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Tooling Platform – Future of software forge

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ABSTRACT

Tooling platform is an open-source software forge. Software forge is a web-based collaborative software platform which can be used for both developing and sharing software applications. Different independent projects can be stored and shared using the Tooling platform. It also acts as a place for maintaining the source code developed by the software development team. It also provides the way for version control of the stored source code. Documentation feature provided in the Tooling platform provides easy maintenance of the developed software application. For users, it can also act as a repository of computer applications. Software forges have gained a lot of popularity in recent years. Forging software is proven to be a successful software development model for many software projects. Tooling platform is used for managing source code repositories, bug reports, discussions, wiki pages, blogs for single or any number of individual projects.

Keywords— Software Forge, Software Engineering, Software Development

1. INTRODUCTION

While creating and maintaining the software several steps play an important role such as design, documentation, coding, testing etc. Software Development may just look like writing and managing the source code but in reality software development is much more than that. Software Development also involves researching, the actual development of the application, prototyping, modification, reuse, maintenance, or any such activities that are needed in building the software product. Computer software's are usually built for different purposes. Usually, most of the software will be built as a solution to the problem the clients are facing. Sometimes software will also be built for some personal use. For whatever reason may the software be built, the quality of the software decides whether people will use the software or not. Sometimes if a software is not user-friendly then the user may refuse to use such a complex system. During software development quality control of the software plays a very important role. Software without quality control is nothing but a wastage of resource and effort. To avoid such a problem with the software application, software engineering discipline has emerged. Software engineering follows a systematic approach during the process of software development.

Project management plays an important role in delivering the project successfully within the decided time frame. Planning, scheduling, and tracking play important activities in project management. Handling large software development is an intrinsically complex and difficult task. A large software system will be very complex and its production may involve hundreds of many years of skilled effort with correspondingly large budgets. Documentation and communication play an important role in software development. Only when a structure is imposed and controlled software development is structured. In recent years various necessary steps are taken by the software industry to improve the reliability and efficiency of the produced software. The main factor in modern software development is to give equal attention to all the development process and coordination of all the aspects of software development. Usually, software development starts with collecting the requirements. After the collection of requirements, it will be analysed studied and divided into small modules. Those modules will be assigned to the developers for actual coding. Once the developer starts coding, he would need the assistance of several other tools to ease his work and to reduce the development time.

In recent year computer-based tools which help with a particular task to the developer are becoming more and more popular. In the olden days, tools were just used to produce the code. Nowadays tools are used in all the steps of software development. Other than using the tools for design, develop and test of the software application tools are also used to track the SD activities. Tooling platform is one such platform where all the tools used in software development can be kept safe and sound. Tooling platform also reduces the stress of the department heads by providing various functionalities along with storing the tools safely. During any software development, more than one tool will be used by the developer to reduce the development time. There are many commonly used tools such as IReport for excel or PDF generation using the application or bar code scanner software, chat boat etc. These tools will be frequently needed by the developers to reduce the workload as SD is usually involved in building a similar type of applications. Whenever any such tools are required they will either be developed by the developer from scratch or downloaded from the internet and used. If the tool is developed by the developer alone then sometimes even the team members may not have much idea about what their colleagues are using. In large organizations where there are

thousands of developers working, it is difficult for everyone to communicate with each other and keep track of tools that are being used. To avoid above mentioned problems Tooling platform is being used. Tooling Platform can be used to upload and store all the tools that are used during the application development, it can also be used store the release information about the application, it can also contain documentation, code repository, version control, review and rating, threaded discussion, wiki, blog, and etc.

