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The system supporting project management as an example of web technologies

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Abstract

The paper presents description of software implemented for project development by Scrum methodology. The presented web application includes functionalities, which could be useful for management side and side responsible for development. The Software as well as Scrum methodology has been created mainly for IT projects, but there is not a problem to use it in other sectors. In the paper the authors present main Scrum rules and their implementation as a web application. The application includes functionalities that improve work efficiency by Scrum methodology.

Keywords: Scrum, JEE, Spring, Hibernate.

System wspierający zarządzanie projektami jako przykład wykorzystania technologii webowych

Streszczenie

W artykule można znaleźć odniesienie do komercyjnych rozwiązań z dziedziny zarządzania projektami. Artykuł przede wszystkim prezentuje opis oprogramowania opracowanego dla projektów prowadzonych według metodyki Scrum. W artykule autorzy odnoszą się do rozwiązań komercyjnych wykazując zalety opracowanego rozwiązania. Przedstawiona aplikacja webowa zawiera w sobie funkcjonalności, które ułatwiają pracę zarówno stronie zarządzającej, jak i stronie odpowiedzialnej za rozwój projektu. Oprogramowanie jak i sama metodyka opracowane zostały głównie dla projektów informatycznych, jednak nie przeszkadza to w użyciu ich w innych sektorach. Autorzy w artykule prezentuje podstawowe zasady panujące w projektach prowadzonych według metodyki Scrum, a następnie pokazują jak zostały one zaimplementowane w formie aplikacji webowej. Aplikacja zawiera funkcjonalności, które znacznie podnoszą efektywność pracy według metodyki Scrum. Artykuł w szczególności adresowany jest do osób zajmujących się zarządzaniem projektami, w szczególności wg. wymienionej metodologii.

Słowa kluczowe: Scrum, JEE, Spring, Hibernate, Project management.

1. Introduction

Dynamic growth of IT projects all over the world together with increase in their size resulted in increasing the pressure on project management. There is a need to define a schedule, establish rules of cooperation between team members. The project management methodology helps to solve these problems. In order to illustrate the presented problem, the authors developed an application code named ScrumTool. This application supports the process of project development and is dedicated to Scrum methodology.

2. Scrum methodology

Scrum is a methodology which is used when a project is being developed. During the last year the scheme grew significantly in

popularity. The methodology is based on continuous team motivation. When the team respects the relevant condition, it is easy to achieve a success using the Scrum methodology.

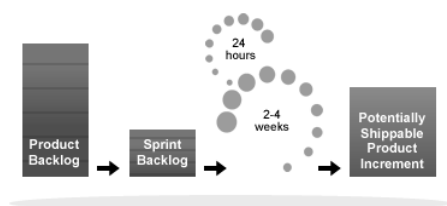
One of the rules is assigning roles to participants in the project. In scrum there are the following roles: Product Owner, Scrum Master and Team. The Team should be created by a group that counts from 5 to 9 persons. Team members are experts at different competences, which assumes different range of responsibilities. Each team member cares indirectly about organizing his own work and is self-motivated to achieve the defined goals in a given period. Product Owner is usually a customer. He can also be the project sponsor. Product Owner is responsible for the definition of goals that have to be achieved by the project team. He is also responsible for business issues of the project and indirectly controls its correct development. The mediator between the team and Product Owner is Scrum Master who directly oversees the project. Scrum Master has to motivate team members, react quickly to problems and give information to the product owner. All these roles are important. Engagement of all parties guarantees the project success.

The phase of software development in Scrum methodology is based on cycles, so called Sprints. The whole process development is divided into shorter stages that last for a limited time period. The Scrum methodology assumes that a single sprint should last from one to four weeks with an emphasis on the fact that each one takes the same time. It is extremely important in the perspective of stability and regularity of project team work. Another important issue is that the goal of each sprint is to release running version of the product. This version must include new elements that are visible to the customer and that have been implemented, compared with the previous sprint. In each sprint we can identify three phases: planning, game and finish.

