Unit Test Virtualization with VMVM

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ABSTRACT

Testing large software packages can become very time intensive. To address this problem, researchers have investigated techniques such as Test Suite Minimization. Test Suite Minimization reduces the number of tests in a suite by removing tests that appear redundant, but risks a reduction in fault-finding ability since it can be difficult to identify which tests are truly redundant. We take a completely different approach to solving the same problem of long running test suites by instead reducing the time needed to execute each test, an approach that we call Unit Test Virtualization. We describe the empirical analysis that we performed to ground our approach and provide an implementation of Unit Test Virtualization targeting Java applications. We evaluated our implementation, VMVM, using 20 real-world Java applications and found that it reduces test suite execution time by up to 97% (on average, 62%) when compared to traditional unit test execution. We also compared VMVM to a well known Test Suite Minimization technique, finding the reduction provided by VMVM to be four times greater, while still executing every test with no loss of fault-finding ability.

Categories and Subject Descriptors

D.2.5 [**Software Engineering**]: Testing and Debugging—
Testing Tools

General Terms

Reliability, Performance

Keywords

Testing, test optimization, unit test virtualization

1. INTRODUCTION

As developers fix bugs, they often create regression tests to ensure that should those bugs recur, they will be detected by the test suite. These tests are added to existing unit test suites and in an ideal continuous integration environment, executed regularly (e.g. upon code check-ins, or nightly). Because developers are often creating new tests, as software grows in size and complexity, its test suite frequently grows similarly. Software can reach a point where its test suite has gotten so large that it takes too long to regularly execute — previous work has reported test suites in industry taking several weeks to execute fully [36].

To cope with long running test suites, testers might turn to Test Suite Minimization or Test Suite Prioritization [43]. Test Suite Minimization techniques such as [14, 15, 22, 23, 27, 28, 38, 41] reduce the total number of tests to execute by identifying duplicate tests. However, identifying which tests are duplicates is hard, and Test Suite Minimization approaches typically rely on coverage measures to identify overlap, which may not be completely accurate. Additionally, Test Suite Minimization is an NP-complete problem [23], and therefore existing algorithms rely on heuristics. Test Suite Prioritization techniques such as [18, 19, 36, 37, 40] re-order test cases, for example so that given the set of changes to the application since the last test execution, the most relevant tests are executed first. This technique is useful for prioritizing test cases to identify faults earlier in the testing cycle, but does not actually reduce the total time necessary to execute the entire suite.

Rather than focus our approach on reducing the number of tests executed in a suite, we have set our goal broadly on minimizing the total amount of time necessary to execute the test suite as a whole. We conducted a study on approximately 1,200 large and open source Java applications to identify bottlenecks in the unit testing process. We found that for most large applications each test executes in its own process, rather than executing several tests in the same process. We discovered that this is done to isolate the state-based side effects of each test from skewing the results for future tests. The upper half of Figure 1 shows an example of a typical test suite execution loop: before each test is executed, the application is initialized and after each test, the application terminates.

In our study we found that these initialization steps add an overhead of up to 3,545% to the total testing time (on average, 615%) compared to running all tests in the same process, without such reinitialization.

At first, it may seem that the time spent running tests could be trivially reduced by removing the initialization step from the loop, performing initialization only at the beginning of the test suite, perhaps using operating system provided `fork` functionality to quickly create a new process for each test. In this way, that initialized application could be reused for all tests (illustrated in the bottom half of Figure 1), cutting out this high overhead. In some cases this is exactly what testers do, writing pre-test methods to bring the system under test into the correct state and post-test methods to return the system to the starting state.

In practice, this can be difficult to implement: developers may make explicit assumptions about how their code will
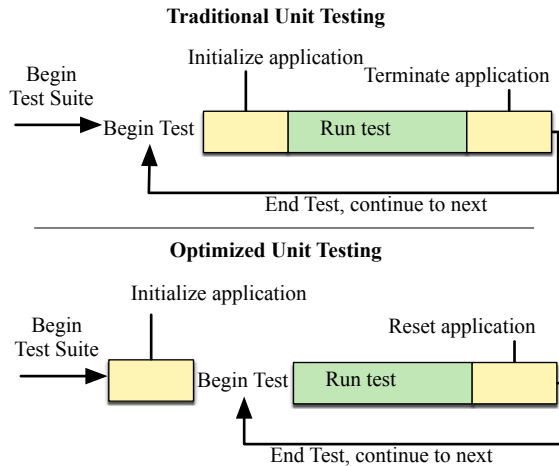
Figure 1: The test execution loop

run, such as permissible in-memory side-effects for certain methods, or dependencies on configuration values within program initialization (which would require completely reinitializing the application under test rather than forking an existing initialized application). As we found in our study of 1,200 real-world Java applications (described further in Section 2), developers often sacrifice performance for correctness by isolating each test in its own process, rather than risk that these side-effects result in false positives or false negatives.

Our key insight is that it is not actually necessary to reinitialize the entire application being tested between each test in order to maintain this isolation. Instead, it is possible to analyze the software to find all potential side-effect causing code and automatically reinitialize only the parts necessary.

In this paper we introduce *Unit Test Virtualization*, a technique whereby the side-effects of each unit test are efficiently isolated from other tests, eliminating the need to restart the system under test with every new test. With a hybrid static-dynamic analysis, Unit Test Virtualization automatically identifies the code segments that may create side-effects and isolates them in a container similar to a lightweight virtual machine. Each unit test executes in its own container that isolates all in-memory side-effects to contain them to affect only that suite, exactly mimicking the isolation effect of executing each test in its own process, but without the overhead. This approach is relevant to any situation where a suite of tests is executed and must be isolated such as regression testing, continuous integration, or even test-driven development.

We implemented Unit Test Virtualization for Java, creating our tool VMVM (pronounced "vroom-vroom"), which transforms application byte code directly without requiring modification to the JVM or access to application source code. We have integrated it directly with popular Java testing and build automation tools JUnit [2], ant [5] and maven [6], and it is available for download via GitHub [7].

We evaluated VMVM to determine the performance benefits that it can provide and show that it does not affect fault finding ability. In our study of 1,200 applications, we found that the test suites for most large applications isolate each unit test into its own process, and that in a sample of these applications, VMVM provides up to a 97% performance gain when executing tests. We compared VMVM with a well known Test Suite Minimization process and found that the

performance benefits of VMVM exceed those of the minimization technique without sacrificing fault-finding ability.

The primary contributions of this paper are:

1. A study of the test suites of 1,200 open source projects showing that developers isolate their tests
2. A presentation Unit Test Virtualization, a technique to efficiently isolate test cases that is language agnostic, certainly among memory managed languages
3. An implementation of our technique for Java, VMVM (released freely via GitHub [7]), evaluated to show its efficacy in reducing test suite runtime and maintaining fault-finding properties

Section 2 explains the factors that contribute to the need for Unit Test Virtualization as well as our study showing the applicability of our approach to large Java applications. Section 3 describes the general Unit Test Virtualization approach. We discuss the implementation and evaluation of VMVM in sections 4 and 5. We conclude with a discussion of related work (Section 6).

2. MOTIVATION

This work would be unnecessary if we could safely execute all of an application's tests in the same process. Were that the case, then the performance overhead of isolating test cases to individual processes could be trivially removed by running each test in the same process. We have discovered, however, that developers rely on process separation to ensure that their tests are isolated and execute correctly.

In this section, we answer the following three motivation questions to underscore the need for this work.

MQ1: Do developers isolate their unit tests?
MQ2: Why do developers isolate their unit tests?
MQ3: What is the overhead of the isolation technique that developers use?

2.1 MQ1: Do developers isolate their tests?

To answer **MQ1** we analyzed the 1,200 largest open source Java projects listed by Ohloh, a website that indexes open source software [3]. At time of writing, Ohloh indexed over 5,000 individual sources such as GitHub, SourceForge and Google Code, comprising over 550,000 projects and over 10 billion lines of code [9]. We restricted ourselves to Java projects in this study due to the widespread adoption of test automation tools for Java, allowing us to easily parse configuration files to determine if the project isolates its test cases (a process described further below).

Using the Ohloh API, we identified the largest open source Java projects, ranked by number of active committers in the preceding 12 months.

From the 1,200 projects, we downloaded the source code for 2,272 repositories (each project may have several repositories to track different versions or to track dependencies). We captured this data between August 15 and August 20,

	Min	Max	Avg	Std dev
LOC	268	20,280.14k	519.40k	1,515.48k
Active Devs	3.00	350.00	15.88	28.49
Age (Years)	0.17	16.76	5.33	3.24

Table 2: Statistics for subjects retrieved from Ohloh

# of Tests in Project	# of Projects Creating New Processes		Lines of Code in Project	# of Projects Creating New Processes	
0-10	24/71	(34%)	0-10k	7/42	(17%)
10-100	81/235	(34%)	10k-100k	60/200	(30%)
100-1000	97/238	(41%)	100k-1m	115/267	(43%)
>1000	38/47	(81%)	>1m	58/82	(71%)
All Projects	240/591	(41%)	All Projects	240/591	(41%)

Table 1: Projects creating a process per test, grouped by tests per project and by lines of code per project

2013. Basic statistics (as calculated by Ohloh) for these projects appear in Table 2, showing the aggregate minimum, maximum, average and standard deviation for lines of code, active developers, and age in years. A complete description of the entire dataset appears in Appendix A in Table 7.

The two most popular build automation systems for Java are ant [5] and maven [6]. These systems allow developers to write build scripts in XML, with the build system managing dependencies and automatically executing pre-deployment tasks such as running tests. Both systems can be configured to either run all tests in the same process or to create a new process for each test to execute in. From our 1,200 projects, we parsed these XML files to identify those that use JUnit as part of their build process and of those, how many isolate each test in its own process. Then, we parsed the source files for each of the projects that use JUnit to determine the number of tests in each of these projects.

We broke down the projects both by the number of tests per project and by the number of lines of code per project. Table 1 shows the result of this study. We found that 81% of those projects with over 1,000 tests create a new process for each test when executing it — only 19% do not isolate their tests in separate processes. When grouping by lines of code, 71% of projects with over one million lines of code create new processes for each test case. Overall, 41% of those projects in our sample that use JUnit create separate processes for each test. With these findings, we are confident in our claim that it is common practice, particularly among large applications (which may have the longest running test suites), to isolate each test case into its own process.

2.2 MQ2: Why isolate tests?

Understanding now that it is common practice for developers to isolate unit tests into separate processes, we next sought to answer **MQ2** — to understand why developers isolate tests.

Perhaps in the ideal unit testing environment each unit test could be executed in the same application process, with pre-test and post-test methods ensuring that the application under test is in a "clean" state for the next test. However, handwritten pre-test and post-test teardown methods can place a burden on developers to write and may not always be correct. When these pre-test and post-test methods are not correct tests may produce false positives, missing bugs that should be caught or false negatives, incorrectly raising an exception when the failure is in the test case, not in the application begin tested.

For example, Muşlu et al. [31] discuss a bug in the Apache Commons CLI library that took approximately four years from initial report to reach a confirmed fix. This bug could be detected by running the application's existing tests independently of each other, but when running on the same instance of the application (using only the developer-provided pre and post-test methods to reset the application), it did not present because it was masked by a hidden dependency between tests that was not automatically reset.

There can be many confounding factors that create such hidden dependencies between tests. For instance, methods may have side effects that are undocumented. In a complex codebase with hundreds of thousands of lines of code, it may be very difficult to identify all potential side effects of an action. When a tester writes the test case for a method, they will be unable to properly reset the system state if they are unaware of that method's implicit side effects. To avoid this sort of confusion, testers may decide to simply execute each test in a separate process — introducing significant runtime overhead to their test suite.

In the remainder of this subsection, we describe these dependencies as they appear in the Java programming language and show a real-world example of one such dependency. Although some terminology is specific to Java, these concepts apply similarly to other languages.

Consider the following real Java code snippet from the Apache Tomcat project shown in Listing 1. This single line of code is taken from the "CookieSupport" class, which defines a series of configuration constants. In this example, the field "`ALLOW_EQUALS_IN_VALUE`" is defined with the modifiers `static final`. As mentioned above, `static` signifies that it can be referenced by any object, regardless of position in the object graph. The `final` modifier indicates that its value is constant — once it is set, it can never be changed. The value that it is assigned on the right hand side of the expression is derived from a "System Property" (a Java feature that mirrors environmental variables).

This initializer is executed only once in the application: when the class containing it is initialized. If a test case depends on the value of this field then it must set the appropriate system property *before* the class containing the field is initialized. Imagine the following test execution: first, a test executes and sets the system property to false. Then this initializer executes, setting the field `ALLOW_EQUALS_IN_VALUE` to false. Then the next test executes, setting the system property to true, expecting that `ALLOW_EQUALS_IN_VALUE` will be set to true when the field is initialized. However, because the value has already been set it will remain as it is: false, causing the second test to fail unexpectedly. This

```
public static final boolean
    ALLOW_EQUALS_IN_VALUE = Boolean.valueOf(
    System.getProperty(``org.apache.tomcat.
    util.http.ServerCookie.
    ALLOW_EQUALS_IN_VALUE'', ``false'')).
    booleanValue();
```

Listing 1: CookieSupport.java: An example of Java code that breaks test independence

scenario is exactly what occurs in the Tomcat test suite and in fact, in the source code for several tests that rely on this property the following comment appears: "Note because of the use of static final constants in Cookies, each of these tests must be executed in a new JVM instance" [1].

Although the above example was from a Java application, the sort of leakage that occurred could happen in practically any language, provided that the developers follow a similar pattern. In general, all that is necessary to cause a leakage is storing some value in shared memory which may be reused in the next test execution. In this specific case, the pattern is caching configuration (acquired from an external source such as a configuration file or environmental property) in memory — certainly a practice shared by many programmers.

There are certainly other potential sources of leakage between test executions, other than explicitly setting some field in memory. For instance in Java, the system property interface mentioned above allows developers to set properties that are persisted for the entire execution of that process. There are also various forms of registries provided by the Java API to allow developers to register services and lookup environments — these too, provide avenues through which data could be leaked between executions.

While in some cases it is possible (although perhaps complicated and time consuming) to write post-test methods to efficiently reset system state, take note that our example, the `static final` field can not be manually reset. Moreover, since this leakage occurs *during* application initialization, it would also be insufficient to initialize an application, fork it, and run each test in a forked process, as this initialization would not reoccur. The only option left to developers is to re-architect their codebase to make testing easier (at the cost of the time to re-architect it and potential defects introduced by the new implementation) or to isolate each test to a separate process.

2.3 MQ3: The overhead of test isolation

To gauge the overhead of test isolation we compared the execution time of several application test suites running in isolation with the execution time running without isolation. We selected 20 projects from our corpus of projects that include build scripts with JUnit tests. We selected projects for this study with the aim of including a mix of both widely used and recognizable projects (e.g. the Apache Tomcat project, a popular JSP server with 8537 commits and 15 recent 47 contributors overall), and smaller projects as well (e.g. JTor, an alpha-quality Tor implementation in Java with only 445 commits and 6 contributors overall). Additional information about each project including a direct link to the project repository can be found in Table 7 in Appendix A.

Modifying each project's build scripts, we ran the test suite for each project twice: once with all tests executing in the same process, and once with one process per test. When executing each test in its own process, we did so by setting the ant configuration options "fork=yes" and "forkMode=perTest." We calculated the overhead of executing each test in a separate process as $100 \times \frac{T_n - T_o}{T_o}$, where T_n is the absolute time to execute all tests in their own process, and T_o is the absolute time to execute all tests in the same process. We performed this study on our commodity server running Ubuntu 12.04.1 LTS and Java 1.7.0_25 on a 4-core 2.66Ghz Xeon processor and 8GB of RAM.

Project	LOC (in k)	Test Classes	Overhead
Apache Ivy	305.99	119	342%
Apache Nutch	100.91	27	18%
Apache River	365.72	22	66%
Apache Tomcat	5,692.45	292	42%
betterFORM	1,114.14	127	3,545%
Bristlecone	16.52	4	3%
btrace	14.15	3	123%
Closure Compiler	467.57	223	884%
Commons Codec	17.99	46	179%
Commons IO	29.16	84	89%
Commons Validator	17.46	21	911%
FreeRapid Downloader	257.70	7	245%
gedcom4j	18.22	57	464%
JAXX	91.13	6	239%
Jetty	621.53	6	49%
JTor	15.07	7	1,128%
mkgmap	58.54	43	226%
Openfire	250.79	12	761%
Trove for Java	45.31	12	794%
upm	5.62	10	2,432%
Average	475.30	56	627%

Table 3: Overhead of isolating tests in new processes
Additional descriptions of each subject appear in Table 6.

Table 3 shows the results of this study. For each project studied, we have included the total lines of code in the project (as counted by Ohloh), the number of test classes per project, and the overhead of isolating each test in its own process. On average, the overhead of executing each test in its own process is stunningly high: 627% on average. We investigated further the subjects "Bristlecone" and "betterFORM" (the subjects with the lowest and highest overhead respectively). We observed that Bristlecone had a low number of tests total (only four test classes in total), with each test taking on average approximately 20 seconds. Meanwhile, in the betterFORM subject, there were 127 test classes total, and each test took on average approximately 0.06 seconds. These results are intuitive: in test suites that have many, fast tests, the testing time can be easily dominated by setup and teardown time to create new processes. On the other hand, for test suites with fewer, longer running tests, the setup and teardown time is masked by the long duration of the tests themselves.

3. APPROACH

Our key insight that enables Unit Test Virtualization is that it is often unnecessary to completely reinitialize an application in order to isolate test cases running in it. As shown in Figure 2, Unit Test Virtualization fits into a traditional unit testing process. During each test execution, Unit Test Virtualization determines what parts of the application will need to be reset before the next execution. At the end of each test execution, the affected memory is reset. This section describes how we determine which parts of the application to reset and how to reset just those components.

Unit Test Virtualization relies on both static and dynamic analysis components to detect what memory segments need to be reset after each test execution. This approach leverages the runtime performance benefits of static analysis (e.g. that
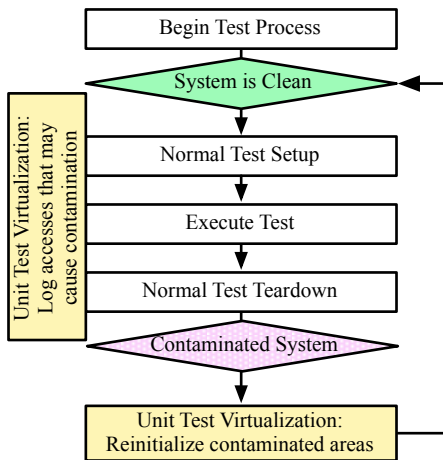
Figure 2: Unit Test Virtualization at the high level

the analysis is precomputed) with the precision of dynamic runtime analysis.

Before test execution, a static analysis pass occurs, placing each addressed memory region into one of two categories: M_s("safe") and M_u("unknown"), as shown graphically in Figure 3. Memory areas that are in M_s can be guaranteed to never be shared between test executions, and therefore do not need to be reset. An area might be in M_s because we can determine statically that it is never accessed, or that it is always reset to its starting condition at the conclusion of a test. This static analysis can be cached at the module-level, only needing to be recomputed when the module code changes. All stack memory can be placed in M_s because we assume that the test suite runner (which calls each individual test) does not pass a pointer to the same stack memory to more than one test. We find this assumption reasonable, as it only places a burden on developers of test suite runners (not developers of tests themselves), which are reusable and often standardized.

Memory areas that are placed in M_u are left to a runtime checker to identify those which are written to but not cleared. As each test case executes, memory allocations and accesses are tracked, specifically tracking each allocation that occurs in M_u. During future executions we ensure that accesses to that same location in M_u are treated as if the location hadn't been accessed before.

This is a general approach and indeed is left somewhat vague, as the details of exactly how M_s is built and how M_u is checked at runtime will vary from language to language. We believe that this approach could be applied to any language, remaining particularly efficient in those that provide
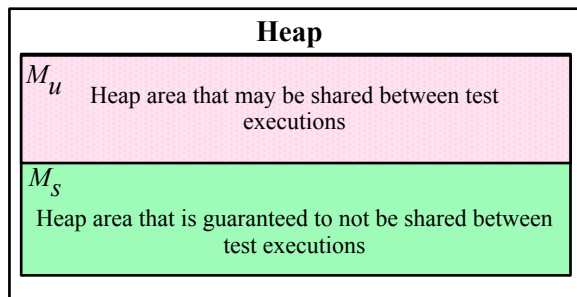
Figure 3: Unit Test Virtualization divides the heap into M_u and M_s
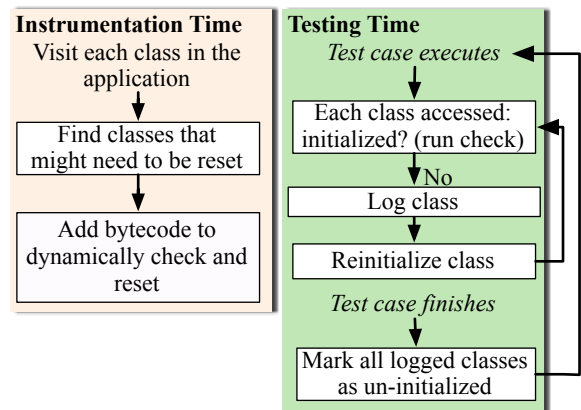
Figure 4: Implementation of VMVM

memory management (such as Java, python, etc). Further detail for the implementation of Unit Test Virtualization as applied to Java programs is provided in the Implementation section that follows.

4. IMPLEMENTATION

To evaluate the performance of Unit Test Virtualization we created a fully-functioning implementation of it for Java. We call our implementation VMVM, pronounced "vroom-vroom," and name it after its technique of building a Virtual Machine-like container within the Java Virtual Machine). VMVM is released under an MIT license and is available on GitHub [7]. We integrated VMVM directly with the popular test utility JUnit and two common build systems: ant and maven, to reset the test environment between automated test executions with no intervention. VMVM requires no modification to the host machine or JVM, running in a completely unmodified environment. VMVM requires no access to source code, an important feature when testing applications that use third party libraries (for which the source may not be available). VMVM is compatible with any Java bytecode, but the runtime depends on newer language features, requiring a JRE version 5 or newer.

Architecturally, VMVM consists of a static bytecode instrumenter (implemented with the ASM instrumentation library [11]) and a dynamic runtime. The static analyzer and instrumenter identify locations that may require reinitializing and insert code to reinitialize if necessary at runtime. The dynamic runtime tracks what actually needs to be reset and performs this reinitialization between each JUnit test. These components are shown at a high level in Figure 4.

4.1 Java Background

Before describing the implementation details for VMVM, we first briefly provide some short background on memory management in Java. While some languages, such as C, allow machine instructions to build pointers to arbitrary locations in memory, Java does not allow pointer manipulation — it has a managed memory model. Without pointer manipulation, the set of accessible memory S to a code region R in Java is constrained to all regions to which R has a pointer to, plus all pointers that may be contained in that region. In an object oriented language, this is referred to as an *object graph*: each object is a node, and if there is a reference from object A to object B, then we say that there exists an edge from A to B. An object can only access other
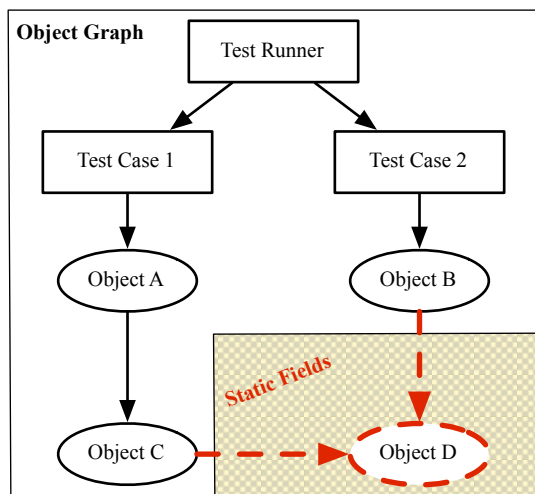
Figure 5: A leaked reference between two tests

objects which are children in its object graph, with the exception of objects that are referred to by fields declared with the `static` modifier. It is easy to see how to systematically avoid leaking data between two tests through regular (e.g. non-static) references:

Consider the simple reference graph shown in Figure 5. Test Case 1 references Object A which in turn references Object C. For Test Case 2 to also reference Object A, it would be necessary for the Test Runner (which can reference Object A) to explicitly pass a reference to Object A to Test Case 2. As long as the test runner never holds a reference to a prior test case when it creates a new one, then this situation can be avoided easily. That is, the application being tested or the tests being executed could not result in such a leak: only the testing framework itself could do so, therefore, this sort of leakage is not of our concern as it can easily be controlled by the testing framework. Therefore, all memory accesses to non-`static` fields are automatically placed in M_s by VMVM.

The leakage problem that we are concerned with comes from `static` fields: in the same figure, we mark "Object D" as an object that is statically referenced. Because it can be referenced by any object, it is possible for Test Case 1 and Test Case 2 to both indirectly access it - potentially leaking data between the tests. It is then only `static` fields that VMVM must analyze to place in M_u or M_s.

4.2 Static Analysis

VMVM must determine which `static` fields are safe (e.g. can be placed in M_s). For a `static` field to be in M_s, it must not only hold a constant value throughout execution, but its value must not be dependent on any non-constant values. This distinction is important as it prevents propagating possibly leaked data into M_s. Listing 2 shows an example of a class with three fields that meet these requirements: the first two fields are set with constant values, and the third is set with a value that is non-constant, but dependent only on another constant value.

In normal operation, when the JVM initializes a class, all `static` fields of that class are initialized. To emulate the behavior of stopping the target application and restarting it (in a new JVM), VMVM does not support reinitializing individual `static` fields of a class, instead reinitializing entire

```java
public class StaticExample {
    public static final String s = "abcd";
    public static final int x = 5;
    public static final int y = x * 3;
}
```

Listing 2: Example of static fields

classes at a time. Therefore, to reinitialize a field, we must completely reinitialize the class that owns that field, executing all of the initialization code of that class. VMVM detects which classes need never be reinitialized to avoid a runtime overhead of checking to reinitialize these classes. In addition to having no `static` fields in M_u, the initialization code for these classes must create no side-effects for other classes. If these conditions are met then the entire class is marked as safe and VMVM never attempts to reinitialize it.

This entire analysis process can be cached per-class file, and as the software is modified, only the analysis for classes affected need be recomputed. Even if it is necessary to execute the analysis on the entire codebase, the analysis is fairly fast. We measured the time necessary to analyze the entire Java API (version 1.7.0_25, using the rt.jar archive) and found that it took on approximately 20 seconds to analyze all 19,097 classes (only 3 seconds to initialize the first 1,000 classes of the API). Table 4 shows the duration of the analysis when varying the portion of the Java API analyzed, providing a rough gauge for how long this analysis takes programs of different sizes.

4.3 Static Instrumentation

Using the results of the analysis performed in the previous step, VMVM instruments the application code (including any external libraries, but excluding the Java runtime libraries to ensure portability) to log the initialization of each class that may need to be reinitialized. Simultaneously, VMVM instruments the application code to preface each access that could result in a class being initialized with a check, to see if it should be reinitialized by force. Note that because we initialize all static fields of a class at the same time, if a class has at least one non-safe static field, then we must check every access to that class, including to safe fields of the class in order to ensure that all classes are initialized in the same order as by the JVM in traditional isolation. The following actions cause the JVM to initialize a class (if it hasn't yet been initialized), and are the actions that VMVM uses to trigger a possible reinitialization:

1. When creating a new instance of the class
2. When accessing a static method of the class
3. When accessing a static field of the class
4. When explicitly requested via reflection

Criteria 1-3 can occur in "normal" code, or dynamically through the Java reflection interface, which allows devel-

Classes Analyzed	Time (seconds)
10	0.16
100	0.90
1,000	2.74
10,000	12.07
19,097	21.21

Table 4: Analysis length on portions of the Java API

opers to reference classes by name at runtime. Regardless of how the class is accessed, VMVM prefaces each such instruction with a check to determine if the class needs to be reinitialized. This check is synchronized, locking on the JVM object that represents the class being checked. This is identical to the synchronization technique specified by the JVM [30]), ensuring that VMVM is fully-functional in multithreaded environments.