2. LITERATURE REVIEW

Earlier in olden days project management was done mainly using pen and paper. But as time has evolved the project management software has also evolved. The world has started to use computers to store information rather than use books, software's are being used rather than write down the data in ledgers. The development of computers has made the organizations to use the software for project management. This has led to the growth of project management software. Developing and managing the project is an extremely exhausting task without using the project management software. Managing the project is very difficult and a complex task. It requires processing of the large data and analysing the information in hand. Even for those projects which are built at one place making the necessary changes and handling the code review, managing the code conflict is very difficult without the help of some software. Project management software's can be seen as the life saviour of the hundreds of developers and team leads because it helps the team to keep the data safe and sound from the outside world. Project management software's also helpful to keep the project well-coordinated. Code repository of the project management software can be used to keep the source code safely. Once the source code is uploaded into the code repository of project management software the data will be safe for eternity. Project management software also provides the version control feature using which at any point of time during development, if any issues arise the team can revert back the changes easily without worrying about the failure of the application. Several authors have tried to analyse the need for project management software as well the important features required to have a perfect project management tool.

Communication plays an important role when a large team is developing the application. Without communication, it is difficult for the team to understand the work progress of other team members. Author Zhang et al. [16] developed an interesting tool called SOPPTS. SOPPTS stands for Students Online Project Planning and Tracking System. As the name itself suggests the tool was developed for the students of Ball State University (BSU). The main thesis behind developing the tool by the author was to help the university students to understand the value of team communication and task tracking. Author has tried to introduce the concept of SOPPTS to improve the project planning. He also states that SOPPTS can be used to improve project tracking. The tool developed was a web-based tool. The tool was developed to coordinate the project work done by the students. Using this tool staff could easily track the student's projects. The tool focused on more than just task coordination, it also provides the communication platform. The communication platform of SOPPTS helped the students to transfer useful information among each other easily.

One more author Rook et al. [1] states the importance of controlling software projects. According to author viewing the programming as an art rather than as a science is the main cause why software project management is having a slow evaluation. He describes the actual importance of computer-based tools.

According to him, the actual development in software development started with automated tools. He states that using computer-based tools helps in the faster delivery of the software. The author also says from his research experience that earlier many tools were just focused on the production of code. Those tools were improved to help with software development activity. Nowadays tools can be used in many of the activities. There are varieties of tools being built to help the software development team with the design, documentation, planning, team co-ordination, task management etc. The author explains that the right tool used in the right ways help a lot in the software development process. The right tool will help to develop the application in a short period of time, and it also helps in planning the project. The right tool can also be used to have a clear time estimation of software development activities. According to him, the most difficult part is faced by the software manager who has to make the entire team work in line. His work describes the work done by the developers as an art. He states that the developers will work on the given task as an artist works on his art. Everyone will be doing their own task in an individual way. The manager has to struggle and make sure that the project will go in one single direction. A manager is the one who joins all the pieces together and brings the application to one shape.

Hu et al. [12] describe the importance of software documentation in successful software development. He states that software documentation plays a very important role in software development activity. According to him, documentation plays as the base of software development. The author states that modern software development is not separable from the documentation activity. The main goal of the thesis was to explain to the world that it is not possible to software will not be able to upgrade and maintain the software without documentation. Author has tried to make the developers understand the importance of documentation. He says that documentation is not very much popular among the developers but that does not mean that they can be ignored. From his point of view even though the software documentation is not popular for developers it is of at most importance to the people who work with software maintenance or secondary development. Author has put an effort to make the developers more interested in the documentation along with the development. His paper has tried to remove the misconception about the software documentation. The author was working as teaching staff at a university so the work the author has done mainly focused on the students. His work has tried to make the students understand why software documentation is necessary and how it can be helpful when upgrading the software to the next level.

Sajad and Sadiq et al. [13] describes the importance of using an automated software tools [AST]. AST is vital for successful planning and managing of software. The author says how software engineering uses the theories and methods and uses a variety of tools for building larger and complex applications. According to him usually, the development of software will be a critical task. He also states that without using the automated tools it is impossible to develop the huge, complicated software. In his work, he says that using the automated tools helps to resolve the complexity of software development and also helps to deliver the system in promised time. Paper talks about using automated software tools for the planning phase of software development. The author also talks about using the automated tools for the design, testing, coding phase of the software application. He has tried to put light on the different tools used at software development activity. Author has tried to explain how to choose the appropriate tool for the appropriate situation of software

