

C++ Assignment 5

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1 Makefile

Makefile is a file that contains a set of rules that defines how a project should be built. It's commonly used in C++ projects to automate the compilation process and manage dependencies between source files.

Besides setting rules for compiling, Makefile can also define variables and functions. But in this assignment, we only need to compile the files together with correct dependencies. So we can have a really simple Makefile for this project:

```
CXX = g++
LXX_FLAGS = -std=c++17

objects = src/assignment5.o src/author.o src/book.o src/main.o \
src/publication.o src/unittest.o

bookshelf : $(objects)
$(CXX) $(LXX_FLAGS) $(objects) -o bookshelf -lgtest -lgtest_main -pthread

clean :
-rm $(objects) bookshelf
```

This is correct because Makefile can deduce automatically. When required of assignment5.o it will add assignment5.cpp and deduce g++ -c assignment5.cpp. The Makefile also defines a function that cleans all the objects generated, which can help test the project easier.

2 Improvements for given files

I made some improvements in given statement of class Book, Author, Publisher.

2.1 Reference of Author in class Book

Class Book has a member Author& author, which is incorrect in this code. In this code we need to sort the Books so we have to use move constructor sometimes. But with the reference member in the class, which can't use default assignment operator, the move constructor is automatically deleted. It's a lot better to use shared_ptr to store the Author.

2.2 vector<Book&>

The component type of containers like vectors must be assignable, and references are not. The programme is ill-formed whenever using vector<Book&> list_of_books in class Publisher and Author.

This can be fixed by using pointer to replace the references.

3 Some details in implementation

- I used `std::map` to store the relationship between author/publisher name and the pointers to them;
- I have to make author and publisher friend classes to book in order to implement `getAuthorName()` and `GetpublisherName()` functions;
- I implemented a special way of inputing because I didn't notice the comma in quotation mark.

4 Results

The result of `showTable`:

```
[ OK ] assignment5Test.authors (0 ms)
[ RUN ] assignment5Test.publisher
[ OK ] assignment5Test.publisher (0 ms)
[ RUN ] assignment5Test.printTable
```

Title	Author(s)	Genre	Price	Publisher
Fundamentals of Wavelets	Goswami, Jaideva	signal_processing	\$22.80	Wiley
Data Smart	Foreman, John	data_science	\$23.50	Wiley
God Created the Integers	Hawking, Stephen	mathematics	\$19.70	Penguin
Superfreakonomics	Dubner, Stephen	economics	\$17.90	HarperCollins
Orientalism	Said, Edward	history	\$19.70	Penguin
Nature of Statistical Learning Theory, The	Vapnik, Vladimir	data_science	\$23.00	Springer
Integration of the Indian States	Menon, V P	history	\$21.70	Orient Blackswan
Drunkard's Walk, The	Mlodinow, Leonard	science	\$19.70	Penguin
Image Processing & Mathematical Morphology	Shih, Frank	signal_processing	\$24.10	CRC
How to Think Like Sherlock Holmes	Konnikova, Maria	psychology	\$24.00	Penguin
Data Scientists at Work	Sebastian Gutierrez	data_science	\$23.00	Apress
Slaughterhouse Five	Vonnegut, Kurt	fiction	\$19.80	Random House
Birth of a Theorem	Villani, Cedric	mathematics	\$22.40	Bedlow Head

The result of `GTest`:

```
Christmas Carol, A Dickens, Charles
[ OK ] assignment5Test.printTable (0 ms)
[-----] 4 tests from assignment5Test (2 ms total)

[-----] Global test environment tear-down
[=====] 4 tests from 1 test suite ran. (2 ms total)
[ PASSED ] 4 tests.
<<<SUCCESS>>>
```