Promoting Open Source Technology in Education: NetBeans : The Perfect Open Source IDE

[1]**Rakesh Sharma,** [2,3] **Sonymol Koshy**

[1]Baddi University of Emerging Sciences & Technology, Baddi, Solan (HP), India
[2]Research Scholar Graphic Era University
[3]Dept of Comp. Sc ,N.D.A Khadakwasla, Pune, Maharashtra, India

Abstract

The NetBeans IDE is an award-winning integrated development environment available for Windows, Mac, Linux, and Solaris. The NetBeans project consists of an open source IDE and an application platform that help developers to rapidly create web, enterprise, desktop, and mobile applications.It offers a full-fledged IDE that runs on multiple platforms and has support for almost every popular language you want to code in. Many developers are migrating their applications to the NetBeans IDE from some of the top IDE's like Eclipse PDE , Zend Studio, Macromedia Dreamweaver Ultradev. Many of the users and students using Borland's JBuilder previously, were equally happy and comfortable with the NetBeans IDE.

Keywords :

IDE, Eclipse, academics, developers

I. Introduction

As an academic involved in teaching Computer Science for almost twenty years, I have continuously faced the challenge of keeping in touch with the major and continuous changes taking place in terms of the programmers working environment. I have seen a number of languages come and then go obsolete .I have worked with assembler, BASIC, Pascal, COBOL, Fortran, C, C++ and Java. I have done so using Intel hardware platforms running UNIX and MSDOS in command line interface mode and then MS Windows and Linux in the GUI mode . Moreover , these have also been the first teaching languages used over the years to introduce students specializing in computer science to programming in universities and even in the lower levels i.e. schools .Somehow because of our Indian students partiality to Microsoft Technologies , Turbo IDEs and Borland's programming IDE with Pascal, C, C++ and Java were used ,though initially DOS and command line mode was used for the same.

Due of my research on free software , I have always been on the lookout for a good IDE that I could work both under Microsoft and Linux especially for academic and teaching purposes. I tried using both NetBeans and Eclipse ,but ultimately found NetBeans 6.8 custom made for my requirements.

II. NetBeans

The NetBeans IDE is an award-winning integrated development environment available for Windows, Mac, Linux, and Solaris. The NetBeans project consists of an open source IDE and an application platform that help developers to rapidly create web, enterprise, desktop, and mobile applications.It offers a full-fledged IDE that runs on multiple platforms and has support for almost every popular language you want to code in . IT Consultant, Danial Oz says

'The platforms supported are Java , JavaFX, PHP, JavaScript and Ajax, Ruby and Ruby on Rails, Groovy and Grails, and C/C++" [7].

The NetBeans project is supported by an extremely active and vibrant developer community and includes detailed and broad documentation and training resources. An extensive collection of third-party plugins are also available for Netbeans .

The NetBeans integrated development environment (IDE) can boost your productivity to a great extend . Visual tools that generate skeleton code are also available, letting you create a basic application without writing a single line of code.

III. The top features of NetBeans IDE![13]

A. Works Out of the Box

Out of the box is the term used to denote items, functionalities, or features that do not require any additional installation .You can directly download and install the NetBeans IDE and use it directly . Installation is easy with its small download size. Since all IDE tools and features are fully integrated there is no need to search out for plug-ins and they work well together when you launch the IDE [1].

B. Free and Open Source

When you use the NetBeans IDE, you automatically become part of the open source community where thousands of users are ready to help and contribute.You will find discussions on the Netbeans mailing lists , blogs on PlanetNetBeans, and very helpful FAQs.

C. Connected Developer

The NetBeans IDE is the tool of choice for teams working in a collaboration environment [2]. You can create and manage projects, file issue tracking reports and collaborate with like-minded developers directly from within the familiar interface of the IDE. You can set up a connection to a local installation of Oracle Database Express Edition (XE) from the NetBeans IDE, use the IDE's built-in SQL editor to handle the database data, and also enable to write PHP code that connects to an Oracle database.

