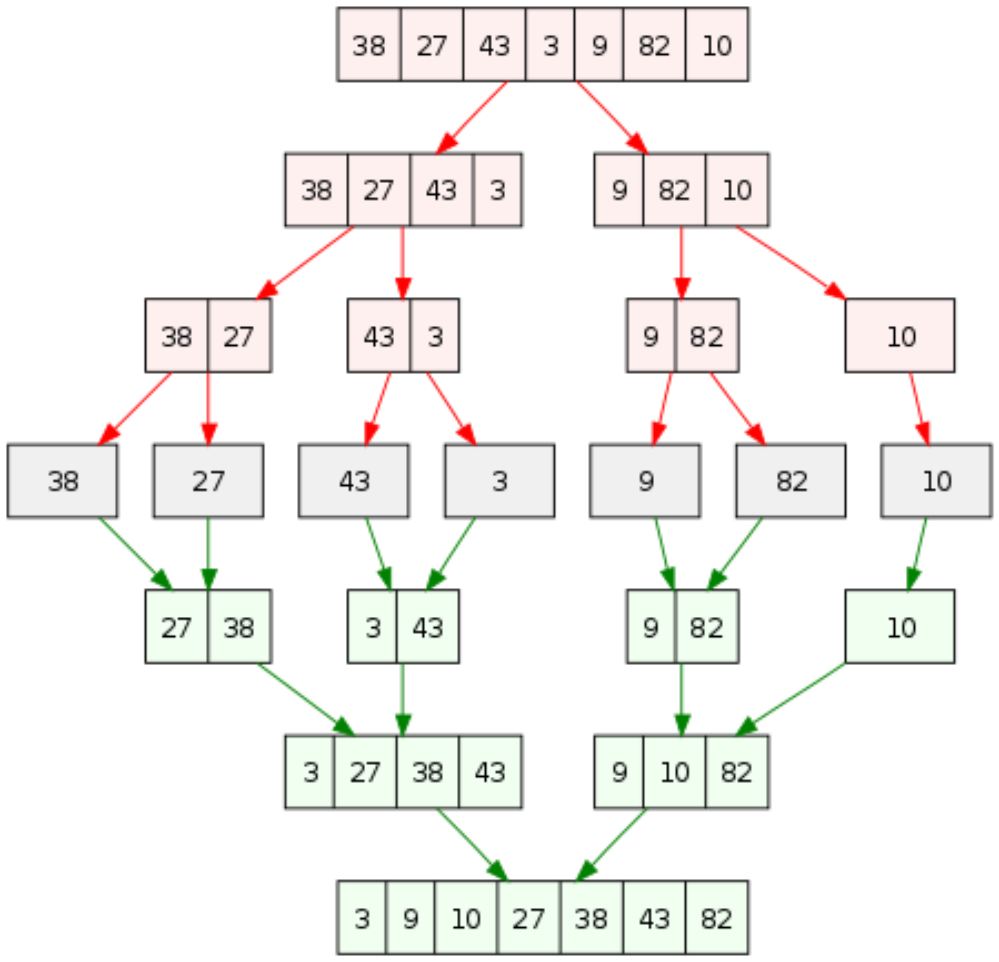


mergesort.c (John von Neumann; 1945)

Merge Sort (mergesort.c)



DO YOU WANNA DANCE TONIGHT?

Data Types

The **type** of a variable determines

- the set of **values** it may take on and
- what **operations** can be performed on them.

int **char** **bool** **double**

[ ]

Integral Types (int-limits.c)

- short (int)
- int
- long (int)
- long long (int)

Signed and Unsigned (unsigned.c)

Be careful when MIXING signed and unsigned types.

Signed and Unsigned (unsigned.c)

Do NOT use unsigned types unless you know exactly what you are doing.

typedef

```
typedef unsigned long long int size_t

typedef long time_t

#define _ _int64 long long
```

char (char.c)

Use `char` only for representing characters.

Do **NOT** assume `signed char` or `unsigned char`.

Overflow (int-overflow.c)

- 有符号整数运算中发生溢出, 程序的行为是**未定义的**。
- 无符号整数运算中没有溢出, 取而代之的是**回绕 (wrap)**现象。

Implicit Conversion

(implicit-conversion.c)

- 算术表达式、逻辑表达式 (先做整值提升; Section 7.4.3)
- 定义初始化、赋值 (类型转换)
- 函数调用时 (类型转换)
- 函数返回时 (类型转换)

Be careful about narrowing conversions!!!