4.4 Logging Class Initializations

Each class in Java has a special method called `<clinit>` which is called upon its initialization. For classes that may need to be reinitialized, we insert our logging code directly at the start of this initializer, recording the name of the class being initialized.

We store this logged information in two places for efficient lookup. First, we store the initialization state of the class in a `static` field that we add to the class itself. This allows for fast lookups when accessing a class to determine if it's been initialized or not. Second, we store an index that contains all of the classes that have been initialized so that we can quickly invalidate those initializations when we want to reinitialize them.

4.5 Dynamically Reinitializing Classes

To reinitialize a class, VMVM clears the flag that indicates that that class has been initialized. The next time that the class is accessed (as described in Section 4.3 above), the initializer will be called.

However, since we only instrument the application code (and not the Java core library set), the above process is not quite complete: there are still locations within the Java library where data could be leaked between test executions. For instance, Java provides a "System Property" interface that allows applications to set process-wide configuration properties. We scanned the Java API to identify public-facing methods that set `static` fields which are internal to the Java API, first using a script to identify possible candidates, then verifying each by hand to identify false positives. In total, we found 48 classes with methods that set the value of some `static` field within the Java API. For each of these methods, VMVM provides copy-on-write functionality, logging the value of each internal field before changing it, and then restoring that value when reinitializing the application.

4.6 Test Automation Integration

VMVM plugs directly into the popular unit testing tool JUnit [2] and build automation systems ant [5] and maven [6]. This integration is important as it makes the transition from isolating tests by process separation to isolating tests by VMVM as painless as possible for developers.

Both ant and maven rely upon well-formed XML configuration files to specify the steps of the build (and test) process. VMVM changes approximately 4 lines of these files, modifying them to include VMVM in the classpath, to execute all tests in the same process, and to notify VMVM after each test completion so that shared memory can be reset automatically. As each test completes VMVM marks each class that was used (and not on its list of "safe" classes) as being in need of reinitialization, triggering reinitialization upon its next access.

Although we integrated VMVM directly into these popular tools, it can also be used directly in any other testing environment. Both the ant and maven hooks that we wrote consist of only a single line of code: `VirtualRuntime.reset()`, which triggers the reinitialization process.

4.7 Supporting Class Reinitialization

VMVM makes several technical modifications to the statically mutable classes to allow them to be reinitialized. First, VMVM performs some housekeeping: renaming the static re-initializer from the internal name `<clinit>` to a configurable name (by default, `_vmvm_clinit_`) and adding a shell `<clinit>` method that calls the original. This is necessary because `<clinit>` is a reserved method name that cannot be called explicitly: it would be impossible to call this method otherwise. At the same time, VMVM adds instructions to dynamically log the initialization of the class.

VMVM must also make modifications to support reinitializing `final static` fields. Although a `final` field can't be changed, if it is a reference to an object, the contents of that object may change. For this reason, VMVM strips the `final` modifier from all mutable static fields of these classes. Note that this occurs *after* the code has been compiled though, so the compiler will still verify that there are no attempts to modify the value of a final field. We manually protect against the code that tries to dynamically set the value of a (no longer) final field with reflection by wrapping all reflective calls with a check to ensure that they do not reference a previously final field.

VMVM makes special accommodations for static fields of interfaces, since Java imposes several requirements on interfaces that limit VMVM from accomplishing the above tasks. In Java, all static fields of interfaces must be `final`, preventing VMVM from removing the modifier. Also, the only static method allowed is the `<clinit>` method, preventing VMVM from renaming the method. In these cases, VMVM modifies all mutable static fields to be a wrapper object that contains the original object. In this way, the actually value of the `final` field (now, a reference to a wrapper object) does not change when performing a reinitialization: only the contents of that wrapper object change (which represents the original field).

5. EXPERIMENTAL RESULTS

To evaluate the performance of VMVM we pose and answer the following three research questions (RQ):

RQ1: How does VMVM compare to test suite minimization in terms of performance and fault-finding ability?

RQ2: In general, what performance gains are possible when using VMVM compared to creating a new process for each test?

RQ3: How does VMVM impact fault-finding ability compared to using traditional isolation?

We performed two studies to address these research questions. Both studies were performed in the same environment as our study from Section 2 — on our commodity server running Ubuntu 12.04.1 LTS and Java 1.7.0_25 with a 4-core 2.66Ghz Xeon processor and 8GB of RAM.

5.1 Study 1: Comparison to Minimization

We address **RQ1**, comparing VMVM to Test Suite Minimization (TSM), by turning to a study performed by Zhang et al. [44]. Zhang et al. applied TSM to Java programs in

the largest study that we could find comparing TSM algorithms using Java subjects. In particular, they implemented four minimization techniques: a greedy technique [15], Harrold et al's heuristic [23], the GRE heuristic [14, 15], and an ILP model [8]. They implemented each technique four different ways (using different coverage metrics and granularities) for a total of 16 TSM implementations. Zhang et al. studied the reduction of test suite size and reduction of fault-finding ability of these TSM implementations using four real-world Java programs as subjects, comparing across several versions of each. The programs were selected from the Software-artifact Infrastructure Repository (SIR) [17]. The SIR is widely used for measuring the performance of TSM techniques and includes tests suites written by the original developers. SIR also contains seeded faults for each program that can be used to evaluate a technique's fault-finding ability.

We downloaded the same 19 versions of the same four applications from the SIR and instrumented them with VMVM. We executed each test suite twice: once with each test case running in its own process, and once with all test cases running in the same process but with VMVM providing isolation. The test scripts included with each application by SIR isolate each test case in its own process, so to execute them with VMVM we replaced the SIR-provided scripts with our own, running each in the same process and calling VMVM to reset the environment between each test. For each version of each application, we calculated the reduction in suite execution time (RT) as $RT = 100 \times \frac{|T_n| - |T_{vmvm}|}{|T_n|}$ where T_n is the absolute time to execute each test in its own process, and T_{vmvm} is the absolute time to execute all of the tests in the same process using VMVM. For each version of the application with seeded faults we calculated the reduction in fault-finding ability (RF) as $RF = 100 \times \frac{|F_n| - |F_{vmvm}|}{|F_n|}$ where F_n is the number of faults detected by executing each test in its own process and F_{vmvm} is the number of faults detected by executing all tests in the same process using VMVM. Zhang et al. similarly calculated RS as the reduction in total suite size (e.g. number of tests, not duration of execution) and RF.

We compare the reduction in test suite size RS directly to our empirical reduction in test suite execution time RT. Table 5 shows the results of this study (RF is not shown in the table, as its value is 0 in all cases). Note that for each subject, Zhang et al. compared 16 minimization approaches, yet we display here only one value per subject. Zhang et al. concluded that using Harrold et al's heuristic [23] applied at the test class level using statement level coverage (one of the 16 approaches evaluated in their work) yielded the best overall reduction in test suite size with the minimal cost to fault-finding ability. Therefore, in this experiment, we compared VMVM to this recommended technique.

To answer **RQ1**, we found that in all cases the reduction in testing time RT was greater than the reduction in test suite size RS. VMVM outperformed the TSM technique on all subjects, reducing the testing time on average by 42%, compared to a reduction in test suite of only 12%. With regard to fault-finding ability: the RF values observed for VMVM are constant at zero, and every test case is still executed in the VMVM configuration. Although the TSM technique also had $RF = 0$ on all seeded faults, such a technique always risks a potential loss of fault finding ability.

Application	LOC (in k)	# of Tests		VMVM RT	TSM RS [44]
		Classes	Methods		
Ant v1	25.83k	34	137	38	3
Ant v2	39.72k	52	219	35	0
Ant v3	39.80k	52	219	35	0
Ant v4	61.85k	101	521	22	7
Ant v5	63.48k	104	557	17	6
Ant v6	63.55k	105	559	17	6
Ant v7	80.36k	150	877	21	11
Ant v8	80.42k	150	878	21	10
JMeter v1	35.54k	23	78	34	8
JMeter v2	35.17k	25	80	37	4
JMeter v3	39.29k	28	78	40	11
JMeter v4	40.38k	28	78	40	11
JMeter v5	43.12k	32	97	48	16
jtopas v1	1.90k	10	138	71	13
jtopas v2	2.03k	11	140	69	11
jtopas v3	5.36k	18	209	48	17
xml-sec v1	18.30k	15	92	69	33
xml-sec v2	18.96k	15	94	78	33
xml-sec v3	16.86k	13	84	53	38
Average	25.83k	51	270	42	12

Table 5: Reduction in test suite size (RS) and reduction in test execution time (RT) for VmVm and Harrold et al's Test Suite Minimization (TSM) technique [23] as calculated by Zhang et al. [44]

In fact, studies using the same algorithm on other subjects have observed RF values up to 100% [35] (finding no faults).

In general, our expectation is that VMVM results in no loss of fault-finding ability. Whereas TSM does not run all tests in a given suite, VMVM does. Our concerns for the impact of VMVM on fault-finding ability are instead related to its correctness of isolation: does VMVM properly isolate applications? Or does this process introduce flaws? We evaluate the correctness of VMVM further from this perspective in the following study of 20, large, real-world applications.

5.2 Study 2: More Applications

To further study the overhead and fault-finding implications of VMVM we applied it to the same 20 open source Java applications used for our motivating study. Most of the applications were well-established, averaging approximately 452,660 lines of code, 717 test methods, and a lifetime of 7 years. These applications are significantly larger than the SIR applications used in Study 1, for which the average application had only 25,830 lines of code and 270 test methods. Additional information about each project appears in Appendix A in Table 7.

For each subject in this study we executed its test suite three times, each time recording the duration of the execution and the number of failed tests. First, we executed the test suite isolating each test case in its own process (what we will refer to as "traditional isolation"), using ant's "forkMode=perTest" option to isolate each test case. Second, we executed the test suite with no isolation, with all test cases executed in the same process (which we will refer to as "not isolated"). Finally, we instrumented the subject with VMVM and executed all tests cases in the same process but with VMVM providing isolation. We then calculated the re-

| Project | Revisions | LOC (in k) | # of Tests | | Age (Years) | Isolates by Default | RT | False Positives | |
			Classes	Methods				VMVM	No Isolation
Apache Ivy	1233	305.99	119	988	5.77	Y	66%	0	52
Apache Nutch	1481	100.91	27	73	11.02	Y	14%	0	0
Apache River	264	365.72	22	83	6.36	Y	49%	0	0
Apache Tomcat	8537	5,692.45	292	1,734	12.36	Y	28%	0	16
betterFORM	1940	1,114.14	127	680	3.68	N	71%	0	0
Bristlecone	149	16.52	4	39	5.94	N	0%	0	0
btrace	326	14.15	3	16	5.52	Y	54%	0	0
Closure Compiler	2296	467.57	223	7,949	3.85	N	73%	0	0
Commons Codec	1260	17.99	46	613	10.44	N	75%	0	0
Commons IO	961	29.16	84	1,022	6.19	Y	47%	0	0
Commons Validator	269	17.46	21	202	6.19	N	82%	0	0
FreeRapid Downloader	1388	257.70	7	30	5.1	N	83%	0	0
gedcom4j	279	18.22	57	286	4.44	N	57%	0	0
JAXX	44	91.13	6	36	7.44	N	86%	0	0
Jetty	2349	621.53	6	24	15.11	Y	31%	0	0
JTor	445	15.07	7	26	3.94	N	91%	0	0
mkgmap	1663	58.54	43	293	6.85	N	62%	0	0
Openfire	1726	250.79	12	33	6.44	Y	87%	0	0
Trove for Java	193	45.31	12	179	11.86	Y	87%	0	0
upm	323	5.62	10	34	7.94	Y	97%	0	0
Average (Overall)	1356	475.30	56	717	7.32	10/20	62%	0	4
Average (Only subjects isolated by default)	1739	743.16	59	419	8.86	10/10	56%	0	7

Table 6: Study 2 — Reduction in testing time (RT) and number of false positives for VMVM over 20 subjects

duction in execution time RT as in Study 1 to address **RQ2**. Half of these subjects isolate test cases by default (e.g. the other half do not normally isolate their test cases), yet we include these subjects in this study to show the potential speedup available if the subject did isolate its test cases.

To answer **RQ3** (beyond the evidence found in the first study) we wanted to exercise VMVM in scenarios where we knew that the test cases being executed had side-effects. When tests have side-effects on each other they can lead to false positives (e.g. a test case that fails despite the code begin tested being correct) and false negatives (e.g. a test case that passes despite the code being tested being faulty). In practice, we were unable to easily identify known false-positives, and therefore studied the effect of VMVM on false negatives, identifiable easily as instances where a test case passes in isolation but fails without isolation. We evaluated the effectiveness of VMVM's isolation by observing the false positives that occur for each subject when executed without isolation, comparing this to the false positives that occur for each subject when executed with VMVM isolation. We use the test failures for each subject in traditional isolation as a baseline to compare to.

The results of this study are shown in Table 6. Note that for each application we executed our study on the most recent (at time of writing) development version, identified by its revision number shown in Table 6.

On average, the reduction in test suite execution time RT was slightly higher than in Study 1: 62% (56% when considering only the subjects that isolate their tests by default), providing strong support for **RQ2** that VMVM yields significant reductions in test suite execution time. We identified the "bristlecone" subject as a worst case style scenario that occurred in our study. In our original motivating study

(described previously in Table 3), we found that there was almost no overhead (only 3%) to isolating the tests in this subject, due to the relatively long amount of time spent executing each individual test and the very small number of tests. Therefore, we were unsuprised to see VMVM provide no reduction in testing time for this subject. On the other hand, we identified the "upm" subject as a near best case: with many, quick executing tests, the overhead of creating a new process for each test was very high (2,432%), providing much room for VMVM to provide improvement.

In no cases did we observe any false positives when isolating tests with VMVM, despite observing false positives in several instances when using no isolation at all. Recall that these subjects are mostly development-grade (e.g. not released software), and in several cases we verified that in fact not all tests were expected to pass. This finding further supports our previous finding for **RQ3** from Study 1, that VMVM does not decrease fault finding ability.

5.3 Limitations and Threats to Validity

The first key potential threat to the validity of our studies is the selection of subjects used. However, we believe that by using the standard SIR artifact repository (which is used by other authors as well, e.g. [22, 25, 38] and more) we can partially address this concern. The applications that we selected for Study 2 were larger on average, a deliberate attempt to broaden the scope of the study beyond the SIR subjects. It is possible that they are not representative of some class of applications, but we still believe that they show both the worst and best case performance of VMVM: when there are very few, long running tests and when there are very many, fast running tests.

Our initial claim that these subjects represent the largest Java projects is based on two assumptions: first that number of contributing developers is an indicator of project size, and second that the projects in the Ohloh repository are a representative sample of all Java projects. We believe that we have captured all of the "largest" Java projects in our dataset regardless of the metric, given the very large number of projects retrieved. Additionally, given the overall size of Ohloh's data (which includes all repositories from, among other sources, GitHub and SourceForge) we believe that our study is at least as broad as previous work by other authors that utilized primarily test subjects from the SIR.

We compared the reduction in testing time RT observed by utilizing VMVM with the reduction in test suite size RS of a Test Suite Minimization system. It is possible that there is not a direct correlation between RT and RS, especially in cases where the ratio of average test time to number of tests is very high. In an extreme example, if some executing tests require human interaction, and others are fully automated, then the reduction in total cost of execution by removing the interaction-based tests from the suite may be significantly higher than what VMVM can provide by speeding up the automated component. However, in the programs studied, this is not the case, and all test cases execute without input from the tester. Moreover, if such a scenario arrises, then it may be efficient to combine VMVM with Test Suite Minimization in order to realize the benefits of both approaches.

Although we provide a high level approach to Unit Test Virtualization that is language agnostic (particularly among memory managed languages), we implemented it in Java. The performance benefits that we revealed could be biased to the language features of Java. For instance, it may be that Java programmers more frequently isolate their unit tests in separate processes than other developers, in which case this approach may not provide such large performance benefits to test suites in other languages. The memory management model of Java may lower the overhead of tracking shared state compared to C, but we believe that such an approach would still remain applicable to other languages without arbitrary memory access such as Python or Ruby.

The final limitation that we discuss is the level of isolation provided by VMVM. VMVM is designed to be a drop-in replacement for "traditional" isolation where only in-memory state is isolated between test cases. It would be interesting to extend VMVM beyond this "traditional" isolation to also isolate state on disk or in databases. Such isolation would need to be integrated with current developer best practices, and we consider it to be outside of the scope of this paper.

6. RELATED WORK

Unit Test Virtualization can be seen as complementary to Test Suite Minimization (TSM), an approach where test cases that do not increase coverage metrics for the overall suite are removed, as redundant [23]. This optimization problem is NP-complete, and there have been many heuristics developed to approximate the minimization [14, 15, 22, 23, 27, 28, 38, 41]. TSM can be limited not only by imprecision of minimization approximations but also by the strength of optimization criteria (e.g. statement or branch coverage), a problem potentially abated by optimizing over multiple criteria simultaneously (e.g. [25]). We believe that it may be feasible to combine TSM with Unit Test Virtualization, min-

imizing both the number of tests executed and the amount of time spent executing those tests.

The effect of TSM on fault finding ability can vary greatly with the structure of the application being optimized and the structure of its test suite. Wong et al. found an average reduction of fault finding ability of less than 7.28% in two separate studies [39, 41]. On larger applications, Rothermel et al. reported a reduction in fault finding ability of over 50% for more than half of the suites considered [35]. Rothermel et al. suggested that this dramatic difference in results could be best attributed to the difference in the size of test suites studied, suggesting that Wong et al's [41] selection of small test suites (on average, less than 7 test cases) reduced the opportunities for loss of fault finding effectiveness [35]. The test suites studied in our first study averaged 51 test classes, and the suites in the second study averaged 56 test classes and over 700 individual test methods.

Similar to TSM is Test Suite Prioritization, where test cases are ordered to maximize the speed at which faults are detected, particularly in regression testing [18, 19, 36, 37, 40]. In this way, large test suites can still be allowed to run in their entirety, but with the hopes that faults are detected earlier in the process. We see Test Suite Prioritization and Unit Test Virtualization as complementary: Unit Test Virtualization increases the rate at which test suites execute, while prioritization increases the rate at which faults are detected by a test suite.

Muşlu et al. studied the effect of isolating unit tests on several software packages, finding isolation to be helpful in finding faults, but computationally expensive [31]. Holmes and Notkin created an approach to identify program dependencies using a hybrid static-dynamic analysis [24], which could be applied to detect hidden dependencies between tests. Pinto et al. studied the evolution of test suites throughout several versions of seven real-world Java programs, measuring the sort of changes made to the test suites [34]. It would be interesting to study specifically the kinds of modifications made to test suites in order to support isolation of unit tests.

The implementation of Unit Test Virtualization can be seen as similar in overall goal to sandboxing systems [4, 26, 29, 33]. However, while sandbox systems restrict all access from an application (or a subcomponent thereof) to a limited partition of memory, our goal is to allow that application normal access to resources, but to record such accesses so that they can be reverted, more similar to checkpoint-restart systems (e.g. [10, 13, 16, 20, 21]). Most relevant are several checkpoint style systems that directly target Java. Nikolov et al. presented recoverable class loaders, allowing for more efficient reinitialization of classes, but requiring a customized JVM [32], whereas VMVM functions on any commodity JVM. Xu et al. created a generic language-level technique for snapshotting Java programs [42], however our approach eliminates the need for explicit checkpoints, instead always reinitializing the system to its starting state.

Unit Test Virtualization may be more similar to microrebooting, a system-level approach to reinitializing small components of applications [12], although microrebooting requires developers to specifically decouple components to enable microrebooting, while Unit Test Virtualization requires no changes to the application under test.

7. CONCLUSIONS AND FUTURE WORK

Unit Test Virtualization is a powerful new approach to reduce the time necessary to execute long test suites by reducing the overhead of isolating individual tests. We have shown the applicability of such an approach by studying 1,200 of the largest Java applications, showing that of the largest, over 80% isolate their test cases, and in general, 40% do. We implemented Unit Test Virtualization for Java, creating our tool VMVM (pronounced "vroom-vroom"), and showed that in our sample of applications, it reduced testing time by up to 97% (on average, 62%), while still executing all test cases and without any loss of fault finding ability. We are interested in exploring further the technical challenges of implementing Unit Test Virtualization in non-memory managed languages, as well as the potential for additional performance gains by combining Unit Test Virtualization directly with Test Suite Minimization. VMVM is currently available publicly on GitHub [7], and could potentially be applied to other domains such as security or fault-recovery by providing a lightweight automatic reinitialization feature.

