

# Supporting Software Development as A Knowledge-Intensive and Collaborative Activity

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SRA Key Technology Lab

# Software development is collaborative

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## Software systems are built by many people

- Power of many hands

- Division of labor

## Many kinds of collaboration exist

- Consensus building

- Brainstorming of design ideas

- Coordination of individual development

# Software development is knowledge intensive

## Knowledge from multiple domains

Problem domain

Programming language

Development tools

Operating systems

Programming libraries

The system under development

Programming is essentially a learning process

From *brawny* collaboration to *brainy* collaboration

Software systems are built by many people

Power of many hands --> Power of many heads

Division of labor --> Distribution of knowledge

Supporting **knowledge collaboration** in software development

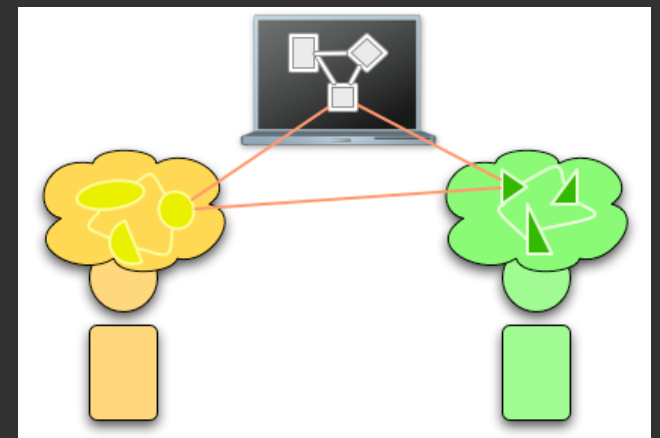
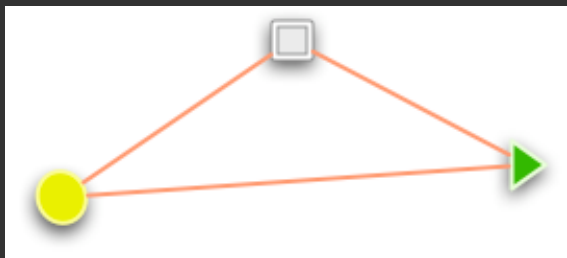
Accessing and integrating distributed knowledge

# Knowledge vs. knowing capability

Knowledge: stored artifacts in the head

Knowledgeable behavior: effective behavior to perform a task

Knowing capability: the capability of accessing and integrating external knowledge for performing a given task



Overall capability of a project team

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NOT the sum of the knowledge of individual developers

But the capability of activating knowledge transfer and integrating what individuals know

# Software project as a knowledge ecosystem

Software project as a self-organizing and evolving knowledge ecosystem

Knowledge is distributed over resources  
artifacts (code, documents) and developers

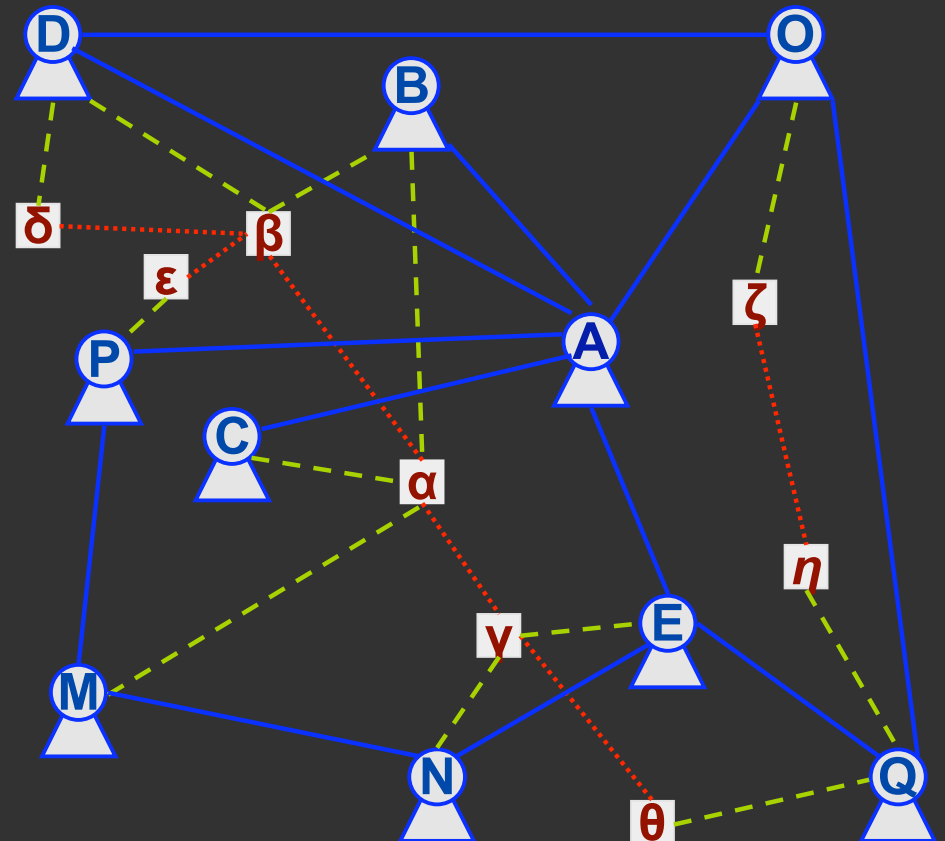
Knowledge flows with interactions of knowledge resources

developer -> artifact

artifact -> artifact

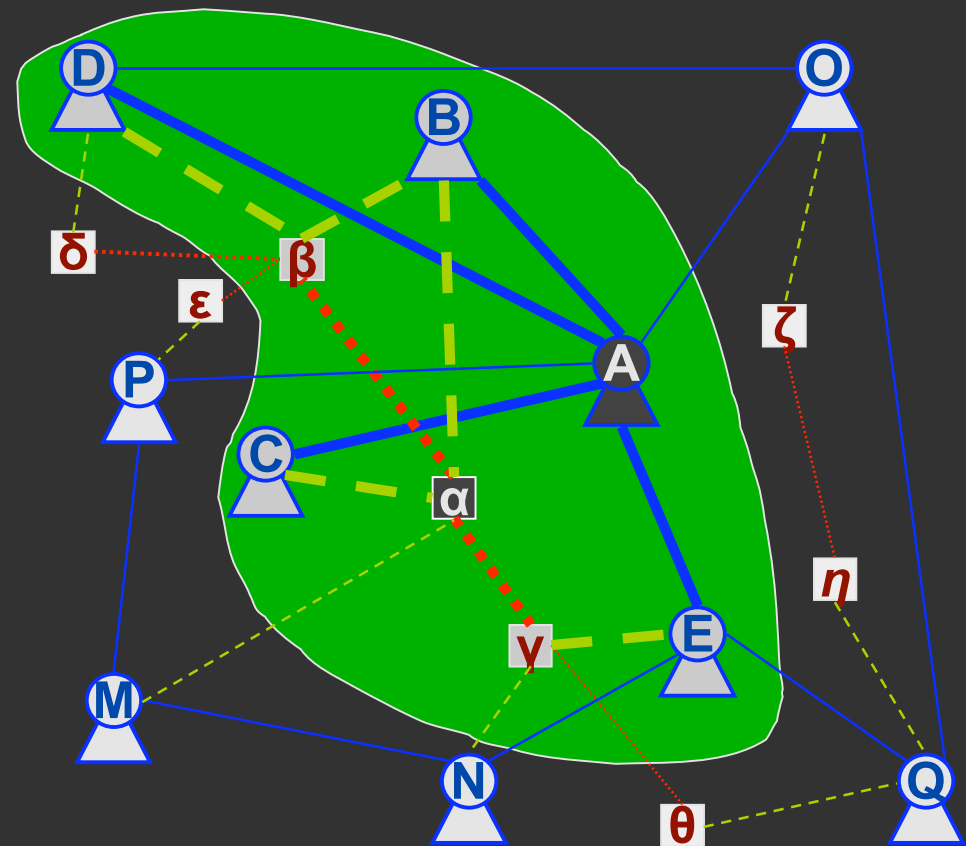
artifact -> developer

developer -> developer



# Supporting knowledge collaboration

Activate all available knowledge resources (technical and social support) in the knowledge ecosystem





# Continuous socio-technical support

## Technical support (knowledge-repository)

- At the bid of users

- Difficult to capture tacit and contextual knowledge

- Inexpensive

## Social support (community-based)

- Dealing with tacit knowledge

- At the mercy of experts

- Expensive

The seamless integration of the two approaches

# The challenges

## Collaboration with cognitive tools (the technical dimension)

What information should be added to complement developers' insufficient knowledge in head

## Collaboration with knowledgeable peers (the social dimension)

Who has the knowledge I need?

Who is willing to help me at this moment?

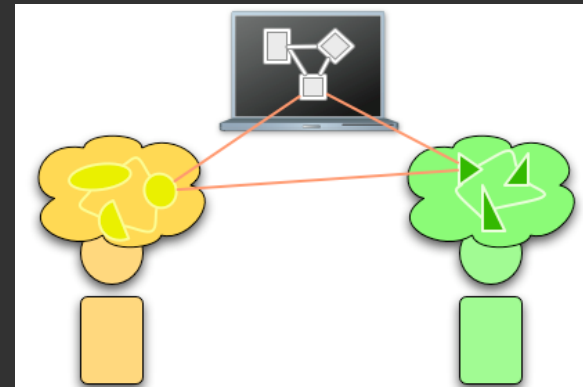
Do I look stupid if I ask this question?

Is the information reliable?

Why should I help him/her?

What happens if I don't help him/her?

I have my own work to do!



