Essentiality of Context in Software Analytics

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January 2017, SEN Symposium, CWI, Amsterdam

Three types ~~Essentiality~~ of Context in Software Analytics

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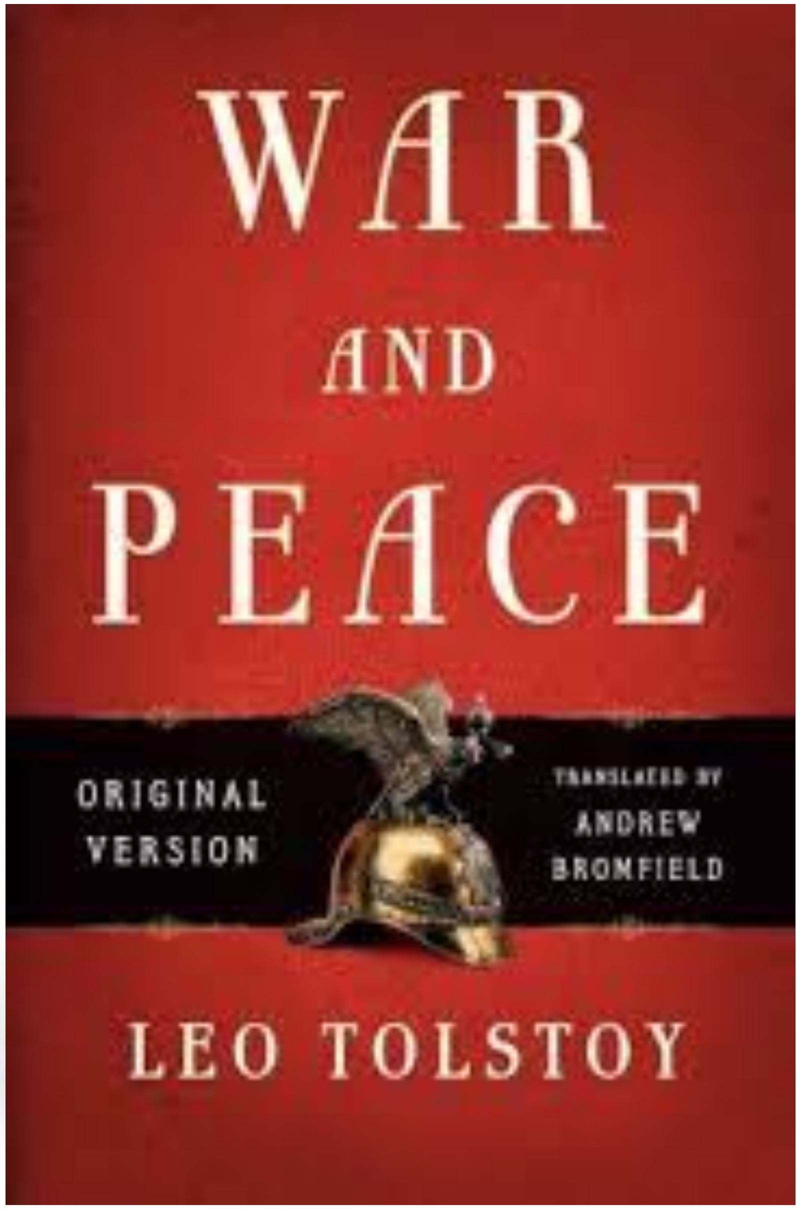
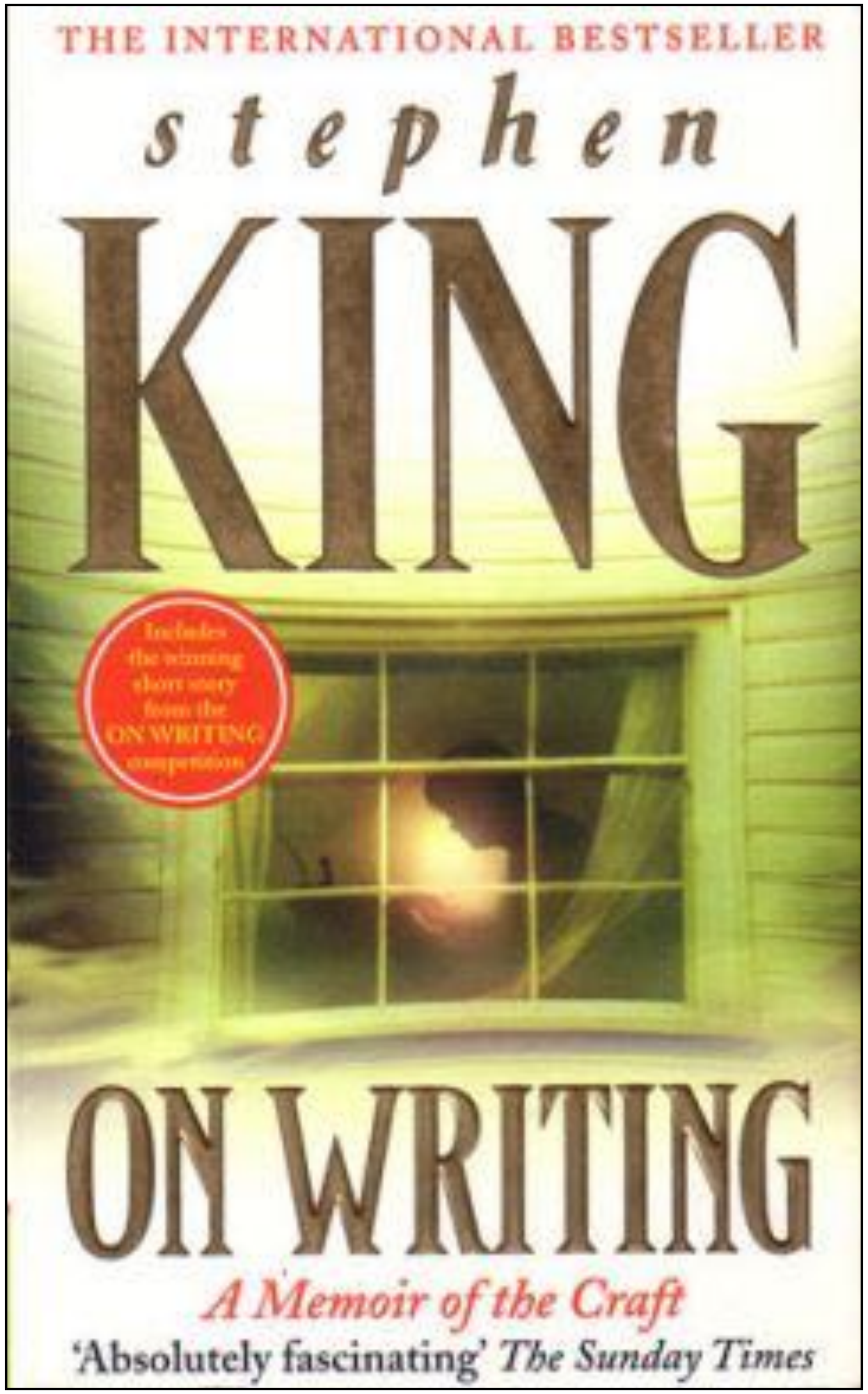


60’000 LOT

60’000 LOC

[Inspired by Andrea Caracciolo]


THE INTERNATIONAL BESTSELLER
stephen
KING
Includes the winning short story from the ON WRITING competition
ON WRITING
A Memoir of the Craft
'Absolutely fascinating' The Sunday Times

Two things above all others:

read a lot and write a lot

Editor

Teaching students that source code is Rwx

Naming functions…

a strange and difficult art,
a little bit like an
abstracted form of poetry
(S. Wolfram)

http://blog.stephenwolfram.com/2010/10/the-poetry-of-function-naming/

Good code detectors

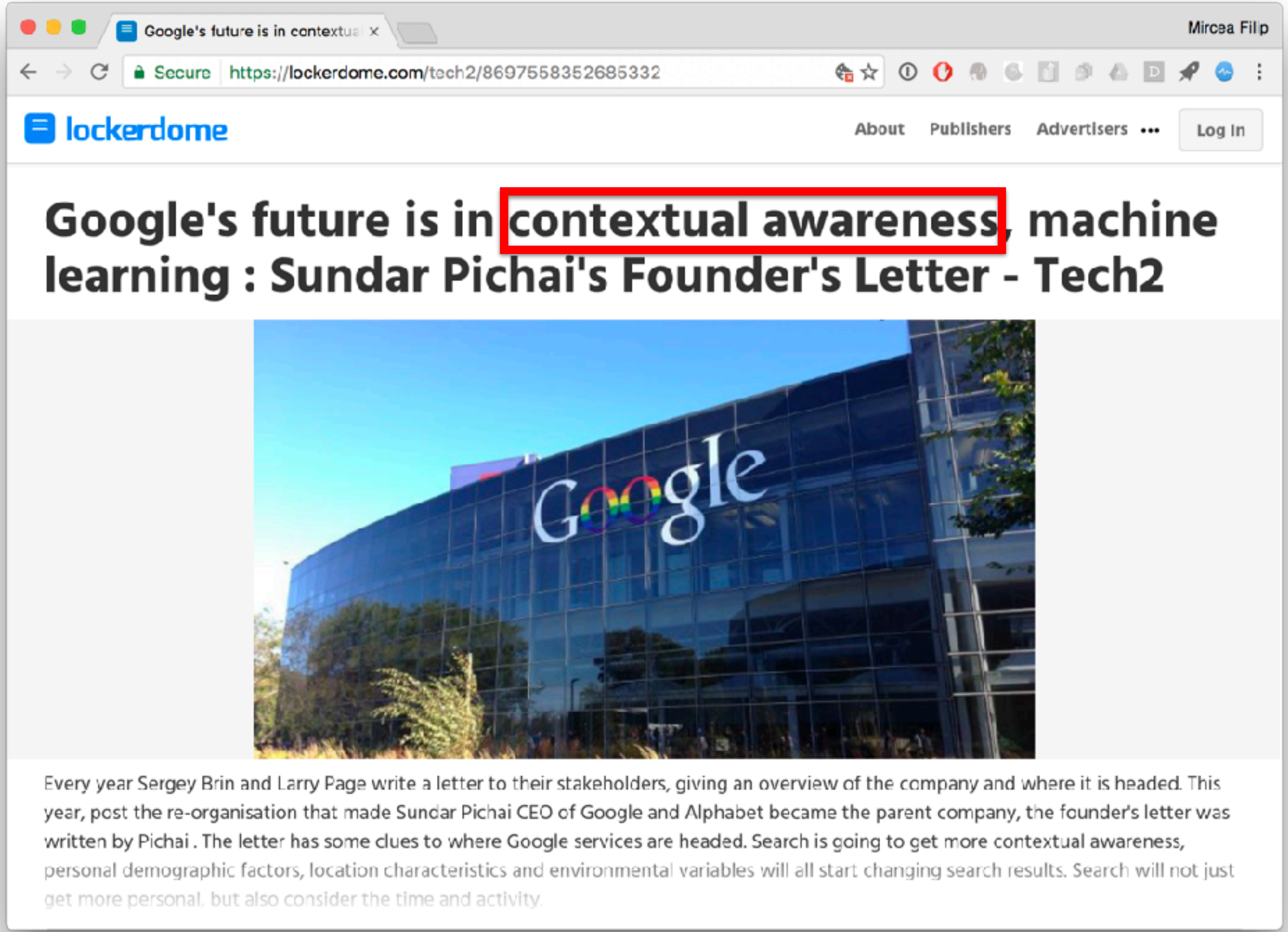
and code perfumes!

The codebase of Google has 2 billion LOC.

All in one place

Remember that time when you tried to stop using google?

and then you changed your mind?



Google's future is in contextu ×
Mircea Filip
Secure https://lockerdome.com/tech2/8697558352685332
lockerdome
About
Publishers
Advertisers •••
Log In

Google's future is in contextual awareness, machine learning : Sundar Pichai's Founder's Letter - Tech2

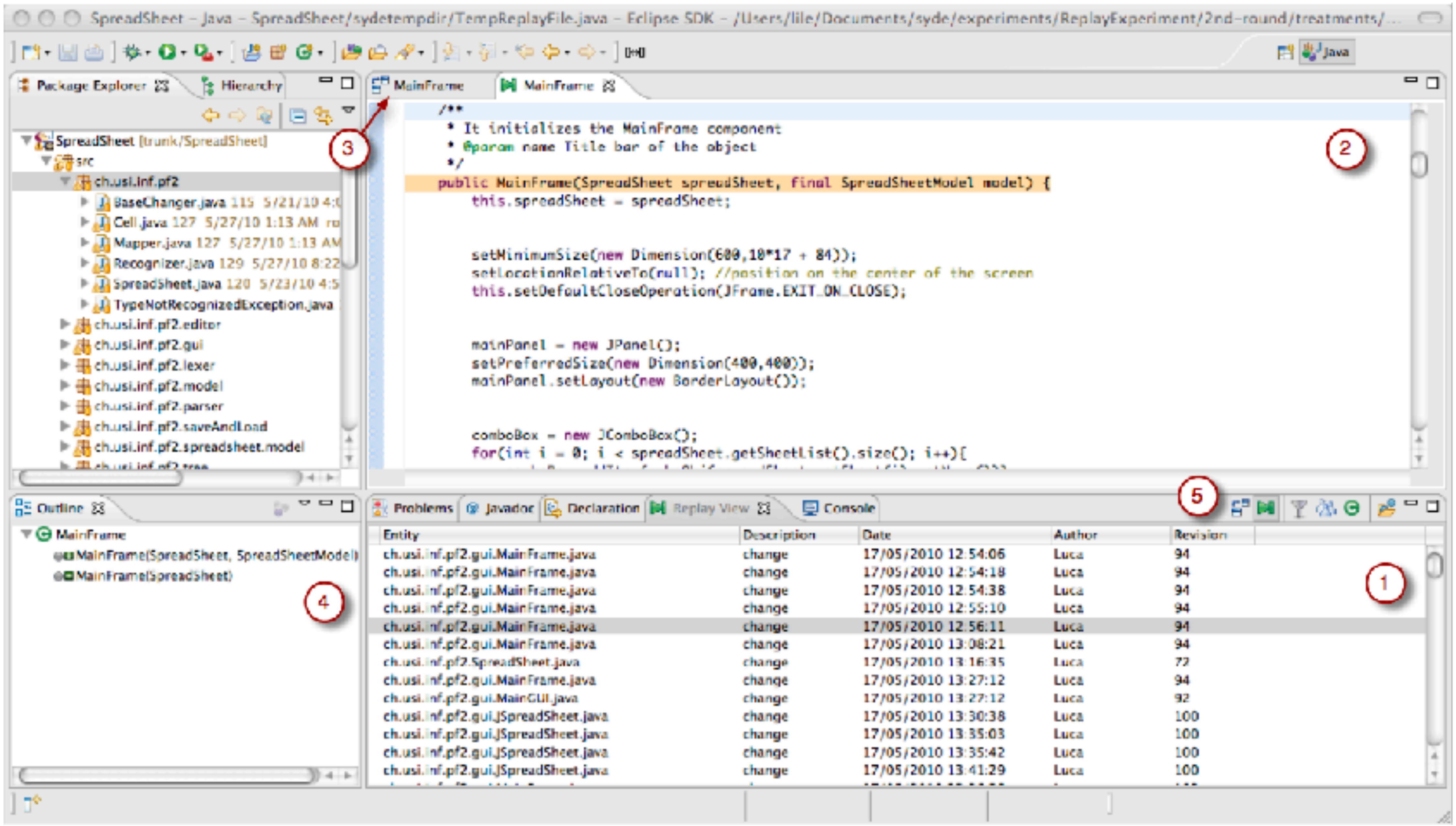
Every year Sergey Brin and Larry Page write a letter to their stakeholders, giving an overview of the company and where it is headed. This year, post the re-organisation that made Sundar Pichai CEO of Google and Alphabet became the parent company, the founder's letter was written by Pichai . The letter has some clues to where Google services are headed. Search is going to get more contextual awareness, personal demographic factors, location characteristics and environmental variables will all start changing search results. Search will not just get more personal, but also consider the time and activity

Using context to offer you the best… ads!

