

BUMPER: A Tool for Coping with Natural Language Searches of Millions of Bugs and Fixes

<https://bumper-app.com>

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March 16, 2016

Software are pledged to have bugs ...

- What do we do about it ?
 - Bug reports are submitted (Github, Bugzilla, JIRA, ...) and assigned
 - Who should fix this bug? - Anvik *et al.* 2006
 - Developer craft a bug-fix.
 - Toward an understanding of bug fix patterns - Pan *et al.* 2009
 - Where should the bugs be fixed? More accurate information retrieval-based bug localization based on bug reports - Zhou *et al.* 2012
 - Bug report closed / marked RESOLVED / FIXED
 - How long will it take to fix this bug? - Weiss *et al.* 2007
 - Characterizing and predicting which bugs get reopened - Zimmermann *et al.* 2012

What developers do when facing an unknow bug ?

- Open questions in face-to-face interviews with 10 undergrads, 5 graduates, 7 junior dev. & 3 senior dev.
 - ① When facing an unknown bug, crash or exception, where do you look for informations ?
 - ② When facing an unknown bug, crash or exception, what are you searching for ?
- Build an online multiple choices survey with their responses

Software are pledged to have bugs

- ① When facing an unknown bug, crash or exception, where do you look for informations ?
 - a) Online search engines (Google, Bing, ...).
 - b) Online specialized websites (Stackoverflow, ...)
 - c) Offline search (Books, Slides, ...).
 - d) Official documentation of the project / programming languages / api (Offline and Online).
 - ② When facing an unknown bug, crash or exception, what are you searching for ?
 - a) How to do X.
 - b) The exception yield by the crash / bug.
 - c) Official documentation of the project / programming languages / api (Offline and Online).
- 150 peoples and got 89 responses (59%)
 - <http://bit.ly/bumper-cser>

What developers do when facing an unknow bug ?

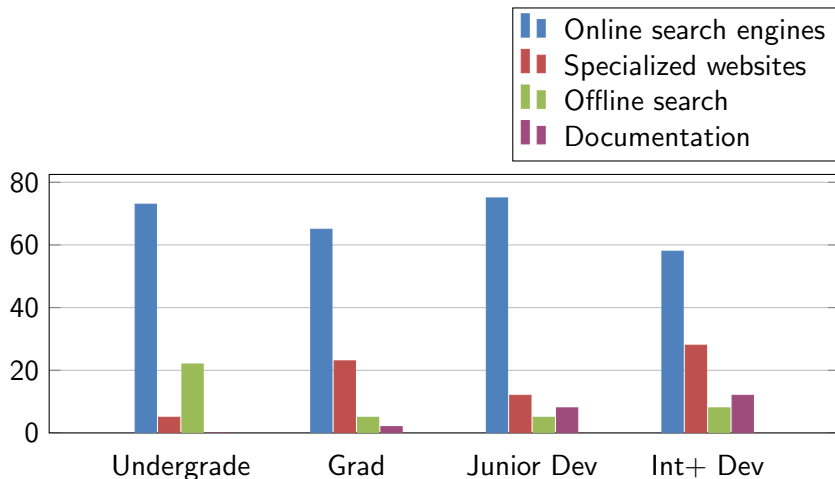


Figure : Answers to *When facing an unknown bug, crash or exception, where do you look for informations ?* in percentage

What developers search for facing an unknow bug ?

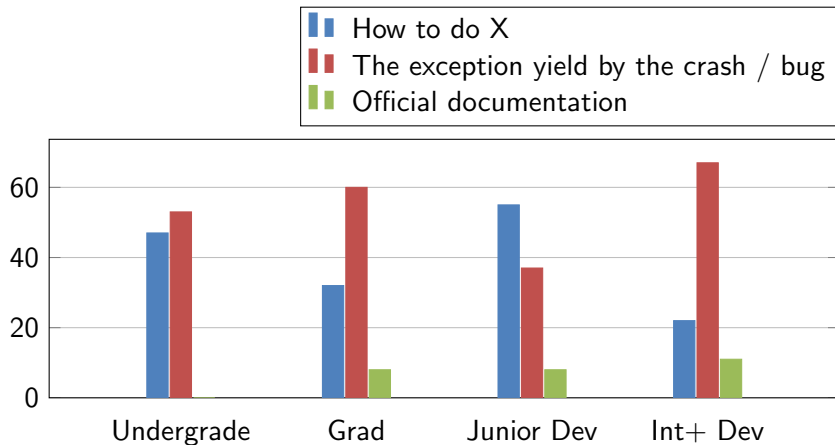


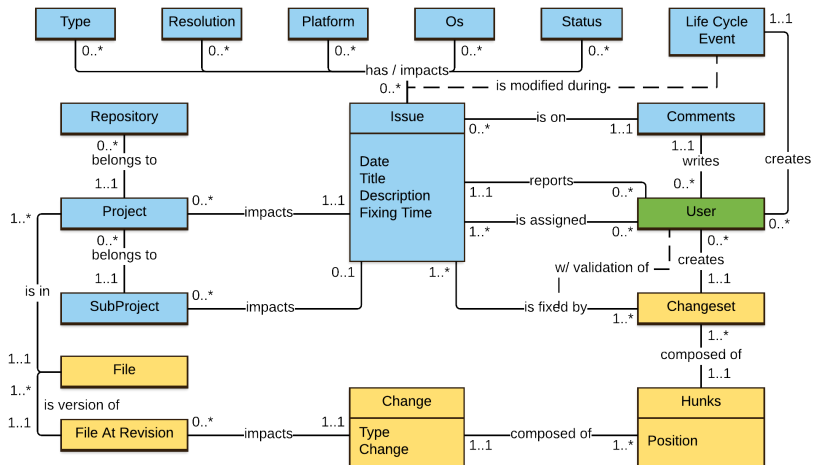
Figure : Answers to *When facing an unknown bug, crash or exception, what are you searching for ?* in percentage