Explicit Conversion

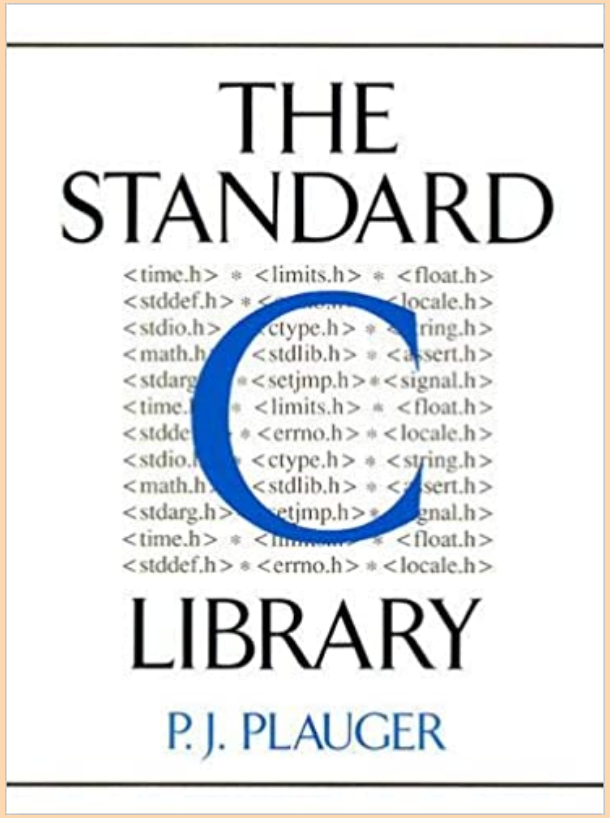
(explicit-conversion.c)

(type) expression

Floating-point Numbers

(float-limits.c)

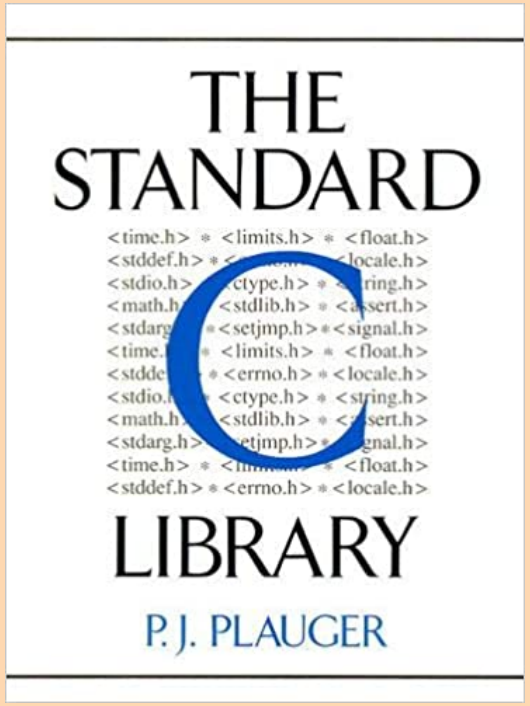
- float (F)
- double
- long double (L)



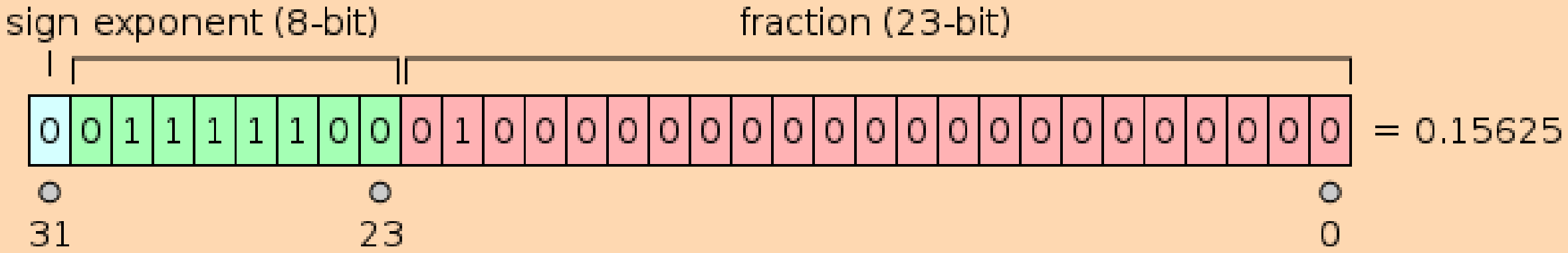
"Floating-point Arithmetic is Hard."