development. Another author called Kipyegen et al. [14] describes how important the software documentation in software engineering. According to him, the success of software development depends on various factors. According to his work documentation is one such factor. He states that documentation is an artifact. His work shows that the main reason for using the documentation is to transfer information about the software system. According to him, the artifact contains the written description of the software. He says this written description is information that can be also be used as evidence. The author suggests systematic approaches to documentation increases the level of confidence of the end deliverable. From his point of view, it also enhances and ensures the product's success through its usability, marketability and ease of support. His work says that using the documentation helps to improve the quality of the software. The author says poor documentation is the cause of many errors and describes how it reduces efficiency in every phase of a software product's development and use [2].

3. METHODOLOGY

After collecting the requirements the planning process of software development begins. During the planning phase, the manager has to decide all the activities related to software development. The manager has to decide the number of people to work in the software development, tools required and technology to be used, time requirements required for the software development etc. After the actual team is formed the manager needs to decide the tools and framework they can use for better software development. Software development in a large IT industry requires a large number of small tools. Many of the small tools are usually being designed and developed and used by the individual developer. Due to a large number of teams and due to the different geographical location there is a high chance of the same tools being developed more than once. Duplication of tools is just wastage of resources and developers valuable time. The management and the experts are focusing on building a common platform that helps to avoid all the above-mentioned problems. Apache Allura is the open source platform that can be used as the ground for building the platform for the specific needs of such organizations [19]. The purpose of the platform being developed is to create a forging tool to develop and share software tools. Tooling Platform is an open source project hosting platform. Tooling Platform is a new kind of extensible forge, with a new set of highly integrated forge tools. Forge is a collaborative web platform, which is used to develop and share software applications. Tooling Platform is an open-source software forge, which has features such as Issue Tracking, Threaded Discussion Forums, Code Repository, and Documentation. Tooling Platform can manage any number of projects, including groups of projects known as Neighbourhoods, as well as sub-projects under individual projects. Tooling Platform is the extension of Apache Allura [19]. Apache Allura is extended and redesigned to meet the specific needs of the company. Tooling platform is a platform that is built by combining many packages. Various tools and packages are inbuilt in the Tooling platform. Along with the inbuilt tools external third party, tools can also be installed. Tooling platform has many features such as it uses the version control for maintaining the software repositories, ticket tracker, discussions, wiki pages, blogs and more. Tooling platform can be used to export the data. Tooling platform also has the feature to export the data. There are a few basic features in the tooling platform that can be used by the user by default. Threaded discussion, threaded comments, spam prevention, email option, search etc. are the basic features installed in Tooling platform. Tooling platform has a strong authentication system that controls the task

each user performs. Various important modules of the Tooling platform are described below.

Following the planning phases, the construction of the task list begins. Tasks form the atomic components of the project [6]. Each task should have a name as a form of identification and an expected start and end dates. In planning how to develop the software, it is the responsibility of project management to ensure that a coherent system of methods and tools is chosen, integrated and supported. However, differences in organization structures, applications and existing approaches make it impractical to prescribe a single scheme that can be universally followed. Methods, tools, management practices or any other element of the total development environment cannot be chosen without considering each element in its relationship to the other parts of the development system. Many of the small tools used in any organization are usually being designed and developed and used by the individual developer. Due to a large number of teams and due to the different geographical location there is a high chance of the same tools being developed more than once. Duplication of tools is just wastage of resources and developers valuable time. The management and the experts are focusing on building a common platform that helps to avoid all the above-mentioned problems. Tooling platform is the open source platform that can be used as the ground for building the platform for the specific needs of any company. The purpose of the platform being developed is to create a forging tool to develop and share software tools. Tooling platform can also be used as a place to safely store the source code and a place to keep the documentation of the software safe. One important feature of the tooling platform is the review and rating option which helps the developer to clearly decide which tool is best suited for them. Review and rating provide the platform for the user to express, share and discuss the tool. Review and rating module is the place where people can express their opinions without any hesitation. People openly discuss their ideas in Review and rating module which can be of large help to the actual developer of the tool. A user who has used the tool may express opinions about their usage of tool or likes or dislikes of the tool openly without any hesitation. Review and rating also help the company to understand the taste of the developer and provide service to them. Earlier without the usage of the review and rating if the user needs to look for a tool then he just has to search for it and try to get the tool. Review and rating have become one of the extremely important sources for various services.

