Code Conventions and Documentation

```
Module Code: ELEE1147

Module Name: Programming for Engineers

Credits: 15

Module Leader: Seb Blair BEng(H) PGCAP MIET MIHEEM FHEA
```

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Naming Conventions

- Lower case `lowercase`: `publicdomiansoftware`
  - elements and attributes
- Upper case `UPPERCASE`: `PUBLICDOMAINSOFTWARE`
  - Naming constants
- Camel Case `camelCase`: `publicDomainSoftware`
  - local variable names
- Pascal Case `PascalCase`: `PublicDomainSoftware`
- Snake Case `snake_case`: `public_domain_software`
  - C/C++ standard library names
- Screaming Snake Case `SCREAMING_SNAKE_CASE`: `PUBLIC_DOMAIN_SOFTWARE`
  - Naming Constants
- Kebab Case `kebab-case`: `public-domain-software`
  - class names, ids
- Screaming Kebab Case `SCREAMING-KEBAB-CASE`: `PUBLIC-DOMAIN-SOFTWARE`
  - Macros

VS C Convention

```c
#include <stdio.h>

// Macros
#define MAX(a, b) ((a) > (b) ? (a) : (b))
#define MIN(a, b) ((a) < (b) ? (a) : (b))

// Global variables
int globalVariableOne;
int globalVariableTwo;

// Function prototypes
void InitializeGlobals();
int AddNumbers(int a, int b);

int main() {
    // Local variables
    int localVariable;

    // Initialize global variables
    InitializeGlobals();

    // Assign values to local variables
    localVariable = AddNumbers(globalVariableOne, globalVariableTwo);

    // Using macros
    printf("Max: %d\n", Max(globalVariableOne, localVariable));
    printf("Min: %d\n", Min(globalVariableTwo, localVariable));

    return 0;
}
...
```

```c
...
// Function definitions
void InitializeGlobals() {
    globalVariableOne = 5;
    globalVariableTwo = 10;
}

int AddNumbers(int a, int b) {
    // This comment explains the function behavior
    return a + b;
}
```

Other conventions

GNU C:

- Naming: Typically follows the lowercase with underscores for variables and functions (e.g., `my_variable`, `my_function()`).
- Indentation: Uses spaces for indentation (often 2 or 4 spaces).
- Brace Style: Opening braces are usually on the same line as the statement, following the Kernighan and Ritchie style.

GCC (GNU Compiler Collection):

- Similar to the GNU C conventions.
- It may include additional guidelines for contributing to the GCC codebase.

Other conventions

LLVM:

- Naming: Uses camelCase for function names and lowercase with underscores for variable names (e.g., `myVariable`, `my_function()`).
- Indentation: Typically 2 spaces.
- Brace Style: Opening braces are on the same line.

Microsoft Visual Studio C++:

- Naming: Uses PascalCase for function and method names, and camelCase for variable names (e.g., `MyFunction()`, `myVariable`).
- Indentation: Typically 4 spaces.
- Brace Style: Opening braces are on the same line.

Other conventions

Google C++ Style Guide:

- Naming: Uses camelCase for variable names, and underscores for function names (e.g., `myVariable`, `my_function()`).
- Indentation: Typically 2 spaces.
- Brace Style: Opening braces are on the same line.

Mozilla C++ Coding Style:

- Naming: Uses camelCase for variable names and function parameters, and PascalCase for function names (e.g., `myVariable`, `MyFunction()`).
- Indentation: Typically 2 spaces.
- Brace Style: Opening braces are on the same line.

Other conventions

Linux Kernel Coding Style:

- Naming: Uses lowercase with underscores for variables and functions (e.g., `my_variable`, `my_function()`).
- Indentation: Typically 8 spaces.
- Brace Style: Opening braces are on the same line.

