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EVALUATION OF IDE DEBUGGING TOOLS: ECLIPSE VS NETBEANS

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Abstract:

The Integrated Development Environment (IDE) provides many debugging tool to limit coding errors and facilitate error correction. It avoids software failure, reduce development and maintenance cost, improve customer agreement and software quality. There are many tools in IDE providing source code editor, build computerization tools and a debugger. Most modern IDEs have quick code completion. Some IDEs contain a compiler, interpreter, or both, such as NetBeans and Eclipse. Both include the concept of plug-ins in that Eclipse was more advantageous than NetBeans, because Eclipse is a complex structure of interconnecting components, delivering all of the functionality. There is literally no monolithic core or base, just a tiny runtime which loads and executes plug-ins. In Eclipse terms: "all is a plug-in". The compatibility between Eclipse and NetBeans based on these attributes: Complexity, Functionality, Extensibility, Flexibility, and Usability to provide additional sources and to solve specific problems and to increase efficiency, because the programmer spending less time in re-writing code and debugging. It also constructs bug report and the bug tracker using the open source Eclipse Bugzilla project from Mozilla.

Keywords— **Integrated Development Environment (IDE), Everything is a plug-in, Complexity, Functionality, Extensibility, Flexibility, and Usability**

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I. INTRODUCTION

An Integrated Development Environment (IDE) or interactive development environment is a software application that provides comprehensive facilities to computer programmers for software development. 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 NetBeans and Eclipse. Many modern IDEs also have a class browser, an object browser, and a class hierarchy diagram, for use in object-oriented software development. The IDE is designed to limit coding errors and facilitate error correction with tools such as the "NetBeans" FindBugs to locate and fix common Java coding problems and Debugger to manage complex code with field watches, breakpoints and execution monitoring.

IDE Tools

There are many IDE tools available for source code editor, built automation tools and debugger. Some of the tools are,

- Eclipse
- NetBeans
- Code::Blocks
- Code Lite
- Dialog Blocks

Eclipse

Eclipse is an integrated development environment (IDE). It contains a base workspace and an extensible plug-in system for customizing the environment. Written mostly in Java, Eclipse can be used to develop applications. By means of various plug-ins, Eclipse may also be used to develop applications in other programming languages: Ada, ABAP, C, C++, COBOL,

Fortran, Haskell, JavaScript, Lasso, Lua, Natural, Perl, PHP, Prolog, Python etc.

The stated goals of Eclipse are "to develop a robust, full-featured, commercial-quality industry platform for the development of highly integrated tools. "To that end, the Eclipse Consortium has been focused on three major projects:

1. The Eclipse Project is responsible for developing the Eclipse IDE workbench (the "platform" for hosting Eclipse tools), the Java Development Tools (JDT), and the Plug-in Development Environment (PDE) used to extend the platform.

2. The Eclipse Tools Project is focused on creating best-of-breed tools for the Eclipse platform. Current subprojects include a Cobol IDE, a C/C++ IDE and an EMF modelling tool.

3. The Eclipse TechnologyProjects focuses on technology research, incubation, and education using the Eclipse platform.Plug-ins In computing, a plug-in (or add-in / addin, plugin, extension or add-on / addon) is a software component that adds a specific feature to an existing software application. When an application supports plug-ins, it enables customization.

Eclipse Plug-ins

Eclipse is an extensible platform for building IDEs. It provides a core of services for controlling a set of tools working together to support programming tasks. Tool builders contribute to the Eclipse platform by wrapping their tools in pluggable components, called *Eclipse plug-ins*, which conform to Eclipse's plug-in contract.

II. RELATED WORK

Modern applications are developed using components implemented in many different technologies, Creating an effective integrated development environment (IDE) for use in programming these applications presents some special challenges because a large number of different tool technologies have to be tightly integrated in support of development task flows. In order to meet these challenges, the Eclipse Platform was designed to serve as the common basis for diverse IDE-based products, providing open APIs (Application Programming Interfaces) to facilitate this integration.

The IDE part of the project known as SaveIDE still lacks many features in terms of usability to be considered a good user-friendly environment for the end users to work with. Since SaveIDE is designed as a set of plug-ins in Eclipse, this thesis tries to investigate the features of different Eclipse modeling tools used in the design of the IDE to further improve its usability features.
In order to achieve this goal, several usability guidelines and suggestions are examined and offered to be considered and used in the improvement process of SaveIDE. This can help readers and other developers get a better picture of how to integrate the usability guidelines with Eclipse modeling tools in order to make SaveIDE more user-friendly.

