

The State of Stratego/XT

Sixth Stratego User Days (SUD 2005)

Martin Bravenboer, Karl Trygve Kalleberg, Rob Vermaas, Eelco
Visser

Institute of Information & Computing Sciences
Utrecht University,
The Netherlands

May 3, 2005

0.14

0.14

- ▶ 3.5 months
- ▶ 54 issues
- ▶ 231 commits
- ▶ `--dr new` is now default
- ▶ hierarchical library
- ▶ no bootstrapped sources in svn
- ▶ `pkg-config`
- ▶ ...and much more!

Utrecht

- ▶ Eelco Visser – Stratego Language and Compiler
- ▶ Karina Olmos – Octave, Tiger
- ▶ Martin Bravenboer – Dryad, Stratego/XT
- ▶ Rob Vermaas – Octave, Dryad, Stratego/XT
- ▶ Eelco Dolstra – Nix Buildfarm and all-round guru

- ▶ Master Students: René de Groot – JavaBorg, Mart Kolthof – CIL, Vectorization, Huanwen Qu – ?, Jory van Zessen – LVM

Utrecht/Bergen (Norway)

- ▶ Magne Haveraaen
- ▶ Anya Helene Bagge – MetaStratego, Codeboost
- ▶ Karl Trygve Kalleberg – Spoofox, Meta/AspectStratego

People: What are others doing?

EPITA (France)

- ▶ Akim Demaille, Valentin David, Clément Vasseur, Julien Roussel, Nicolas Despres, ChoJin, Alexandre Borghi, Renaud Durlin, Olivier Gournet, Thomas Largillier, Nicolas Pouillard, ...?
- ▶ C and C++, attribute grammars, extended SDF

Université René Descartes (Paris 5, France)

- ▶ Mikal Ziane and Salima Chantit
- ▶ Refactoring, bad smells, Java

TUE (The Netherlands) / Moskou

- ▶ Yaroslav Usenko and others
- ▶ muCRL linearizer

People: What are others doing?

Lucent / Bell Labs

- ▶ Daniel Waddington, Bin Yao, Ramesh Viswanathan
- ▶ Proteus (C transformation system)
- ▶ Harsha Nagesh, Pankaj Risbood – Evaluating

OGI (Oregon, USA)

- ▶ Dick Kieburtz – Theorem prover for Programmatica

DIKU (Copenhagen, Denmark)

- ▶ Julia Lawall
- ▶ Evaluating Stratego for use in Tarantula (driver evolution)

University of Waterloo (Canada)

- ▶ Language extension projects by students

Dynamic rules

- ▶ scope labels, `:+`. `bagof-R` and `bigbagof-R`
- ▶ boolean operations, `changesets`
- ▶ dependencies

⇒ talk by Eelco Visser

Modules

- ▶ hierarchical module names
- ▶ ongoing work: design of module system

Aspect Stratego

⇒ talk by Karl Trygve Kalleberg

Sugar

- ▶ `if s then s (else s)? end`
- ▶ `switch s (case s : s)* (otherwise : s)? end`

Separate compilation

- ▶ XTC programs
- ▶ Fixes for Mac OS X
- ▶ Supported by stand-alone compiler
- ▶ Detection of redefinition

Usability

- ▶ Reporting of parse errors
- ▶ Report of ambiguities in concrete object syntax
- ▶ Disable heuristic SGLR filters
- ▶ `--xtc-repo`

Ongoing work: strc-core

- ▶ Definition of core language
- ▶ Representation of annotations
- ▶ Refactoring and cleanup

- ▶ SSL to Stratego Library
- ▶ Hierarchical structure

```
collection
  /hash-table
  /list
  /set
  /tuple
```

```
lang
```

```
strategy
  /general
  /pack
  /traversal
```

```
system
  /io
  /posix

term

util
  /config
```

term/string/newname

```
<newname> "var" // produces "var_0"  
<newname> "var" // produces "var_1"
```

collection/hash-table/common

```
new-hashtable  
hashtable-put(|key, value)  
hashtable-get(|key)
```

collection/set/indexed

```
new-iset  
iset-add(|t)  
iset-contains(|t)  
iset-values
```