Temporal Context

short term

Replaing past development sessions


SpreadSheet - Java - SpreadSheet/sydetempdir/TempReplayFile.java - Eclipse SDK - /Users/lile/Documents/syde/experiments/ReplayExperiment/2nd-round/treatments/...
Java
Package Explorer
Hierarchy
MainFrame
MainFrame
Outline
Problems
Javadoc
Declaration
Replay View
Console
1
2
3
4
5

```
SpreadSheet [trunk/SpreadSheet]
  src
    ch.usi.inf.pf2
      BaseChanger.java 115  5/21/10 4:(
      Cell.java 127  5/27/10 1:13 AM  ro
      Mapper.java 127  5/27/10 1:13 AM
      Recognizer.java 129  5/27/10 8:22
      SpreadSheet.java 120  5/23/10 4:5
      TypeNotRecognizedException.java
    ch.usi.inf.pf2.editor
    ch.usi.inf.pf2.gui
    ch.usi.inf.pf2.lexer
    ch.usi.inf.pf2.model
    ch.usi.inf.pf2.parser
    ch.usi.inf.pf2.saveAndLoad
    ch.usi.inf.pf2.spreadsheet.model
    ch.usi.inf.pf2.tree
```

```java
/**
 * It initializes the MainFrame component
 * @param name Title bar of the object
 */
public MainFrame(SpreadSheet spreadSheet, final SpreadSheetModel model) {
    this.spreadSheet = spreadSheet;


    setMinimumSize(new Dimension(600,10*17 + 84));
    setLocationRelativeTo(null); //position on the center of the screen
    this.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);


    mainPanel = new JPanel();
    setPreferredSize(new Dimension(400,400));
    mainPanel.setLayout(new BorderLayout());


    comboBox = new JComboBox();
    for(int i = 0; i < spreadSheet.getSheetList().size(); i++){
```

```
MainFrame
  MainFrame(SpreadSheet, SpreadSheetModel)
  MainFrame(SpreadSheet)
```

Entity	Description	Date	Author	Revision
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:54:06	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:54:18	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:54:38	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:55:10	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:56:11	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 13:08:21	Luca	94
ch.usi.inf.pf2.SpreadSheet.java	change	17/05/2010 13:16:35	Luca	72
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 13:27:12	Luca	94
ch.usi.inf.pf2.gui.MainGUI.java	change	17/05/2010 13:27:12	Luca	92
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:30:38	Luca	100
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:35:03	Luca	100
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:35:42	Luca	100
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:41:29	Luca	100

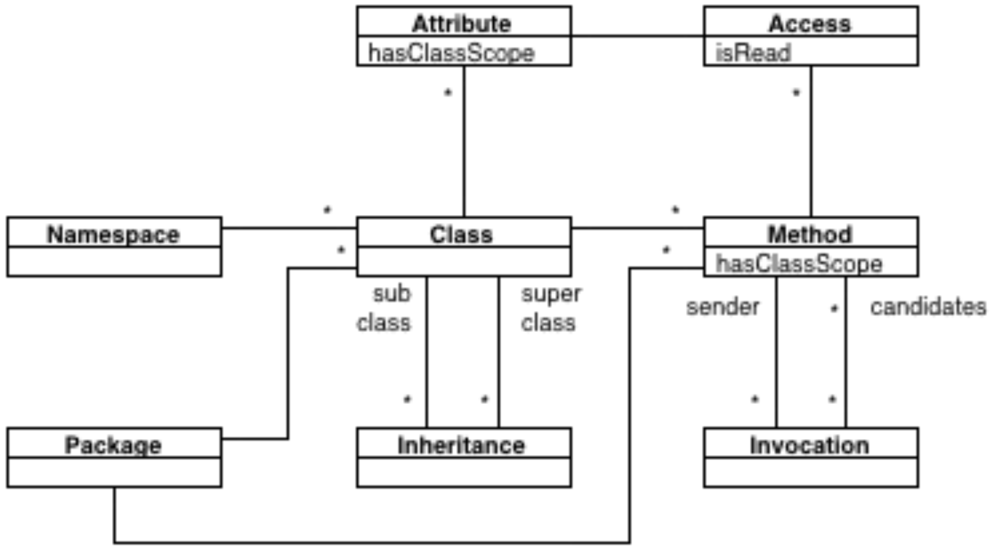
http://scg.unibe.ch/scgbib?_k=cTtdaMMP&query=replay+hattori

Temporal Context

long term

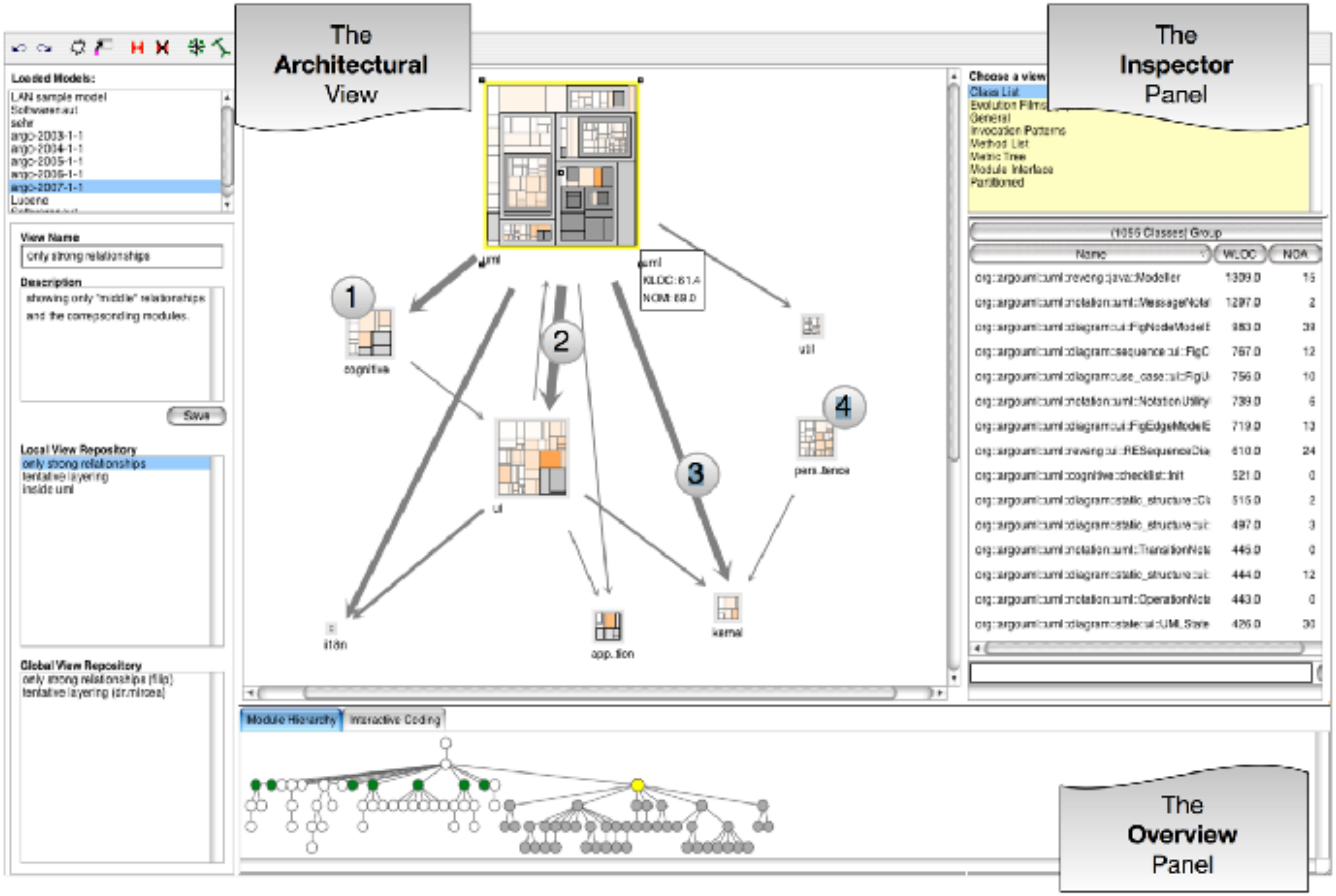
Software Analytics Platform

60’000 LOC



Language Independent Meta-Model

Interactive Architecture Recovery



Loaded Models:
LAN sample model
Softwarenaut
sehr
argo-2003-1-1
argo-2004-1-1
argo-2005-1-1
argo-2006-1-1
argo-2007-1-1
Lucene

View Name: only strong relationships

Description: showing only "middle" relationships and the corresponding modules.

Local View Repository
only strong relationships
tentative layering
inside uml

Global View Repository
only strong relationships (filip)
tentative layering (dr.mircea)

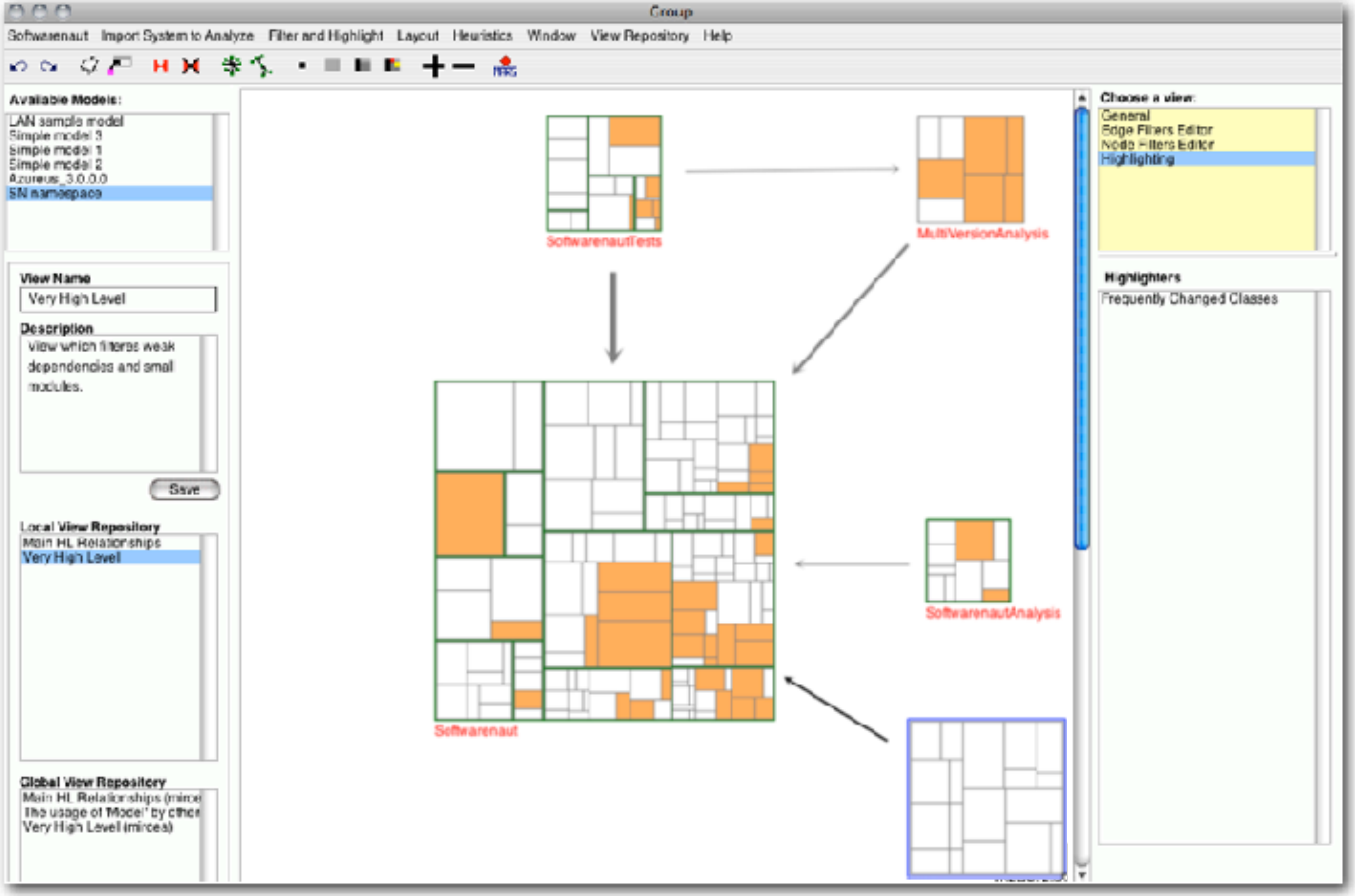
Choose a view:
Class List
Evolution Films
General
Invocation Patterns
Method List
Metric Tree
Module Interface
Partitioned

(1056 Classes) Group

Name	WLOC	NOA
org::argouml::uml::reveng::java::Modeller	1309.0	15
org::argouml::uml::notation::uml::MessageNota	1297.0	2
org::argouml::uml::diagram::ui::FigNodeModelE	983.0	39
org::argouml::uml::diagram::sequence::ui::FigC	767.0	12
org::argouml::uml::diagram::use_case::ui::FigU	756.0	10
org::argouml::uml::notation::uml::NotationUtility	739.0	6
org::argouml::uml::diagram::ui::FigEdgeModelE	719.0	13
org::argouml::uml::reveng::ui::RESequenceDia	610.0	24
org::argouml::uml::cognitive::checklist::Init	521.0	0
org::argouml::uml::diagram::static_structure::Cl	515.0	2
org::argouml::uml::diagram::static_structure::ui:	497.0	3
org::argouml::uml::notation::uml::TransitionNota	445.0	0
org::argouml::uml::diagram::static_structure::ui:	444.0	12
org::argouml::uml::notation::uml::OperationNota	443.0	0
org::argouml::uml::diagram::state::ui::UMLState	426.0	30

Evolutionary and Collaborative Software Architecture Recovery with Softwarenaut.
Mircea Lungu, Michele Lanza, and Oscar Nierstrasz. In Science of Computer Programming 79(0) p. 204 - 223, 2014.

Hotspots can focus the analysis process



Available Models:
LAN sample model
Simple model 3
Simple model 1
Simple model 2
Azureus_3.0.0.0
SN namespace

View Name
Very High Level

Description
View which filters weak dependencies and small modules.

