National Research University Higher School of Economics
Faculty of Computer Science
Bachelor's Program "HSE University and University of London Double Degree Program in Data Science and Business Analytics"

Introduction to Programming

Workshop #1

Wed 13.01.2021

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Welcome to the seminars!

- Teacher for Groups 203-1 and 204-2:

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- e-mail: jcarrasquel@hse.ru
- Telegram: @juliocarrasquel (for urgent matters)
- The SmartLMS course website is being prepared… (there we will have material, control works, forums)
- Classes via Zoom (check your schedule)
- Consultation hours via Zoom (preliminary for Saturdays 14:00-15:20). Write before to request consultation.

Outline

- Tools – Installation and Configuration
- Creating a “Hello world” program in QTCreator
- Step-by-step compilation in the console.
- CmakeLists.txt, project structure, and headers
- C++ features and references
- Exercise

Tools – Installation and Configuration

- **C++ compiler:** gcc/g++ in Linux, clang in Apple, and MinGW in Windows.
  - How to install MinGW in Windows 10: https://www.youtube.com/watch?v=sXW2VLrQ3Bs
- **Cmake:** Pre-installed in Linux and Apple. In Windows, download it at https://cmake.org/
  - How to install Cmake in Windows 10: https://www.youtube.com/watch?v=sXW2VLrQ3Bs
- **QTCreator IDE:** Download community version at: https://www.qt.io/download-open-source

Creating a “Hello world” program in QTCreator

[demonstration during the seminar]

Step-by-step compilation in the console

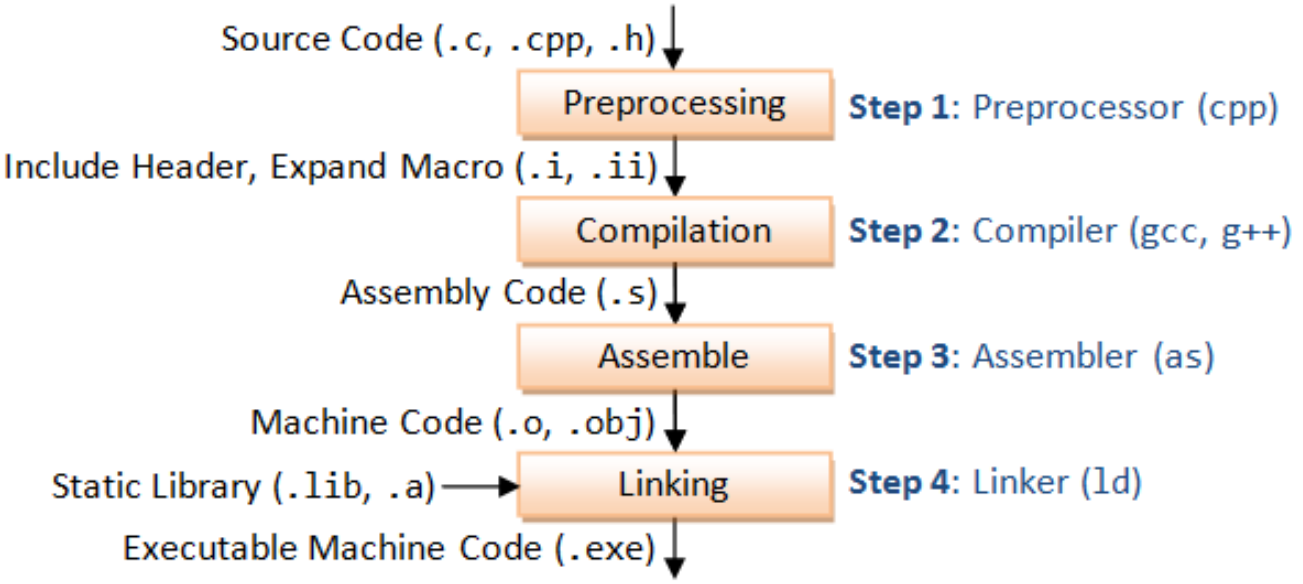
Quick compilation:

g++ main.cpp -o main.exe

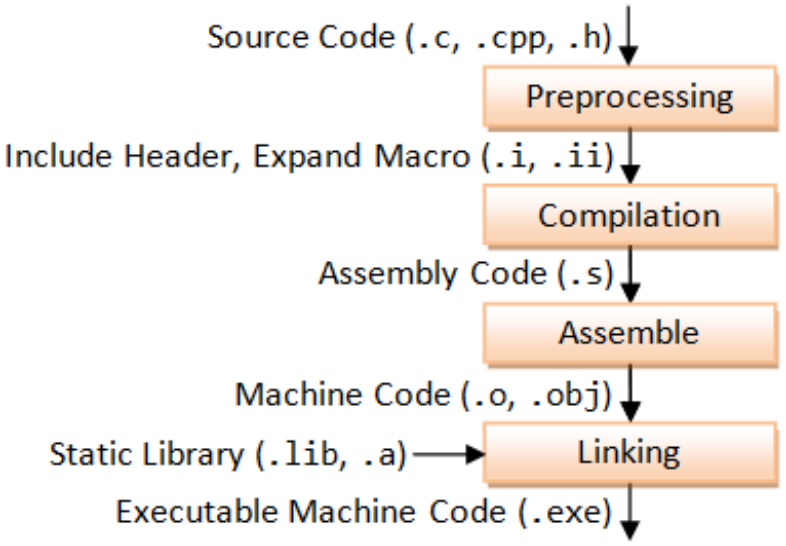
Execution:

main.exe in Windows or ./main in Linux

Step-by-step compilation in the console



Step-by-step compilation in the console



Step:	Command example:
Step 1: Preprocessor (cpp)	`cpp main.cpp > main.i`
Step 2: Compiler (gcc, g++)	`g++ -S main`
Step 3: Assembler (as)	`g++ -c main.s`
Step 4: Linker (ld)	`g++ -o main main.o`

CMakeLists.txt

- CmakeLists.txt file contains a set of directives and instructions describing the project's source files and targets.
- **Additional reference at:** https://www.jetbrains.com/help/clion/cmakelists-txt-file.html

[open Shershakov's example project]

Project structure and Headers

[extend ex2 *in Shershakov's example project]*

C++ features and references

- See the cheat-sheet accompanying these slides for a quick overview on C++ features.
- **Websites to consult for libraries:**
  - http://cplusplus.com/
  - https://en.cppreference.com/w/
- **Book:**
  - *C++ Primer Plus (Sixth Edition). Stephen Prata, Addison-Wesley, 2012*

Exercise

- Write a program in C++ that reads an integer value *x* and computes the following functions:

$$y1 = \sin(x)$$

$$y2 = x^3$$

Results y1 and y2 must be printed using std :: cout