
Object-Oriented Programming and Design

a Practical Approach with Smalltalk

University of Neuchatel
2002-2003

ducasse@iam.unibe.ch

<http://www.iam.unibe.ch/~ducasse/>

Thanks

- Some of the material has been taken from the lectures of
 - Ralph Johnson (University of Illinois)
 - Carinne Lukas (University of Brussels)
 - Roger Withney (University of San Diego)

I want to thank them for providing their lectures material. This current lecture is also free. Use, change it as much as you want, but please report bugs to me.

Goals

- Learn how to model world with objects
- Learn how to design for reuse
- Learn Smalltalk
 - Learn a set of tools and components
 - Learn a new culture
- Have fun

Wiki of the Lecture

- <http://scgwiki.iam.unibe.ch:8080/LOO/>
- You can edit the pages
- You will put the stuff you should give us
- You will find all the information for the lectures
- And more
- The Wiki and the webserver are written in Squeak
- Squeak mailing-list (www.squeak.org)
- French Smalltalk mailing-list
www.squeakfoundation.org
(squeak-fr@lists.squeakfoundation.org)

Other sources of information

- Lectures on Smalltalk
 - www.iam.unibe.ch/~ducasse/
- Lectures of Ralph Johnson
 - <http://st-www.cs.uiuc.edu/users/cs497/lectures.html>
 - Yes one of the Gang of Four Book (Design Patterns) is a Smalltalk Guru!!
- Lectures of Roger Withney
 - <http://www.eli.sdsu.edu/courses/spring01/cs635/index.html>

Web Resources

Local Website

<http://www.iam.unibe.ch/~scg/Resources/Smalltalk/>

<http://www.iam.unibe.ch/~ducasse/PubHTML/Smalltalk.html>

Local Wiki:

<http://scgwiki.iam.unibe.ch:8080/SmalltalkWiki/>

Cincom Smalltalk

<http://www.cincom.com/smalltalk/>

Squeak

<http://www.squeak.org/>

<http://www.cc.gatech.edu/squeak.1>

Dolphin Smalltalk

<http://www.object-arts.com/Home.htm>

<http://www.smalltalk.org>

<http://www.goodstart.com/index.shtml>

<http://st-www.cs.uiuc.edu/>

VisualWorks Wiki

<http://brain.cs.uiuc.edu/VisualWorks/>

VisualAge Wiki:

<http://brain.cs.uiuc.edu/VisualAge/>

Newsgroup:

comp.lang.smalltalk

ESUG

<http://www.esug.org/>

BSUG

<http://www.bsug.org/>

GSUG

<http://www.gsug.org/>

SSUG

<http://www.iam.unibe.ch/~ssug/>

Why Smalltalk?

- Pure object-oriented language
- Uniform
- Simple
- Powerful
- Dynamically typed (no type coercion...)
- No primitive types
- Syntax simple so force to think !!!!!
- Discuss design, OO modeling and not syntax!!

Why Smalltalk?

- Object Culture
- Environment completely written in Smalltalk
- Powerful development tools
 - Refactoring Browser
 - SUnit
- Copied everywhere (collections, debugger,...)

- Important knowledge for meta-modeling
 - *OMG Model Driven Architecture, MOF...*
- Good to model real world applications
 - UPS packet Tracking
 - www.ezboard.com
 - UBS, Mobiliar and other banking applications

Squeak?

- Pros

- Developed by the inventors of Smalltalk
- Open source
- Fun
- Multimedia, 3D, Sounds,....

- Cons

- You may think that Smalltalk is not serious
- Code is sometimes not so good

Books on Design

- Object-Oriented Design Heuristic, Arthur Riel
- Refactoring: Improving the Design of Existing Code by Martin Fowler
- Smalltalk by Example, Alec Sharp
- The Smalltalk Design Pattern Companion S.Alpert, K.Brown and B.Woolf
- Best Smalltalk Practices, K. Beck

Books on Smalltalk

- *Smalltalk by Example*, Alec Sharp
 - Pdf at:
<http://www.iam.unibe.ch/~ducasse/WebPages/FreeEBooks.html>
- *Best Smalltalk Practices*, K. Beck
- *Smalltalk Pattern Design Companion*, S. Alpert, K. Brown and B. Woolf
- *Squeak*, X. Briffault, S. Ducasse (fr)

Books for Starting

- On To Smalltalk, P. Winston, Addison-Wesley, 1998, 0-201-49827-8
- Smalltalk by Example : The Developer's Guide, A. Sharp, McGraw Hill, ISBN: 0079130364, 1997
 - <http://www.iam.unibe.ch/~ducasse/FreeBooks.html>
- Smalltalk: an Introduction to application development using VisualWorks, T. Hopkins and B. Horan, Prentice-Hall, 1995, 0-13-318387-4
- Joy of Smalltalk, Ivan Tomek
 - [Http://brain.cs.uiuc.edu/VisualWorks/Joy+of+Smalltalk](http://brain.cs.uiuc.edu/VisualWorks/Joy+of+Smalltalk)
- Chamond, Liu, Smalltalk, Objects, and Design, iUniverse.com, ISBN: 1583484906, 2000.

