**OPEN-SOURCE**

Open-source are the software tools that are freely available without a commercial license across the web. Open Source denotes products which contains permission to use its source code, design documents or contents.

Open-source tools are commercially licensed and available to users for free. Popular examples of open-source tools include many of the software products from the Apache Foundation, such as big-data tool Hadoop, GIT, Eclipse, Node etc. These are freely available, with the licensing held by a user community, instead of a company making a profit from software. Anyone can use freely, share, and change open source software in modified or unmodified form.

**Values of Open Source**

One of the greatest advantages of open source is it can used from anyone and can be implemented to anywhere since the source is easily available. The business value of open source software (OSS) goes beyond a company’s bottom line. The concept of freeware was introducing in 90’s when the internet popularity is at the peak. It encourages the open collaborations. Also, Open-sourcing is the act of propagating the open source movement widely and effectively.

**Below are the Few Open Source Tools Listed**

**Testing Open-source Tools**

Test management tools are very important to any test team. Test teams use these tools to help capture requirements, design test cases, map test cases to requirements, test execution reports and much more.

1. **Selenium WebDriver**: - It was originally developed by Jason Huggins in 2004, Selenium gets its name from Greek Word ‘Selene’, which means Moon. The Selenium WebDriver is the most popular testing tool which caters different testing needs. It has an object-oriented API for testing modern complex web applications. It is quite like UFT, only that Selenium focuses on automating web-based applications. This was developed by Selenium to support dynamic web pages.

**Pros of Selenium WebDriver**

* Capable of testing across web browsers like Firefox, Chrome, IE etc.
* Independence of using C#, Java, Perl, PHP, Python, JS(Node) and Ruby as scripting languages.
* Tests for user-like actions on the web application.
* Parallel execution on multiple machines is possible which saves time and effort.
* Can be used for more complex testing such as production monitoring and load testing and API is also possible by creating the JSON file.

**Cons of Selenium WebDriver**

* One of the major cons of Selenium is, it supports web browsers testing only.
* Test maintenance is difficult, say due to the element waits in applications using AJAX.
* Users need to learn and use different frameworks to standardize the testing process.
* Proper implementation methods, if not followed, will slow down the testing.
* No official technical support from any organizations or individuals.

1. **Capybara**: - Capybara is a web-oriented test automation software which is used to simulates the scenarios for user stories and automates web application testing. Capybara is popularly used for end-to-end, acceptance and integration testing the Rack applications like Rails, Sinatra. It helps to test web application by simulating how a real user would interact with web applications.

**Pros of Capybara**

* It supports behavior-driven software development which simulates scenarios for user stories and automates web application.
* Interaction with JavaScript is easy, and implementation is smooth.
* It has an intuitive API to simulates real user actions on an application. For example, hidden elements/links are not clicked by a user, so they are avoided.
* It is one of the best tools to aid you to interact with browser functionality in your code.
* It easily integrates with all the common test automation framework used with Rails.

**Cons of Capybara**

* Detailed knowledge of the software required before implementations.
* Experiencing is required for opting the Capybara.
* High memory consumption when using multiple drivers for testing.
* Tests become easy due to smaller changes in model/controller, text or design.
* Debugging is difficult compare to other automation tools.

1. **JMeter**: - JMeter is primarily used to test the performance of any web applications. It can be also used to test loading times for static and dynamic elements in a web application. JMeter discover the maximum number of users that website can handles. It provides variety of graphical analyses of performance reports. One of the major points if JMeter is that a tester can simulate a heavy load on a server, group of servers, network or object to test their strengths.

**Pros of JMeter**

* Installation is very easy, it can be installed on any desktop. Very light weight tool.
* Test IDE allows test recording from browsers or native applications.
* Ability to extract data from popular response formats like HTML, JSON, XML or any textual format.
* Easily available plugins, for example, visualization plugin for data analysis and other plugins for representations.
* It has a user-friendly interface or can be used in a command line interface.

**Cons of JMeter**

* It can be used only on web-based applications.
* It doesn’t support JavaScript and by extension doesn’t automatically support AJAX request.
* Complex applications that use dynamic content like CSRF tokens or use JS to alter request can be difficult to test using JMeter. Complex scenario cannot be done using JMeter thread group
* Consumption of memory is high in GUI mode and performance testing like Load, Stress with high users, which causes it gives out errors for many users.

**Database Management Open-source Tools**

In today’s world, databases play a major role in the infrastructure of companies and how they operate or manage their operations. Any website you browse and any mobile application you download must have a database running on the back-end to support the operations, you see on your desktop or mobile.

1. **MySQL:** - MySQL is one of the popular relational databases management system for web-based applications. “My” is the name of co-founder Michael Widenius's daughter, and "SQL", stands for Structured Query Language. It’s free and open source software. My SQL is based on client-server model. This database engine allows you to select from a variety of storage engines that enable you to change the functionality of the tool and handle data from different table types. It also has an easy to use interface, and batch commands let you process enormous amounts of data. Many big web applications like Facebook, Twitter, YouTube, Google, and Yahoo! use MySQL for data storage purposes.

