C/C++ Programming

Basic C

1. Introduction of softwar programming & C/C++ & Hello World
    - Code, source code, machine code, byte code
    - Complie & interpret
    - Compiling proccess
    - Comment & Preprocessing
2. Basic data types & Expression
    - Data types: integer, floating-point, character, void, enum
    - Variable, constant
    - Basic IO: printf, scanf
    - Storage class & initial value
    - Operators & their precedence
    - Type casting
3. Condition statements
    - if/else
    - switch/case
4. Loop:
    - for
    - while
    - do/while
5. Bitwise operators
    - Operators: & | ^ << >>
    - Loop & Bitwise operators
6. Function
    - Declaration & Definition
    - Function call
    - Overloading
    - Recursive function
7. Array
    - 1D array
    - Multidimentional array
8. Pointer
    - Address & Value of a variable
    - Pointer to data
    - Pointer to constant
    - Constant pointer
    - Dynammic allocation
    - Pointer to pointer
9. C-string
    - what is c-string

    - standard functions on C-string
10. struct, union, typedef

Adavanced C

1. Processor directives
    - #include
    - #define
    - #if/#elif
2. Multi source files
3. Function pointer
4. IO - advanced
    - Streams:
        - FILE*
        - FILE* stdin, stdout
    - Formatted IO:
        - fscanf, fprintf,
        - scanf, printf
        - sscanf, sprintf
        - vscanf, vprintf
    - Direct input/output:
        - fread, fwrite
    - Character IO
        - getc, putc
        - fgetc, fputc
        - fgets, fputs
        - don't use gets, use fgets instead
        - puts
5. File
    - Operations on files
        - rename, remove
        - tmpfile, tmpnam
    - File access
        - fopen, fclose, freopen
    - File positioning
        - rewind
        - fgetpos, fsetpos
        - ftell, fseek
6. Multithreading & Concurrency
    - Thread
    - Mutex
    - Condition variable
7. Implementing data structures
    - Queue & Stack
    - Linked List
    - Binary Tree
    - Hash Table

    - Map
    - Set
8. Common algorithms
    - Searching
    - Sorting
    - breedy algorithm
    - dynamic programming

Basic C++ POP

1. Basic-C-liked with C++ features:
    - Hello World in C++
    - printf, scanf => learn std::cout, std::cin
    - Casting operators: cosnt_cast, static_cast
    - Runtime type id
    - C-array & std::array, std::vector
    - C-string & std::string
    - type-2 for loop
    - Dynamic allocation & new, delete
    - Reference type

Basic C++ OOP

1. Processor directives
    - #include
    - #define
    - #if/#elif
2. Multi source files
3. Namespace
4. Class & object
    - public, protected, private
    - member data, member function
    - constructor, destructor
    - Class, Object, Instance, Instantiation
    - static member
    - runtime type id
5. Inheritance
    - Inheritance
    - Base class, derived class, base class subobject.
    - Override
    - virtual & non-virtual
    - pure virtual (abstract)
    - Implementation
    - dynamic_cast
6. Initialization types
7. Overloading operator

Advanced C++

1. IO - advanced
    - stdin, stdout
    - cin, cout
2. File:
    - fstream, ofstrea, ifstream
3. Template
4. Exception
5. Advanced pointer
    - Pointer to function
    - Pointer to member function
    - Pointer to member data
6. Smart pointers
    - shared_ptr, weak_ptr, unique_ptr
    - casting operators of smart pointers.
7. std::function & Callable types
    - Free function
    - Member function
    - Member data accessor
    - lambda expression
    - Function object
    - std::bind
8. std::mem_fn
9. Multithreading & Concurrency
10. Containers
    - Pair & Tuple
    - Queue & Stack
    - Linked List & std::list
    - Hash table
    - Binary tree
    - Map and Set
11. Common algorithms
    - Searching
    - Sorting
    - breedy algorithm
    - dynamic programming

C/C++ for work

1. IPC
    - IPC on Linux
    - IPC on Windows
2. Lib & Multi-module (`mandary`)
    - on Linux
    - on Windows
3. build system (`mandary`)

    - make (Linux / Windows + MinGW)
    - cmake (Linux/Windows)
    - GNU autotool (Only on Linux)
4. Using third-party lib (`mandary`)
5. Boost (`mandary`)
    - big number
    - timer
    - xml & json
6. Advanced data types
    - xml & json (`mandary`)
    - yml (`mandary`)
    - sqlite (`mandary`)
    - base64 (`mandary`)
    - protobuf
    - MessagePack
7. Network (`mandary`)
8. Information Security Fundamentals
9. Multimedia
10. Image Processing
    - OpenCV
11. Audio Processing
12. Graphics
    - OpenGL
13. GUI
    - Introducing WinAPI & Win32++ for GUI
    - Introducing QT for GUI
14. Automation test
15. Programming on some embedded devices
    - Linux programming
    - Arduino programming
    - Raspberry programming
16. Design Patterns
17. Architecture Patterns
18. Clean Code & Code Clean