Advanced

- Smalltalk Best Practice Patterns, K. Beck, Prentice Hall, 1997, ISBN 0-13-476904-x
- The Design Patterns Smalltalk Companion, S. Alpert and K. Brown and B. Woolf, Addison-Wesley, 1998, 0-201-18462-1
- Smalltalk with Style, S. Skublics and E. Klimas and D. Thomas, Prentice-Hall, 1996, 0-13-165549-3.
- The Smalltalk Developer's Guide to VisualWorks, T. Howard, Sigs Books, 1995, 1-884842-11-9
- Mastering Envy/Developer, A. Knight, J. Pelrine, and A Chou., SIG Press.

Other References (II)

- The Taste of Smalltalk, T. Kaehler and D. Patterson, Norton, 0-393-95505-2, 1985
<http://www.iam.unibe.ch/~ducasse/FreeBooks.html>
- Smalltalk The Language and Its Implementation, A. Goldberg and D. Robson, 0-201-11371-6, 1982 (called The Blue Book contains the original VM description
- <http://users.ipa.net/~dwighth/smalltalk/bluebook/>),
- To understand the language, its design, its intention....
 - Peter Deutsch, The Past, The Present and the Future of Smalltalk, ECOOP'89
 - Byte 81 Special Issues on Smalltalk (read Dan Ingalls paper on language intent)
 - Alan Kay, The Early History of Smalltalk, History of Programming Languages, Addison-Wesley, 1996

In French

- Smalltalk, programmation orientée objet et développement d'applications, X. Briffault and G. Sabah, Eyrolles, Paris. 2-212-08914-7
- Squeak, X. Briffault and S. Ducasse, Eyrolles, 2002.
- (really old) ...Dugerdil, Press romandes.

Commercial Smalltalks

- Smalltalk-80 -> ObjectWorks -> **VisualWorks**
by (ParcPlace -> ObjectShare->Cincom)
 - mac, pc, hp, linux, unix
 - www.cincom.com/visualworks/
- IBM Smalltalk (pc, unix, aix...)
 - www.software.ibm.com/ad/smalltalk/
- **VisualAge** = IBMSmalltalk + Envy (OTI -> IBM)
- Smalltalk-V (virtual) -> Parts -> VisualSmalltalk by (Digitalk -> ObjectShare)

Commercial Smalltalk

- **Smalltalk Agents (Mac)** www.quasar.com
-> **SmallScript** www.quasar.com (.Net, PC and Mac)
- **Smalltalk MT (PC, assembler)**
- **Dolphin Smalltalk (PC)**
- www.object-arts.com/Home.htm
- **Enfin Smalltalk -> Object Studio (Cincom)**
www.cincom.com/objectstudio/

Free Smalltalks

- Non Commercial versions
 - VisualAge is free for University:
www.software.ibm.com/ad/smalltalk/education/univagr.html
 - Dolphin Smalltalk on PC (version 2 and not the last version)
www.object-arts.com/Home.htm
 - VisualWorks7.0 has a non-commercial version
www.cincom.com/smalltalk/
- Free
 - Smalltalk/X (free, PC, Linux, Unix)
 - > www.exept.de/ (run java byte code into Smalltalk VM)
 - Smalltalk/Express (free now but not maintained anymore)
- Open Source
 - Squeak www.squeak.org/
 - Gnu Smalltalk www.gnu.org/smalltalk/
 - Fscript (mac OSX) www.fscript.org/

Team Development Environments

- Envy (OTI) most popular, available for VisualWorks until VW5i
- VSE (Digitalk), (not available)
- TeamV, (not available)
- Store for VW7 (new Objectshare)
- ObjectStudio v6 (similar to Envy)

Challenges of the Lectures

- To learn Squeak one must master:
 - Smalltalk language syntax
 - While Smalltalk syntax is simple it is not like C/C++/Java
 - Change your mind for a better world
- Squeak Programming Environment
 - Requires more effort to learn at first, but worth the effort
- Squeak Class Library
 - Squeak 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

Lecture Outline

- Learning by Immersion in Smalltalk
- What is OOP?
- Key concepts
- Smalltalk syntax,
- Smalltalk OOP Model
- How to good OO code?
- Design Heuristics
- Most Common Design Mistakes
- Refactoring
- Testing