**Pros of MySQL**

* It is designed for Web, Cloud and Big Data. It is easy to maintain with value of providing high performance.
* It is very scalable and flexible in terms of Web and data warehouse strength
* It is one of the secure data protection freeware. It is Fast, portable, and secure
* It can be made to work with other databases, including DB2 and Oracle**.**

**Cons of MySQL**

* It is restricted for complex business logics. There are few stability issues.
* Prior knowledge is a must to understand the concept of MySql.
* Transactions are not handled very efficiently and may cause problem in colleting data.
* You may spend a lot of time and efforts to get MySQL to do things that other systems do automatically, like create incremental backups or plans.
* Support is available for the free version, but you’ll need to pay for it.

1. **Oracle 12:** -Oracle E-Business Suite (EBS) version 12,Oracle is constantly at the top of lists of popular databases and used widely across everywhere when it comes to handle the database. The first version of this database management tool was created in late 70s, and there are several editions has been released to perform the task.

The newest version of Oracle, 12c, C stands for Clouds, is designed for the cloud and can be hosted on a single server or multiple servers, and it enables the management of databases holding billion of records. Since, we all know the importance of data in our corporate life.

**Pros of Oracle12**

* Multiple data base support, there is no database size restrictions.
* You can archive rows within a table by marking them as inactive. These inactive rows are in the database and can be optimized using compression but are not visible to the application.
* You can now have invisible columns in a table. When a column is defined as invisible, the column won’t appear in generic queries.
* Earlier if you had to restore a table, you had to do all sorts of things like restoring a tablespace and or do Export and Import. The new restore command in RMAN simplifies the task.
* Oracle support cursor which ease programming when programming is needed. A cursor basically lets you do row-by-row processing.

**Cons of Oracle12**

* The cost of Oracle can be prohibitive, especially for smaller organizations.
* The system can require significant resources once installed, so hardware upgrades may be required to even implement Oracle.
* Handling is sometime difficult to manage, hence might be chance of losing data if not handle correctly.

1. **PostgreSQL:** - PostgreSQL is one of several free popular databases, and it is frequently used for web databases. It allows users to manage both structured and unstructured data. It can also be used on most major platforms, including Linux-based ones, and it’s simple to import information from other database types using the tool. This database management engine can be hosted in several environments, including virtual, physical and cloud-based environments.

**Pros of PostgreSQL**

* This database management engine is scalable and can handle terabytes of data.
* It supports JSON.
* There are a variety of predefined functions.
* Several interfaces are available.

**Cons of PostgreSQL**

* Documentationcan be spotty, so you may find yourself searching online to figure out how to do something.
* Configuration can be confusing.
* Speed may suffer during large bulk operations or read queries.

**IDEs Open-source Tools**

IDEs stands for integrated development environment, it is a software application that provides a platform to the developers or computer programmers to facilitates the software developments. It comes in the forms of an application programs. An IDE normally consists of a source code editor, build automation tools and a debugger. Most modern IDEs have intelligent code completion. Some IDEs contain a compiler, interpreter, or both, such as Net Beans and Eclipse; others do not, such as SharpDevelop and Lazarus.

1. **Eclipse: -** In computer programing, Eclipse is an integrated development environment, it consists of workspace where programmers or developers operate the operations. Eclipse is mostly written in Java, but It may also use to develop applications in programming languages via plug-ins, including Ada, ABAP, C, C++, C#, Clojure, COBOL, D, Erlang, Fortran, Groovy, Haskell, JavaScript, Julia, Lasso, Lua, NATURAL, Perl, PHP, Prolog, Python, R, Ruby (including Ruby on Rails framework), Rust, Scala, and Scheme.

**Pros of Eclipse**

* It is free, and it is easily running on Linux, Mac, Solaris, and Windows.
* Debugging is easy and code writing is easy.
* It is flexible in use, vast array of plugins available for eclipse make it easy and valuable tool.
* Integrated with version control tools GIT, SVN which make it easy to handle the pipelines.
* Server integrations is easy – Run Tomcat, JBoss inside the workspace.

**Cons of Eclipse**

* It is very heavyweight, has lots of plugins to install which makes it bit lengthy to operate.
* Customization is difficult, uninstallation of add-ins is difficult.
* Debugger pane is slow in operation since it contains lots of information’s which are sometime useless.
* It requires large amount of system resources which leads to crash and loss of work.

1. **NetBeans: -** NetBeans is an open source integrated development environment, it supports development of all Java application types (Java SE (including JavaFX), Java ME, web, EJB and mobile applications) and PHP, C++, and other programming languages. It includes modular components across a wide range of tools and features an IDE (integrated development environment) that allows developers to create applications using a GUI.

**Pros of NetBeans**

* Auto completion is the code make it easier to code and debug.
* Running server-based applications is easy to operate.
* Installation is easy and quick, integration is flexible with other tools.
* NetBeans is very good for the creation of testing scripts for automation testing.

**Cons of NetBeans**

* It takes lots of time start initially.
* Code conversion option is limited in another source language.
* There are problems in code execution time and start time if they are high complexity and too heavy.
* Import code option is limited and debugger is less efficient.

