

Table 1 The detailed information of the selected systems

| Index | Software | Version Number | Introduction | TNC | TNE | ANM | ANA | ALC |
|-------|--------------------|----------------|---|------|-------|-------|------|--------|
| 1 | Elasticsearch | 1.6.0 | Elasticsearch is a distributed RESTful search engine built for the cloud. | 4152 | 12748 | 7.05 | 2.21 | 161.78 |
| 2 | Android-async-http | 1.4.7 | An asynchronous, callback-based Http client for Android built on top of Apache's "HttpClient" libraries. | 73 | 126 | 6.75 | 4.27 | 157.68 |
| 3 | Iosched | 2013 | This project is the Android app for the conference. | 495 | 1057 | 5.78 | 3.93 | 127.59 |
| 4 | Libgdx | 1.6.2 | LibGDX is a cross-platform Java game development framework based on OpenGL (ES) . | 1988 | 4572 | 7.22 | 2.67 | 105.6 |
| 5 | Androidannotations | 3.3.1 | AndroidAnnotations is an Open Source framework that speeds up Android development. | 696 | 1948 | 4.79 | 3.94 | 79.2 |
| 6 | Okhttp | 2.4.0 | An HTTP & SPDY client for Android and Java applications. For more information see the website and the wiki. | 239 | 522 | 4.70 | 3.04 | 249.83 |
| 7 | RxJava | 1.0.12 | RxJava is a Java VM implementation of Reactive Extensions: a library for composing asynchronous and event-based programs by using observable sequences. | 436 | 951 | 7.65 | 3.52 | 220.88 |
| 8 | Spring-framework | 4.2.0 | The Spring Framework provides a comprehensive programming and configuration model for modern Java-based enterprise applications -- on any kind of deployment platform | 6139 | 16014 | 6.32 | 4.55 | 155.54 |
| 9 | Zxing | 4.7.3 | ZXing is a multi-format 1D/2D barcode image processing library implemented in Java, with ports to other languages. | 4703 | 9241 | 5.71 | 4.01 | 138.26 |
| 10 | MPAndroidChart | 2.1.0 | MPAndroidChart is an easy to use chart library for Android. | 149 | 297 | 10.54 | 3.62 | 202.7 |

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| 11 | Netty | 4.0.29 | Netty is an asynchronous event-driven network application framework for rapid development of maintainable high performance protocol servers & clients. | 1674 | 3790 | 4.76 | 3.19 | 167.98 |
| 12 | Guava | 18.0 | The Guava project contains several of Google's core libraries that we rely on in our Java-based projects | 1733 | 2614 | 5.00 | 3.66 | 242.95 |
| 13 | Junit | 4.12 | JUnit is a simple framework to write repeatable tests. | 395 | 528 | 5.71 | 5.97 | 97.67 |
| 14 | Presto | 0.108 | Presto is a distributed SQL query engine for big data | 2212 | 3974 | 7.78 | 3.54 | 142.45 |
| 15 | Glide | 3.6.0 | Glide is a fast and efficient open source media management and image loading framework for Android. | 419 | 797 | 7.55 | 3.32 | 118.84 |
| 16 | Disruptor | 3.3.2 | A High Performance Inter-Thread Messaging Library | 178 | 356 | 5.70 | 3.29 | 109.94 |
| 17 | Stetho | 1.1.1 | Stetho is a sophisticated debug bridge for Android applications | 176 | 283 | 4.61 | 5.56 | 98.26 |
| 18 | Titan | 0.9.0 | Titan is a highly scalable graph database optimized for storing and querying large graphs with billions of vertices and edges distributed across a multi-machine cluster. | 986 | 2522 | 5.21 | 1.47 | 118.70 |
| 19 | Fastjson | 1.2.6 | Fastjson is a JSON processor written in Java | 1436 | 2624 | 3.11 | 2.07 | 85.63 |
| 20 | AndroidAsync | 2.1.6 | AndroidAsync is a low level network protocol library. | 213 | 397 | 8.15 | 3.21 | 123.01 |
| 21 | gradle | 2.4 | Gradle is a build tool with a focus on build automation and support for multi-language development | 5337 | 12341 | 4.14 | 4.02 | 73.30 |
| 22 | HoloEverywhere | 2.1.0 | Bringing Holo Theme from Android 4.1 to 2.1 and above. | 271 | 515 | 15.816 | 7.26 | 249.96 |
| 23 | Storm | 0.10.0 | Similar to how Hadoop provides a set of general primitives for doing batch processing, Storm provides a set of general primitives for doing realtime computation. | 845 | 1544 | 6.33 | 3.07 | 152.16 |