TinyOS is a widely used open source operating system for embedded systems written in NesC. NesC code is first compiled into a C program which is then processed by an ordinary C compiler. Since there is no dedicated NesC debugger a normal C debugger is used for debugging. C debugger is unaware of the NesC code so the user has to have some knowledge about the implementation of the NesC compiler, something a TinyOS developper should not have to worry about. This paper presents a solution which allows the developer debug a TinyOS application without being aware of the implementation of the NesC compiler. A TinyOS debug plug-in for Eclipse is presented. The Eclipse plug-in facilitates debugging by integrating support for variable examination, breakpoints and automatic launching of debug sessions. First testers have found the presented Eclipse plug-in to be a useful tool for TinyOS developers.

III. PREVIOUS IMPLEMENTATIONS

Eclipse and NetBeans IDEs

The basic versions of both Eclipse and NetBeans offer very similar standard capabilities. You get the auto-complete options for Java code so you can select from a menu rather than typing everything out. You get pointers on debugging and optimizing code as you go along. GUI builders, version control and other IDE features are also included.

IBM offer IDE

Eclipse was rolled out successfully to a much larger user population earlier than NetBeans. By 2003,

Eclipse already had a substantial following in the IBM community. Acceptance spiked even higher when IBM released control of the IDE to the newly created Eclipse Foundation. IBM revamped its own products during the same time period to rely heavily on the Eclipse platform. Today, Eclipse is viewed as a well-proven platform that commercial vendors can build on to create their own set of products and that enterprise users can rely on for internal application development.

Eclipse System Architecture

The Eclipse SDK includes the Eclipse Java Development Tools, offering an IDE with a built-in incremental Java compiler and a full model of the Java source files. This allows for advanced refactoring techniques and code analysis. Eclipse's widgets are implemented by a widget toolkit for Java called SWT, unlike most Java applications, which use the Java standard Abstract Window Toolkit (AWT) or Swing.

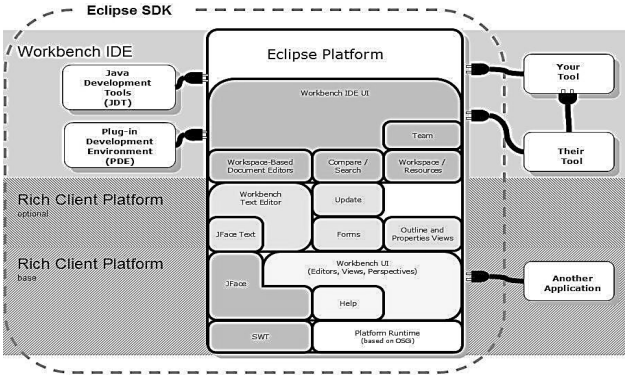

Fig. 1.1 Eclipse System Architecture

NetBeans System Architecture

NetBeans is an IDE for developing software applications in Java, JavaScript, PHP, Python, C/C++, etc. NetBeans is also a platform framework that can be used for developing desktop applications in Java. NetBeans was developed in Java.

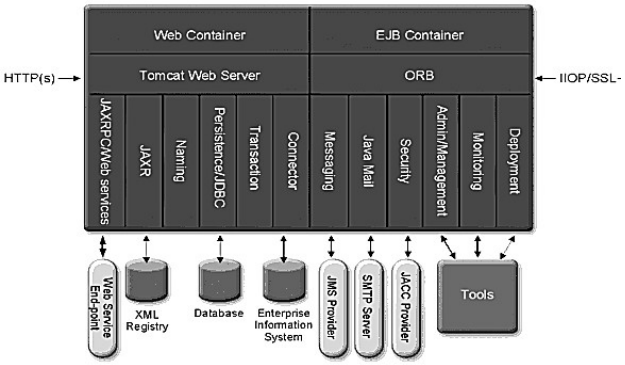

Fig 1.2 NetBeans System Architecture

IV. SYSTEM IMPLEMETNATION

4.1 Difference between Eclipse and Netbeans

NetBeans and Eclipse are two of the most popular free and open source Java IDE, they have their differences. Support for Maven is better in NetBeans. Because you can get GlassFish with Java EE package for NetBeans, it is easier to use than in Eclipses (as you have to configure GlassFish separately). NetBeans comes with build-in GUI builder for Swing, but you need to use a separate plug-in in Eclipse. The general opinions within the Java community about these two IDE are fairly similar.