Concrete Syntax

- ▶ Major cleanup and update of SDF in Stratego/XT
- ▶ `sglri`
fancy error reporting at command-line
- ▶ `pack-sdf`
usability: module names, include mechanism
- ▶ `sdf2parenthesize`
parenthesizer based on associativity and priorities in SDF
- ▶ `parse-unit`
concrete syntax, usability
- ▶ `asfix-anno-comments`
comment preserving transformations

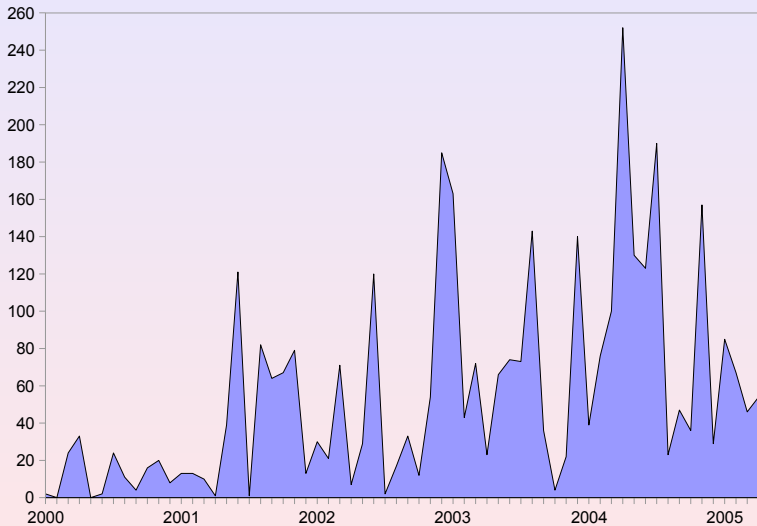
Abstract syntax

- ▶ Introduction of `stratego-regular`: `rtg`
- ▶ `format-check` – visualization, performance
- ▶ `xml2aterm` and `aterm2xml` – conversion & roundtrip

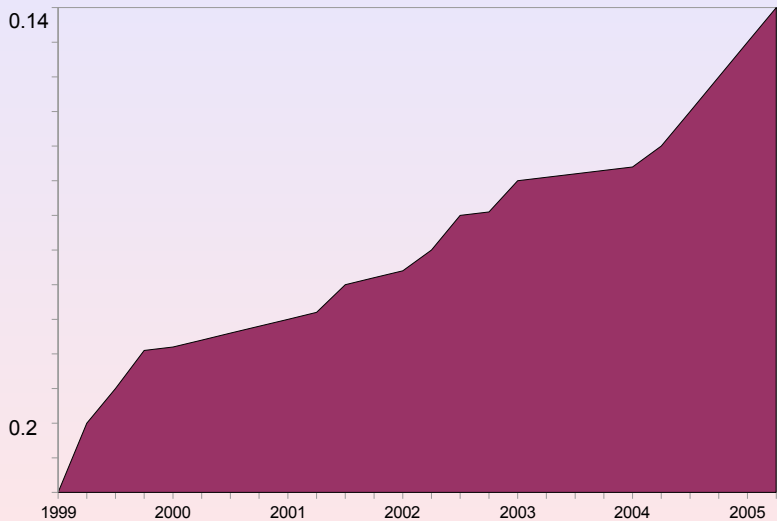
News: Development and Deployment

- ▶ JIRA issue tracking
- ▶ Nix Buildfarm
 - ▶ Continuous distribution
 - ▶ Nix channels, RPMs
- ▶ Cygwin and Mac OS X Support
- ▶ Bootstrapping: baseline Stratego/XT
- ▶ Separate Stratego/XT Utils
- ▶ Shared libraries - Libtool
- ▶ pkg-config
 - ▶ Forward compatible `Makefile.xt`
 - ▶ Implicit configuration
- ▶ Build-time XTC repositories
 - ▶ Uninstalled packages (check without install)

