CS 535 Object-Oriented Programming & Design
Fall Semester, 2003
Doc 1 Introduction
Contents

References

VisualWorks Application Developer's Guide, doc/vwadg.pdf in the VisualWorks installation. Chapter 1 The VisualWorks Environment.

Smalltalk Best Practice Patterns, Kent Beck

Object-Oriented Design Heuristics, Arthur Riel

Software Productivity Research, Inc. (www.spr.com)

Introduction

Goal

Understand how to use classes & objects in code

Syntax of language is easy

How to create code that is:

- Understandable
- Modifiable
- Maintainable
- Reusable

Main Idea in Object-Oriented Programming

Related data and operations belong together

Design Heuristic 3.3

Beware of classes with many public accessor methods

Many accessors indicate that related data and behavior are not being kept in one place

Kent Beck's Indicators of Good Style

Once and only once

Don't repeat

- Logic
- Methods

Lots of little pieces

Rates of change

Don't put two rates of change together

Don't mix variables that change hourly with those that change monthly

Why Smalltalk

- Best language to learn object-oriented thinking
- Productivity Gains

Software Productivity Research Study

Language	Lines of code/function point
Smalltalk	21
Ada 95	49
Java	53
C++	53
COBOL	107
C	128

Why Smalltalk

- Experience with dynamic typed language
- Reading Code
- Tool Support in software development

Learning Smalltalk

- Smalltalk language syntax

  While Smalltalk syntax is simple it is not like C/C++/Java

- Smalltalk Programming Environment

  Requires more effort to learn at first, but worth the effort

- Smalltalk Class Library

  Smalltalk has a large library of useful code

  Don't code without it

- Object-oriented thinking

  This is the hardest part

- Smalltalk culture

  Smalltalker's have standard ways to code & solve problems

  See Smalltalk Best Practice Patterns by Kent Beck

Some History

1967 Simula-67

Language developed in Norway for simulations

Use classes and objects

Late 1960's Alan Kay – Father of Personal Computer

Kay Ph. D. thesis addresses the question:

How will we interact with notebook size computers?

Dynabook

1970-80 Xerox Parc

Alan Kay, Dan Ingalls, Ted Kaehler and others work on Smalltalk

Small – Originally for children

talk - Code is to communicate

Smalltalk Influences

Object-Oriented Programming

GUI

- Macintosh
- Windows

Refactoring

Extreme Programming

Versions of Smalltalk

VisualWorks

VisualAge for Smalltalk

Squeak

Dolphin
Smalltalk MT

Smalltalk X

Smallscript (.NET Smalltalk)

PocketSmalltalk

Smalltalk & Bytecode

Smalltalk is compiled to a bytecode for a virtual machine

Bytecode is same on all machines

VisualWorks has VM's for:

- Windows
- Macintosh
- Unix

VisualWork's virtual machine (VM) uses a JIT to compile bytecodes

Just-in-time compilers (JIT)

- Compile bytecode to native machine code
- Cache the native machine code
- Run the native machine code
- Usually runs faster than interpreting bytecode

Smalltalk started using just-in-time compilers in early 1980s

VisualWorks
Parts of VisualWorks

Executable Virtual Machine (visual, visual.exe)

This is the VM that interprets Smalltalk bytecode

visual.sou

Source code for most of class library

visual.cha

Source code for changes & new classes
Does not exist until after you first use VisualWorks

visual.im

Bytecode of sources that are executed

At first the image will appear to be an IDE for Smalltalk

parcels

Code bundles

Starting VisualWorks

See the class wiki for instructions on downloading VW 7.1

Before Starting VisualWorks

Before you start VisualWorks make a copy of visual.im

You will need it later

Starting VisualWorks on Windows

Method 1

Drag and drop the image file on the Visual application or visual.exe

Method 2

Double click on the image file

The first time you do this you may get a dialog asking for the application to run the image. Select visual. You will have to find it first. It is in the bin directory.

