

# Current Trends in Software Engineering Research

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## Abstract

Software engineering is a dynamic discipline that has continuous growth in research in identifying new methods, tools and methodologies that have caused vast improvement in software development and maintenance to be more reliable and efficient. Past research critics on cost reduction, quality and flexibility have endlessly tried to design and develop many ways to improve these sectors, but they are still causing impacts to the software industry (Saad et al., 2014). The new trends in software engineering research topics resolve under the research field of Cloud Computing, Big Data, Android Computing, Network Security and Software Engineering Project Management. Nevertheless, there are more other research areas in software engineering that have been intensely researched and implemented in

**Keywords:** Methodology, Tools, Model.

## 1. Cloud Computing

Cloud computing is a new area in the research field of software engineering where more new techniques and models are introduced with benefit to the industry and also provide knowledge with intention to improve the education and software industry in providing reduced cost and improve the current technology in the industry (Saad et al., 2014), (Abdelmaboud, A et al., 2015).

Based on readings from current journals and conference papers, researchers have identified that the quality of services in cloud computing are rather poor and because of the variety of services provided in cloud computing where the focus of the services is neglected and the benefit of cloud computing is not felt by the software industry and the users. Thus, research by Abdelmaboud, A et al., (2015) has introduced five research focus areas to improve cloud computing services. The research areas are as in Figure 1 below.

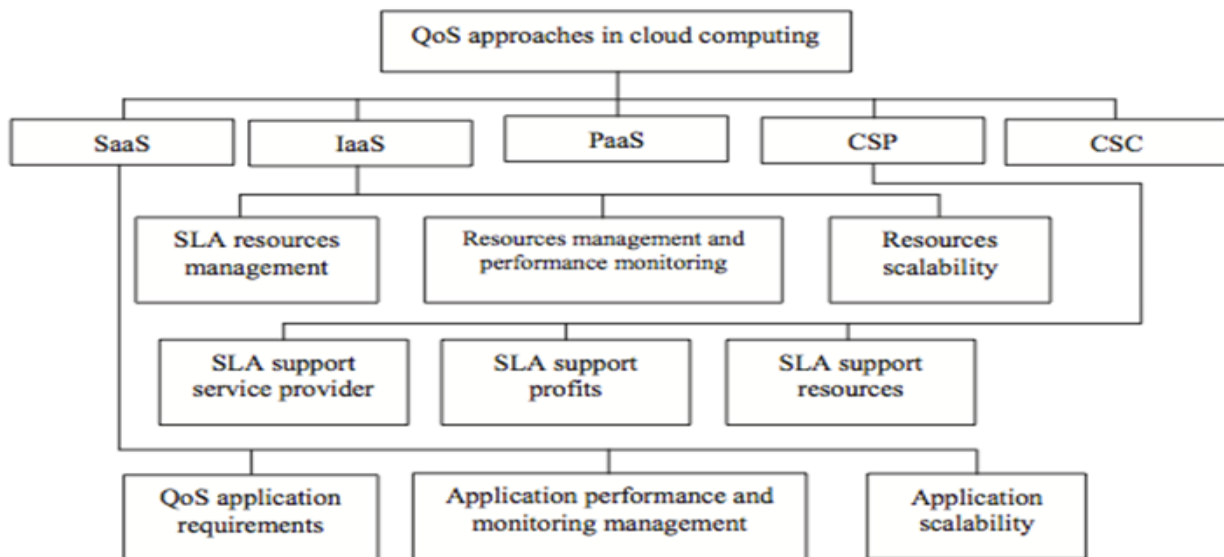


Figure-1. The characteristics of quality of services in cloud computing (Abdelmaboud, A et al., 2015).

The SaaS research focus is related to the applications provided in systems that act as service to consumers. PaaS research focus on development of the platform resource for applications and system services. IaaS research focus on data centers and virtualizations resources in organizations. While CSP focus to the providers of cloud computing services such as software, software platform and infrastructure services to the users. Finally CSC related to the people and the organization who use cloud computing services like the software, platform etc.