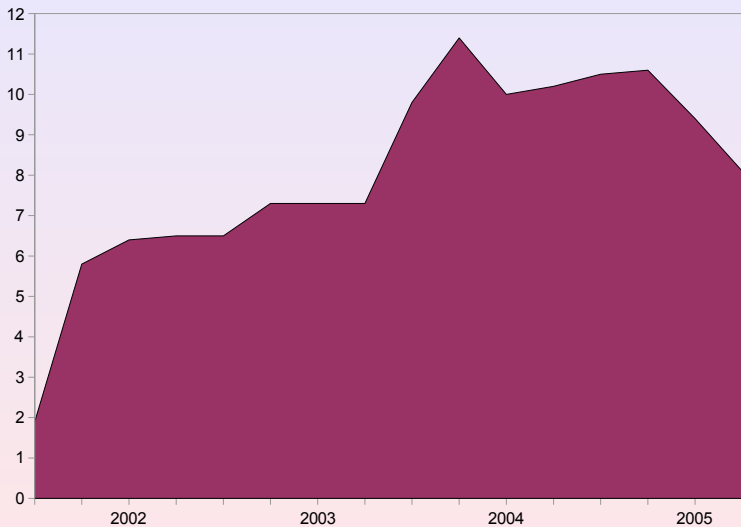
Statistics: Number of Commits



Statistics: Releases



Statistics: Size of Sources



- ▶ API documentation
 - ▶ xDoc
 - ▶ Usability of API docs
 - ▶ Hierarchical modules
 - ▶ Continuous update
 - ▶ Stratego Library, XTC, Dryad
- ▶ Stratego/XT Manual
 - ▶ DocBook
 - ▶ More structure than Wiki
 - ▶ Mixture of languages, examples, tools
 - ▶ Contiguously build
- ▶ Publications
 - ▶ Dynamic rules, Concrete Object Syntax, Aspect Stratego

Language

- ▶ Program Transformation with Scoped Dynamic Rewrite Rules.
Fundamenta Informaticae: Special Issue on Program Transformation
- ▶ Composing Source-to-Source Data-Flow Transformations with Rewriting Strategies and Dependent Dynamic Rewrite Rules.
International Conference on Compiler Construction (CC'05)
- ▶ Combining Aspect-Oriented and Strategic Programming.
International Workshop on Rule-Based Programming (RULE'05).

Surveys

- ▶ A Survey of Strategies in Rule-Based Program Transformation Systems.
Journal of Symbolic Computation special issue on Strategies in Rewriting and Programming

Applications

- ▶ Transformers: a C++ program transformation framework
Technical report – EPITA Research & Development Laboratory
- ▶ Concrete Syntax for Objects. Domain-Specific Language Embedding and Assimilation without Restrictions
Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'04)
- ▶ Retrofitting the AutoBayes Program Synthesis System with Concrete Object Syntax.
Domain-Specific Program Generation: International Seminar, Dagstuhl (LNCS)

Master course on program transformation using Stratego/XT

- ▶ 10 weeks, 2 lectures per week
- ▶ 5 weeks: learn Stratego/XT
- ▶ 5 weeks: project

Challenging projects:

- ▶ Java refactoring: extract method
- ▶ Java bytecode obfuscation
- ▶ Java inner class lifting (lambda lifting)
- ▶ Driver evolution (Tarantula)
- ▶ SubJ – Subject Oriented Java Composition
- ▶ Compilation of embedded XPath (Java)

- ▶ **Transformers** – C and C++
- ▶ **Codeboost** – C++
- ▶ **Dryad & Java Front** – Java
- ▶ **Octave Compiler** – Octave
- ▶ **Tiger Compiler** – Tiger compiler and examples

