

Processing: A Learning Environment for Creating Interactive Web Graphics

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Introduction

The Processing project introduces a new audience to computer programming and encourages an audience of hybrid artist/designer/programmers. It integrates a programming language, development environment, and teaching methodology into a unified structure for learning. Its goal is to introduce programming in the context of electronic art and to open electronic art concepts to a programming audience. Unlike other popular web programming environments such as Flash and Director, Processing is an extension of Java and supports many of the existing Java structures, but with a simplified syntax. The application runs locally and exports programs to Java applets, which may be viewed over the Internet. It is not a commercial production tool, but is build specifically for learning and prototyping.

Concept

Graphical user interfaces became mainstream nearly twenty years ago, but programming fundamentals are still primarily taught through the command line interface. Classes proceed from outputting text to the screen, to GUI, to computer graphics (if at all). It is possible to teach programming in a way that moves graphics and concepts of interaction closer to the surface. Making exercises created during learning viewable over the web supports the creation of a global educational community and provides motivation for learning. A “view source” method of programming enables the community to learn from each other.

The concept of Processing is to create a text programming language specifically for making responsive images, rather than creating a visual programming language. The language enables sophisticated visual and responsive structures and has a balance between features and ease of use. Many computer graphics and interaction techniques can be discussed including vector/raster drawing, 2D/3D transformations, image processing, color models, events, network communication, information visualization, etc. Processing shifts the focus of programming away from technical details like threading and double-buffering and places emphasis on communication.

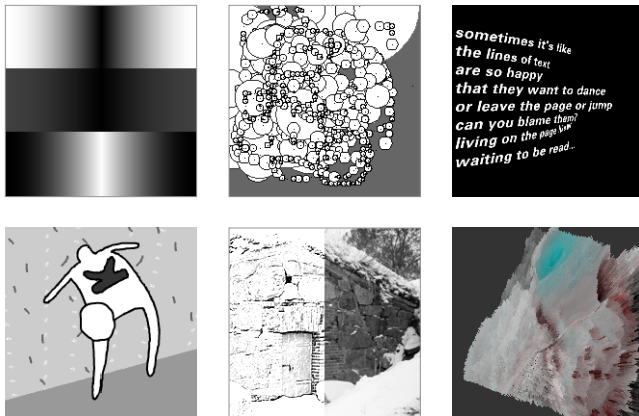


Figure 1: Example images created with Processing.

Programming Language/Environment

Processing is a Java environment which translates programs written in its own syntax into Java code and then compiles to executable Java Applet 1.1 byte code. It includes a custom 2D/3D engine inspired by PostScript and OpenGL. The software is free to use and the source code will be made public. It runs on Windows, Mac OS X, Mac OS 9, and Linux and the software

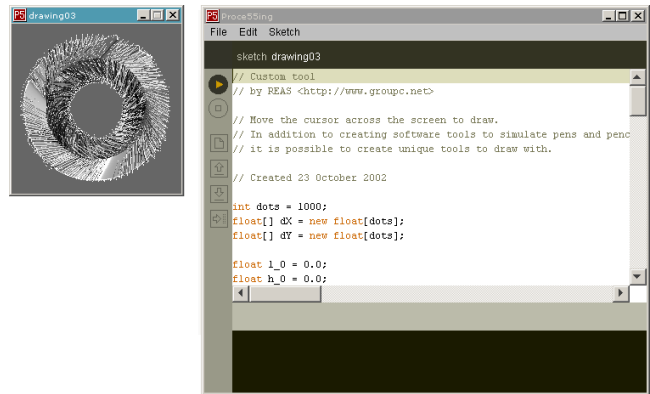


Figure 2: The Processing Development Environment.

is currently in Alpha release. The Beta release is scheduled for Summer 2003. Processing Version 1.0 focuses on teaching basic concepts of interactive networked computer graphics.

Processing provides three different modes of programming—each one more structurally complex than the previous. In the most basic mode, programs are single line commands for drawing primitive shapes to the screen. In the most complex mode, Java code may be written within the environment. The intermediate mode allows for the creation of dynamic software in a hybrid procedural/object-oriented structure. It strives to achieve a balance between features and clarity, which encourages the experimentation process and reduces the learning curve.

Skills learned through Processing enable people to learn languages suitable for different contexts including web authoring (ActionScript), networking and communications (Java), micro-controllers (C), and computer graphics (OpenGL).

Networked Learning

The Processing website houses a set of extended examples and a complete reference for the language. Hundreds of students, educators, and practitioners across five continents are involved in using the software. An active online discussion board is a platform for discussing individual programs and future software additions to the project. The software has been used at diverse universities and institutions in cities including: Boston, New York, San Francisco, London, Paris, Oslo, Basel, Brussels, Berlin, Bogota (Colombia), Ivrea (Italy), Manila, and Tokyo.

See also: <http://www.proce55ing.net>