Local View Repository
Main HL Relationships
Very High Level

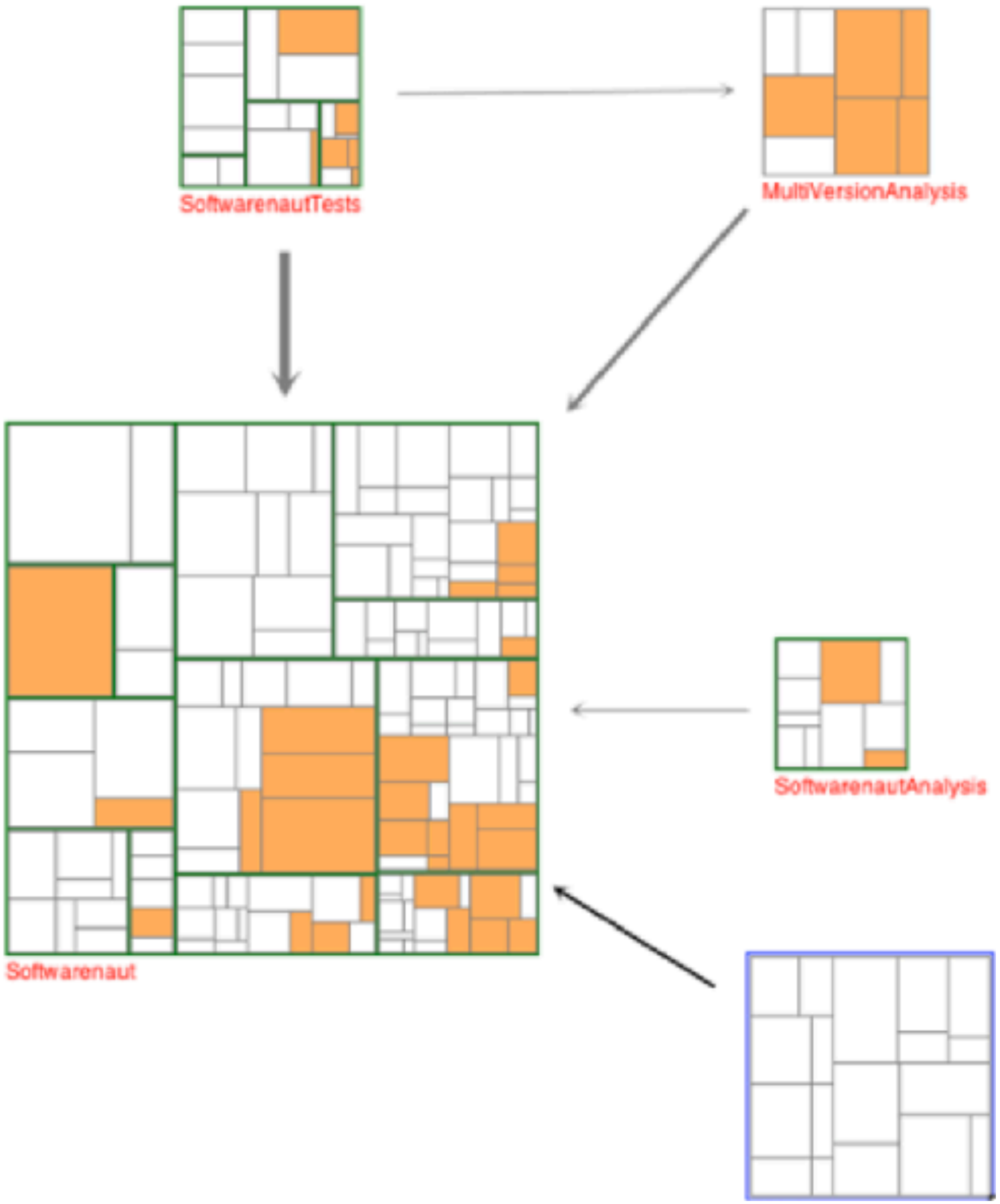
Global View Repository
Main HL Relationships (mirce
The usage of 'Model' by other
Very High Level (mircea)

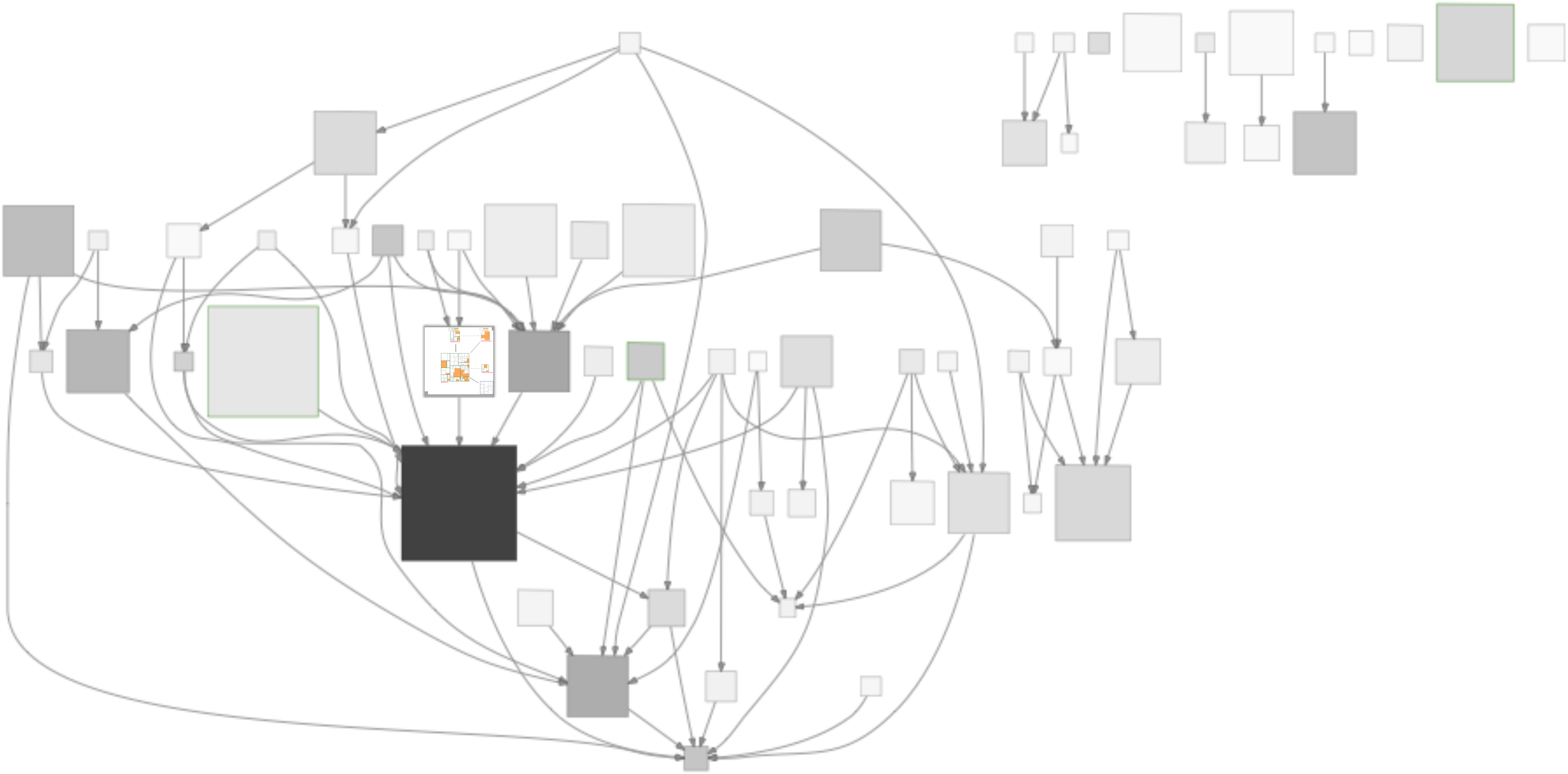
Choose a view:
General
Edge Filters Editor
Node Filters Editor
Highlighting

Highlighters
Frequently Changed Classes

https://mircealungu.github.io/post/14-01-01-evolutionary-and-collaborative-software-architecture-recovery/

“No system is an island, entire of itself”

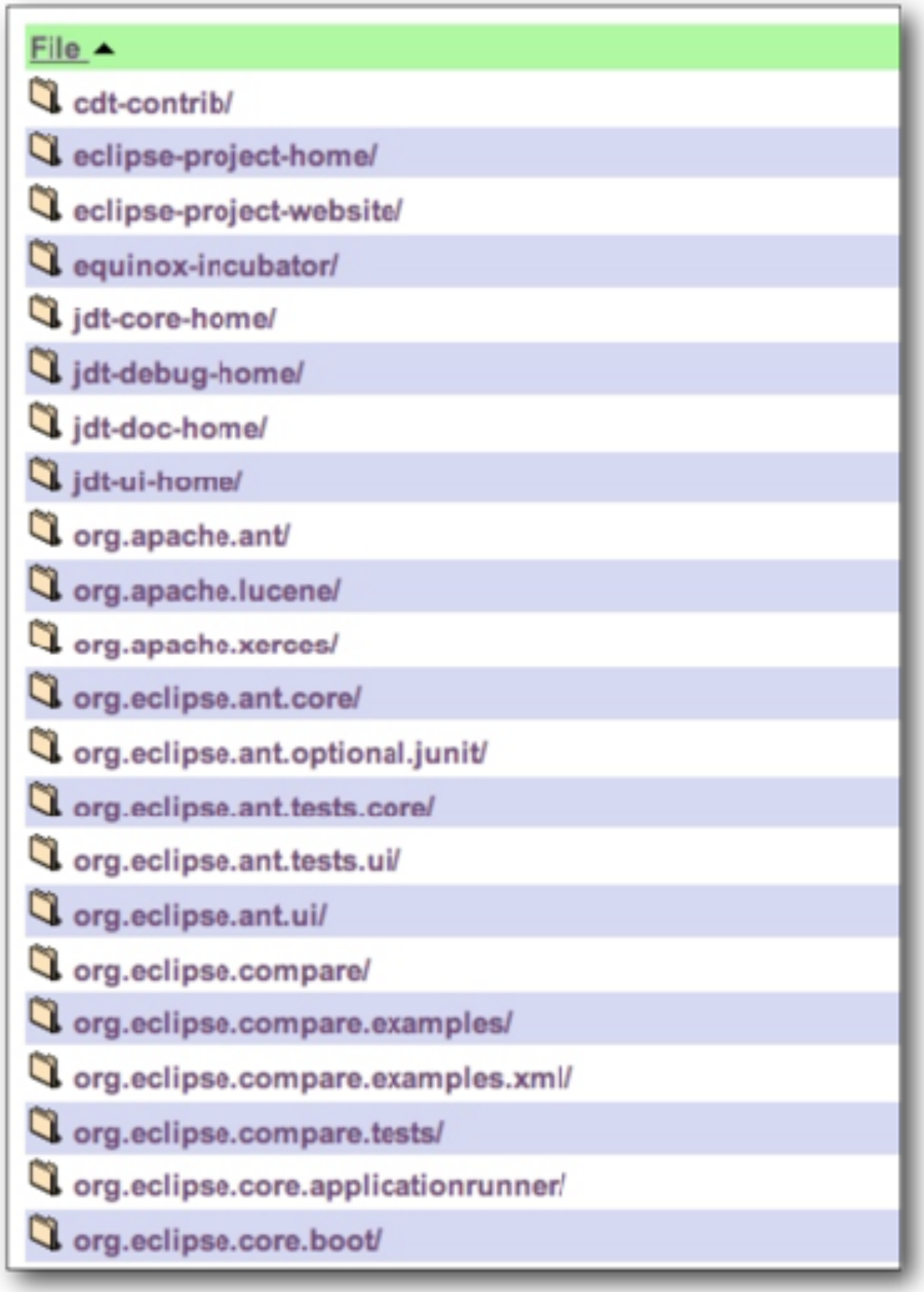




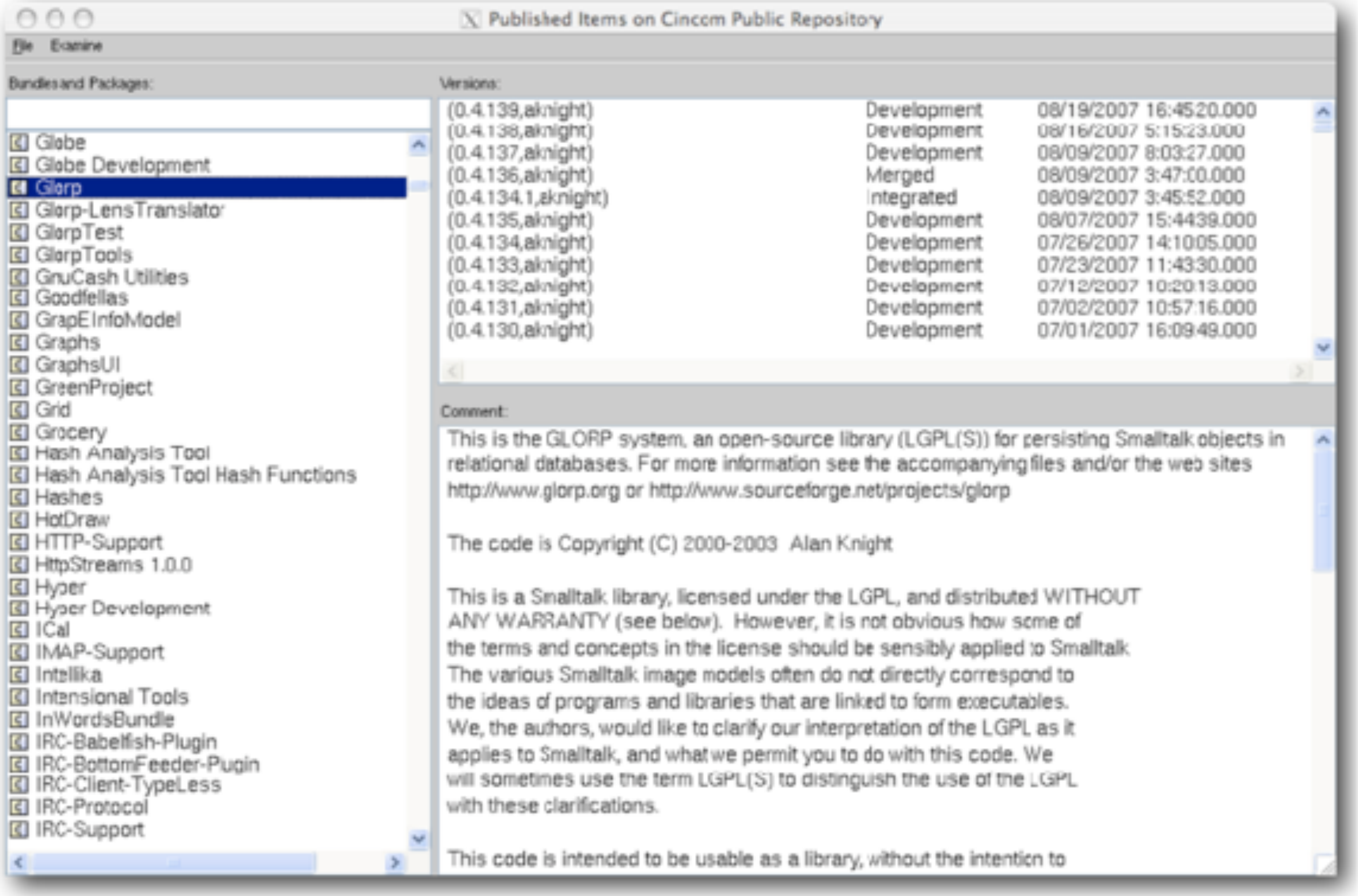
The Systemic Context

The ecosystem: challenges

And some organizations are still using tools like these!