4.2 Eclipse Vs NetBeans

1) Platform Support

There is no difference between the both of them under this segment. Eclipse and NetBeans have cross-platform support. You can have this application running on Windows, Mac, Linux, Solaris and any other platform, as long as JVM (Java Virtual Machine) is installed.

2) Multiple Language Support

Both have a wide range of programming language support, which includes C/C++, Java, JavaScript and PHP. But how do you get this support is an interesting part. Eclipse is a plugin based IDE. Large part of its functionality comes from plugins. On the other hand NetBeans has many projects and is a tool based IDE. It incorporates many platforms using tooling support. Thus making it less scattered.

3) Java Support

NetBeans has a strong support when you are developing MVC based application in Java. Servlet/JSP development is fairly very simple compared to Eclipse, especially in the field of deployment and debugging.

4) Database Support

NetBeans comes with in-built support for and SQL, MySQL and Oracle drivers plus it includes some others too. So this definitely makes things easy for beginners. However Eclipse has JDBC driver support – but it takes some serious time to configure the connection.

Comparing Java IDEs: Eclipse Vs NetBeans

5) Eclipse

Eclipse has been in existence from the year 2001, ever since IBM released Eclipse as an open source platform. Managed by the non-profit Eclipse Foundation, this is used in both open source and commercial projects. Starting in a humble manner, this has now emerged as a major platform, which is also used in several other languages. The greatest advantage of Eclipse is that it features a whole plethora of plugins, which makes it versatile and highly customizable.

NetBeans

NetBeans was independently developed in the latter half of the 1990s. It emerged as an open source platform after it was acquired by Sun in 1999. Now a part of Oracle, this IDE can be used to develop software for all versions of Java ranging between Java ME, up to the Enterprise Edition. Like Eclipse, NetBeans too features a variety of plugins you can work with.

NetBeans offers you various different bundles – 2 C/C++ and PHP editions, a Java SE edition, the Java EE edition that offers everything you will ever need for your project.

Which of the following IDEs do you MOSTLY use for development today?	Count	Percent of Responses	Percent of Cases
Microsoft Visual Studio .NET	411	26.8	53.0
Eclipse	195	12.7	25.2
Macromedia Studio MX	116	7.6	15.0
Oracle Developer Suite	108	7.1	14.1
Borland JBuilder	78	5.1	10.1
IBM WebSphere Studio	67	4.4	8.6
Sun Java Studio	67	4.4	8.6
IBM Rational Developer	59	3.9	7.6
NetBeans	51	3.3	6.6
BEA Weblogic Workshop	47	3.1	6.1
Sun Studio (C/C++/Fortran)	41	2.7	5.3
Borland C#Builder	36	2.4	4.6
CodeWarrior	29	1.9	3.7
Other	226	14.8	29.2
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Total responses	1531	100	197.7
29 missing cases; 775 valid cases			

Table 1.1: State of Eclipse

Results from EDC's IDE use survey shows Eclipse is 2nd to Visual Studio, at 24.3 vs. 55.3 percent, whereas Sun Java Studio and NetBeans, and IBM and Oracle's IDEs are all just around 11% each. However, Eclipse use is growing faster than Microsoft's VS suite. [Note that both of Sun's tools add up to about 22%.] EDC estimates that Eclipse could catch up with Visual Studio in about two more years.

While MS tools dominate both enterprises and SMB, Eclipse growth is stronger in the enterprise, while trends show MS VS use is dropping slowly in large corporations. Among the challenges Eclipse will face in winning over Microsoft-based developers is a perception that Visual Studio provides more functionality in the Windows environment than Eclipse, and that it seems to have better support offerings from Microsoft.

Driving Eclipse acceptance is its low cost and other factors, such as its existing broad industry adoption and the belief in developer circles that Eclipse is among the most technologically advanced tools sets. Yet, fewer than 30% are willing to pay for Eclipse support, and only 15% are ready to pay now. Andrews called this a 'complex story", since most respondents are unwilling to pay over $100 for a plugin, and only 15% willing to pay up to $250. That may trouble companies betting their futures as commercial developers of Eclipse plugins.