Another conference paper related to cloud computing is on the adoption of cloud computing for software engineering learning environment by Saad et al., (2014). Issues highlighted in this paper is related to the availability, maintenance, accessibility, scalability, compatibility and resource utilization of software and hardware tools used in software engineering course. Another issue highlighted is the willingness to adapt this new technology. From the survey handled with three universities which are

Asia Pacific University of Technology and Innovation Malaysia, University Technology Malaysia and University Malaya Malaysia survey results shows that software engineering students face difficulty of compatibility , availability and licensing of the software while lectures are concern by the availability of the labs for scenarios whrer the class is huge and unmanageable groups. Furthermore, this paper provides a guideline in implementing the software engineering tool in cloud with descriptions in Figure 2 is as below.

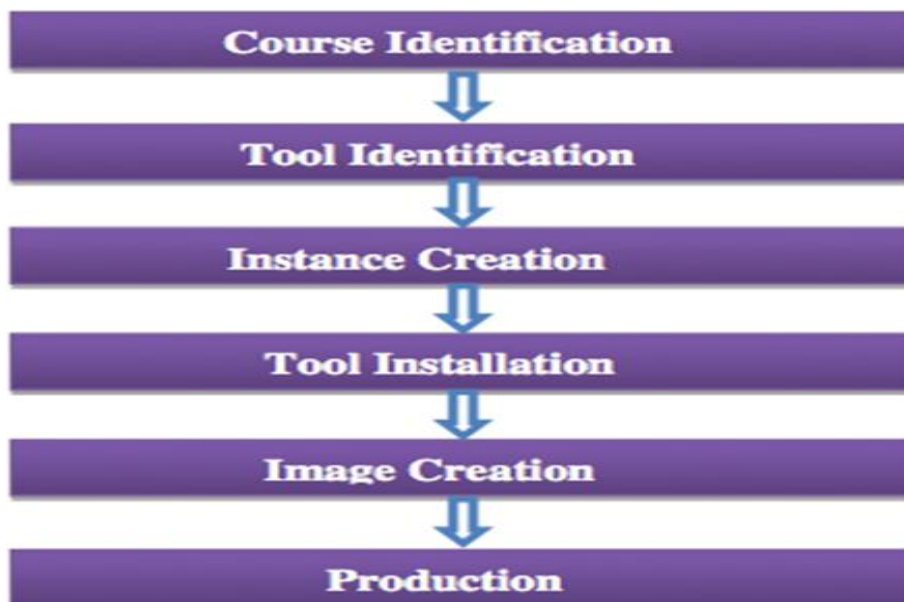


Figure-2. Guidelines in implementing software engineering tools on cloud (Saad et al., 2014)

In addition, benefits of cloud computing usage is where users can work on multiple computers and operating systems. Ursr also can access to the software regardless of time and location. Univeresities will have top beneficiaries and this able to opimize the resouces more efficiently. To conclude, cloud computing have indulge in many areas weather in education or industry and would cause benefit with the improvement of quality and improving the guidelines in implementing the tools in cloud able to provide benefits to the community.

## 2. Big Data

Big Data in software system utilize the Operational Data (OD) for software design and maintenance activities (Mockus, A., 2014, May). The structure and unstructured data in operational support tools have long been prevalent in software engineering field. Proposing systematic approach to the engineering field of operational data base systems are popular researched within the Big Data research topics (Mockus, A., 2014, May). Based on the journal paper by Mockus, A. (2014), suggesting to satisfy the growing needs for OD system in software engineering and other fields are emerging. It will be necessary to develop basic principles and tools that allow to have effective use of engineering in OD ssystem. Mockus, A. (2014), systematically grab best practises and use past reaseach approach from other domains like databses and principles of OD system challenges. Proposed feature that will act as a guide to build engineering principles in OD system are two event should have the same context, data incomplete, data incorrect, filetered or tempered. From the features develop it is also necessary to develop library basic mechanism to describe the relationships among entities for software negineering domain (Saad et al., 2014). The mechanisms are designed into models and used as sements by context, input missing values etc. Particular care needs to be taken when applying methods in OD because the assumptions may be taken for granted and techniques may not be applicable for OD in general and fo sowaftr engineering in particualr. Future work in this area for research are implementing effective methods to identify data entry problem, clean data, augment or segment events and develop robust methods in identifying subject identities (Assunção, M. D. et al., 2014). While another research paper on Big Data describes the approaches and environments for applying clouds on Big Data applications (Assunção, M. D. et al., 2014). Proposed four areas of analytic and Big Data are data mangement, model development and scoring, vizualitaion and user interaction also business models. To conclude, Big Data is seen challenge in industries to overcome competitors. While if industries able to make use of Big Data to obtain information then the deman of customers will grow, increase revenue, reduce cost and increase operations. Cloud computing help to elevate demand with cost propotional and Big Data is still time consuming, requirees expensive softwares, large insfrastructures and efforts (Assunção et al., 2014), (Mockus, A., 2014).

