Synthesis of forensic-ready software architectures for microservices-based systems

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Introduction

- What is the microservices architectural style?
- What are the benefits and drawbacks?
- Why microservices need to be forensic-ready?

Motivating example

- Shopify case study - confused deputy problem

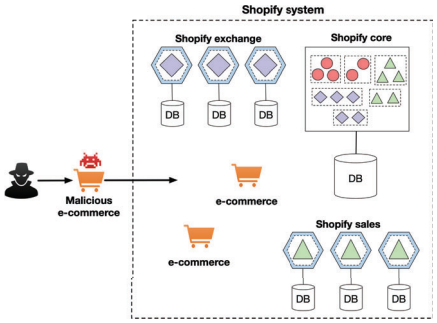


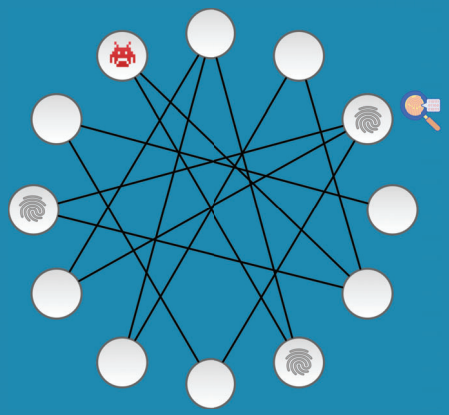
Fig. 1. Shopify e-commerce platform: a hybrid approach of monolith and microservices architectures.

Digital forensic challenges

- Ephemeral environments
- Dynamic attack surface
- Investigation space problem
- Islands of knowledge problem
- Post-*mortem* analysis

References
[1] Yan Cui, "Capture and forward correlation IDs through different Lambda event sources," 2014. [Online]. Available: https://hackernoon.com/capture-and-forward-correlation-ids-through-different-lambda-event-sources-220c227c65f5
[2] W. Li, Y. Lemieux, J. Gao, Z. Zhao, and Y. Han, "Service mesh: Challenges, state of the art, and future research opportunities," in 2019 IEEE International Conference on Service-Oriented System Engineering (SOSE), April 2019, pp. 122–1225.
[3] Blackwell, C. (2010). Improved situational awarenss and response with enhanced OODA loops. In 6th CSIIR Workshop. ACM Press.

How to **facilitate** digital forensic investigations in **microservices**-based systems?



Automated **reasoning** to explain the **contributing factors** that led to an **incident.**

For more information, please scan the QR code.

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How complex microservices-based systems can be?

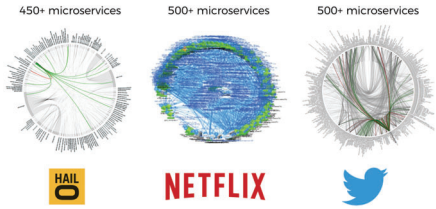

Fig. 2. Examples of microservice architectures using death star diagrams [1].

How to monitor microservices-based systems?

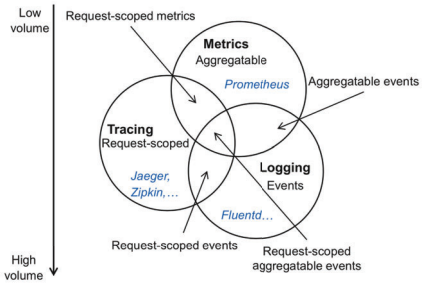

Fig. 3. Venn diagram for monitoring microservice-based applications [2].

Problems with the monitoring

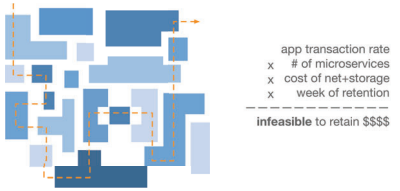

Fig. 4. Distributed tracing in microservice-based applications.

How to investigate incidents in microservices-based systems?

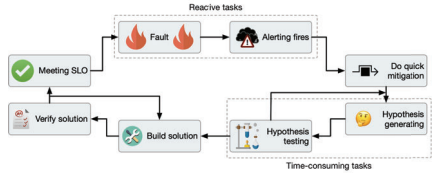

Fig. 5. An investigation feedback loop based on the OODA loop [3].