Microlearning in C++ programming language

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ABSTRACT

This paper is a study of C++ programming language course at   SDU (Suleyman Demirel University, Almaty, Kazakhstan) by using microlearning. Firstly, it gives a brief description about microlearning concept, then, shows print screens of a website, prepared on microlearning using html, frames and css.

Keywords: microlearning, C++ programming language.

INTRODUCTION

In his book " The C++ programming language", Bjarne Stroustrup gives two important advices. The first advice is "You don't have to know every detail of C++ to write good programs", and second one is "Focus on programming techniques, not on language features".[1]

These are important advices for students because they do not know what they need and why. Lecturer must explain C++ to students so that they do not be afraid, and each can think that he/she can program in a good way. Microlearning is a new term in education. It was introduced in University of Innsbruck, Austria (www.microlearning.org). Microlearning means that small charks of information are given to student in a small amount of time.

In learning and developing enviroments macro, meso and micro parts are used. Macro contains meso parts, meso contains micro parts (this presents the smallest part of them) and all of them construct   together products. For example in computer science to make a big project (macro) is divided into subprojects (meso) and then each subproject contains its modules (micro). It is called "divide and conquere". This example shows that in learning it is important to begin from small parts to construct big parts. Microlearning is a new method that teaches in this way.

MICROLEARNING IN C++ PROGRAMMING LANGUAGE

In our work (it is a study of "CS 201 Programming Technologies C/C++" in SDU) we make a webpage by using microlearning in C++ PL. Our course is based on the book "C++ How to Program, Fifth Edition" by H. M. Deitel, P. J. Deitel - Deitel & Associates, Inc. The content is absolutely essential here, because student must understand given topic in a small amount of time and also see its practical code. Also, at the end of topic we put practical questions with complexity. This means that each question has its own difficulty level (star). Questions are taken from different olympiad webpages (www.topcoder.com, uva.onlinejudge.org e.t.c) or prepared by me based on our traditions (togyz kumalak) or university (canteen).

General concept of work is illustrated in figure 1. Where general topics means mostly known topics of C++ programming languages such as arrays, pointers e.t.c. Each general topic consists of sub topics and all of them are under list of topics.

Each item from this topic has its own web page, which is constructed in 3 parts: description, C++ code and problems.
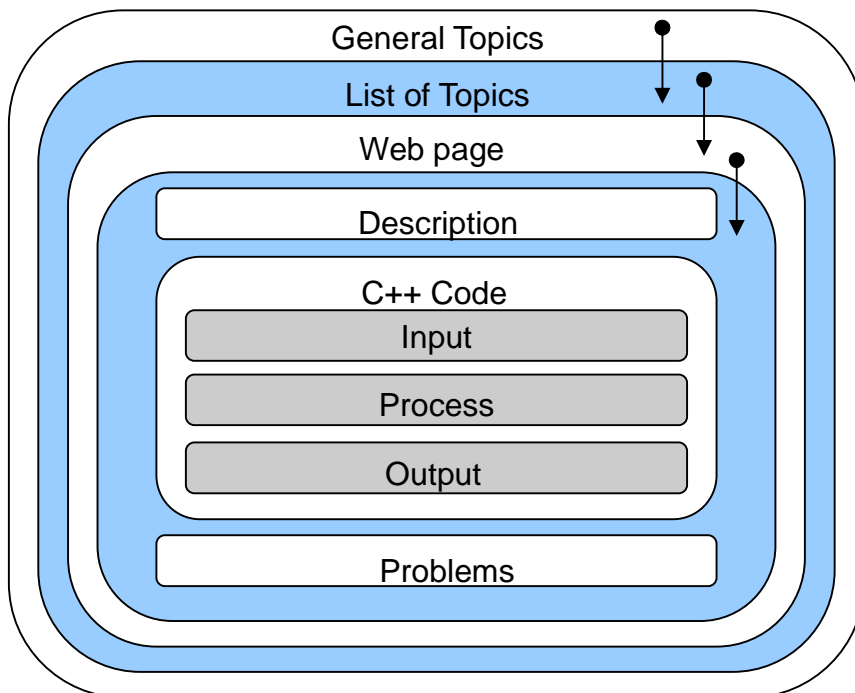

