

# C Program Structure and Keywords

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# Outline

- 1 Hello World
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# Hello World

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# Hello World in C

```
1 #include <stdio.h>
2
3 int main(){
4     printf("Hellow, world!");
5     return 0;
6 }
```

# Greetings in C

```
1 #include <stdio.h>
2
3 int main(){
4     char username[20];
5     printf("Enter your name: ");
6     scanf("%s", username);
7     printf("Good day to you, %s!", username);
8 }
```

# Program Structure

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# Preprocessor Macros

- `#include`: include header files
- `#define`: define constants/macros
- Conditional macros: `#if`, `#ifdef`, `#ifndef`, `#else`, `#elif`, `#endif`: compile conditionally
- `#undef`: remove macro definitions

# The `main` Function

- Entry point of C programs
- Return type (`int`) indicates exit status
- Function name: `main`
- Parentheses for parameters (empty for now)
- Curly braces `{}` define the body



# Defining Variables

- Syntax: `data_type variable_name;`
- Must end with semicolon ;
- Variables must be declared before use
- Can assign values at declaration

# Semicolons and Statements

- Semicolon ends a statement. Two statements in one line:
  - `int x = 10; y = x + 5;`
  - Discouraged in practice
- Multiple statements form the body of functions
- Common source of beginner errors

# Calling Functions

- Syntax: `functionName(arguments);`
- Parentheses hold arguments (can be empty)
- Must match function definition/prototype

# Return Values

- Functions can return a value to the caller
- Syntax: `return expression;`
- In `main()`, `return 0;` indicates successful execution
- Non-zero return values often indicate an error

# Brackets in C

- Parentheses `()`: grouping expressions and function calls
- Curly braces `{}`: define a block of code
- Square brackets `[]`: array indexing

# Comments

- Single-line: `// comment`
- Multi-line (often discouraged):

```
/* this is  
a multiline comment */
```

# Escape Sequences

- `\n`: newline
- `\t`: tab
- `\\`: backslash
- `\"`: double quote
- `\'`: single quote

# Whitespace and Indentation

- Whitespace is ignored (except in strings)
- Indentation improves readability
- Use a single tab or four spaces for one level of indentation
- Example:

```
if(condition){  
    statement;  
}
```



# Coding Conventions

- Meaningful variable names
- Consistent indentation
- Opening brace { on the same line as keyword
- Use comments for clarity

# Keywords in C

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# Data Types and Values

- `int`: integer type
- `float`: single precision floating-point
- `double`: double precision floating-point
- `char`: single character
- `void`: no return value / no data
- `signed`, `unsigned`: signed/unsigned integers
- `short`, `long`: specify integer size

# Control Flow

- `if, else`: conditional branching
- `switch, case, default`: multi-way branching
- `for, while, do`: loops
- `break`: exit loop or switch
- `continue`: skip current iteration
- `goto`: jump to label (use sparingly)
- `return`: exit function, optionally returning value

# Structuring

- `struct`: group related variables
- `union`: store different types in same memory
- `enum`: named integer constants
- `typedef`: define a type alias

# Pointer and Address-of Operators

- *datatype \*varname*: declares a pointer
- *\*varname*: dereferences a pointer to access the value
- *&varname*: gives the memory address of a variable
- Example:

```
1 #include <stdio.h>
2
3 int main(){
4     int x = 10;
5     int *p = &x;    // p points to x
6
7     printf("%x", p);    // prints the hex address of x
8     printf("\n%d", *p);    // prints 10
9 }
```

# Storage Classes

- `auto`: default local variable storage
- `register`: hint to store variable in CPU register
- `static`: preserve value between function calls
- `extern`: variable defined elsewhere

# Memory and Miscellaneous

- `const`: read-only variable
- `volatile`: variable may change unexpectedly
- `restrict`: pointer optimization hint
- `inline`: suggest inline function expansion
- `_Atomic`: atomic variable access
- `_Thread_local`: thread-local storage
- `_Noreturn`: function does not return
- `sizeof`: size of object or type
- `_Alignas`, `_Alignof`: memory alignment
- `_Generic`: type-generic selection (C11)



# Preprocessor Keywords

- `#define`: define macro or constant
- `#include`: include header file
- `#if`: conditional compilation
- `#ifdef`: compile if macro defined
- `#ifndef`: compile if macro not defined
- `#else`, `#elif`: alternative conditions
- `#endif`: end conditional
- `#undef`: undefine macro
- `#line`: set line number for compiler messages
- `#error`: generate compilation error
- `#pragma`: compiler - specific instruction

# Exercise

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# Exercise

- Modify the hello-world program to print something else.
- Modify the greetings example to print something else.

**Questions?**

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