Current Trends in Software Engineering Research

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CURRENT TRENDS IN SOFTWARE ENGINEERING RESEARCH

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ABSTRACT

Software engineering is dynamic disciplines that have continuous growth in research in identifying new methods, tools and methodologies that have cause vast improvement in software development and maintenance to be more reliable and efficient. Past research critics on cost reduction, quality and flexibility have endless try to design and develop many ways to improve these sectors are still causing impacts to the software industry [1]. *The new trends in software engineering research topics resolves 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 intense researched and implemented in the industries.*

Keywords: Methodology, Tools, Model, Cloud Computing, Android Computing, Big Data, Network Security, Project Management

Contribution/ Originality:

1. CLOUD COMPUTING

Cloud computing 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 intension to improve the education and software industry in providing reduction cost and improve the current technology in the industry [1]; [2]. Based from past research, problems in identifying the quality of services in cloud computing are rather poor and because of variety of services provided in cloud computing are neglected, mostly in service sector where the benefit of cloud computing is not felt by the software industry and the users. Thus researcher Abdelmaboud, et al. [2] have introduced five-research focus area to improve cloud-computing services. The research areas are as in Figure 1 below.
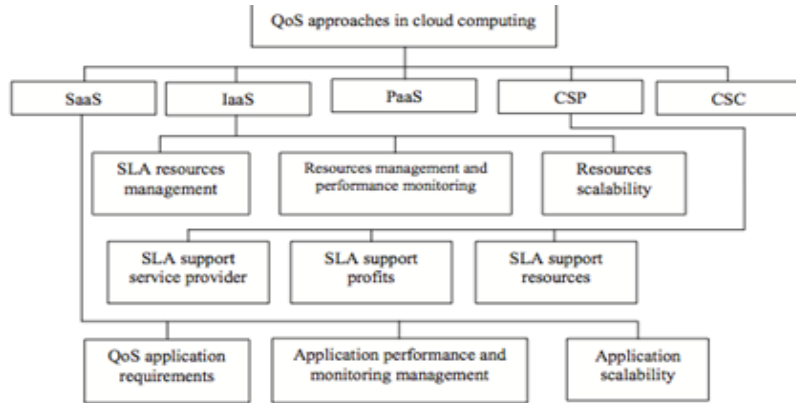
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Figure-1. The characteristics of quality of services in cloud computing [2].

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 canters and virtualization 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 the adoption of cloud computing for software engineering learning environment through Saad and Rana [1] research study. Issues highlighted in this paper are 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 collective review of past survey handled with three universities which are Asia Pacific University of Technology and Innovation Malaysia, University Technology Malaysia and University Malaya Malaysia, discussion of results obtained where 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 for huge classes and unmanageable groups. Furthermore, this paper provides a guideline in implementing the software engineering tool in cloud with descriptions in Figure 2 as below.

Figure-2. Guidelines in implementing software engineering tools on cloud [1]

In addition, benefits of cloud computing usage are visualized through working on multiple computers and operating systems with regardless of time and location. In addition, universities will have top beneficiaries and this able to optimize the resources more efficiently. To conclude, cloud computing have indulge in many areas weather in education or industry and would have benefited users through quality improvement and providing guidelines in implementing the tools in cloud which also indirectly cause benefit to the society.

2. BIG DATA

Now "Big Data" is famously known for software system utilize the Operational Data (OD) for software design and maintenance activities [3]. 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 database systems are popular researched within the Big Data research topics [3]. Mockus [3] research study suggests satisfying 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 having effective use of engineering in OD system. Mockus [3] had systematically grab best practises and use past research approach from other domains like databases and principles of OD system challenges. The proposed feature acts as a guide to build engineering principles in OD system are two events that should have the same context, data incomplete, data incorrect, filtered or tempered. From the features develop it is also necessary to develop library basic mechanism to describe the relationships among entities for software engineering domain [1]. The mechanisms are designed into models and used as segments 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 for software engineering in particular. 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 [4]. While another research paper on Big Data describes the approaches and environments for applying clouds on Big Data applications [4]. Proposed four areas of analytic and Big Data are data management, model development and scoring, visualization and

user interaction also business models. To conclude, Big Data is seen challenge in industries to overcome competitors. While industries able to make use of Big Data to obtain information then the demand of customers will grow, increase revenue, reduce cost and increase operations. Cloud computing help to elevate demand with cost proportional and Big Data is still time consuming, requires expensive software, large infrastructures and efforts [4]; [3].

3. ANDROID COMPUTING

Proliferations of Android device and application services have created demands that are applicable for software testing techniques [5]. Previous research focuses on unit and GUI testing of Andiods applications. Today, EvoDroid [6] is an evolutionary approach for system testing in Android applications. EvoDroid overcomes the shortcoming for system testing and Mahmood, et al. [6] suggests combining two novel techniques, Android specific program on identifying segments of code to be searched independently and evolutionary algorithm that gives information for such segments. Although the approach [6] have shown to successful hand existing tools and techniques for automated testing in Android applications, it could degrade because of unable to systematically reason about input conditions. Future work exists in this are to extend the model and framework exist to provide full use of search base algorithm. Besides, Android application can be considered as Event Driven Software (EDS) that is driven by several types of events [5]. 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 [5]. Problem of automatic testing in Android Google platform suggests techniques for rapid crash testing and regression testing of the application [5]; [1]. 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 provided at different solutions. Popular critic 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 [7]; [8]. Research on novel security metric that stated k-zero safety identified that metrics are able to count the many responsible network assets compared to ranking the vulnerabilities. K-zero safety can be applied through network hardening and submits. Network hardening renders the k-zero network [8] for larger vulnerabilities. Examples of network hardening is increasing diversity, strengthen isolation, disabling services and firewall attacks. Sub metrics applies modelling and quantifying services by patching with related vulnerabilities. This is an opportunity in choosing different network hardening solutions [8]. 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 [8] in an application services. However research on network security have grown deeper in measuring the existing networks. Study on security measures relating to the single broadcast Local Area Network (LAN) (Ethernet [7]. A hierarchical 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 has 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 continuous to do changes after been hacked Ethernet [7] and this model is beneficial for an open environment in real time. To conclude, network security research areas in software engineering is growing from topology area to metrics or framework extensions regards to this technology.

5. SOFTWARE ENGINEERING PROJECT MANAGEMENT

Software engineering project management purpose to manage the required set of activities and tasks consists major set of issues in planning of software projects [9] that involves software requirements, project planning that are incomplete, software costs and schedules which are hard to prepare and the criteria for selecting the best analysis, design, testing and management methodology for a software project that are in progress [9]. It is quite little that researchers know, the strength and weakness of a software type in planning for a software engineering projects leads towards completion of time involves setting objectives and goals, strategies, developing policies, determining course action and making decisions [9]; [10]. In addition, getting the right people on the right project team suggest to improve the chances of success which is through acknowledging through qualification, technical skills and experience of team members [10].

6. CONCLUSION

This article benefits research students 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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