

WikiDev 2.0: Facilitating Software Development Teams

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Abstract—Software development is fundamentally a collaborative task. Developers, sometimes geographically distributed, collectively work on different parts of a project. The challenge of ensuring that their contributions consistently build on one another is a major concern for collaborative development and implies concerns with effective communication, task administration and exchange of documents and information concerning the project. In this demo, we present *WikiDev 2.0*, a lightweight wiki-based tool suite that enhances collaboration within software development teams. *WikiDev 2.0* integrates information from multiple development tools and displays the results through its wiki-based front-end. The tool also offers several analysis techniques and visualizations that improve the project-status awareness of the team.

Keywords—collaborative software development; integrated environments; clustering; system analysis; wiki-based platforms

I. INTRODUCTION

Today, most software development is collaborative. Development tasks are distributed to different people, who, in some cases, are located in different geographic locations and time zones. Collaboration in software development teams has been studied by many researchers and it has been reported to have a positive impact on the software development process [2],[3]. However, it has also been found that the distribution of tasks and people can pose additional challenges to software development teams [2],[3]. These problems include inefficient communication, ineffective administration and inconsistencies in shared documentation and data. The last problem is further exacerbated by the abundance of tools the developers have at their disposal.

In this demonstration we present *WikiDev 2.0*, a lightweight wiki-based tool platform designed to provide a unified web-based interface for every tool that the developers want to use. Through this platform, every developer can access information relevant to her task, even though she may not necessarily use the tools involved in producing this information. The integration of the tools is based on systematically designed APIs that ensure the extendibility of *WikiDev 2.0* in order to accommodate the preferences of the development team and the needs of the project. Furthermore, wikis, on which the interface is based, are well known and easy to use, thus reducing the learning effort required by the developers to become familiar with *WikiDev 2.0*. Finally,

the tool offers a selection of services for data and information sharing, analytics and improvement of project-status awareness.

While many tools and environments have been proposed to facilitate collaboration in software development, like IBM's Jazz, *WikiDev 2.0* differs from such tools by offering an extendible and customizable set of tools in a lightweight and easy to learn platform.

II. WIKIDEV 2.0 OVERVIEW

A. *WikiDev 2.0 Architecture*

WikiDev 2.0 is based on a 3-tier architecture. The resource layer includes information about tickets, mail messages, IRC meeting logs, wiki pages, UML models and source code. This information is imported – in a manner transparent to the team – from Bugzilla, a dedicated mailing list, an IRC bot recording the development team's channels and SVN repository information. The *WikiDev 2.0* platform supports a set of RESTful APIs for updating and accessing these resources; in this manner its resource layer remains independent of any external database schema or specific tool. For example, if a team used a repository other than SVN, to integrate it to *WikiDev 2.0* one would have to develop a wrapper that accesses the new repository to extract from it the software artifacts that the *WikiDev 2.0* software-asset API assumes. The middle layer offers several services to support the team collaboration, including access control, and the integration and analysis of the available information. Finally, the top tier is the front-end, where all of the information is presented as wiki pages and visualizations.

B. *WikiDev 2.0 Services*

WikiDev 2.0 is built on Annoki [1], our extension of MediaWiki. Many of the services offered by the tool are actually provided by the Annoki extensions. The *WikiDev 2.0* services include the following.

Namespaces enhance the security and privacy of a project's data. Each project or each development team can have a namespace, so that everything published under this namespace will be visible and editable only by members of that team.

A **calendar** provides scheduling services. It can be added in any wiki page and, for each specific date on which events are scheduled, another wiki page is created. The calendar extension can be particularly useful for task and meeting scheduling.

Templates allow the users to create and edit predefined wiki page schemas. The graphical **Template Editor** extension that generates a form view for the template instances can be useful especially for inexperienced users.

The **contribution-analysis** service uses special metrics to keep track of each user's contributions to the project in terms of source code commits, ticket changes and wiki page edits. This information can help developers answer questions like *who works on what and how much?* Using the results of this analysis, we can also identify usage patterns and proper or abnormal behaviors.

