The Mumie
MathletFactory Tutorials

General Information

Contents

1 About this document

This document adresses to mathlet developers who wants to get familiar with the creation of mathlets using the MathletFactory's library. It does not aim to describe each single class but to illustrate the necessary techniques and philosophies for the construction of a mathlet. This technical stuff will be accompanied by comprehensive examples and hints. A complete overview of all classes can be found in the APIDOC. The use of the APIDOC will be assumed.

2 About the Mumie MathletFactory

The MUMIE is an e-learning platform specialized in mathematics and mathematical sciences. It is a fully web-based learning- and teaching environment using standard techniques (such as XHTML, MathML and Java) for deploying mathematical content to the end-user inside a standard compliant internet browser.

The MATHLETFACTORY is a Java library and part of the MUMIE in which it is used to produce and to visualize dynamic, interactive mathematical content with Java applets (so called "mathlets"). It allows the rapid development of such mathlets, containing complex mathematical algorithms and scenes along with a common generic behaviour and appearance.
The MATHLETFACTORY library contains a large collection of mathematical objects (so called MM-OBJECTS), which can be used both in calculations and presentations of dynamic problems. Their visualizations may be both symbolic and graphical (both 2D and 3D). Their state may be interactively changeable by the user and may cause further interaction between them.

The MATHLETFACTORY is developed since 2001 and released in 2007 the milestone 2.0, which has been used since then by several thousands of students at different international universities. The main development effort is actually done for the milestone 2.1 which will be released in spring 2008.

The MATHLETFACTORY library is open source and provided under the GNU Public License (GPL). It is compliant with all Java versions of SUN Microsystems and Apple Inc. starting with Version 1.4.2[1]. Further information and documentation as well as source code is available under `http://www.mumie.net`.

[1]Some additional extensions may require a newer Java version.

3 Fundamental Concepts

Generic programming of mathlets

The programming of mathlets is generic and easy to use but does not restrict the applet developer in his creativity. By automatically adding standard features to new mathlets and providing a flexible and generic applet "skeleton" the developer can concentrate on the mathematical content.
The MathletFactory library acts hereby as a reusable component system.

Separation of logic and representation

The MathletFactory follows the philosophy to separate the (abstract) mathematical object from its further representation(s) on the screen, defining a veritable Model-View-Controller architecture (MVC). By handling interactive actions (e.g. user interaction) through generic but specific *events*, changes are automatically reflected to the mathematical model and also propagated to any dependant objects, allowing even complex dependency trees.

Abstract number fields for arbitrary-precise calculations

Most mathematical objects are based on an abstract number class which makes it possible to perform calculations on a particular number field with its own arbitrary precision. While some operations need a complex number field, other situations can be more satisfied with an answer in whole numbers. Furthermore while e.g. floating point operations are executed faster than rational ones, the latter are more precise and user friendly.

Open extensible framework

The MathletFactory library offers a wide spectrum of objects for the most needed mathematical entities and applet developer's concerns but also can be extended in almost every included technology[2]. By providing an open framework and both a complete API documentation and tutorials for its techniques, the MathletFactory truly underlines its open source idea.

4 Available resources

The MathletFactory library as well as the APIDOC, examples, sources and other documentation can be downloaded from the internet site:

http://www.mumie.net

[2]Some extension features are only available in the up-coming milestone 2.1