(Section 23.1 `float.h`)

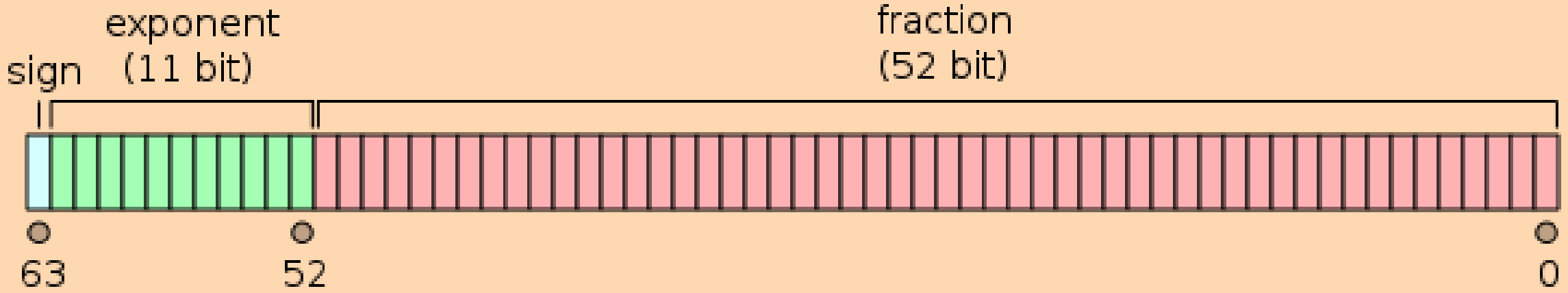
"Many applications don't need floating-point arithmetic at all."



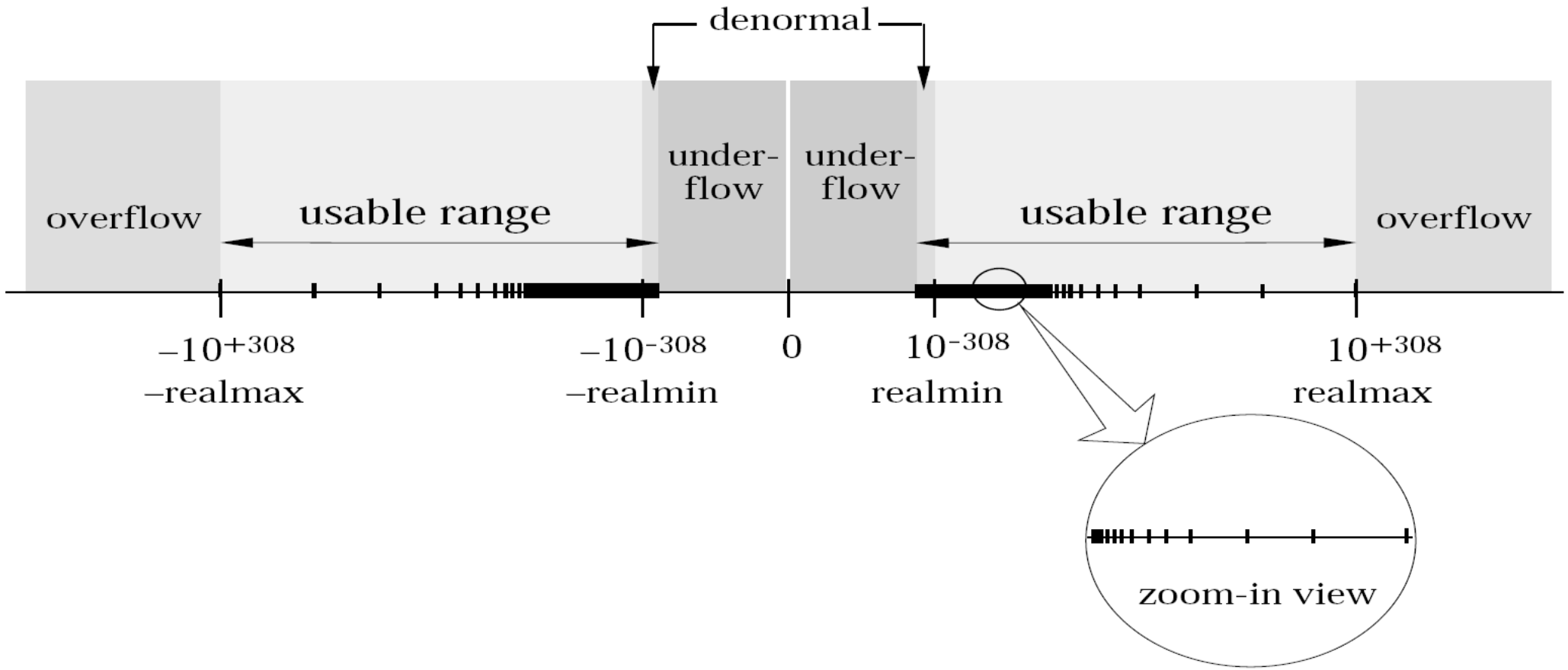
Use `math.h` (Section 23.3) whenever possible.



