
A *trick* to prevent a file being included *multiple* times

- Inclusion of header files

- Large programming project:

- **Large programming projects** will have **many** "header files" that are being **included** into various **program files**

 - **Nested inclusion** with such a **large number** of header file can **sometimes** create **recursive inclusion**

- **Fact:** Header files usually contains **only** the following:

- **macros definitions (#define)**
 - **data type definitions**
 - **variable definitions**

You should **define** these items **only once** !!!

- **Therefore:**

- A **header file** must **included** for **processing at most once** !!!

\$64,000 question:

- **How** can we **ensure** that a **header file** will be **processed at most once** ????
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- **Trick** using `#ifndef` to prevent a header file being included *multiple* times

- Consider the following **header file**:

```
line 1
line 2
...
line n
```

- We **add** the following **conditional include lines** to the **header file**:

```
#ifndef KEY

#define KEY
line 1
line 2
...
line n
```

```
#endif
```

- Suppose this header file is somehow included *multiple times*:

```
#include "this-header-file.h"
...
#include "this-header-file.h"
```

Then:

- The *first time* we process this include file:

- The symbol `KEY` was *not defined*, so we process the text between `#ifndef KEY` ... `#endif` in the include file:

```
#define KEY
line 1
line 2
...
line n
```

Result:

- We process the include file one time
- We define the symbol `KEY`

- The *second time* we process this include file:

- The symbol `KEY` has been *defined* !!!!

Therefore: the *while include file* will be *skipped (not processed !!)*

```
#ifndef KEY --- KEY is defined !!! FALSE !!! SKIP !!!

#define KEY
line 1
line 2
...
line n
```

```
#endif
```

- **Stopping recursive include**

- This **include trick** is often used by **C programmers** to **stop accidental recursive include files**

- **Example:**

```
/* (1) use conditional include --- the key must be unique !!! */
#ifndef RECURSE_H

/* (2) inside the conditional include: define the key !!! */
#define RECURSE_H
/* =====
   We define RECURSE_H to STOP the processing if
   this header file is INCLUDED AGAIN !!!
   ===== */

// This is a recursive include:
#include "stop-recurse.h"

int x;

/* (3) this ends the conditional include from above*/
#endif
```

- **Example Program:** (Demo above code)

Example

- Prog file: **/home/cs255000/demo/c/Cprep/stop-recurse.h**

How to run the demo:

- **cd /home/cs255000/demo/c/Cprep**
- **gcc main-recurse2.c**