BUMPER Data (as of now)

Table : RESOLVED/FIXED BUG (R/F BR), CHANGESETS (CS), AND PROJECTS BY DATASET

Dataset	R/F BR	CS	Files	Projects
Gnome	550,869	1,231,354	367,245	512
Netbeans	53,258	122,632	30,595	39
Apache	49,449	106,366	38,111	349
Eclipse	78,830	184,900	21,712	190
Total	732,406	1,645,252	457,663	1,930

BUMPER Metamodel



- Search for "YOUR TERMS" in bug reports and bug fix.

*(type : "BUG" AND report_t : "YOUR TERMS" AND – churns : 0)
OR
({!parent which = "type : BUG"} type :
"CHANGESET" AND fix_t : "YOUR TERMS")*

(type : "BUG" AND report_t : "Exception"
AND (project : "Axis2" OR project : "ide")
AND (reporter : "Rich" OR resolution : "fixed")
*AND (severity : "Major" OR fixing_time : [10 TO *])*
AND — churns : 0)

Or ... you can let BUMPER find what your are looking for...

bumper
Find Out How Others Fixed It

Type your search



SHOWCASE

ADVANCED QUERY MODE

API

DATASETS

PUBLICATIONS

ABOUT

Or ... you can let BUMPER find what your are looking for...

Null Pointer Exception

About 27626 results (0.01 seconds)

LANGUAGES

DATASETS

DOWNLOAD

NullPointerException at
org.netbeans.api.java.source.JavaSource\$JavaSourceAccessorImpl.
38 https://netbeans.org/bugzilla/show_bug.cgi?id=189412 java, netbeans, java

Build: NetBeans IDE 6.9 (Build 201006101454) VM: Java HotSpot(TM) Client VM, 16.2-b04, Java(TM) SE Runtime Environment, 1.6.0_19-b04 OS: Windows 7 Stacktrace: java.lang.NullPointerException

NullPointerException at
org.netbeans.modules.java.source.usages.LuceneIndex\$DirCache.
10 https://netbeans.org/bugzilla/show_bug.cgi?id=189499 java, netbeans, java

Build: NetBeans IDE Dev (Build 201008130001) VM: Oracle JRockit(R), R28.0.1-21-133393-1.6.0_20-20100512-2131-windows-x86_64, Java(TM) SE Runtime Environment, 1.6.0_20-b02 OS: Windows 7

Enable collecting thread cpu timestamps by default
https://netbeans.org/bugzilla/show_bug.cgi?id=189921 java, netbeans, profiler

Given the fact that thread cpu timestamps are available to JVM (1.6+) on all modern operating systems and obtaining them is reasonably quick [1] we can enable collecting them by default.

NullPointerException at java.util.Arrays\$ArrayList.<init>
2 https://netbeans.org/bugzilla/show_bug.cgi?id=177814 java, netbeans, platform

Build: NetBeans IDE Dev (Build 20100119814001) VM: Java HotSpot(TM) Client VM, 1.6.0_19

176129.80dc07f52485 #189412 NullPointerException at
org.netbeans.api.java.source.JavaSource\$JavaSourceAccessorImpl.setJavaSource
• java.source/src/org/netbeans/modules/java/source/JavaSourceAccessor.java
• java.source/src/org/netbeans/modules/java/source/parsing/JavacParserResult.java

(2) files, (10) insertions, (4) deletions

```
Index: java.source/src/org/netbeans/modules/java/source/JavaSource  
Accessor.java  
-----  
@@ -84,6 +84,7 @@  
import org.openide.text.PositionRef;  
import org.openide.util.Exceptions;  
import org.openide.util.Mutex;  
+import org.openide.util.Parameters;  
  
/**  
 *
```

```
Index: java.source/src/org/netbeans/modules/java/source/JavaSource  
Accessor.java  
-----  
@@ -316,9 +317,14 @@  
}  
  
@Override  
- public void run(Result result, SchedulerEvent event) {  
+ public void run(@NonNull Result result, SchedulerEvent ev
```

SHOWCASE

ADVANCED QUERY MODE

API

DATASETS

PUBLICATIONS

ABOUT

- BUMPER: Bug Metarepository Search Engine for Developers and Researchers
 - Online Search Engine with 1 million bug reports AND fixes from major open-source repositories
 - Apache Software Foundation, Netbeans, Eclipse, Gnome, FireFox, Chrome, Kde, ...
 - Imports bugs reports from Bugzilla, JIRA and Github, ... and fixes from SVN, Mercurial, Git, ...
 - Natural language for developers
 - Advanced API for researchers

Conclusion and Future work

- <https://bumper-app.com>
- 1 million bugs and associated fixes
- Apache Software Foundation, Netbeans, Eclipse, Gnome, FireFox, Chrome, Kde, ...
- Imports bugs from Bugzilla, JIRA and Github, ... and fixes from SVN, Mercurial, Git, ...
- Natural Language Search for developers
- Advanced API for researchers
- Currently assessing how much faster a suitable solution can be found using BUMPER rather than Google/Stack Overflow/Books ...

QUESTIONS?