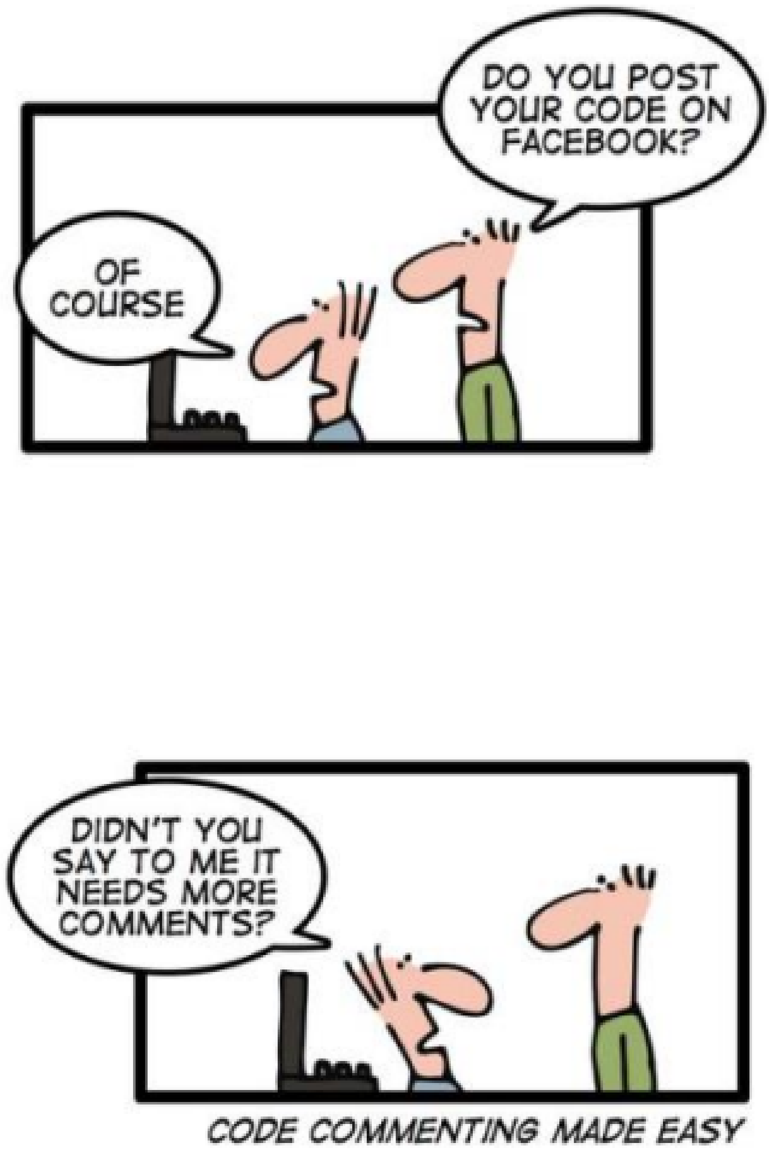
Qt Coding Style:

- Naming: Uses camelCase for variables and functions (e.g., `myVariable`, `myFunction()`).
- Indentation: Typically 4 spaces.
- Brace Style: Opening braces are on the same line.

Documentation, 'doc as you go...'

Why Documentation

- **You**
  - put down the project and return to it much later
  - want people to use it and give you credit
- **Others**
  - would be encouraged to contribute
  - more easily use your code
- **Science / Engineering**
  - Advances
  - Open collaboration
  - Reproducibility and transparency