The **communication-analysis** module keeps track of the communication within a team. One of the communication visualizations displays collaboration in terms of messages exchanged between team members. This analysis can help the users answer questions like *who talks to whom and how much?* This information can also help us identify communication patterns within a team.

The **artifact-clustering** service identifies groups of strongly related artifacts including tickets, messages, wiki pages and code artifacts, based on text analysis. It can help the users answer questions like *what triggered a particular change, who has discussed a specific artifact that should potentially be consulted about changes to it and how might a member's own work affect other people's work?* We can also use this information to initiate collaboration between team members.

A variety of **visualizations** display the contribution and communication analyses described above, as well as provide a graphical environment for understanding and developing wiki pages. For the first two types of visualization we used the Google Visualization API. For the latter two we used Adobe Flex to create a WikiMap, which visualizes the structure of the wiki, including how pages link together and how authors relate to pages, and wiEGO, which allows users to graphically create structured wiki pages.

Finally, the **UMLViewer** is a Flash-based interactive display of UML models associated with a project. This extension uses XML representations of UML diagrams that have been converted to a JDevAn [4],[5] database format, allowing for specific queries to be issued to display subsets of the diagram for further analysis. This viewer also uses the clustering data to display artifacts (such as mail messages) related to a specific UML object in order to provide a complete view of the development process for that object.

III. CONCLUSIONS AND FUTURE WORK

WikiDev 2.0 is work in progress. Nevertheless it has been deployed at the University of Alberta for more than two years and has been used by approximately 120 students taking project-based software-engineering courses in our department. Its stability and robustness, in spite of the continuous extensions that it is undergoing, constitutes strong evidence for the quality of its overall architecture and API design.

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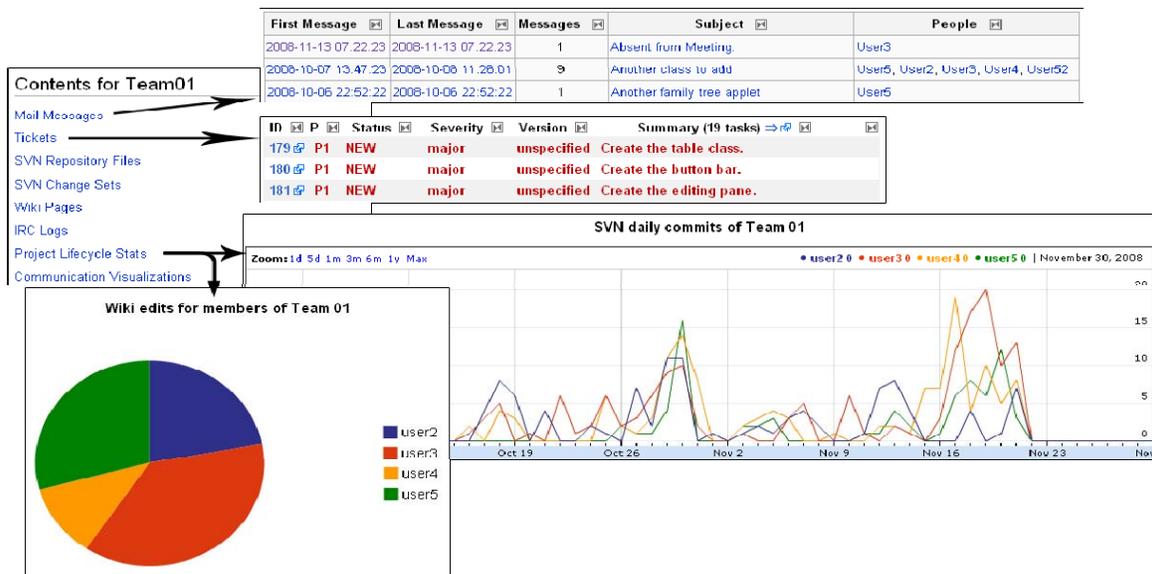


Figure 1. A sample of the information displayed in the WikiDev 2.0 system