IDK1531 Advanced C++ Course
Introduction to C++

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The C++ Programming Language

Bjarne Stroustrup

Developed at Bell Labs since 1979 before initial standardization in 1998.

- General-purpose cross-platform programming language
- Object-oriented and generic programming features
- Biased towards system programming and embedded systems
- Provides facilities for low-level memory manipulation

C++ standardization over time

ISO/IEC standard	Informal Name
ISO/IEC 14882:1998	C++98
ISO/IEC 14882:2003	C++03
ISO/IEC 14882:2011	C++11
ISO/IEC 14882:2014	C++14
ISO/IEC 14882:2017	C++17
ISO/IEC 14882:2020	C++20

The C++17 standard was published in December 2017.
The C++20 exists as a draft `http://eel.is/c++draft/`

A C++ program may be *hosted* (running inside OS) or *freestanding* aka *bare metal* (does not need OS to run).

Examples of hosted programs:

- User-space (ring 3) programs
    - usermode applications
    - usermode services

- Kernel-space (ring 0) programs
    - OS drivers
    - hypervisors (paravirtualization)
    - kernel-mode managers and services

Examples of freestanding programs:

- OS kernel
- Bootloader
- Firmware: EFI/UEFI, BIOS, device firmware, …
- Bare-metal hypervisors

Programs may be built for different subsystems:

- Console subsystem
- GUI subsystem
- EFI subsystem (i.e. subsystems $11 - 13$ in PE/COFF)
- Native (programs hosted in kernel space)

as well as for different build targets:

- Standalone executable
- Static library (.a, .lib)
- Shared library (.so, .dll)

Built C++ program is a file in a specific format

- PE/COFF (Windows, ReactOS)
- ELF (GNU/Linux,BSD*,*NIX)
- XCOFF (Mac OS)
- PEF (Mac OS)

containing machine code for a specific instruction set architecture (ISA)

- Intel x86, x86_64 (most popular)
- Alpha, AVR, ARM, MIPS, PPC, RISC-V, SPARC, …

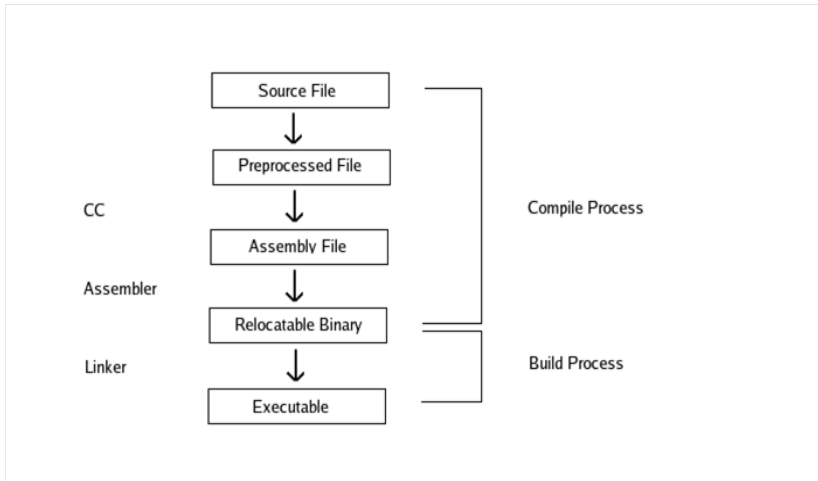and data in a logically isolated areas called *sections*.

C++ as a cross-platform language

- Preprocessor and conditional compilation
- Cross-compilation
- The standard C++ library
- The C++ run-time library

C++ as a cross-architecture language

- Cross-compilation

The building process:

?

THANK YOU
FOR
YOUR
ATTENTION
ANY QUESTIONS?