Usage of architectural styles and technologies in IT companies and organizations

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As in many other software engineering activities, Non-Functional Requirements (NFR) are fundamental in the process of selection of the architectural style and the technologies for developing a software system. To know more about this issue, we are currently driving a survey to find out which architectural styles and technologies are being in use in IT companies and organizations, and their relation to types of NFR. We want to apply this knowledge to Model-Driven Software Development (MDSD), and in fact we are currently developing a framework that considers NFR in the MDSD process.

The survey is available in the following URL: http://www.lsi.upc.edu/~dsdm-survey.

Development of the survey: The survey has been developed following an iterative methodology. At each iteration, it has been revised by IT experts and researchers of the area. There have been three iterations, the first one in plain text and the other two using the current electronic format. It was difficult to find good (and cheap) software for developing surveys; finally, we chose LimeSurvey, which is free open source software (FOSS).

For the dissemination of the survey we are using mainly two strategies. On the one hand, personal contact with software architects that we know personally. On the second hand, advertisement in IT communities hosted in common sites such as LinkedIn and Facebook. In this first stage, we have contacted 7 software architects and advertised in the International Association of Software Architects group and we plan to do the same in other similar groups.

Design of the survey: The survey is divided into three parts: first, common questions about software development; second, questions about the degree of desired interaction with development tools; and third, questions about the usage and knowledge of MDSD. The third part of the survey is driven in three different ways depending on the knowledge of the respondents.

In the first part of the survey we have asked about the used architectural styles, the type of developed applications, the technological styles used in them, questions about the use of data base management systems (DBMS), and finally questions about NFR.

The second part consists of two questions about the desirable interaction of a hypothetical development tool. The first question is about code generation and the second is about design decisions.

Finally, in the third part the survey may take three different paths. If the respondent doesn't know the concept of MDSD, the survey finishes. If he/she knows the concept but doesn't use MDSD in his/her projects, we ask about his/her knowledge about MDSD, namely about the known initiatives, development frameworks, and several questions to find out his/her opinion about MDSD. If he/she is using MDSD in his/her projects, we ask about the usage of MDSD. It is interesting to see in the third case if they are using different architectural styles or technologies when they develop software using MDSD.

Current status: We have, at the time of writing, 56 responses to the survey. We have planed to wait until we have at least 100 responses before the publication of the results. As a preview, we have seen the following tendencies in the current responses.

From the architectural point of view, more than the 65% of respondents use 3-layered or MVC architectural styles followed by client-server (51%) and SOA (46%). The most common type of application is Web-based (75%) followed by Web Services (58%).
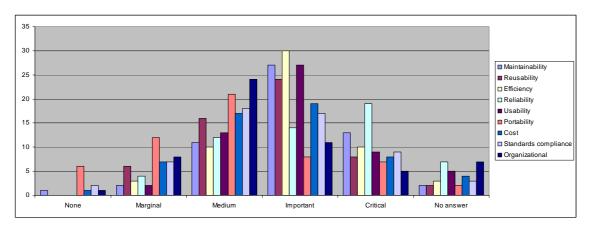
Fig. 1: importance of different types of NFR in software projects

From the technological point of view Java-based technologies are used by a 75% of respondents. Only 21% declare to be using .Net-based technologies, which looks a bit strange because many software development companies currently announce that they develop in .Net (may be this fact will be reduced on the final results), and the least used is stack solution (e.g. LAMP) with 14%. JSP is the most used Java technology (57%), but also a significant amount of respondents use Struts (48%) or Servlets (48%).

When we talk about DBMS, relational databases are, as expected, the most used (88%), being Oracle (69%), SQL-Server (33%), and MySQL (32%) are the most widespread brands. It is a bit surprising that MySQL is used only by 32% of respondents while 77% are developing Web-based applications. The only DBMS-related mechanism that has a relevant amount of importance is stored procedures (39% of respondents think that stored procedures are important or even critical in their applications), whilst triggers and checks have very little importance (80% approximately of respondents report that these mechanisms have no or little importance for them).

The importance of NFR is not very clear, we have found a division of opinions: while 96% of respondents consider NFR (73% at the same level as functional requirements), only 57% use NFR to take architectural and technological decisions. In the Fig. 1 we have summarized the reported importance of each individual NFR. We can see that the requirements such as maintainability, reusability, efficiency, reliability, and usability have a tendency of being more important than portability, cost, standard compliance, and organizational NFR.

When we put NFR into practice, 80% of respondents do not use development tools that analyze the NFR compliance, but 70% would like to use such kind of tools.

In the second part of the survey (questions about interaction) the most accepted answer for all questions is that developers want to be asked, but only for the most important decisions. This answer can be related with the view of MDSD not as a fully automatic process but as an assisted one, in which some decisions are taken by the expert.

A great part of the respondents (79%) do not use MDSD in their software projects, so it is difficult to carry out a good evaluation of this part of the survey at this moment. On the other hand, 50% of them declare to know the concept. Eclipse EMP seems to be the most known platform for MDSD and MDA the most known methodology.

This was an overview of the current answers to the survey, for the final report on it we will do a deeper statistical data analysis. For example, we will analyze for each architectural style or technological style (these terms are defined in the survey) which are the most important NFR.

Conclusions: This survey can be seen as a particular instrument that addresses some of the questions raised in the EASA'09 cfp. Our position is that a way to obtain empirical evidence about the current state of software architectures usage in IT companies and organizations is asking the involved actors.