A systematic mapping study of design and deployment models in cloud computing

In the traditional system of computing, all that is required in terms of applications, runtime, operating system and networking are provided by the organization. In cloud computing, various levels of resources are available at a cloud service provider's (CSP) data center and they are made available based on the need of the user at a cost. A user or an organization does not need to acquire the infrastructure necessary for its functioning. In some instances all, the computing resources from application to networking are provided by the CSP. In some cases, the user needs only the application and data; after that, all other computing resources are provided by the CSP. The resources provided by the CSP are available on-demand, and they are scalable. This leads to a reduction in cost and allows organizations to focus on important tasks. The services are in four categories, namely: Software-as-a-Service (SaaS), Infrastructure-as-a-Services, (IaaS), Platform-as-a-Service, (PaaS), and serverless computing.

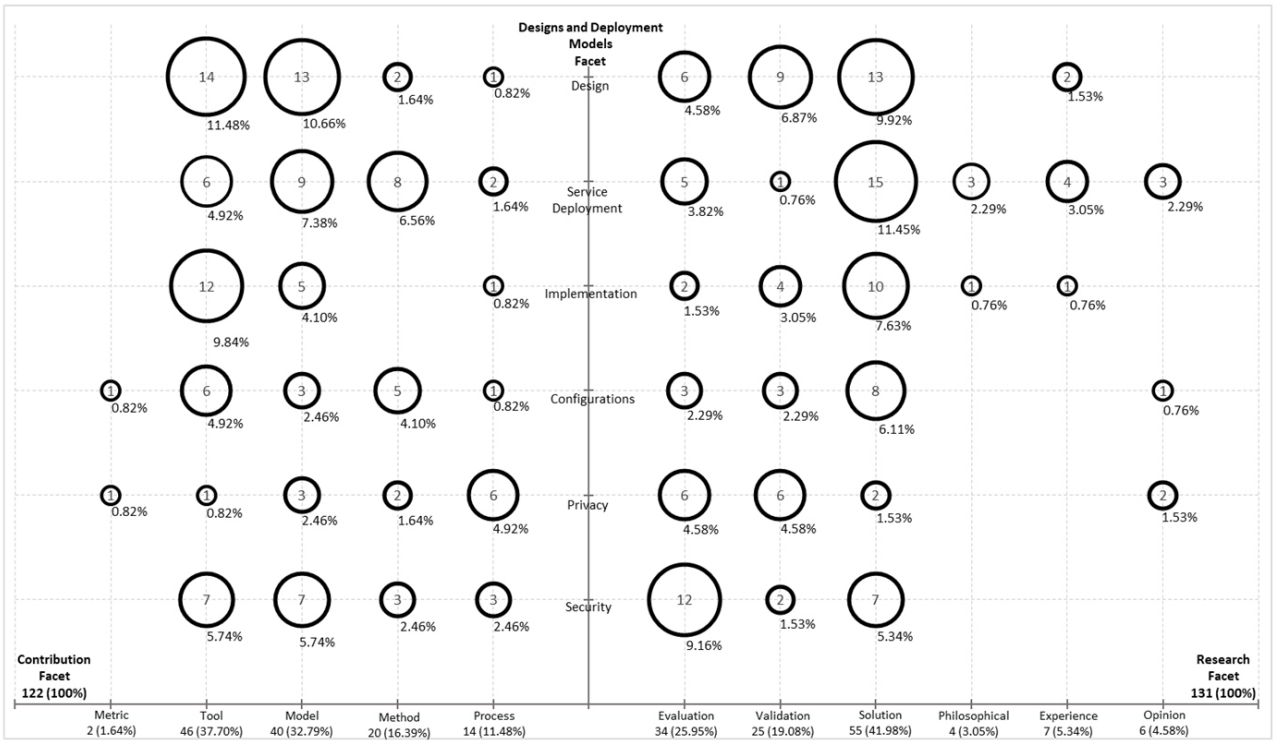

Fig. 1. Systematic map of design and deployment models for cloud.

These service types are vital aspects of the discussion on cloud design and deployment models. Topics in cloud design and deployment models such as the cloud aggregation, cloud brokerage and cloud federation enhance the cloud development process. Cloud aggregation combines and

integrates multiple cloud computing services, while broker deployment involves the management of different transactions between multiple public clouds and any cloud consumer over the internet. They are four cloud deployment models, namely: private, public, community and hybrid clouds. The federated cloud or Interclouds integrates these four cloud models into a scalable cloud platform and supports the cloud aggregator. Several important cloud activities such as load balancing, resource provisioning, resource allocation, peer-to-peer cloud, governance model, cloud interoperability and data storage models are centered on the study of design and deployments models.

Clearly, the study of cloud designs and deployment models is a core aspect of cloud computing, which makes it worthy of consideration. A systematic mapping study of cloud design and deployment models allows the visualization of the extent of research that has been carried out in this field of study. Six features of cloud designs and deployment models were selected for this review, which include design, service deployment, implementation, configuration, privacy and security.

The selected features were subjected to the systematic mapping process and the outcome is as shown in Figure 1. Validation, evaluation, solution, philosophical, opinion and experience research categories were utilized. Metric, tool, model, method and process contribution categories was also applied. The results indicated that there were more publications on design and service deployment features in terms of tools at 11.48% and 10.86%, respectively. There were more publications on service deployment in terms of methods at 6.56% and more publications on privacy in terms of process at 4.92%.

On the other hand, there were no publications based on this study on metric as it relates to design, service deployment, implementation and security. There were also no articles on implementation in terms of method. There were no papers on philosophical and experience research on the topics of security, privacy and configuration. Furthermore, articles on metric, model, method and tool in terms of privacy were the least at 0.82%, 0.82%, 2.46% and 1.64%, respectively. It can also be seen that publications on evaluation, philosophical and experience on the topic of implementation were the least at 1.53%, 0.76% and 0.76%, respectively. In addition, papers on tool, model and solution were emphasized more in terms of this area of study. On the other hand, metric and process contribution areas had the least publications, while philosophical, experience and opinion research areas had the least publications. Clearly, several deductions can be made from a systematic map, which makes this form of study highly significant. The visual appeal of the map helps to summarize and deliver results to cloud users, providers and researchers alike. It clearly helps to identify gaps in the topic area to enhance further research activities. This result would enable researchers to study areas that had not been explored.

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Publication

Cloud designs and deployment models: a systematic mapping study
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BMC Res Notes. 2019 Jul 19