In the planning phase the project team with Scrum Master plan work for the next sprint. Product Owner defines goals that have to be achieved in the sprint. The planning phase is a one-day meeting. The team discusses the tasks which must be performed, estimates are created, work is subdivided. It is also time for a debate over solutions and architecture of the created system.

After planning, it there is the so called „game phase”. This phase lasts the whole sprint. In this phase daily short meetings take place. During the Scrum-meetings each team member answers Scrum Master the following questions: what he did the day before, what he is going to do this day and whether he has recently encountered problems. These meetings take place every day and it is best if they last no longer than 15 minutes. They should be also standing meetings what can motivate team to action. Daily meetings are one of key features of scrum. Adequate involvement of team members in them is the key to a success. Information about obstacles and orientation on what each team member does, helps management side and the side responsible for product development as well. Fig. 1 shows schematically how

product development, according to Scrum methodology, processes.



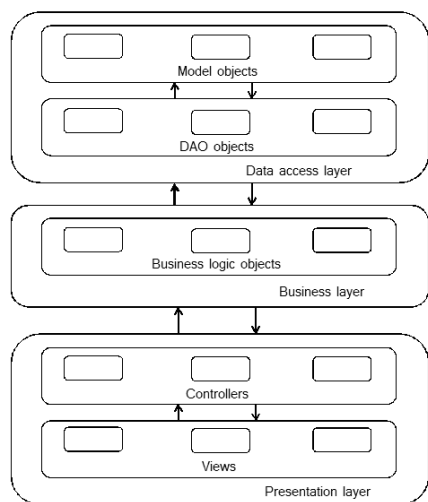
Rys. 1. Rysunek przedstawia główne cykle mające miejsce w projektach prowadzonych według Scrum

Fig. 1. Cycles and main parts of Scrum methodology

The last day of Sprint is the time to close tasks and release a new version of the product. It is called a finish phase. This phase is an all-day meeting. During the first part of the meeting the team shows Product Owner what was done during the Sprint. Under ideal conditions the second part of the meeting is dedicated to the team. This is the time for analysis what was done, what difficulties were encountered and what could be improved. The author also makes comparisons between his own produced software and commercial ScrumWorks.

3. ScrumTool

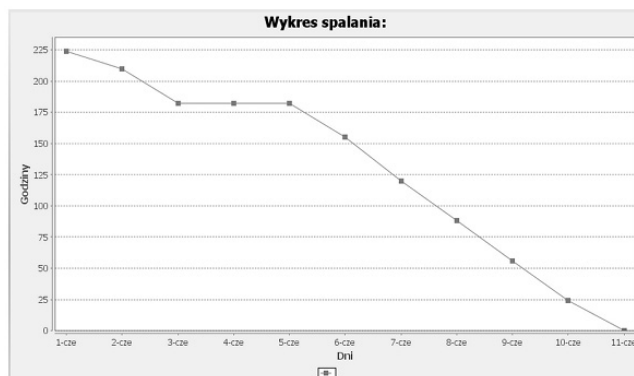
The system ScrumTool was created for supporting project development process for the management side and the side responsible for product development as well. The developed system called ScrumTool contains a range of functionalities. Some of them will be discussed below.



Rys. 2. Architektura systemu ScrumTool
Fig. 2. Scrum Tool system architecture

The whole system is divided into three webbased applications dedicated to the appropriate roles. The first of them is Project administration application, including such functionalities as project creation and Scrum Master account management. This application is destined for administrative objectives. The second application is dedicated to Scrum Master role. This is a ScrumMaster application – designed to manage the specific project ex. tasks management, statistics and graphs, sprint chart generator. The last application is dedicated to team members. It provides an interface and modules such as time management module, documentation module, holidays module, sprints chart generator, obstacles management module. During the project development it is important to control the leading task. ScrumTool provides an interface to manage tasks which are performed by team members. The system enables assigning tasks, reporting the time spent on their performance and tracking progress. Each task