# Learning Java API on demand

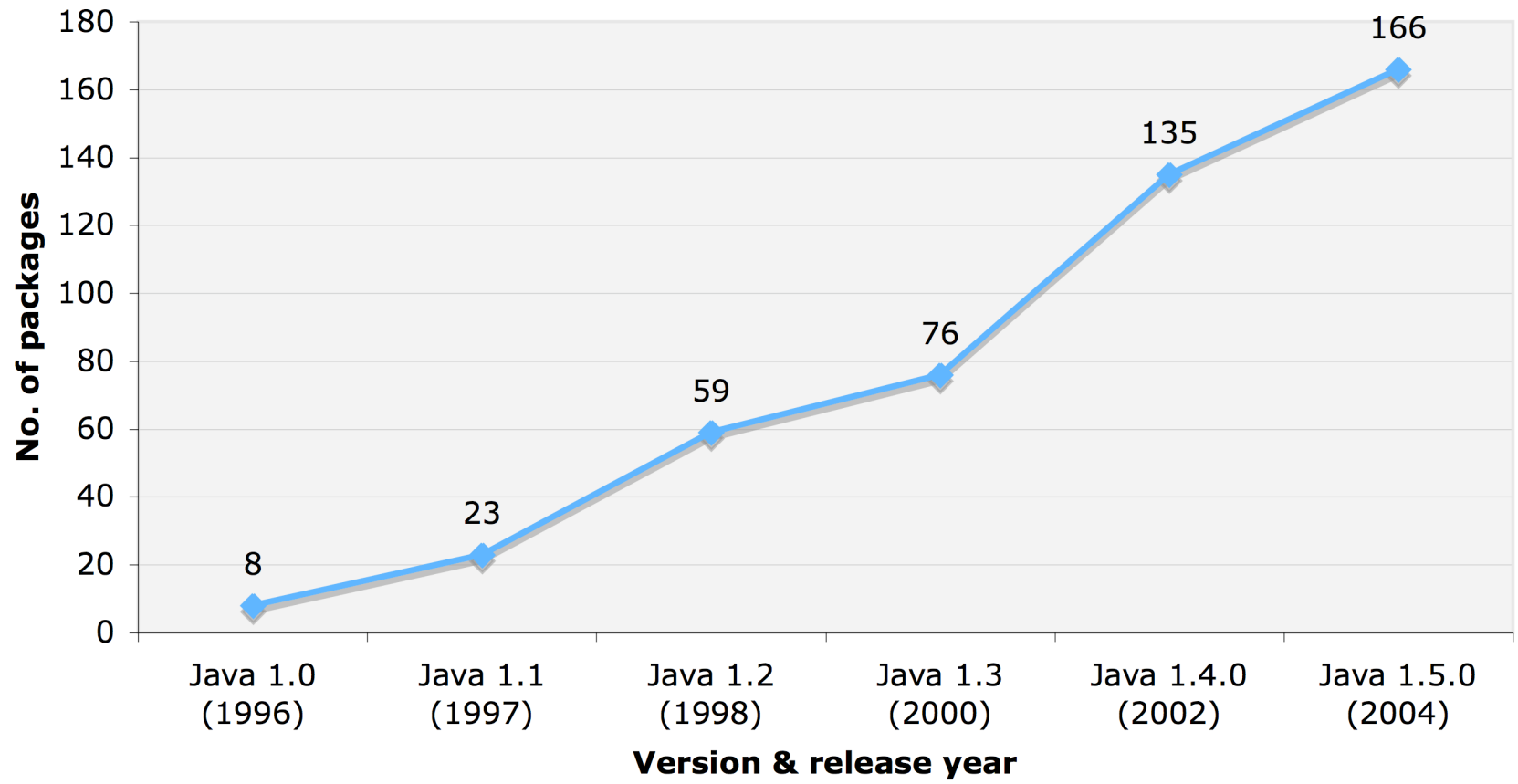
---

CodeBroker

STeP\_IN (Socio-Technical Platform for in situ  
Networking)

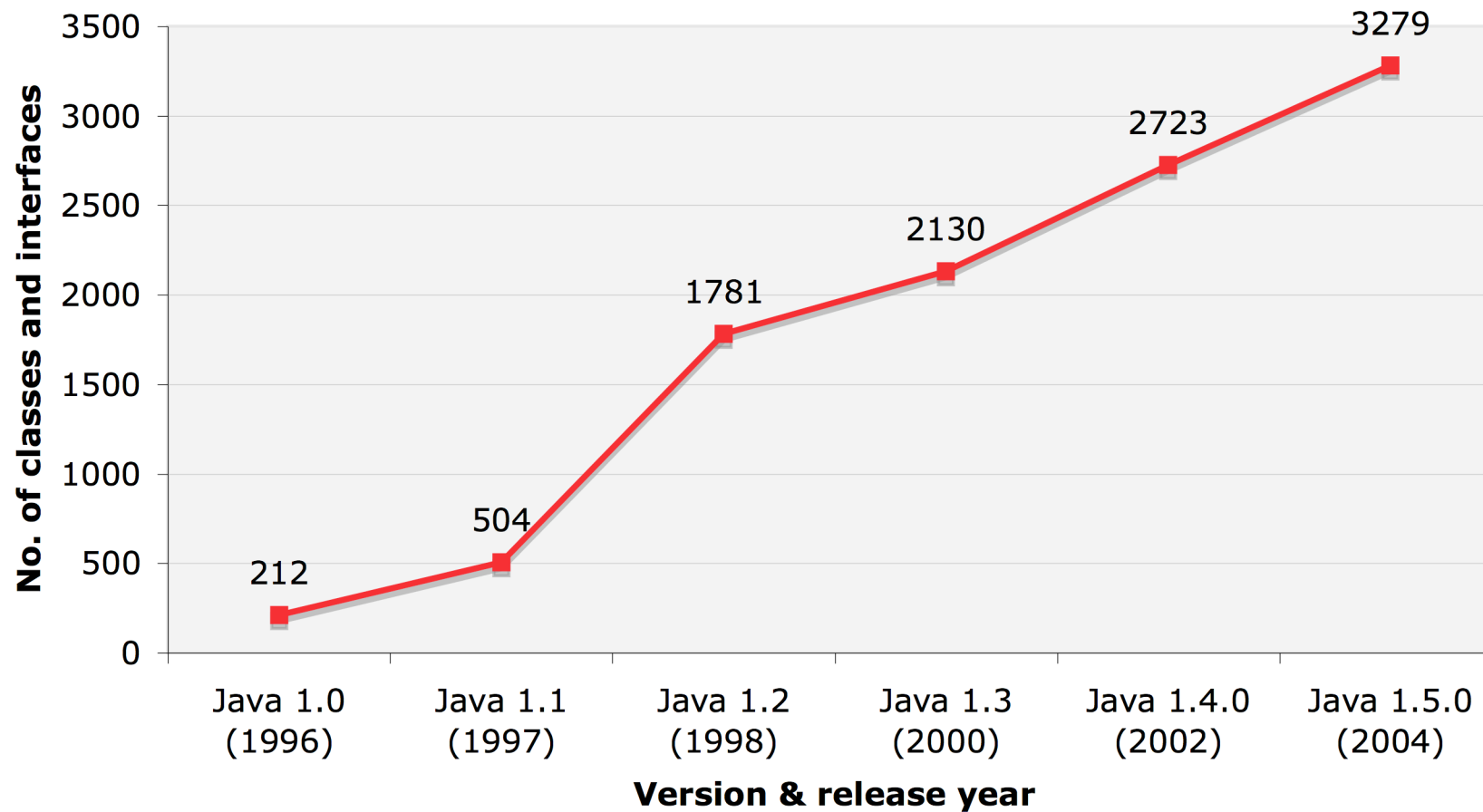
# Rapid growth of Java API

**The growth of Java API packages**



# Rapid growth of Java API

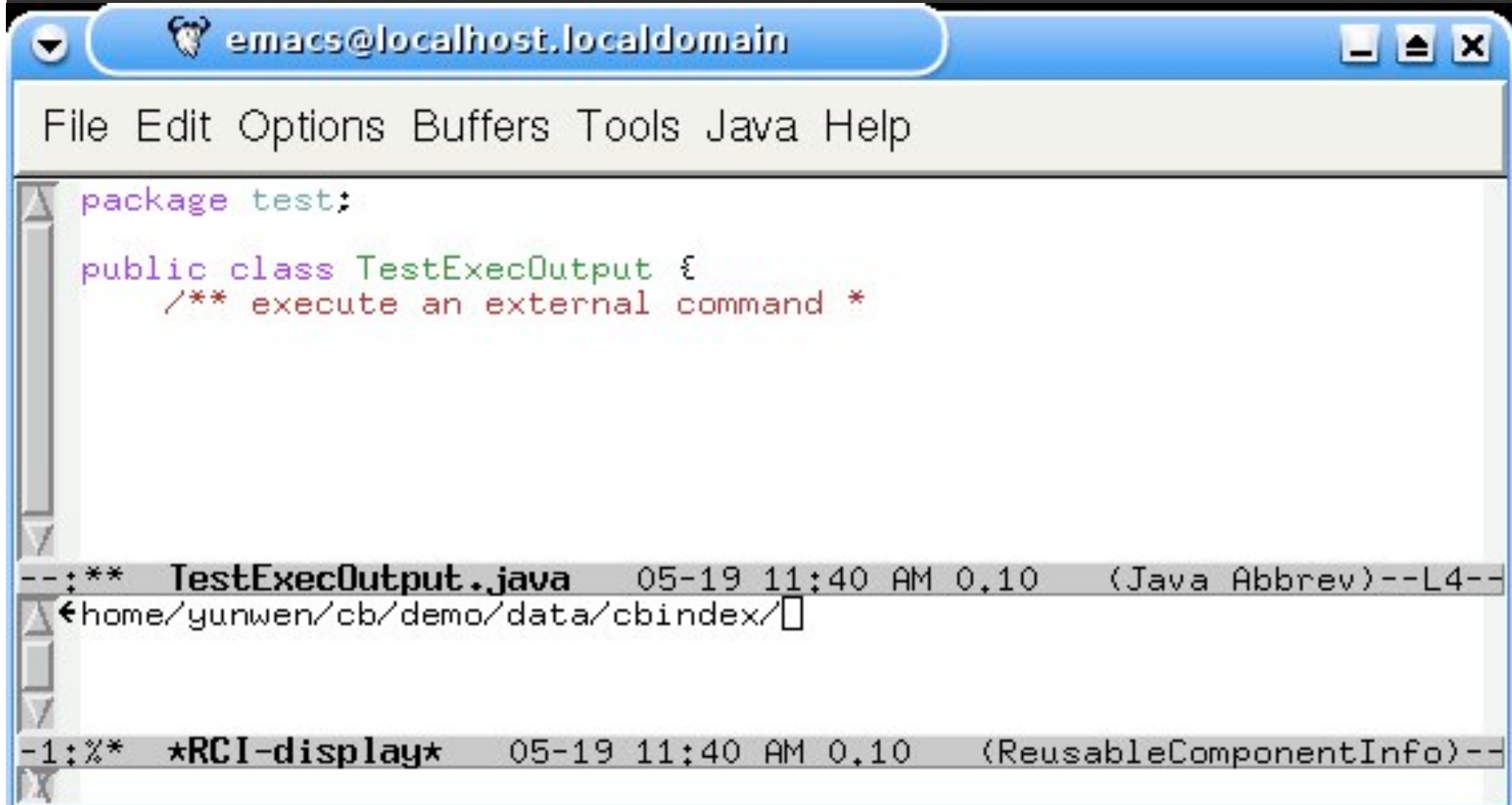
**The growth of Java API classes and interfaces**



# Libraries used in STeP\_IN

Library Name	Class	Method
activation.jar	38	261
bcel-5.1.jar	373	3093
commons-collections-3.1.jar	446	4021
commons-dbcp-1.2.1.jar	44	935
commons-pool-1.2.jar	25	277
jun547.jar	2640	18412
mail.jar	240	1966
postgresql.jar	82	1216
resolver.jar	29	298
StPL75.jar	175	1384
xercesImpl.jar	784	7463
xml-ParserAPIs.jar	207	1748
<b>Total</b>	<b>5083</b>	<b>41074</b>