8. ACKNOWLEDGMENTS

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APPENDIX

A. APPLICATIONS STUDIED

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
52 North WPS	https://svn.52north.org/svn/geoprocessing/ main/52n-wps-config/trunk/	30	N	N
52 North WPS	https://svn.52north.org/svn/geostatistics/ main/uncertweb/52n-wps-io-uncertweb/ trunk/	51	N	N
52 North WPS	https://svn.52north.org/svn/geoprocessing/ main/52n-xml-wps-v100/trunk/	9	N	N
52 North WPS	git://github.com/52North/WPS.git	1265	Y	N
52North - SOS	https://svn.52north.org/svn/swe/main/SOS/ Service/trunk/	2449	Y	N
52North - SOS	https://svn.52north.org/svn/swe/main/SOS/ Service/branches/52n-sos-400-refactored	2222	Y	N
52NorthSecurity	https://svn.52north.org/svn/security/52n- security-api/trunk/	1648	N	N
52NorthSecurity	https://svn.52north.org/svn/security/52n- security-apps/trunk/	449	N	N
52NorthSecurity	https://svn.52north.org/svn/security/52n- security-xml/trunk/	44	Y	N
52NorthSecurity	https://svn.52north.org/svn/security/52n- security-build-tools/trunk/	18	N	N
abam	https://code.google.com/p/abam.abam-dom/	76	N	N
abam	https://code.google.com/p/abam.abam- commons/	18	N	N
abam	https://code.google.com/p/abam.abam- employee/	230	N	N
abam	https://code.google.com/p/abam.abam- student/	143	N	N
abam	https://code.google.com/p/abam.abam-ws/	88	N	N
acacia-business-ace	http://acacia-business-ace.googlecode.com/ svn/trunk	728	Y	Y
Accord	git://github.com/rmarins/accord.git	349	N	N
Accord	git://github.com/rmarins/netty-isdn- transport.git	56	N	N
acris	http://acris.googlecode.com/svn/sesam/ trunk	510	Y	N
acris	http://acris.googlecode.com/svn/trunk	1105	N	N
acris	http://acris.googlecode.com/svn/corpis/ trunk	286	N	N
ActionBarSherlock	git://github.com/JakeWharton/ ActionBarSherlock.git	1479	N	N
ActiveAndroid	git://github.com/pardom/ActiveAndroid.git	164	N	N
activejdbc	http://activejdbc.googlecode.com/svn/ trunk/	451	Y	N
Activiti	git://github.com/Activiti/Activiti.git	3678	Y	N
Activiti	git://github.com/Activiti/Activiti- Designer.git	238	N	N
aerogear-android	git://github.com/aerogear/aerogear- android.git	537	N	N
Agorava	git://github.com/agorava/agorava-core.git	120	Y	N
Agorava	git://github.com/agorava/agorava- twitter.git	52	Y	N
Agorava	git://github.com/agorava/agorava- facebook.git	44	Y	N
Agorava	git://github.com/agorava/agorava- linkedin.git	38	Y	N
Agorava	git://github.com/agorava/agorava- socializer.git	55	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
AgroSense	https://hg.java.net/hg/agrosense~core	2923	Y	N
airbrake-java	git://github.com/airbrake/airbrake-java.git	103	N	N
airhead-research	http://airhead-research.googlecode.com/svn/trunk	578	Y	Y
airhead-research	git://github.com/fozziethebeat/S-Space.git	155	Y	Y
airline	git://github.com/airlift/airline.git	67	N	N
ala-bie	http://ala-bie.googlecode.com/svn/trunk/	3800	Y	N
Alfresco Content Management	http://svn.alfresco.com/repos/alfresco-open-mirror/alfresco/HEAD/root	12359	Y	Y
alljoyn_java	git://github.com/alljoyn/alljoyn_java.git	404	Y	Y
Alma Common Software	:pserver:guest:@cvssrv.hq.eso.org:/project18/CVS	17488	N	N
Amdatu	https://bitbucket.org/amdatu/amdatu-search	68	Y	Y
Amdatu	https://bitbucket.org/amdatu/amdatu-mongodb	24	Y	Y
Ametys	https://svn.ametys.org/trunk/cms/trunk	1971	N	N
Ametys	https://svn.ametys.org/trunk/plugins/explorer/trunk	296	N	N
Ametys	https://svn.ametys.org/trunk/explorer/trunk	171	N	N
Ametys	https://svn.ametys.org/trunk/plugins/datainclusion/trunk	86	N	N
Ametys	https://svn.ametys.org/trunk/plugins/artisteer/trunk	18	N	N
Ametys	https://svn.ametys.org/trunk/plugins/blog/trunk/	175	N	N
Ametys	https://svn.ametys.org/trunk/plugins/contentio/trunk/	29	N	N
Ametys	https://svn.ametys.org/trunk/plugins/dashboard/trunk/	46	N	N
Ametys	https://svn.ametys.org/trunk/plugins/document2flash/trunk/	54	N	N
Ametys	https://svn.ametys.org/trunk/plugins/external-edition/trunk/	19	N	N
Andlytics	git://github.com/AndlyticsProject/andlytics.git	1121	N	N
Android Maven Plugin	git://github.com/jayway/maven-android-plugin.git	1510	N	N
android-maven-plugin	git://github.com/jayway/maven-android-plugin.git	1510	N	N
android-on-freerunner	git://gitorious.org/android-on-freerunner/platform_dalvik.git	42	N	N
android-store	git://github.com/soomla/android-store.git	518	N	N
animoto_api_client_java	git://github.com/animoto/animoto_api_client_java.git	139	Y	N
annotation-tools	https://annotation-tools.googlecode.com/hg/	779	Y	Y
ansj_seg	git://github.com/ansjsun/ansj_seg.git	131	N	N
ANTLR	git://github.com/antlr/antlr4.git	2279	Y	N
Apache ACE	http://svn.apache.org/repos/asf/ace/trunk	1187	Y	Y
Apache Any23	git://github.com/apache/any23.git	1315	Y	Y
Apache Archiva	http://svn.apache.org/repos/asf/archiva/trunk	6667	Y	N
Apache Archiva	http://svn.apache.org/repos/asf/archiva/sandbox	200	Y	N
Apache Archiva	http://svn.apache.org/repos/asf/archiva/site/	317	N	N
Apache Archiva	http://svn.apache.org/repos/asf/archiva/tools/trunk/	80	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Apache Archiva	http://svn.apache.org/repos/asf/archiva/branches/archiva-1.3.x/	2868	Y	N
Apache Aries	https://svn.apache.org/repos/asf/aries/trunk/	3435	Y	Y
Apache Camel	http://svn.eu.apache.org/repos/asf/camel/branches/camel-1.x	3502	Y	Y
Apache Camel	https://git-wip-us.apache.org/repos/asf/camel.git	14723	Y	Y
Apache Chemistry	http://svn.apache.org/repos/asf/chemistry/opencmis/trunk/	1581	Y	N
Apache CloudStack	https://git-wip-us.apache.org/repos/asf/cloudstack.git	20140	Y	N
Apache Cocoon 3	http://svn.apache.org/repos/asf/cocoon/cocoon3/trunk/	1182	Y	N
Apache Commons BCEL	https://svn.apache.org/repos/asf/commons/proper/bcel/trunk	559	Y	N
Apache Commons BeanUtils	http://svn.apache.org/repos/asf/commons/proper/beanutils/trunk	238	Y	Y
Apache Commons BeanUtils	https://svn.apache.org/repos/asf/commons/sandbox/beanutils2/trunk	173	N	N
Apache Commons Codec	http://svn.apache.org/repos/asf/commons/proper/codec/trunk	1260	Y	N
Apache Commons Collections	http://svn.apache.org/repos/asf/commons/proper/collections/trunk	2549	Y	Y
Apache Commons Collections	http://svn.apache.org/repos/asf/commons/proper/collections/branches/collections_jdk5_branch	1628	Y	N
Apache Commons Compress	http://svn.apache.org/repos/asf/commons/proper/compress/trunk	1096	N	N
Apache Commons Configuration	http://svn.apache.org/repos/asf/commons/proper/configuration/trunk	1350	Y	Y
Apache Commons Configuration	http://svn.apache.org/repos/asf/commons/proper/configuration/branches	505	Y	Y
Apache Commons DBCP	http://svn.apache.org/repos/asf/commons/proper/dbcp/trunk	566	Y	Y
Apache Commons DbUtils	http://svn.apache.org/repos/asf/commons/proper/dbutils/trunk	369	Y	N
Apache Commons Digester	http://svn.apache.org/repos/asf/commons/proper/digester/trunk	1781	Y	N
Apache Commons Email	http://svn.apache.org/repos/asf/commons/proper/email/trunk	656	Y	N
Apache Commons Imaging	https://svn.apache.org/repos/asf/commons/proper/imaging/trunk	504	Y	N
Apache Commons JCI	http://svn.apache.org/repos/asf/commons/proper/jci/trunk	124	Y	N
Apache Commons Lang	http://svn.apache.org/repos/asf/commons/proper/lang/trunk	1935	Y	Y
Apache Commons Monitoring	http://svn.apache.org/repos/asf/commons/sandbox/monitoring/trunk	189	Y	N
Apache Commons Net	http://svn.apache.org/repos/asf/commons/proper/net/trunk	875	Y	N
Apache Commons OGNL	http://svn.apache.org/repos/asf/commons/proper/ognl/trunk/	544	Y	N
Apache Commons SCXML	https://svn.apache.org/repos/asf/commons/proper/scxml/trunk	625	Y	Y
Apache Commons Validator	http://svn.apache.org/repos/asf/commons/proper/validator/trunk	269	Y	N
Apache Commons VFS	http://svn.apache.org/repos/asf/commons/proper/vfs/trunk	909	Y	N
Apache Continuum	https://svn.apache.org/repos/asf/continuum/trunk	1587	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Apache Continuum	`https://svn.apache.org/repos/asf/continuum/branches`	830	Y	N
Apache Continuum	`https://svn.apache.org/repos/asf/continuum/sandbox`	114	Y	N
Apache Continuum	`https://svn.apache.org/repos/asf/continuum/site`	375	N	N
Apache Continuum	`https://svn.apache.org/repos/asf/continuum/parent/trunk`	84	N	N
Apache Continuum	`https://svn.apache.org/repos/asf/continuum/skin/trunk`	11	N	N
Apache Crunch	`https://git-wip-us.apache.org/repos/asf/crunch.git`	624	Y	N
Apache Curator	`https://git-wip-us.apache.org/repos/asf/incubator-curator.git`	1152	Y	N
Apache CXF	`http://svn.eu.apache.org/repos/asf/cxf/trunk`	12286	Y	Y
Apache CXF	`https://svn.apache.org/repos/asf/cxf/xjc-utils/trunk/`	39	N	N
Apache CXF	`https://svn.apache.org/repos/asf/cxf/build-utils/trunk/`	43	N	N
Apache CXF	`https://svn.apache.org/repos/asf/cxf/dosgi/trunk/`	545	Y	N
Apache CXF	`https://svn.apache.org/repos/asf/cxf/fediz/trunk/`	267	Y	N
Apache DeltaSpike	`https://git-wip-us.apache.org/repos/asf/deltaspike.git`	863	Y	N
Apache Derby	`https://svn.apache.org/repos/asf/db/derby/code/trunk`	6852	Y	Y
Apache Directory Studio	`http://svn.apache.org/repos/asf/directory/studio/trunk`	4324	Y	N
Apache EasyAnt	`http://svn.apache.org/repos/asf/ant/easyant/tasks/trunk/`	27	N	N
Apache EasyAnt	`http://svn.apache.org/repos/asf/ant/easyant/buildtypes/trunk/`	33	N	N
Apache EasyAnt	`http://svn.apache.org/repos/asf/ant/easyant/core/trunk`	270	N	N
Apache EasyAnt	`http://svn.apache.org/repos/asf/ant/easyant/easyant4e/trunk`	10	N	N
Apache EasyAnt	`http://svn.apache.org/repos/asf/ant/easyant/plugins/trunk`	161	N	N
Apache EasyAnt	`http://svn.apache.org/repos/asf/ant/easyant/skeletons/trunk`	15	N	N
Apache Felix	`http://svn.apache.org/repos/asf/felix/trunk`	10154	Y	N
Apache Felix	`http://svn.apache.org/repos/asf/felix/branches`	134	Y	N
Apache Flume	`git://git.apache.org/flume.git`	1330	Y	N
Apache Hadoop	`http://svn.apache.org/repos/asf/hadoop/common/branches/pre-HADOOP-4687/`	3874	Y	Y
Apache Hadoop	`http://svn.apache.org/repos/asf/hadoop/common/trunk/hadoop-common-project`	1217	Y	Y
Apache Hadoop	`http://svn.apache.org/repos/asf/hadoop/common/trunk/hadoop-hdfs-project/hadoop-hdfs/`	2490	Y	N
Apache Hadoop	`http://svn.apache.org/repos/asf/hadoop/common/trunk/hadoop-mapreduce-project/`	2429	Y	N
Apache Hadoop	`http://svn.apache.org/repos/asf/hadoop/common/trunk/hadoop-minicluster/`	3	N	N
Apache Hadoop	`http://svn.apache.org/repos/asf/hadoop/common/trunk/hadoop-yarn-project/`	535	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Apache Hadoop	http://svn.apache.org/repos/asf/hadoop/common/trunk/hadoop-tools/	100	Y	Y
Apache Ivy	http://svn.apache.org/repos/asf/ant/ivy/core/trunk/	1233	Y	Y
Apache Jackrabbit	git://git.apache.org/jackrabbit.git	7836	Y	N
Apache Jackrabbit Oak	http://svn.apache.org/repos/asf/jackrabbit/oak/trunk	4435	Y	N
Apache JAMES Project	http://svn.apache.org/repos/asf/james/jsieve/trunk	500	N	N
Apache JAMES Project	http://svn.apache.org/repos/asf/james/imap/trunk/	1100	N	N
Apache JAMES Project	http://svn.apache.org/repos/asf/james/mailbox/trunk	607	N	N
Apache JMeter	http://svn.apache.org/repos/asf/jmeter/trunk/	9743	Y	Y
Apache Lenya	https://svn.apache.org/repos/asf/lenya/trunk	4813	Y	N
Apache Lenya	https://svn.apache.org/repos/asf/lenya/docu	578	N	N
Apache Lenya	https://svn.apache.org/repos/asf/lenya/sandbox	330	Y	Y
Apache Lenya	http://svn.apache.org/repos/asf/lenya/branches/BRANCH_2_0_X	10564	Y	Y
Apache Lenya	http://svn.apache.org/repos/asf/lenya/branches/BRANCH_2_1_X/	10625	Y	Y
Apache Lenya	http://svn.apache.org/repos/asf/lenya/contributions/	121	N	N
Apache Lucene	:pserver:anonymous:@lucene.cvs.sourceforge.net:/cvsroot/lucene	89	Y	N
Apache Lucene	http://svn.apache.org/repos/asf/lucene/dev/trunk/lucene/	9085	N	N
Apache Mahout	http://svn.apache.org/repos/asf/mahout/trunk	2766	Y	N
Apache Marmotta (incubator)	https://git-wip-us.apache.org/repos/asf/incubator-marmotta.git	575	Y	Y
Apache Marmotta (incubator)	https://svn.apache.org/repos/asf/incubator/marmotta/	150	N	N
Apache Marmotta (incubator)	https://git-wip-us.apache.org/repos/asf/incubator-marmotta.git	793	Y	Y
Apache Maven 2	https://svn.apache.org/repos/asf/maven/jxr/trunk	174	N	N
Apache Maven 2	https://svn.apache.org/repos/asf/maven/plugins/trunk	10334	Y	N
Apache Maven 2	https://svn.apache.org/repos/asf/maven/release/trunk	710	Y	N
Apache Maven 2	https://svn.apache.org/repos/asf/maven/plugin-tools/trunk	740	Y	N
Apache Maven 2	https://svn.apache.org/repos/asf/maven/plugin-testing/trunk	99	Y	N
Apache Maven 2	https://git-wip-us.apache.org/repos/asf/maven-scm.git	1749	Y	N
Apache Maven 2	https://git-wip-us.apache.org/repos/asf/maven-surefire.git	1715	Y	Y
Apache Maven 2	https://git-wip-us.apache.org/repos/asf/maven-wagon.git	941	Y	N
Apache Maven 2	https://git-wip-us.apache.org/repos/asf/maven-integration-testing.git	1966	Y	N
Apache Maven 2	https://git-wip-us.apache.org/repos/asf/maven.git	9639	Y	N
Apache Maven SCM	http://svn.apache.org/repos/asf/maven/scm/trunk	1583	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Apache Maven SCM	`http://git-wip-us.apache.org/repos/asf/maven-scm.git`	0	Y	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/core/trunk`	3313	Y	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/tomahawk/trunk`	2644	Y	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/shared/trunk`	496	N	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/shared/branches/3_0_0`	109	Y	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/tobago/trunk`	4645	Y	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/current`	36	Y	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/tomahawk/trunk/sandbox`	1134	Y	N
Apache MyFaces	`http://svn.apache.org/repos/asf/myfaces/current20`	50	Y	N
Apache MyFaces	`https://svn.apache.org/repos/asf/myfaces/extensions/cdi/trunk/`	1119	Y	N
Apache MyFaces	`https://svn.apache.org/repos/asf/myfaces/extensions/validator/trunk`	508	Y	N
Apache Nutch	`:pserver:anonymous:@nutch.cvs.sourceforge.net:/cvsroot/nutch`	1051	Y	Y
Apache Nutch	`http://svn.apache.org/repos/asf/nutch/trunk`	1481	Y	Y
Apache ODE	`http://svn.apache.org/repos/asf/ode/trunk`	1064	Y	N
Apache ODF Toolkit	`https://svn.apache.org/repos/asf/incubator/odf/trunk`	631	Y	Y
Apache Olingo (Incubation)	`https://git-wip-us.apache.org/repos/asf/incubator-olingo-odata2`	34	N	N
Apache Oltu	`https://svn.apache.org/repos/asf/oltu/trunk/`	608	Y	N
Apache OpenJPA	`http://svn.apache.org/repos/asf/openjpa/trunk`	4620	Y	N
Apache OpenNLP	`https://svn.apache.org/repos/asf/opennlp/trunk/`	948	Y	N
Apache OpenNLP	`https://svn.apache.org/repos/asf/opennlp/sandbox/`	346	Y	N
Apache PDFBox	`http://svn.apache.org/repos/asf/pdfbox/trunk`	1289	Y	Y
Apache Rat	`http://svn.apache.org/repos/asf/creadur/rat/trunk/`	400	N	N
Apache Rave	`http://svn.apache.org/repos/asf/rave/trunk/`	1183	N	N
Apache River	`http://svn.apache.org/repos/asf/river/jtsk/trunk`	264	Y	Y
Apache Roller	`http://svn.apache.org/repos/asf/roller/trunk/`	3450	Y	N
Apache Shindig	`http://svn.apache.org/repos/asf/shindig/trunk`	4704	Y	N
Apache Shiro	`https://jsecurity.svn.sourceforge.net/svnroot/jsecurity/trunk`	810	N	N
Apache Shiro	`http://svn.apache.org/repos/asf/shiro/trunk`	1577	Y	N
Apache SIS	`https://svn.apache.org/repos/asf/sis/trunk`	312	Y	Y
Apache Sling	`http://svn.apache.org/repos/asf/sling/trunk`	8231	Y	N
Apache Solr	`http://svn.apache.org/repos/asf/lucene/dev/trunk/solr/`	7531	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Apache Synapse	`http://svn.apache.org/repos/asf/synapse/trunk/java/`	3146	Y	Y
Apache Tajo (incubating)	`https://git-wip-us.apache.org/repos/asf/incubator-tajo.git`	808	Y	N
Apache Tika	`git://git.apache.org/tika.git`	1844	Y	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/tc6.0.x/trunk`	5087	N	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/maven-plugin/trunk/`	475	Y	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/tc7.0.x/trunk/`	8537	Y	Y
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/taglibs/extended/trunk/`	21	Y	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/taglibs/rdc/trunk/`	155	N	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/taglibs/site/`	70	N	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/taglibs/standard/trunk/`	907	Y	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/taglibs/taglibs-parent/trunk/`	70	N	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/taglibs/trunks/`	9	Y	N
Apache Tomcat	`http://svn.apache.org/repos/asf/tomcat/site/trunk/`	1062	N	N
Apache TomEE	`http://svn.apache.org/repos/asf/tomee/tomee/trunk/`	7535	Y	Y
Apache Turbine	`http://svn.apache.org/repos/asf/turbine/core/trunk`	1779	Y	Y
Apache Turbine	`http://svn.apache.org/repos/asf/turbine/fulcrum/trunk`	1884	Y	Y
Apache Tuscany	`http://svn.apache.org/repos/asf/tuscany/sca-java-1.x/trunk/`	10705	Y	Y
Apache Tuscany	`http://svn.apache.org/repos/asf/tuscany/sca-java-2.x/trunk/`	16093	Y	N
Apache UIMA	`http://svn.apache.org/repos/asf/uima/build/trunk`	404	N	N
Apache UIMA	`http://svn.apache.org/repos/asf/uima/sandbox/trunk`	2320	N	N
Apache UIMA	`http://svn.apache.org/repos/asf/uima/uima-as/trunk`	1181	Y	N
Apache UIMA	`http://svn.apache.org/repos/asf/uima/uimaj/trunk`	3425	Y	N
Apache UIMA	`http://svn.apache.org/repos/asf/uima/sandbox/uimafit/trunk`	142	Y	N
Apache Wave (Incubating)	`https://svn.apache.org/repos/asf/incubator/wave/trunk`	183	Y	Y
Apache WSS4J	`https://svn.apache.org/repos/asf/webservices/wss4j/trunk`	1603	Y	N
Apache ZooKeeper	`http://svn.apache.org/repos/asf/zookeeper/trunk`	1058	Y	Y
apache-isis	`git://git.apache.org/isis.git`	4006	Y	N
ApAM	`git://github.com/AdeleResearchGroup/ApAM.git`	1829	Y	N
aparapi	`http://aparapi.googlecode.com/svn/trunk/`	350	Y	Y
Apenmool Generative Framework	`:pserver:anonymous:@apenmoolgen.cvs.sourceforge.net:/cvsroot/apenmoolgen`	3	Y	Y
AppFuse	`git://github.com/appfuse/appfuse.git`	3530	Y	N
AProMoRe	`http://apromore.googlecode.com/svn/trunk/`	1276	Y	Y
Ardor3D	`git://github.com/Renanse/Ardor3D.git`	238	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
ArgoUML	http://argouml-andromda.tigris.org/svn/argouml-andromda/trunk	121	N	N
ArgoUML	http://argouml-cpp.tigris.org/svn/argouml-cpp/trunk	295	Y	Y
ArgoUML	http://argouml-csharp.tigris.org/svn/argouml-csharp/trunk	158	N	N
ArgoUML	http://argouml-db.tigris.org/svn/argouml-db/trunk	78	N	N
ArgoUML	http://argouml-ca.tigris.org/svn/argouml-ca/trunk	13	N	N
ArgoUML	http://argopdf.tigris.org/svn/argopdf/trunk	85	N	N
ArgoUML	http://argoprint.tigris.org/svn/argoprint/trunk	424	Y	Y
ArgoUML	http://argouml-actionscript3.tigris.org/svn/argouml-actionscript3/trunk	44	N	N
argparse4j	git://github.com/tatsuhiro-t/argparse4j.git	200	N	N
args4j	git://github.com/kohsuke/args4j.git	381	N	N
ArmedBear Common Lisp (ABCL)	svn://common-lisp.net/project/armedbear/svn/trunk	13750	N	N
ArmedBear Common Lisp (ABCL)	http://abcl.org/svn/trunk/abcl/	13812	N	N
Arquillian	git://github.com/arquillian/arquillian-container-jetty.git	75	N	N
Arquillian	git://github.com/arquillian/arquillian-container-tomcat.git	107	Y	N
Arquillian	git://github.com/arquillian/arquillian-container-openwebbeans.git	63	N	N
Arquillian	git://github.com/arquillian/arquillian-container-resin.git	30	N	N
Arquillian	git://github.com/arquillian/arquillian-container-glassfish.git	143	Y	N
Arquillian	git://github.com/arquillian/arquillian-container-jbossas.git	186	Y	N
Arquillian	git://github.com/arquillian/arquillian-container-osgi.git	158	Y	N
Arquillian	git://github.com/arquillian/arquillian-container-openejb.git	72	N	N
Arquillian	git://github.com/arquillian/arquillian-container-openshift.git	23	Y	N
Arquillian	git://github.com/arquillian/arquillian-container-cloudbees.git	13	N	N
asadmin	git://github.com/Codeartisans/asadmin.git	174	N	N
Atmosphere	git://github.com/Atmosphere/atmosphere.git	3898	N	N
Aurora Game Hub	git://github.com/sguergachi/AuroraGameHub.git	427	N	N
AutobahnAndroid	git://github.com/tavendo/AutobahnAndroid.git	97	N	N
aws-sdk-for-java	git://github.com/amazonwebservices/aws-sdk-for-java.git	96	N	N
Axis2 (Java)	http://svn.apache.org/repos/asf/axis/axis2/java/core/trunk	12473	Y	Y
Axon Framework	git://github.com/AxonFramework/AxonFramework	1426	Y	N
azure-sdk-for-java	git://github.com/WindowsAzure/azure-sdk-for-java.git	1705	N	N
BaseX	https://basex.svn.sourceforge.net/svnroot/basex/trunk	74	N	N
BaseX	git://github.com/BaseXdb/basex.git	5919	N	N
Batoo JPA	git://github.com/BatooOrg/BatooJPA.git	790	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Bazaar Java library	`lp:bzr-java-lib`	659	Y	N
Bazaar Plugin for Eclipse	`lp:bzr-eclipse`	1075	N	N
bcdev's ceres	`git://github.com/bcdev/ceres.git`	1099	N	N
BDSup2Sub	`git://github.com/mjuhasz/BDSup2Sub.git`	162	N	N
Beam - Earth Observation Toolbox	`git://github.com/bcdev/beam.git`	8147	N	N
beast-mcmc	`http://beast-mcmc.googlecode.com/svn/trunk`	4933	N	N
Betaville	`http://betaville.googlecode.com/svn/BetavilleServer/trunk`	120	N	N
Betaville	`http://betaville.googlecode.com/svn/BetavilleApp/trunk/`	453	N	N
Betaville	`git://github.com/Betaville/Betaville.git`	135	N	N
betterFORM	`git://github.com/betterFORM/betterFORM.git`	1940	Y	N
betterFORM	`git://github.com/betterFORM/betterFORM.git`	2114	Y	N
bio-formats	`git://github.com/openmicroscopy/bioformats.git`	9941	Y	N
bio-formats	`git://github.com/openmicroscopy/bioformats.git`	11329	Y	N
bio2rdf	`git://github.com/ansell/queryall.git`	939	Y	N
bio2rdf	`git://github.com/bio2rdf/bio2rdf-webapp.git`	363	Y	N
bio2rdf	`https://bio2rdf.svn.sourceforge.net/svnroot/bio2rdf/branches/pre1point0`	941	N	N
bio2rdf	`git://github.com/ansell/bio2rdf-webapp.git`	366	Y	N
BioJava	`git://github.com/biojava/biojava.git`	6378	N	N
BioJava	`git://github.com/biojava/biojava-legacy.git`	64	N	N
BioPAX	`:pserver::@biopax.cvs.sourceforge.net:/cvsroot/biopax`	437	N	N
BioPAX	`http://biopax.hg.sourceforge.net:8000/hgroot/biopax/paxtools`	842	Y	N
BioPAX	`http://biopax.hg.sourceforge.net:8000/hgroot/biopax/validator`	254	Y	N
bleeding_edge	`git://github.com/dart-lang/bleeding_edge.git`	25015	N	N
Blue Mind	`http://git.blue-mind.net/`	7650	N	N
BombusMod_miss.loveless	`https://svn.berlios.de/svnroot/repos/bombusmod/full`	306	N	N
BombusMod_miss.loveless	`http://bm2.googlecode.com/svn/trunk`	1235	N	N
BombusQD	`http://qd-fork.googlecode.com/svn/trunk`	536	N	N
BoneCP	`http://github.com/wwadge/bonecp`	531	Y	N
BrailleBlaster	`https://code.google.com/p/brailleblaster/`	354	N	N
brianm's jdbi	`git://github.com/brianm/jdbi.git`	808	Y	N
BRIDGE Collaborative Toolkit	`:pserver:anonymous:@bridgetools.cvs.sourceforge.net:/cvsroot/bridgetools`	414	N	N
Bristlecone Performance Test Tools	`https://bristlecone.svn.sourceforge.net/svnroot/bristlecone/trunk/bristlecone`	149	Y	N
Broadleaf Commerce	`https://broadleaf.svn.sourceforge.net/svnroot/broadleaf/trunk/`	2181	Y	N
Broadleaf Commerce	`git://github.com/BroadleafCommerce/BroadleafCommerce.git`	5699	Y	N
BTM	`git://git.codehaus.org/btm-git.git`	856	Y	N
btrace	`https://kenai.com/hg/btrace~hg`	326	Y	Y
btrace	`https://kenai.com/hg/btrace~visualvm-plugin`	81	N	N
Buddycloud Server (Java implementation)	`git://github.com/buddycloud/buddycloud-server-java.git`	601	Y	N
BuildCraft	`https://github.com/BuildCraft/BuildCraft.git`	1692	N	N
Bukkit	`git://github.com/Bukkit/Bukkit.git`	1392	N	N
bungeni-editor	`http://bungeni-editor.googlecode.com/svn`	3073	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
C4J	git://github.com/C4J-Team/C4J.git	392	Y	N
camel-extra	http://svn.codespot.com/a/apache-extras.org/camel-extra/trunk/	227	Y	Y
camunda fox BPM Platform	https://svn.camunda.com/fox	4323	Y	N
camunda fox BPM Platform	https://bitbucket.org/camunda/fox-quickstarts.git	90	N	N
camunda fox BPM Platform	https://bitbucket.org/camunda/fox-quickstarts-incubation.git	15	Y	N
camunda fox BPM Platform	https://bitbucket.org/camunda/fox-showcases.git	128	Y	N
camunda fox BPM Platform	https://bitbucket.org/camunda/outer-space-demos.git	46	N	N
camunda fox BPM Platform	https://git.eclipse.org/c/bpmn2-modeler/org.eclipse.bpmn2-modeler.git	478	N	N
camunda fox BPM Platform	git://github.com/camunda/fox-platform.git	220	Y	N
camunda fox BPM Platform	git://github.com/camunda/fox-engine.git	2649	Y	N
camunda fox BPM Platform	https://bitbucket.org/camunda/fox-quickstarts-ee.git	96	N	N
Card Me - VCard Java Library	http://svn.code.sf.net/p/cardme/code/trunk	175	Y	N
Card Me - VCard Java Library	http://svn.code.sf.net/p/cardme/code/branches/cardme-0.3	163	Y	N
Cargo	http://svn.codehaus.org/cargo/core/trunk	1394	N	N
Cargo	http://svn.codehaus.org/cargo/resources/trunk	274	N	N
Cargo	http://svn.codehaus.org/cargo/extensions/trunk	653	Y	N
Cassandra	git://git.apache.org/cassandra.git	10047	Y	N
Catrobat	git://github.com/Catrobat/Catroid.git	7554	N	N
Catrobat	git://github.com/Catrobat/Paintroid.git	1609	N	N
Catrobat	git://github.com/Catrobat/Catroweb.git	1158	Y	Y
Catrobat	git://github.com/Catrobat/musicdroid.git	438	N	N
Catrobat	git://github.com/Catrobat/C-Catroid-Edition.git	14	N	N
Catrobat	git://github.com/Catrobat/Ironpaws.git	98	N	N
Catrobat	git://github.com/Catrobat/HTML5-Player.git	80	Y	Y
Catroid	git://github.com/Catrobat/Catroid.git	7554	N	N
Cayenne	http://svn.apache.org/repos/asf/cayenne/main/trunk	3647	Y	N
CBCJVM	git://github.com/CBCJVM/CBCJVM.git	311	N	N
cbeust's testng	git://github.com/cbeust/testng.git	2550	Y	N
CBSviewer	git://github.com/MinELenI/CBSviewer.git	728	Y	N
CDO Model Repository	git://git.eclipse.org/gitroot/cdo/cdo.git	7715	N	N
CDO Model Repository	git://git.eclipse.org/gitroot/cdo/cdo.old.git	1287	N	N
CDO Model Repository	git://git.eclipse.org/gitroot/cdo/cdo.git	5829	N	N
CDO Model Repository	git://git.eclipse.org/gitroot/cdo/cdo.git	4369	N	N
CDO Model Repository	git://git.eclipse.org/gitroot/cdo/cdo.git	2990	N	N
CDO Model Repository	git://git.eclipse.org/gitroot/cdo/cdo.git	1814	N	N
CDO Model Repository	git://git.eclipse.org/gitroot/cdo/cdo.git	188	N	N
Ceylon Runtime	git://github.com/ceylon/ceylon-runtime.git	276	Y	N
ceylon-compiler	git://github.com/ceylon/ceylon-compiler.git	7435	Y	N
ceylon.language	git://github.com/ceylon/ceylon.language.git	2766	Y	N
Checker Framework	https://checker-framework.googlecode.com/hg/	4473	Y	Y
Chorus	git://github.com/Chorus-bdd/Chorus.git	411	N	N
Chouette (java server)	https://github.com/afimb/chouette	1745	Y	N
cids Toolkit	https://github.com/cismet/cids-server.git	551	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
cids Toolkit	https://github.com/cismet/cids-navigator.git	621	N	N
cids Toolkit	https://github.com/cismet/cismap-commons.git	676	N	N
cids Toolkit	https://github.com/cismet/cismap-plugin.git	288	N	N
cids Toolkit	https://github.com/cismet/cismet-gui-commons	436	Y	N
cids Toolkit	https://github.com/cismet/cismet-commons.git	316	Y	N