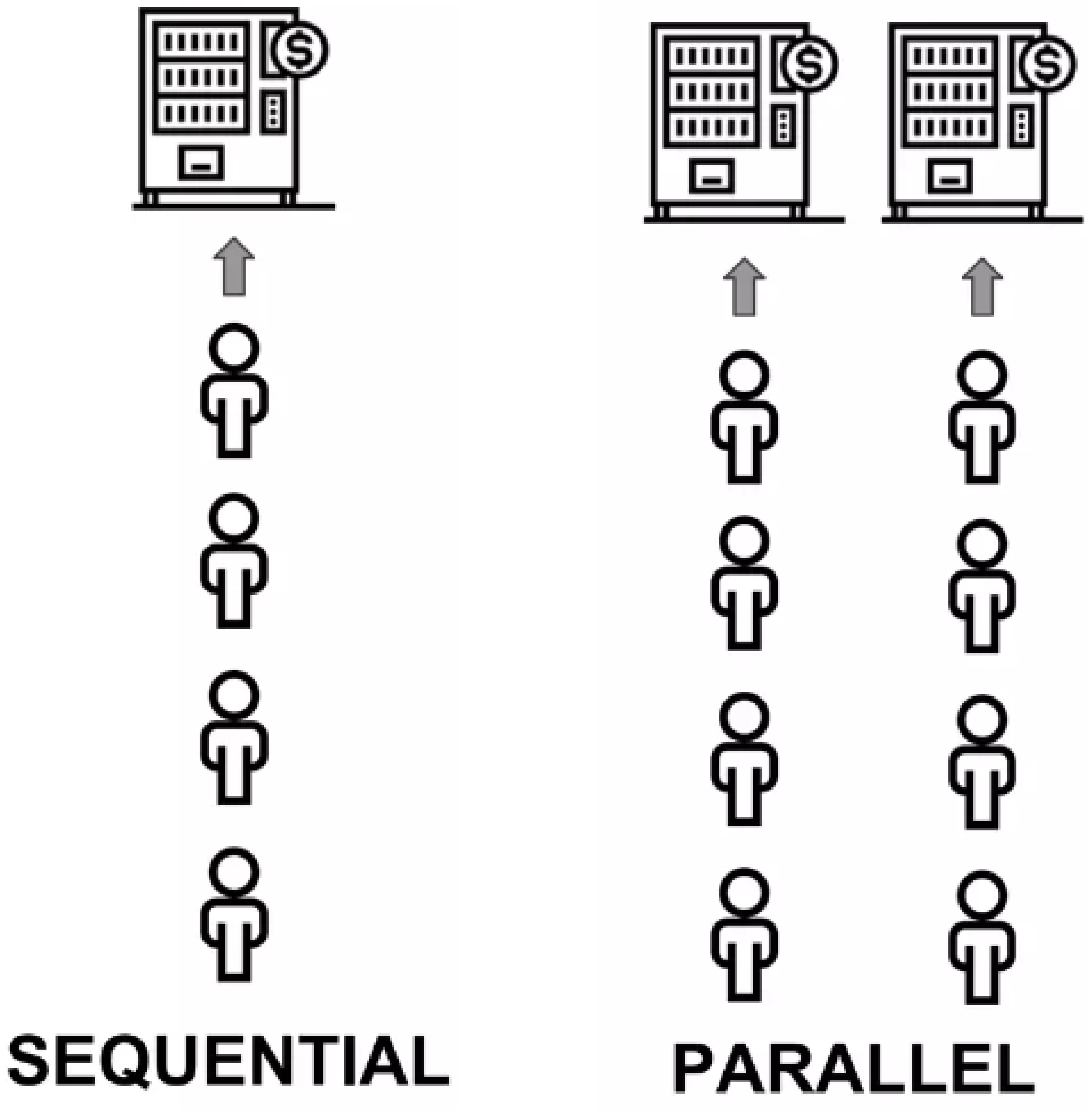

DO YOU POST YOUR CODE ON FACEBOOK?
OF COURSE
DIDN'T YOU SAY TO ME IT NEEDS MORE COMMENTS?
CODE COMMENTING MADE EASY

Tools for Documentantion

- **Python**
  - Sphinx, Doctest, Numpydoc
- **R**
  - R Markdown, Kite
- **C++**
  - BoostBook, QuickBook, GhostDoc
- **Java**
  - Javadoc
- **Ruby**
  - Docurium
- **Doxygen**
  - r, C, C#, PHP, Java, Python, and

Divergence Dilemma

- As with all documentation code develops faster and is released, thus creates a divergence, as in code <-> documentation become out of sync.