# Creating awareness of unknown API



The image shows a screenshot of an Emacs window titled "emacs@localhost.localdomain". The window has a menu bar with "File", "Edit", "Options", "Buffers", "Tools", "Java", and "Help". The main editing area contains the following Java code:

```
package test;

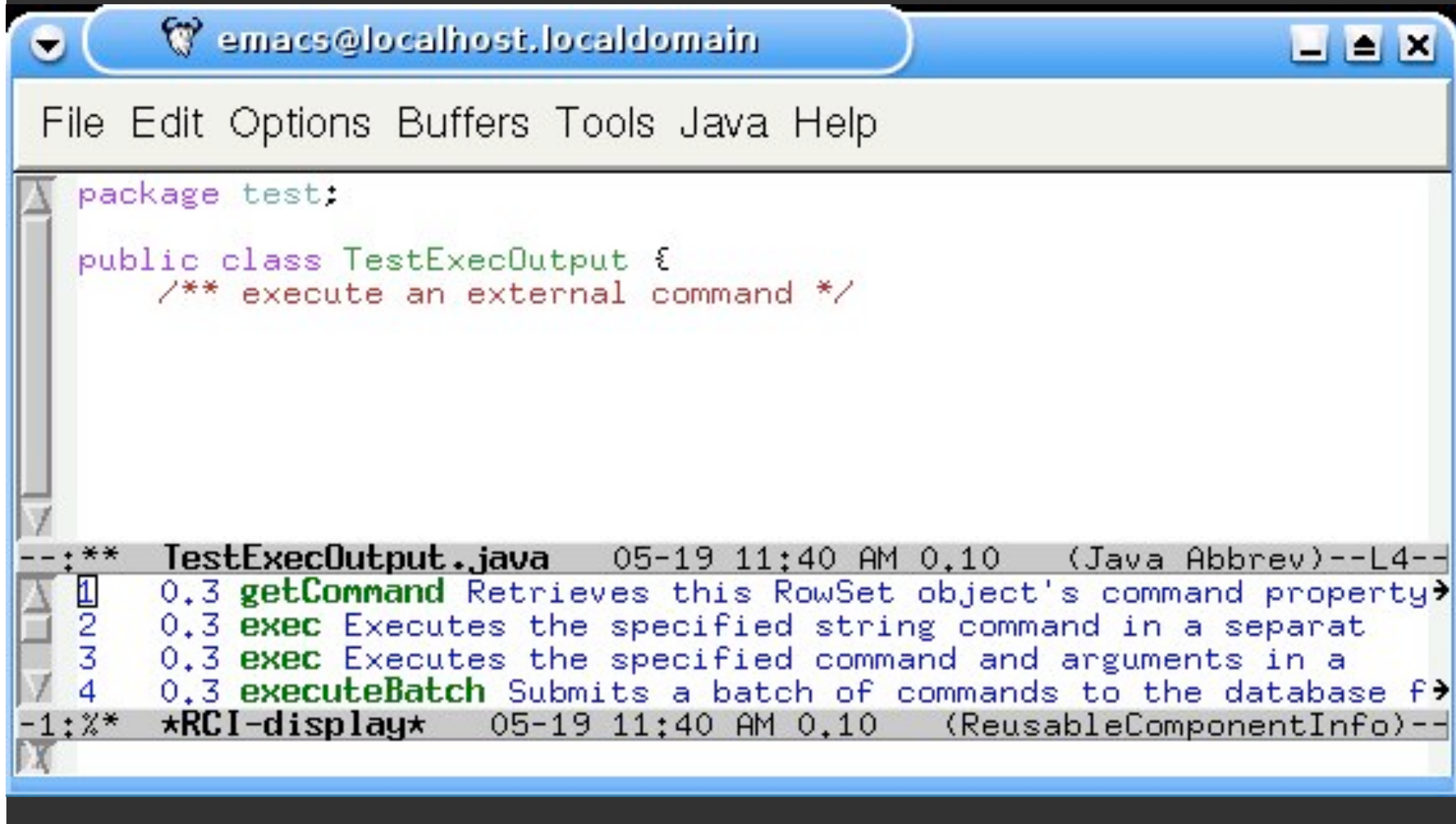
public class TestExecOutput {
    /** execute an external command */

```

At the bottom of the window, there is a status bar with the following text:

```
--:** TestExecOutput.java 05-19 11:40 AM 0.10 (Java Abbrev)--L4--
←home/yunwen/cb/demo/data/cbindex/□
-1:;%* *RCI-display* 05-19 11:40 AM 0.10 (ReusableComponentInfo)--
```

# Creating the awareness of unknown API



The image shows a screenshot of an Emacs editor window. The title bar reads "emacs@localhost.localdomain". The menu bar includes "File", "Edit", "Options", "Buffers", "Tools", "Java", and "Help". The main text area contains the following Java code:

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package test;

public class TestExecOutput {
    /** execute an external command */

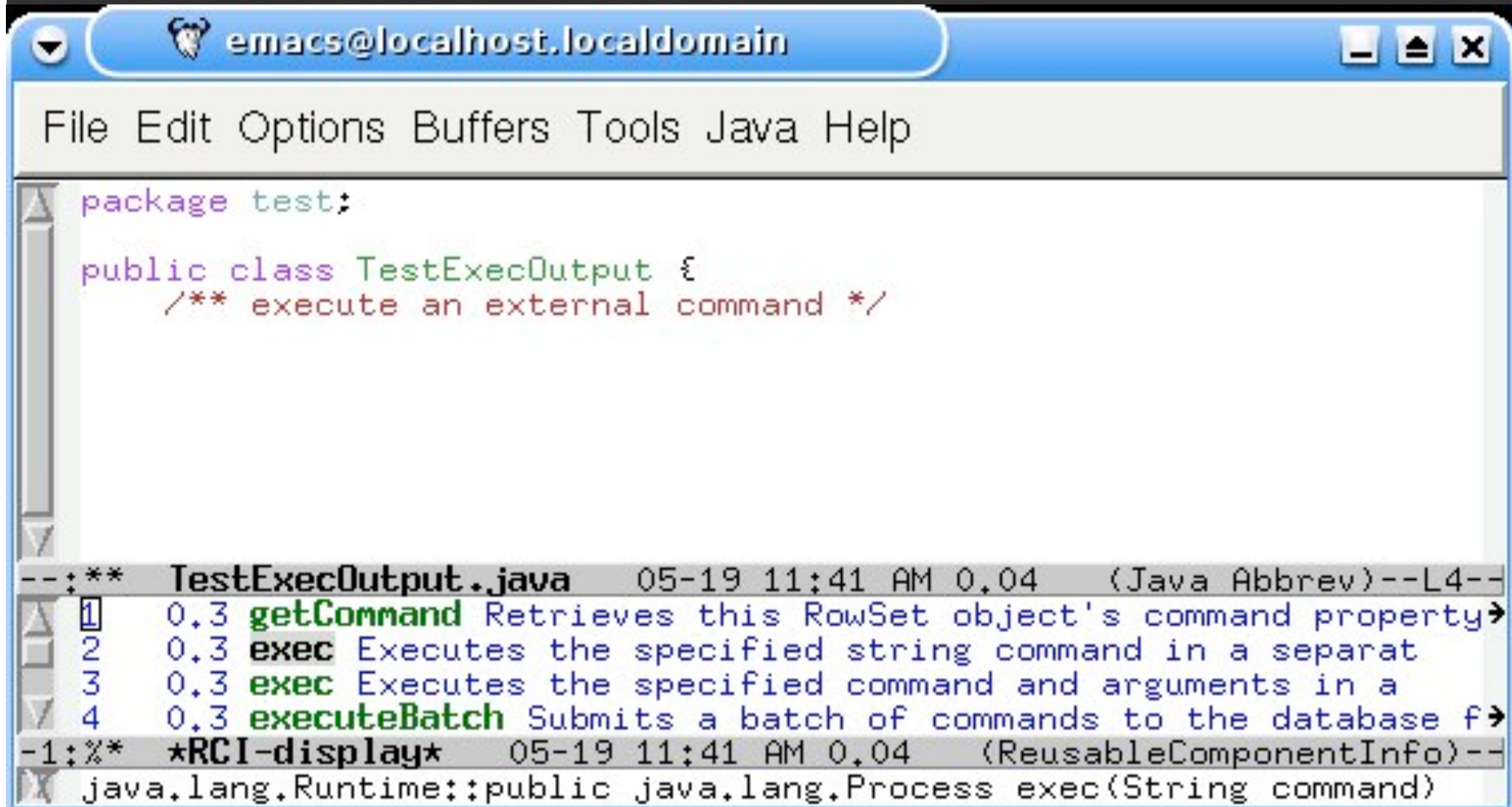
```

Below the code, there is a scrollable list of entries, likely generated by a tool like Javadoc. The entries are as follows:

- :\*\* TestExecOutput.java 05-19 11:40 AM 0,10 (Java Abbrev)--L4--
- 1 0,3 **getCommand** Retrieves this RowSet object's command property →
- 2 0,3 **exec** Executes the specified string command in a separat
- 3 0,3 **exec** Executes the specified command and arguments in a
- 4 0,3 **executeBatch** Submits a batch of commands to the database f →
- 1:%\* **\*RCI-display\*** 05-19 11:40 AM 0,10 (ReusableComponentInfo)--



# Mouse triggered information



The image shows a screenshot of an Emacs window titled "emacs@localhost.localdomain". The menu bar includes "File", "Edit", "Options", "Buffers", "Tools", "Java", and "Help". The main text area contains the following Java code:

```
package test;

public class TestExecOutput {
    /** execute an external command */

```

A tooltip is displayed over the code, showing the signature and description of the `exec` method:

--:***	<b>TestExecOutput.java</b>	05-19 11:41 AM 0,04	(Java Abbrev)--L4--
1	0,3	<b>getCommand</b>	Retrieves this RowSet object's command property →
2	0,3	<b>exec</b>	Executes the specified string command in a separat
3	0,3	<b>exec</b>	Executes the specified command and arguments in a
4	0,3	<b>executeBatch</b>	Submits a batch of commands to the database f →
-1:;%*	<b>*RCI-display*</b>	05-19 11:41 AM 0,04	(ReusableComponentInfo)--
X	java.lang.Runtime::public	java.lang.Process	exec(String command)

# Jumping to documents

**exec**

```
public Process exec(String command)
    throws IOException
```

Executes the specified string command in a separate process.

The `command` argument is parsed into tokens and then executed as a command in a separate process. The token parsing is done by a [StringTokenizer](#) created by the call:

```
new StringTokenizer(command)
```

with no further modifications of the character categories. This method has exactly the same effect as `exec(command, null)`.

**Parameters:**  
`command` - a specified system command.

**Returns:**  
a `Process` object for managing the subprocess.

**Throws:**  
[SecurityException](#) - if a security manager exists and its `checkExec` method doesn't allow creation of a subprocess.  
[IOException](#) - if an I/O error occurs  
[NullPointerException](#) - if `command` is null  
[IllegalArgumentException](#) - if `command` is empty

**See Also:**  
[exec\(java.lang.String, java.lang.String\[\]\)](#), [SecurityManager.checkExec\(java.lang.String\)](#)

[Examples](#) | [Discussion Archive](#) | [Ask Experts](#) | [Upload Example](#)

**Examples** | **Discussion Archive** | **Ask Experts** | **Upload Example**

# Finding examples

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

**Examples for: java.lang.Runtime  
java.lang.Process exec(java.lang.String)**

[Previous] **1** 2 [Next] [Add Example] [Discussion Archive] [Ask Expert]

***This example is provided by vincent.***

0 found it helpful  
0 found it not helpful

[Add Example] [Discussion Archive] [Ask Expert]

