2. If, For, Array

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Review

Variables (变量)　　Data Types (数据类型)

Operators (运算符)　　Expressions (表达式)

Assignment Statements (赋值语句)

I/O (Input/Output; 输入输出)

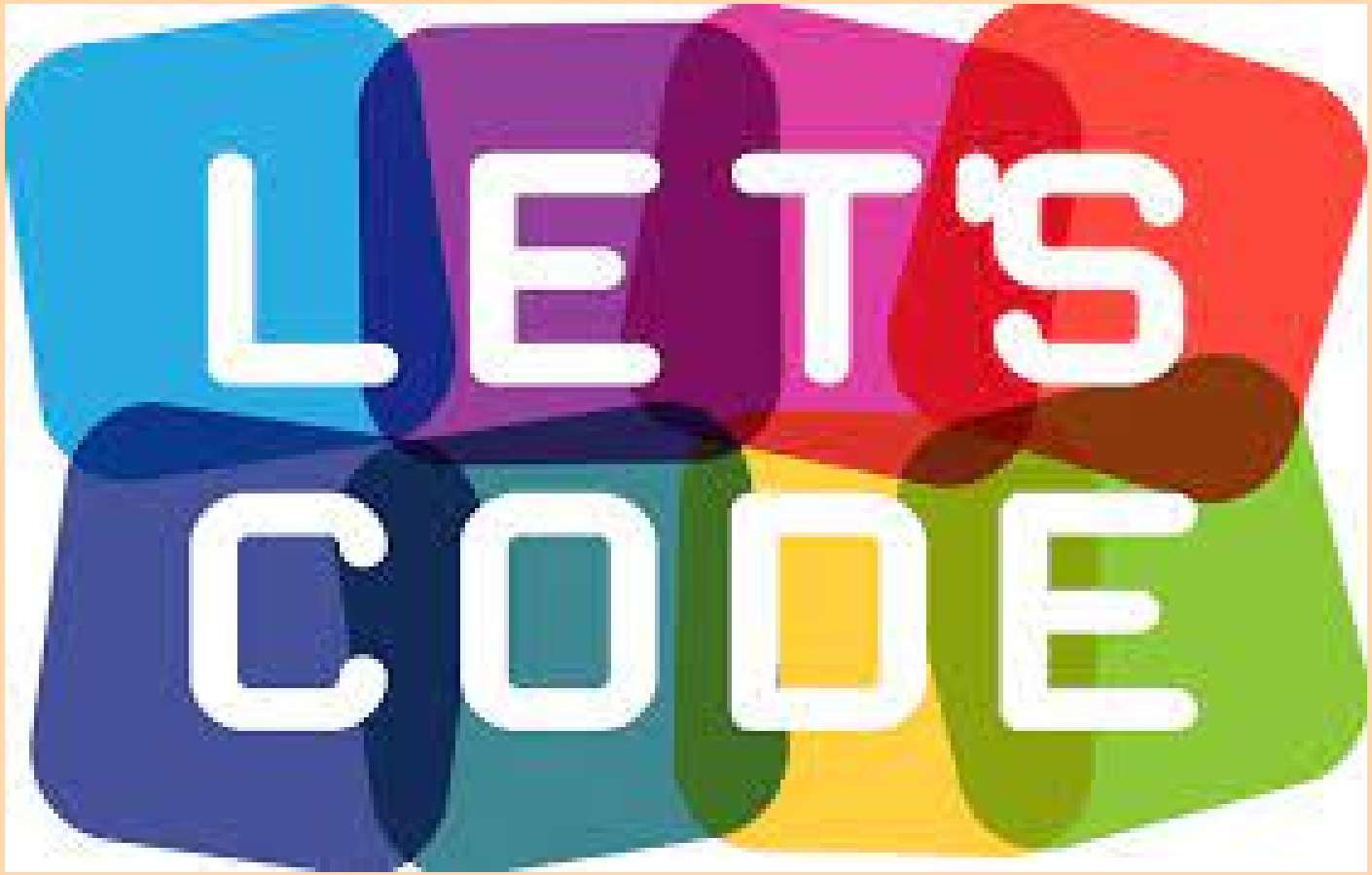
Overview

If Statement (`if` 语句)

For Statement (`for` 语句)

Logical Expressions (逻辑表达式)

Array (数组)



min.c leap.c min-array.c

Min

Min of Two

Given two integers a and b, to compute their minimum.

$$min = \min\{a, b\}$$

It is up to you to ensure that the type of the actual argument matches the type expected by conversion specifiers.

Avoid UBs!!!

Min of Two

```
min = a >= b ? b : a;
```

(条件表达式; 三目运算符)

Do Not Use it Too Much!

Do Not Be Too Clever!

