

Proceedings

**IEEE 10th International Conference
on Cloud Computing Technology and Science**

CloudCom 2018

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on Cloud Computing Technology and Science**

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International Workshop on Anomaly Detection ON the Cloud and the Internet of Things (ADON 2018)

Preface

The first international workshop on Anomaly Detection ON the Cloud and the Internet of Things is part of the CloudCom 2018 Conference which takes place in Nicosia, Cyprus, December 10-13, 2018. The purpose of the Workshop is to bring together experts on networks, security, cloud computing, Internet of Things (IoT) and distributed computing in general, as well as experts on algorithms, pattern recognition and machine learning working on various aspects of anomaly detection.

Anomalies are detected in systems as a result of malicious behavior of users or, as unscheduled changes in the operation of a system. With the advent of cloud, similar behavior is now detected in virtualized environments such as the environment of a cloud provider (now affecting the operation of the system in scale and a large number of users) with certain economic and operational impact. Although cloud systems are considered to be more efficient, for example in terms of reliability, security etc. compared to legacy systems operating within the premises of an enterprise, they are exposed to a much larger number of users on the internet. At the same time, due to its scalability and affordability, the cloud is considered to be the ideal environment for deploying IoT applications. This exposes the application and the cloud to even more risks, as IoT is operating in the periphery of the cloud and is generally less protected than the cloud itself. In particular, the advent of the cloud and Internet of Things (IoT) open up new possibilities in the design and development of methodologies ensuring reliable security protection and, in cases where this fails, of methodologies for detecting and for dealing with the cause and point of system failure.

Due to the size and complexity of modern systems, anomalies can be detected in many aspects of system operation and relate mainly to:

- **Malicious user's behavior detection** which is typically expressed as (a) Fraud detection in which case, authorized or unauthorized users operate the system for the purpose of unfair or unlawful gain and (b) Intrusion detection in which case, unauthorized users are attempting to disrupt normal system operation.
- **System failures** which is due to heavy (CPU, network and memory) workloads or faulty or misconfigured resources. A special case of system failure is encountered when parts of the system fails to operate as scheduled due to power failure or material fatigue (e.g. disk failure).
- **Anomalies in IoT systems** due to unexpected behavior of connected devices which can be detected by monitoring the operation of these devices on the network, or by the analysis of real time data streams of misconfigured devices, or by monitoring and analyzing network traffic.

Anomaly detection has been studied extensively in recent years and new methods are now becoming available for the cloud and the IoT. Depending on application, anomalies can be detected either in real time i.e. typically by the analysis of stream data acquired by the application and operation of the system or, in batch (i.e. by analyzing system log data). Methods and systems for stream processing for example Storm, Spark, Flink, big data analysis techniques (as log data eventually become big) combined with Machine Learning techniques (for adapting anomaly detection to the peculiarities of the data and of the environment) are of particular importance to the design of anomaly detection methods. Combined with methods of system security and analysis in virtualized environments (such as the cloud), the new era of methods for anomaly detection will soon arise.

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