D. Powerful GUI Builder

You can build great GUIs using the GUI Builder that supports a sophisticated yet simplified Swing Application Framework and Beans Binding.

E. Support for Java Standards and Platforms

The IDE provides end-to-end solutions for all Java development platforms including the latest Java standards.
1. Java Mobility Support provides a complete environment to create, test, debug and run applications for mobile devices. With pre-processor blocks, you can readily handle fragmentation issues. Support for Java Mobility development is the best among all Java development tools. These applications created in Visual Mobile Development ,run on mobile phones, set-top boxes, and PDAs using JavaFX Mobile and the Java ME SDK 3.0 Platform.
2. Java Enterprise Edition (EE) 6 support:
Netbeans is the first free, open-source IDE to support Java

EE 6 specifications. Java Enterprise and Web Applications can be built applications using CSS, JavaScript, and JSP . Support for frameworks includes JSF (Facelets), Struts, Spring, Hibernate, and a full set of tools for Java EE 6, CDI, GlassFish 3, EJB, and web services development.

F.   Java Standard Edition (SE) Support:
You can develop applications using the latest Java SE standards. You can create professional standards-based user interface with the NetBeans Swing GUI Builder.

G.   Profiling and Debugging Tools
The NetBeans IDE profiler enables you to get real time update of memory usage and potential performance bottlenecks. Furthermore, you can instrument specific parts of code to avoid performance degradation during profiling.You can evaluate Java heap contents and find memory leaks using the HeapWalker tool .

H.   Dynamic Language Support
The NetBeans IDE provides integrated support for scripting languages such as JavaFX, Ruby and Ruby on Rails, PHP, Groovy, Python and Ajax Development & JavaScript.

1.   PHP
Using NetBeans IDE for PHP, is one of the great combinations for enhanced productivity of an IDE (code completion, real-time error checking, debugging and more) with the speed and simplicity of a brilliant text editor in a less than 30mb download. You can even create a PHP project from a remote PHP application .

2.   Ruby and Ruby on Rails Support
Ruby is a dynamic open-source programming language. It has an easily readable syntax and focuses on simplicity and productivity. Rails is a framework that enables you to quickly create database-based web applications that are based on the model-view-controller architecture [4]. Both native Ruby and JRuby development on Rails are available and also let a user switch easily between the two. Ruby provides extensive editing capabilities making it easy to create and modify Ruby applications.

3.   Python Applications
Python is an extremely versatile open source dynamic programming language renowned for its clear syntax, object-oriented simplicity and ease of integration with modules written in Java and other languages. [5]

4.   JavaScript
The NetBeans IDE has the JavaScript tools you need: an intelligent JavaScript editor, CSS/HTML code completion, the ability to debug JavaScript in Firefox and IE, and bundled popular JavaScript libraries.[9]
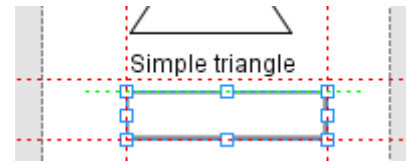
5.   Groovy
Groovy is a dynamic, object-oriented programming language for the Java platform with similar capabilities as Python and Ruby, but with a syntax very similar to Java, making it easy for Java developers to learn and use. In the NetBeans IDE, you can now create Grails applications, integrate Groovy scripts with your JavaSE project.

6.   JavaFX
The NetBeans IDE is the official tool for JavaFX development. You can see the visual code live in the editor, and analyze your application's performance with the JavaFX Profiler. The JavaFX Composer can be used to lay out JavaFX GUI applications visually, just as in the case of the Swing GUI builder for Java SE applications [2].
JavaFX Composer is very good to create form-like UI components and access to various data sources.