```
// execute external commands in a Java program
try {
    String command = "ls";
    Process p = Runtime.getRuntime().exec(command);
    //do something with p
} catch (IOException e) {
    //do something
}
```

This example is :  Helpful  Not helpful

This page was created by STeP\_IN (001) on 2006/05/19 11:45:01

# Reading archived discussion

STeP\_IN : Discussion Archive - Mozilla

File Edit View Go Bookmarks Tools Window Help

[\[Home\]](#) [\[Logout\]](#) [\[JavaDoc\]](#) [\[Social Profile\]](#) [\[Technical Profile\]](#) [\[Involved DynC\]](#) [\[Account\]](#)

**Discussion Archive for:** **java.lang.Runtime**  
**java.lang.Process exec(java.lang.String)**

[\[Examples\]](#) [\[Ask Expert\]](#)

**DynCs:**

- [how to use exec](#)  
vincent  
2006/03/02 12:24:25
- [call an external command](#)  
vincent  
2006/03/02 12:33:26
- [help on exec](#)  
vincent  
2006/03/02 12:58:59
- [exec](#)  
vincent  
2006/03/02 14:11:32
- [help](#)  
vincent  
2006/03/02 14:36:10
- [help on exec](#)  
vincent  
2006/03/02 16:02:08
- [read output of command](#)

**Discussions:**

**[Examples] [Ask Expert]**

**From:** vincent  
**Subject:** how to use exec  
**Date:** 2006/03/02 12:24:25

I want to execute an external command, such as 'ls', but I don't know to use exec in context. Could someone please to help me. Thanks in advance

---

**From:** vincent  
**Subject:** call an external command  
**Date:** 2006/03/02 12:33:26

I need to call an external command from a Java program. Could someone help me using exec. Thx in advance.

---

**From:** vincent  
**Subject:** help on exec  
**Date:** 2006/03/02 12:58:59

could someone please tell me how to use exec? thanks.

# Asking the experts

STeP\_IN : Ask Experts - Mozilla

File Edit View Go Bookmarks Tools Window Help

[\[Home\]](#) [\[Logout\]](#) [\[JavaDoc\]](#) [\[Social Profile\]](#) [\[Technical Profile\]](#) [\[Involved DynC\]](#) [\[Account\]](#)

***Requesting collaboration from experts on:*** `java.lang.Runtime`  
`java.lang.Process`  
`exec(java.lang.String)`

Subject : read the output

Question : How do I read the output of the executed command in the Java program?

Submit

# Emails to dynamically chosen experts

Message 22:

From dync+17@bud.cs.colorado.edu Thu Mar 9 05:27:03 2006

X-Original-To: ginny@bud.cs.colorado.edu

From: dync+17@bud.cs.colorado.edu

To: ginny@bud.cs.colorado.edu

Subject: [Dync 17] read the output of the command

MIME-Version: 1.0

Content-Type: text/plain; charset=UTF-8

Content-Transfer-Encoding: 7bit

Date: Thu, 9 Mar 2006 05:27:02 -0700 (MST)


harry has requested help on  
java.lang.Runtime  
Process exec (String)

Your email address will be automatically changed to your STeP\_IN UserName when your reply is sent.  
Please don't include your signature if you want to remain to be known only by your UserName in STeP\_IN.

-----Question Contents-----

how to read the output of the command's execution.  
thanks.

& ☐

 Shell



## Experts chosen based on the DynC approach

A DynC is a small group of knowledge workers that forms *ad hoc* in support of a particular *user* working on a particular *task*, and disassembles as the task is finished

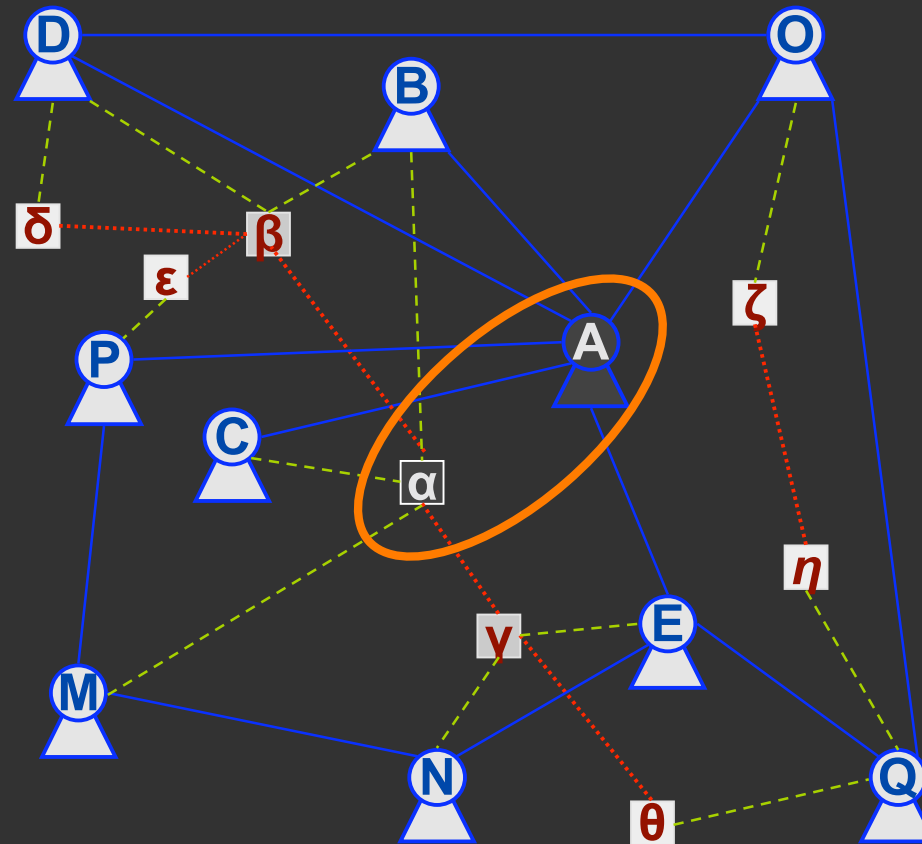
- High expertise on a given task

- Established social relationship with the person

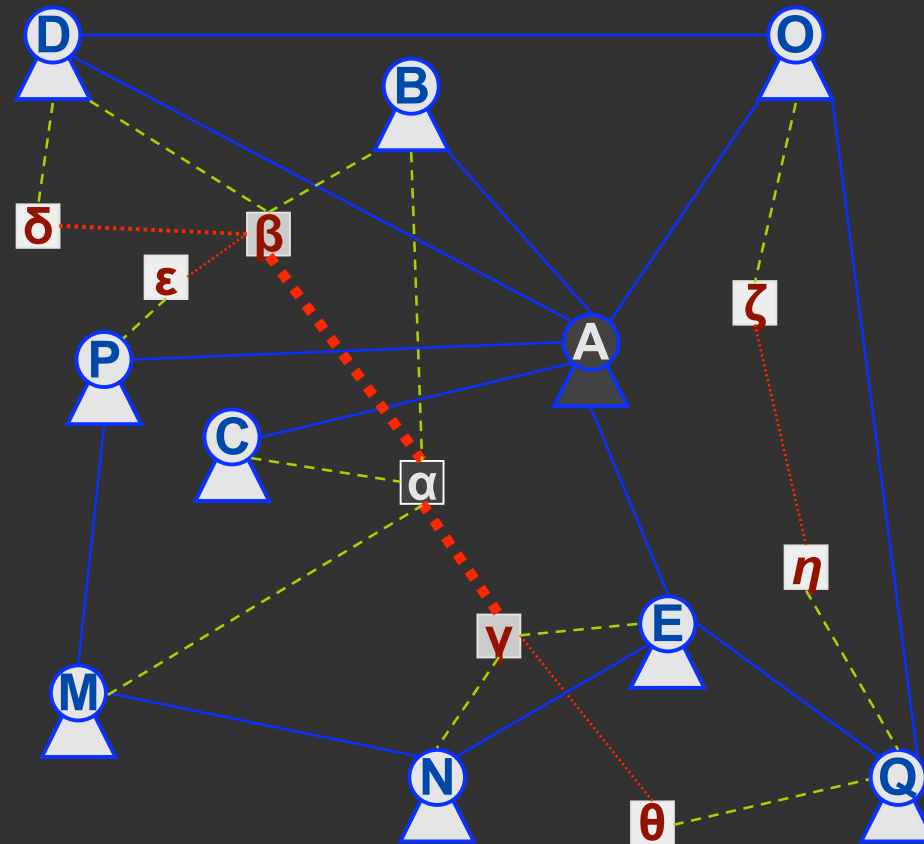




Triggering event for  $DynC(A, \alpha)$

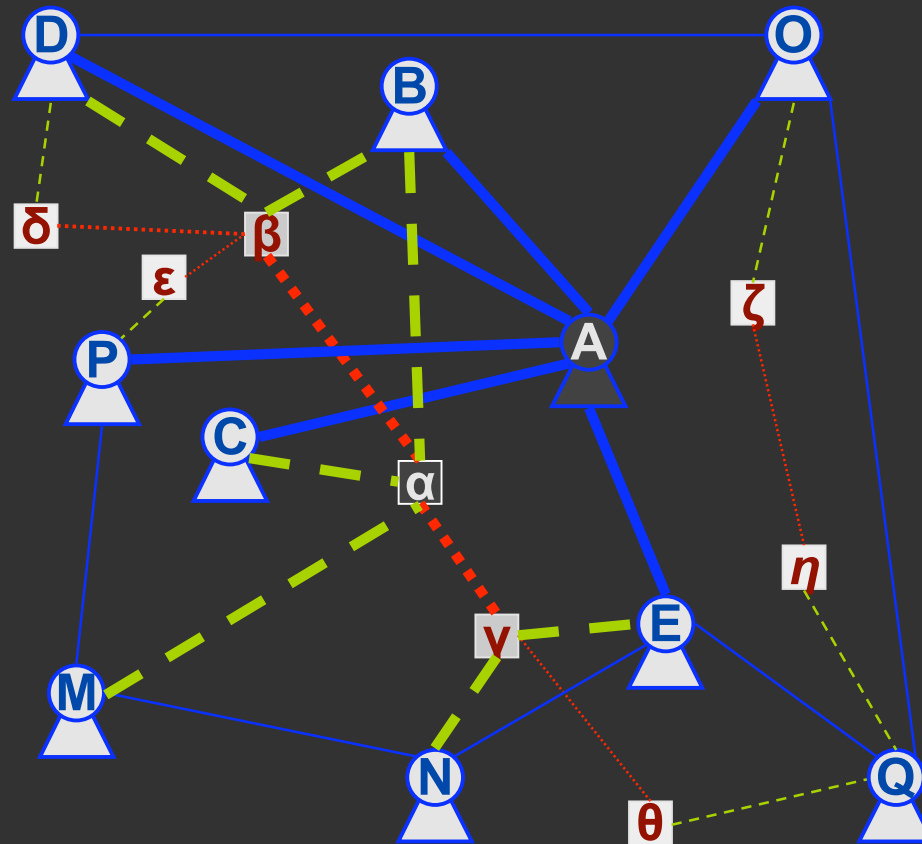


# From information to information

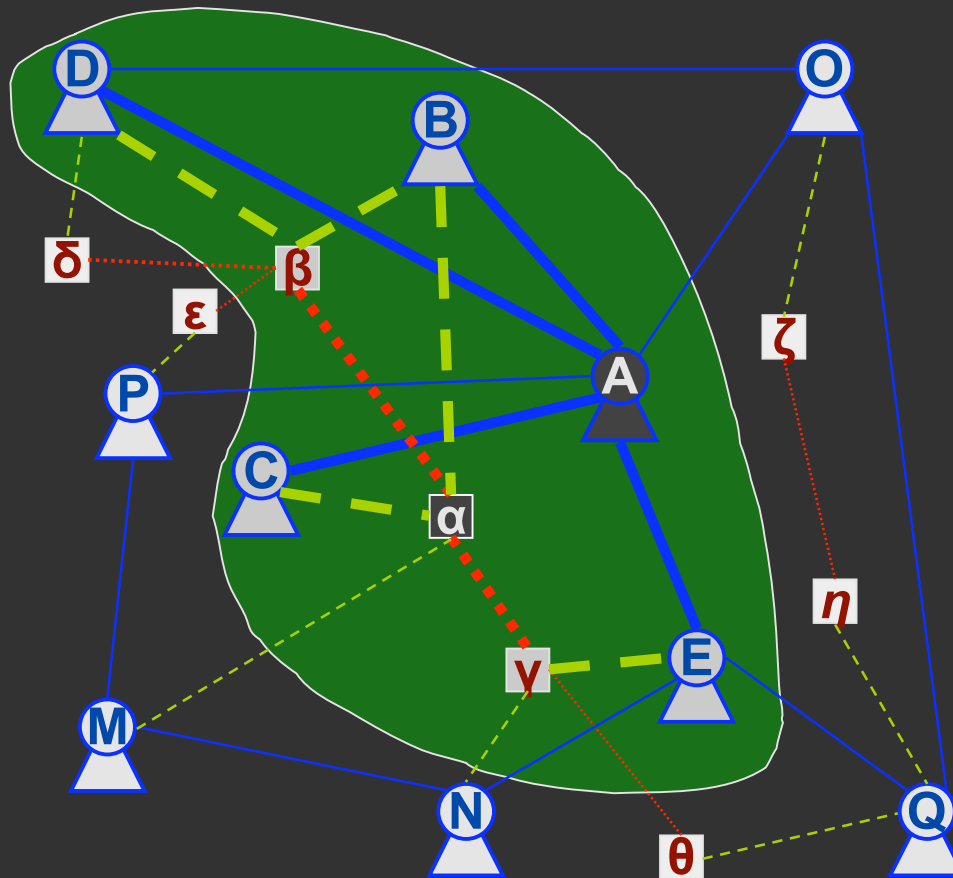


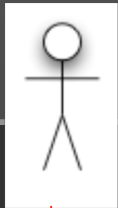


# From people to people

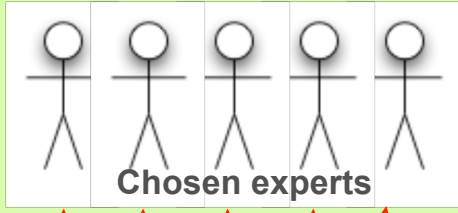


$$\text{DynC}(A, \alpha) = \{A, B, C, D, E\}$$





Knowledge collaboration



# Collaboration support

STeP\_IN: Ask Experts - Mozilla Firefox

Requesting collaboration from experts on: org.apache.lucene.analysis.CharTokenizer char normalize(char)

Subject: normalize

Question: Could some one please tell me the algorithm used in this method?

Done

**Ask experts**

Profile management

lu1288's Technical Profile

lu1288's Social Profile

STeP\_IN Repository

Human-human relation  
Human-info relation  
Info-info relation  
Discussion archive

STeP\_IN: Discussion Archive - Mozilla Firefox

Discussion Archive for: org.apache.lucene.analysis.CharTokenizer char normalize(char)

DynCs: Similarity score computation documentation

Re(2): Lucene with Number-Text

any other operations performed in this method?

Done

**Discussion archive**

codeBroker Search Interface - Mozilla Firefox

Search for... normalize token

Options... Scope: Filter:

Return only methods:  I used  I never used  Both

1	<a href="#">normalize</a>	Called on each token character to normalize it before...
0.5	org.apache.lucene.analysis.CharTokenizer.	protected char normalize(char c)
2	<a href="#">normalize</a>	Collects only characters which are not link characters...
0.5	org.apache.lucene.analysis.LowerCaseTokenizer.	protected char normalize(char c)
3	<a href="#">setOmitNorms</a>	Experts: If set, omit normalization for associated...
0.5	org.apache.lucene.document.Field.	public void setOmitNorms(boolean omitNorms)
4	<a href="#">normalize</a>	Assigns the query normalization to this...
0.47	org.apache.lucene.search.ConstantScoreQuery.ConstantWeight.	public void normalize(float weight)
5	<a href="#">normalize</a>	Assigns the query normalization to this...
0.45	org.apache.lucene.analysis.CharTokenizer.	public void normalize(float weight)
6	<a href="#">isTokenChar</a>	returns true iff a character is included in the...

Done

**Search interface**

CharTokenizer - Mozilla Firefox

normalize

protected char normalize(char c)

Called on each token character to normalize it before it is added to the token. The default implementation does nothing. Subclasses may use this to, e.g., lowercase tokens.

next

public final Token next()

Returns the next token in the stream, or null at EOS.

Specified by: next in class TokenStream

Throws: java.io.IOException

Done

**Enhanced documents**

STeP\_IN: Examples - Mozilla Firefox

Examples for: org.apache.lucene.analysis.CharTokenizer char normalize(char)

This example is provided by lu1288.

