

Thesis Proposal (30 hp)

Title

Implementation of an Interactive System for Visualization of Programming Concepts in C++

Examiner

Aida Nordman

Starting Date

The thesis should start as soon as we find one student with the required qualifications (see below).

Background

Programming is considered by most novices too abstract and a difficult subject to learn. Moreover, most of the universities are nowadays required to teach programming languages that are largely used in the industry (e.g. **C++**). The choice of programming language used in an introductory programming course may, therefore, not be motivated only on pedagogical reasons.

Visualization systems have been successfully used in programming education, since they enhance the understanding of abstract and complex programming concepts.

A common approach in teaching programming to novices is to first introduce the basics concepts of a programming language and then teach students more advanced strategies for the whole programming process. Thus, visualization tools that help students to understand and use basic programming concepts are of great value in introductory programming courses.

The aim of this thesis is to develop an interactive system for visualization of basic programming concepts, in **C++** language, that helps students to enhance their understanding and capability to use those concepts in solving practical problems. Examples of basic programming concepts are loops (**while**-loop, **for**-loop), functions, and passing arguments to functions by reference (by value). To this end, the system should be designed around a kernel of objects that are both reusable and pedagogically rich. The system will be then used and tested in the introductory programming courses at ITN.

Thesis Goals

- To survey relevant e-learning systems for programming such as the multimedia systems based on the work approach of [Boyle](#) (<http://www.londonmet.ac.uk/ltri/learningobjects/index.htm>).
- To investigate the use of design patterns in designing a collection of re-usable learning objects.
- To implement an interactive system for visualization of basic programming concepts underlying the C++ language. The system should be available through a web page and allow students to test their knowledge through sets of exercises.

Qualifications

- Experienced programmer.
- Knowledge of visualization techniques.
- Knowledge of web applications development.
- Knowledge of basic design patterns.

Contact Information

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