Added and improved editor hints, debugging, refactoring Enhanced Palettes for JavaFX Shapes, Colors, Effects, and Charts and Improved code formatting are some of the salient features [3].
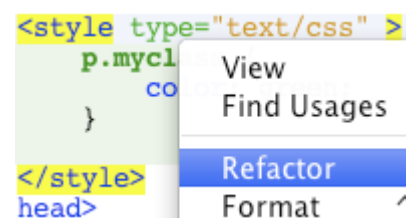The latest JavaFX SDK 1.2.1 provides :Improved code completion ,Editor Hints like Fix Imports, Surround With, Implements Abstract Methods, and more
Improved navigation: Hyperlinks, Go to Type, Find Usages

7.   JavaScript and Ajax Development
JavaScript is an object-oriented scripting language primarily used in client-side interfaces for web applications. Ajax (Asynchronous JavaScript and XML) is a Web 2.0 technique that allows changes to occur in a web page without the need to perform a page refresh. JavaScript toolkits can be optimized to implement Ajax-enabled components and functionality in web pages.

I.   Extensible Platform
The platform can be extended and along with its Swing-based foundation saves development time and can optimize performance. It facilities include a Java Debugger, New Applet and Web Start (JNLP) support etc .Support for annotation processors are provided within the editor, and are configurable in the Project Properties .[2]

Web Languages support : HTML, CSS, JavaScript are supported with features like Code completion and hyper linking for id and class selector attributes and also Refactoring inline CSS styles .
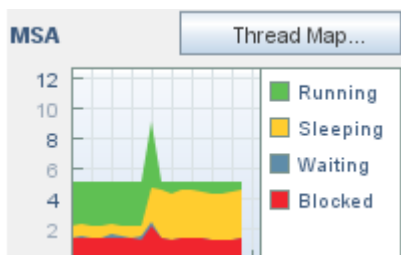
J.   Customizable Projects
The NetBeans IDE provides a build process, through which you can easily customize projects and add functionality. You can build, run, and deploy projects to servers outside of the IDE. Working with projects in maven , Groovy , Scala , Kenai, OSGi with increased interoperability and support is a key feature .There is a branding Editor for both Ant and Maven Platform-based projects . Enhanced support for consuming

web services and connecting to databases is also one of the strong points .

K. Non-Java Code Support

Netbeans does not limit you to the Java programming language. You can include many other programming languages, such as C/C++, scripting languages like JavaScript, Ruby, etc. You can even define your own language and include it in your projects. C and C++ Development is also strongly supported. Edit, profile, and debug and perform Unit test integration with C/C++ projects .Faster synchronization during remote development is seen including remote file download and browsing [13].

Profiling features include a new Microstate Accounting indicator, Thread Map view, Hot Spots view, Memory Leaks view and Sync Problems view . There is a gdbserver attach making it easier attaching to already running processes

Other Assorted Features

Database integration: Code completion in SQL Editor now also for DELETE, DROP, UPDATE statements, and for reserved keywords .

Groovy 1.6.4 & Grails: Improved code completion, including methods introduced via AST Transformations

L. Dedicated Support Available

When you can't get the help you need from the community, consider Developer Support Packages, which offer programming advice, software support, and training credits.

M. Java Card

Support for creating Java Card Connected3servlets,classic and extended applets,Backward compatibility with Java Card 2.2.x and Java Card Classic Debugging, and multiple Java Card Platform/Device creation, Alignment with Java Card Reference Implementation
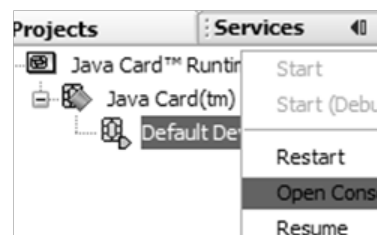
IV. Why are People Switching to the NetBeans IDE!

Many developers are migrating their applications to the NetBeans IDE from other IDEs. Some of the top IDE's are Eclipse PDE, Zend Studio, Macromedia Dreamweaver Ultradev, Komodo IDE, Notepad++ and NetBeans. NetBeans offers a full-fledged IDE that runs on multiple platforms and very good to share with people

working under MS and Linux. Academics teaching Computer Science are using it for their teaching as well !