Starting VisualWorks on Macintosh

Method 1

Drag and drop the image file on the visual application

Method 2

Double click on the image file

Starting VisualWorks on UNIX

Type:

visual imageFilename &

where you need to replace imageFilename with the actual name of the image file you wish to run

You path has to be set to include the program visual

VisualWorks on Rohan

Image requires ~9MegBytes of disk space

Copy /opt/vw71nc/image/visualnc.im to a local directory

Change permissions so you have write permission on the local copy

Set the VISUALWORK environment variable

setenv VISUALWORKS /opt/vw71nc (csh or tcsh)

set VISUALWORKS='/opt/vw71nc' (sh)

Add the following to you path

/opt/vw71nc/bin/solaris

To start the image:

visual imageName

Some VisualWorks Environment

VisualWorks uses three logical buttons

- **Select** button
  Selects objects and text

- **Operate** button
  Opens a menu with context-sensitive commands

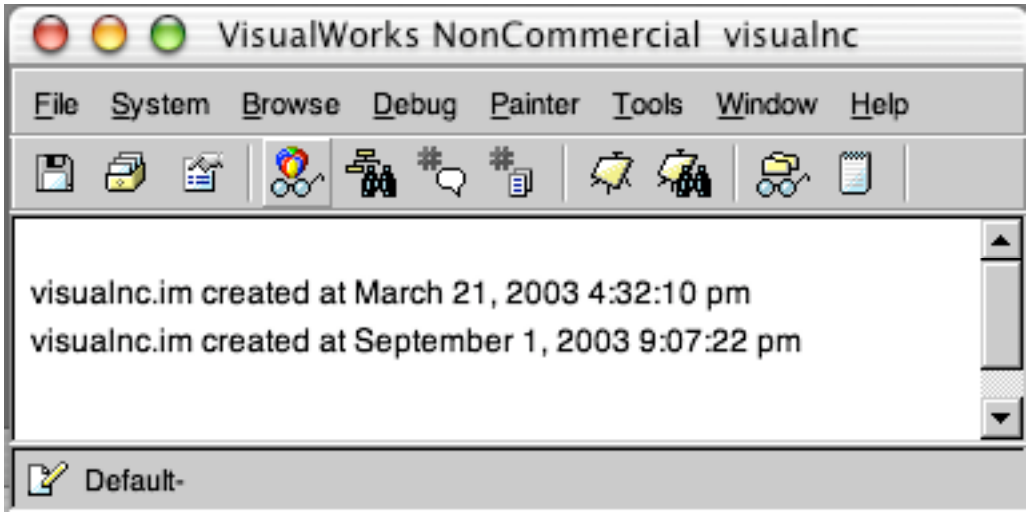
- **Window** button
  Opens a menu with window commands

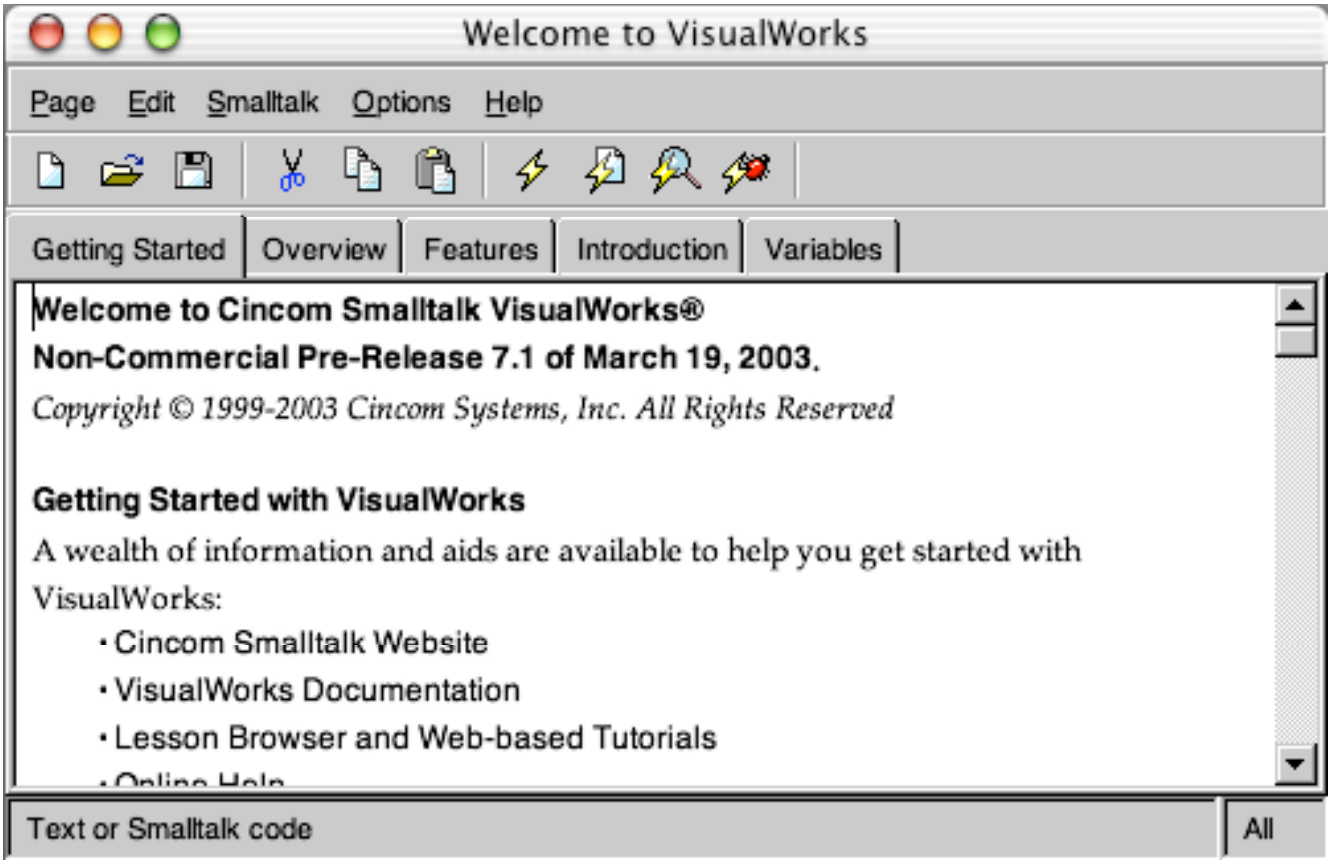
Mapping Logical to Physical Mouse Buttons