3.1 Ticket/bug tracking

Ticket/bug tracker can be used by the user to report an issue. It can also be used to track the progress of the SD. Ticket tracker can also be used to easily identify who is working on which task. It also allows the manager of the system to customize the tracking procedure so that unnecessary documentation on the part of the problem solvers does not become a waste of time. Many kinds of enterprises use Ticket/bug tracker applications, including software developers, manufacturers, IT help desks, and other service providers. When working on a complex project, it is important for team members, client partners to track the project to confirm a team's adherence to the schedule and to detect problems early when there might be time to do something about them. If the managers do not track projects, they cannot control them. And, if a project is not being controlled, it is out of control. Without tracking, the manager or the team member has no way to monitor potential problems or to know whether the project plans are being carried out correctly or accurately. In the past, it was difficult to find an effective way to track a project except by periodic static reports. With the tooling platform,

manager and member can view the plan through the ticket /tracker tab. Once installed, for each tickets instance, there are a number of configuration options available.

3.2 Threaded Discussion Forums

Team members make individual performances and the success of each team member depends on the timely receipt of deliverables from other members. Therefore, team productivity depends on the ability to coordinate efforts and is the sum of the sequential individual performances. Regarding the task structure, the project tasks follow a sequential order and there is a progressive integration of the work. Because, in this level, the coordination among project team members is required, there is a great need for interactive communication. Typical computer applications to support coordinated work include electronic mail, workflow automation and group calendaring [19]. Discussion forums have been used by a wide variety of organizations, including businesses and educational institutions.

Online forums can be used for many purposes a discussion forum gives software engineer an opportunity to participate in virtual conversations at any time and any location. The threaded discussion refers to online discussion postings about a topic. Threaded discussions are online conversations people have by posting topics and responses to web pages called forums. Participants consider each topic a thread, and replies as strings of conversations. Discussion forums are common tools in the software maintenance tools. From enhancing engagement to making thinking visible and helping build community, discussion forums can have a tremendous impact on application documentation.

3.3 Version control

For projects which have their team members spread in different places and tasks depending on different team member's performance, the collaboration between the members is crucial. Version control is the means by which different versions and drafts of a document (or file or record or dataset) are managed. Version control involves a process of naming and distinguishing between a series of draft documents which lead to a final version. Version control is important for documents that undergo a lot of revision and redrafting and is particularly important for electronic documents because they can easily be changed by a number of different users. When software development team has more than one developer it might be difficult to analyse the changes done by them to the source code. Version control systems are a category of software tools that help a software team to manage changes to the source code over time. Tooling platform uses the version control to resolve this problem. Version control software keeps track of every modification to the code in a special kind of database. Software developers working in teams are continually writing new source code and changing existing source code. The code for a project, app or software component is typically organized in a folder structure or file tree. One developer on the team may be working on a new feature while another developer fixes an unrelated bug by changing code, each developer may make their changes in several parts of the file tree.

Version control helps teams solve these kinds of problems, tracking every individual change by each contributor and helping prevent concurrent work from conflicting. If a mistake is made, developers can turn back the clock and compare earlier versions of the code to help fix the mistake while minimizing disruption to all team members. For most software teams, the source code is a repository of the invaluable knowledge and

understanding about the problem domain that the developers have collected and refined through careful effort. Version control protects source code from both catastrophe and the casual degradation of human error and unintended consequences.