Literate Programming

- a computer program is given as an explanation of how it works in a natural language, such as English, interspersed (embedded) with snippets of macros and traditional source code, from which compilable source code can be generated.

doxygen

Doxygen syntax

```c
//**
 * @file calculator.c
 * @brief Simple calculator program with basic operations.
 */

#include <stdio.h>

/**
 * @brief Adds two numbers.
 * @param a The first operand.
 * @param b The second operand.
 * @return The sum of a and b.
 */
int add(int a, int b) {
    return a + b;
}

/**
 * @brief Subtracts two numbers.
 * @param a The first operand.
 * @param b The second operand.
 * @return The result of subtracting b from a.
 */
int subtract(int a, int b) {
    return a - b;
}
```

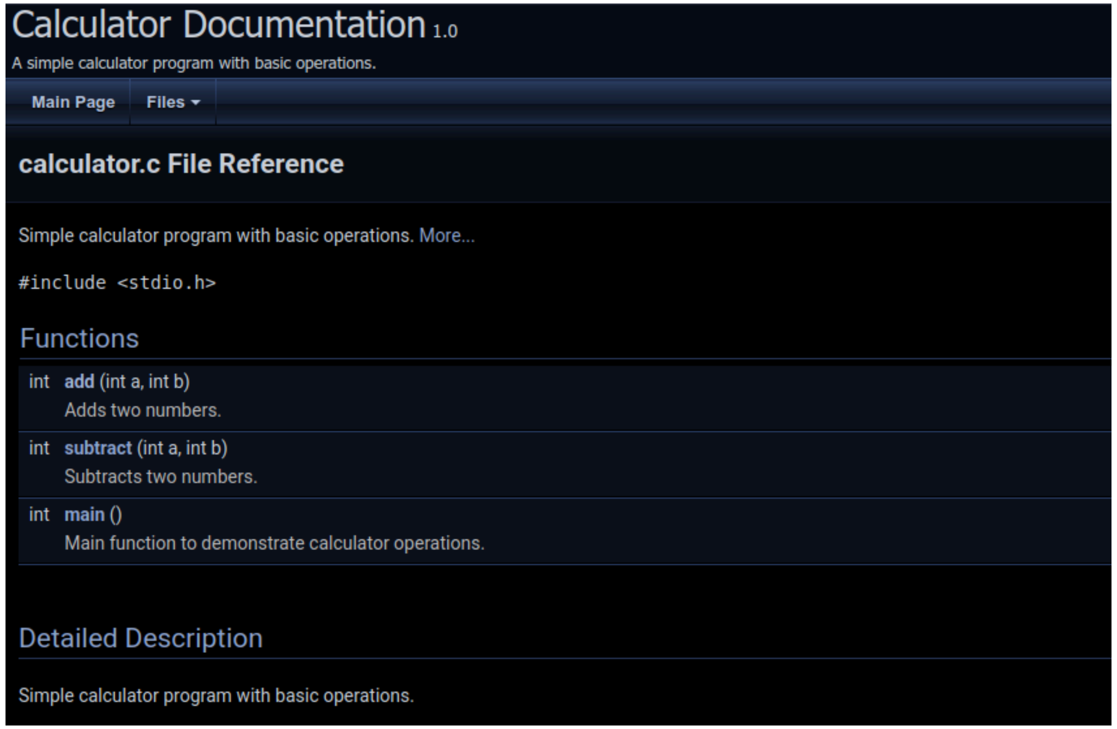
```c
/**
 * @brief Main function to demonstrate calculator operations.
 * @return 0 if successful, otherwise an error code.
 */
int main() {
    int num1, num2;

    printf("Enter two numbers: ");
    scanf("%d %d", &num1, &num2);

    printf("Sum: %d\n", add(num1, num2));
    printf("Difference: %d\n", subtract(num1, num2));

    return 0;
}
```

Example output



Calculator Documentation 1.0

A simple calculator program with basic operations.

Main Page Files

calculator.c File Reference

Simple calculator program with basic operations. More...