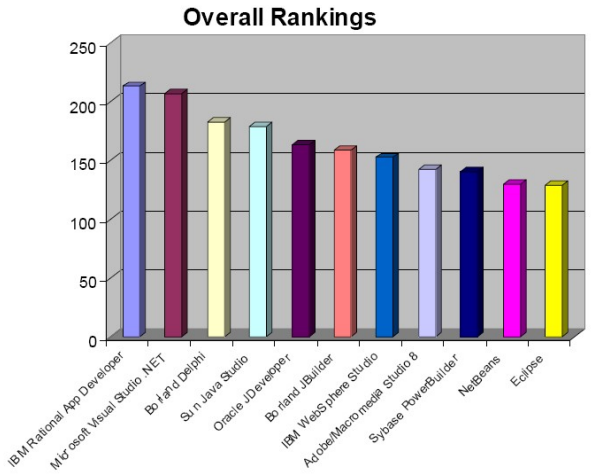

Fig 1.3 : Overall Ranking

One cool thing is that we've been looking at Build Tools in use since 2010, and we've seen the following trends over the last few years. Here are the self-reported statistics from 3 years worth of developer data.To look at the trends, we can see that Ant (with or without Ivy) is losing ground. Maven is at the stable "market leader" position, slightly increasing share depending on who is asked. Gradle, which wasn't available until 2012, jumped into the scene and started grabbing users, potentially encouraging enough Ant + Ivy users to jump ship while others maintained consistency with Maven.

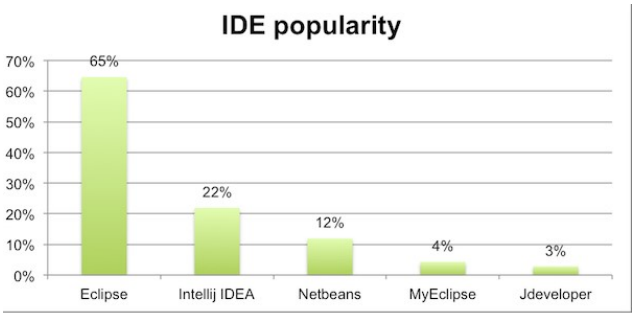

Fig : IDE Popularity

4.3 IDEs Vs Build Tools

Given the deep integration and love-hate relationship between users of different IDEs and build tools, we thought about starting here and covering Eclipse and NetBeans, which comfortably take up over 90% of the IDE market. Other tools, like Spring Tools Suite, MyEclipse, IBM RAD, JBossDev Studio, vi/vim, emacs, etc didn't make up significant portions of the overall community, so to make things simpler we didn't cover them at this time.

The following graphic depicts the number of projects and lines of code (measured in millions) joining this release over the years.

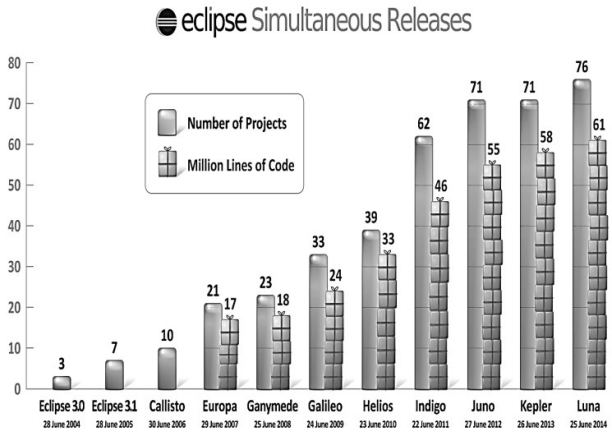

Fig. 1.3 Eclipse Releases Java Support

EVALUATION RESULT:

In terms of user base, Eclipse has emerged here as the clear leader, with only one-third of respondents using IntelliJ IDEA (#2) and Netbeans (#3). Perhaps including MyEclipse separately and not doing the same for other Eclipse distributions like RAD was not the best idea, that's something we'll do better next year. It is interesting that according to this chart Oracle's (ex-)flagship IDE, JDeveloper, is even more marginal than the small independent player MyEclipse.

Compared to the last year's chart we see % gains for the open source containers. We can also see that Jetty and Tomcat have a bigger share than last year, while Glassfish is sliding a bit. The results from these 1000+ developers shows that Oracle Weblogic and IBM Websphere have lost a total of 8% of the market to the open source containers compared to last year.