File ▲
cdt-contrib/
eclipse-project-home/
eclipse-project-website/
equinox-incubator/
jdt-core-home/
jdt-debug-home/
jdt-doc-home/
jdt-ui-home/
org.apache.ant/
org.apache.lucene/
org.apache.xerces/
org.eclipse.ant.core/
org.eclipse.ant.optional.junit/
org.eclipse.ant.tests.core/
org.eclipse.ant.tests.ui/
org.eclipse.ant.ui/
org.eclipse.compare/
org.eclipse.compare.examples/
org.eclipse.compare.examples.xml/
org.eclipse.compare.tests/
org.eclipse.core.applicationrunner/
org.eclipse.core.boot/



- Globe
- Globe Development
- Glorp
- Glorp-LensTranslator
- GlorpTest
- GlorpTools
- GnuCash Utilities
- Goodfellas
- GrapEInfoModel
- Graphs
- GraphsUI
- GreenProject
- Grid
- Grocery
- Hash Analysis Tool
- Hash Analysis Tool Hash Functions
- Hashes
- HotDraw
- HTTP-Support
- HttpStreams 1.0.0
- Hyper
- Hyper Development
- ICal
- IMAP-Support
- Intellika
- Intensional Tools
- InWordsBundle
- IRC-Babelfish-Plugin
- IRC-BottomFeeder-Pugin
- IRC-Client-TypeLess
- IRC-Protocol
- IRC-Support

(0.4.139,aknight)	Development	08/19/2007 16:4520.000
(0.4.138,aknight)	Development	08/16/2007 5:15:23.000
(0.4.137,aknight)	Development	08/09/2007 8:03:27.000
(0.4.136,aknight)	Merged	08/09/2007 3:47:00.000
(0.4.134.1,aknight)	Integrated	08/09/2007 3:45:52.000
(0.4.135,aknight)	Development	08/07/2007 15:4439.000
(0.4.134,aknight)	Development	07/26/2007 14:1005.000
(0.4.133,aknight)	Development	07/23/2007 11:4330.000
(0.4.132,aknight)	Development	07/12/2007 10:2013.000
(0.4.131,aknight)	Development	07/02/2007 10:57:16.000
(0.4.130,aknight)	Development	07/01/2007 16:0949.000

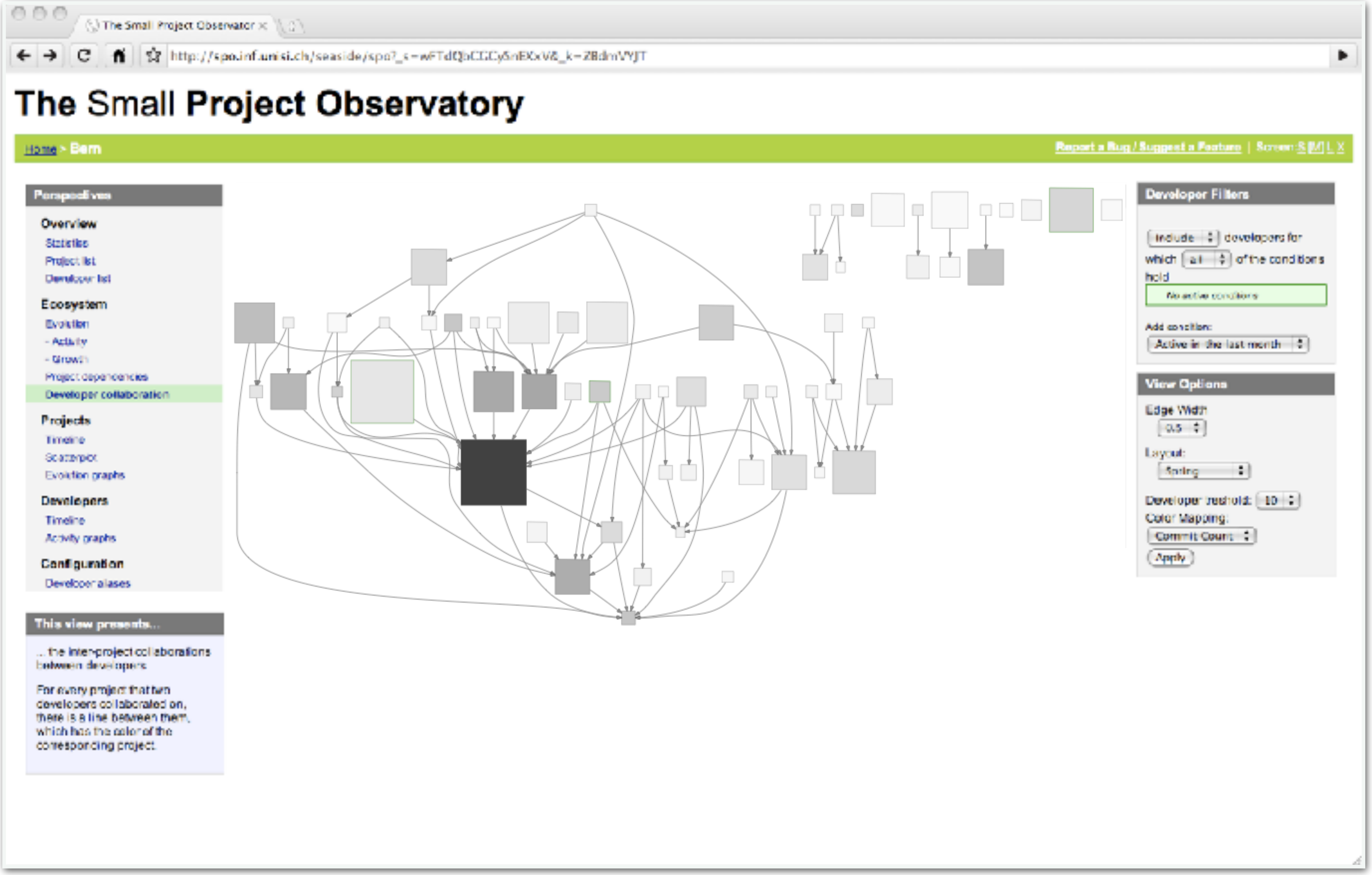
This is the GLORP system, an open-source library (LGPL(S)) for persisting Smalltalk objects in relational databases. For more information see the accompanying files and/or the web sites http://www.glorp.org or http://www.sourceforge.net/projects/glorp

The code is Copyright (C) 2000-2003 Alan Knight

This is a Smalltalk library, licensed under the LGPL, and distributed WITHOUT ANY WARRANTY (see below). However, it is not obvious how some of the terms and concepts in the license should be sensibly applied to Smalltalk The various Smalltalk image models often do not directly correspond to the ideas of programs and libraries that are linked to form executables. We, the authors, would like to clarify our interpretation of the LGPL as it applies to Smalltalk, and what we permit you to do with this code. We will sometimes use the term LGPL(S) to distinguish the use of the LGPL with these clarifications.

This code is intended to be usable as a library, without the intention to

Ecosystem Dashboards



The Small Project Observatory

This view presents...

...the inter-project collaborations between developers

For every project that two developers collaborated on, there is a line between them, which has the color of the corresponding project.

Include developers for which all of the conditions hold

No active conditions

Add condition: Active in the last month

Edge Width: 0.5

Layout: Spring

Developer treshold: 10

Color Mapping: Commit Count

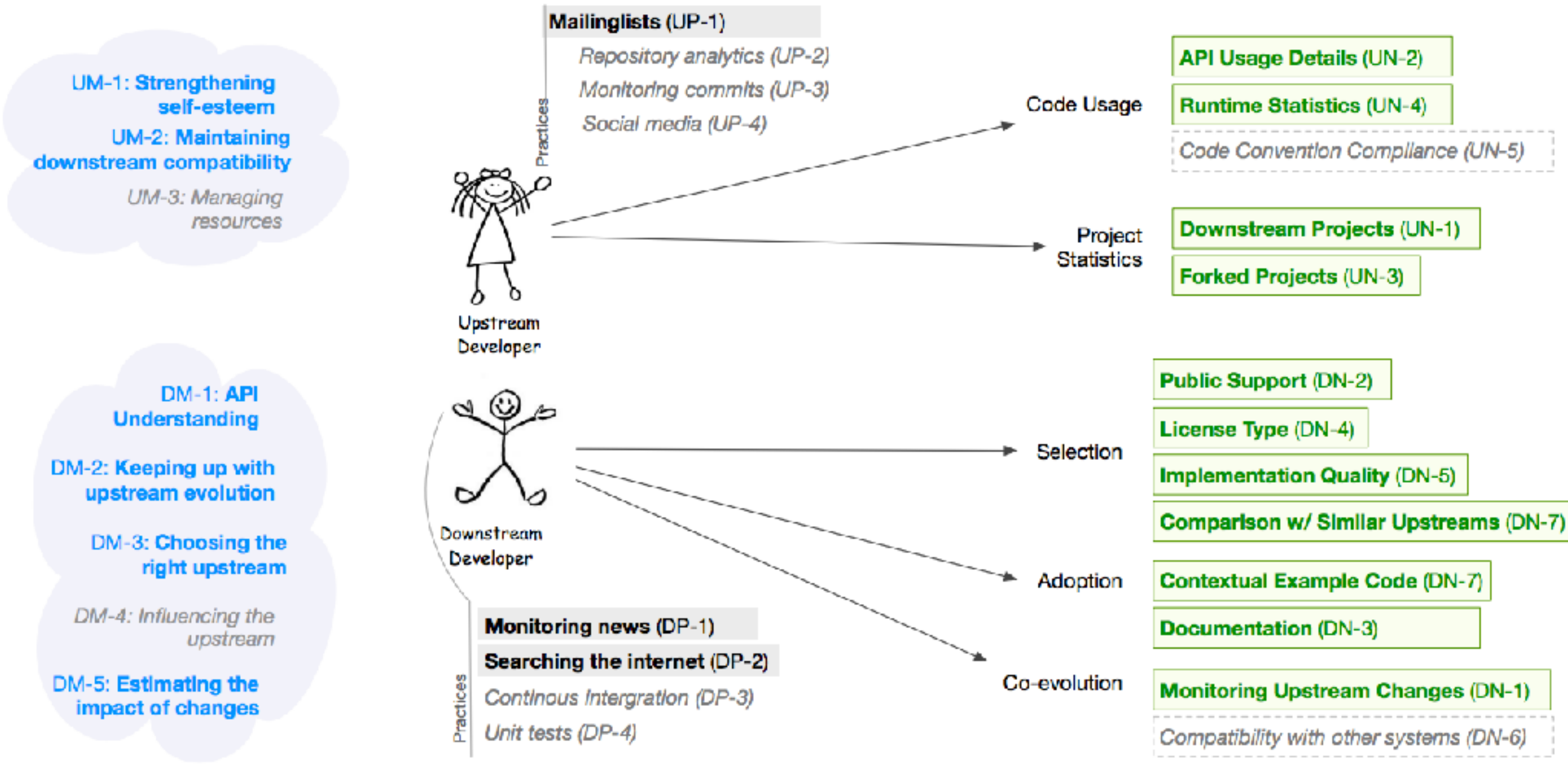
The Small Project Observatory: Visualizing Software Ecosystems. Mircea Lungu, Michele Lanza, Tudor Gîrba, and Romain Robbes. In Science of Computer Programming, Elsevier 75(4) p. 264—275, April 2010.

[redacted] User:

[...] where is [redacted], why was it deleted?? I use it and now is gone!!! I even had a specialization of it [...]

[redacted] Developer:

They have been dropped. A mail went out to this list if anybody still used them and nobody replied. [...] Personally I don't know of any application that uses these dialogs.



UM-1: Strengthening self-esteem

UM-2: Maintaining downstream compatibility

UM-3: Managing resources

Practices

Mailinglists (UP-1)

Repository analytics (UP-2)

Monitoring commits (UP-3)

Social media (UP-4)

Upstream Developer

Code Usage

API Usage Details (UN-2)

Runtime Statistics (UN-4)

Code Convention Compliance (UN-5)

Project Statistics

Downstream Projects (UN-1)

Forked Projects (UN-3)

DM-1: API Understanding

DM-2: Keeping up with upstream evolution

DM-3: Choosing the right upstream

DM-4: Influencing the upstream

DM-5: Estimating the impact of changes

Downstream Developer

Practices

Monitoring news (DP-1)

Searching the internet (DP-2)

Continous Intergration (DP-3)

Unit tests (DP-4)

Selection

Public Support (DN-2)

License Type (DN-4)

Implementation Quality (DN-5)

Comparison w/ Similar Upstreams (DN-7)

Adoption

Contextual Example Code (DN-7)

Documentation (DN-3)

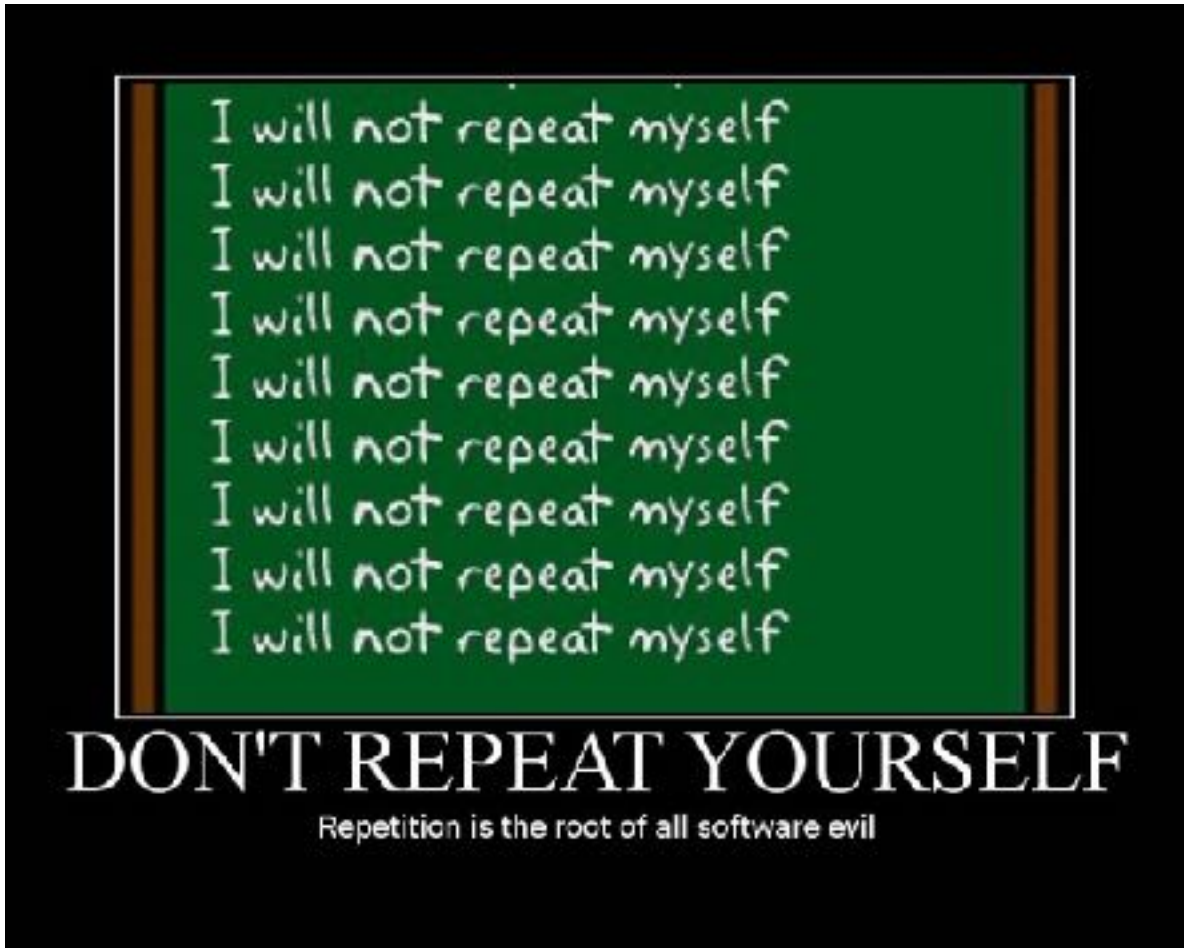
Co-evolution

Monitoring Upstream Changes (DN-1)

Compatibility with other systems (DN-6)

A Quantitative Analysis of Developer Information Needs. Nicole Haenni, Mircea Lungu, Niko Schwarz, and Oscar Nierstrasz. In Software Ecosystems. In Proceedings of the 2nd Workshop on Ecosystem Architectures (WEA'14), 2014.