Cilia	git://github.com/AdeleResearchGroup/Cilia.git	476	Y	N
citrine-scheduler	http://citrine-scheduler.googlecode.com/svn/trunk/	125	N	N
Citrus Testframework	git://github.com/christophd/citrus.git	1445	Y	N
Class Persistence Object (CPO)	https://cpo.svn.sourceforge.net/svnroot/cpo/api/trunk	649	Y	N
Class Persistence Object (CPO)	https://cpo.svn.sourceforge.net/svnroot/cpo/util/trunk	380	Y	N
Clojure	git://github.com/clojure/clojure.git	2462	Y	N
Closure Compiler	http://closure-compiler.googlecode.com/svn/trunk/	2296	Y	N
closure-compiler	http://closure-compiler.googlecode.com/svn/trunk	2296	Y	N
cloud-odata-java	git://github.com/SAP/cloud-odata-java.git	3008	N	N
cloudify	git://github.com/CloudifySource/cloudify.git	8665	Y	N
clyde	git://github.com/threerings/clyde.git	2427	Y	N
Cobertura	https://github.com/cobertura/cobertura.git	831	Y	Y
CodeCover	https://codecover.svn.sourceforge.net/svnroot/codecover/trunk	186	N	N
codemodel	https://svn.java.net/svn/codemodel~svn/trunk	250	N	N
CollabNet Connector Framework	https://ctf.open.collab.net/svn/repos/ccf/trunk	3405	Y	Y
Coloane	https://coloane.lip6.fr/svn/trunk	1826	N	N
Coloane	https://coloane.lip6.fr/svn/incubation	1048	N	N
Combinatory Reduction Systems Extended	:pserver:anonymous:@crsx.cvs.sourceforge.net:/cvsroot/crsx	1541	N	N
CometD	git://github.com/cometd/cometd.git	2341	Y	N
commafeed	git://github.com/Athou/commafeed.git	1656	N	N
Commons IO	http://svn.apache.org/repos/asf/commons/proper/io/trunk	961	Y	Y
Commons JEXL	https://svn.apache.org/repos/asf/commons/proper/jexl/trunk/	1232	Y	N
Commons Monitoring	http://svn.apache.org/repos/asf/commons/sandbox/monitoring/trunk	189	Y	N
Concordion	git://github.com/concordion/concordion-kickstart.git	4	Y	N
config-magic	git://github.com/brianm/config-magic.git	137	N	N
ConnectBot	git://github.com/kruton/connectbot.git	546	N	N
ConnectBot	http://code.google.com/p/connectbot	546	N	N
Coral	git://github.com/objectledge/coral.git	1826	N	N
cordova-android	git://github.com/apache/cordova-android.git	2376	Y	N
cotrixrep	git://github.com/cotrix/cotrixrep.git	448	N	N
couchbase-java-client	git://github.com/couchbase/couchbase-java-client.git	260	Y	Y
counterclockwise	git://github.com/laurentpetit/ccw.git	1487	Y	N
CraftBukkit	git://github.com/Bukkit/CraftBukkit.git	2372	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
credentials-maven-plugin	`git://github.com/genthaler/credentials-maven-plugin.git`	73	Y	N
CruiseControl	`https://svn.code.sf.net/p/cruisecontrol/code/trunk/cruisecontrol`	4009	Y	Y
crux-framework	`http://crux-framework.googlecode.com/svn/trunk`	1605	N	N
Cumulus4j	`https://dev.nightlabs.org/svn/public/cumulus4j/trunk/`	1644	Y	N
curso-de-java	`git://github.com/ideais-estagio-2012/curso-de-java.git`	84	Y	Y
dagger	`git://github.com/square/dagger.git`	513	N	N
Daisy the Open Source CMS	`http://svn.daisycms.org/repos/daisy/trunk/daisy`	3833	Y	N
Daisy the Open Source CMS	`http://dev.outerthought.org/svn_public/outerthought_daisy//contrib`	208	N	N
Daisy the Open Source CMS	`http://dev.outerthought.org/svn_public/outerthought_daisy/trunk/daisy`	4197	Y	N
Dali Java Persistence Tools	`git://git.eclipse.org/gitroot/dali/webtools.dali.git`	6105	N	N
DART language	`http://dart.googlecode.com/svn/trunk/`	276	N	N
DART language	`http://dart.googlecode.com/svn/branches/bleeding_edge`	24938	N	N
DART language	`http://dart.googlecode.com/svn/experimental/`	566	N	N
Dasein Cloud	`https://dasein-cloud.svn.sourceforge.net/svnroot/dasein-cloud/trunk`	1339	Y	N
DataCleaner	`http://eobjects.org/svn/DataCleaner/trunk`	2171	Y	N
DataNucleus	`https://svn.code.sf.net/p/datanucleus/code`	18089	Y	Y
datanucleus-appengine	`http://datanucleus-appengine.googlecode.com/svn/trunk`	821	Y	Y
db4o	`http://source.db4o.com/db4o/trunk`	13714	N	N
dcm4che 2	`https://svn.code.sf.net/p/dcm4che/svn/dcm4che2/trunk`	1157	N	N
DeadlockLabJavaOne2012	`git://github.com/henri-tremblay/DeadlockLabJavaOne2012.git`	45	Y	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/felix-shell.git`	22	N	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/felix-main.git`	34	N	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/felix-framework.git`	31	N	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/activemq.git`	63	Y	Y
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/activemq-protobuf.git`	20	Y	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/activemq-activeio.git`	14	Y	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/uimaj.git`	28	Y	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/uima-as.git`	13	Y	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/libhibernate3-java.git`	153	Y	N
Debian Java packages Team	`git://anonscm.debian.org/pkg-java/jigsaw.git`	36	Y	Y
deegree	`https://svn.wald.intevation.org/svn/deegree/`	0	Y	Y
deegree3	`git://github.com/deegree/deegree3.git`	7180	Y	N
DeepaMehta	`http://svn.berlios.de/svnroot/repos/deepamehta/trunk`	172	N	N
dex2jar	`https://dex2jar.googlecode.com/hg/`	614	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
DiabloMiner	`git://github.com/Diablo-D3/DiabloMiner.git`	262	N	N
DiskLruCache	`git://github.com/JakeWharton/DiskLruCache.git`	117	N	N
disy-commons	`:pserver:anonymous:@disy-commons.cvs.sourceforge.net:/cvsroot/disy-commons`	22	Y	Y
disy-commons	`https://disy-commons.svn.sourceforge.net/svnroot/disy-commons/trunk/`	3072	Y	N
DKPro Core	`http://dkpro-core-asl.googlecode.com/svn/de.tudarmstadt.ukp.dkpro.core-asl/trunk/`	1280	Y	N
DKPro Core	`http://dkpro-core-gpl.googlecode.com/svn/de.tudarmstadt.ukp.dkpro.core-gpl/trunk/`	244	Y	N
DKPro Similarity	`http://dkpro-similarity-asl.googlecode.com/svn/trunk/`	257	N	N
DKPro Similarity	`http://dkpro-similarity-gpl.googlecode.com/svn/trunk`	89	N	N
DMDirc	`git://dmdirc.com/~dmdirc/parser`	161	Y	Y
DMDirc	`git://dmdirc.com/~dmdirc/plugins`	890	N	N
DMDirc	`git://dmdirc.com/~dmdirc/util`	69	Y	Y
DMDirc	`git://github.com/DMDirc/DMDirc.git`	7154	Y	Y
docx4j	`git://github.com/plutext/docx4j.git`	2309	Y	Y
dogtag-pki	`http://svn.fedorahosted.org/svn/pki/trunk/pki`	1573	N	N
dogtag-pki	`git://git.fedorahosted.org/pki.git`	2222	N	N
dogtag-pki	`git://git.fedorahosted.org/pki.git`	120	N	N
dotCMS - Java Web CMS	`git://github.com/dotCMS/dotCMS.git`	4556	Y	N
dozer	`git://github.com/DozerMapper/dozer.git`	612	Y	N
DrizzleJDBC	`git://github.com/krummas/DrizzleJDBC.git`	313	Y	N
DroidParts	`git://github.com/yanchenko/droidparts.git`	1064	N	N
dropwizard	`git://github.com/codahale/dropwizard.git`	1805	N	N
Drosera server	`git://git.code.sf.net/p/orienteering/droseraserver/code`	123	N	N
eAdventure 2.0	`git://github.com/e-ucm/eadventure.git`	1300	N	N
EasierSBS	`svn://svn.petalslink.com/svnroot/trunk/research/dev/experimental/easiersbs/`	42	N	N
EasyBeans (EJB 3.0 Container)	`svn://svn.forge.objectweb.org/svnroot/easybeans/trunk`	4508	Y	N
EasyBeans (EJB 3.0 Container)	`git://gitorious.ow2.org/ow2-easybeans/core.git`	194	Y	N
EasyBeans (EJB 3.0 Container)	`git://gitorious.ow2.org/ow2-easybeans/tests.git`	37	N	N
EasyBeans (EJB 3.0 Container)	`git://gitorious.ow2.org/ow2-easybeans/utils.git`	4	N	N
EasyBeans (EJB 3.0 Container)	`git://gitorious.ow2.org/ow2-easybeans/persistence-hibernate.git`	24	N	N
EasyBeans (EJB 3.0 Container)	`git://gitorious.ow2.org/ow2-easybeans/persistence-eclipselink.git`	19	N	N
Ebean ORM / Persistence Layer	`https://ebeanorm.svn.sourceforge.net/svnroot/ebeanorm/ebean/trunk/`	549	Y	N
Ebean ORM / Persistence Layer	`git://github.com/ebean-orm/avaje-ebeanorm.git`	103	Y	N
echo3ext20	`http://echo3ext20.googlecode.com/svn/trunk`	828	N	N
Eclipse Aether	`git://git.eclipse.org/gitroot/aether/aether-ant.git`	34	Y	N
Eclipse Aether	`git://git.eclipse.org/gitroot/aether/aether-core.git`	331	N	N
Eclipse Aether	`git://git.eclipse.org/gitroot/aether/aether-ant.git`	34	Y	N
Eclipse Aether	`git://git.eclipse.org/gitroot/aether/aether-demo.git`	23	N	N
Eclipse BIRT	`https://git.eclipse.org/c/birt/org.eclipse.birt.git/`	28227	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Eclipse CDT Target Communication Framework (TCF)	`git://git.eclipse.org/gitroot/tcf/org.eclipse.tcf.git`	3309	N	N
Eclipse e4 Project	`git://git.eclipse.org/gitroot/e4/org.eclipse.e4.releng.git`	1658	N	N
Eclipse e4 Project	`git://git.eclipse.org/gitroot/e4/org.eclipse.e4.search.git`	84	N	N
Eclipse e4 Project	`git://git.eclipse.org/gitroot/e4/org.eclipse.e4.tools.git`	645	N	N
Eclipse e4 Project	`git://git.eclipse.org/gitroot/e4/org.eclipse.e4.ui.git`	842	N	N
Eclipse e4 Project	`git://git.eclipse.org/gitroot/e4/org.eclipse.e4.utils.git`	43	N	N
Eclipse Equinox p2	`git://git.eclipse.org/gitroot/equinox/rt.equinox.p2.git`	5829	N	N
Eclipse Equinox p2	`git://git.eclipse.org/gitroot/platform/eclipse.platform.ui.git`	23955	N	N
Eclipse Equinox p2	`git://git.eclipse.org/gitroot/pde/eclipse.pde.ui.git`	11043	N	N
Eclipse Gemini	`git://git.eclipse.org/gitroot/gemini.web/org.eclipse.gemini.web.gemini-web-container.git`	285	N	N
Eclipse Gemini	`git://git.eclipse.org/gitroot/gemini.management/org.eclipse.gemini.managment.git`	97	N	N
Eclipse Gemini	`http://git.eclipse.org/gitroot/gemini.naming/org.eclipse.gemini.naming.git`	36	Y	N
Eclipse Gemini Blueprint	`git://git.eclipse.org/gitroot/gemini.blueprint/org.eclipse.gemini.blueprint.git`	111	Y	Y
Eclipse Graphical Modeling Project (GMP)	`https://git.eclipse.org/gitroot/gmf-tooling/org.eclipse.gmf-tooling.git`	8587	N	N
Eclipse Gyrex	`git://git.eclipse.org/gitroot/gyrex/gyrex-platform.git`	1275	N	N
Eclipse Gyrex	`git://git.eclipse.org/gitroot/gyrex/gyrex-admin.git`	279	N	N
Eclipse Gyrex	`git://git.eclipse.org/gitroot/gyrex/gyrex-releng.git`	1298	N	N
Eclipse Gyrex	`git://git.eclipse.org/gitroot/gyrex/addons/gyrex-mongodb-persistence.git`	26	N	N
Eclipse Gyrex	`git://git.eclipse.org/gitroot/gyrex/addons/gyrex-search.git`	160	N	N
Eclipse Java Development Tools (JDT)	`http://git.eclipse.org/gitroot/jdt/eclipse.jdt.core.git`	19167	N	N
Eclipse Java Development Tools (JDT)	`http://git.eclipse.org/gitroot/jdt/eclipse.jdt.debug.git`	8949	N	N
Eclipse Java Development Tools (JDT)	`http://git.eclipse.org/gitroot/jdt/eclipse.jdt.git`	321	N	N
Eclipse Java Development Tools (JDT)	`http://git.eclipse.org/gitroot/jdt/eclipse.jdt.ui.git`	26092	N	N
Eclipse Java development tools Core	`git://git.eclipse.org/gitroot/jdt/eclipse.jdt.core.git`	19286	N	N
Eclipse Java development tools Core	`git://git.eclipse.org/gitroot/jdt/eclipse.jdt.core.binaries.git`	17	N	N
Eclipse Java development tools debug	`git://git.eclipse.org/gitroot/jdt/eclipse.jdt.debug.git`	9028	N	N
Eclipse Java development tools UI	`git://git.eclipse.org/gitroot/jdt/eclipse.jdt.ui.git`	26245	N	N
Eclipse Java development tools UI	`git://git.eclipse.org/gitroot/platform/eclipse.platform.ui.git`	23955	N	N
Eclipse Java development tools UI	`git://git.eclipse.org/gitroot/pde/eclipse.pde.ui.git`	11043	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Eclipse MAT	http://dev.eclipse.org/svnroot/tools/org.eclipse.mat/trunk	1275	N	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.reviews.git	652	N	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.builds.git	551	Y	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.docs.git	947	N	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.git	1356	Y	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.commons.git	1711	N	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.context.git	2897	N	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.tasks.git	8377	N	N
Eclipse Mylyn	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.versions.git	151	N	N
Eclipse Mylyn Builds	git://git.eclipse.org/gitroot/mylyn/org.eclipse.mylyn.builds.git	551	Y	N
Eclipse Mylyn Builds	git://git.eclipse.org/gitroot/platform/eclipse.platform.ui.git	23955	N	N
Eclipse Mylyn Builds	git://git.eclipse.org/gitroot/pde/eclipse.pde.ui.git	11043	N	N
Eclipse Nebula	git://git.eclipse.org/gitroot/nebula/org.eclipse.nebula.git	2327	N	N
Eclipse Packaging Project (EPP)	git://git.eclipse.org/gitroot/epp/org.eclipse.epp.packages.git	1193	N	N
Eclipse Packaging Project (EPP)	git://git.eclipse.org/gitroot/epp/org.eclipse.epp.old.git	209	N	N
Eclipse Packaging Project (EPP)	git://git.eclipse.org/gitroot/epp/org.eclipse.epp.usagedata.git	271	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.debug.git	10330	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.resources.git	3426	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.runtime.git	3740	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.swt.git	22903	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.common.git	22693	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.git	7807	Y	Y
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.releng.git	2652	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.team.git	8108	N	N
Eclipse Platform Project	http://git.eclipse.org/gitroot/platform/eclipse.platform.text.git	6095	N	N
Eclipse Requirements Modeling Framework	git://git.eclipse.org/gitroot/rmf/org.eclipse.rmf.git	810	N	N
Eclipse Requirements Modeling Framework	git://git.eclipse.org/gitroot/platform/eclipse.platform.ui.git	23955	N	N
Eclipse Requirements Modeling Framework	git://git.eclipse.org/gitroot/pde/eclipse.pde.ui.git	11043	N	N
Eclipse Sapphire	http://git.eclipse.org/gitroot/sapphire/org.eclipse.sapphire.git	1674	N	N
Eclipse Scout	git://git.eclipse.org/gitroot/scout/org.eclipse.scout.rt.git	2252	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Eclipse Scout	git://git.eclipse.org/gitroot/scout/org.eclipse.scout.sdk.git	861	N	N
Eclipse Scout	git://git.eclipse.org/gitroot/scout/scout.rt.incubator.git	35	N	N
Eclipse Scout	git://git.eclipse.org/gitroot/scout/org.eclipse.scout-aggregator.git	183	N	N
Eclipse SMILA	http://dev.eclipse.org/svnroot/rt/org.eclipse.smila/trunk/	2798	Y	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.ide.git	1049	Y	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.engine.git	954	Y	Y
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.ide.simulation.git	70	N	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.ide.wst.git	159	N	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.build.tools.git	116	N	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.components.git	32	Y	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.documentation.git	1101	N	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.examples.git	36	N	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.git	37	N	N
Eclipse Stardust	https://git.eclipse.org/r/p/stardust/org.eclipse.stardust.product.git	41	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.kernel.git	1370	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.apps.git	609	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.artifact-repository.git	272	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.bundlor.git	38	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.documentation.git	575	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.ide.git	276	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.kernel-system-verification-tests.git	52	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.kernel-tools.git	303	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.medic.git	337	N	N
Eclipse Virgo	git://git.eclipse.org/gitroot/virgo/org.eclipse.virgo.jetty-server.git	202	N	N
Eclipse Web Tools Platform (WTP)	git://git.eclipse.org/gitroot/libra/org.eclipse.libra.git	186	N	N
Eclipse Web Tools Platform (WTP)	git://git.eclipse.org/gitroot/sourceediting/webtools.sourceediting.git	5728	N	N
Eclipse Web Tools Platform (WTP)	git://git.eclipse.org/gitroot/sourceediting/webtools.sourceediting.xpath.git	437	N	N
Eclipse Web Tools Platform (WTP)	git://git.eclipse.org/gitroot/sourceediting/webtools.sourceediting.xpath.tests.git	327	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Eclipse Web Tools Platform (WTP)	git://git.eclipse.org/gitroot/ sourceediting/webtools.sourceediting. xsl.git	635	N	N
Eclipse Web Tools Platform (WTP)	git://git.eclipse.org/gitroot/ sourceediting/webtools.sourceediting. xsl.tests.git	266	N	N
Eclipse WindowBuilder	http://dev.eclipse.org/svnroot/tools/org. eclipse.windowbuilder/trunk	556	N	N
eclipse-build	http://git.eclipse.org/gitroot/linuxtools/ org.eclipse.linuxtools.eclipse-build.git	759	N	N
eclipse-build	git://git.eclipse.org/gitroot/platform/ eclipse.platform.ui.git	23955	N	N
eclipse-build	git://git.eclipse.org/gitroot/pde/eclipse. pde.ui.git	11043	N	N
EclipseLink	http://git.eclipse.org/gitroot/ eclipselink/eclipselink.runtime.git	8909	Y	Y
EclipseLink	https://git.eclipse.org/c/eclipselink/ examples.git/	267	Y	N
EclipseLink	https://git.eclipse.org/c/eclipselink/ examples/mysports.git/	55	Y	N
eFaps	http://efaps.googlecode.com/svn	10052	Y	N
EGit	git://git.eclipse.org/gitroot/egit/egit. git	3456	N	N
EGit	git://git.eclipse.org/gitroot/egit/egit- github.git	618	N	N
EGit	git://git.eclipse.org/gitroot/egit/egit- pde.git	28	N	N
ehcache	http://svn.terracotta.org/svn/ehcache/ trunk	5003	Y	Y
eid-tsl	http://eid-tsl.googlecode.com/svn/trunk	122	Y	N
Ektorp	git://github.com/helun/Ektorp.git	294	N	N
elasticsearch	git://github.com/elasticsearch/ elasticsearch.git	5242	Y	N
ELK Reasoner	http://elk-reasoner.googlecode.com/svn/ trunk/	426	Y	N
ELK Reasoner	git://github.com/klinovp/elk.git	1232	Y	N
embedded-jmxtrans	git://github.com/jmxtrans/embedded- jmxtrans.git	233	Y	N
emite	http://emite.googlecode.com/svn/trunk	1458	N	N
emite	git://github.com/EmiteGWT/emite.git	316	Y	N
Empire	git://github.com/mhgrove/Empire.git	254	Y	Y
Encog Machine Learning Framework	git://github.com/encog/encog-java-core.git	3200	N	N
Encog Machine Learning Framework	git://github.com/encog/encog-java- examples.git	687	N	N
Encog Machine Learning Framework	git://github.com/encog/encog-java- workbench.git	1034	N	N
epubcheck	http://epubcheck.googlecode.com/svn/trunk	337	N	N
epublib	git://github.com/psiegman/epublib.git	508	N	N
Equinox	http://git.eclipse.org/gitroot/equinox/rt. equinox.bundles.git	1618	N	N
Equinox	http://git.eclipse.org/gitroot/equinox/rt. equinox.framework.git	3855	N	N
Equinox	http://git.eclipse.org/gitroot/equinox/rt. equinox.incubator.git	778	N	N
Equinox	http://git.eclipse.org/gitroot/equinox/rt. equinox.p2.git	5829	N	N
Equinox	git://git.eclipse.org/gitroot/platform/ eclipse.platform.ui.git	23955	N	N
Equinox	git://git.eclipse.org/gitroot/pde/eclipse. pde.ui.git	11043	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Equivalent-Exchange-3	`git://github.com/pahimar/Equivalent-Exchange-3.git`	992	N	N
erik's window manager	`http://code.google.com/p/ewm`	134	N	N
Errai Framework	`http://github.com/errai/errai.git`	5841	Y	Y
ESIGate (Website Assembling Toolkit)	`svn://svn.code.sf.net/p/webassembletool/code/trunk`	1017	Y	N
ESIGate (Website Assembling Toolkit)	`https://svn.code.sf.net/p/webassembletool/code/tools/trunk`	37	N	N
Essentials	`git://github.com/essentials/Essentials.git`	3183	Y	Y
Essentials	`git://github.com/essentials/Essentials.git`	3800	Y	Y
eTrice	`http://git.eclipse.org/gitroot/etrice/org.eclipse.etrice.git`	2102	N	N
Eucalyptus	`git://github.com/eucalyptus/eucalyptus.git`	19687	Y	Y
Eucalyptus	`git://github.com/eucalyptus/eucalyptus.git`	19697	Y	Y
Eucalyptus	`git://github.com/eucalyptus/eucalyptus.git`	16882	Y	Y
Eucalyptus	`https://github.com/eucalyptus/eucalyptus.git`	19630	Y	Y
EUGene	`http://svn.nuiton.org/svn/eugene/trunk`	619	N	N
evernote-sdk-java	`git://github.com/evernote/evernote-sdk-java.git`	48	N	N
exhibitor	`git://github.com/Netflix/exhibitor.git`	650	N	N
existdb-contrib	`http://existdb-contrib.googlecode.com/svn/trunk`	375	Y	Y
eXo Platform	`git://github.com/exoplatform/aio-portal.git`	5601	Y	Y
eXo Platform	`git://github.com/exoplatform/aio.git`	1	Y	Y
eXo Platform	`git://github.com/exoplatform/aio-webos.git`	188	Y	Y
F-Droid	`git://gitorious.org/f-droid/fdroidclient.git`	536	N	N
F-Droid	`git://gitorious.org/f-droid/fdroiddata.git`	7459	N	N
factual-java-driver	`git://github.com/Factual/factual-java-driver.git`	247	N	N
fauxjo	`http://fauxjo.googlecode.com/svn/fauxjo/trunk`	186	Y	N
FBReaderJ	`git://github.com/geometer/FBReaderJ`	5840	Y	N
FDroid Repository	`git://gitorious.org/f-droid/fdroidclient.git`	536	N	N
FDroid Repository	`git://gitorious.org/f-droid/fdroiddata.git`	7459	N	N
Fedora Digital Object Repository	`git://github.com/fcrepo/fcrepo.git`	723	Y	N
Fedora Digital Object Repository	`git://github.com/fcrepo/fcrepo-historical.git`	6181	Y	N
fedora-client	`git://github.com/mediashelf/fedora-client.git`	308	Y	N
fernandezpablo85's scribe	`git://github.com/fernandezpablo85/scribe-java.git`	315	N	N
Fess	`http://svn.sourceforge.jp/svnroot/fess/fess/trunk`	1129	N	N
Fess	`http://svn.sourceforge.jp/svnroot/fess/fess-server/trunk/`	214	N	N
FEST	`git://github.com/alexruiz/fest-assert-2.x.git`	511	N	N
Fiji	`git://github.com/fiji/fiji`	9666	N	N
Fiji	`git://github.com/fiji/ImageJA`	1239	N	N
FindBugs	`http://findbugs.googlecode.com/svn/trunk`	14392	Y	Y
Floodlight	`git://github.com/floodlight/floodlight.git`	2107	Y	N
Flying Saucer	`git://github.com/flyingsaucerproject/flyingsaucer.git`	2466	Y	N
Flyway	`https://github.com/flyway/flyway/trunk`	911	Y	N
FMJ - Freedom for Media in Java	`:pserver:anonymous:@fmj.cvs.sourceforge.net:/cvsroot/fmj`	1623	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
FMJ - Freedom for Media in Java	svn://svn.code.sf.net/p/fmj/code/	30	Y	Y
fongo	git://github.com/foursquare/fongo.git	279	N	N
Force Field X	git://kenai.com/ffx~public-source	732	Y	N
Fractal	svn://svn.forge.objectweb.org/svnroot/fractal/trunk	5220	Y	Y
Fractal	svn://svn.forge.objectweb.org/svnroot/fractal/branches	1880	Y	Y
Fractal	svn://svn.forge.objectweb.org/svnroot/fractal/sandbox	3347	Y	Y
Fractal	svn://svn.forge.objectweb.org/svnroot/fractal/web	146	N	N
frc1885-2013	https://code.google.com/p/frc1885-2013.display	196	N	N
frc2876	http://frc2876.googlecode.com/svn/trunk	166	Y	Y
Free Seas Ahoy!	http://freeseasahoy.hg.sourceforge.net:8000/hgroot/freeseasahoy/freeseasahoy	1061	N	N
FreeCol	git://git.code.sf.net/p/freecol/git	9521	Y	Y
Freedomotic Building Automation	https://code.google.com/p/freedomotic/	463	Y	Y
freedroidz	svn://svn.evolvis.org/svnroot/freedroidz/trunk	685	N	N
Freeplane	git://github.com/freeplane/freeplane	5072	Y	N
FreeRapid Downloader	http://svn.wordrider.net/svn/freerapid/trunk	1388	Y	N
FreeRapid Downloader	http://svn.wordrider.net/svn/freerapid-plugins/trunk	2645	N	N
FREVO	svn://newton-nes.uni-klu.ac.at:8081/demesos/Sourcecode/Frevo	695	N	N
functionaljava's functional-java	git://github.com/functionaljava/functionaljava.git	127	N	N
FUSE ESB (enterprise ServiceMix)	git://github.com/jboss-fuse/fuse.git	4705	Y	Y
ga-worldwind-suite	git://github.com/ga-m3dv/ga-worldwind-suite.git	1912	Y	N
gae-maven-plugin	git://github.com/maven-gae-plugin/maven-gae-plugin.git	346	N	N
Game Gardens	git://github.com/threerings/game-gardens.git	905	Y	N
GATE	http://svn.code.sf.net/p/gate/code/gate/trunk/	13820	Y	Y
GateIn	http://anonsvn.jboss.org/repos/gatein/portal/trunk/	3127	Y	N
GateIn	git://github.com/gatein/gatein-portal	4297	Y	Y
GBIF ECAT	http://gbif-ecat.googlecode.com/svn/trunk	3472	Y	N
gbif-dataportal	http://gbif-dataportal.googlecode.com/svn/trunk/	324	Y	N
GCViewer	git://github.com/chewiebug/GCViewer.git	328	N	N
gedcom4j	git://github.com/frizbog/gedcom4j.git	279	Y	N
gedcomx-fileformat-java	git://github.com/FamilySearch/gedcomx-fileformat-java.git	59	Y	N
GenMAPP-CS	http://genmappcs.googlecode.com/svn/trunk	52	N	N
GenoViz	https://genoviz.svn.sourceforge.net/svnroot/genoviz/trunk	11690	Y	Y
geo-platform	git://github.com/geosdi/geo-platform.git	2711	Y	N
GeoCraft	https://wush.net/svn/geocraft	12709	Y	Y
geoForge	https://geoforge.googlecode.com/svn/trunk	2739	N	N
GeoGit	git://github.com/opengeo/GeoGit.git	867	Y	Y
GeoGit	git://github.com/opengeo/GeoGit.git	596	Y	Y
geoip-api-java	git://github.com/maxmind/geoip-api-java.git	141	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
GeoKettle	http://dev.spatialytics.com/svn/geokettle-2.0/trunk/	184	Y	Y
GeoServer	git://github.com/geoserver/geoserver.git	2219	Y	N
GeotoolKit	http://hg.geotoolkit.org/geotoolkit/	2130	Y	N
GeotoolKit	http://hg.geotoolkit.org/geotoolkit-pending/	4551	Y	N
GeoTools	http://svn.osgeo.org/geotools/trunk	6617	Y	Y
GeoTools	git://github.com/geotools/geotools/	2680	Y	Y
geoviz	http://geoviz.googlecode.com/svn/trunk	768	N	N
Gerrit Code Review	https://gerrit.googlesource.com/gerrit	8194	N	N
Gitblit	https://code.google.com/p/gitblit	1402	N	N
github-api	git://github.com/kohsuke/github-api.git	353	N	N
glacieruploader	git://github.com/MoriTanosuke/glacieruploader.git	115	N	N
GlassFish	https://svn.java.net/svn/glassfish~svn/trunk/main/	4716	Y	Y
GlueGen	http://github.com/sgothel/gluegen.git	1026	N	N
GlueGen	git://jogamp.org/srv/scm/gluegen.git	1026	N	N
gmusic.api	git://github.com/jkiddo/gmusic.api.git	53	N	N
GNU Classpath	:pserver:anonymous:@cvs.savannah.gnu.org:/sources/classpath	408	N	N
GNU Classpath	:pserver:anonymous:@cvs.savannah.gnu.org:/sources/classpath	123	N	N
GoodData-CL	git://github.com/gooddata/GoodData-CL.git	1209	N	N
google-gson	http://google-gson.googlecode.com/svn/trunk	980	N	N
google-web-toolkit	http://google-web-toolkit.googlecode.com/svn/trunk	6334	Y	Y
google-web-toolkit	https://gwt.googlesource.com/gwt	6918	Y	Y
GpsMid	git://gpsmid.git.sourceforge.net/gitroot/gpsmid/GpsMid	5630	Y	N
Gradle	git://github.com/gradle/gradle.git	14646	Y	N
Grails	http://svn.codehaus.org/grails/trunk/grails	3858	Y	Y
Grails	git://github.com/grails/grails-core.git	12340	N	N
Granite Data Services	git://github.com/graniteds/graniteds.git	819	Y	N
Granite Data Services	https://granite.svn.sourceforge.net/svnroot/granite/graniteds/trunk	2647	Y	N
graphhopper	git://github.com/graphhopper/graphhopper.git	937	Y	N
Graphical Editing Framework (GEF)	http://git.eclipse.org/gitroot/gef/org.eclipse.zest.git	158	N	N
Graphical Editing Framework (GEF)	http://git.eclipse.org/gitroot/gef/org.eclipse.gef.git	5184	N	N
Graphical Editing Framework (GEF)	http://git.eclipse.org/gitroot/gef/org.eclipse.gef4.git	505	N	N
Graphical Editing Framework (GEF)	https://github.com/eclipse/gef.git	5184	N	N
Graphical Editing Framework (GEF)	https://github.com/eclipse/gef4.git	505	N	N
grapht	https://bitbucket.org/grouplens/grapht	479	Y	N
Graylog2	git://github.com/Graylog2/graylog2-server.git	904	Y	N
greenDAO	git://github.com/greenrobot/greenDAO.git	322	N	N
GroIMP	https://groimp.svn.sourceforge.net/svnroot/groimp/trunk/	2653	N	N
Groovy	git://git.codehaus.org/groovy-git.git	9911	Y	N