Netbeans provides developers with a consistent look and feel across all of its supported languages. NotePad++ is not good for C/C++/Java, so use NetBeans. Code::Blocks, is a great IDE, but acts inconsistent with certain errors . NetBeans and Eclipse, are both pretty good with Java. Eclipse was nice, but NetBeans has a much more comfortable feel to it. NetBeans, has some cool features that Eclipse doesn't have!.

Macromedia Dreamweaver Ultradev and other DW tools are troubled with traditional bugs on release 1 of any version. Aptana, is a good PHP IDE with debugging built and great facilities. But they have dropped all PHP support from the tool, changed the FTP method , and moreover it looks like it has no more long term plans to support PHP developers [8]. NetBeans comes out the winner among PHP IDE's – it is not based on a bloated Eclipse platform, and being free, the price factor is a bonus . Since NetBeans 6.8 was released, lot many developers think that it is the right choice for our development needs in the future. It is very good for project-wide and XHTML code completion, code refactoring, and includes a full debugger. It has a high level of support for HTML, CSS, and JavaScript code as well [10].

NetBeans is very good with the responsiveness without sacrificing high-level functionality. It has a feature set that seems to predict exactly what you want and would have designed into the product. The main difference between Eclipse and Netbeans in my opinion is, that Netbeans focuses on providing the very basic functionality for a developer. It is very well tested and provides a great integration with databases and application servers [11].

The best part of Netbeans is that no complicated configuration is necessary. NetBeans unpacks and sets up easily and works right away. Compared to Eclipse ,for Servlet development you will see a great integration of the development environment. It takes a lot of time to conFig. Eclipse to properly develop web components. NetBeans is pre-conFig.d to develop, debug, and deploy web components quickly onto Tomcat which is included with the download. You will be amazed how quickly you could deploy a new web application [11].

NetBeans is an IDE that stands out above all others as far as cost and features are concerned. It's completely free. It offers a built-in FTP client and supports subversion publishing. It is very small, fast, and has many built-in features that help create better code, more efficiently. Netbeans is hands down the best IDE, with the least about of bugs, and virtually no learning curve for almost all types of users.

Some features available in NetBeans [12]
- highlighting a variable highlights it everywhere in the file, making it easy to see where it is been used.
- crtl+clicking a method call navigates to the method

declaration
• Any file can be quickly opened via a keyboard shortcut
• ctrl+space automatically suggests variable names

The user interface of NetBeans is perceptive, and the drag and drop palettes are easy and transparent. The automatic integration of Frameworks (along with the tutorials) makes working with new Java technologies relatively easy. One can implement MVC easily without having to memorize vast directory structures. The built-in example apps are self-explanatory and highly instructive. You can write and deploy web based support applications from some of the clients in as little as an hour or two.

Many users are using NetBeans for all of their Ruby, Groovy, and eventually Scala development and have started of with trying it in an enterprise development environment. Despite the fact that they spent $1000 this year investing in Zend's product, and spending time with Zend's tech support and developers , they are migrating over to use NetBeans for most of the development [14].

Macromedia Dreamweaver Ultradev and other DW tools are fine if one does not get fed up with the continual costs of upgrading and the traditional bugs on release 1 of any version. Why would anyone spend $250 for IntelliJ , $1000 in Zend's product when you can get NetBeans for free? [14].

V. NetBeans best as compared to other IDEs:

1. Great GUI builder
2. Great Ant integration (no more hand-keeping consistency between IDE and separate build script!)
3. Great and CONSISTENT IDE user interface (no more user interface mess like in Eclipse). Very decent JSP Editor, plus seamless integration with Tomcat saving a lot of time.
4. Great IDE speed (faster than Eclipse that literally freezes the desktop). Incremental deployments an awesome feature which again ends up saving precious time.
5. Great Debugger. It actually works well with web applications.
6. Great Profiler (easy and effective - you feel like using simple wizard and get exact information)
7. Everything in NetBeans is out of the box. It has an HTTP monitor that actually works.
8. Code sharing (collaboration).

