TURTLE GRAPHICS IN JAVA

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The usage of computer graphics can very easily be justified - all the way from introduction of computers to children, through computer education and education by using computers, to entertainment and fun. Introduction of World Wide Web into everyday life and increase of the number of people, who are using it, enlarged the quantity of graphics that we are all faced with. Also, WWW induced new and powerful concept - programming language Java.

This language is interpreted, so it can be executed on any type of a machine that has its' virtual machine, which literary means "every type of machines used at universities and at home". On the other hand, it is a language whose execution is fast and powerful enough that it can cover "all" of the users' needs. One of the greatest advantages of Java is that it is already rich with built-in classes for platform independent graphical user interface. Also, it supports picture, animation, sound and net capabilities in such an easy way, that a programmer can concentrate on the real essence of a problem. Also, Java programs, by its nature, are robust and of high performance, because of multiple concurrent threads of activity in application, supported by the built-in mechanism of multithreading. An additional important moment in Java usage is "trust" and notion of security that user can have in Java application, because of built-in protection in Java run-time system.

As quite a lot of both scientific papers and teaching experience showed, usage of turtle graphics helps a lot in better understanding of some of the most difficult programming concepts, like for example, recursion, modular programming or functional programming paradigm in general, as some of the most obvious. The programming language LOGO was designed for educational purposes at Bolt Beranek and Newman INC, in Cambridge, Massachusetts, USA, in the late 1960's. The basic idea was to test whether the discipline of programming can be used to teach children some notions assumed to be hard for understanding, like for example mathematical and other abstract concepts. Yet, it has proved to be so successful, that later it became a regular part of courses for grown-ups as well, and for other programming (or other) concepts.

Rather traditional, and somewhat informal, turtle graphics is described as a process of creating a picture as a result of behavior of "an animal" (a turtle), which crawls across a sheet of paper (i.e. screen), dragging a pencil, "leaving a trail behind". Or, in other words, pictures in turtle graphics concept are drawn by drawing lines from current turtle position for a given length in a given direction.

Turtle graphics has been implemented in a Java programming language as a Java applet. The implementation of turtle graphics in Java is important because it brings the expressiveness of LOGO to Java language. Also, as a field that is to be explained is more complicated, visual methods in showing and explaining certain subjects have a greater value. Besides, implementation of turtle graphics in Java programming language, proved to be rather easy to "exploit" in everyday education, where values of individual, independent, and yet creative work will show its' result. The choice of Java programming language proved excellent, because we are dealing with a language that is portable, interpreted, high-performance, simple and object-oriented, which are all characteristics of a modern programming language of a high quality.