Figure 1. General Concept

Description part explains own topic definitely, shortly and unique. It follows C++ code with comments, which includes three parts input, process and output as shown in figure 2.
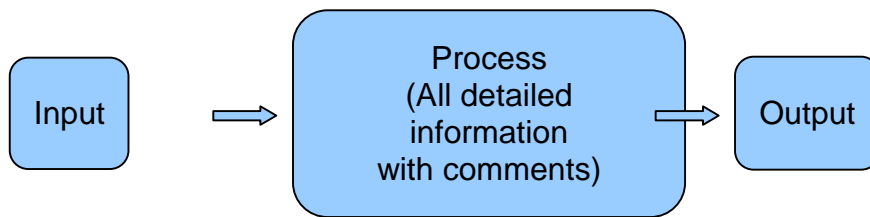
Figure 2. C++ code structure

In practical side of work as shown in figure 3 there is a webpage with weeks, topics and information.
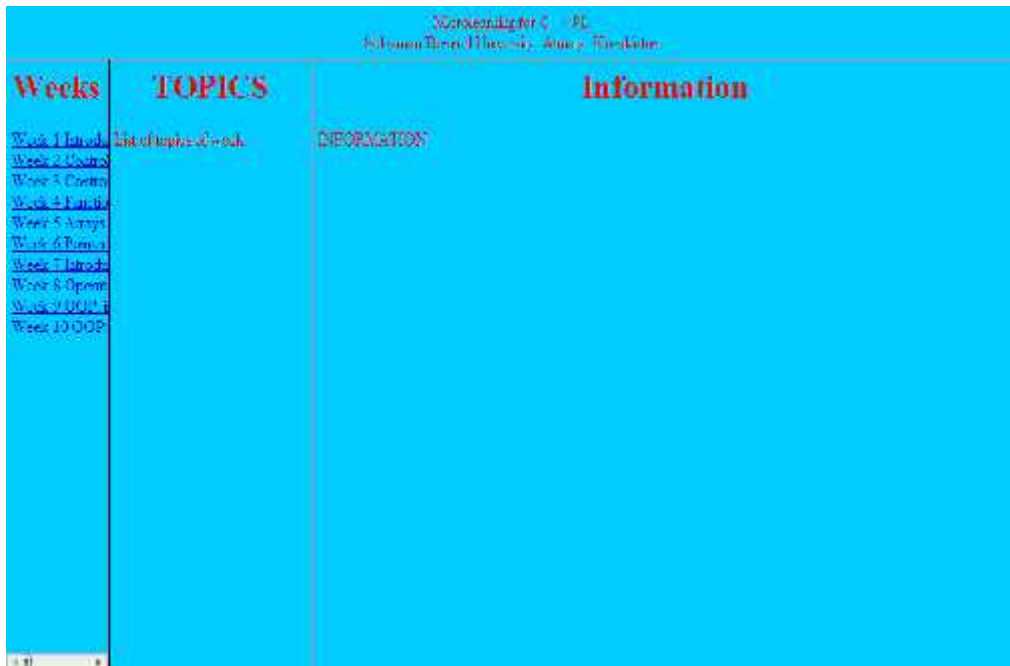

Figure 3 Main page

The principles of microlearning : divide the whole lecture into the portions, which can be handeled in 1 week and in short time.

When one of the week links is pressed, the topics of this week are shown in topics frame as in figure 4.

Figure 4 Topics for week6

Each topic contains small information about it (figure 5), and also at the end of topic there is a practice for this work with its corresponding complexity (stars)(figure 6).

