Applications

Since its creation in the early 1980s, Smalltalk has been widely used in academic research as well as in commercial applications. Here are some current Smalltalk applications that are advancing the state of software.

Teaching: EToys (Squeak), SqueakBot, BotsInc, Scratch...

Multimedia: Sophie, OpenCroquet, Plopp...

Web development: Seaside, Aida, Komanche, Swazoo...

Persistence management: object oriented databases (Magma, GemStone), relational databases (MySQL, PostgreSQL), object relational mapping (Glorp).

Etoys and DrGeo on an OLPC

Glossary

Image: The Smalltalk environment contains a persistent object store, the image. This contains application code (classes and methods), objects holding application state and can even include the development tools to inspect and debug the program while it is executing.

Virtual Machine: A virtual machine is a program which is capable of executing other programs. It eases application portability.

Reflection: A language is said to be reflective when it contains mechanisms to inspect and modify code during a program execution.

Dynamic typing: Some languages force the developer to indicate the type of each variable (integer, string...); this is called static typing. Dynamic typing does not impose this constraint, and so makes programs more reusable and easier to change.

Books

- Numerous free books:
  `http://stephane.ducasse.free.fr/FreeBooks.html`
- Smalltalk in general
  - *Smalltalk with Style*
    (Edward Klimas, Suzanne Skublics and David A. Thomas, free)
  - *Smalltalk by Example: the Developer's Guide* – (Alec Sharp, free)
- Squeak in particular
  - *Squeak by Example* – (2007, free)
  - *Powerful Ideas in the Classroom*
    (BJ Allen-Conn and Kim Rose)

Events

- European Smalltalk User Group conferences (ESUG). Since 1993, industrial and academic Smalltalkers meet in an European country.
  `http://www.esug.org/conferences`
- Annual conference, organised in North America by the STIC (`http://www.stic.st`), an association with industrial actors and Smalltalk editors.
  `http://www.smalltalksolutions.com/`

Internet

- Official Squeak website:
  `http://www.squeak.org`
- Wiki:
  `http://wiki.squeak.org`
- News:
  `http://news.squeak.org`

Smalltalk

a programming language
purely **object oriented**
and a **dynamic** environment

EUROPEAN SMALLTALK USER GROUP
esug
www.esug.org

Smalltalk important concepts

Smalltalk is an *object-oriented*, *dynamically-typed* language, with a simple syntax which can be learnt in *fifteen minutes*. Its main advantage comes from the fact that it is *very consistent*:

- everything is an object: classes, methods, numbers, etc.
- a small number of rules, and no exceptions!

Smalltalk runs in a *virtual machine*. Development takes place in an *image* in which all objects live and are modified.

Smalltalk syntax

Reserved words	
`nil`	undefined object (default variable values)
`true` and `false`	boolean objects
`self`	current object
`super`	current object in the super class context
`thisContext`	run-time stack of the current method

Reserved characters	
`:=` (or ←)	assignment
`^` (or ↑)	return a result from a method
`| var1 var2 var3 |`	declaration of three temporary variables
`$a`	character `a`
`#(abc 123)`	array containing two literals: the symbol `#abc` and the number 123
`.` (period)	terminate expressions
`;`	message cascade
`[ ]`	code block (it's an object !)
`"comment"`	
`'string'`	

Message sending

A method is called by sending a message to an object, the message receiver; the message returns an object. The message is based on natural language, having a subject, a verb and complements. There are three message types: unary, binary and keyword.

Unary messages. A unary message is one with no arguments.

```
array := Array new.
array size.
```

The first example creates and returns a new instance of the Array class, by sending it the message `new`. The second example asks for the size of this array which returns `0`.

Binary messages. A binary message takes only one argument, is named by a symbol and is often used for arithmetic expressions.

```
3 + 4.
'Hello', ' World'.
```

The `+` message is sent to the object 3 with 4 as a parameter. In the second case, the message `,` is sent to the string `'Hello'` with `' World'` as a parameter.

Keyword messages. A keyword message can take one or more arguments. The arguments are inserted between each keyword, after each colon.

```
'Smalltalk' allButFirst: 5.
3 to: 10 by: 2.
```

The first example calls the method `allButFirst:` on a string and pass the argument `5`. The method returns the string `'talk'`. The second example returns a collection containing elements 3, 5, 7 and 9.

Block

Blocks are objects containing code that is not executed immediately. They are the basis for control structures like conditionals or loops. Also, blocks can be used to attach behavior, e.g., to menu items.

```
#('Hello ' 'World')
       do: [:string | Transcript show: string].
```

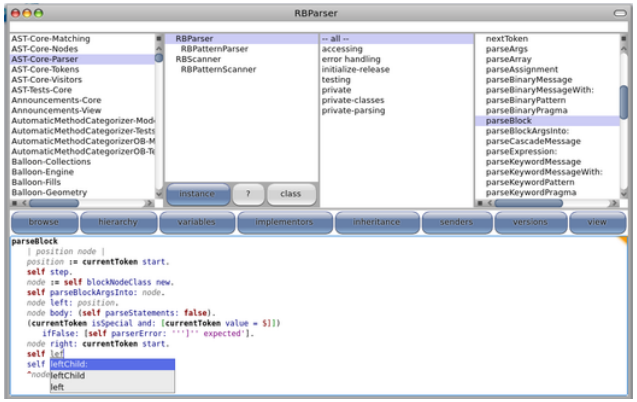
The example sends the message `do:` to an array of strings with a block as a parameter. The block is evaluated once for each element in the array. The block parameter `string` contains each element of the array, one after the other. As a result of the whole expression, the strings `'Hello '` then `'World'` are displayed in the transcript.

Development environment

Most Smalltalk implementations come with an integrated development environment that allows you to browse the source code and to interact with objects. Lots of tools are available, all implemented in Smalltalk thanks to a reflection API:

- a class and method browser;
- refactoring tools;
- object inspectors;
- a debugger;
- release management and version control tools;
- and much, much more!

Code can be inspected and evaluated directly in the image, using simple key combinations and full menus.



The Pharo code browser

Implementations

There are a number of Smalltalk implementations available:

Squeak & Pharo: free, open-source and multi-platform implementations. Actively developed.

VisualWorks: proprietary and multi-platform, freely available for non commercial use.

Gemstone: proprietary implementation which includes an highly efficient object database.

And others: GNU Smalltalk, Smalltalk/X, SyX, VA Smalltalk, Dolphin...