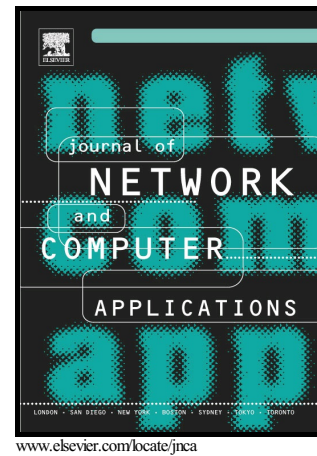


## Author's Accepted Manuscript

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PII: S1084-8045(17)30354-5  
DOI: <https://doi.org/10.1016/j.jnca.2017.10.021>  
Reference: YJNCA2001

To appear in: *Journal of Network and Computer Applications*

Received date: 10 June 2017  
Revised date: 9 October 2017  
Accepted date: 28 October 2017

Cite this article as: Sidra Aslam, Saif ul Islam, Abid Khan, Mansoor Ahmed, Adnan Akhundzada and Muhammad Khurram Khan, Information collection centric techniques for cloud resource management: Taxonomy, analysis and challenges, *Journal of Network and Computer Applications*, <https://doi.org/10.1016/j.jnca.2017.10.021>

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# Information collection centric techniques for cloud resource management: Taxonomy, analysis and challenges

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## Abstract

The emergence of cloud computing has gained massive attention for both industry and academia. Resource management in cloud computing is a challenging task due to the complex nature of user requirements and fluctuating workloads. The current research has primarily focused on scheduling algorithms, load balancing, and efficient resource sharing in computational clouds, however; classifying state information collection strategies have largely been neglected. This paper presents a survey of Information Collection Centric Techniques (ICCT) for cloud resource management. The paper contributes by providing a thematic taxonomy of the current state-of-the-art techniques to present a comprehensive classification of the state information collection mechanisms. Moreover, a thorough comparative analysis based on various parameters of the state-of-the-art ICCT have been carried out to highlight their merits and demerits. Finally, the paper concludes by presenting recommendations, issues and open research challenges that should be considered while proposing and designing novel resource management techniques.

**Keywords:** Cloud computing, resource management, state information collection, scheduling

## 1. Introduction

The radical growth of Internet users certainly necessitates excessive use of web and mobile applications that are now majorly hosted by clouds. According to the CISCO, nearly 92% of overall workload will be processed in the cloud by 2020 [1]. Moreover, with the rapid growth in information and communication technologies (ICTs), a large percentage of organizations and enterprises are turning towards the cloud computing paradigm that provides a cost-effective computing for resource-intensive applications. For many businesses, the elasticity, lack of upfront capital, and provision of services according to the degree of requirements (processing, memory and storage resources) are the key advantages of using various cloud platforms [2]. Efficient management of cloud resources help the cloud

providers to effectively utilize the available resources that consequently improves the overall performance of the system. For efficient resource utilization, different allocation techniques are adapted by the cloud service providers, such as static and dynamic resource allocation [3, 4, 5, 6, 7]. The selection of the technique is dependant on the choice of service providers and users requirements.

In cloud computing environment, the resources are assigned to users according to their needs on demand. Due to the dynamic, heterogeneous and complex nature of requests in cloud computing environment, efficient resource management is quite challenging [8]. In order to allocate resources efficiently, it is very important to have knowledge of the current state of available resources. Similarly, the process of state information dissemination is equally crucial to design varied resource allocation strategies. Moreover, the number of machines participating in this process do have a significant impact on the performance of cloud services. Consequently, it is indispensable to synchronize state information collection and resource allocation policies. In contrast, a cloud service can face critical problems,

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