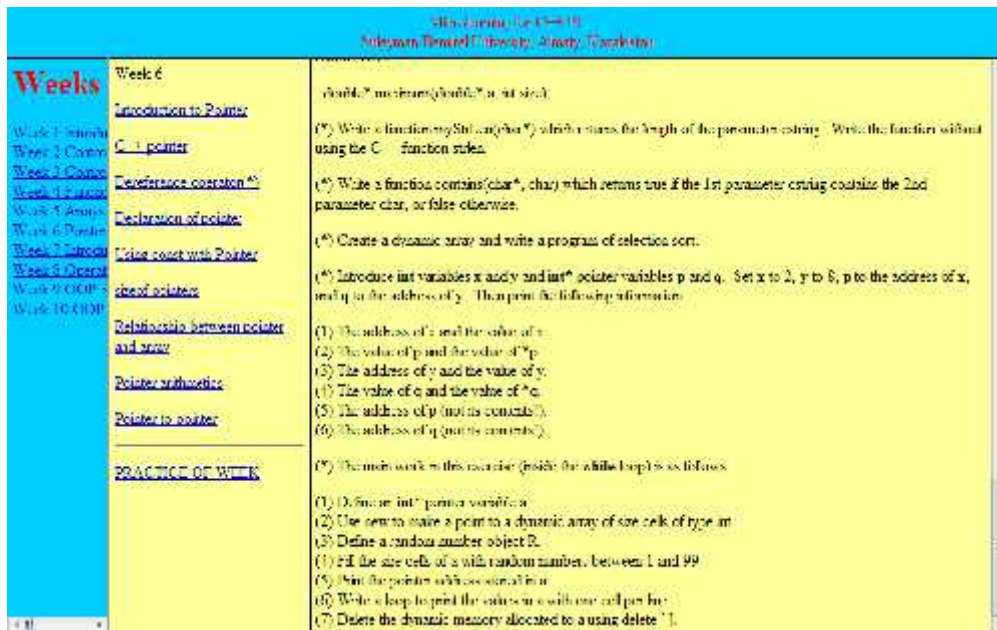*Figure 5 Information about C++ pointer in week6*

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Figure 6 Practice of week 6

Our work is based on frames and on css. Each week is saved in different folders and each topic is saved in different webpage. This is good for making changes without modifying other files.

FUTURE WORK

This is only part of the thesis work, and it is not complete yet. In future, after finishing it is to be extended to mobile devices like Iphone, Android cell phones and can even be placed in Internet to be accessible from anywhere.

For practice works can be written hints for solving problems.

CONCLUSION

In our work we showed how to use microlearning in C++ programming language. However, not all the topics are covered yet, and we are only at the beginning of our work. The topics of the course are also to be updated.

Our work can be developed and used not only for students in university; it can also be useful for beginners and self-study students.

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Appendix A

Curriculum of "CS 201 Programming Technologies C/C++" in SDU

Weekly distribution

Week #	Topic	Description
1	Introduction, history, hello world, Memory concepts, Arithmetic, if	Chapter 1,2
2	Control statements: Algorithm, Pseudocode, while, ++, --	Chapter 4
3	Control statements: for, do…while, switch, break, continue,(==/=)	Chapter 5
4	Functions: Math functions , C++ library, scope rules, References, default arguments, function overloading, Recursion	QUIZ 1, Chapter 6
5	Arrays: Declaring arrays, passing arrays to functions, search & sort, multidimensional arrays, C++ template class vector	Chapter 7

6	Pointers: pointers operators, pointer arguments, sizeof, pointers vs. arrays, function pointers, pointer based strings	QUIZ 2, Chapter 8
7	MIDTERM	MIDTERM
8	Classes: Introduction to classes, constructor, destructor, members, separating Interface form Implementation (*.h and *.cpp)	Chapter 3,9
9	Classes: const, Composition, friend, this, new, delete, static, iterators; Operator overloading, fundamentals, member/global functions, Unary,Binary	Chapter 10,11
10	OOP: inheritance, protected, Base/derived classes, types of inheritance;	QUIZ 3, Ch. 12
11	OOP:Polymorphism, Abstract classes, virtual functions, virtual destructors	Ch13
12	Templates: function templates, class templates, templates in inheritance, Stack<?>, Data structures	Chapter 14,21
13	Streams input/output, streams manipulators, File Processing	Chapter 15,17,23