```

1 found it helpful.
0 found it not helpful.

if (isTokenChar(c) && !isItATokenChar(c)) {
    if (length == 0)
        start = offset - 1;
    buffer[offset++] = normalize(c);
}

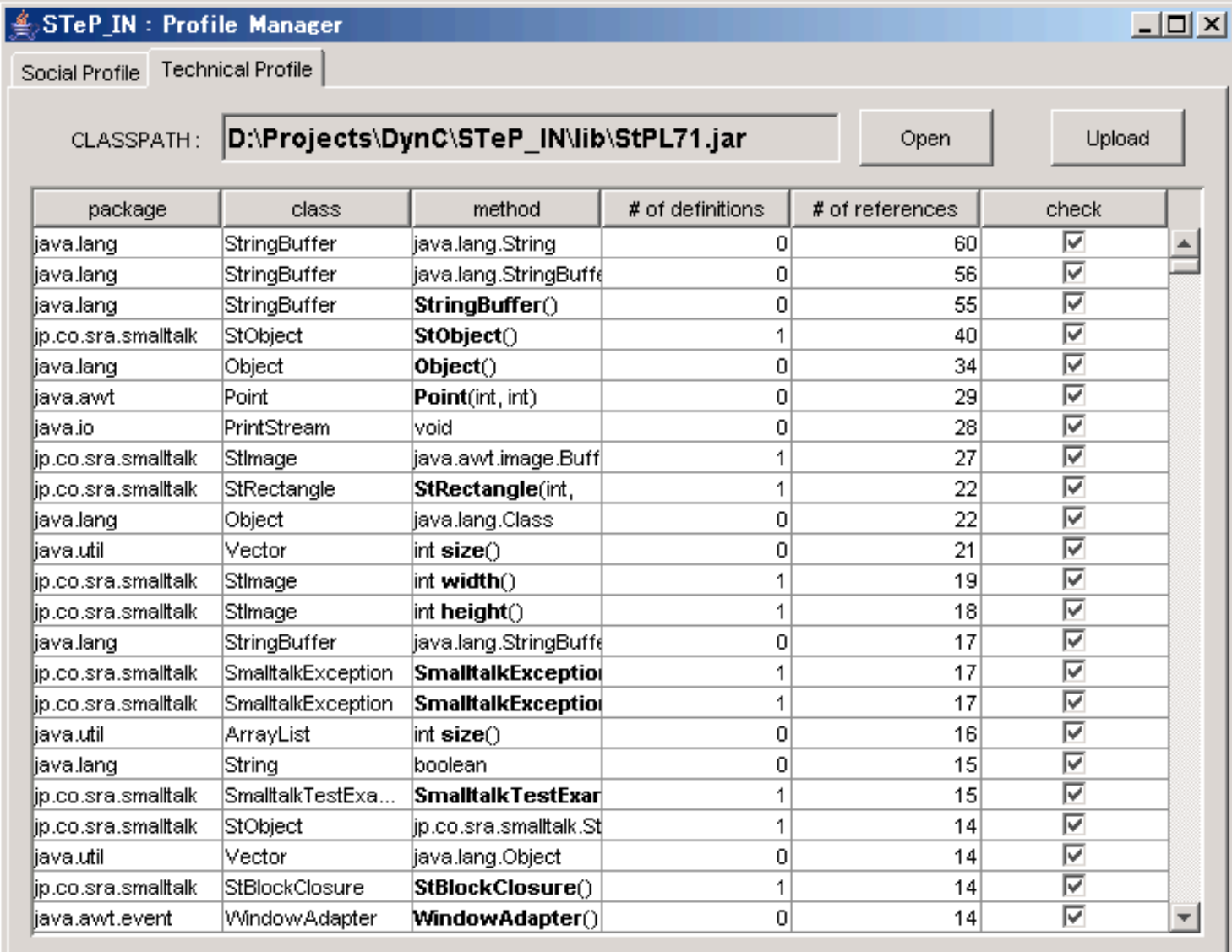
```

Done

**Examples**

# Search engine

# Initializing *Technical Profile* (Developer-Info)



STeP\_IN : Profile Manager

Social Profile | Technical Profile

CLASSPATH:

package	class	method	# of definitions	# of references	check
java.lang	StringBuffer	java.lang.String	0	60	<input checked="" type="checkbox"/>
java.lang	StringBuffer	java.lang.StringBuffer	0	56	<input checked="" type="checkbox"/>
java.lang	StringBuffer	<b>StringBuffer()</b>	0	55	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	StObject	<b>StObject()</b>	1	40	<input checked="" type="checkbox"/>
java.lang	Object	<b>Object()</b>	0	34	<input checked="" type="checkbox"/>
java.awt	Point	<b>Point(int, int)</b>	0	29	<input checked="" type="checkbox"/>
java.io	PrintStream	void	0	28	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	StImage	java.awt.image.BufferedImage	1	27	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	StRectangle	<b>StRectangle(int, int)</b>	1	22	<input checked="" type="checkbox"/>
java.lang	Object	java.lang.Class	0	22	<input checked="" type="checkbox"/>
java.util	Vector	int <b>size()</b>	0	21	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	StImage	int <b>width()</b>	1	19	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	StImage	int <b>height()</b>	1	18	<input checked="" type="checkbox"/>
java.lang	StringBuffer	java.lang.StringBuffer	0	17	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	SmalltalkException	<b>SmalltalkException()</b>	1	17	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	SmalltalkException	<b>SmalltalkException(String)</b>	1	17	<input checked="" type="checkbox"/>
java.util	ArrayList	int <b>size()</b>	0	16	<input checked="" type="checkbox"/>
java.lang	String	boolean	0	15	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	SmalltalkTestExample	<b>SmalltalkTestExample()</b>	1	15	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	StObject	jp.co.sra.smalltalk.StObject	1	14	<input checked="" type="checkbox"/>
java.util	Vector	java.lang.Object	0	14	<input checked="" type="checkbox"/>
jp.co.sra.smalltalk	StBlockClosure	<b>StBlockClosure()</b>	1	14	<input checked="" type="checkbox"/>
java.awt.event	WindowAdapter	<b>WindowAdapter()</b>	0	14	<input checked="" type="checkbox"/>

# Initializing *Social Profile* (Human-Human)

The screenshot shows the 'STeP\_IN : Profile Manager' window. It has two tabs: 'Social Profile' (selected) and 'Technical Profile'. Below the tabs, there is a text field for 'MBOX:' containing 'C:\shared\dync-mbox' and an 'Open' button. The main area contains a table with four columns: 'name', 'domain', '# of messages', and 'check'. The table lists 20 email addresses with their respective domains and message counts. At the bottom of the window, there are three buttons: 'Initialize', 'Update Usage#', and 'Add Usage#'.

name	domain	# of messages	check
n	sra.co.jp	22	<input type="checkbox"/>
Yunwen.Ye	Colorado.EDU	154	<input checked="" type="checkbox"/>
m	sra.co.jp	39	<input checked="" type="checkbox"/>
g	cs.colorado.edu	8	<input checked="" type="checkbox"/>
m	is.aist-nara.ac.jp	14	<input checked="" type="checkbox"/>
i	ist.osaka-u.ac.jp	13	<input checked="" type="checkbox"/>
o	empirical.jp	15	<input checked="" type="checkbox"/>
y	computer.org	30	<input checked="" type="checkbox"/>
m	ist.osaka-u.ac.jp	36	<input checked="" type="checkbox"/>
b	ics.uci.edu	16	<input checked="" type="checkbox"/>
k	sra.co.jp	87	<input checked="" type="checkbox"/>
a	sra.co.jp	42	<input checked="" type="checkbox"/>
l	uci.edu	1	<input checked="" type="checkbox"/>
k	ics.es.osaka-u.ac.jp	1	<input checked="" type="checkbox"/>
t	colorado.edu	2	<input checked="" type="checkbox"/>
n	is.aist-nara.ac.jp	3	<input checked="" type="checkbox"/>
k	gray.plala.or.jp	3	<input checked="" type="checkbox"/>
m	sra.co.jp	6	<input checked="" type="checkbox"/>
y	kid.rcast.u-tokyo.ac.jp	8	<input checked="" type="checkbox"/>
m	is.naist.jp	39	<input checked="" type="checkbox"/>
d	gte.net	3	<input checked="" type="checkbox"/>



# Search interface

CodeBroker Search Interface - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/cgi-bin/web/query.cgi?query= Go

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

Powered by CodeBroker

Search for...  
normalize token Search

Options...  
Scope:   
Filter:   
Return only methods:  I used  I never used  Both

[previous] 1 2 3 [next]

1	<a href="#">normalize</a>	Called on each token character to normalize it before...
0.5	org.apache.lucene.analysis.CharTokenizer.	protected char normalize(char c)
2	<a href="#">normalize</a>	Collects only characters which are not link characters...
0.5	org.apache.lucene.analysis.LowerCaseTokenizer.	protected char normalize(char c)
3	<a href="#">setOmitNorms</a>	Expert: If set, omit normalization associated with this field...
0.5	org.apache.lucene.document.Field.	public void setOmitNorms(boolean omitNorms)
4	<a href="#">normalize</a>	...
0.47	org.apache.lucene.search.ConstantScoreQuery.ConstantWeight.	public void normalize(float weight)
5	<a href="#">normalize</a>	Assigns the query normalization weight to this...
0.45	org.apache.lucene.search.Weight.	public void normalize(float weight)
6	<a href="#">isTokenChar</a>	Returns true iff a character is included in the token set...

Done

# Enhanced Java API document

CharTokenizer - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/codebroker/javadoc/org/apac...

Examples Discussion Archive Ask Experts Upload Example

## normalize

protected char [normalize](#)(char c)

Called on each token character to normalize it before it is added to the token. The default implementation does nothing. Subclasses may use this to, e.g., lowercase tokens.

Examples Discussion Archive Ask Experts Upload Example

Examples Discussion Archive Ask Experts Upload Example

throws java.io.IOException

Returns the next token in the stream, or null at EOS.

**Specified by:**  
[next](#) in class [TokenStream](#)

**Throws:**  
java.io.IOException

Examples Discussion Archive Ask Experts Upload Example

[Overview](#) [Package](#) **[Class](#)** [Tree](#) [Deprecated](#) [Index](#) [Help](#)

[PREV CLASS](#) [NEXT CLASS](#) [FRAMES](#) [NO FRAMES](#) [All Classes](#)

SUMMARY: NESTED | [FIELD](#) | [CONSTR](#) | [METHOD](#)      DETAIL: FIELD | [CONSTR](#) | [METHOD](#)

Done

# Example

The screenshot shows a Mozilla Firefox browser window with the title "STeP\_IN : Show Example - Mozilla Firefox". The address bar contains the URL "http://bud.cs.colorado.edu/STeP\_IN/ShowExample?p". The page content includes a navigation menu with links like [Home], [Logout], [JavaDoc], [Social Profile], [Technical Profile], [Involved DynC], and [Account]. A section titled "Examples for:" lists "org.apache.lucene.analysis.CharTokenizer" and "char normalize(char)". Below this, there are navigation links [Previous] 1 [Next] and [Add Example], [Discussion Archive], [Ask Expert]. A bolded statement reads "This example is provided by lu1612." followed by feedback counts: "1 found it helpful." and "0 found it not helpful." A code block is shown in a dashed box, containing the following Java code:

```
if (isTokenChar(c)) { // if it's a token char
    if (length == 0)
        start = offset - 1;
    buff[length++] = normalize(c);
}
```

At the bottom, there is a feedback form: "This example is:  Helpful  Not helpful

The footer of the page states: "This page was created by STeP\_IN (001) on 2006/10/23 04:49:17"

# Discussion archive

STeP\_IN : Discussion Archive - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/STeP\_IN/DyncArchive?method

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

**Discussion Archive for:** org.apache.lucene.analysis.CharTokenizer  
char normalize(char)

[Examples] [Ask Expert]

**DynCs:**

- [Similarity score computation documentation](#)  
lu1192  
2004/09/21 03:52:09
- [Re\(2\): Lucene with Number+Text](#)  
lu229  
2002/03/26 16:10:00
- [any other operations peformed in this method?](#)  
lu1283  
2006/10/04 17:05:20

**Discussions:**

From: lu1192  
Subject: Similarity score  
Date: 2004/09/21 03:52:09

Hi,

I was looking through the source code and think there may be a discrepancy in the org.apache.lucene.search.Similarity class. I think it actually occurs in the code.

I believe the problem is only in the org.apache.lucene.analysis.CharTokenizer class.

I'm pretty sure that there is a bug in the org.apache.lucene.search.TermSimilarity class. I can see that first sumOfSquares() method during search.

Done

# Ask experts

STeP\_IN : Ask Experts - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/STeP\_IN/Dync?method\_id=9 Go

[\[Home\]](#) [\[Logout\]](#) [\[JavaDoc\]](#) [\[Social Profile\]](#) [\[Technical Profile\]](#) [\[Involved DynC\]](#) [\[Account\]](#)

**Requesting collaboration from experts on:** `org.apache.lucene.analysis.CharTokenizer`  
`char normalize(char)`

Subject : normalize

Question : Could some one please tell me the algorithm used in this method?

Done

# Evaluate a DynC

The screenshot shows a Mozilla Firefox browser window with the title "STeP\_IN : DynC Management - Mozilla Firefox". The address bar contains the URL "http://bud.cs.colorado.edu/STeP\_IN/DyncManagemen". The page content includes navigation links, a user profile section for "lu1283's Involved Dync", and a table of active DynC entries. The table has columns for DynC ID, Subject, Method, Start Date, and a feedback section. One entry is visible with ID 2530, subject "normalize", and method "CharTokenizer char normalize(char)". The feedback section for this entry contains two radio buttons: "helpful" and "not helpful".

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

## lu1283's Involved Dync

[Active DynC you initiated]  
[Others' active DynC you are participating]  
[Past DynC you initiated]  
[Past DynC you participated]

### Active DynC you initiated

[Previous] 1 [Next]

DynC ID	Subject	Method	Start Date	This DynC was helpful; thank you for your help. This DynC was not helpful; thank you for participation.
<a href="#">2530</a>	normalize	CharTokenizer char normalize(char)	2006/10/23 01:55:16	<input type="radio"/> helpful <input type="radio"/> not helpful

---

This page was created by STeP\_IN (001) on 2006/10/23 02:54:00

Done

# Forming a DynC in STeP\_IN

## Expert identification

Create an ordered list of candidate experts based on their expertise on the specific API

## Expert selection

From the list of candidate experts, select those who are likely willing to help the programmer

# Expert identification

---

Level1: Confirmed expertise

Level2: Claimed expertise

Level3: Inferred expertise

Level4: Future expertise



# Expert identification

## Level1 : Confirmed expertise

### lu953's Involved Dync

[\[Active Dync you initiated\]](#)

[\[Others' active Dync you are participating\]](#)

[\[Past Dync you initiated\]](#)

[\[Past Dync you participated\]](#)

#### *Past Dync you participated*

[\[Previous\]](#) [1](#) ... [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [\[Next\]](#)

Dync ID	Subject	Method	Start Date	End Date	Helpful/Not helpful
<a href="#">834</a>	can lucene be backed to have an update field	MultipleTermPositions int doc()	2004/11/10 06:16:55	2004/11/10 06:16:55	helpful
<a href="#">975</a>	Similarity score computation documentation	CharTokenizer char normalize(char)	2004/09/21 03:52:09	2004/09/21 03:52:09	helpful

Done

# Expert identification

## Level2: Claimed expertise

### lu953's Technical Profile

#### Profile Summary

Total methods used: 78

Methods declared as Expert: 0

Methods declared as No Knowledge: 0

#### Display methods...

All methods used

#### Options...

Scope:

Filter:

[Previous] 1 2 3 4 [Next]

Method	Author	Usage #	Declare
org.apache.lucene.analysis CharTokenizer org.apache.lucene.analysis.Token next()	No	27	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.analysis CharTokenizer char normalize(char)	No	2	<input checked="" type="radio"/> Expert <input type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.analysis Token int getPositionIncrement()	No	1	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.analysis Token java.lang.String termText()	No	3	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.analysis TokenFilter	No	5	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge

Done

# Expert identification

## Level3: Inferred expertise

### lu1192's Technical Profile

#### Profile Summary

Total methods used: 10

Methods declared as Expert: 0

Methods declared as No Knowledge: 0

#### Display methods...

All methods used

#### Options...

Scope :

Filter :

[Previous] 1 [Next]

Method	Author	Usage #	Declare
org.apache.lucene.analysis CharTokenizer char normalize(char)	No	4	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.document Document float getBoost()	No	3	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.index Term java.lang.String field()	No	1	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.search DefaultSimilarity float idf(int, int)	No	1	<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge
org.apache.lucene.search			<input type="radio"/> Expert <input checked="" type="radio"/> Not Declared <input type="radio"/> No Knowledge

Done

# Expert identification

## Level4: Future expertise

Asked a question on the same API in the past

Did not get help from the DynC and gave the evaluation of “not helpful”

# Expert selection

4 kinds of relations

help<A,B>

friend<A,B>

exclude<A,B>

email<A,B>

STeP\_IN : Social Profile Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/STeP\_IN/SocialProfile?page=4

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

## lu953's Social Profile

Your Social Profile is only known to you.

**Profile Summary**  
You declared to participate in DynCs initiated by 0 members.  
You declared not to participate in DynCs initiated by 0 members.  
You have email exchanges with 93 members.  
You have helped other members 101 times, and you have been helped 0 by other members.

**Display members...**  
All members related

**Options...**  
Scope:

[Previous] 1 2 3 4 5 6 7 8 9 10 [Next]

User Name	Participation in His/Her DynC	Participation in My DynC	Mail Exchange		Future Participation in His/Her DynC
			From	To	
lu1281	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1282	1	0	0	1	<input type="radio"/> always <input type="radio"/> neutral <input checked="" type="radio"/> never
lu1283	0	0	0	0	<input checked="" type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never
lu1284	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1286	2	0	0	3	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1292	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1308	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never

Done

# Expert selection

4 kinds of relations

help<A,B>

friend<A,B>

exclude<A,B>

email<A,B>

STeP\_IN : Social Profile Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/STeP\_IN/SocialProfile?page=4

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

## lu953's Social Profile

Your Social Profile is only known to you.

**Profile Summary**  
You declared to participate in DynCs initiated by 0 members.  
You declared not to participate in DynCs initiated by 0 members.  