The DRY Principle

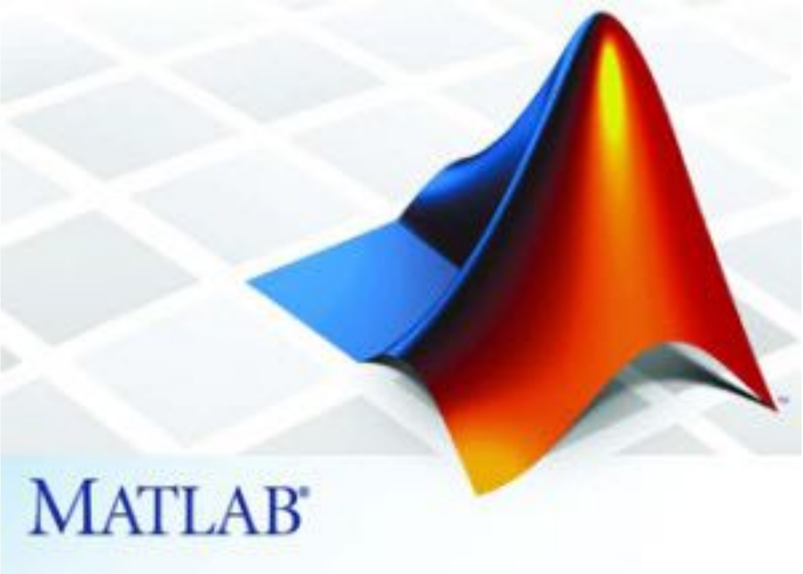


But what about DRO?

Smalltalk Ecosystem: 14% of code cloned*!

* On How Often Code is Cloned Across Repositories.
Schwarz, Lungu, Robbes. ICSE NIER 2012

Challenge: establishing the right ecosystem norms

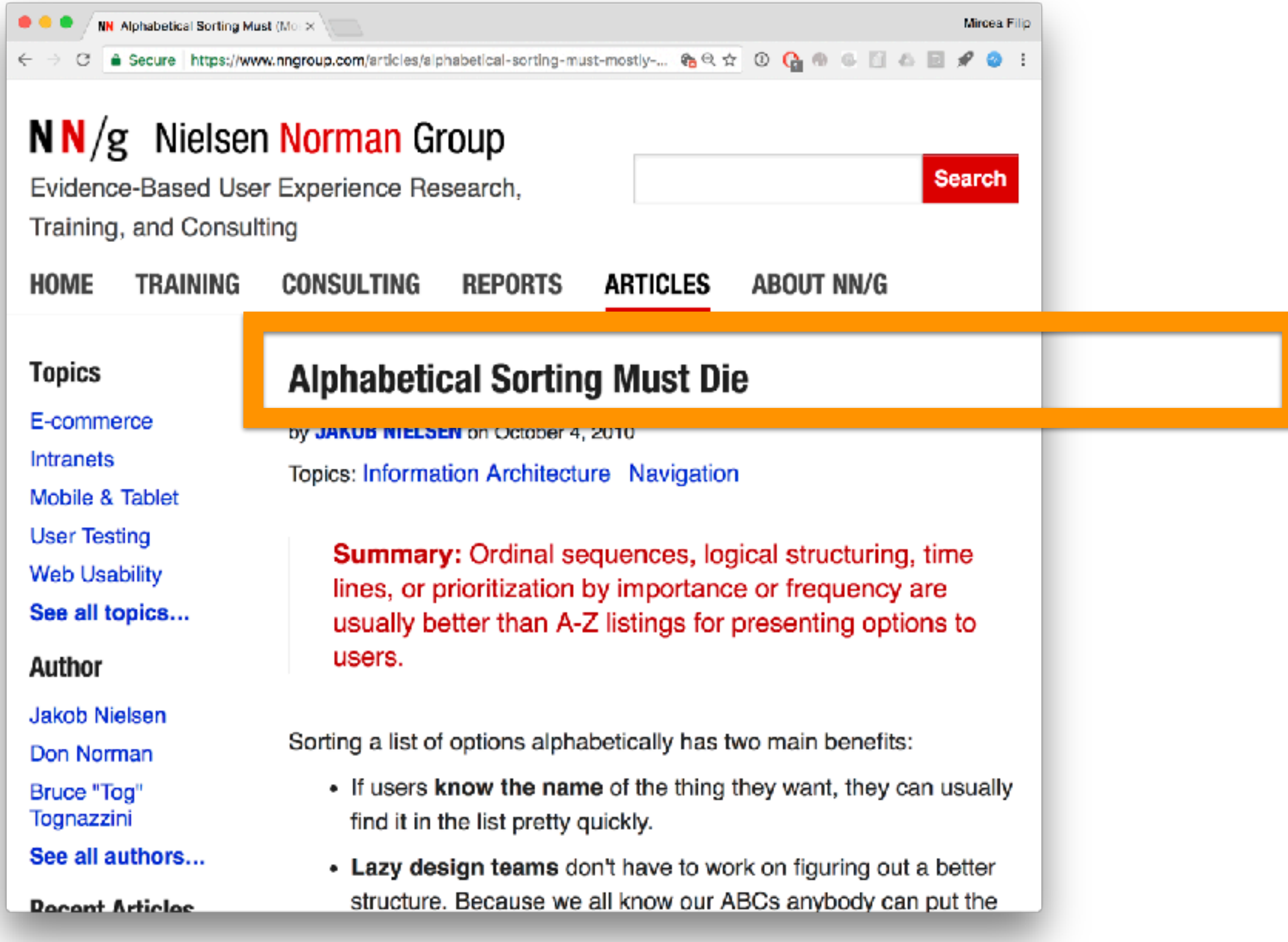


back to this later…

The Systemic Context

The ecosystem: opportunities

#1 — usability of our tools++


NN Alphabetical Sorting Must (Mo ×
Mircea Filip
Secure https://www.nngroup.com/articles/alphabetical-sorting-must-mostly-...
NN/g Nielsen Norman Group
Search
HOME
TRAINING
CONSULTING
REPORTS
ARTICLES
ABOUT NN/G

Evidence-Based User Experience Research, Training, and Consulting

Topics

- E-commerce
- Intranets
- Mobile & Tablet
- User Testing
- Web Usability
- **See all topics...**

Author

- Jakob Nielsen
- Don Norman
- Bruce "Tog" Tognazzini
- **See all authors...**

Recent Articles

Alphabetical Sorting Must Die

by **JAKOB NIELSEN** on October 4, 2010

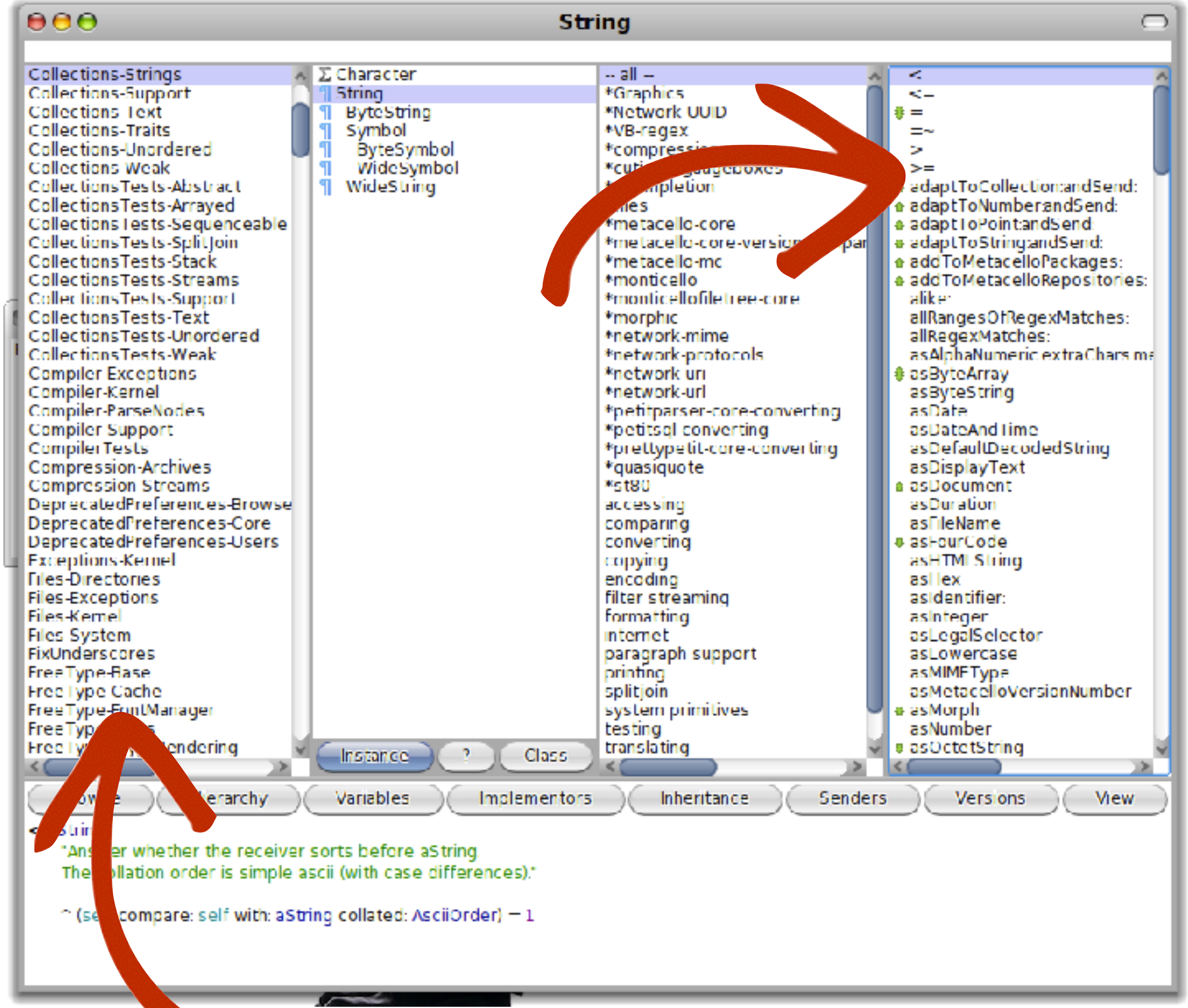
Topics: Information Architecture Navigation

Summary: Ordinal sequences, logical structuring, time lines, or prioritization by importance or frequency are usually better than A-Z listings for presenting options to users.

Sorting a list of options alphabetically has two main benefits:

- If users **know the name** of the thing they want, they can usually find it in the list pretty quickly.
- **Lazy design teams** don't have to work on figuring out a better structure. Because we all know our ABCs anybody can put the

The Refactoring Browser



Collections-Strings
Collections-Support
Collections-Text
Collections-Traits
Collections-Unordered
Collections-Weak
CollectionsTests-Abstract
CollectionsTests-Arrayed
CollectionsTests-Sequenceable
CollectionsTests-SplitJoin
CollectionsTests-Stack
CollectionsTests-Streams
CollectionsTests-Support
CollectionsTests-Text
CollectionsTests-Unordered
CollectionsTests-Weak
Compiler-Exceptions
Compiler-Kernel
Compiler-ParseNodes
Compiler-Support
Compiler-Tests
Compression-Archives
Compression-Streams
DeprecatedPreferences-Browse
DeprecatedPreferences-Core
DeprecatedPreferences-Users
Exceptions-Kernel
Files-Directories
Files-Exceptions
Files-Kernel
Files-System
FixUnderscores
FreeType-Base
FreeType-Cache
FreeType-FontManager
FreeTyp s
FreeTy endering

Σ Character
¶ String
¶ ByteString
¶ Symbol
¶ ByteSymbol
¶ WideSymbol
¶ WideString

-- all --
*Graphics
*Network UUID
*VB-regex
*compressi
*cuti gaugeboxes
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*metacello-core
*metacello-core-versio par
*metacello-mc
*monticello
*monticellofiletree-core
*morphic
*network-mime
*network-protocols
*network-uri
*network-url
*petitparser-core-converting
*petitsql-converting
*prettypetit-core-converting
*quasiquote
*st80
accessing
comparing
converting
copying
encoding
filter streaming
formatting
internet
paragraph support
printing
splitjoin
system primitives
testing
translating