is performed for the proper functionality of the system. These functionalities are grouped in the so-called “backlogs”. These are key points of documentation – goals sketched by Product Owner. In each sprint several backlogs should be reached. ScrumTool offers an interface to manage backlogs. In addition, the possibility of grouping backlogs in categories was introduced, which increases clarity and readability of tracking progress. Each backlog can be Tag-coded. It underlines additionally, what regards the given “backlog”. In the system, during the project development, a fair amount of data is stored. Their analysis is a crucial issue of project management. ScrumTool provides tools which, based on the data gathered, generate statistics and graphs. During the Sprint, team members report the time spent each day on tasks. Based on these data, ScrumTool generates the so-called Sprint burndown graph. The total number of hours remaining to complete the Sprint in Sprint days is considered. As a result, a chart is generated. If the project is properly managed, it is represented by a broken line (total hours for tasks remaining to complete the Sprint, which gets closer and closer to zero each day). The success is the situation, when on the last day of the Sprint the line touches the X axis. On the graph it is easy to notice all problems arising during the project development. If the total number of hours does not fall down, this is a sign that tasks are badly estimated. Control of Sprint burndown chart allows verifying whether the Sprint can be completed on time, whether serious risks exist. Especially important is the analysis of graphs of the first 2-3 sprints. On this basis it can be concluded, how much the team is able to do within a specified period of time and at which moments during the project development most problems arise.



Rys. 3. Na rysunku znajduje się wykres spalania sprintu
Fig. 3. Sprint burndown chart

The system generates statistics to support additionally Scrum Master. In each sprint key functionalities identified as backlogs are implemented. For each backlog the number of hours spent on its implementation is counted. It is also possible to preview the whole sprint – a list of all tasks, including specifying the time of their performance. Data analysis in the whole system is performed in real time, all data depends strictly on time (current working place in the sprint). The aim of this analysis is to show the Scrum Master the burden of individual team members and react to the situation, when one of them copes with his task more quickly than it had previously been estimated.

Projects development by Scrum methodology is usually of quite high risk. Each day and each task is important. For this reason, there is a functionality introduced in the system enabling excluding the team member from the project for a specified time and report vacation submitted by the member. The system automatically takes the leave into account and exclusion of members from project when it assigns tasks. Scrum Master does not need to do analysis and bear in mind the availability of team members. The system performs this analysis for him.

It is also important to collect and report problems encountered during the project development. The System provides

functionality, which makes it possible to report obstacles during the performance of tasks by team members. Scrum Master is able to manage such obstacles, and the entirety is stored in the system and can, in the future, serve as a knowledge base for team members.



Rys. 4. Na rysunku widać główny interfejs aplikacji ScrumTool
Fig. 4. Main interface of ScrumTool application

The whole system is presented in the way of clear graphical interface. All kinds of figures are presented in graphical form. For each backlog in the system it is possible to determine the following parameters: priority, risk, effort. Their interpretation is a pillar. Each task has a progress bar that appears next to the task. All kinds of obstacles and also stopped tasks are represented by red colour, easily noticeable by Scrum Master.

The system architecture is based on layers. There is a separate layer to manage operations on the elements of the database model. In this layer a range of interfaces is used, including the main GenericDao which defines operations common to all models. There is also a separate layer that executes business logic. In this layer all calculations take place and implementations for particular functionalities of the system are defined. There is also a layer that is responsible for presenting data and interaction with the user system.

4. Other applications

There are numerous applications on the market but they are dedicated for specific project management methodologies.

There is a tool ScrumWorks from CollabNet, which, like Scrum Tool is dedicated to projects run by Scrum methodology.

The main difference is that ScrumWorks is running also as webbased and standalone application, and ScrumTool is only webbased.

ScrumWorks is an application developed for years, and contains much more functionality than presented ScrumTool system. CollabNet has introduced such ability to manage project milestones.