We asked people to choose only one primary container in this question, even though in many companies several containers are in use. Since we were interested first of all, in what container do people spend most of their time in development it just made more sense to phrase it like that. So don't make any assumptions as to how this applies to the production deployment, but it's a good estimate for the situation in development.

Here the market penetration is more important than the comparison aspect. JPA is used almost as much as the venerable JSP, with 37% of market penetration. EJB versions altogether have 39%, which would make them the most popular standard, but there's likely some overlap between EJB2 and EJB3 users, so the actual total is likely a bit smaller. Up-and-coming CDI standard has gained 6% so far, will be very interesting to see how much this will change next year.

Think the biggest thing that component-based frameworks need to work on is their REST support. I think more and more components are being developed on the client (with frameworks like jQuery, ExtJS and SproutCore) and web frameworks should try to embrace that. I especially like frameworks that allow emitting JSON and HTML from the same classes. This allows for easy web page and API development at the same time.

Evaluation schema for implementation technologies.

Activity		Effort	Factor
Framework Engineering	Implementing reusable code	Effort for making code reusable across the product line (development for reuse)	Reuse techniques
			Variation types
			Granularity levels
		Effort for testing reusable code	Testability
	Reacting to evolutionary change	Effort for integrating system-specific code into the product line	Integration impact
		Effort for adding or removing variation (variability management)	Automation
		Maintenance effort	Reuse techniques
Application Engineering	Reusing code	Effort for reusing code to derive a concrete product (development with reuse)	Reuse techniques
	Resolving variations	Effort for creating a concrete product line member	Binding time
			Automation

Table1.1: Implementation Technologies

Reuse techniques: This factor is divided into two: Reuse between SPL members, where the technology is evaluated on how variability can be separated from commonalities, and how variants can be selected for the specific members. Reuse over time, where it is evaluated on support for introduction of unexpected features and variability during software evolution.

Variation types: Is evaluation on how the technology handles positive and negative variability. Positive variability is when functionality is added for creating an SPL member and negative is when functionality is removed Which needs to be done to perform refactoring and two code listings (original code and refectories code) with highlighted changes. The user can see all changes and then confirm or cancel refactoring. The bad design here is that after renaming the user is prompted with text to press enter. He don't know that clicking on the small arrow will give him the chance to see the preview first.

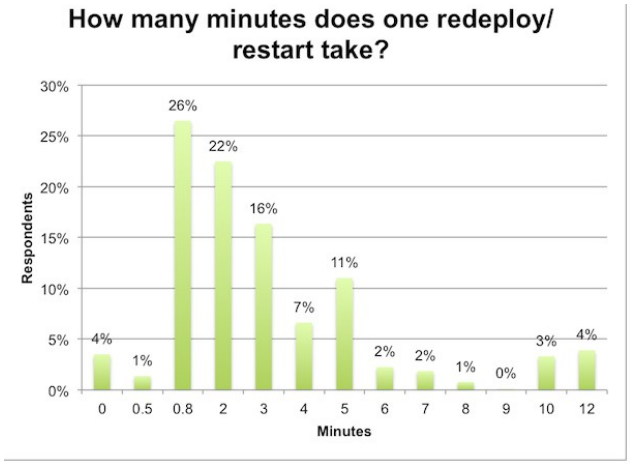

Fig : Redeployed restart Compilers

We didn't ask with such accuracy last year, which makes it harder to compare, but it seems the trends have stayed the same. The average redeploy time is 3.1 minutes, but the standard deviation is 2.8, which means that the redeploy time varies greatly. It can be noted that a statistically significant segment of respondents (just over 1 in every 10 developers) responded that it takes over 10 minutes to redeploy.