<
<=
=
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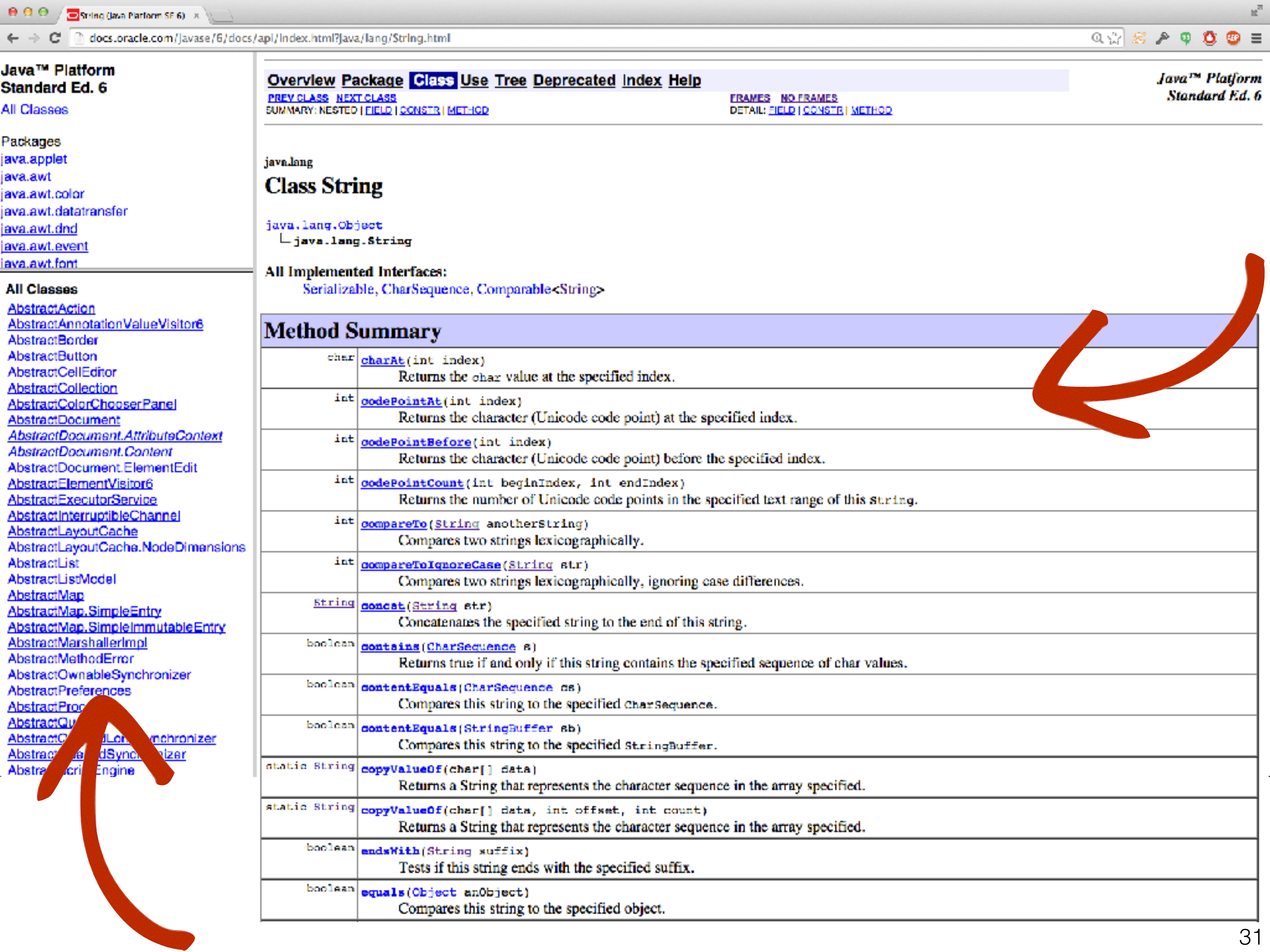
>
>=
adaptToCollection:andSend:
adaptToNumber:andSend:
adaptToPoint:andSend:
adaptToString:andSend:
addToMetacelloPackages:
addToMetacelloRepositories:
alike:
allRangesOfRegexMatches:
allRegexMatches:
asAlphaNumeric:extraChars:me
asByteArray
asByteString
asDate
asDateAndTime
asDefaultDecodedString
asDisplayText
asDocument
asDuration
asFileName
asFourCode
asHTMLString
asHex
asIdentifier:
asInteger
asLegalSelector
asLowercase
asMIMEType
asMetacelloVersionNumber
asMorph
asNumber
asOctetString

```
< aStrin
	"Ans er whether the receiver sorts before aString
	The ollation order is simple ascii (with case differences)."

	^ (se compare: self with: aString collated: AsciiOrder) = 1
```



String (Java Platform SE 6)
docs.oracle.com/javase/6/docs/api/index.html?java/lang/String.html

Java™ Platform
Standard Ed. 6

All Classes

Packages
java.applet
java.awt
java.awt.color
java.awt.datatransfer
java.awt.dnd
java.awt.event
java.awt.font

All Classes
AbstractAction
AbstractAnnotationValueVisitor6
AbstractBorder
AbstractButton
AbstractCellEditor
AbstractCollection
AbstractColorChooserPanel
AbstractDocument
AbstractDocument.AttributeContext
AbstractDocument.Content
AbstractDocument.ElementEdit
AbstractElementVisitor6
AbstractExecutorService
AbstractInterruptibleChannel
AbstractLayoutCache
AbstractLayoutCache.NodeDimensions
AbstractList
AbstractListModel
AbstractMap
AbstractMap.SimpleEntry
AbstractMap.SimpleImmutableEntry
AbstractMarshallerImpl
AbstractMethodError
AbstractOwnableSynchronizer
AbstractPreferences
AbstractProc
AbstractQu
AbstractC lLo nchronizer
Abstrac a dSync izer
Abstra cri Engine

Overview Package Class Use Tree Deprecated Index Help
PREV CLASS NEXT CLASS
SUMMARY: NESTED | FIELD | CONSTR | METHOD
FRAMES NO FRAMES
DETAIL: FIELD | CONSTR | METHOD

Java™ Platform
Standard Ed. 6

java.lang

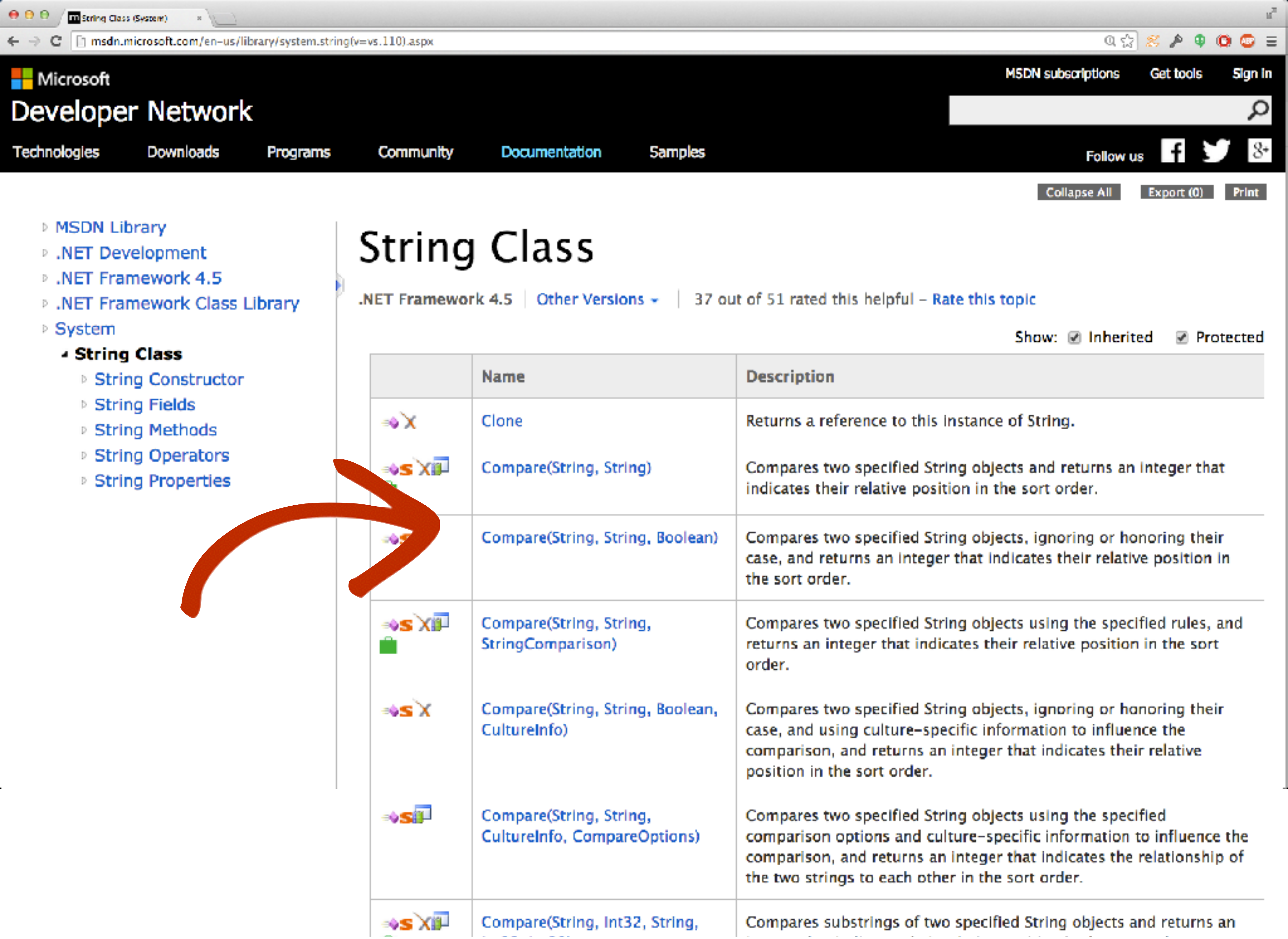
Class String

```
java.lang.Object
  └java.lang.String
```

All Implemented Interfaces:
Serializable, CharSequence, Comparable<String>

Method Summary

`char`	`charAt(int index)` Returns the `char` value at the specified index.
`int`	`codePointAt(int index)` Returns the character (Unicode code point) at the specified index.
`int`	`codePointBefore(int index)` Returns the character (Unicode code point) before the specified index.
`int`	`codePointCount(int beginIndex, int endIndex)` Returns the number of Unicode code points in the specified text range of this `String`.
`int`	`compareTo(String anotherString)` Compares two strings lexicographically.
`int`	`compareToIgnoreCase(String str)` Compares two strings lexicographically, ignoring case differences.
`String`	`concat(String str)` Concatenates the specified string to the end of this string.
`boolean`	`contains(CharSequence s)` Returns true if and only if this string contains the specified sequence of char values.
`boolean`	`contentEquals(CharSequence cs)` Compares this string to the specified `CharSequence`.
`boolean`	`contentEquals(StringBuffer sb)` Compares this string to the specified `StringBuffer`.
`static String`	`copyValueOf(char[] data)` Returns a String that represents the character sequence in the array specified.
`static String`	`copyValueOf(char[] data, int offset, int count)` Returns a String that represents the character sequence in the array specified.
`boolean`	`endsWith(String suffix)` Tests if this string ends with the specified suffix.
`boolean`	`equals(Object anObject)` Compares this string to the specified object.



String Class

.NET Framework 4.5 | Other Versions | 37 out of 51 rated this helpful – Rate this topic

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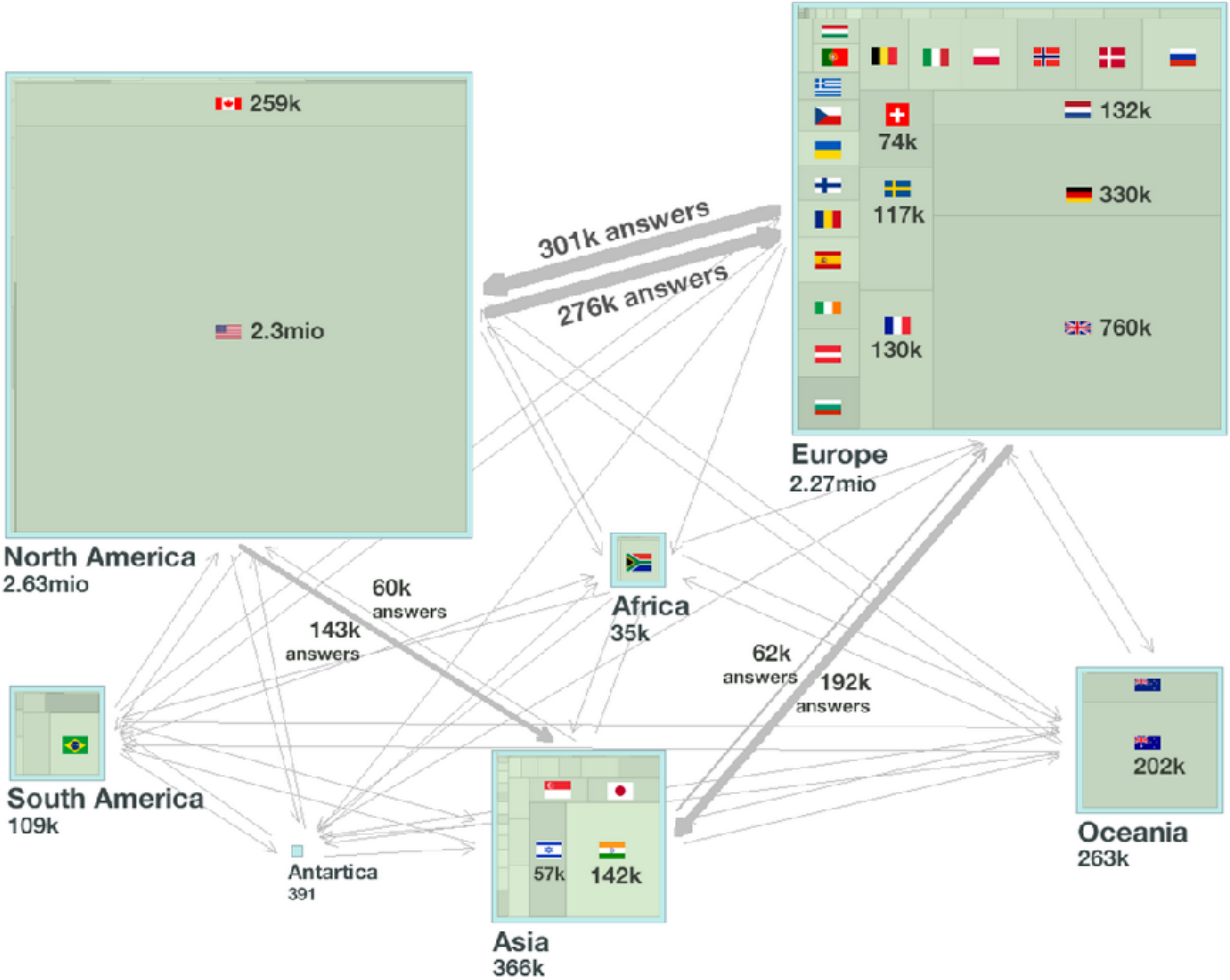
	Name	Description
	Clone	Returns a reference to this instance of String.
	Compare(String, String)	Compares two specified String objects and returns an integer that indicates their relative position in the sort order.
	Compare(String, String, Boolean)	Compares two specified String objects, ignoring or honoring their case, and returns an integer that indicates their relative position in the sort order.
	Compare(String, String, StringComparison)	Compares two specified String objects using the specified rules, and returns an integer that indicates their relative position in the sort order.
	Compare(String, String, Boolean, CultureInfo)	Compares two specified String objects, ignoring or honoring their case, and using culture-specific information to influence the comparison, and returns an integer that indicates their relative position in the sort order.
	Compare(String, String, CultureInfo, CompareOptions)	Compares two specified String objects using the specified comparison options and culture-specific information to influence the comparison, and returns an integer that indicates the relationship of the two strings to each other in the sort order.
	Compare(String, Int32, String,	Compares substrings of two specified String objects and returns an