Min of Three

Given three integers a, b, and c, to compute their minimum.

$$min = \min\{a, b, c\}$$

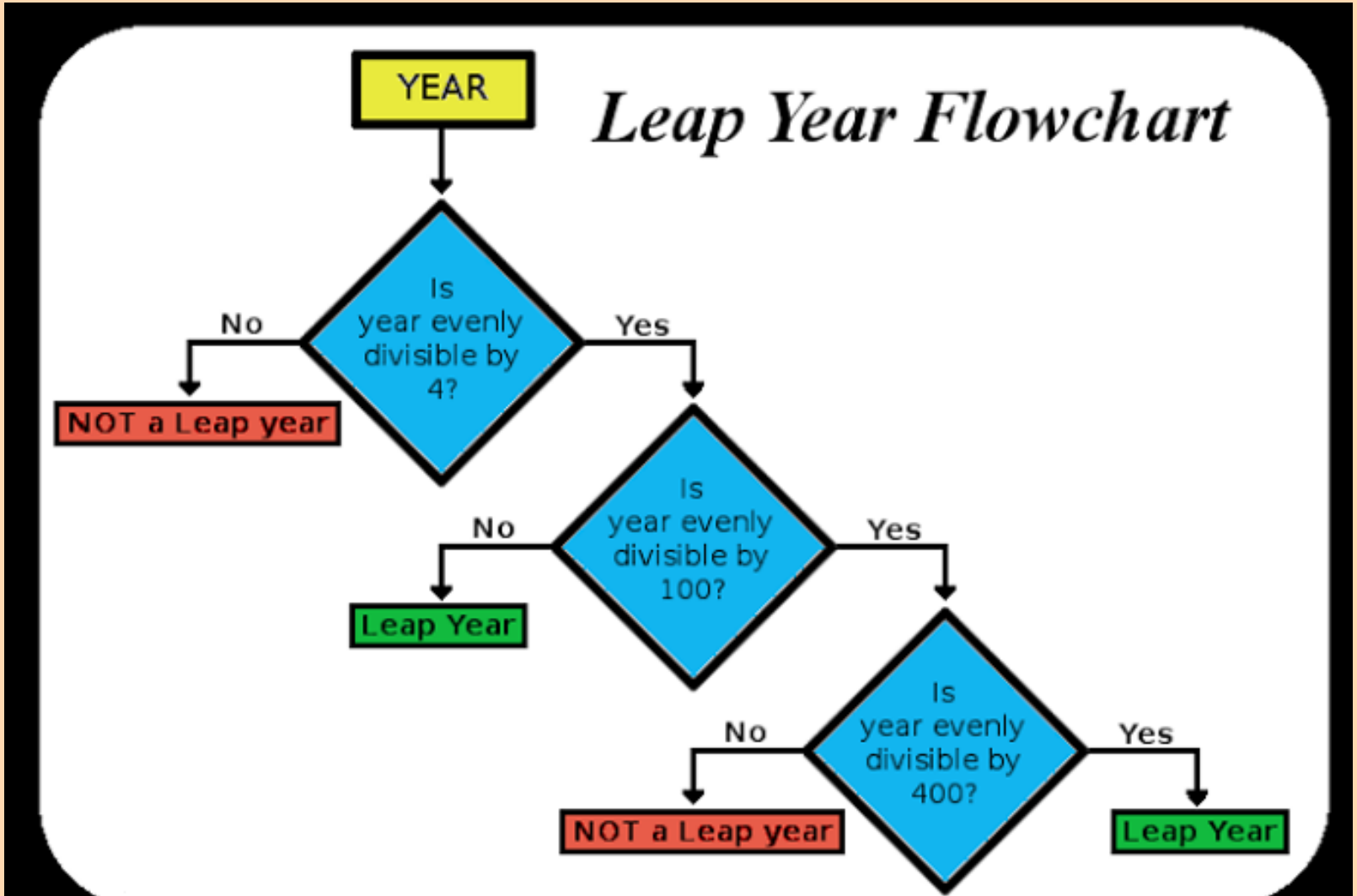
Min of a Set of Numbers

Given a set A of integers, to compute their minimum.

