5.3.2 Malicious User

Multi-tenancy security is complex because both the malicious user and the actual user are on the same server. This is why avoidance of security is possible in multi-tenancy, as it is not designed to infiltrate the inside part of servers, and is ability is limited to the boundaries of the network layer [13]. In agreement, (S10) described the imminent threat around the container-based cloud deployments in a multi-tenant environment as a threat posed by an instance where a malicious or attacker container and non-malicious container reside in the same host operating system and are running on the same container engine. Cloud security deployment could be based on how strongly the container engine can implement identity management.

5.3.3 Migration

In cloud computing, migration can be described as moving from a legacy system to cloud computing or moving from one deployment model to another in a CNA. It can also be considered as the movement of part of the data in the cloud computing paradigm, called portability, through the moving of pods, clusters, containers, and users. Based on isolation and multi-tenancy, migration becomes a challenge. Moving different parts of the prominent structure takes time and resources (S9). However, migration should be a first-class notion in the system, having the same stature as scalability, consistency, fault-tolerance, and functionality. Nonetheless, migration will not be easily achieved if multi-tenancy is not solved in the CNA implementation's architecture stage. Those challenges are being solved by modification and customisation. Organisations using CNA provide their own do-it-yourself (DIY) approaches, such as the Alibaba virtual cluster, which implements multi-tenancy in a containerised orchestration application, Kubernetes. Alibaba virtual cluster achieves this by implementing complex customisation and the application's adjustments, including interface, API, and design parameters. According to the [18], Kubernetes is not multi-tenancy-enabled at default and to achieve a multi-tenancy containerised cloud architecture, multiple configurations and customisation are needed, and so is the use of tools such as namespaces, network policies, resource quotas and isolation systems, such as the sandbox and sole tenant nodes provided and being improved.

6 Conclusion and Future Research

Multi-tenancy is a key characteristic of software-oriented architecture, but according to the review it is not thoroughly considered in the cloud-native architecture which seems that the multi-tenancy in cloud-native seem to be different to concept in software-oriented architecture because of the differences in style, component, and principle of cloud native architecture. This review may not be able to justify the differences based on the scope of this research, further research work in this area is needed. Our discussion shows some the trending concepts in multi-tenancy within cloud-native architecture that brings about improvement to the cloud computing paradigm in general and also challenges that are introduce. We identify challenges such as migration, malicious user and isolation issues which has some interest but not maturity of research area is quite low. Overall, based on analysis and classification, further research is needed to provide a detailed understanding of multi-tenancy in cloud-native architecture through experiments and case studies. The experiment-based findings will make cloud computing security, isolation and migration in cloud-native architecture less complicated. Secondly, future research should investigate other cloud computing properties such as interoperability and portability in cloud-native architecture. Which will remove the gap in knowledge about the adoption of cloud-native architecture and technology and increase the adoption of cloud computing and cloud-native-based technology in small, medium and large-scale enterprises.

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