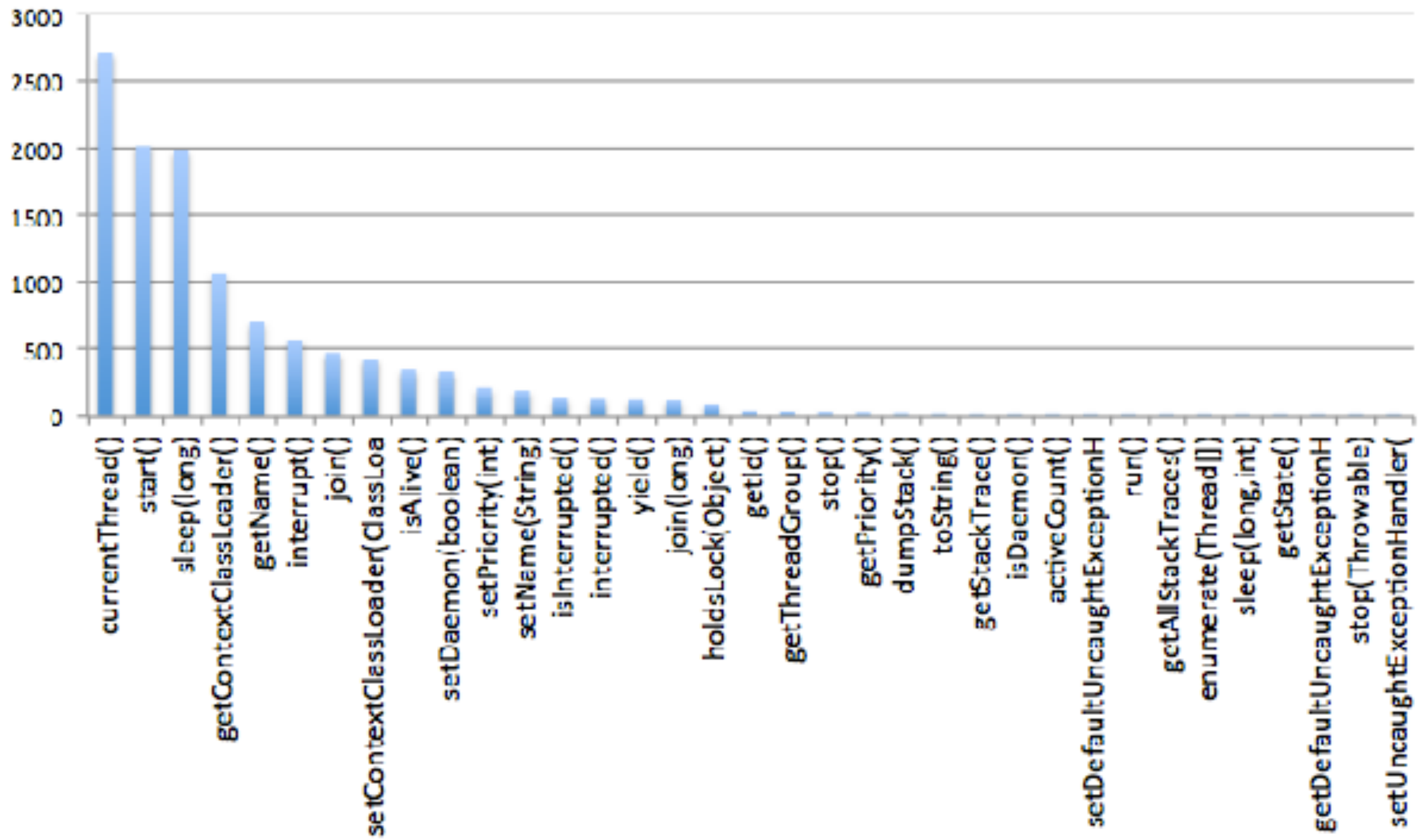
stackoverflow



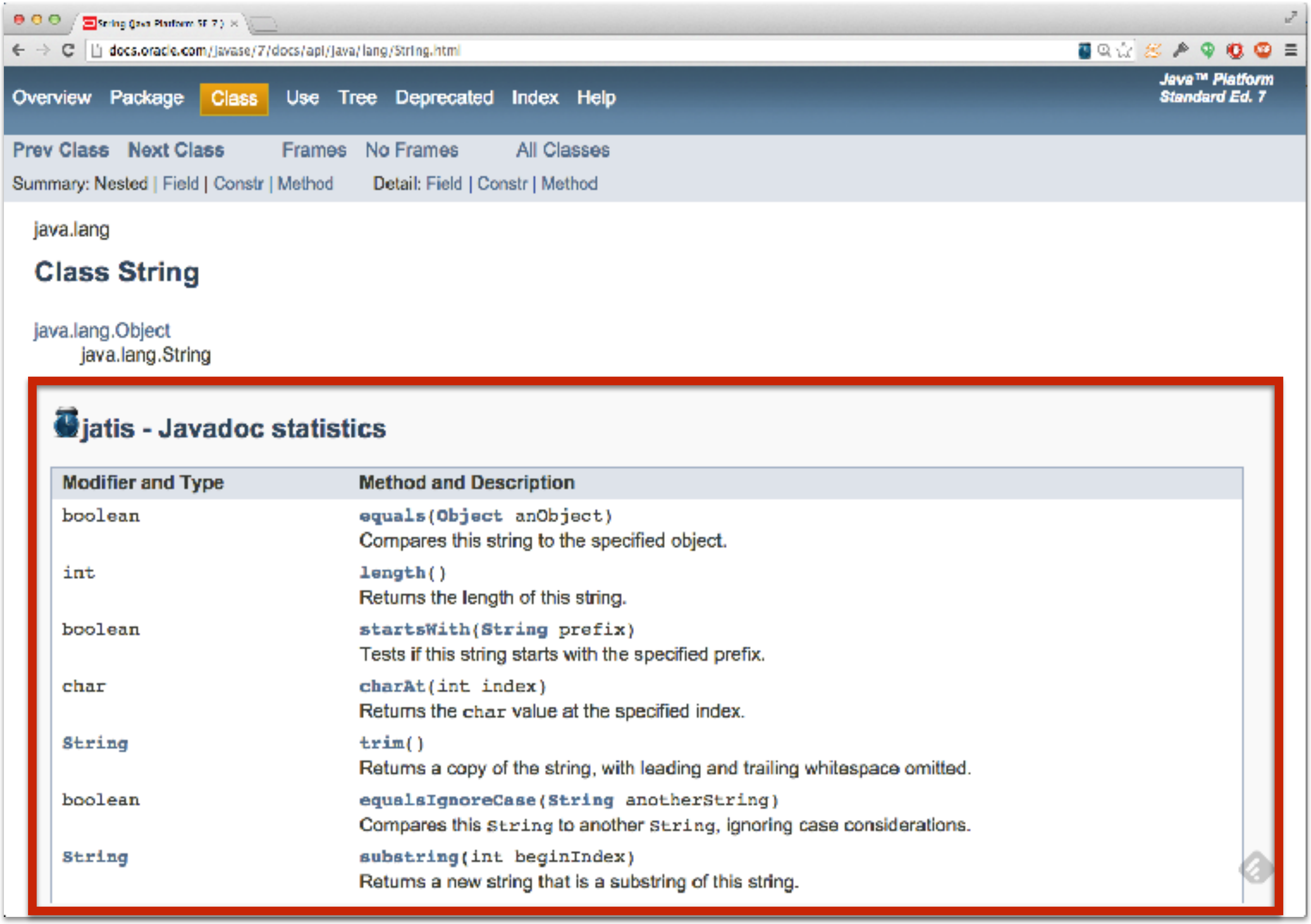
Geo-Locating the Knowledge Transfer in StackOverflow. Dennis Schenk and Mircea Lungu. In Proceedings of the 5th International Workshop on Social Software Engineering, p. 21—24, 2013.

Usage of java.lang.Thread in the ecosystem

Pangea streamlines analyzing multiple systems with Moose.



Augmenting JavaDoc in Chrome


String (Java Platform SE 7)
docs.oracle.com/javase/7/docs/api/java/lang/String.html
Overview
Package
Class
Use
Tree
Deprecated
Index
Help
Java™ Platform Standard Ed. 7
Prev Class
Next Class
Frames
No Frames
All Classes
Summary: Nested | Field | Constr | Method
Detail: Field | Constr | Method

java.lang

Class String

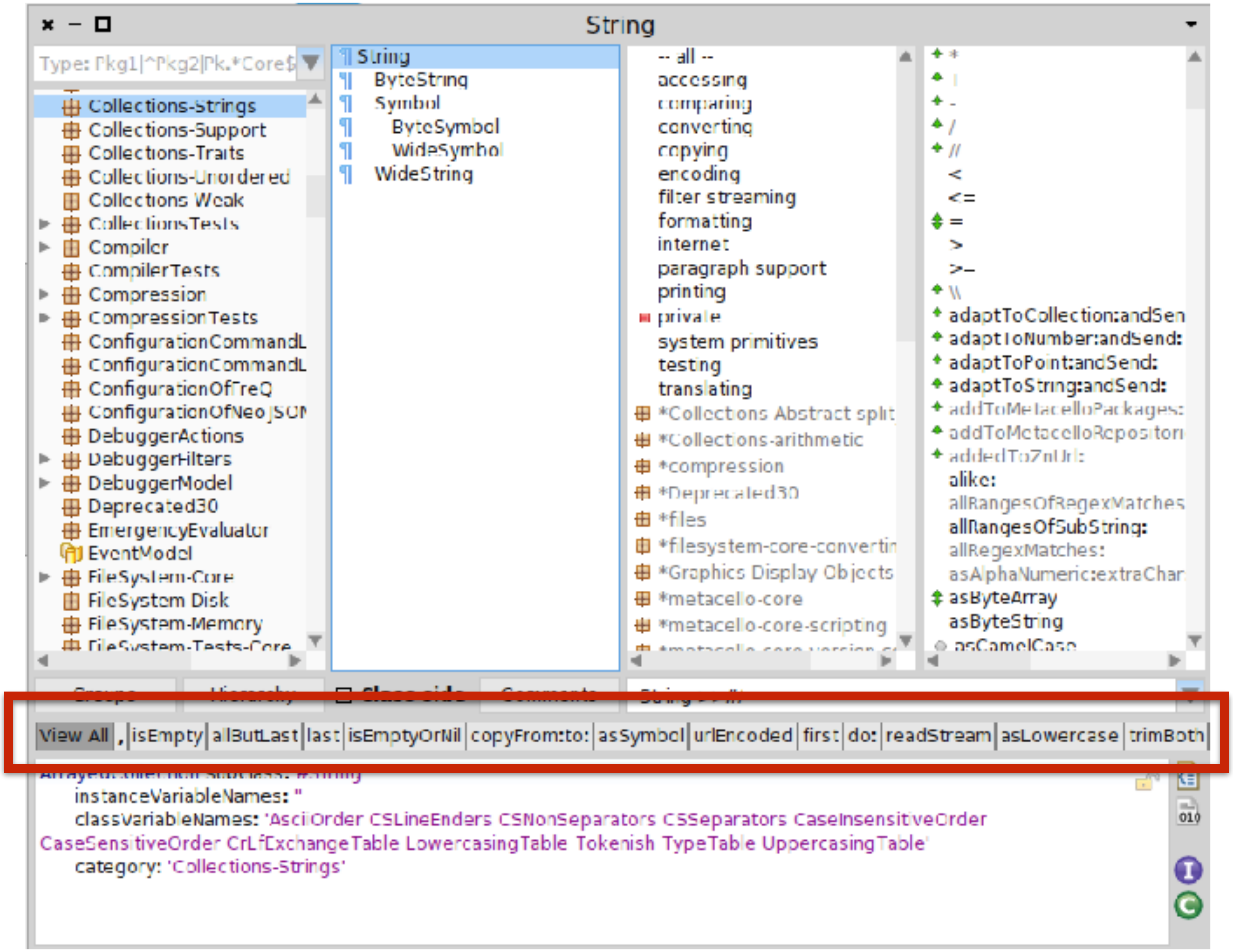
java.lang.Object
    java.lang.String

jatis - Javadoc statistics

Modifier and Type	Method and Description
`boolean`	`equals(Object anObject)` Compares this string to the specified object.
`int`	`length()` Returns the length of this string.
`boolean`	`startsWith(String prefix)` Tests if this string starts with the specified prefix.
`char`	`charAt(int index)` Returns the `char` value at the specified index.
`String`	`trim()` Returns a copy of the string, with leading and trailing whitespace omitted.
`boolean`	`equalsIgnoreCase(String anotherString)` Compares this `String` to another `String`, ignoring case considerations.
`String`	`substring(int beginIndex)` Returns a new string that is a substring of this string.

Overthrowing the Tyranny of Alphabetical Ordering in Documentation Systems. Boris Spasojević, Mircea Lungu, and Oscar Nierstrasz. In 2014 IEEE International Conference on Software Maintenance and Evolution (ERA Track), p. 511-515, September 2014.

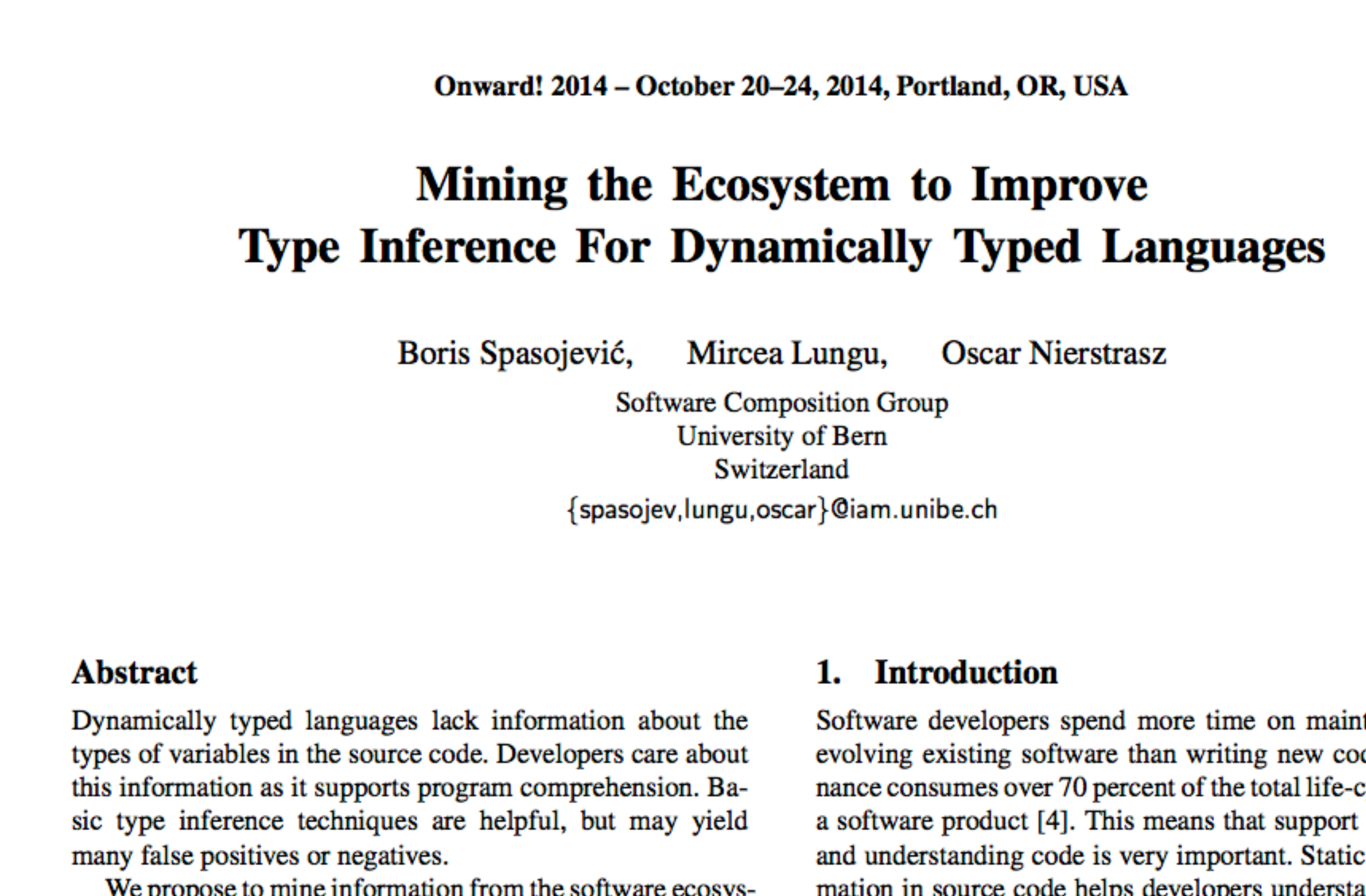
Augmenting The Refactoring Browser



```
ArrayedCollection subclass: #String
	instanceVariableNames: ''
	classVariableNames: 'AsciiOrder CSLineEnders CSNonSeparators CSSeparators CaseInsensitiveOrder CaseSensitiveOrder CrLfExchangeTable LowercasingTable Tokenish TypeTable UppercasingTable'
	category: 'Collections-Strings'
```

Overthrowing the Tyranny of Alphabetical Ordering in Documentation Systems. Boris Spasojević, Mircea Lungu, and Oscar Nierstrasz. In 2014 IEEE International Conference on Software Maintenance and Evolution (ERA Track), p. 511-515, September 2014.

