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MINING THE ARCHITECTURE OF CONTAINERIZED MICROSERVICES-BASED APPLICATIONS

A Dissertation by

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ABSTRACT

This research addresses the challenge of automatically recovering the architecture of microservices-based applications deployed on different containerization technologies. The complexity of modern microservices ecosystems necessitates an efficient and accurate approach for understanding the underlying architecture to support system maintenance, analysis, and optimization.

This research presents a three-step architecture mining process to automatically recover the architecture of microservices-based applications. The first step involves static analysis, where the tool examines the deployment configuration files to identify the various microservices present in the deployment. In the second step, the dynamic analyzer monitors real-time traffic and identifies the communication patterns between the microservices. Finally, the refiner component further fine-tunes the recovered architecture by identifying any message brokers available in the deployment.

The prototype underwent a thorough evaluation using a demo boutique application developed using microservices by Google Cloud Platform. The test results demonstrate the tool's capability to accurately identify all available microservices within this application and their relevant communication patterns. This successful evaluation showcases the effectiveness and reliability of the architecture mining tool in analyzing microservices-based applications.

Keywords: Microservices, Architecture Recovery, Container Based deployment, Container Orchestration

Subject Descriptors

- Information systems --> Information systems applications --> Computing platforms
- Software and its engineering --> Software creation and management --> Designing software --> Software design engineering
- Computing methodologies --> Distributed computing methodologies