groupware-workbench	http://groupware-workbench.googlecode.com/svn/trunk	1112	Y	N
guava-libraries	https://code.google.com/p/guava-libraries/	2008	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
guitar-umd	https://guitar.svn.sourceforge.net/svnroot/guitar/trunk	724	Y	Y
Gumtree	http://svn.codehaus.org/gumtree/gumtree/trunk	2128	N	N
Gumtree	http://svn.codehaus.org/gumtree/datamodel/trunk	294	N	N
Gumtree	git://github.com/Gumtree/gumtree.git	409	Y	Y
gvSIG Desktop	https://devel.gvsig.org/svn/gvsig-desktop-1/trunk/	0	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-plugintemplates/org.gvsig.fortunecookies/trunk/	126	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-plugintemplates/org.gvsig.landregistryviewer/trunk/	50	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-plugintemplates/org.gvsig.landregistryviewer.app/trunk/	33	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-gpe/org.gvsig.gpe/library/trunk/	107	Y	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-gpe/org.gvsig.xmlpull/library/trunk/	67	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-gpe/org.gvsig.xmlschema/library/trunk/	42	Y	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-metadata/library/trunk/	412	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-metadata/extension/trunk/	62	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-geoprocess/org.gvsig.geoprocess/trunk/	360	N	N
gvSIG Desktop 2.0	https://devel.gvsig.org/svn/gvsig-desktop/trunk	20092	Y	N
GWT (formerly Google Web Toolkit)	http://google-web-toolkit.googlecode.com/svn/trunk	6334	Y	Y
GWT (formerly Google Web Toolkit)	https://gwt.googlesource.com/gwt	6918	Y	Y
GWTP	git://github.com/ArcBees/GWTP.git	1388	Y	N
HA-JDBC	git://github.com/ha-jdbc/ha-jdbc.git	2082	Y	N
handlebars.java	git://github.com/jknack/handlebars.java.git	468	Y	N
Handy-URI-Templates	git://github.com/damnhandy/Handy-URI-Templates.git	299	Y	N
Harmony Project	https://code.google.com/p/harmony.harmony/	484	N	N
Harmony Project	https://code.google.com/p/harmony.harmony-core/	75	N	N
Harmony Project	https://code.google.com/p/harmony.core/	89	N	N
hazelcast	http://hazelcast.googlecode.com/svn/trunk	2068	Y	N
hazelcast	git://github.com/hazelcast/hazelcast.git	4645	Y	N
hdcookbook	https://svn.java.net/svn/hdcookbook~svn/trunk	577	Y	Y
HeadsUp Agile	git://github.com/headsupdev/agile.git	381	N	N
Hibernate	git://github.com/hibernate/hibernate-orm.git	4814	N	N
Hibernate OGM	git://github.com/hibernate/hibernate-ogm.git	834	Y	N
Hibernate OGM	git://github.com/emmanuelbernard/hibernate-core-ogm.git	3278	N	N
Hibernate Search	http://anonsvn.jboss.org/repos/hibernate/search/trunk	857	N	N
Hibernate Search	git://github.com/hibernate/hibernate-search.git	2715	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Hibernate Validator	git://github.com/hibernate/hibernate-validator	2243	Y	N
hibernate-memcached	git://github.com/raykrueger/hibernate-memcached.git	140	N	N
hibiscus	git://github.com/willuhn/hibiscus.xmlrpc.git	161	N	N
hibiscus	git://github.com/willuhn/hibiscus.git	2629	N	N
Hippo CMS 7	http://svn.onehippo.org/repos/hippo/hippo-cms7/repository/trunk/	1251	Y	Y
Hippo CMS 7	http://svn.onehippo.org/repos/hippo/hippo-cms7/cms/trunk/	1995	Y	Y
Hippo CMS 7	http://svn.onehippo.org/repos/hippo/hippo-cms7/packages/trunk/	1118	N	N
Hippo CMS 7	http://svn.onehippo.org/repos/hippo/hippo-cms7/addons/addon-channel-manager/trunk/	871	Y	Y
Hippo CMS 7	http://svn.onehippo.org/repos/hippo/hippo-cms7/addons/addon-hst-configuration-editor/trunk/	294	Y	Y
Hippo Site Toolkit	http://svn.onehippo.org/repos/hippo/hippo-cms7/site-toolkit/trunk/	5352	Y	N
Hippo Site Toolkit	http://svn.onehippo.org/repos/hippo/hippo-cms7/archetypes/trunk/	549	N	N
Histone	git://github.com/MegafonWebLab/histone-java	293	Y	N
Histone	git://github.com/MegafonWebLab/histone-php	17	N	N
histone-java	git://github.com/MegafonWebLab/histone-java.git	293	Y	N
hitchfs	git://github.com/hitch17/hitchfs.git	61	N	N
hometrac	http://hometrac.googlecode.com/svn/trunk	85	N	N
HTMF- Hard Token Management Framework	https://hardtokenmgmt.svn.sourceforge.net/svnroot/hardtokenmgmt/trunk/	1108	Y	N
HtmlUnit	http://svn.code.sf.net/p/htmlunit/code/trunk/htmlunit	8103	N	N
Hudson	git://git.eclipse.org/gitroot/hudson/org.eclipse.hudson.core.git	1015	Y	N
HunspellJNA	git://github.com/dren-dk/HunspellJNA.git	22	N	N
hypergraphdb	http://hypergraphdb.googlecode.com/svn/trunk	2031	Y	Y
Hyperic HQ	git://git.springsource.org/hq/hq.git	17092	Y	N
I2P	git://github.com/i2p/i2p.i2p.git	9194	Y	Y
iCal4j	:pserver:anonymous:@ical4j.cvs.sourceforge.net:/cvsroot/ical4j	1210	Y	Y
iCal4j	http://ical4j.hg.sourceforge.net:8000/hgroot/ical4j/ical4j	1485	Y	Y
ice4j	http://ice4j.googlecode.com/svn/trunk	327	Y	N
ICEfaces	http://anonsvn.icesoft.org/repo/icefaces3/trunk	4680	Y	N
ICEfaces	http://anonsvn.icesoft.org/repo/icepush/trunk	174	N	N
ICEfaces	http://anonsvn.icesoft.org/repo/icefaces/trunk	4151	N	N
ICU for Java	http://source.icu-project.org/repos/icu/icu4j/trunk	6375	N	N
idlife-k2al	http://idlife-k2al.googlecode.com/svn/trunk	292	Y	Y
Illarion	git://github.com/Illarion-eV/Illarion-Java.git	1695	N	N
Illarion-Java	git://github.com/Illarion-eV/Illarion-Java.git	1695	N	N
Industrial Connector for Mylyn	http://svn.codespot.com/a/eclipselabs.org/industrial-mylyn/trunk	83	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Infinispan	git://github.com/infinispan/infinispan.git	5347	Y	Y
Infinispan	git://github.com/infinispan/infinispan-sample-module.git	3	N	N
Infinispan	git://github.com/infinispan/infinispan-archetypes.git	52	Y	N
infomas-asl	git://github.com/rmuller/infomas-asl.git	65	N	N
inotify-java	https://code.launchpad.net/inotify-java/trunk	78	Y	N
Inria Spoon	svn://scm.gforge.inria.fr/svnroot/spoon/trunk	2121	Y	N
Intellij Community	git://github.com/JetBrains/intellij-community.git	103528	Y	Y
IntelliJ IDEA Community Edition	git://git.jetbrains.org/idea/community.git	103529	Y	Y
interproscan	http://interproscan.googlecode.com/svn/trunk/	1943	N	N
Inventory Tweaks for Minecraft	git://github.com/mkalam-alami/inventory-tweaks.git	456	N	N
ISAcreator	git://github.com/ISA-tools/ISAcreator.git	788	N	N
ISIS-Fish	svn://labs.libre-entreprise.org/svnroot/isis-fish/isis-fish/trunk	2790	N	N
ISIS-Fish	svn://labs.libre-entreprise.org/svnroot/isis-fish/isis-fish-data/trunk	57	N	N
ISIS-Fish	http://svn.forge.codelutin.com/svn/isis-fish/trunk/	3025	N	N
ISIS-Fish	http://svn.forge.codelutin.com/svn/isis-fish-data/trunk/	277	N	N
ISIS-Fish	http://svn.forge.codelutin.com/svn/isis-fish-docs/trunk	132	N	N
iText ÃĆÂő, a JAVA-PDF library	https://itext.svn.sourceforge.net/svnroot/itext/trunk	4727	N	N
iText ÃĆÂő, a JAVA-PDF library	https://itext.svn.sourceforge.net/svnroot/itext/examples	157	N	N
iText ÃĆÂő, a JAVA-PDF library	https://itext.svn.sourceforge.net/svnroot/itext/book	294	N	N
iText ÃĆÂő, a JAVA-PDF library	https://itext.svn.sourceforge.net/svnroot/itext/itext-parent/trunk	4	N	N
iText ÃĆÂő, a JAVA-PDF library	http://svn.code.sf.net/p/itext/code/trunk	5167	N	N
iText ÃĆÂő, a JAVA-PDF library	http://svn.code.sf.net/p/itext/code/book	332	N	N
iText ÃĆÂő, a JAVA-PDF library	http://svn.code.sf.net/p/itext/code/tutorial	157	N	N
iTextÃĆÂő XML Worker	https://xmlworker.svn.sourceforge.net/svnroot/xmlworker/trunk	348	Y	N
iTextÃĆÂő XML Worker	http://svn.code.sf.net/p/xmlworker/code-0/trunk	385	Y	N
IzPack	git://git.codehaus.org/izpack.git	3827	Y	Y
IzPack	git://github.com/jponge/izpack-full-svn-history-copy.git	2956	Y	N
Jabox	git://github.com/jabox/jabox.git	587	N	N
JabRef	git://git.code.sf.net/p/jabref/code	3816	N	N
JaClouX	http://osl.uniparthenope.it/hg/projects/jacloux/jacloux/	671	Y	Y
JaCoCo Java Code Coverage Library	https://github.com/jacoco/jacoco.git	1010	Y	N
JacORB	git://github.com/JacORB/JacORB.git	5583	Y	N
jacuzzi	http://jacuzzi.googlecode.com/svn/trunk	68	N	N
jade4j	git://github.com/neuland/jade4j.git	120	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
jAER	https://jaer.svn.sourceforge.net/svnroot/jaer/trunk	3655	Y	Y
Jahia	https://devtools.jahia.com/svn/jahia/trunk/	16066	N	N
Jajuk	http://git.gitorious.org/jajuk/jajuk.git	6129	Y	N
Jalview	http://source.jalview.org/git/jalview.git	5221	N	N
Jansi	git://forge.fusesource.com/jansi.git	104	Y	N
Japid	git://github.com/branaway/Japid.git	237	N	N
Jardin	http://jardin.googlecode.com/svn/trunk	174	N	N
Jasig Calendar Portlet	git://github.com/Jasig/CalendarPortlet	351	Y	N
Jasig Central Authentication Service	git://github.com/Jasig/cas.git	1156	Y	N
Jasig News Reader Portlet	git://github.com/Jasig/NewsReaderPortlet.git	237	N	N
Jasig uPortal	git://github.com/Jasig/uPortal.git	10829	Y	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jasmine/trunk	1261	N	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jade/trunk	359	N	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jadort/trunk	636	N	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jasmine-deploy-me/trunk	391	Y	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jasmine-monitoring/trunk/jasmine-monitoring	2102	Y	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jasmine-selfmanagement/trunk/jasmine-selfmanagement	371	N	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jasmine-vm/vmm-agent/trunk	233	N	N
JASMINe	svn://svn.forge.objectweb.org/svnroot/jasmine/jasmine-design/trunk	357	N	N
JASMINe	git://gitorious.ow2.org/ow2-kerneos/kerneos.git	560	Y	N
JasperReports	http://code.jaspersoft.com/svn/repos/jasperreports/trunk	5832	N	N
JasperReports Server	http://code.jaspersoft.com/svn/repos/jasperserver/trunk	13229	Y	N
JasperSoft Business Intelligence Suite	http://code.jaspersoft.com/svn/repos/jasperreports/trunk	5832	N	N
JasperSoft Business Intelligence Suite	http://code.jaspersoft.com/svn/repos/jasperserver/trunk	13229	Y	N
JasperSoft Business Intelligence Suite	http://code.jaspersoft.com/svn/repos/ireport/trunk	1189	N	N
Jaspersoft Studio	http://code.jaspersoft.com/svn/repos/jasperreportseclipseplugin/trunk	696	N	N
Jaspersoft Studio	http://code.jaspersoft.com/svn/repos/jaspersoftstudio/trunk	3108	N	N
Java 3D Core	git://github.com/hharrison/java3d-core.git	785	N	N
Java Algebra System	http://krum.rz.uni-mannheim.de/jas.git	4485	Y	Y
Java Algebra System	https://code.google.com/p/java-algebra-system/	4485	Y	Y
Java Bindings for OpenAL	git://github.com/mbien/joal.git	181	Y	N
Java Bindings for OpenAL	git://jogamp.org/srv/scm/joal.git	317	N	N
Java Caching System	http://svn.apache.org/repos/asf/commons/proper/jcs/trunk	865	Y	Y
Java Chronicle	git://github.com/peter-lawrey/Java-Chronicle.git	284	N	N
Java EE kickoff app	git://github.com/javaeekickoff/java-ee-kickoff-app.git	87	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Java EntityBus	http://entitybus.googlecode.com/svn/trunk/	66	Y	N
Java EntityBus	https://source.sakaiproject.org/contrib/caret/entitybroker/trunk/	97	Y	N
Java EntityBus	https://source.sakaiproject.org/svn/entitybroker/trunk/	637	Y	N
Java for OpenGL Demos and Tutorials	git://github.com/sgothel/jogl-demos.git	430	Y	Y
Java for OpenGL Demos and Tutorials	git://jogamp.org/srv/scm/jogl-demos.git	430	Y	Y
Java Native Access (JNA)	git://github.com/twall/jna.git	2413	Y	Y
Java Neural Network Framework Neuroph	https://neuroph.svn.sourceforge.net/svnroot/neuroph/trunk	732	Y	Y
Java NRPE Server	git://github.com/ziccardi/jnrpe-lib.git	269	Y	N
Java NRPE Server	git://github.com/ziccardi/jnrpe-install.git	12	N	N
Java NRPE Server	git://github.com/ziccardi/jnrpe-server.git	41	N	N
Java NRPE Server	git://github.com/ziccardi/jnrpe-plugins.git	12	N	N
Java Quickcheck	https://hg.java.net/hg/quickcheck~repository	633	Y	N
Java Simon	https://code.google.com/p/javasimon/	1036	N	N
Java Space Alert Mission Generator	git://github.com/mkalus/JSpaceAlertMissionGenerator.git	76	N	N
Java Wiki Bot Framework	git://github.com/eldur/jwbf.git	373	Y	N
java-apns	git://github.com/notnoop/java-apns.git	325	N	N
java-cas-client	git://github.com/Jasig/java-cas-client.git	373	Y	N
java-driver	git://github.com/datastax/java-driver.git	521	N	N
Java-Mandrill-Wrapper	git://github.com/cribbstechnologies/Java-Mandrill-Wrapper.git	33	N	N
java-object-diff	git://github.com/SQiShER/java-object-diff.git	184	Y	N
java-sdk	git://github.com/qiniu/java-sdk.git	252	N	N
java-signals	git://github.com/threerings/java-signals.git	42	N	N
Java-WebSocket	git://github.com/TooTallNate/Java-WebSocket.git	438	N	N
Java2Script	http://java2script.googlecode.com/svn/trunk	947	N	N
javaeetutorial	https://svn.java.net/svn/javaeetutorial~svn/trunk	711	N	N
JavaHg	https://bitbucket.org/aragost/javahg/	778	N	N
JavaHg	https://bitbucket.org/aragost/javahg-ext-purge	31	N	N
JavaHg	https://bitbucket.org/aragost/javahg-ext-mq	51	N	N
JavaHg	https://bitbucket.org/aragost/javahg-ext-rebase	40	N	N
javamoney	http://javamoney.googlecode.com/svn/trunk/javamoney	13	N	N
javamoney	git://github.com/JavaMoney/javamoney	390	N	N
Javarifier	https://javarifier.googlecode.com/hg/	316	N	N
JavaServer Faces	https://svn.java.net/svn/mojarra~svn/trunk	9503	N	N
JavaServer Faces	https://svn.java.net/svn/mojarra~svn/branches/MOJARRA_2_1X_ROLLING/	9102	Y	Y
Javassist	http://anonsvn.jboss.org/repos/javassist/trunk	536	Y	Y
JAVA_ISDS	git://github.com/xrosecky/JAVA_ISDS.git	71	N	N
jax-ws	https://svn.java.net/svn/jax-ws~sources/trunk	4715	Y	N
jax-ws	https://svn.java.net/svn/jax-ws~sources/branches/jaxws22	4877	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
JAXB	https://svn.java.net/svn/jaxb~version2/trunk	2339	Y	Y
JAXB	https://svn.java.net/svn/jaxb~version1/trunk	149	Y	Y
JAXB	https://svn.java.net/svn/jaxb~version2/branches/jaxb-2_2-branch/jaxb-ri	2758	Y	Y
JAXB	git://java.net/jaxb~v2	2952	N	N
JAXX	https://jaxx.svn.sourceforge.net/svnroot/jaxx/trunk/	44	Y	N
JAXX	http://svn.nuiton.org/svn/jaxx/trunk	1718	N	N
jBasics	git://github.com/schloepke/jbasics.git	333	N	N
jBehave	git://git.codehaus.org/jbehave-core.git	1830	Y	N
jBehave	git://git.codehaus.org/jbehave-web.git	718	Y	N
jBehave	git://git.codehaus.org/jbehave-tutorial.git	293	Y	N
jBehave	git://git.codehaus.org/jbehave-site.git	57	N	N
jblas	git://github.com/mikiobraun/jblas.git	336	Y	Y
JBoss AOP	http://anonsvn.jboss.org/repos/jbossas/projects/aop/trunk	1720	Y	Y
JBoss AOP	http://anonsvn.jboss.org/repos/jbossas/branches/Branch_AOP_1_5	117	Y	Y
JBoss Cache	http://anonsvn.jboss.org/repos/jbosscache/core/trunk	5555	Y	N
JBoss Cache	http://anonsvn.jboss.org/repos/jbosscache/pojo/trunk	92	Y	Y
JBoss Cache	http://anonsvn.jboss.org/repos/jbosscache/cacheloader-migration/trunk	13	N	N
JBoss Drools	git://github.com/droolsjbpm/guvnor.git	4869	N	N
JBoss Drools	git://github.com/droolsjbpm/drools.git	6957	Y	N
JBoss Drools	git://github.com/droolsjbpm/droolsjbpm-build-bootstrap.git	829	N	N
JBoss Drools	git://github.com/droolsjbpm/droolsjbpm-build-distribution.git	296	N	N
JBoss Drools	git://github.com/droolsjbpm/droolsjbpm-knowledge.git	994	N	N
JBoss Drools	git://github.com/droolsjbpm/droolsjbpm-tools.git	1267	N	N
JBoss Drools	git://github.com/droolsjbpm/droolsjbpm-integration.git	1110	Y	N
JBoss Drools	git://github.com/droolsjbpm/drools-chance.git	51	N	N
JBoss ESB	http://anonsvn.jboss.org/repos/labs/labs/jbossesb/trunk/	4845	Y	Y
JBoss Forge	git://github.com/forge/core.git	2062	N	N
JBoss Forge	git://github.com/forge/plugin-seam-persistence.git	14	N	N
JBoss Forge	git://github.com/forge/plugin-spring-mvc.git	546	N	N
JBoss Forge	git://github.com/forge/plugin-hibernate-tools.git	46	N	N
JBoss Forge	git://github.com/forge/plugin-seam-jms.git	9	N	N
JBoss Forge	git://github.com/forge/plugin-arquillian.git	81	N	N
JBoss Forge	git://github.com/forge/plugin-jboss-as.git	37	N	N
JBoss Messaging	http://anonsvn.jboss.org/repos/messaging/trunk	5386	N	N
JBoss Messaging	http://anonsvn.jboss.org/repos/messaging/branches/Branch_1_4	3074	N	N
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/jboss-cl/trunk	396	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/jboss-deployers/trunk	803	Y	Y
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/jboss-jsr303/trunk	28	N	N
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/jboss-man/trunk	162	Y	N
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/jboss-mdr/trunk	135	Y	N
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/jboss-reflect/trunk	839	Y	N
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/demos/microcontainer/trunk	163	N	N
JBoss Microcontainer	http://anonsvn.jboss.org/repos/jbossas/projects/jboss-classpool/trunk	157	Y	N
JBoss Microcontainer	git://github.com/jbosgi/jbosgi-framework.git	1119	Y	N
JBoss Negotiation	http://anonsvn.jboss.org/repos/jbossas/projects/security/security-negotiation/trunk	144	Y	Y
JBoss Portal	http://anonsvn.jboss.org/repos/portal/modules/common/trunk	167	N	N
JBoss Portal	http://anonsvn.jboss.org/repos/portal/modules/web/trunk	95	Y	N
JBoss Portal	http://anonsvn.jboss.org/repos/portal/modules/test/trunk	222	Y	N
JBoss Portal	http://anonsvn.jboss.org/repos/portal/modules/portlet/trunk	728	Y	N
JBoss Portal	http://anonsvn.jboss.org/repos/portal/branches/JBoss_Portal_Branch_2_6	968	Y	Y
JBoss Portal	http://anonsvn.jboss.org/repos/portal/branches/JBoss_Portal_Branch_2_7	3920	Y	Y
JBoss Tools	git://github.com/jbosstools/jbosstools-build-ci.git	125	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-build-sites.git	653	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-download.jboss.org.git	1253	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-central.git	2320	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-base.git	4797	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-build.git	889	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-documentation.git	2120	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-forge.git	738	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-freemarker.git	155	N	N
JBoss Tools	git://github.com/jbosstools/jbosstools-birt.git	329	N	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/stack/cxf/trunk	1871	Y	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/spi/trunk	347	N	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/common/trunk	475	N	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/container	1058	Y	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/common-tools/trunk	30	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/api/trunk	58	N	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/legacy/branches/jbossws-2.0/	1825	N	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/hudson/trunk	88	N	N
JBoss Web Services	http://anonsvn.jboss.org/repos/jbossws/framework	1508	N	N
JBox2D	https://jbox2d.svn.sourceforge.net/svnroot/jbox2d/trunk/	257	N	N
JBox2D	http://jbox2d.googlecode.com/svn/trunk/	605	N	N
jBPM	http://anonsvn.jboss.org/repos/jbpm/jbpm3/trunk/	814	Y	N
jBPM	http://anonsvn.jboss.org/repos/jbpm/jbpm4/trunk/	1756	Y	N
jBPM	http://anonsvn.jboss.org/repos/jbpm/jbpm3/branches/jbpm-3.2-soa	1360	Y	N
jBPM	git://github.com/droolsjbpm/jbpm.git	1787	Y	Y
jBPM	git://github.com/bpmc/bpm-console.git	146	N	N
jBPT	http://jbpt.googlecode.com/svn/trunk	367	Y	N
jcabi	git://github.com/yegor256/jcabi.git	900	N	N
jchord	http://jchord.googlecode.com/svn/trunk	1574	N	N
jclouds	https://git-wip-us.apache.org/repos/asf/incubator-jclouds.git	8160	Y	N
JCodec	git://github.com/jcodec/jcodec.git	68	N	N
jcodings	git://github.com/jruby/jcodings.git	88	N	N
JCommander Library	git://github.com/cbeust/jcommander.git	478	Y	N
JDeb	git://github.com/tcurdt/jdeb.git	456	Y	N
jdeolive's geodb	git://github.com/jdeolive/geodb.git	49	N	N
JDOM	:pserver:anonymous:anonymous@cvs.jdom.org:/home/cvspublic	886	N	N
JDOM	git://github.com/hunterhacker/jdom/	1604	Y	N
JDownloader	svn://svn.jdownloader.org/jdownloader/trunk	21858	N	N
jEdit	https://jedit.svn.sourceforge.net/svnroot/jedit/jEdit/trunk	5647	Y	N
jEdit	https://jedit.svn.sourceforge.net/svnroot/jedit/plugins/GdbPlugin/trunk	212	N	N
jEdit	https://jedit.svn.sourceforge.net/svnroot/jedit/plugins/Console/trunk	728	N	N
jEdit	https://jedit.svn.sourceforge.net/svnroot/jedit/plugins/ErrorList/trunk	161	N	N
jEdit	https://jedit.svn.sourceforge.net/svnroot/jedit/plugins/GlobalPlugin/trunk	59	N	N
jEdit	https://jedit.svn.sourceforge.net/svnroot/jedit/plugins/Ancestor/trunk	47	N	N
jEdit	https://jedit.svn.sourceforge.net/svnroot/jedit/plugins/CommonControls/trunk	94	N	N
jemmy	https://svn.java.net/svn/jemmy~jemmy2/trunk	101	Y	Y
jemmy	https://hg.java.net/hg/jemmy~jemmyfx13	1	Y	Y
jemmy	https://hg.java.net/hg/jemmy~jemmy3	197	Y	Y
Jena	http://svn.apache.org/repos/asf/jena/trunk	1590	Y	N
Jenkins	git://github.com/jenkinsci/analysis-core-plugin	657	Y	Y
Jenkins	git://github.com/jenkinsci/analysis-collector-plugin	354	N	N
Jenkins	git://github.com/jenkinsci/checkstyle-plugin	700	N	N
Jenkins	git://github.com/jenkinsci/bazaar-plugin.git	157	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Jenkins	git://github.com/jenkinsci/active-directory-plugin.git	390	N	N
Jenkins	git://github.com/jenkinsci/accurev-plugin.git	320	N	N
Jenkins	git://github.com/jenkinsci/artifactdeployer-plugin.git	102	N	N
Jenkins	git://github.com/jenkinsci/appaloosa-plugin.git	80	N	N
Jenkins	git://github.com/jenkinsci/campfire-plugin.git	122	N	N
Jenkins	git://github.com/jenkinsci/build-failure-analyzer-plugin.git	88	Y	Y
Jenkins JIRA plugin	git://github.com/jenkinsci/jira-plugin.git	530	N	N
jenkins-cucumber-jvm-reports-plugin-java	git://github.com/masterthought/jenkins-cucumber-jvm-reports-plugin-java.git	64	N	N
jeromq	git://github.com/zeromq/jeromq.git	180	Y	Y
Jersey	git://github.com/jersey/jersey.git	1207	Y	Y
Jersey	git://github.com/jersey/jersey-1.x.git	4529	Y	Y
jersey's jersey	git://github.com/jersey/jersey.git	658	Y	Y
JetSpeed 2	http://svn.apache.org/repos/asf/portals/jetspeed-2/portal/trunk	2563	Y	N
JetSpeed 2	http://svn.apache.org/repos/asf/portals/jetspeed-2/applications/j2-admin/trunk	443	N	N
Jetty - Java HTTP Servlet Server	:pserver:anonymous:@jetty.cvs.sourceforge.net:/cvsroot/jetty	2349	Y	Y
Jetty - Java HTTP Servlet Server	http://svn.codehaus.org/jetty/jetty/branches/jetty-6.1	2908	Y	N
Jetty - Java HTTP Servlet Server	git://git.eclipse.org/gitroot/jetty/org.eclipse.jetty.project.git	7293	Y	Y
Jetty - Java HTTP Servlet Server	git://git.eclipse.org/gitroot/jetty/org.eclipse.jetty.wtp.git	90	N	N
Jetty - Java HTTP Servlet Server	git://git.eclipse.org/gitroot/jetty/org.eclipse.jetty.parent.git	91	N	N
Jetty - Java HTTP Servlet Server	git://git.codehaus.org/jetty-project.git	6686	Y	Y
Jetty - Java HTTP Servlet Server	git://git.codehaus.org/jetty-sandbox.git	43	Y	N
jfxtras	https://jfxtras.googlecode.com/hg/	197	Y	N
JGit	git://git.eclipse.org/gitroot/jgit/jgit.git	2747	Y	N
JGraLab	git://github.com/jgralab/jgralab.git	7521	Y	Y
JGraphT	git://github.com/jgrapht/jgrapht.git	801	N	N
JGroups	git://github.com/belaban/JGroups.git	17030	N	N
JiBX	git://github.com/jibx/schema-library.git	213	N	N
JiBX	git://github.com/jibx/jibx.git	95	N	N
JiBX	git://github.com/jibx/core.git	80	Y	N
JiBX	git://github.com/jibx/maven-plugin.git	67	N	N
JiBX	git://github.com/jibx/sub-projects.git	13	N	N
JiBX	git://github.com/jibx/jibx-parent.git	67	N	N
JiBX	git://github.com/jibx/jibxws.git	7	Y	Y
JiBX	git://github.com/jibx/xbis.git	1	N	N
JikesRVM	http://hg.code.sourceforge.net/p/jikesrvm/code	10661	Y	N
Jitsi (previously SIP Communicator)	https://github.com/jitsi/jitsi.git	10009	Y	Y
jlatexmath	git://git.forge.scilab.org/jlatexmath.git	329	N	N
jless	git://github.com/jryans/jless.git	99	N	N
JLine	git://github.com/jline/jline2	540	Y	N
JLM (Java Learning Machine)	git://github.com/oster/JLM.git	1839	N	N
JMANGOS	git://github.com/MinimaJack/JMANGOS.git	528	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
JMEdit	http://hg.code.sf.net/p/jmedit/code	34	N	N
Jmol	https://jmol.svn.sourceforge.net/svnroot/jmol/trunk	14969	Y	N
Jmol	:pserver:anonymous:@jmol.cvs.sourceforge.net:/cvsroot/jmol	3152	Y	N
jMonkey Engine	http://jmonkeyengine.googlecode.com/svn/trunk	7993	Y	Y
jMonkey Engine	http://jmonkeyplatform-contributions.googlecode.com/svn/trunk/	1055	Y	Y
jmustache	git://github.com/samskivert/jmustache.git	172	Y	N
jmxdatamart	git://github.com/TripwireInc/jmxdatamart.git	377	N	N
jmxtrans	git://github.com/jmxtrans/jmxtrans.git	355	N	N
jmzml	http://jmzml.googlecode.com/svn/trunk	177	N	N
Jnex Java Framework	https://jnex.svn.sourceforge.net/svnroot/jnex/jnex/	349	N	N
Joda Convert	git://github.com/JodaOrg/joda-convert.git	105	N	N
Joda Money	git://github.com/JodaOrg/joda-money.git	207	N	N
Joda Time	git://github.com/JodaOrg/joda-time	1673	Y	N
jodconverter	http://jodconverter.googlecode.com/svn/trunk	143	Y	N
jodconverter	git://github.com/nuxeo/jodconverter.git	148	N	N
jodconverter	git://github.com/mirkonasato/jodconverter.git	148	Y	N
jodconverter	git://github.com/conceptboard/jodconverter.git	178	Y	N
jodconverter	git://github.com/expertsystems/jodconverter.git	176	Y	N
Jodd	git://github.com/oblac/uphea	14	N	N
jogl	git://github.com/sgothel/jogl.git	4674	N	N
jogl	git://jogamp.org/srv/scm/jogl.git	4720	N	N
JOLIE	https://jolie.svn.sourceforge.net/svnroot/jolie/trunk	1974	Y	Y
Jolokia	git://github.com/rhuss/jolokia.git	981	Y	Y
JOnAS (Java Open Application Server)	svn://svn.forge.objectweb.org/svnroot/jonas/jonas/trunk	6901	Y	Y
JOnAS (Java Open Application Server)	svn://svn.forge.objectweb.org/svnroot/jonas/jonas/branches/jonas_4_10	269	Y	Y
JOnAS (Java Open Application Server)	svn://svn.forge.objectweb.org/svnroot/jonas/sub-projects	1372	Y	Y
JOnAS (Java Open Application Server)	svn://svn.forge.objectweb.org/svnroot/jonas/sandbox	2566	Y	Y
JOnAS (Java Open Application Server)	svn://svn.forge.objectweb.org/svnroot/jonas/jonas/branches/jonas_5_1	297	Y	Y
JOnAS (Java Open Application Server)	http://git.gitorious.ow2.org/ow2-jonas/jonas-agent.git	44	Y	N
JOnAS (Java Open Application Server)	http://git.gitorious.ow2.org/ow2-jonas/jonas-console.git	184	Y	N
JOnAS (Java Open Application Server)	http://git.gitorious.ow2.org/ow2-jonas/audit-jpa-nosql.git	2	N	N
JOnAS (Java Open Application Server)	http://git.gitorious.ow2.org/ow2-jonas/osgi-jndi-service.git	56	Y	N
joni	git://github.com/jruby/joni.git	154	Y	N
jOOQ	git://github.com/jOOQ/jOOQ.git	2780	N	N
JORAM	svn://svn.forge.objectweb.org/svnroot/joram/trunk	5302	N	N
JOSM	http://josm.openstreetmap.de/svn/trunk	6084	Y	N
JOSM	http://svn.openstreetmap.org/applications/editors/josm/	6844	N	N
JOSM	git://github.com/openstreetmap/josm.git	5813	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
JPA Security	https://jpasecurity.svn.sourceforge.net/svnroot/jpasecurity/trunk/	1314	Y	N
jpasskit	git://github.com/bitzeche/jpasskit.git	69	Y	N
