

Lexical Macros in C/C++

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The College of New Jersey
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(e.g., mobiles, pagers, PDA, smartphones)

Note: These slides will be available on
our [www](#) site. The last slide in
this presentation has the URL.

Why macros?

- common operations
- common constants
- reduce chances of error
- improve performance

Simple cases

- `#define XYZ 15`
- `#define XYZ(x) ((x)+5)`

What is a macro?

- sequence of tokens with substitution
- can be nested
- restrictions/limitations

Macros are different than functions

- inline; no CALL involved
- no type checking in the macro expansion
- if a macro is shared, use a header file

Macros are part of a structured approach

- eliminate repetitive coding
- provide wrappers for common functions
- provide shorter incantations for common operations

Why do macros have a bad reputation?

- misperception
- common mistakes
- solution: understanding, care, and caution

Most common error

- understanding compiler phases
- C/C++ macros are lexical preprocessor constructs
- most common error is underuse of parentheses
 - Error: `#define f(x) x+5`

Two errors: First, Within

- `#define f(x) x*5`
- what happens if usage is `f(y+5)`
- “`y + 5 * 5`”
- Probably not what was intended. Solution:
 - parenthesize formal parameter
 - to wit: `#define f(x) (x)*5`

Second Error: Without

- `#define f(x) (x)+5`
- what happens when “`j = 10 * f(y)`”
- “`j = 10 * (y) + 5`”
- Probably not what was intended
- Solution:
 - `#define f(x) ((x)+5)`

Type conversion hazards

- the preprocessor is purely lexical; no type checking
- consider whether typecasting is needed for safety
- e.g., `(int)x`, `(float)y`
- remember to parenthesize parameters correctly, (e.g., `(int)(x)`)

Preprocessor symbols

- `__LINE__`
- `__FILE__`
- useful in preprocessor generated error messages

Speaking of error messages

- `#error`
- `#warning`
- use in concert with `#if`, `#elif`, `#else`, `#ifdef`, `#ifndef`, `#endif`
- particularly useful if macro relies upon other definitions

Macros can be complex.

- continuation lines
- common code sequences
- understand possible use cases

Questions?

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Session Notes & Materials:

<http://www.rlgsc.com/trentoncomputerfestival/2012/index.html>