

# Message Queue Data Security in Multi Tenant Environment

Aalbrecht Alby Irawan                      Tobias Münch  
Hochschule Osnabrück                      Hochschule Osnabrück

Rainer Roosmann  
Hochschule Osnabrück

33th Crypto Day, 17 September 2021

Multi-tenancy, defines as an architectural pattern in which a single instance of the service infrastructure enabling access from multiple tenants to the same instance, can significantly ease operations and reduce delivery costs for a large number of tenants (Bezemer, Zaidman, Platzbeecker, Hurkmans & Hart (2010)), (Wang, Guo, Gao, Sun, Zhang & An (2008)). A tenant groups several users that have the same view of the system, usually an organization or a company (Guan, Wang & Yang (2014)). If multiple tenants should communicate through the single-instance message broker, an additional security mechanism should be added, which can be described as "preventing a user from getting the privileges to access data belonging to other tenants" (Wang *et al.* (2008)). Message Broker goal is to facilitate the construction of decentralized topology without a single point of failure, enabling fault tolerance and high availability (John & Liu (2017)). More often than not, the single-instance message broker will be responsible for managing multiple intercommunicating services. To ensure the security of the transferred data, this broker has been equipped with a security mechanism, e.g. access control, virtual hosts and custom policies. We proposed two different approaches to realize data security in a multi-tenant environment. 1) Each tenant gets its own virtual Host 2) Each tenant gets its queue with tenant Id. We studied the performance difference between the two approaches. Our study finds that tenant Id provides better performance than the approach with multiple virtual host.

## References

- COR PAUL BEZEMER, ANDY ZAIDMAN, BART PLATZBEECKER, TOINE HURKMANS & AAD HART (2010). Enabling multi-tenancy: An industrial experience report. *IEEE International Conference on Software Maintenance, ICSM* .
- HUI GUAN, XUAN WANG & HONGJI YANG (2014). A framework for security driven software evolution. In *ICAC 2014 - Proceedings of the 20th International Conference on Automation and Computing: Future Automation, Computing and Manufacturing*, 194–199. Institute of Electrical and Electronics Engineers Inc. ISBN 9781909522022.

VINEET JOHN & XIA LIU (2017). A Survey of Distributed Message Broker Queues URL <https://arxiv.org/abs/1704.00411v1>.

ZHI HU WANG, CHANG JIE GUO, BO GAO, WEI SUN, ZHEN ZHANG & WEN HAO AN (2008). A study and performance evaluation of the multi-tenant data tier design patterns for service oriented computing. *IEEE International Conference on e-Business Engineering, ICEBE'08 - Workshops: AiR'08, EM2I'08, SOAIC'08, SOKM'08, BIMA'08, DKEEE'08* 94–101.