	3-Button	2-Button	1-Button
Select	Left button	Left Button	Button
Operate	Right button	Right button	Ctrl+Button
Window	Middle button	Ctrl+Left button	command+Button

You should perform the action described in the next few pages. One learns what one does.

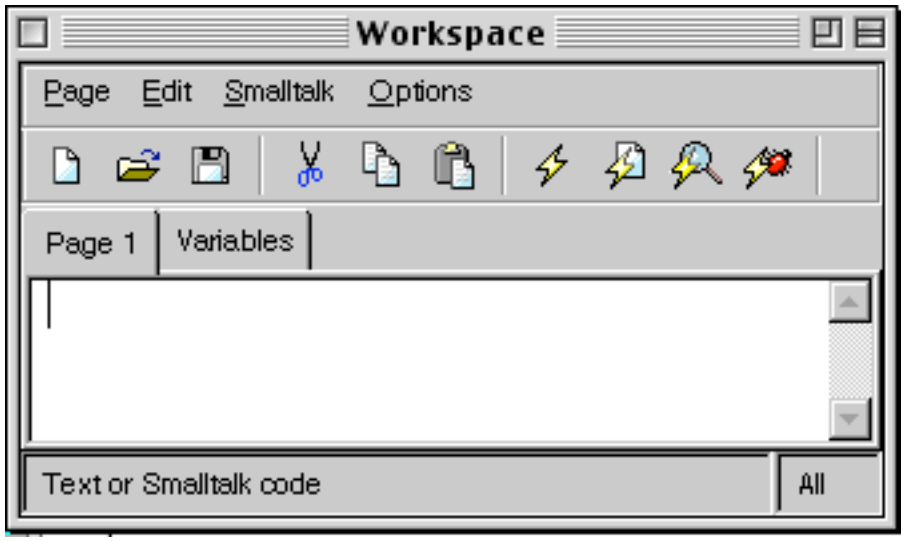
Windows on Startup
Launcher





Ivan Tomek's Introduction is a good way to start to learn about Smalltalk

Workspace



 Do it (ctrl-d)
Compile and execute the selected code

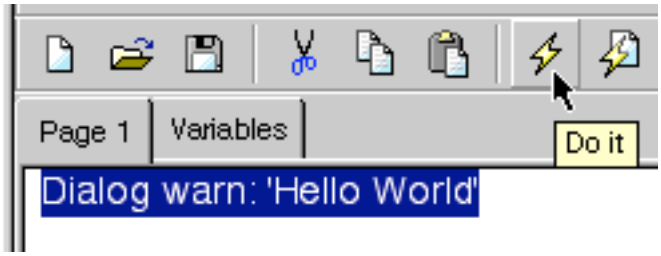
 Print it (ctrl-p)
Same as "do it" but also prints the result of running the code

 Inspect it (ctrl-i)
Same as "do it" but also opens an inspector window on the result of running the code

 Debug it (ctrl-d)
Opens the debugger to allow you to step through the selected code. We will cover the debugger later.