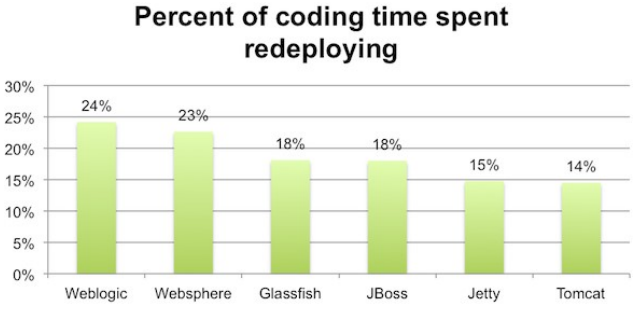

Fig : Coding Time Spend Redeploying

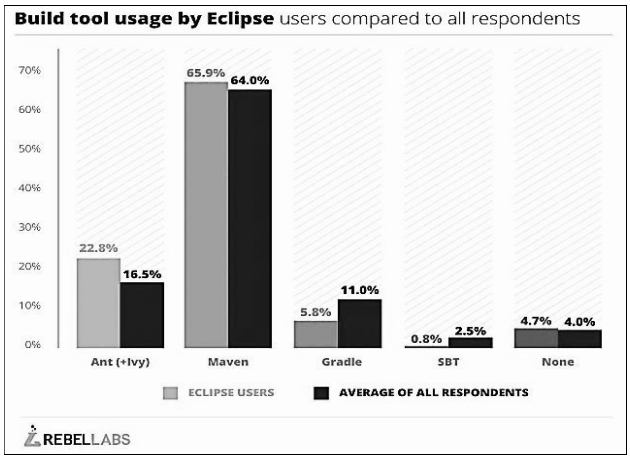

Fig. 1.4 Eclipse

The first survey on the 'old' IDE had 53 respondents. The 95% confidence interval for the mean score is 43 to 52. The student's comments were about missing auto completion, differences with modern IDE's, and poor debugging. The second survey on the first version of the Eclipse plug-in had 64 respondents. The 95% confidence interval for the mean score is 49 to 58. The comments were about the output of unit-tests, missing documentation, and poor debugging again. Unfortunately, some students also used the survey to express discontent with parts of the course they were taking in which they used the IDE, resulting in comments about resist for example. The third survey on the second version of the Eclipse plug-in had 56 respondents. The 95% confidence interval for the mean score is 39 to 47. The students commented on performance issues, the lack of mental state inspection during execution, and some inconveniences resulting from the use of external module files.

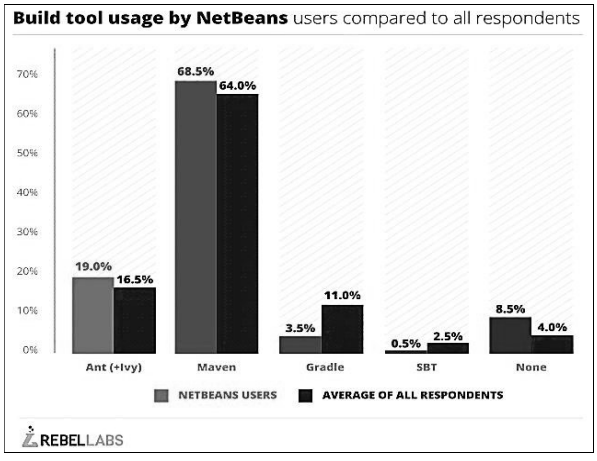

Fig. 1.5 NetBeans

The fourth and final survey on the second version of the Eclipse plug-in had only 6 respondents. Though this is a low number, a trend might be distilled from these evaluations. The 95% confidence interval for the mean score is 64 to 83. The comments were approving of the immediate reporting of errors and warnings and the stepping debugger**.**

CONCLUSION

Eclipse is better over NetBeans for many reasons. The first one is the startup time, NetBeans takes ages to load, and loading on the first instance is terrible in case of NetBeans IDE. Eclipse is very simple to get started with. The intelligence feature on Eclipse is better than that on NetBeans.Due to the complexity and extensibility of Eclipse, you will need additional resources to help you solve your specific problems. Fortunately, the web contains several resources which can help you with your Eclipse problems. The Eclipse bug and feature tracker is using the open source Bugzilla project from Mozilla. In this system you enter error reports for bugs you encounter with the usage of Eclipse and also to request new feature or improvements of existing features problems. This bug tracker can be found under Eclipse Bugzilla. Here you can search for existing bugs and review them. Eclipse can be mainly used for some purpose are: The only purpose of Eclipse is to increase the efficiency. Programmers should spend less time repeating stuff. Programmers should spend less time re writing code and debugging.

FUTURE WORK

The activities of CDT's Multi-Core Working Group, this group aims to bring together different people from the community to jointly work on developing multi-core debugging for CDT. Although this effort does cover the debugging of target with multiple cores, we use the term multi-core debugging in a much wider sense. Multi-core debugging is meant to describe the simultaneous debugging of multiple cores, processes, threads, or other objects which are represented in standard debugger views. Debugging Highly Complex Applications Potential Future Features

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