You have email exchanges with 93 members.  
You have helped other members 101 times, and you have been helped 0 by other members.

**Display members...**  
All members related

**Options...**  
Scope:

[Previous] 1 2 3 4 5 6 7 8 9 10 [Next]

User Name	Participation in His/Her DynC	Participation in My DynC	Mail Exchange		Future Participation in His/Her DynC
			From	To	
lu1281	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1282	1	0	0	1	<input type="radio"/> always <input type="radio"/> neutral <input checked="" type="radio"/> never
lu1283	0	0	0	0	<input checked="" type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never
lu1284	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never

A(lu953) contributed (sent an email) to the DynC initiated by B(lu1281)

# Expert selection

## 4 kinds of relation

help<A,B>

friend<A,B>

exclude<A,B>

email<A,B>

STeP\_IN : Social Profile Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/STeP\_IN/SocialProfile?page=4

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

## lu953's Social Profile

Your Social Profile is only known to you.

**Profile Summary**  
You declared to participate in DynCs initiated by 0 members.  
You declared not to participate in DynCs initiated by 0 members.  
You have email exchanges with 93 members.  
You have helped other members 101 times, and you have been helped 0 by other members.

**Display members...**  
All members related [Display]

**Options...**  
Scope: [ ]

[Previous] 1 2 3 4 5 6 7 8 9 10 [Next]

User Name	Participation in His/Her DynC	Participation in My DynC	Mail Exchange		Future Participation in His/Her DynC
			From	To	
lu1281	1	0	0	1	<input type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never
lu1282	1	0	0	1	<input type="radio"/> always <input type="radio"/> neutral <input checked="" type="radio"/> never
lu1283	0	0	0	0	<input checked="" type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never
lu1284	1	0	0	1	<input type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never

A (lu953) declares that he/she will always participate in the DynCs initiated by B (lu1283).

# Expert selection

## 4 kinds of relation

help<A,B>

friend<A,B>

exclude<A,B>

email<A,B>

STeP\_IN : Social Profile Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/STeP\_IN/SocialProfile?page=4

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

### lu953's Social Profile

Your Social Profile is only known to you.

**Profile Summary**  
You declared to participate in DynCs initiated by 0 members.  
You declared not to participate in DynCs initiated by 0 members.  
You have email exchanges with 93 members.  
You have helped other members 101 times, and you have been helped 0 by other members.

**Display members...**  
All members related [Display]

**Options...**  
Scope :

[Previous] 1 2 3 4 5 6 7 8 9 10 [Next]

User Name	Participation in His/Her DynC	Participation in My DynC	Mail Exchange		Future Participation in His/Her DynC
			From	To	
lu1281	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1282	1	0	0	1	<input type="radio"/> always <input type="radio"/> neutral <input checked="" type="radio"/> never
lu1283	0	0	0	0	<input checked="" type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never
lu1284	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never

A (lu953) declares that he/she will never participated in the DynCs initiated by B(lu1282).



# Expert selection

## 4 kinds of relation

help<A,B>

friend<A,B>

exclude<A,B>

email<A,B>

STeP\_IN : Social Profile Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://128.138.75.231/STeP\_IN/SocialProfile?page=4

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

### lu953's Social Profile

Your Social Profile is only known to you.

**Profile Summary**  
You declared to participate in DynCs initiated by 0 members.  
You declared not to participate in DynCs initiated by 0 members.  
You have email exchanges with 93 members.  
You have helped other members 101 times, and you have been helped 0 by other members.

**Display members...**  
All members related

**Options...**  
Scope:

[Previous] 1 2 3 4 5 6 7 8 9 10 [Next]

User Name	Participation in His/Her DynC	Participation in My DynC	Mail Exchange		Future Participation in His/Her DynC
			From	To	
lu1281	1	0	0	1	always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1282	1	0	0	1	<input type="radio"/> always <input type="radio"/> neutral <input checked="" type="radio"/> never
lu1283	0	0	0	0	<input checked="" type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never
lu1284	1	0	0	1	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never

The number of emails that A (lu953) sent to B (lu1281) outside of STeP\_IN.

# Expert selection process

for each  $X$  in the *list of candidate experts*

1. If  $\text{exclude}\langle X, A \rangle$  //  $X$  does not want to participate in  $A$ 's DynC

Remove  $X$  from the *list of candidate experts*

## lu65's Social Profile

lu1283	0	0	2	0	<input type="radio"/> always <input type="radio"/> neutral <input checked="" type="radio"/> never
lu1284	1	0	0	2	<input type="radio"/> always <input type="radio"/> neutral <input type="radio"/> never

# Expert selection process

for each  $X$  in remaining *list of candidate experts*

2. If friend $\langle X, A \rangle$  //  $X$  wants to participate in  $A$ 's DynC

Add  $X$  to the DynC

## lu953's Social Profile

						always	neutral	never
lu1283		0	0	0	0	<input checked="" type="radio"/> always	<input type="radio"/> neutral	<input type="radio"/> never

# Expert selection process

for each  $X$  in remaining *list of candidate experts*

3. If  $\text{help}(A, X) - \text{help}(X, A) > 0$

*// A has helped X more than the other way around*

Add  $X$  to the DynC

# Expert selection process

for each  $X$  in remaining *list of candidate experts*

4. A recently helped  $X$

Add  $X$  to the DynC

# Expert selection process

for each  $X$  in remaining *list of candidate experts*

5. Add those  $X$ s that have been helped more than they have helped others.

# Expert selection process

for each  $X$  in remaining *list of candidate experts*

6. Choose  $X$ s according to the number of email  $\langle X, A \rangle$

## lu1283's Social Profile

[Previous] 1 [Next]

User Name	Participation in His/Her DynC	Participation in My DynC	Mail Exchange		Future Participation in His/Her DynC
			From	To	
lu1026	0	0	1	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1107	0	0	1	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1192	0	0	0	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1276	0	0	1	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu1953	0	0	0	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu229	0	0	0	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu292	0	0	1	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu53	0	0	1	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu65	0	0	0	2	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never
lu744	0	0	1	0	<input type="radio"/> always <input checked="" type="radio"/> neutral <input type="radio"/> never

# Socially aware communication

## To sustain knowledge collaboration

Freedom of no-participation to avoid forced collaboration

Give high priority to the motivation of experts

The success of one collaboration should not come at the cost of future collaboration

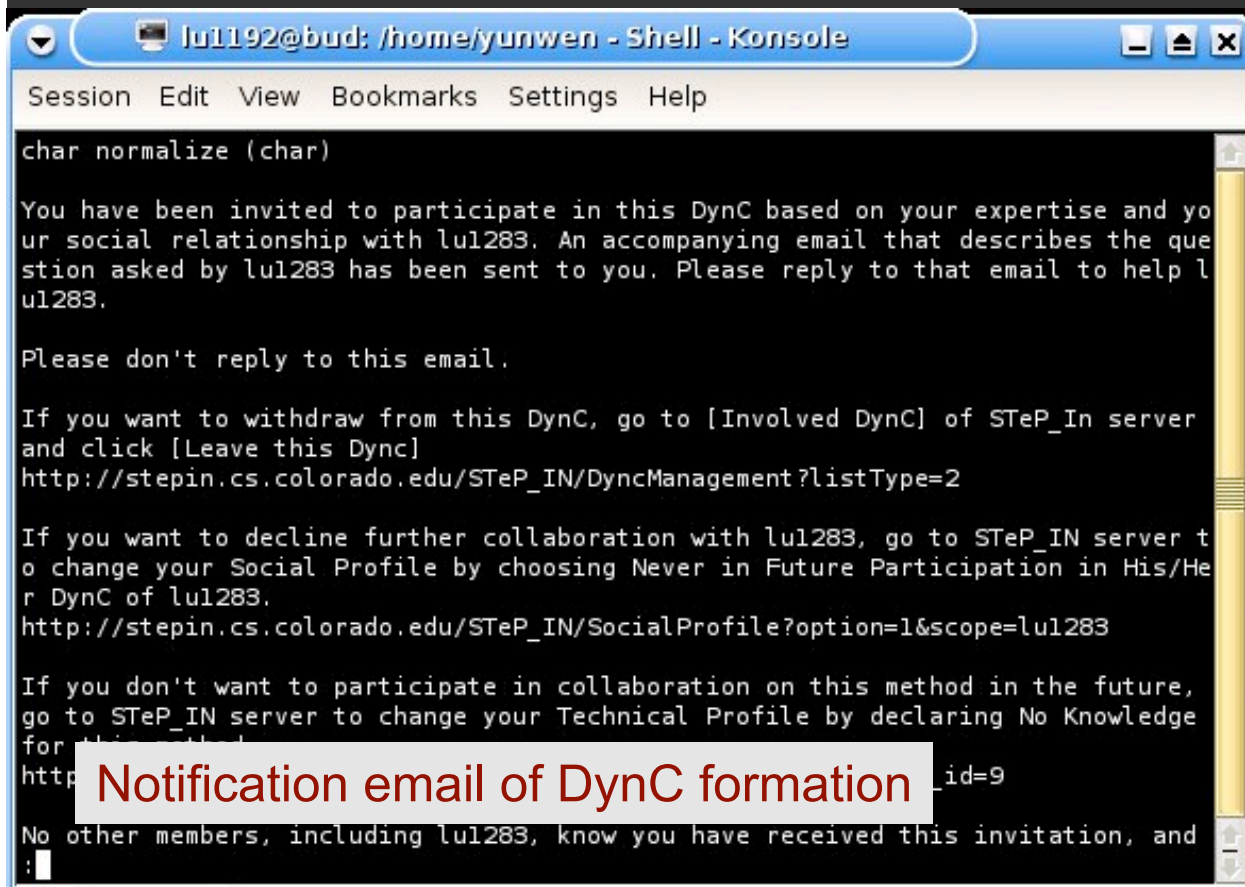
Asymmetrical information disclosure

No-participation is socially acceptable



# Socially aware communication

To say "NO" to certain DynCs in a socially acceptable way



The image shows a terminal window titled "lu1192@bud: /home/yunwen - Shell - Konsole". The terminal displays the output of a command, which is an email notification. The notification text is as follows:

```
char normalize (char)

You have been invited to participate in this DynC based on your expertise and your social relationship with lu1283. An accompanying email that describes the question asked by lu1283 has been sent to you. Please reply to that email to help lu1283.