3.4 Wiki overview

Collecting all the pieces of knowledge from a person's head is a tough thing to do, no matter what the topic or project is. The wiki becomes a repository of knowledge that all employees can contribute to and learn from. The more knowledgeable the employees are, the better they can serve the customers, the better they can perform in their jobs, and hopefully, that leads to making the company more profitable. One of the most common uses of having a wiki is to have a single point to document a company, client, or project. The benefit of having a wiki page on a topic, such as a project, is that it is easy to add and maintain small pieces of documentation that sometimes don't fit well into a full-blown spec or project plan. Sometimes just having a link that gets people to the right location of the project plan or latest revision of a quote can be just as important.

Since software development requires a large amount of time there is a high chance that by the time project is delivered to the client the team members who had worked on the project may have got promoted to another job role at another location, or worse yet may have left the company. Using wiki if a team member has created the proper documentation and wrote down everything that would ever be needed to get to the source code, login to the production server, or figure out who set the requirements on the client side in the first place, it may help to save a lot of development time. The wiki is a collaborative document editor which can be easily edited. By default, any project developer can edit the project wiki. Like most modern wiki's all edits are non-destructive, a copy of every version will be kept safe.

3.5 Review and rating

Nowadays, a company or organization provide a business service which needs to get feedback from the customer. The provider will read a customer review and other customers who need to use services or products will read a review to express opinions on the services. The reviews are important reference suggestions when the developer decides whether to use a particular tool or not. In general, users always show their preferences for a tool through their reviews. People's opinion has become one of the extremely important sources for various services in ever-growing popular social networks. In particular, online opinions have turned into a kind of virtual currency for businesses looking to market their products, identify new opportunities, and manage their reputations. In general, recommender systems are defined as the supporting systems which help users to find information, products, or services (such as books, movies, music, digital products, websites, and TV programs) by aggregating and analysing suggestions from other users, which means reviews from various authorities, and user attributes. After viewing such reviews they take their decisions. So, such reviews must be correct and proper. A similar idea is been put into the review and rating feature of Tooling platform.

Generally, the reviews are displayed in the form of star ratings. Developers just have to see the ratings which are generated by analysing the ratings given by other developers or any user who has used and rated the tool and have to take his/her decisions. Such ratings are easily understandable by any user. But they don't give a clear idea about the actual popularity of the tool. They are helpful only in the scenario where if any product is

excellent or very poor. The scenario where the tool is average, star ratings prove a bit confusing for any user. They don't get clear views of what the other users think of that tool. If the reviews are in simple English statement it would be easy for any user to understand the feelings of the other users too, about the product. Also, star ratings will be there for his/her help. So, the review of any tool will give a clear idea to any developer so that he can easily take his/her decisions in such a confusing scenario too. Tooling platform also provides an option for users to provide their feedback on the tools used. Tools used may be liked by the developer or he may not have liked the tool. If the developer openly expresses the difficulties that were faced by him during the tool usage period it may actually help the other developer who is planning of downloading and using the tool.

Review and rating page has a lot of benefits such as instead of downloading the tools and being dissatisfied with the tool, the developer can just view the review online and see which is best suited for him. Development of rating and review was mainly done with the recommendation system in mind. If the review and rating are allowed by every person who uses the tool the clear opinion or popularity of the tool can be obtained easily. Using the user review and rating the developer of the tool can improvise some feature in the tool.

4. CONCLUSIONS

In this paper, we first discussed the software engineering process and importance of software engineering in software application development. A detailed description of the tooling platform is given in the introduction part which states the need for using the platform. Next section discusses the work done by the various authors. It talks about the different factors which help to build better software forge. Various features of the platform are discussed in the next section.

5. THE FUTURE RESEARCH DIRECTIONS

The paper focuses on introducing the new software forge that can be seen as the future of the software development activity. Tooling platform has various important features such as ticket tracker, code repository, documentation etc. Even though the tooling platform successfully covers the important aspects of software development there are still a few points that could be improved in the future. The recommendation system is one such point which can be considered for future work. Using the recommendation system user can be given the right suggestion at the right time.

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