VI. Features that are better in Eclipse - by Experts

Eclipse Veteran David Heffelfinger switches To NetBeans but misses the some features of Eclipse. He thinks the CVS/Subversion integration is better in Eclipse Additionally, in Eclipse ctrl+O can be used to quickly open an outline of the current Java file, then typing in the first few letters of a method or variable filters the ones displayed in the outline.This feature combined with the "quick file open" helps lightning fast navigation to a specific segment of the code.Eclipse can be set up so that a semicolon is automatically placed at the end of the current line [12].

He says ,"All in all, with the improvements made to the NetBeans editor, the tight integration with Maven, and the painless way of setting up a JSF project (essentially, all required code completion and features works "automagically") NetBeans has now surpassed Eclipse in usability. Count me in as a new convert."

Harshad Oak, founder of Rightrix Solutions and the editor of IndicThreads.com says "Recently downloaded the new NetBeans 6.1 beta and was impressed. I already had the latest JDeveloper and Eclipse on my machine".

VII. Finally in Education

Netbeans works out of the box both under Windows XP and other open source platforms. As an academic, I have found it an excellent tool to easily develop non-GUI Java applications and programming assignments for the Object Oriented Programming modules. Many of the users and students using Borland's JBuilder previously, were equally happy and comfortable with the new NetBeans IDE.

NetBeans for me is a great tool for people looking for a good programming IDE. Since it offers a full-fledged IDE that runs on multiple platforms and has support for almost every popular language you want to write the code in, it can be extremely helpful for users looking for a common IDE. It saves time spent in learning to set environments and instead can concentrate on the finer points of the programming language and architecture. This has also led me to advocate and encourage my colleagues to actively start using it for their teaching.

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Dr. Rakesh Sharma, is Ph.D. & M.Tech in CSE and an alumnus of BITS-Pilani where he completed his B.E. (Honours) before joining the Armed Forces in the Corps of Signals. He launched the first Electronic Exchange at Command HQ, Lucknow and the first INMARSAT terminal at Siachen, Ladakh (world's highest battlefield), commanded the biggest Signal Compay of MP, Bihar and Orissa Area, programmed the entire communication set up of Army Training Command at Mhow prior to its moving out to Shimla and as Group Commander NCC Group HQ of Meghalaya proposed and ensured that NCC is made compulsory for the North Eastern Regions and the J&K. After serving as Colonel he left the services to join Higher Education.

Branch Counsellor for the IEEE Chapter of Uttarakhand, Fellow with the IETE, New Delhi and the IE, Kolkatta, Life Member of the ISTE and ICS, he has served as Director, Principal and Dean of Engineering for reputed Institutes / Colleges and Universities all over North India for the last 8 years. He has also finished his PGDM and is currently pursuing another Ph.D in Management. An instructor with the Para Sailing, an avid sports fan – a Medalist and Ranked Weightlifter and Powerlifter, he has raised Army's Teams in Taekwondo, Weightlifting and Athletics. Authored 4 books on Army Communication, is Guide to 5 and co-guide to 4 Research Scholars, Chief Editor of International Journal with 11 International Papers and 20 plus National Papers. Awarded by the IBM for the TGMC Contest the Officer has shared the dias with the VCs of BITS, Pilani & UTU Doon, and presided over the International Seminar sponsored by INTEL and IL&FS.

Sonymol Koshy was awarded the B.E.(CSE) degree from Marathwada University Maharashtra, India, in 1990, M. Tech(IT) from Allahabad Agricultural University, Allahabad , India in 2006 and is presently pursuing Ph.D in Computer Science and Engineering from Graphic Era University, Dehradun, Uttarakhand, India .She started her career as an instructor to Defence cadets at the prestigious National Defence Academy, Khakwasla , Pune , India and is currently conducting collaborative research in open source software at Apex Institute of Technology, Kaushalganj U.P., India. Due to her interest in object oriented programming ,she worked for sometime as a software developer in Web based Java applications and EJB. She has authored and edited many books based on Computer Applications and core Java . Her main research interests are Open Source Software in Education and Industry .