Tutorial II
Prograph CPX: Visual Programming
Applied to Industrial Software Development
Philip Cox, Pictorius Inc.

Visual Programming as a research topic is still very young, having been aggressively pursued for less than 15 years. However, the arrival and proliferation of graphics-based hardware and operating systems in the mid 80's, and the subsequent almost universal adoption of graphical user interfaces, has focused attention on the role of graphics in computing. In particular, major software and hardware companies are intensely interested in using computer graphics and visualisation to make software design and production faster and cheaper. Prograph CPX is the latest implementation of Prograph, a visual, dataflow, object-oriented programming language resulting from a visual programming research project at Acadia University and the Technical University of Nova Scotia. Prograph CPX is intended for commercial application development, and as such provides modularisation mechanisms, debugging tools, an application framework, support for group development, compilation and so forth.

Contents
This tutorial begins by introducing the Prograph language. First we will consider the Prograph model of data flow programming, showing how it differs from the standard data flow models. Second we investigate the visual representation of single-inheritance object-orientation supported in the language and how it is incorporated into the data flow model. Several examples will be presented to show how familiar algorithms are "coded" in this style, and how visual representations of execution can be used to assist the debugging process. In presenting the examples, we will demonstrate features of the Prograph CPX environment. In particular, we will show how the functionality can be extended by adding tools and object editors, and how the simultaneous building and running of applications leads to a productive, top-down development style. To complete our overview of Prograph CPX, we will investigate its application framework, consisting of a library of approximately 150 Application Building Classes (ABCs), together with an approximately equal number of classes that implement high-level object editors for the ABCs.

Outline
- The Prograph model of data flow programming
- Visual representation of object-orientation
- Visualisation of execution for debugging
- Extending functionality with tools and editors
- The application framework: very high level component assembly
- The near future: crossplatform application development

Who should attend?
This tutorial is intended for individuals who are interested in visual programming not only as a research topic, but also in its practical application to commercial software development. It is also suitable for those who need a vehicle for teaching visual programming, object-oriented design and application frameworks.

Speaker Biography
Philip Cox is the founder and President of Pictorius Incorporated, developers of Prograph CPX and related products. Prior to this he held faculty positions at the universities of Waterloo, Toronto, Auckland, Acadia University, and most recently the Technical University of Nova Scotia, where his joint research with T. Pietrzykowski on visual programming led to the design of the Prograph language. Dr. Cox holds a PhD in Computer Science from the University of Waterloo, and an MSc in Pure Mathematics from the University of Auckland. His research has concentrated on graph-based mechanical deduction systems, intelligent backtracking, logic programming, abductive inference, mechanical diagnosis, and visual programming.

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