jpcsp	http://jpcsp.googlecode.com/svn/trunk	3309	Y	Y
jqm4gwt	git://github.com/sksamuel/jqm4gwt.git	191	N	N
JSatTrak	git://github.com/sgano/JSatTrak.git	199	Y	Y
jSCSI	git://github.com/disy/jSCSI.git	1337	N	N
jsmaa	git://github.com/tommite/jsmaa.git	446	N	N
JSONAPI	git://github.com/alecgorge/jsonapi.git	485	N	N
jsoup	git://github.com/jhy/jsoup.git	585	N	N
jsr-333	https://svn.java.net/svn/jsr-333~svn/trunk	52	N	N
jsr308-langtools	https://jsr308-langtools.googlecode.com/hg/	4425	N	N
jtharness	https://svn.java.net/svn/jtharness~svn/trunk	1074	Y	N
jtimer	http://svn.chorem.org/svn/jtimer/trunk	619	N	N
JTor	git://github.com/brl/JTor.git	445	Y	N
JUnit	git://github.com/junit-team/junit.git	1600	Y	N
JVoiceXML	http://svn.code.sf.net/p/jvoicexml/code/trunk	237	Y	Y
jWeb1T	http://jweb1t.googlecode.com/svn/com.googlecode.jweb1t/trunk/	61	N	N
jWordSplitter	git://github.com/danielnaber/jwordsplitter.git	104	N	N
jzmq	git://github.com/zeromq/jzmq.git	379	Y	N
k9mail	git://github.com/k9mail/k-9.git	4545	N	N
kaleido-foundry	git://github.com/kaleidofoundry/kaleido-repository.git	420	Y	N
Kalypso	https://kalypso.svn.sourceforge.net/svnroot/kalypso/trunk	7595	N	N
KalypsoBASE	https://dev.bjoernsen.de/svn/kalypsobase/trunk	6300	Y	N
KalypsoBASE	https://svn.wb.tu-harburg.de/kalypso/source/k-reporting/trunk	192	Y	Y
KenBot	https://bitbucket.org/kenbot/kenbot.git	228	N	N
KIELER	http://git.rtsys.informatik.uni-kiel.de/scm/kieler/pragmatics.git	8076	N	N
KIELER	http://git.rtsys.informatik.uni-kiel.de/scm/kieler/semantics.git	7742	N	N
kiji-schema	git://github.com/kijiproject/kiji-schema.git	398	Y	N
Kilim	git://github.com/kilim/kilim.git	47	N	N
Knopflerfish	https://www.knopflerfish.org/svn/knopflerfish.org/trunk	2106	N	N
Knoplerfish	https://www.knopflerfish.org/svn/knopflerfish.org/trunk	2106	N	N
KoLmafia	:pserver::@kolmafia.cvs.sourceforge.net:/cvsroot/kolmafia	4708	N	N
kotlin	git://github.com/JetBrains/kotlin.git	11324	Y	N
Kryo	http://kryo.googlecode.com/svn/trunk/	313	N	N
Kuali Rice	https://svn.kuali.org/repos/rice/trunk/	6391	Y	N
Kune	svn://scm.ourproject.org/svnroot/kune/trunk	1657	Y	Y
Kune	git://gitorious.org/kune/trunk.git	2286	Y	Y
l10n-maven-plugin	http://code.google.com/p/l10n-maven-plugin/	72	N	N
L2J Server	https://svn.l2jserver.com/trunk/	4747	N	N
L2J Server	https://svn.l2jserver.com/branches/unstable/L2J_Server_BETA/	4555	N	N
LAMS	:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot	3309	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
LAMS	`:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot`	499	N	N
LAMS	`:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot`	639	N	N
LAMS	`:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot`	2240	N	N
LAMS	`:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot`	128	N	N
LAMS	`:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot`	759	N	N
LAMS	`:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot`	25	N	N
LAMS	`:pserver:anonymous:@lamscvs.melcoe.mq.edu.au:/usr/local/cvsroot`	92	N	N
langagelinotte	`http://langagelinotte.googlecode.com/svn/trunk`	2609	N	N
LanguageTool	`https://github.com/languagetool-org/languagetool.git`	9334	Y	N
LanguageTool	`https://github.com/languagetool-org/languagetool-community-website.git`	367	N	N
lanterna	`https://code.google.com/p/lanterna/`	582	N	N
lazyrecords	`https://code.google.com/p/lazyrecords/`	333	N	N
LDAP Synchronization Connector (LSC)	`https://lsc-project.org/svn/`	1850	Y	N
ldapchai	`http://ldapchai.googlecode.com/svn/trunk/`	62	Y	N
leJOS NXJ	`https://lejos.svn.sourceforge.net/svnroot/lejos/trunk`	6610	Y	Y
lemire's javaewah	`git://github.com/lemire/javaewah.git`	149	N	N
LensKit	`https://bitbucket.org/grouplens/lenskit`	2954	Y	N
LevelDB Java Port	`git://github.com/dain/leveldb.git`	173	N	N
libjitsi	`https://github.com/jitsi/libjitsi.git`	343	N	N
LibrePlan	`git://github.com/Igalia/libreplan.git`	9242	N	N
Liferay Portal	`git://github.com/liferay/liferay-portal.git`	71063	Y	N
Liferay Portal	`git://github.com/liferay/liferay-plugins.git`	12197	Y	Y
Liferay Portal	`git://github.com/liferay/liferay-maven-support.git`	153	N	N
Liferay Portal	`git://github.com/liferay/liferay-faces.git`	808	Y	N
Liferay Portal	`git://github.com/liferay/liferay-docs.git`	2570	Y	Y
liferay-portal	`git://github.com/liferay/liferay-portal.git`	71063	Y	N
Lightweight Java Game Library	`:pserver:anonymous:@java-game-lib.cvs.sourceforge.net:/cvsroot/java-game-lib`	2146	N	N
Lightweight Java Game Library	`https://java-game-lib.svn.sourceforge.net/svnroot/java-game-lib/trunk/LWJGL`	3716	N	N
LIMA - Accounting software	`http://svn.chorem.org/svn/lima/trunk`	1502	N	N
LinID OpenLDAP Manager	`http://svn.linid.org/svn/linid-om/trunk`	286	N	N
LinShare, file secure sharing	`http://svn.linid.org/svn/linshare/trunk/linshare`	646	Y	N
LiquiBase	`git://github.com/liquibase/liquibase.git`	2500	Y	N
Logback	`git://github.com/qos-ch/logback.git`	3032	Y	Y
lorsource	`git://github.com/maxcom/lorsource.git`	5471	Y	N
Lutece	`http://dev.lutece.paris.fr/svn/lutece/contribs/atoswordline/trunk`	17	N	N
Lutece	`http://dev.lutece.paris.fr/svn/lutece/applications/aires/trunk`	5	N	N
Lutece	`http://dev.lutece.paris.fr/svn/lutece/applications/simpa/trunk/plugin-searchasso`	67	N	N
Lutece	`http://dev.lutece.paris.fr/svn/lutece/contribs/vdm/trunk`	11	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Lutece	http://dev.lutece.paris.fr/svn/lutece/contribs/adullact-projet/trunk	33	N	N
Lutece	http://dev.lutece.paris.fr/svn/lutece/applications/teleservices/trunk/	279	N	N
Lutece	http://dev.lutece.paris.fr/svn/lutece/applications/signalement-ramen/trunk/	2238	N	N
Lutece	http://dev.lutece.paris.fr/svn/lutece/applications/plu/trunk/	318	N	N
Lutece	http://dev.lutece.paris.fr/svn/lutece/applications/alpaca/trunk	369	N	N
LWJGL	git://github.com/LWJGL/lwjgl.git	3746	N	N
lwuit-incubator	https://svn.java.net/svn/lwuit-incubator~svn/trunk	161	Y	Y
M2E Android Configurator	git://github.com/rgladwell/m2e-android.git	509	N	N
m3util	git://github.com/jCoderZ/m3util.git	93	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/blog.git	33	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/blossom/blossom-extension-data.git	31	Y	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/blossom/blossom.git	217	Y	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/blossom/samples.git	74	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/categorization.git	413	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/cmis.git	44	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/commenting.git	251	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/modules/dam.git	836	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/magnolia_ui.pub.git	6313	N	N
Magnolia CMS	http://git.magnolia-cms.com/git/ce-bundle.pub.git	1356	Y	N
Makumba	https://makumba.svn.sourceforge.net/svnroot/makumba/trunk	5329	Y	N
martinimix	http://martinimix.googlecode.com/svn/trunk/martinimix	284	Y	Y
MATSim	https://matsim.svn.sourceforge.net/svnroot/matsim/contrib/trunk	643	Y	N
MATSim	https://matsim.svn.sourceforge.net/svnroot/matsim/playgrounds/trunk	10716	Y	N
Mavanagaiata	git://github.com/koraktor/mavanagaiata.git	249	N	N
Maven Doxia	https://svn.apache.org/repos/asf/maven/doxia/doxia/trunk	1500	Y	N
Maven Doxia	https://svn.apache.org/repos/asf/maven/doxia/doxia-sitetools/trunk	525	Y	N
Maven Doxia	https://svn.apache.org/repos/asf/maven/doxia/doxia-tools/trunk	267	Y	N
Maven Doxia	https://svn.apache.org/repos/asf/maven/doxia/site	249	N	N
Maven Doxia	https://svn.apache.org/repos/asf/maven/doxia/doxia-ide/trunk	59	N	N
Maven Integration for Eclipse	git://git.eclipse.org/gitroot/m2e/m2e-core.git	1201	N	N
maven-clojure-plugin	git://github.com/talios/clojure-maven-plugin.git	413	Y	N
mbassador	git://github.com/bennidi/mbassador.git	176	Y	N
megamek	svn://svn.code.sf.net/p/megamek/code/trunk	8231	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
MegaMekLab	svn://svn.code.sf.net/p/megameklab/code/trunk	971	N	N
MekHQ	http://svn.code.sf.net/p/mekhq/code/trunk	183	N	N
memcached-session-manager	git://github.com/magro/memcached-session-manager.git	463	N	N
Mentaframework	http://soliveirajr.com/svn/mentawai/trunk	296	Y	N
Mentaframework	https://mentaframework.svn.sourceforge.net/svnroot/mentaframework/mentawai/trunk/	6	Y	N
MercurialEclipse	http://bitbucket.org/mercurialeclipse/main	3203	N	N
MessageApi	git://github.com/t1/message-api.git	386	Y	N
Metacat	https://code.ecoinformatics.org/code/metacat/trunk	7255	Y	Y
MetaModel	http://eobjects.org/svn/MetaModel/trunk	845	Y	N
MiGen	http://migen.googlecode.com/svn/trunk	11925	N	N
Milton Webdav Server	git://github.com/miltonio/milton2	311	N	N
Mines Java Toolkit	git://github.com/dhale/jtk	1174	N	N
Mistral	https://bitbucket.org/tidalwave/mistral-src	230	Y	Y
mkgmap	http://svn.parabola.me.uk/mkgmap/trunk	1663	Y	N
MMBase	https://scm.mmbase.org/mmbase/trunk	36412	Y	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoCore.git	145	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoChat.git	81	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoParty.git	70	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoInfo.git	43	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoInfoCoords.git	23	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoMoney.git	65	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoPet.git	31	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoDamage.git	27	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoMail.git	33	N	N
mmoMinecraft	git://github.com/mmoMinecraftDev/mmoInfoCompass.git	26	N	N
Mobicents	https://code.google.com/p/commscale.load-balancer	353	Y	N
Mobicents	https://code.google.com/p/commscale.cluster	121	N	N
Mobicents	https://code.google.com/p/commscale.snmp-adaptor	85	N	N
Mobicents	https://code.google.com/p/commscale.sbc-sip	634	Y	Y
Mobicents	https://code.google.com/p/commscale.sbc-media	32	N	N
Mobicents	https://code.google.com/p/commscale.jdocbook	15	N	N
Mobicents	http://code.google.com/p/jasn/	129	N	N
Mobicents	https://code.google.com/p/commtesting.mss-arquillian/	160	Y	N
Mobicents	https://code.google.com/p/commscale.commons	13	N	N
Mobicents	https://code.google.com/p/commtesting.sipp-report-tool/	11	N	N
Mockito	git://github.com/mockito/mockito.git	1879	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
modelmapper	`git://github.com/jhalterman/modelmapper.git`	309	Y	N
ModeShape	`git://github.com/ModeShape/modeshape.git`	3749	Y	N
Mojo	`http://svn.codehaus.org/mojo/trunk`	16367	Y	N
Mojo	`http://svn.codehaus.org/mojo/site`	680	N	N
Mojo	`http://svn.codehaus.org/mojo/c-builds/trunk`	289	Y	N
Mojo	`git://github.com/gwt-maven-plugin/gwt-maven-plugin.git`	269	N	N
Mondrian	`git://github.com/pentaho/mondrian.git`	3339	Y	Y
Mondrian	`git://github.com/pentaho/mondrian.git`	3361	Y	Y
Mongo Java Driver	`git://github.com/mongodb/mongo-java-driver.git`	1596	N	N
Mop	`git://forge.fusesource.com/mop.git`	262	Y	N
Morphia	`https://github.com/mongodb/morphia`	604	Y	N
Morpho	`https://code.ecoinformatics.org/code/morpho/trunk`	5419	Y	Y
MOSKitt	`http://subversion.moskitt.org/gvcase-bpmn/trunk`	445	N	N
mosstest	`git://github.com/mosstest/mosstest.git`	123	Y	Y
MOTECH	`https://code.google.com/p/motech/`	3572	Y	N
movie-renamer	`https://code.google.com/p/movie-renamer/`	269	Y	Y
moviejukebox	`http://moviejukebox.googlecode.com/svn/trunk`	2803	Y	N
Moving Code	`https://svn.52north.org/svn/geoprocessing/main/movingcode/movingcode-runtime/trunk/`	144	Y	N
Moving Code	`https://svn.52north.org/svn/geoprocessing/main/movingcode-schema/trunk/`	10	N	N
Mozilla Rhino	`:pserver:anonymous:@cvs-mirror.mozilla.org:/cvsroot`	2619	Y	N
Mozilla Rhino	`https://github.com/mozilla/rhino.git`	3010	Y	N
mp4parser	`http://mp4parser.googlecode.com/svn/trunk/`	739	N	N
msv	`https://svn.java.net/svn/msv~svn/trunk`	1754	N	N
muCommander	`https://svn.mucommander.com/mucommander/trunk`	3980	N	N
muCommander	`https://svn.mucommander.com/mucommander-commons-ant/trunk/`	10	N	N
muCommander	`https://svn.mucommander.com/mucommander-commons-collections/trunk/`	13	N	N
muCommander	`https://svn.mucommander.com/mucommander-commons-conf/trunk/`	30	N	N
muCommander	`https://svn.mucommander.com/mucommander-commons-file/trunk/`	50	N	N
muCommander	`https://svn.mucommander.com/mucommander-commons-io/trunk/`	16	N	N
muCommander	`https://svn.mucommander.com/mucommander-commons-runtime/trunk/`	19	N	N
muCommander	`https://svn.mucommander.com/mucommander-commons-util/trunk/`	18	N	N
Mule	`https://svn.codehaus.org/mule/branches/mule-3.x/`	13726	Y	Y
Mule	`https://svn.codehaus.org/mule/branches/mule-2.2.x/`	8618	Y	Y
Mule	`https://svn.codehaus.org/mule/branches/mule-2.1.x/`	7215	Y	Y
Mule	`https://svn.codehaus.org/mule/branches/mule-2.0.x/`	7294	Y	Y
Mule	`git://github.com/mulesoft/mule.git`	14935	Y	Y
MultiBit Merchant	`git://github.com/gary-rowe/MultiBitMerchant`	325	N	N
Multimodal	`git://github.com/illes/multimodal.git`	120	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
mustache.java	git://github.com/spullara/mustache.java.git	815	N	N
MVFLEX Expression Language (MVEL)	http://svn.codehaus.org/mvel/trunk	2330	Y	N
MVFLEX Expression Language (MVEL)	git://github.com/mvel/mvel.git	2821	Y	N
mycontainer	http://mycontainer.googlecode.com/svn/trunk/devel	767	Y	N
MyCoRe	http://server.mycore.de/svn/mycore/trunk	9829	Y	Y
MyRobotLab	https://myrobotlab.googlecode.com/svn/trunk/	1628	Y	N
narya	git://github.com/threerings/narya.git	6739	Y	N
NavTable	git://github.com/navtable/navtable.git	383	N	N
NavTable	git://github.com/navtable/navtable.git	383	N	N
NavTablFforms	git://github.com/navtable/navtableforms.git	300	N	N
needle	git://github.com/akquinet/needle.git	206	Y	N
Neembuu Uploader	svn://svn.code.sf.net/p/neembuuuploader/code/NeembuuUploader	421	Y	Y
Neo4j - the graph database	git://github.com/neo4j-examples/java-shop-categories.git	11	N	N
Neo4j - the graph database	git://github.com/neo4j/doctools.git	661	N	N
Neo4j - the graph database	git://github.com/neo4j/cypher-refcard.git	30	N	N
Neo4j - the graph database	git://github.com/neo4j/cypher-dsl.git	140	Y	N
Neo4j - the graph database	git://github.com/neo4j/ease-maven-plugin.git	21	Y	N
Neo4j - the graph database	git://github.com/neo4j/docs-maven-plugin.git	38	Y	N
NetBeans IDE	http://hg.netbeans.org/main/	260906	Y	Y
netbeans-gradle-project	git://github.com/kelemen/netbeans-gradle-project.git	549	N	N
Netty Project	http://anonsvn.jboss.org/repos/netty/subproject/benchmark	49	N	N
Netty Project	git://github.com/netty/netty.git	5240	Y	Y
netty-socketio	git://github.com/mrniko/netty-socketio.git	198	Y	N
nextweb-js	git://github.com/appjangle/nextweb-js.git	276	N	N
nextweb-onedb-java	git://github.com/onedb/nextweb-onedb-java.git	309	N	N
nfctools	git://github.com/grundid/nfctools.git	127	N	N
nifty-gui	https://nifty-gui.svn.sourceforge.net/svnroot/nifty-gui	1672	N	N
nifty-gui	git://github.com/void256/nifty-gui.git	1845	N	N
NorthernWind	https://bitbucket.org/tidalwave/northernwind-src	1841	N	N
NorthernWind	https://bitbucket.org/tidalwave/northernwind-resources-src	114	Y	N
NorthernWind	https://bitbucket.org/tidalwave/northernwind-site-archetypes-src/	128	N	N
Nuiton-JS	http://svn.nuiton.org/svn/nuiton-js/trunk	73	N	N
Nuiton-matrix	http://svn.nuiton.org/svn/nuiton-matrix/trunk	352	N	N
Nuiton-utils	http://svn.nuiton.org/svn/nuiton-utils/trunk/	1613	N	N
nuun-framework	git://github.com/kametic/nuun-framework.git	132	N	N
Nuxeo ECM	git://github.com/nuxeo/addons.git	233	N	N
Nuxeo ECM	git://github.com/nuxeo/jodconverter.git	148	N	N
Nuxeo ECM	git://github.com/nuxeo/apricot-libs.git	163	Y	N
Nuxeo ECM	git://github.com/nuxeo/cloudbinarymanager.git	1	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Nuxeo ECM	git://github.com/nuxeo/marketplace-diff.git	17	Y	N
Nuxeo ECM	git://github.com/nuxeo/marketplace-birt.git	13	Y	N
Nuxeo ECM	git://github.com/nuxeo/marketplace-drive.git	16	N	N
OBiBa - Onyx	git://github.com/obiba/onyx.git	4782	Y	Y
ObjectLedge	git://github.com/objectledge/ledge.git	3440	Y	N
OCPsoft Rewrite	git://github.com/ocpsoft/rewrite.git	936	N	N
OGNL	git://github.com/jkuhnert/ognl.git	199	Y	N
okhttp	git://github.com/square/okhttp.git	472	N	N
OLAT	http://hg.olat.org/repos/OLAT/	62	N	N
OLAT	http://hg.olat.org/repos/OLAT-7.2.x/	391	N	N
OLAT	http://hg.olat.org/repos/OLAT-7.4.x	6163	Y	N
OLAT	http://hg.olat.org/repos/OLAT-7.3.x/	3653	Y	N
OLAT	http://hg.olat.org/repos/OLAT-PLUGINS/	1	Y	Y
OLAT	http://hg.olat.org/repos/OLAT-DB-REORG/	3532	Y	N
OmegaT	https://omegat.svn.sourceforge.net/svnroot/omegat/trunk	3939	Y	Y
OMERO	git://git.openmicroscopy.org/ome.git	26043	N	N
OMERO	git://git.openmicroscopy.org/bioformats.git	7883	Y	N
omssa-parser	http://omssa-parser.googlecode.com/svn/trunk	114	N	N
ONDEX Suite	https://ondex.svn.sourceforge.net/svnroot/ondex/trunk	18394	Y	Y
onebusaway-gtfs-modules	git://github.com/OneBusAway/onebusaway-gtfs-modules.git	273	N	N
Ontopia	http://ontopia.googlecode.com/svn/trunk/	1309	Y	N
Open eHealth Integration Platform	git://github.com/krasserm/ipf.git	1799	Y	Y
Open eHealth Integration Platform	git://github.com/krasserm/ipf-runtime.git	48	Y	N
Open eHealth Integration Platform	git://github.com/krasserm/ipf-labs.git	47	N	N
Open eHealth Integration Platform	git://github.com/krasserm/ipf-tools.git	14	N	N
Open eHealth Integration Platform	git://github.com/oehf/ipf.git	1834	Y	Y
Open eHealth Integration Platform	git://github.com/oehf/ipf-runtime.git	56	Y	N
Open Sahara	http://dev.opensahara.com/r/p/os.git	2514	Y	N
open-monica	http://open-monica.googlecode.com/svn/trunk	745	N	N
Open-Xchange	https://code.open-xchange.com/git/wd/backend	47890	Y	N
Open-Xchange	https://code.open-xchange.com/git/wd/testing/selenium	213	N	N
Open-Xchange	https://code.open-xchange.com/git/documentconverter-api	107	N	N
Open-Xchange	https://code.open-xchange.com/git/frontend6	12819	N	N
Open-Xchange	https://code.open-xchange.com/git/office	1399	Y	N
Open-Xchange	https://code.open-xchange.com/git/selenium6	66	N	N
Open2Jam	git://github.com/open2jamorg/open2jam.git	451	N	N
OpenCms	git://github.com/alkacon/opencms-core.git	15397	Y	Y
OpenCms	git://github.com/alkacon/opencms-core.git	17120	Y	Y
OpenDJ	https://svn.forgerock.org/opendj/trunk	8164	N	N
OpenDS	https://svn.java.net/svn/opends~svn/trunk/opends	5231	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
OpenEngSB	git://github.com/openengsb/homepage.git	182	N	N
OpenFaces	git://github.com/openfaces/OpenFaces.git	2054	Y	N
Openfire	http://svn.igniterealtime.org/svn/repos/openfire/trunk	1726	Y	Y
OpenGamma Platform	git://github.com/OpenGamma/OG-Platform.git	25383	Y	N
OpenGamma Platform	git://github.com/OpenGamma/OG-Platform.git	25865	Y	N
OpenGamma Platform	git://github.com/OpenGamma/OG-RStats.git	370	N	N
OpenGamma Platform	git://github.com/OpenGamma/OG-RStats.git	319	N	N
OpenGrok	git://github.com/OpenGrok/OpenGrok.git	1476	Y	Y
openHAB	https://openhab.googlecode.com/hg/	1719	N	N
OpenIAM Identity Manager	git://github.com/OpenIAM/openiam-idm-ce	1110	Y	N
OpenICF	https://svn.forgerock.org/openicf/trunk	2584	Y	N
OpenID-Connect-Java-Spring-Server	git://github.com/mitreid-connect/OpenID-Connect-Java-Spring-Server.git	1364	N	N
OpenIDM	https://svn.forgerock.org/commons/json-crypto/trunk	19	N	N
OpenIDM	https://svn.forgerock.org/commons/json-fluent/trunk	53	N	N
OpenIDM	https://svn.forgerock.org/commons/json-patch/trunk	6	N	N
OpenIDM	https://svn.forgerock.org/commons/forgerock-parent/trunk/	26	N	N
OpenIDM	https://svn.forgerock.org/commons/json-ref/trunk	9	N	N
OpenIDM	https://svn.forgerock.org/commons/json-resource/trunk	34	N	N
OpenIDM	https://svn.forgerock.org/commons/forgerock-restlet/trunk/	11	N	N
OpenIDM	https://svn.forgerock.org/commons/forgerock-util/trunk/	20	N	N
OpenIDM	https://svn.forgerock.org/commons/forgerock-rest/trunk/	211	N	N
OpenIMAJ	svn://svn.code.sf.net/p/openimaj/code/trunk	2259	Y	N
OpenIoT	https://github.com/OpenIotOrg/openiot	130	N	N
OpenJDK	http://hg.openjdk.java.net/jdk8/jdk8/jdk	7828	Y	Y
OpenJDK	http://hg.openjdk.java.net/jdk8/jdk8/jaxp/	474	N	N
OpenJDK	http://hg.openjdk.java.net/jdk8/jdk8/jaxws	393	N	N
OpenJDK	http://hg.openjdk.java.net/jdk8/jdk8/langtools	1937	N	N
OpenJDK	http://hg.openjdk.java.net/jdk8/jdk8/hotspot/	5059	N	N
OpenJDK 6	http://hg.openjdk.java.net/jdk6/jdk6/hotspot/	2449	N	N
OpenJDK 6	http://hg.openjdk.java.net/jdk6/jdk6/jaxp/	77	N	N
OpenJDK 6	http://hg.openjdk.java.net/jdk6/jdk6/jdk	736	Y	Y
OpenJDK 6	http://hg.openjdk.java.net/jdk6/jdk6/jaxws	74	N	N
OpenJDK 6	http://hg.openjdk.java.net/jdk6/jdk6/langtools	143	N	N
OpenJDK 7	http://hg.openjdk.java.net/jdk7u/jdk7u/hotspot/	4619	N	N
OpenJDK 7	http://hg.openjdk.java.net/jdk7u/jdk7u/jaxp/	609	N	N
OpenJDK 7	http://hg.openjdk.java.net/jdk7u/jdk7u/jaxws	550	N	N
OpenJDK 7	http://hg.openjdk.java.net/jdk7u/jdk7u/jdk	6450	Y	Y
OpenJDK 7	http://hg.openjdk.java.net/jdk7u/jdk7u/langtools	1473	N	N
OpenJUMP	http://svn.code.sf.net/p/jump-pilot/code/	3676	Y	Y
OpenLaszlo	http://svn.openlaszlo.org/openlaszlo/trunk/	5734	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	3834	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	5978	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	4113	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	3143	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	3475	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	2584	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	6066	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	3087	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	2102	Y	N
OpenMRS Core	git://github.com/openmrs/openmrs-core.git	1	Y	N
OpenNMS	git://github.com/OpenNMS/installer.git	110	N	N
OpenOLAT	http://hg.openolat.org/openolat	2398	N	N
OpenPortal	https://svn.java.net/svn/portlet-container~svn/trunk	802	Y	N
OpenPortal	https://svn.java.net/svn/portal~svn/trunk/portal	2057	Y	Y
OpenPTK	https://svn.java.net/svn/openptk~svn/trunk/openptk	1371	N	N
OpenRefine	git://github.com/OpenRefine/OpenRefine.git	1862	Y	Y
OpenRemote	https://openremote.svn.sourceforge.net/svnroot/openremote/workspace	3403	Y	Y
OpenShift Java Client	git://github.com/openshift/openshift-java-client.git	197	Y	N
openstack-java-sdk	git://github.com/woorea/openstack-java-sdk.git	518	N	N
Opina: Online Survey Software	https://clinker.klicap.es/repos/opina/branches/2.x	2356	Y	Y
opscr	https://github.com/openmrs/openmrs-module-xforms.git	401	N	N
opscr	https://github.com/openmrs/openmrs-core.git	3834	Y	N
opscr	https://github.com/openmrs/openmrs-module-reporting.git	1048	N	N
opscr	https://github.com/openmrs/openmrs-module-calculation.git	172	N	N
opscr	https://github.com/openmrs/openmrs-module-reportingcompatibility.git	88	N	N
opscr	https://github.com/openmrs/openmrs-module-serialization.xstream.git	46	N	N
opscr	https://github.com/openmrs/openmrs-module-htmlwidgets.git	36	N	N
opscr	https://github.com/openmrs/openmrs-module-htmlformentry.git	818	N	N
opscr	https://github.com/openmrs/openmrs-module-patientflags.git	77	N	N
opscr	https://github.com/openmrs/openmrs-module-formentry.git	386	N	N
OrbisGIS	git://github.com/irstv/orbisgis.git	7772	Y	N
Orcc	git://github.com/orcc/orcc.git	7902	N	N
Orekit	http://www.orekit.org/git/orekit	2133	Y	N
OrientDB	git://github.com/nuvolabase/orientdb.git	5608	Y	N
Orika	http://orika.googlecode.com/svn/trunk/	177	N	N
Orika	git://github.com/elaatifi/orika.git	404	Y	N
Orika	https://github.com/orika-mapper/orika.git	519	Y	N
OSATE	git://github.com/osate/osate2-core.git	1761	N	N
OSATE	git://github.com/osate/osate2-plugins.git	310	N	N
OSATE	git://github.com/osate/osate2-core	1780	N	N
OSATE	git://github.com/osate/ErrorModelV2.git	366	N	N
OSIAM	https://evolvis.org/anonscm/git/osiam/osiam.git	4455	Y	Y
OSM2World	git://github.com/tordanik/OSM2World.git	443	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
OsmAnd	git://github.com/osmandapp/Osmand.git	8980	N	N
OsmAnd	git://github.com/osmandapp/OsmAnd-tools	474	Y	N
Overthere	git://github.com/xebialabs/overthere.git	636	N	N
ovirt-engine	git://gerrit.ovirt.org/ovirt-engine	9199	Y	N
OW2 PLAY Event Market-place	git://github.com/play-project/play-metadata.git	35	N	N
OW2 PLAY Event Market-place	git://github.com/play-project/play-governance.git	149	Y	N
OW2 PLAY Event Market-place	git://github.com/play-project/play-dsb-wsn-component.git	8	N	N
OW2 PLAY Event Market-place	git://github.com/play-project/play-platform.git	2	N	N
OW2 PLAY Event Market-place	git://github.com/PetalsLinkLabs/petals-dsb.git	579	N	N
OW2 PLAY Event Market-place	git://github.com/play-project/play-commons.git	116	N	N
OW2 PLAY Event Market-place	git://github.com/play-project/play-eventadapters.git	70	N	N
OW2 PLAY Event Market-place	git://github.com/play-project/play-dcep.git	592	Y	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/annotation-processor.git	7	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/archive.git	13	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/audit-report.git	10	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/base64.git	7	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/antrmic-maven-plugin.git	9	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/bundle-bouncycastle-java5.git	6	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/bundle-commons-collections.git	6	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/bundle-commons-logging.git	6	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/bundle-commons-modeler.git	7	N	N
OW2 Utilities	http://git.gitorious.ow2.org/ow2-utilities/base-ee-events.git	8	N	N
OWL API	git://github.com/ansell/owlapi.git	1183	Y	N
OWL API	https://owlapi.svn.sourceforge.net/svnroot/owlapi/v3/trunk/	990	Y	N
OWL API	git://git.code.sf.net/p/owlapi/code	1137	Y	N
OWL API	git://github.com/ignazio1977/owlapi.git	1191	Y	N
owlcms	https://code.google.com/p/owlcms/	968	N	N
OX-Framework	git://github.com/52North/OX-Framework.git	493	N	N
Palava	git://github.com/palava/palava-cache-oscache.git	44	N	N
Palava	git://github.com/palava/palava-captcha.git	42	N	N
Palava	git://github.com/palava/maven-ipcstub-generator.git	39	N	N
Palava	git://github.com/palava/palava-activecollab.git	21	N	N
Palava	git://github.com/palava/palava-bridge.git	170	N	N
Palava	git://github.com/palava/palava-cache.git	135	N	N
Palava	git://github.com/palava/palava-cache-ehcache.git	70	N	N
Palava	git://github.com/palava/palava-cache-infinispan.git	39	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Palava	`git://github.com/palava/palava-captcha-octo.git`	44	N	N
Pangool	`git://github.com/datasalt/pangool.git`	711	Y	Y
PathVisio	`http://svn.bigcat.unimaas.nl/pathvisio/trunk`	2835	Y	Y