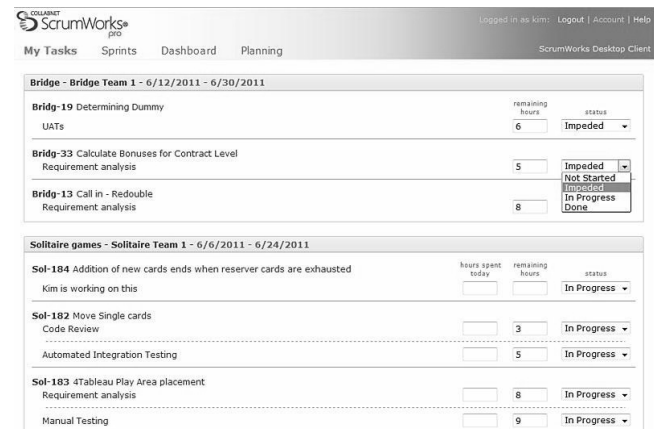
The application allows you to generate charts based on the milestones of the project. It gives information and orientation where the teamwork really is in comparison to the full scope of the work to be done.

ScrumWorks allows a number of analyses such as estimated comparative analysis of the task time and real time which has been devoted to the task.

The application provides the ability to export / import data to MS Excel environment.

Additionally, there is a tool which allows integration with systems such as Subversion, Bugzilla and JIRA. ScrumWorks application is user-friendly. Moreover, for the standalone version drag & drop mechanism has been implemented (eg. when laying backlogs Sprint). It is certainly a lot easier for a user.

In addition, the standalone application gives full support to the "panel" services. Panels can dock in any way on the screen (so that you can personalize the look of the application).



Rys. 5. Główny interfejs aplikacji ScrumWorks (<http://collab.net>)
Fig. 5. Main interface of ScrumWorks application (<http://collab.net>)

The difference between Scrum Tool, and ScrumWorks is essential - Scrum Tool is dedicated to smaller projects.

ScrumWorks is a commercial application, thereby reducing its availability to companies that can afford it. Scrum Tool is a freeware tool.

It can be a great tool for start-ups. ScrumTool allows you to start using Scrum in your company and its teachings and learning. It provides enough functionality for the rising companies.

And what is very important - it is focused mainly on completing the maximum working time for employees (which is characteristic for small business priorities).

ScrumWorks is a tool much more complex and it can be difficult introducing Scrum in the enterprise. It may be too large tool where the user gets lost and discouraged to learn the methodology and compliance with its rules.

Scrum Tool allows you to explore the advantages of Scrum in a simple and accessible way using a friendly interface.

5. Technologies

Implementation of the system is based on Java Enterprise Edition platform. The author chose this technology because it is an open-source platform and it achieves good results in real large commercial projects.

The main framework used for implementation of the application was Spring 3.0. Through it the author could, during the system development, focus mostly on implementation of business logic. The use of Spring availed that such operations as: transactions, created objects management are executed by the framework. Through it we obtain reliability of the application when it comes to implementation of basic functions which are used for creation of web applications.

The author used also the framework Hibernate, which chimes with Spring providing access handling to data from the database. Through hibernate, the system has obtained independence from a particular database system.

The subsidiary technologies that have been used in the project are: Spring Security, Spring MVC 3.0, Apache Tiles 2.0, jQuery, JSP/JSTL, XHTML/HTML/CSS. For testing, the author used PostgreSQL as the database system.

6. Summary

High dynamics of development and changes characterize IT projects at present. Projects deviate from the rigid rules more and more. There are solutions that enable adapting to developing expectations. The tools are needed to control work and help the

management side. The ScrumTool is such a tool. The system dedicated to IT projects contains key functionalities that enable improving work of the side which manages project development process. The tool that provides statistics and graphs showing work progress, with high dynamics of running projects at present, is very vital and Scrum Tool provides such opportunities. ScrumTool allows relatively easy implementation of SCRUM methodology for project work because of its simplicity. This is a free application, and in addition to the previously described advantages, it must be pointed out that this is a new and fully functional solution which can effectively compete with commercial applications.

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