≈ 7 ≈ 16

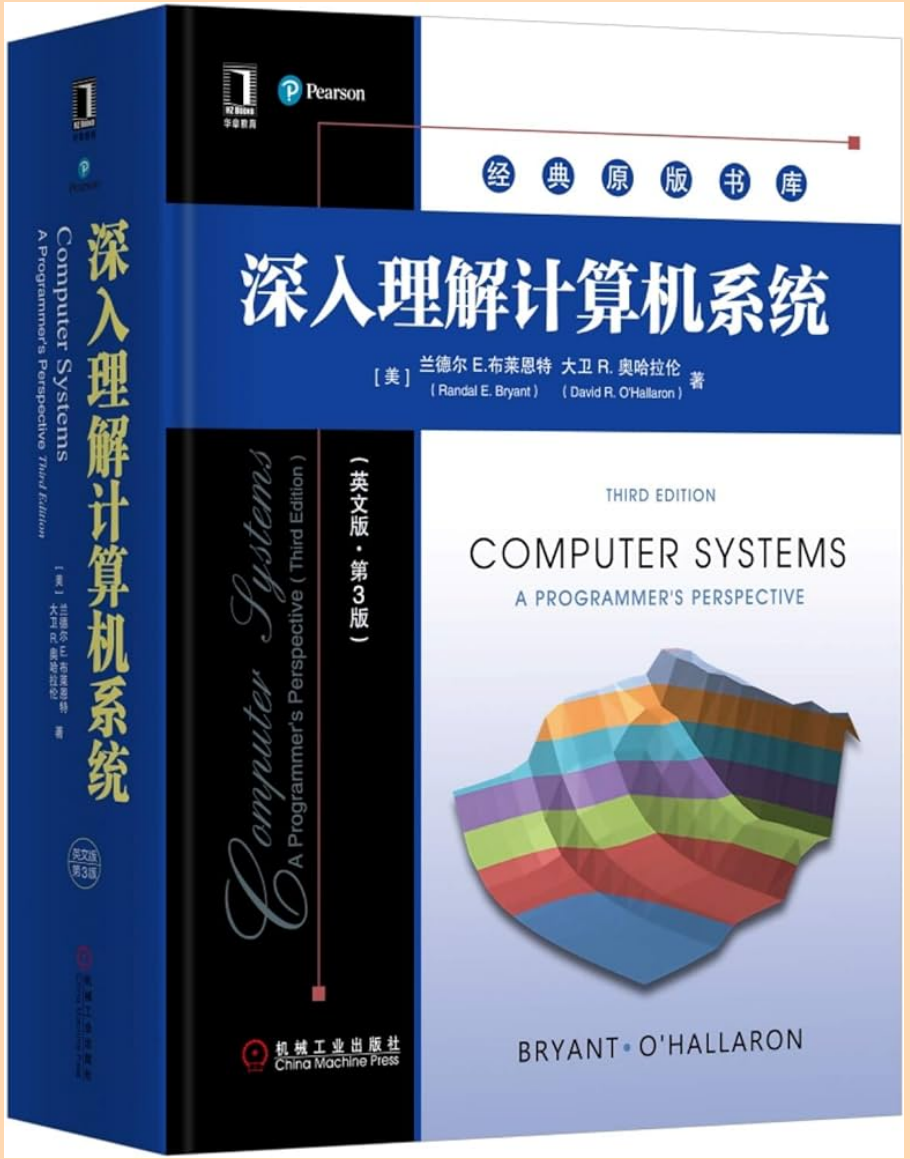


Floating Point Number Line



implicit-conversion.c

sum-product.c loop.c