Please don't reply to this email.

If you want to withdraw from this DynC, go to [Involved DynC] of STeP_In server and click [Leave this DynC]
http://stepin.cs.colorado.edu/STeP_IN/DyncManagement?listType=2

If you want to decline further collaboration with lu1283, go to STeP_IN server to change your Social Profile by choosing Never in Future Participation in His/Her DynC of lu1283.
http://stepin.cs.colorado.edu/STeP_IN/SocialProfile?option=1&scope=lu1283

If you don't want to participate in collaboration on this method in the future, go to STeP_IN server to change your Technical Profile by declaring No Knowledge for this method.
http://stepin.cs.colorado.edu/STeP_IN/TechnicalProfile?option=1&scope=lu1283&id=9

No other members, including lu1283, know you have received this invitation, and
```

A red text box with a white background is overlaid on the terminal, containing the text "Notification email of DynC formation" in red font. The text box is positioned over the URL "http://stepin.cs.colorado.edu/STeP\_IN/TechnicalProfile?option=1&scope=lu1283&id=9".

# Socially aware communication

To say "NO" to certain DynCs in a socially acceptable way

The image shows a screenshot of a web browser window titled "STeP\_IN : DynC Management - Mozilla Firefox". The browser displays a page titled "lu1192's Involved Dync". The page content includes navigation links like [Home], [Leave this DynC], [Social Profile], [Involved DynC], and [Account]. Below the title, there are links for [Active DynC you initiated], [Others' active DynC you are participating], [Past DynC you initiated], and [Past DynC you participated]. A section titled "Others' active DynC you are participating" contains a table with the following data:

DynC ID	Subject	Method	Start Date	Initiated by	Leave this DynC
<a href="#">2530</a>	normalize	CharTokenizer char normalize(char)	2006/10/23 01:55:16	lu1283	<input checked="" type="checkbox"/> Leave

A red circle highlights the "Leave" checkbox in the table. A blue arrow points from the "Leave this DynC" link in the browser to the terminal window below. The terminal window shows a notification email with the subject "Notification email of DynC formation" and a URL ending in "\_id=9".

# Socially aware communication

To say "NO" to certain DynCs in a socially acceptable way

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

## lu1192's Technical Profile

**Profile Summary**  
Total methods used: 10  
Methods declared as Expert: 0  
Methods declared as No Knowledge: 0

**Options...**  
Scope :   
Filter :

[Previous] 1 [Next]

Method	Author	Usage #	Declare
org.apache.lucene.analysis.CharTokenizer.char normalize(char)	No	4	<input type="radio"/> Expert <input type="radio"/> Not Declared <input checked="" type="radio"/> No Knowledge

Notification email of DynC formation [\\_id=9](#)

If you don't want to participate in this DynC, you can go to STeP\_IN server to change your Technical Profile by declaring No Knowledge for this DynC.  
[http://stepin.org/dynC/lu1192/char-normalize-char-1283.html?id=9](#)

No other members, including lu1283, know you have received this invitation, and

# Socially aware communication

To say "NO" to certain DynCs in a socially acceptable way

STeP\_IN : Social Profile Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

← → ↻ × 🏠 📄 http://

[Home] [Logout] [JavaDoc] [Social Profile] [Technical Profile] [Involved DynC] [Account]

## lu1192's Social Profile

Your Social Profile is only known to you.

### Profile Summary

You declared to participate in DynCs initiated by 0 members.  
You declared not to participate in DynCs initiated by 0 members.  
You have email exchanges with 5 members.  
You have helped other members 0 times, and you have been helped 7 by other members.

**Display members...**  
All members related

**Options...**  
Scope: lu1283

User Name	Participation in His/Her DynC	Participation in My DynC	Mail Exchange		Future Participation in His/Her DynC
			From	To	
lu1283	0	0	0	0	<input type="radio"/> always <input type="radio"/> neutral <input checked="" type="radio"/> never

No collaboration with this person

Notification email of DynC formation [\\_id=9](#)

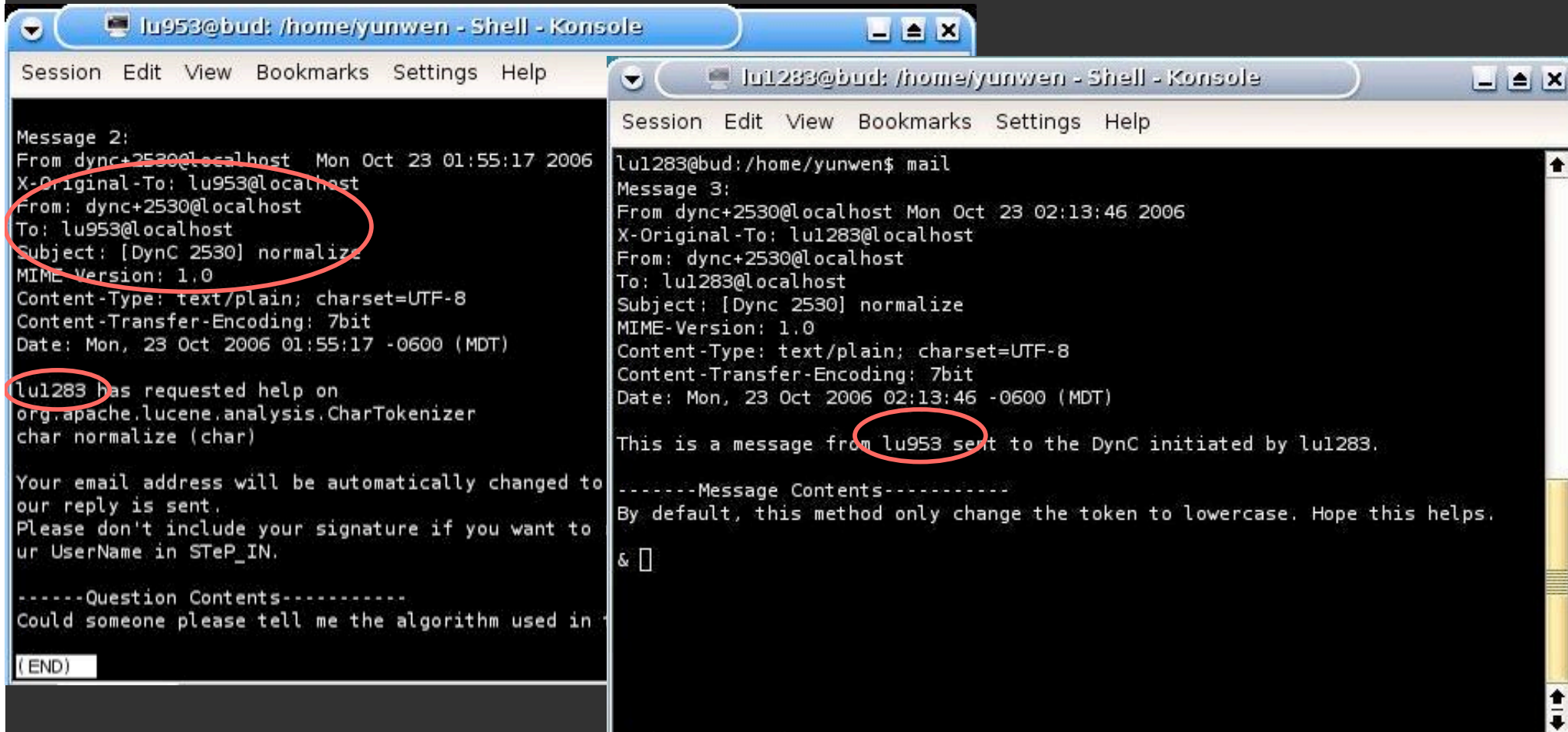
No other members, including lu1283, know you have received this invitation, and

# Socially aware communication

## Asymmetry of information disclosure

DynC members are not made public

Members who contributed are acknowledged publicly



The image shows two terminal windows from a Linux environment. The left window, titled 'lu953@bud: /home/yunwen - Shell - Konsole', displays an email message (Message 2) with the following content:

```
Message 2:
From: dync+2530@localhost Mon Oct 23 01:55:17 2006
X-Original-To: lu953@localhost
From: dync+2530@localhost
To: lu953@localhost
Subject: [Dync 2530] normalize
MIME-Version: 1.0
Content-Type: text/plain; charset=UTF-8
Content-Transfer-Encoding: 7bit
Date: Mon, 23 Oct 2006 01:55:17 -0600 (MDT)

lu1283 has requested help on
org.apache.lucene.analysis.CharTokenizer
char normalize (char)

Your email address will be automatically changed to
our reply is sent.
Please don't include your signature if you want to
ur UserName in STeP_IN.

-----Question Contents-----
Could someone please tell me the algorithm used in
```

The right window, titled 'lu1283@bud: /home/yunwen - Shell - Konsole', shows a user typing 'mail' and receiving an email (Message 3) with the following content:

```
lu1283@bud:/home/yunwen$ mail
Message 3:
From: dync+2530@localhost Mon Oct 23 02:13:46 2006
X-Original-To: lu1283@localhost
From: dync+2530@localhost
To: lu1283@localhost
Subject: [Dync 2530] normalize
MIME-Version: 1.0
Content-Type: text/plain; charset=UTF-8
Content-Transfer-Encoding: 7bit
Date: Mon, 23 Oct 2006 02:13:46 -0600 (MDT)

This is a message from lu953 sent to the Dync initiated by lu1283.

-----Message Contents-----
By default, this method only change the token to lowercase. Hope this helps.

& []
```

Red circles highlight the email addresses 'lu953@localhost' in the first window and 'lu953' in the second window, indicating the sender of the messages.

# Summary

Software development is knowledge intensive and collaborative

Providing technical and social support for the easy acquisition of external knowledge when needed

[http://stepin.cs.colorado.edu/STeP\\_IN/](http://stepin.cs.colorado.edu/STeP_IN/)