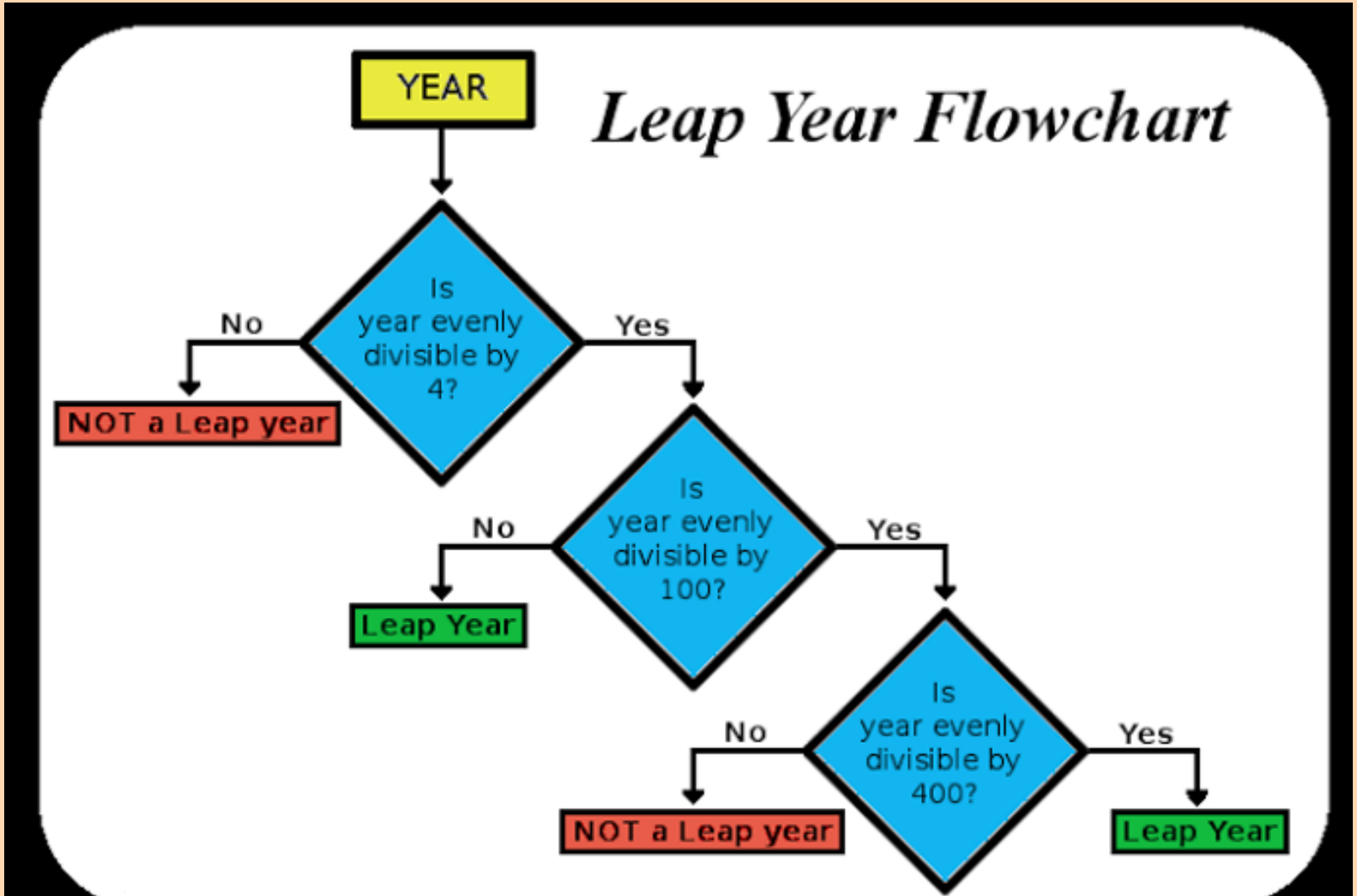
$$min = \min A$$

Leap Year

Leap Year (1): Nested `if/else` (YES)



Leap Year (2): Nested `if/else` (NO)



Leap Year (3): `else if`

if (*year* is not divisible by 4) **then** (it is a common year)

else if (*year* is not divisible by 100) **then** (it is a leap year)

else if (*year* is not divisible by 400) **then** (it is a common year)

else (it is a leap year)

Leap Year (4): The Ultimate Version

A year is a leap year if

- it is divisible by 4 but not by 100,
- except that years divisible by 400 are leap years.

Short-circuit Evaluation (短路求值)

```
// test: year = 25
// test: year = 80
// test: year = 100
// test: year = 400
if ((year % 4 == 0 && year % 100 != 0) ||
    (year % 400 == 0)) {
  leap = 1;
}
```

Min of a Set of Numbers

Given a set A of integers, to compute their minimum.

$$min = \min_i A_i$$

$$\min\{3, 5, 2, 7\} = \min(\min(\min(3, 5), 2), 7)$$

For Statement

```
for ( <expression> ; <expression> ; <expression> )
    <statement>
```

```
for (initialization; condition; increment/decrement)
    statement
```

```
#define NUM 5
```

Symbolic Constants (符号常量)

`int numbers[NUM] = {0};` has a *constant* size.

`NUM` is known at *compiler* time.

Array Initializer

- `int numbers[NUM] = {1};`
- `int numbers[] = {0};`
- `int numbers[NUM] = {[2] = 1};`

Array Initializer (DON'T)

```
int numbers[NUM] = {};
```

Forbidden in C99 (Unfortunately!)

Allowed by GCC by default (Unfortunately!!)

Array Initializer (DON'T)

```
int numbers[NUM];
```

`numbers` may contain garbage values;

always initialize it

Array Initializer (DON'T)

```
int numbers[];
```

You must specify the size so that the compiler/runtime can allocate memory for it.

Min of a Set of Input Numbers

Input a set A of $n \geq 1$ integers, to compute their minimum.

$$min = \min_i A_i$$


SEE
YOU
NEXT
WEEK