Program transformation framework for the C and C++

- ▶ Transformers 0.3 (for Stratego/XT 0.14)
- ▶ ISO standard grammars
- ▶ C syntax definition and disambiguation tools, based on attribute grammars.
- ▶ C++ syntax definition and partial disambiguation
- ▶ Extensions of SDF (ast, pp, attributes)
- ▶ Talks later today

Java-front (stable)

- ▶ Upgraded to full 1.5
- ▶ Extensive support for concrete syntax

Dryad (beta)

- ▶ Disambiguation, qualification and reclassification
- ▶ Type checker
- ▶ Java bytecode interface
- ▶ Unified model for classes in bytecode and Java

AspectJ (alpha)

- ▶ SDF syntax definition (SGLR!)
- ▶ Pretty-printer
- ▶ Both extend Java-front

- ▶ Concrete Syntax for Objects (OOPSLA)
 - ▶ Embedding of DSL in Java
 - ▶ JavaBorg

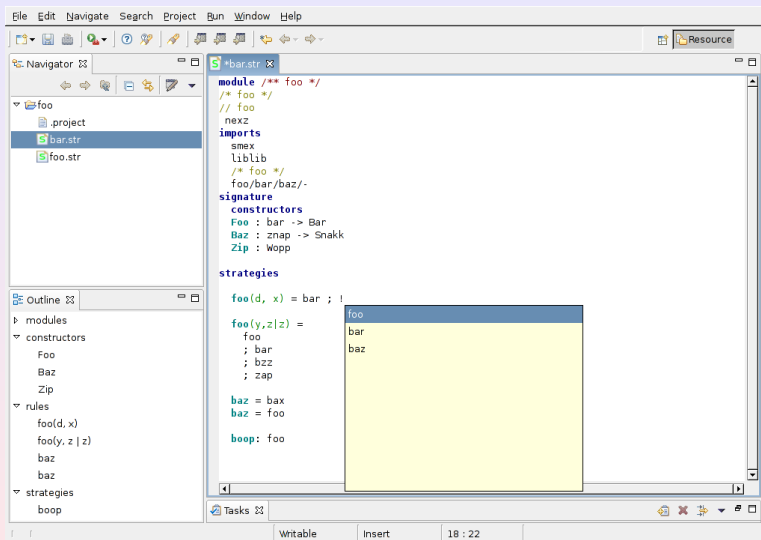
- ▶ René de Groot (master student):
 - ▶ Swul (user-interface language)
 - ▶ Regular expressions
 - ▶ Talk later today

- ▶ Waterloo & Utrecht (PT): XPath embedding

- ▶ Demo and paper at GTTSE (Portugal)

- ▶ Continuing work on Java code generation

News: Spoofox Stratego Editor



Later today: demo by Karl Trygve Kalleberg

Octave

- ▶ Wednesday: Octave talk by Rob Vermaas
- ▶ Master project: Octave vectorizer

Tiger

- ▶ Mostly demonstration and experiments

Transformation Tool Composition (XTC)

- ▶ XTC2 (Eelco Visser)
 - ▶ Namespaces and scoped bindings (plugins)
- ▶ XTC3 (Niels Janssen)
 - ▶ Component definition, contracts, abstraction

Stratego Shell

- ▶ Released
- ▶ Bug fixes and usability

2004-2005

- ▶ Stratego/XT is becoming mature
- ▶ More language-specific support
 - ▶ e.g. Dryad & Transformers
- ▶ Many contributors

2005-2006 (Utrecht)

- ▶ Stratego
 - ▶ Compiler: `strc-core`
 - ▶ Language: module system
- ▶ Maybe Stratego/XT 1.0 in 2006?
- ▶ Dryad
 - ▶ Complete type-checker for 1.5
 - ▶ High-level transformation
 - ▶ JVM bytecode backend