compare.c**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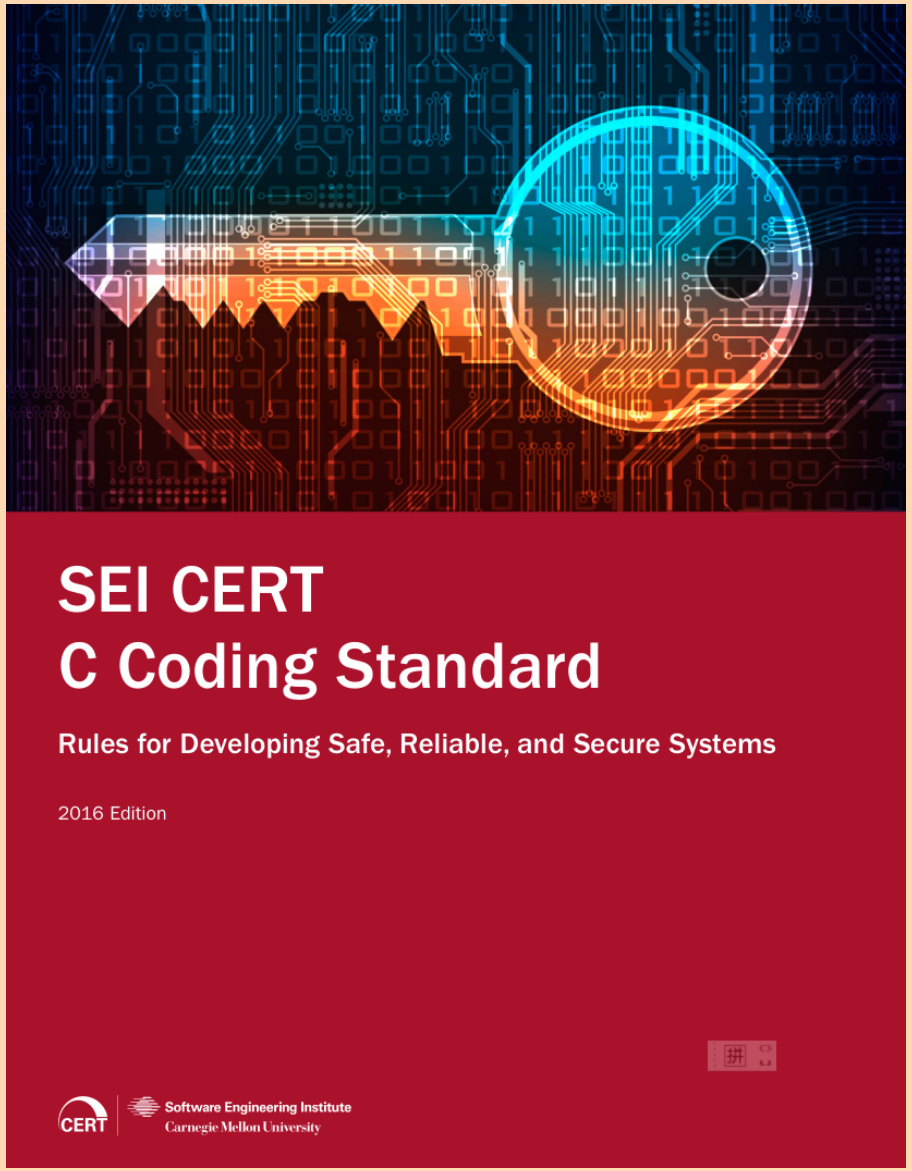
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