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| 24 | Guice | 4.0 | Put simply, Guice alleviates the need for factories and the use of new in your Java code | 545 | 1551 | 6.64 | 4.62 | 156.37 |
| 25 | Dubbo | 2.4.11 | Dubbo is a distributed service framework empowers applications with service import/export capability with high performance RPC | 1210 | 2486 | 6.69 | 3.60 | 135.48 |
| 26 | Orientdb | 2.0.11 | OrientDB is an Open Source NoSQL DBMS with the features of both Document and Graph DBMSs | 2040 | 3883 | 9.06 | 3.86 | 187.72 |
| 27 | Neo4j | 2.2.3 | Neo4j is the world's leading Graph Database. It is a high performance graph store with all the features expected of a mature and robust database, like a friendly query language and ACID transactions | 4546 | 7458 | 5.28 | 3.73 | 146.06 |
| 28 | jna | 4.1.0 | JNA provides simplified access to native library methods without requiring any additional JNI or native code | 383 | 734 | 8.42 | 5.90 | 346.30 |
| 29 | Smile | 1.0 | SmileMiner (Statistical Machine Intelligence and Learning Engine) is a set of pure Java libraries of various state-of-art machine learning algorithms | 764 | 1421 | 7.33 | 2.51 | 192.88 |
| 30 | Tachyon | 0.6.4 | Tachyon is a memory-centric distributed storage system enabling reliable data sharing at memory-speed across cluster frameworks, such as Spark and MapReduce. | 445 | 958 | 5.78 | 3.87 | 300.21 |
| 31 | ExoPlayer | 1.3.3 | ExoPlayer is an application level media player for Android | 240 | 639 | 8.35 | 7.79 | 186.19 |
| 32 | Grails | 3.0.2 | Grails is a framework used to build web applications with the Groovy programming language | 780 | 1397 | 9.53 | 3.49 | 146.9 |
| 33 | Mockito | 2.0.23 | Mockito is a framework for unit tests in Java | 943 | 1712 | 4.34 | 9.02 | 102.08 |

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| 34 | Mongo-java-driver | 3.0.2 | The MongoDB Java Driver providing both synchronous and asynchronous interaction with MongoDB | 1365 | 2171 | 5.61 | 8.43 | 131.39 |
| 35 | Hibernate-orm | 5.0 | Hibernate ORM is a component/library providing Object/Relational Mapping (ORM) support to applications and other components/libraries | 7732 | 13574 | 5.17 | 4.04 | 124.7 |
| 36 | Deeplearning4j | 0.0.3.3.4 | Deeplearning4J is an Apache 2.0-licensed, open-source, distributed neural net library written in Java and Scala. | 633 | 1250 | 7.419 | 6.05 | 131.39 |
| 37 | Hazelcast | 3.4.4 | Hazelcast is a clustering and highly scalable data distribution platform for Java | 3885 | 7163 | 3.67 | 5.30 | 120.50 |
| 38 | Jadx | 0.6.0 | Jadx is a java decompiler is used for produce Java source code from Android Dex and Apk files | 493 | 763 | 6.29 | 4.26 | 94.34 |
| 39 | Blueprints | 2.6.0 | Blueprints is a property graph model interface. It provides implementations, test suites, and supporting extensions | 311 | 492 | 8.70 | 5.49 | 145.63 |
| 40 | Quasar | 0.7.2 | Quasar is a library that provides high-performance lightweight threads, Go-like channels, Erlang-like actors, and other asynchronous programming tools for Java | 569 | 1020 | 9.10 | 6.88 | 167.46 |
| 41 | Cucumber-jvm | 1.3.20 | Cucumber is a tool for running automated tests written in plain language | 520 | 844 | 4.93 | 4.31 | 65.97 |
| 42 | Webmagic | 0.5.2 | A scalable crawler framework. It covers the whole lifecycle of crawler: downloading, url management, content extraction and persistent | 232 | 361 | 3.76 | 3.38 | 73.82 |
| 43 | Zookeeper | 3.5.1 | Apache ZooKeeper is an effort to develop and maintain an open-source server which enables highly reliable distributed coordination | 540 | 1090 | 6.64 | 5.96 | 197.85 |

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| 44 | Ninja | 1.5.3 | Ninja is a small build system with a focus on speed. | 406 | 1082 | 5.65 | 7.26 | 110.61 |
| 45 | Rundeck | 2.5.1 | Rundeck is an open source automation service with a web console, command line tools and a WebAPI. | 753 | 1694 | 7.67 | 5.52 | 151.47 |
| 46 | Moco | 0.10.1 | Moco is an easy setup stub framework. | 943 | 2212 | 4.34 | 6.02 | 102.08 |
| 47 | Flyway | 3.2.1 | Flyway is an open-source database migration tool. It strongly favors simplicity and convention over configuration. | 352 | 595 | 3.22 | 4.36 | 96.90 |
| 48 | Flume | 4.3.1 | Flume is a distributed, reliable, and available service for efficiently collecting, aggregating, and moving large amounts of log data. | 545 | 1226 | 7.04 | 3.12 | 164.82 |
| 49 | Astyanax | 3.6.0 | Astyanax is a high level Java client for Apache Cassandra. Apache Cassandra is a highly available column oriented database. | 135 | 345 | 7.19 | 5.89 | 84.45 |
| 50 | Syncany | 0.4.5 | Syncany is a cloud storage and filesharing application with a focus on security and abstraction of storage. | 587 | 1348 | 5.97 | 4.02 | 121.35 |

Where *TNC* represents the total number of classes, *TNE* denotes the total number of edges in the class-level network, *ANM*, *ANA* and *ALC* are the average number of methods, average number of attributes, and average lines of code, respectively.