Pax URL	`git://github.com/ops4j/org.ops4j.pax.url.git`	696	N	N
Pax URL	`git://github.com/ops4j/org.ops4j.pax.url.git`	542	N	N
Pax Web	`git://github.com/ops4j/org.ops4j.pax.web.git`	1817	Y	N
Pax Web	`git://github.com/ops4j/org.ops4j.pax.web.git`	1337	Y	N
Pax Web	`git://github.com/ops4j/org.ops4j.pax.web.git`	1247	Y	N
Pax Web	`git://github.com/ops4j/org.ops4j.pax.web.git`	1402	Y	N
Pax Web	`git://github.com/ops4j/org.ops4j.pax.web.git`	1491	Y	N
Pax Web	`git://github.com/ops4j/org.ops4j.pax.web.git`	1719	Y	N
PCGen :: An RPG Character Generator	`https://pcgen.svn.sourceforge.net/svnroot/pcgen/Trunk`	15637	Y	Y
PCGen :: An RPG Character Generator	`svn://svn.code.sf.net/p/pcgen/code/Trunk`	17356	Y	Y
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-actionsequence-plugin/trunk`	1696	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/bi-platform-webdriver-tests/trunk`	32	Y	Y
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-administration-console/trunk`	344	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-aggdesigner/trunk`	249	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-cubedesigner/trunk`	549	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-designstudio-core/trunk`	578	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-designstudioIDE/trunk`	685	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-designstudioIDE-linux/trunk`	587	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/pentaho-designstudioIDE-mac/trunk`	597	N	N
Pentaho BI Platform v1.x	`http://source.pentaho.org/svnroot/bi-platform-v2/trunk-closed/`	5149	Y	Y
Pentaho Reporting	`https://github.com/pentaho/pentaho-reporting.git`	969	N	N
pentaho-platform	`git://github.com/pentaho/pentaho-platform.git`	3268	Y	Y
Perka Flatpack	`git://github.com/perka/cli`	35	N	N
Perka Flatpack	`git://github.com/perka/flatpack-java.git`	228	N	N
Petals	`svn://svn.forge.objectweb.org/svnroot/petals/trunk`	12579	Y	N
Petals	`https://svn.petalslink.com/svnroot/trunk/product/dev`	1905	Y	N
Petals	`https://github.com/petalslink/petals-studio`	325	N	N
Petals DSB	`svn://svn.petalslink.com/svnroot/trunk/research/commons/dsb/`	472	N	N
Petals DSB	`git://github.com/PetalsLinkLabs/petals-dsb.git`	579	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
picard	`https://picard.svn.sourceforge.net/` `svnroot/picard/trunk/`	1020	N	N
picocontainer	`http://svn.codehaus.org/picocontainer`	5834	Y	Y
picocontainer	`git://git.codehaus.org/picocontainer-` `git.git`	296	Y	N
picocontainer	`git://github.com/picocontainer/` `picocontainer.git`	296	Y	N
PircBotX	`http://pircbotx.googlecode.com/hg`	1861	Y	N
PL/Java	`git://github.com/tada/pljava.git`	489	N	N
PMD	`git://github.com/pmd/pmd.git`	7106	Y	N
pms-mlx	`git://github.com/taconaut/pms-mlx.git`	2259	N	N
PNML Framework	`https://srcdev.lip6.fr/svn/research/` `ISOIEC-15909/Dev/Sources/pnmlFramework_` `2/trunk/CoreModel`	88	N	N
PNML Framework	`https://srcdev.lip6.fr/svn/research/` `ISOIEC-15909/Dev/Sources/pnmlFramework_` `2/trunk/PTNET`	83	N	N
PNML Framework	`https://srcdev.lip6.fr/svn/research/` `ISOIEC-15909/Dev/Sources/pnmlFramework_` `2/trunk/SN`	64	N	N
PNML Framework	`https://srcdev.lip6.fr/svn/research/` `ISOIEC-15909/Dev/Sources/pnmlFramework_` `2/trunk/HLPN`	52	N	N
PNML Framework	`https://srcdev.lip6.fr/svn/research/` `ISOIEC-15909/Dev/Sources/pnmlFramework_` `2/trunk/PTHLPNG`	10	N	N
PNML Framework	`https://srcdev.lip6.fr/svn/research/` `ISOIEC-15909/Dev/Sources/pnmlFramework_` `2/trunk/Utils`	146	N	N
policy	`https://svn.java.net/svn/policy~policy/` `trunk`	181	N	N
Pollen	`http://svn.chorem.org/svn/pollen/trunk`	1711	N	N
Portofino	`http://hg.code.sf.net/p/portofino/` `mercurial`	1895	N	N
ppwcode	`http://ppwcode.googlecode.com/svn`	6562	Y	Y
ProActive	`git://gitorious.ow2.org/ow2-proactive/` `programming.git`	9199	Y	N
ProActive	`git://gitorious.ow2.org/ow2-proactive/` `optimizing.git`	171	N	N
ProActive	`git://gitorious.ow2.org/ow2-proactive/` `scheduling.git`	10416	Y	N
ProActive	`git://gitorious.ow2.org/ow2-proactive/` `virtualizing.git`	118	Y	N
ProActive	`git://gitorious.ow2.org/ow2-proactive/` `workflow_studio.git`	606	N	N
ProActive	`git://gitorious.ow2.org/ow2-proactive/` `scheduling_rest.git`	356	Y	N
ProActive	`git://gitorious.ow2.org/ow2-proactive/` `scheduling_portal.git`	106	Y	N
Project Jigsaw	`http://hg.openjdk.java.net/jigsaw/jigsaw/` `hotspot/`	4611	N	N
Project Jigsaw	`http://hg.openjdk.java.net/jigsaw/jigsaw/` `jaxp/`	450	N	N
Project Jigsaw	`http://hg.openjdk.java.net/jigsaw/jigsaw/` `jaxws/`	416	N	N
Project Jigsaw	`http://hg.openjdk.java.net/jigsaw/jigsaw/` `jdk/`	7373	Y	Y
Project Jigsaw	`http://hg.openjdk.java.net/jigsaw/jigsaw/` `langtools/`	1843	N	N
Project Lambda	`http://hg.openjdk.java.net/lambda/lambda/` `hotspot/`	5118	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Project Lambda	`http://hg.openjdk.java.net/lambda/lambda/jaxp/`	521	N	N
Project Lambda	`http://hg.openjdk.java.net/lambda/lambda/jaxws/`	441	N	N
Project Lambda	`http://hg.openjdk.java.net/lambda/lambda/jdk/`	9389	Y	Y
Project Lambda	`http://hg.openjdk.java.net/lambda/lambda/langtools/`	2249	N	N
projectlombok	`git://github.com/rzwitserloot/lombok.git`	1357	Y	Y
ps3mediaserver	`git://github.com/ps3mediaserver/ps3mediaserver.git`	2316	N	N
psicquic	`http://psicquic.googlecode.com/svn/trunk/`	1123	N	N
psimi	`http://psimi.googlecode.com/svn/trunk/`	1693	N	N
Ptolemy II	`https://source.eecs.berkeley.edu/svn/chess/ptII/trunk`	63286	Y	Y
pulse - Java web app framework / CMS	`http://svn.code.sf.net/p/pulse-java/code/branches/0.7/trunk`	2941	N	N
PushTalk	`git://github.com/good-life/PushTalk.git`	98	N	N
Py4J	`git://github.com/bartdag/py4j.git`	354	Y	Y
qcadoo Framework	`git://github.com/qcadoo/qcadoo.git`	1598	N	N
qcadoo MES	`git://github.com/qcadoo/mes.git`	7631	N	N
qcadoo MES	`git://github.com/qcadoo/qcadoo.git`	1598	N	N
Qi4j - New Energy For Java	`git://github.com/Qi4j/qi4j-sandbox.git`	701	Y	N
QuackBot	`http://quackbot.googlecode.com/hg/`	308	N	N
Quartz Enterprise Job Scheduler	`http://svn.terracotta.org/svn/quartz/trunk`	1610	Y	Y
Quelea-projection	`https://code.google.com/p/quelea-projection/`	1037	Y	Y
Querydsl	`git://github.com/mysema/querydsl.git`	4530	Y	N
QuickFIX/J	`https://quickfixj.svn.sourceforge.net/svnroot/quickfixj/trunk`	831	Y	Y
QuickFIX/J - Open Source Java FIX Engine	`https://quickfixj.svn.sourceforge.net/svnroot/quickfixj/trunk/`	833	Y	Y
rabbitmq-java-client	`git://github.com/rabbitmq/rabbitmq-java-client.git`	2114	Y	Y
Rapla	`https://rapla.svn.sourceforge.net/svnroot/rapla/extensions`	1	N	N
Rapla	`https://rapla.svn.sourceforge.net/svnroot/rapla/trunk`	177	Y	Y
Rapla	`:pserver:anonymous:@rapla.cvs.sourceforge.net:/cvsroot/rapla`	11	N	N
Rapla	`:pserver:anonymous:@rapla.cvs.sourceforge.net:/cvsroot/rapla`	49	N	N
Rapla	`:pserver:anonymous:@rapla.cvs.sourceforge.net:/cvsroot/rapla`	1339	Y	Y
raptor-chess-interface	`http://raptor-chess-interface.googlecode.com/svn/trunk`	1615	N	N
raven-java	`git://github.com/kencochrane/raven-java.git`	787	N	N
React	`git://github.com/SpoutDev/React.git`	103	N	N
recurly-java-library	`git://github.com/killbilling/recurly-java-library.git`	106	Y	N
Red5	`http://red5.googlecode.com/svn/java/server/trunk`	2636	N	N
Red5	`http://red5.googlecode.com/svn/doc/trunk`	425	N	N
Red5	`http://red5.googlecode.com/svn/build/macosx/trunk`	9	N	N
Red5	`http://red5.googlecode.com/svn/flash/trunk`	94	N	N
Red5	`http://red5.googlecode.com/svn/java/example/trunk`	123	Y	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Red5	http://red5.googlecode.com/svn/java/plugins/trunk	85	Y	N
Redline	git://github.com/craigwblake/redline.git	279	Y	N
redline-smalltalk	git://github.com/jamesladd/redline-smalltalk.git	1341	N	N
reevoomark-java-api	git://github.com/reevoo/reevoomark-java-api.git	41	N	N
regola-kit	http://regola-kit.googlecode.com/svn/trunk	432	Y	N
Remote Application Platform	git://git.eclipse.org/gitroot/rap/org.eclipse.rap.git	8017	Y	N
Remote Application Platform	git://git.eclipse.org/gitroot/rap/org.eclipse.rap.tools.git	709	N	N
Rest Assured	git://github.com/jayway/rest-assured.git	691	Y	N
RESTEasy	https://resteasy.svn.sourceforge.net/svnroot/resteasy/trunk	1383	Y	N
RESTEasy	https://github.com/resteasy/Resteasy.git	2123	Y	Y
Restlet Framework	git://github.com/restlet/restlet-framework-java.git	7713	Y	Y
reunion	git://github.com/ReunionDev/reunion.git	497	N	N
reunion	git://github.com/ReunionDev/reunion-data.git	339	N	N
ReXSL	https://github.com/yegor256/rexsl.git	2012	N	N
RHQ Management Platform	git://git.fedorahosted.org/rhq/rhq.git	17307	Y	N
RHQ Management Platform	http://git.fedorahosted.org/git/rhq/rhq.git	0	Y	N
riak-java-client	git://github.com/basho/riak-java-client.git	778	Y	N
RichFaces	http://anonsvn.jboss.org/repos/richfaces/branches/community/3.3.X/	13620	Y	N
RichFaces	git://github.com/richfaces/components.git	1829	N	N
RichFaces	git://github.com/richfaces/dev-examples.git	859	Y	N
RichFaces	git://github.com/richfaces/vdl-doc.git	12	N	N
RichFaces	git://github.com/richfaces/shade-transformers.git	46	N	N
RichFaces	git://github.com/richfaces/checkstyle.git	38	N	N
RichFaces	git://github.com/richfaces/parent.git	80	N	N
RichFaces	git://github.com/richfaces/showcase.git	631	N	N
RichFaces	git://github.com/richfaces/sandbox.git	571	Y	N
RichFaces	git://github.com/richfaces/richfaces.git	4740	Y	N
Rio	git://github.com/dreedyman/Rio.git	1498	Y	N
Rio	git://github.com/dreedyman/Rio.git	980	Y	N
robolectric	git://github.com/pivotal/robolectric.git	3560	Y	N
Robotium	git://github.com/jayway/robotium.git	941	N	N
Robotium	git://github.com/hugojosefson/robotium.git	400	N	N
RokClock	http://github.com/rokstrnisa/RokClock.git	81	N	N
Roma Meta Framework	git://github.com/romaframework/roma-webwizard.git	17	N	N
Roma Meta Framework	git://github.com/romaframework/frontend.git	108	N	N
Roma Meta Framework	git://github.com/romaframework/core.git	166	N	N
Roma Meta Framework	git://github.com/romaframework/view-janiculum.git	161	N	N
Roma Meta Framework	git://github.com/romaframework/persistence-datanucleus.git	56	N	N
Roma Meta Framework	git://github.com/romaframework/mail.git	12	N	N
Roma Meta Framework	git://github.com/romaframework/chart-jfreechart.git	12	N	N
Roma Meta Framework	git://github.com/romaframework/users.git	43	N	N
Roma Meta Framework	git://github.com/romaframework/project-web.git	46	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Roma Meta Framework	git://github.com/romaframework/console.git	14	N	N
rrdws	https://rrdws.googlecode.com/hg/	587	Y	N
RSF	git://github.com/rsf/RSFUtil.git	1232	N	N
RSF	http://rsf.fluidproject.org/svn/projects/RSFHibernate3/trunk/	83	N	N
RSF	git://github.com/rsf/RSFComponents.git	175	N	N
RSF	git://github.com/rsf/SakaiRSF.git	175	N	N
RSF	git://github.com/rsf/PonderUtilCore.git	409	N	N
RSF	git://github.com/rsf/ServletUtil.git	240	N	N
RSF	git://github.com/rsf/SakaiRSFSamples.git	207	N	N
RunaWFE	https://runawfe.svn.sourceforge.net/svnroot/runawfe/RunaWFE-2.x	1459	Y	Y
RunaWFE	https://runawfe.svn.sourceforge.net/svnroot/runawfe/RunaWFE-3.x	2809	Y	Y
Rundeck	git://github.com/dtolabs/rundeck.git	2609	Y	N
SafeCreative Java API	https://code.google.com/p/safecreative-java-api/	135	N	N
sailfin-cafe	https://svn.java.net/svn/sailfin-cafe~svn/trunk	527	Y	N
SAPO Broker	svn://softwarelivre.sapo.pt/broker/trunk	1466	N	N
SAPO Broker	git://github.com/sapo/sapo-broker.git	1909	N	N
SAT4J	svn://svn.forge.objectweb.org/svnroot/sat4j/maven/trunk	1912	Y	Y
SBS	http://sbs.googlecode.com/svn/trunk/	128	N	N
sbt-plugin	git://github.com/jenkinsci/sbt-plugin.git	45	N	N
Scaffold Hunter	https://scaffoldhunter.svn.sourceforge.net/svnroot/scaffoldhunter/trunk/	1740	N	N
SCAPE	git://github.com/openplanets/scape.git	649	Y	N
SCENARI	http://scenari-platform.org/svn/dev-core/trunk	12675	Y	Y
Scirenderer	git://git.forge.scilab.org/scirenderer.git	216	N	N
scrimage	git://github.com/sksamuel/scrimage.git	285	N	N
Seam 2	git://github.com/seam/drools.git	110	N	N
Seam 2	git://github.com/seam/dist.git	233	N	N
Seam 2	git://github.com/seam/config.git	273	Y	N
Seam 2	git://github.com/seam/catch.git	287	Y	N
Seam 2	git://github.com/seam/build.git	72	N	N
Seam 2	git://github.com/seam/clouds.git	42	Y	N
Seam 2	git://github.com/seam/conversation.git	69	N	N
Seam 2	git://github.com/seam/cron.git	85	Y	N
Seam 2	git://github.com/seam/compatibility.git	14	N	N
Seam 3	git://github.com/seam/drools.git	110	N	N
Seam 3	git://github.com/seam/dist.git	233	N	N
Seam 3	git://github.com/seam/config.git	273	Y	N
Seam 3	git://github.com/seam/catch.git	287	Y	N
Seam 3	git://github.com/seam/examples.git	412	Y	N
Seam 3	git://github.com/seam/build.git	72	N	N
Seam 3	git://github.com/seam/clouds.git	42	Y	N
Seam 3	git://github.com/seam/conversation.git	69	N	N
Seam 3	git://github.com/seam/cron.git	85	Y	N
selenese-runner-java	git://github.com/vmi/selenese-runner-java.git	505	Y	N
semanticdiscoverytoolkit	http://semanticdiscoverytoolkit.googlecode.com/svn/trunk/	474	Y	Y
semanticvectors	http://semanticvectors.googlecode.com/svn/trunk	575	Y	Y
Sensei DB	git://github.com/senseidb/sensei.git	2124	Y	N
Sesame	http://repo.aduna-software.org/svn/org.openrdf/sesame/branches/2.6	1296	Y	N
Sesame	https://bitbucket.org/openrdf/sesame.git	3395	Y	N
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap.git	755	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
ShrinkWrap	git://github.com/shrinkwrap/descriptors.git	263	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/resolver.git	270	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap-descriptors-archive-integration.git	22	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap-container-jetty-70.git	24	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap-container-mobicents-13.git	24	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap-container-jetty-60.git	23	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap-container-tomcat-60.git	20	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap-container-glassfish-31.git	47	Y	Y
ShrinkWrap	git://github.com/shrinkwrap/shrinkwrap-container-openejb-31.git	43	Y	Y
siipapw-ex	http://siipapw-ex.googlecode.com/svn/trunk/siipapw-ex	2034	N	N
Silverpeas	git://github.com/Silverpeas/Silverpeas-Core.git	4304	Y	N
Silverpeas	git://github.com/Silverpeas/Silverpeas-Components.git	2630	Y	N
silvertrout	https://code.google.com/p/silvertrout	169	Y	N
Simbrain	http://simbrain.googlecode.com/svn/trunk/	2347	N	N
simplenlg	http://simplenlg.googlecode.com/svn/trunk/	97	Y	Y
Siyapath	http://siyapath.googlecode.com/svn/trunk/	202	Y	N
skylight1	http://skylight1.googlecode.com/svn/trunk/	794	N	N
slyum	https://code.google.com/p/slyum/	226	N	N
smap-suite	http://smap-suite.googlecode.com/svn/	2899	Y	Y
SnakeYAML	https://snakeyaml.googlecode.com/hg/	1477	Y	N
Sneer - The Sovereign Computing Platform	git://github.com/klauswuestefeld/sneer.git	8263	N	N
SOCIETIES-Platform	git://github.com/societies/SOCIETIES-Platform.git	8311	Y	Y
Sonar	git://github.com/SonarSource/sonar.git	6807	Y	N
Sonar	git://github.com/SonarSource/sonar-update-center.git	219	N	N
Sonar	git://github.com/SonarSource/sonar-dev-maven-plugin.git	84	N	N
Sonar	git://github.com/SonarSource/sonar-examples.git	316	Y	Y
Sonar	git://github.com/SonarSource/sonar-java.git	581	Y	N
Sonar	git://github.com/SonarSource/sonar-runner.git	260	N	N
Sonar	git://github.com/SonarSource/sonar-ant-task.git	101	N	N
Sonar C# Plugins Ecosystem	git://github.com/SonarCommunity/sonar-dotnet.git	1213	N	N
Sonar IDE	http://svn.codehaus.org/sonar-ide/trunk/	787	N	N
Sonar IDE	git://github.com/SonarSource/sonar-eclipse.git	877	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-javascript.git	319	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-openid.git	37	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-scm-activity.git	291	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-flex.git	271	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Sonar plugins	git://github.com/SonarCommunity/sonar-php.git	490	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-cas.git	24	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-ldap.git	96	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-groovy.git	127	N	N
Sonar plugins	git://github.com/SonarCommunity/sonar-python.git	178	N	N
Sonar plugins	git://github.com/SonarSource/sonar-java.git	581	Y	N
Sone	git://github.com/Bombe/Sone.git	2668	N	N
spacecmd	git://git.fedorahosted.org/spacewalk.git	26283	Y	N
Spacewalk	git://git.fedorahosted.org/git/spacewalk.git	26283	Y	N
Spark	http://svn.igniterealtime.org/svn/repos/spark/trunk	2165	Y	Y
spots-core-libraries	https://svn.java.net/svn/spots-core-libraries~svn/trunk	1174	Y	N
Spout	git://github.com/SpoutDev/Spout.git	5828	N	N
Spray	https://code.google.com/a/eclipselabs.org/p/spray/	1841	Y	N
Spring Data JPA	git://github.com/SpringSource/spring-data-jpa.git	363	Y	N
Spring Data MongoDB	git://github.com/SpringSource/spring-data-mongodb.git	1091	Y	N
Spring Framework	git://github.com/SpringSource/spring-batch.git	4445	Y	N
Spring Framework	git://github.com/SpringSource/spring-webflow.git	2395	N	N
Spring Framework	https://anonsvn.springsource.org/svn/spring-osgi/trunk	2167	Y	Y
Spring Framework	https://github.com/SpringSource/spring-data-commons.git	575	N	N
Spring Integration	git://github.com/SpringSource/spring-integration-templates	63	N	N
Spring Integration	git://github.com/SpringSource/spring-integration-samples	313	Y	N
Spring Integration	git://github.com/SpringSource/spring-integration-extensions	140	Y	N
Spring Integration Samples	git://github.com/SpringSource/spring-integration-samples.git	313	Y	N
Spring roo	git://github.com/SpringSource/spring-roo.git	4535	Y	N
spring-data-book	git://github.com/SpringSource/spring-data-book.git	209	Y	Y
spring-data-neo4j	git://github.com/SpringSource/spring-data-neo4j.git	1317	Y	Y
spring-data-solr	git://github.com/SpringSource/spring-data-solr.git	317	N	N
spring-jade4j	git://github.com/neuland/spring-jade4j.git	27	N	N
spymemcached	git://github.com/dustin/java-memcached-client.git	899	Y	Y
sqlpower-library	http://sqlpower-library.googlecode.com/svn/trunk	1875	Y	N
SQuirreL SQL Client	:pserver:anonymous:@squirrel-sql.cvs.sourceforge.net:/cvsroot/squirrel-sql	3440	Y	Y
SQuirreL SQL Client	https://squirrel-sql.svn.sourceforge.net/svnroot/squirrel-sql/trunk	6383	Y	Y
SQuirreL SQL Client	git://git.code.sf.net/p/squirrel-sql/git	6448	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
sshj	git://github.com/shikhar/sshj.git	389	N	N
starch	http://starch.googlecode.com/svn/trunk	129	Y	Y
Starjava	git://github.com/Starlink/starjava.git	9662	Y	Y
Steam Condenser	git://github.com/koraktor/steam-condenser-java.git	499	N	N
Stendhal	:pserver:anonymous:@arianne.cvs.sourceforge.net:/cvsroot/arianne	21929	Y	N
Stendhal	:pserver:anonymous:@arianne.cvs.sourceforge.net:/cvsroot/arianne	2205	N	N
Stendhal	git://arianne.git.sourceforge.net/gitroot/arianne/stendhaldeveloper.git	303	Y	Y
stripe-java	git://github.com/stripe/stripe-java.git	170	N	N
Struts 2	http://svn.apache.org/repos/asf/struts/struts2/trunk	2870	Y	N
su4j	https://bitbucket.org/fundacionctic/su4j	99	N	N
Sweble	git://sweble.org/git/tooling.git	31	N	N
Sweble	git://sweble.org/git/utils.git	35	N	N
Sweble	git://sweble.org/git/parser-toolkit.git	51	N	N
Sweble	git://sweble.org/git/sweble.git	16	N	N
Sweble	git://sweble.org/git/sweble-wikitext.git	86	N	N
Sweble	git://sweble.org/git/parser-toolkit.git	127	N	N
Sweble	git://sweble.org/git/sweble.git	20	N	N
Sweble	git://sweble.org/git/sweble-wikitext.git	324	N	N
Sweble	git://sweble.org/git/tooling.git	38	N	N
Sweble	git://sweble.org/git/utils.git	68	N	N
SymmetricDS	https://svn.code.sf.net/p/symmetricds/code/trunk	5330	Y	Y
TakaTuka Java Virtual Machine	https://takatuka.svn.sourceforge.net/svnroot/takatuka/trunk/	1568	Y	Y
Talend	http://talendforge.org/svn/tos/trunk/	29807	N	N
Talend	git://github.com/Talend/tesb-rt-se.git	3217	N	N
Talend Open Studio	http://talendforge.org/svn/tos/trunk/	29807	N	N
Tapestry	http://svn.apache.org/repos/asf/tapestry/tapestry4/trunk	1027	Y	N
Tapestry	http://svn.apache.org/repos/asf/tapestry/tapestry5/trunk	3256	Y	N
Tapestry	https://git-wip-us.apache.org/repos/asf/tapestry-5.git	4257	Y	N
Technic Launcher	git://github.com/TechnicPack/TechnicLauncher.git	910	N	N
Teiid	git://github.com/teiid/teiid.git	3981	Y	N
tempus-fugit	git://github.com/tobyweston/tempus-fugit.git	197	N	N
Terracotta	http://svn.terracotta.org/svn/tc/dso/trunk/	11230	N	N
Terracotta Forge	http://svn.terracotta.org/svn/forge/projects	26087	Y	Y
Terramenta	https://bitbucket.org/teamninjaneer/terramenta	136	N	N
TestNG	http://testng.googlecode.com/svn/trunk	926	Y	N
TestNG	git://github.com/cbeust/testng.git	2550	Y	N
The ADAMS Flow	https://svn.cms.waikato.ac.nz/svn/adams/trunk/	7450	Y	N
The ADAMS Flow	https://svn.cms.waikato.ac.nz/svn/adams-addons/trunk/	4	Y	N
The Chemistry Development Kit	https://cdk.svn.sourceforge.net/svnroot/cdk/cdk-taverna/trunk	384	Y	N
The Chemistry Development Kit	https://cdk.svn.sourceforge.net/svnroot/cdk/jchempaint/trunk	974	Y	N
The Chemistry Development Kit	git://github.com/cdk/cdk.git	13200	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
The Chemistry Development Kit	git://github.com/egonw/cdk.git	13187	Y	Y
The GeoViz Toolkit	http://geoviz.googlecode.com/svn/trunk	735	N	N
The Grinder	git://git.code.sf.net/p/grinder/code	4779	Y	N
thymeleaf	git://github.com/thymeleaf/thymeleaf-dist.git	377	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-gtvg.git	100	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-stsm.git	98	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-extrathyme.git	59	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-thvsjsp.git	48	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-sayhello.git	50	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-springsecurity.git	42	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-springmail.git	27	N	N
thymeleaf	git://github.com/thymeleaf/thymeleafexamples-petclinic.git	48	Y	N
thymeleaf	git://github.com/thymeleaf/thymeleaf-extras-springsecurity3.git	26	N	N
tiktak-project	git://github.com/tiktak-project/tiktak.git	248	N	N
tinkerpop's blueprints	git://github.com/tinkerpop/blueprints.git	1524	Y	N
tinkerpop's frames	git://github.com/tinkerpop/frames.git	236	Y	N
tinkerpop's furnace	git://github.com/tinkerpop/furnace.git	99	N	N
Tomighty	git://github.com/ccidral/tomighty.git	353	N	N
TomP2P	git://github.com/tomp2p/TomP2P.git	936	N	N
Toolsverse ETL Framework	http://svn.code.sf.net/p/toolsverseetl/code/trunk	15	Y	Y
Toolsverse ETL Framework	https://toolsverse-etl-framework.googlecode.com/svn/trunk/	30	Y	Y
ToPIA	http://svn.nuiton.org/svn/topia/trunk	1568	N	N
totallylazy	https://code.google.com/p/totallylazy/	1365	N	N
treetank	git://github.com/disy/treetank.git	4748	Y	N
Trove for Java	:pserver:anonymous:@trove4j.cvs.sourceforge.net:/cvsroot/trove4j	193	Y	Y
Trove for Java	https://trove4j.svn.sourceforge.net/svnroot/trove4j/main/trunk	110	Y	N
Trove for Java	https://bitbucket.org/robeden/trove.git	17	Y	N
TrueVFS	https://hg.java.net/hg/truevfs~v1	6537	N	N
twilio-java	git://github.com/twilio/twilio-java.git	249	N	N
twitter4j	git://github.com/yusuke/twitter4j.git	1610	N	N
Tynamo	http://svn.codehaus.org/tynamo/trunk/	2253	Y	N
Type Annotations Open-JDK project	http://hg.openjdk.java.net/type-annotations/type-annotations/langtools	2757	N	N
Type Annotations Open-JDK project	http://hg.openjdk.java.net/type-annotations/type-annotations/jdk	7946	Y	Y
Tyrus	git://github.com/tyrus-project/tyrus.git	685	Y	N
Ubimix	git://github.com/ubimix/org.ubimix.analyzer.git	1	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.iterator.git	10	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.adapters.git	12	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.json.rpc.servlet.git	5	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.events.git	24	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
Ubimix	git://github.com/ubimix/org.ubimix.commons.fs.git	13	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.osgi.git	9	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.json.git	22	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.rpc.git	27	N	N
Ubimix	git://github.com/ubimix/org.ubimix.commons.geo.git	19	N	N
uby	http://uby.googlecode.com/svn/de.tudarmstadt.ukp.uby/trunk/	255	Y	N
uDig	git://github.com/uDig/udig-platform.git	2793	N	N
UltraESB	https://bitbucket.org/adroitlogic/ultraesb	1292	Y	Y
UMLGraph	https://github.com/dspinellis/UMLGraph.git	525	N	N
unfolding	git://github.com/tillnagel/unfolding.git	595	Y	N
Unitils	https://unitils.svn.sourceforge.net/svnroot/unitils/trunk	1233	Y	N
Universal Password Manager	git://github.com/adrian/upm-swing	323	Y	Y
Universal-G-Code-Sender	git://github.com/winder/Universal-G-Code-Sender.git	260	Y	Y
upm-swing	git://github.com/adrian/upm-swing.git	323	Y	Y
utchess	http://utchess.googlecode.com/svn/trunk/	715	Y	Y
utterlyidle	https://code.google.com/p/utterlyidle/	779	N	N
Vaadin	http://dev.vaadin.com/svn/doc/trunk/	403	N	N
Vaadin	http://dev.vaadin.com/svn/addons/	3119	Y	Y
Vaadin	http://dev.vaadin.com/svn/contrib/	564	Y	Y
Vaadin	http://dev.vaadin.com/git/vaadin.git	12916	N	N
Vaadin	http://dev.vaadin.com/svn/doc/trunk	403	N	N
Vaadin	http://dev.vaadin.com/git/addons/timeline/timeline.git	346	Y	N
Vaadin	http://dev.vaadin.com/git/addons/calendar/calendar.git	263	Y	N
Vaadin Addon: Lazy Query Container	git://github.com/tlaukkan/vaadin-lazyquerycontainer.git	117	N	N
Validator.nu	http://hg.mozilla.org/projects/htmlparser/	752	Y	N
Vanilla	git://github.com/Vanilla/Vanilla.git	3455	N	N
verinice	http://svn.verinice.org/svnroot/TRUNK/	2964	N	N
VersionOne.Integration.Git	git://github.com/versionone/VersionOne.Integration.Git.git	162	Y	N
VersionOne.SDK.Java.APIClient	git://github.com/versionone/VersionOne.SDK.Java.APIClient.git	102	Y	N
VersionOne.SDK.Java.ObjectModel	git://github.com/versionone/VersionOne.SDK.Java.ObjectModel.git	61	Y	N
visage-lang	git://github.com/visage-lang/visage-javafx	86	Y	Y
visage-lang	git://github.com/visage-lang/visage-javafx-test	18	Y	Y
visage-lang	git://github.com/visage-lang/visage-compiler	6974	Y	Y
visage-lang	git://github.com/visage-lang/netbeans-plugin	4162	Y	Y
visage-lang	git://github.com/visage-lang/visage-android	13	Y	Y
VisualVM	https://svn.java.net/svn/visualvm~svn/trunk	2793	N	N
Vitral SDK	https://vitral.svn.sourceforge.net/svnroot/vitral/vitral/trunk	560	N	N
VRaptor 3	git://github.com/caelum/vraptor.git	3272	Y	Y
vt-middleware	http://vt-middleware.googlecode.com/svn/	2805	Y	Y