## 3. Android Computing

Profileration of Android device and application sevicees have created demand that are applicable for software testing techniques (Amalfitano et al., 2011). Previous research focus on unit and GUI tetsing of Andiods applications. Today, EvoDroid (Mahmood et al., 2014) is an evolutionary approach for system testing in Android applications. EvoDroid overcomes the shortcoming for system testing and Mahmood et al., (2014) suggests to combine two novel techniques, Android specific program on identifying segments of code to be serached independently and evolutionary algorithm that gives information for such segments. Although the approach (Mahmood et al., 2014) have shown to successful

han existing tools and techniques for automated testing in Android applications, it could degrade because of unable to systematically reason about input conditions. Future work exist in this are to extend the model and frameworkk exist to provide full use of searh base algorithm. Besides, Android appliiation can be considered as Event Driven Software (EDS) which is driven by several types of events (Amalfitano et al., 2011). Major issue with Android application testing is accessing testing approaches for traditional EDS system (such as GUIs, Rich Internet Applications, embedded software, etc.) also available in Android based mobile application (Amalfitano et al., 2011). Problem of automatic testing in Android Google platform suggests techniques for rapid crash testing and regression testing of the application (Amalfitano et al., 2011), (Saad et al., 2014). The proposed testing technique is aim at finding runtime crashes or visible faults on modified versions of the application. To conclude, Android computing in software engineering field of research is growing in testing in identifying the right approach and model.

#### 4. Network Security

Network security is desirable as it enables to have direct measurement and compares the security level providedat different solutions. Pupolar criticism of past research is dealing with the rank level of vulnerabilities identified which are able to be measurable and security is not quantifiable until the issue is fixed (Heberlein et al.,1990), (Wang, et al., 2014). Research on novel security metric that stated k-zero safety identified that metircs are able to count the many reponsible network assets compared to ranking the vulnerabilities. k-zero safety can be applied through network hardening and submetrics. Network hardening renders the k-zero network (Wang, et al., 2014) for larger vulnerabilities. Examples of network hardening is increasing diversity, strenghting isolation, disabling services and firewall attacks. Submetrics applies modelling and quantifying services by patching with related vulnerabilities. This is an oppportunity inchoosing different network hardening solutions (Wang, et al., 2014). The proposed safety model is efficient in determining the appropriate metric for determining the value. Future improvements and evaluations are needed to rank the k-zero day vulnerabilities in handling inputs that are known to vulnerabilities (Wang, et al., 2014) in a application services. However research on network security have grown deeper in measuring the existing networks. Study on security measures relating to the signgle broadcast Local Area Network (LAN) (Ethernet Heberlein et al.,1990). A heirrachiral model was proposed in clarifying the intrusion detection mechanism in network security. Types of attacks are preparation phase, attack phase and post phase. Preparation phase is where the attacker have generic information of the network. Attack phase is when the network is remotely log from another machine and accessed in another machine. Finally, post phase is when the system continous to do changes after been hacked (Ethernet Heberlein et al.,1990). This model is designed to be operated in an open environment in real time. To conclude, network security research areas in software engineering is growing from topology area to metrics or framework entensions regards to this technology.

#### 5. Software Engineering Project Management

Software engineering project management is when a manager is assigned to manage the required set of activities and tasks. Major issues exists in planning of software projects (Thayer, R. H.,1987) which are software requirements, planning program that incomplete, software costs and schedules that are hard to prepare, criterias that are not available for selecting the best analysis, design, testing and management methodology for a sftware project (Thayer, R. H.,1987). Figure 3 also states the strngth and weelness of a software type where planning in a software engineering projects leads towards completion on time involves setting objectives and goals, strategies, develoing policies, determining course action and making dicisions (Thayer, R. H.,1987), (Howard, A., 2001). Besides getting the right people on the right project team suggest to improve the chances of success. This could be acknowledge through qualification, technical skills and experience of team members (Howard, A., 2001).

#### 6. Conclusion

This article benefits research studnets in software engineering field to acknowledge the latest trends of research topics available and to move further with the research gap and future works stated in the research papers reviewed.

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