1. **Open Perl IDE: -** Open Perl IDE is a visual, integrated development environment for writing and debugging Perl scripts with any standard Perl distribution under Windows 95/98/NT/2000. For Perl development you can either use a plain text editor or an Integrated Development Environment, also called IDE. Perl are used widely as scripting language.

**Pros of Open Perl IDE**

* Open perl IDE is dynamic in nature. It is very useful for graphical programming.
* Often used in scripting, and one of the Platform to create tools for System Administration.
* Open Perl Can be Imperative, Procedural, Functional or Object Oriented, depends upon need.
* It is mature and multi-purpose language.

**Cons of Open Perl IDE**

* As scripting, it is slower for a lot of tasks.
* Oops concept is not fully implemented, and it is difficult to implement.
* Tough to manage if the lines of code extend.
* Syntax and argument handling in the script is poor.

**Editors Open-source Tools**

Open-sourcing is the act of propagating the open source movement. Editor is one of the most powerful and advance tools which has been used on a large scale.

1. **Crimson Editor: -** Crimson Editor has been published by the Ingyu Kang. Crimson Editor is a freeware editor which is mostly used for the Microsoft windows. It is a professional editor for windows. It is basically used for the source code editor. You can call it the one of the best alternatives to the Notepad as well because it offers the additional editing features in the shape of editing in several programming languages as well.

**Pros of Crimson Editor**

* Open last working file automatically, it remembers all the positions where changes happens
* Regular expression has been supported in the Crimson Editor.
* Automatic spell check and correction has been imported.
* It is a very lightweight, it also supports tabs.

**Cons of Crimson Editor**

* It is supported to windows only.
* It has a limited new syntax support for new languages
* User defined language doesn't support triple quote strings
* Update notifications are not smooth

1. **Syn Text Editor: -** It is Syn Text is a highly customizable text and programming editor, Syn features syntax highlighting for many languages, active scripting, macro recording, the ability to launch a program (e.g. a Compiler) and capture the output, support for projects, etc. This advanced text editor comes with the basic features and functions of syntax highlighting and saving of the files in multiple file formats. The simple editing functions of this text editor allow the users to perform standard to advanced text editing like changing the format and case, setting bookmarks, inserting current time and data, search system and much more.

**Pros of Syn Text Editor**

* It is highly flexible and customizable text editor
* It supports removable storage media platform.
* Syn Text Editor is simply a perfect text editor for dealing with a large amount of data and text files.
* It is very helpful in performing large set of data.

**Cons of Syn Text Editor**

* Maintenance of Syn Text is bit difficult. There is problem in stability while maintaining the data.
* Update notifications are not smooth

**Artificial Intelligence Open-source Tools**

In computer science, AI is signifying as “Intelligent Agent”, John McCarthy is the father of Artificial Intelligence, Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think. Artificial intelligence is an exceptional technology following the futuristic approach. It helps you maintain accuracy and increase productivity with better results. AI makes it possible for machines to learn from experience. AI emphasizes the creation of intelligent machines that work, operate and react like human beings

1. **TensorFlow**: - TensorFlow is an open-source machine learning framework used for Artificial Intelligence and designed in Python programming language, it is designed by the Google brain team to implement machine and deep learning concept in the easiest manner. It is basically developed to conduct machine learning and deep learning for research and production. TensorFlow allows developers to create dataflow graphics structure, it moves through a network or a system node, and the graph provides a multidimensional array or tensor of data.

**Pros of TensorFlow**

* It supports multiple platforms which includes ‎Linux‎, ‎macOS‎, ‎Windows‎, and Android
* Source is easily available since it is developed by Google team and which is a freeware.
* It is backed by a big and good company called google. It is nicely coded and documented.
* Simplifies the numeric computation.
* TensorFlow offers flexibility on multiple models.

**Cons of TensorFlow**

* Advance coding knowledge is required to understand the AI logics and programs.
* The feature that is most required when it comes to variable length sequences are the symbolic loops. TensorFlow doesn’t offers this feature, but is a workaround using finite unfolding.
* TensorFlow lacks behind in both speed & usage when compared to its competitors.
* TensorFlow has an odd structure, so it’s hard to find an error and difficult to debug.

1. **OpenNN**: - It stands for “Open Neural Networks” written in C++ programing Language, OpenNN is an open-source artificial intelligence which help people to build neural network models without the need of programming. It helps you develop robust models with C++ and Python while containing algorithms and utilities to deal with machine learning solutions like forecasting and classification. OpenNN implements data mining methods as a bundle of functions and it is the most successful machine learning method.

**Pros of OpenNN**

* It supports multiple platforms which includes ‎Linux‎, ‎macOS‎, ‎Windows‎, and Android
* Source is easily available since it is developed by Google team and which is a freeware.

**Cons of OpenNN**

* It provides the high level of dependence, which in turns required experience in the tools for it to perform activities.
* Not a user friendly as commercial freeware.
* It lacks the extensive tech support which in turns no vendor level maintenance and help. Lack solid customer support teams.
* Command-lines interface required extensive inputs of commands.