#2 — intelligence of our tools++



Onward! 2014 – October 20–24, 2014, Portland, OR, USA

Mining the Ecosystem to Improve Type Inference For Dynamically Typed Languages

Boris Spasojević, Mircea Lungu, Oscar Nierstrasz

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Abstract

Dynamically typed languages lack information about the types of variables in the source code. Developers care about this information as it supports program comprehension. Basic type inference techniques are helpful, but may yield many false positives or negatives.

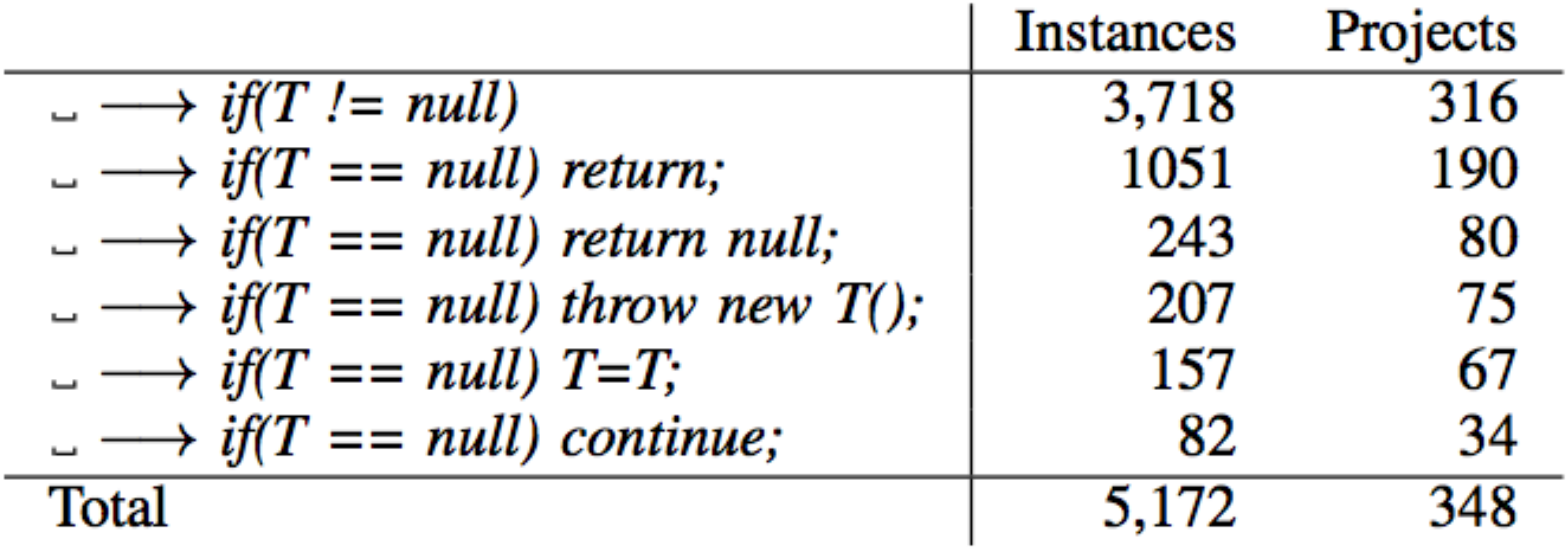
We propose to mine information from the software ecosys-

1. Introduction

Software developers spend more time on maint
evolving existing software than writing new cod
nance consumes over 70 percent of the total life-c
a software product [4]. This means that support
and understanding code is very important. Static
mation in source code helps developers understa

#3 — understanding our organization++

Most Popular Bug-Fixes

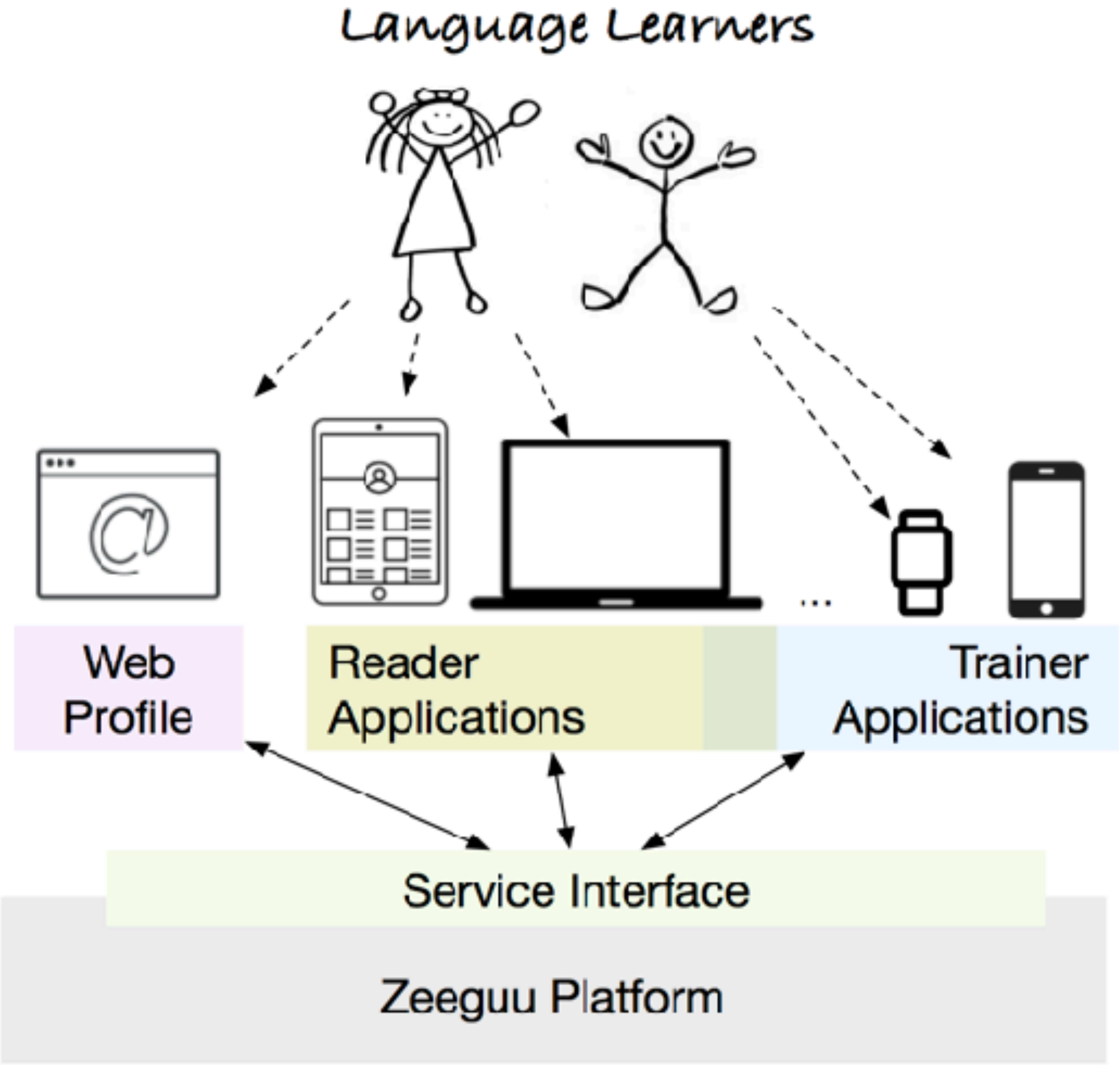


	Instances	Projects
␣ ⟶ *if(T != null)*	3,718	316
␣ ⟶ *if(T == null) return;*	1051	190
␣ ⟶ *if(T == null) return null;*	243	80
␣ ⟶ *if(T == null) throw new T();*	207	75
␣ ⟶ *if(T == null) T=T;*	157	67
␣ ⟶ *if(T == null) continue;*	82	34
Total	5,172	348

Mining frequent bug-fix code changes. Haidar Osman, Mircea Lungu, and Oscar Nierstrasz. In Software Maintenance, Reengineering and Reverse Engineering (CSMR-WCRE), 2014 Software Evolution Week - IEEE Conference on, p. 343-347, February 2014

The Personal Context

Accelerating Second Language Acquisition



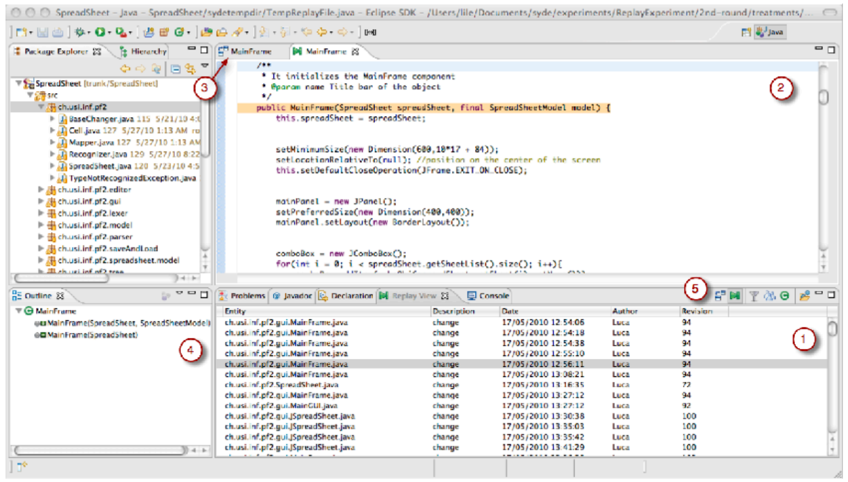
Lungu, Bootstrapping a Ubiquitous Software Ecosystem, Proceedings of WEA 2016

Code Reading Recommender

based on subjective complexity

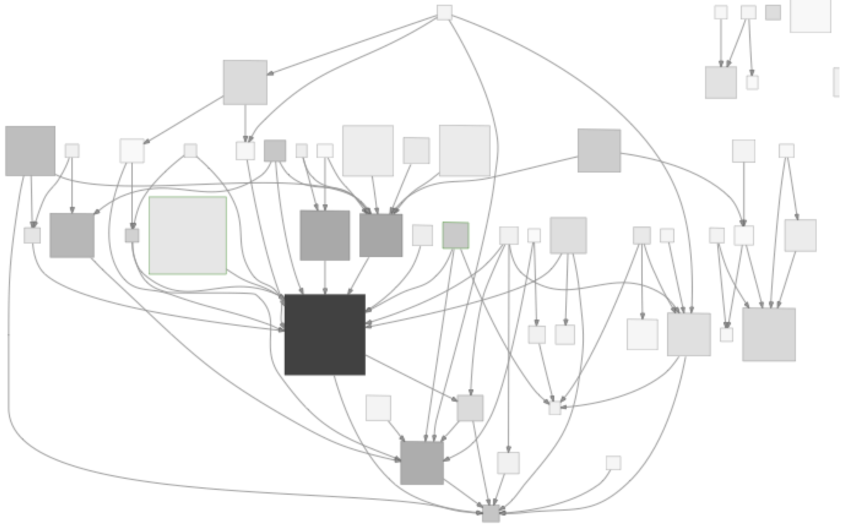
designed by freepik.com

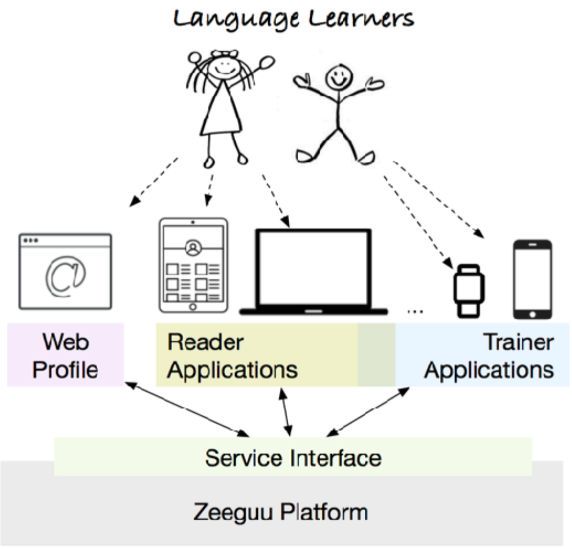
Context in Software Analytics


SpreadSheet – Java – SpreadSheet/sydetempdir/TempReplayFile.java – Eclipse SDK – /Users/lile/Documents/syde/experiments/ReplayExperiment/2nd-round/treatments/…
Java
Package Explorer
Hierarchy
SpreadSheet [trunk/SpreadSheet]
src
ch.usi.inf.pf2
BaseChanger.java 115 5/21/10 4:0
Cell.java 127 5/27/10 1:13 AM ro
Mapper.java 127 5/27/10 1:13 AM
Recognizer.java 129 5/27/10 8:22
SpreadSheet.java 120 5/23/10 4:5
TypeNotRecognizedException.java
ch.usi.inf.pf2.editor
ch.usi.inf.pf2.gui
ch.usi.inf.pf2.lexer
ch.usi.inf.pf2.model
ch.usi.inf.pf2.parser
ch.usi.inf.pf2.saveAndLoad
ch.usi.inf.pf2.spreadsheet.model
Outline
MainFrame
MainFrame(SpreadSheet, SpreadSheetModel)
MainFrame(SpreadSheet)
MainFrame
MainFrame
Problems
Javadoc
Declaration
Replay View
Console
1
2
3
4
5

```java
/**
 * It initializes the MainFrame component
 * @param name Title bar of the object
 */
public MainFrame(SpreadSheet spreadSheet, final SpreadSheetModel model) {
    this.spreadSheet = spreadSheet;


    setMinimumSize(new Dimension(600,10*17 + 84));
    setLocationRelativeTo(null); //position on the center of the screen
    this.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);


    mainPanel = new JPanel();
    setPreferredSize(new Dimension(400,400));
    mainPanel.setLayout(new BorderLayout());


    comboBox = new JComboBox();
    for(int i = 0; i < spreadSheet.getSheetList().size(); i++){
```

Entity	Description	Date	Author	Revision
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:54:06	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:54:18	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:54:38	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:55:10	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 12:56:11	Luca	94
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 13:08:21	Luca	94
ch.usi.inf.pf2.SpreadSheet.java	change	17/05/2010 13:16:35	Luca	72
ch.usi.inf.pf2.gui.MainFrame.java	change	17/05/2010 13:27:12	Luca	94
ch.usi.inf.pf2.gui.MainGUI.java	change	17/05/2010 13:27:12	Luca	92
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:30:38	Luca	100
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:35:03	Luca	100
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:35:42	Luca	100
ch.usi.inf.pf2.gui.JSpreadSheet.java	change	17/05/2010 13:41:29	Luca	100





Temporal (eco)Systemic Personal

@mircealungu

https://mircealungu.github.io