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
W3C CSS Validator	`:pserver:anonymous:anonymous@dev.w3.org:/sources/public`	2175	N	N
Waffle Web Framework	`git://github.com/dblock/waffle.git`	445	Y	Y
Wazaabi 2.0	`git://git.eclipse.org/gitroot/wazaabi/org.eclipse.wazaabi.git`	356	N	N
WebLab	`svn://svn.forge.objectweb.org/svnroot/weblab/trunk`	2505	Y	Y
WebLab	`svn://svn.forge.objectweb.org/svnroot/weblab/branches`	250	Y	Y
WebSocket-SDK	`https://svn.java.net/svn/websocket-sdk~source-code-repository/trunk`	191	Y	Y
WEKA	`https://svn.cms.waikato.ac.nz/svn/weka/trunk/packages`	813	N	N
Weld	`git://github.com/weld/extensions.git`	698	Y	N
Weld	`git://github.com/weld/api.git`	358	N	N
Weld	`git://github.com/weld/build.git`	153	N	N
Weld	`git://github.com/weld/core.git`	4797	Y	N
Weld	`http://github.com/weld/parent.git`	160	N	N
Weld	`http://anonsvn.jboss.org/repos/weld/archetypes/eap51-weld-jsf-webapp/trunk/`	8	N	N
Weld	`http://anonsvn.jboss.org/repos/weld/archetypes/javaee6-webapp/trunk/`	194	N	N
Weld	`http://anonsvn.jboss.org/repos/weld/archetypes/jsf-weld-servlet-webapp/trunk/`	16	N	N
Wicket	`https://git-wip-us.apache.org/repos/asf/wicket.git`	17337	Y	N
wicket-bootstrap	`git://github.com/l0rdn1kk0n/wicket-bootstrap.git`	693	Y	N
Wikitty	`http://svn.nuiton.org/svn/wikitty/trunk`	1507	Y	N
WildFly	`git://github.com/wildfly/wildfly.git`	12797	Y	Y
WoPeD	`:pserver:anonymous:@woped.cvs.sourceforge.net:/cvsroot/woped`	48	N	N
WoPeD	`:pserver:anonymous:@woped.cvs.sourceforge.net:/cvsroot/woped`	124	N	N
WoPeD	`:pserver:anonymous:@woped.cvs.sourceforge.net:/cvsroot/woped`	265	N	N
WoPeD	`:pserver:anonymous:@woped.cvs.sourceforge.net:/cvsroot/woped`	657	N	N
WoPeD	`:pserver:anonymous:@woped.cvs.sourceforge.net:/cvsroot/woped`	2	N	N
WoPeD	`:pserver:anonymous:@woped.cvs.sourceforge.net:/cvsroot/woped`	174	N	N
Worldwind Java	`http://worldwind31.arc.nasa.gov/svn/trunk`	1458	Y	Y
WSIT (Metro)	`https://svn.java.net/svn/metro~svn/trunk`	777	N	N
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/products/as/`	2888	Y	N
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/components/service-mgt`	786	Y	Y
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/components/webapp-mgt`	355	N	N
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/components/security`	736	N	N
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/components/reliable-messaging`	186	N	N
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/components/throttling`	266	N	N
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/components/caching`	220	N	N
WSO2 Application Server	`http://svn.wso2.org/repos/wso2/carbon/platform/trunk/components/wsdl2code`	155	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
WSO2 Business Process Server	https://svn.wso2.org/repos/wso2/branches/carbon/3.0.0/products/bps	150	Y	N
WSO2 Business Process Server	https://svn.wso2.org/repos/wso2/trunk/carbon	22818	Y	Y
WSO2 Carbon	https://svn.wso2.org/repos/wso2/carbon/platform/trunk/	16563	Y	Y
WSO2 Carbon	https://svn.wso2.org/repos/wso2/carbon/kernel/trunk/	23398	Y	Y
WSO2 Carbon	https://svn.wso2.org/repos/wso2/carbon/orbit/trunk/	1315	N	N
WSO2 Enterprise Service Bus (ESB)	https://svn.wso2.org/repos/wso2/carbon/platform/trunk/products/esb/	708	Y	N
WSO2 ESB	http://svn.wso2.org/repos/wso2/carbon/kernel/branches/4.0.0/	25484	Y	Y
WSO2 ESB	http://svn.wso2.org/repos/wso2/carbon/platform/branches/4.0.0/	0	Y	Y
WSO2 Stratos	https://svn.wso2.org/repos/wso2/trunk/stratos/vmware	2	N	N
WSO2 Stratos	https://svn.wso2.org/repos/wso2/carbon/kernel/trunk/	24523	Y	Y
WSO2 Stratos	https://svn.wso2.org/repos/wso2/carbon/orbit/trunk/	1315	N	N
WSO2 Stratos	https://svn.wso2.org/repos/wso2/carbon/platform/trunk/	16559	Y	Y
Xerial SQLite JDBC	https://bitbucket.org/xerial/sqlite-jdbc	571	N	N
XIncProc	git://github.com/etourdot/xincproc.git	85	N	N
xmemcached	git://github.com/killme2008/xmemcached	666	N	N
xtandem-parser	http://xtandem-parser.googlecode.com/svn/trunk/	188	N	N
XWiki	git://github.com/xwiki/xwiki-commons.git	2212	Y	N
XWiki	git://github.com/xwiki/xwiki-enterprise.git	3407	Y	N
XWiki	git://github.com/xwiki/xwiki-rendering.git	755	Y	N
XWiki	git://github.com/xwiki/xwiki-manager.git	636	Y	N
XWiki	git://github.com/xwiki/xwiki-platform.git	23970	Y	N
XWiki	git://github.com/xwiki/xwiki-eclipse.git	641	N	N
XWiki	git://github.com/xwiki/xwiki-office.git	244	N	N
XWiki	git://github.com/xwiki/xwiki-dev-tools.git	222	N	N
XXL-eXtensible and fleXible Library	http://xxl.googlecode.com/svn/trunk/	88	N	N
Xydra	http://xydra.googlecode.com/svn/trunk/	3058	Y	N
YaCy	git://gitorious.org/yacy/rc1.git	9788	Y	Y
Yakindu Statechart Tools	http://svn.codespot.com/a/eclipselabs.org/yakindu/SCT2/trunk	2812	N	N
Yapbam	http://svn.code.sf.net/p/yapbam/code/Yapbam	1493	N	N
Yes-Cart	http://yes-cart.googlecode.com/svn/trunk/	912	N	N
Yougi	git://github.com/htmfilho/yougi.git	402	Y	N
yubico-java-client	git://github.com/Yubico/yubico-java-client.git	197	N	N
Zanata	git://github.com/zanata/zanata.git	9128	Y	N
zend-webapi	https://zend-webapi.googlecode.com/svn/trunk/	210	N	N
zipwhip-api	git://github.com/Zipwhip/zipwhip-api.git	489	N	N
ZK	git://github.com/zkoss/zk	19070	N	N
ZK	git://github.com/zkoss/zk	16248	N	N
ZK	git://github.com/zkoss/zk	9985	N	N
ZK	git://github.com/zkoss/ztltest	761	Y	N
ZK	git://github.com/zkoss/ztltest	53	Y	N
ZK - Simply Ajax and Mobile	https://zk1.svn.sourceforge.net/svnroot/zk1/addon	382	N	N

Table 7: Complete listing of applications studied, continues to next page

Project Name	Repository URL	Commit #	Uses JUnit	Forks JUnit
ZK - Simply Ajax and Mobile	`https://zk1.svn.sourceforge.net/svnroot/zk1/trunk`	9650	Y	Y
ZXing	`http://zxing.googlecode.com/svn/trunk`	2535	Y	N

Table 7: Complete listing of applications studied