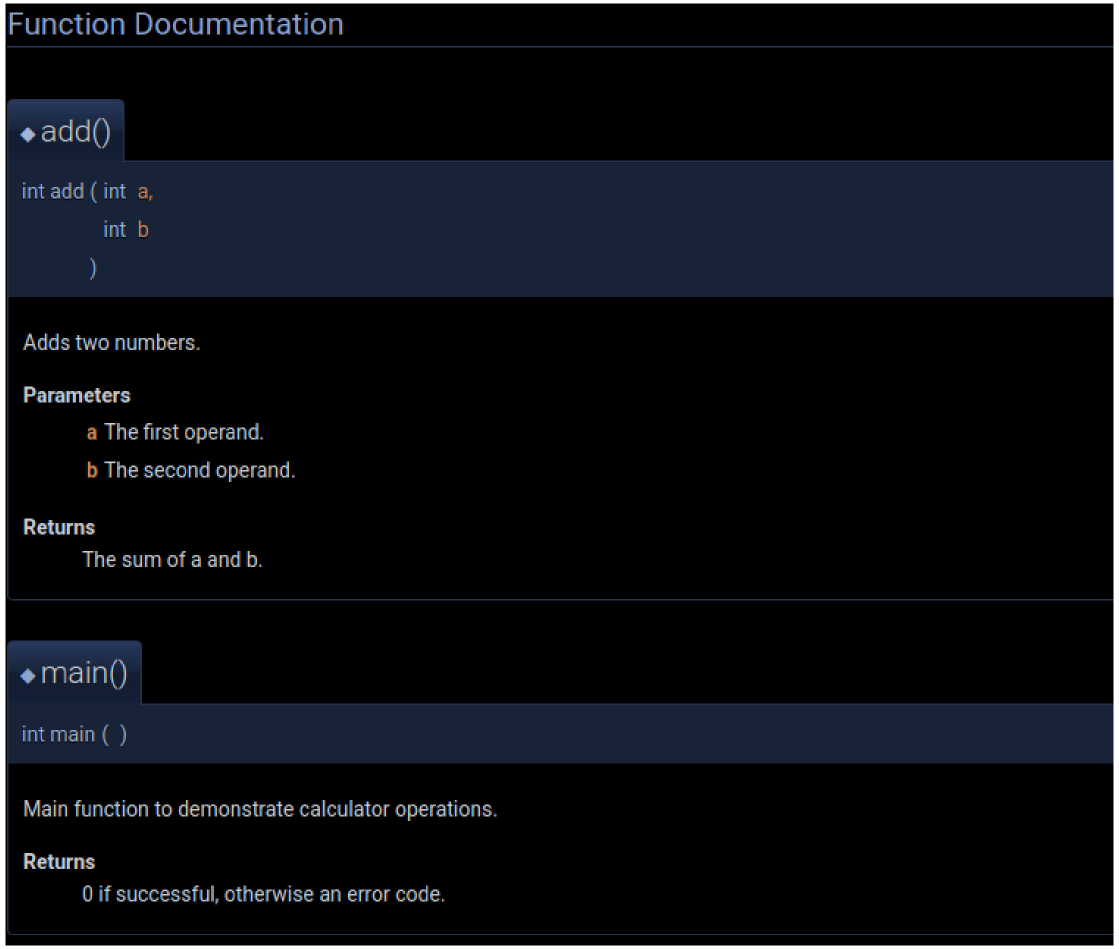
```
#include <stdio.h>
```

Functions

int	**add** (int a, int b) Adds two numbers.
int	**subtract** (int a, int b) Subtracts two numbers.
int	**main** () Main function to demonstrate calculator operations.

Detailed Description

Simple calculator program with basic operations.



Function Documentation

◆ add()

```
int add ( int  a,
          int  b
        )
```

Adds two numbers.

Parameters

a	The first operand.
b	The second operand.

Returns

The sum of a and b.

◆ main()

```
int main ( )
```

Main function to demonstrate calculator operations.

Returns

0 if successful, otherwise an error code.

Doxygen Configuration file

```
PM> doxygen.exe doxygenConfigFile
```

```
# Doxyfile for calculator.c

DOXYFILE_ENCODING      = UTF-8
PROJECT_NAME           = "Calculator Documentation"
PROJECT_NUMBER         = 1.0
PROJECT_BRIEF          = "A simple calculator program with basic operations."

OUTPUT_DIRECTORY       = ./docs
CREATE_SUBDIRS         = NO

INPUT                  = calculator.c
RECURSIVE              = NO

EXTRACT_ALL            = YES
EXTRACT_PRIVATE        = YES
EXTRACT_STATIC         = YES
EXTRACT_LOCAL_CLASSES  = YES

GENERATE_LATEX         = NO
GENERATE_HTML          = YES
```