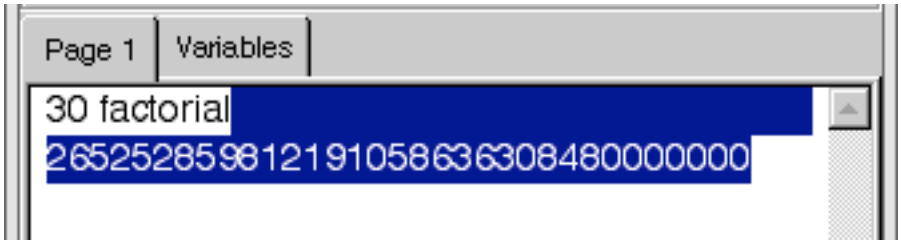
Examples

Do it

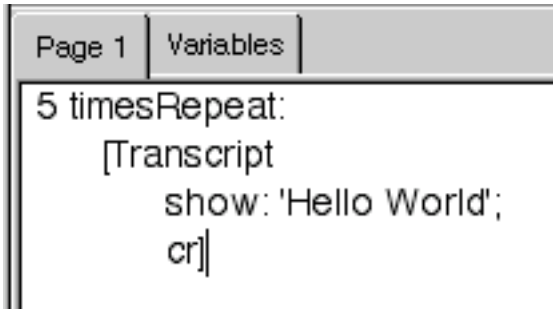


Print it

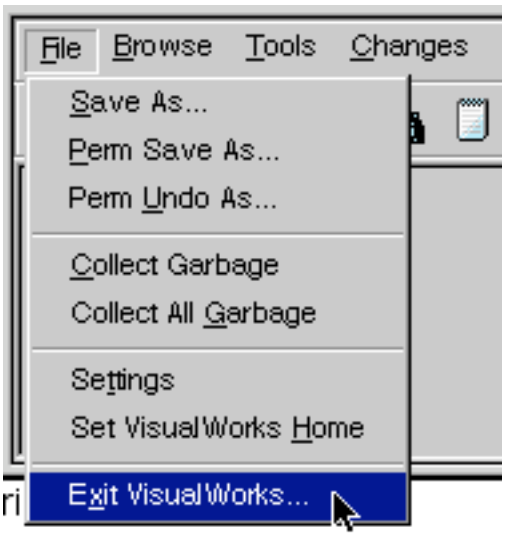

Page Edit Smalltalk Options
Page 1 Variables
30 factorial

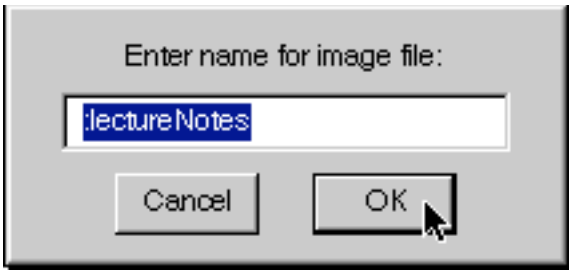

Page 1 Variables
30 factorial
265252859812191058636308480000000

Using the Transcript



Exiting from VisualWorks





Some Text Editing Short Cuts

Selection shortcuts (double click)

To select text, use the following double-click shortcuts.
Double-click at start or end of a window to select all text in the window.
Double-click at start of line to select the line. Does not work on the first line.
Double-click at end of line to select the line. Does on work on the last line.
Double-click just after an opening (or just before the closing) of ' or [or (or " selects all text surrounded by the symbols.
Double-click inside a word or selector to select the word or selector.

Ctrl keys

Press at the same time the control key and the second key to:

<Ctrl> f inserts ifFalse: into the text.
<Ctrl> t inserts ifTrue: into the text.
<Ctrl> g inserts := into the text.
<Ctrl> d inserts today's date into the text.
<Ctrl> s (search or find) finds the next instance of the string in your copy buffer (last copied or cut string)
<Ctrl> e (replace) opens a replace dialog
<Ctrl> a (find) opens a find dialog
<Ctrl> c is equivalent to Copy,
<Ctrl> z will Undo the most recent text change,
<Ctrl> v is equivalent to Paste

ESC keys

Press and release the ESC key then press the second key to:

ESC b changes the selected text to bold.
ESC i changes the selected text to italic.
ESC u underlines the selected text.
When the letter is uppercase (B, I, U), the effect is reversed: ESC U removes underline, etc.
ESC + increases the font size of the selected text
ESC - decreases font size of the selected text
ESC followed by < or ' or " or [or (adds surrounding < ' " [(to the selected text.
ESC followed by <tab> selects the text just typed in
ESC x removes style changes to current selection and returns to default font.