Editorial

Assuring quality of web-based applications

The Internet is rapidly expanding into all sectors of our society and becoming an indispensable platform of information systems and other computer applications. Web-based applications are complex, ever evolving and rapidly updated software systems. Testing and maintaining web-based applications impose a challenge to existing software quality assurance and testing techniques because the Internet is a heterogeneous, distributed, multiplatform, multilingual, multimedia, autonomous, and cooperative wide area network computing environment. Traditional quality models, testing methods and tools are not adequate for web-based applications because they do not address problems associated with the new features of web-based applications.

With support from and in conjunction with IEEE International Computer Software and Applications Conferences (COMPSAC), a series of international workshops on Quality Assurance and Testing of Web-based Applications (QATWBA) was launched in September 2004. In particular, the first and the second QATWBA workshops were successfully held at COMPSAC'04 in Hong Kong and COMPSAC'05 in Edinburgh, respectively. The third workshop of the series will take place at COMPSAC'06 in Chicago in September 2006. This special issue contains five papers recommended by the program committees of the first two workshops. These papers have been substantially revised and extended and reviewed by at least three program committee members for publication in this journal. The paper by *Giuseppe Di Lucca* and *Anna Rita Fasolino* surveys the current state-of-research on testing web-based applications and discusses the future trend. It sets a good background for the rest of the papers that reports original research results on the topic and helps the readers understand the challenges. One of the most common architecture of web-based applications is the so-called client–server architecture, where the server side contains scripts that handle HTTP requests, interact with other components of the software system, and generate dynamic contents. In the paper titled *Data Flow Analysis and Testing JSP-Based Web Applications*, *Chien-Hung Liu*

extends traditional data flow software testing techniques to address problems in testing scripts written in Java Server Pages, a popular technology for developing server-side scripts. The heterogeneity, autonomicity, collaborative behaviour, and the rapidly evolving life cycle of Web-based applications has led to the proposal of agent-based approaches to software development in general, cf. [1–4], and to quality assurance and testing Web-based applications in particular; cf. [5–7]. Unlike conventional data flow testing, *An Agent-Based Data-Flow Testing Approach for Web Applications*, by *Yu Qi*, *David Kung* and *Eric Wong*, is an application of a BDI (Belief-Desire-Intention) agency that employs method level, object level and object-cluster level test agents to cooperatively perform data-flow testing of web applications. Test coverage is an important aspect of testing. This is addressed by *Jenny Li* and *David Weiss*' paper titled *Code-Coverage Guided Prioritized Test Generation*. It describes a test case generation method for testing programs written in the Java programming language, which is widely used to implement server side components. Web-based applications are required to run uninterruptedly year-round to ensure that the services are available anywhere at any time. In the paper *Binary Analysis and Automated Hot Patching for Web-Based Applications*, *Hai Huang*, *Wei-Tek Tsai* and *Yinong Chen* address the problem of patching web-based applications without bringing the system down and interrupting the services. A very nice feature of their approach and the techniques is that patching is applied to binary code. Thus, it is applicable to software systems developed in all programming languages and technologies. This feature is of particular importance for web-based applications because web-based applications often contain components written in multiple programming languages, developed using different tools and techniques, and targeted for different platforms.

Quality assurance and testing of web-based applications is a wide area. A great amount of work in the area has been developed in the last decade. This special issue cannot cover all aspects of the area. We hope it can foster more

research to this topic and the adoption of the research results in practices.

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