

Document name	Code	Segment	Created by
Alouffi2021-A_systematic_literature_review_on_cloud_computing_s	VENDOR LOCK-IN > Vendor Lock-in	Data unavailability, vendor lock-in and insufficient measures of security create concerns for users. Consumers show their concern over the lack of interoperability and standards. Portability features are provided with limited offers. Therefore, evaluation of SLAs benefits the service providers in terms of legal actions, while minimal assurance of data protection for consumers is specified to reflect the consumers' requirements at the right time [13].	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	In this paper, we discuss key challenges for developing for and accessing cloud services in resource constrained settings, namely, (1) Frequent Internet partitions and bandwidth constraints, (2) Data jurisdiction restrictions, (3) Vendor lock-in, and (4) Poor quality of service.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Difficulty portability between clouds	Inspired by these challenges, we propose a set of important design considerations and properties for a resilient multi-cloud service layer, that includes: (1) Containerization and orchestration of applications, (2) Application placement and replication, (3) Portability and multi-cloud migration, (4) Resilience to network partitions and bandwidth constraints, (5) Automated service discovery and load balancing, (6) Localized image registry, and (7) Support for platform monitoring and management.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	We present an implementation and validation case study, Crane Cloud, an open source multi-cloud service abstraction layer built on-top of Kubernetes that is designed with inherent support for resilience to network partitions, microservice orchestration (deployment, scaling and management of containerized applications), a localized image registry, support for migration of services between private and public clouds to avoid vendor lock-in issues and platform monitoring.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	Other concerns include vendor lock-in, data security and protection, and price.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	Vendor lock-in Vendor lock-in, which is a user difficulty of switching from one vendor to another, is regarded as one of the major deterrents in the adoption of cloud by developers as well as small and medium-sized enterprises (SMEs) (Sahandi et al.,	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	Other than vendor lock-in, there are other variations including product lock-in, version lock-in, architecture lock-in, platform lock-in, skills lock-in and mental lock-in (Hohpe, 2019).	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	Consequently, the applications developed for a specific cloud provider such as Amazon Web Services (AWS) may not work out-of-the box with another cloud provider such as IBM cloud due to inherent dependencies of the underlying IT infrastructure (hardware and software), cloud semantics and non-standardized APIs (Opara-Martins et al., 2016; Kratzke et al., 2014).	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Difficulty portability between clouds	Consequently, the applications developed for a specific cloud provider such as Amazon Web Services (AWS) may not work out-of-the box with another cloud provider such as IBM cloud due to inherent dependencies of the underlying IT infrastructure (hardware and software), cloud semantics and non-standardized APIs (Opara-Martins et al., 2016; Kratzke et al., 2014).	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Difficulty portability between clouds	The migration of cloud services from one provider to another usually requires major reworks on the application that may be catastrophic for mission-critical systems. For instance, the APDD case study may use vendor-specific machine learning libraries and tools making it difficult to migrate to another cloud when there is need.	Ivon Miranda Santos

Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	The vendor lock-in challenge emphasizes the need for new abstraction layers to alleviate the difficulty of migrating applications between clouds.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Difficulty portability between clouds	The vendor lock-in challenge emphasizes the need for new abstraction layers to alleviate the difficulty of migrating applications between clouds. New platforms and architectures such as Kubernetes (Burns et al., 2016) offer new possibilities to implement a vendor neutral layer on top of public and private clouds. However, the current offerings of managed Kubernetes layers assume migration of services in situations where there is stable connectivity and infrastructure and are not designed for data centers that may be characterized by frequent network partitions and bandwidth constraints.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor lock-in concern	The vendor lock-in challenge emphasizes the need for new abstraction layers to alleviate the difficulty of migrating applications between clouds. New platforms and architectures such as Kubernetes (Burns et al., 2016) offer new possibilities to implement a vendor neutral layer on top of public and private clouds. However, the current offerings of managed Kubernetes layers assume migration of services in situations where there is stable connectivity and infrastructure and are not designed for data centers that may be characterized by frequent network partitions and bandwidth constraints.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Challenge of vendor lock-in	The vendor lock-in challenge emphasizes the need for new abstraction layers to alleviate the difficulty of migrating applications between clouds. New platforms and architectures such as Kubernetes (Burns et al., 2016) offer new possibilities to implement a vendor neutral layer on top of public and private clouds. However, the current offerings of managed Kubernetes layers assume migration of services in situations where there is stable connectivity and infrastructure and are not designed for data centers that may be characterized by frequent network partitions and bandwidth constraints.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	In this section, we present the design considerations and properties for a resilient multi-cloud service layer that is envisioned to meet the above requirements, namely, (1) Frequent Internet partitions and bandwidth constraints, (2) Data jurisdiction restrictions, (3) Vendor lock-in, and (4) Poor quality of service.	Ivon Miranda Santos

Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	3.3. DC 3: Portability and multi-cloud migration Portability in cloud computing can be defined as the ability for movement of applications, workloads, processes and data from one cloud environment to another with least disruption, whether manually or automatically. The least disruption should translate to lowest possible cost, effort and time. The movement of one service, such as the one instance of the prediction microservice for automated plant diagnosis system from Cluster 2 to Cluster 1 as shown in Fig. 5, should cause minimal or no downtime and should not compromise the QoS attributes tagged to overall operation of the system. As noted earlier, cloud computing offers significant benefits such as scalability, disaster recovery, mobility and cost reduction in operation of an organization's IT infrastructure. This is evidenced in the introduction of different cloud computing technologies and deployments to make it easy for organizations to embrace and adopt this new wave of handling compute, storage and network workloads. One of the pertinent issues in the adoption of cloud computing is vendor lock-in (lack of portability and interoperability across cloud platforms) where providers work with specific technologies such as tools and programming interfaces. Given the different deployment models and the cloud service models, organizations should be able to move cloud services from one provider to another without worries of complexities and infrastructure dependence.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Difficulty portability between clouds	Crane Cloud is an open source multi-cloud service layer designed to enable developers, organizations and researchers to set up reliable cloud-services in low resource setting. The Crane Cloud software layer was conceived to address the key hurdles of operating a cloud-service platform in resource constrained environments characterized by challenges identified in Section 2.2. Its main ingredients include resilience to network partitions, support for microservice orchestration, support for migration of services between private and public clouds to avoid vendor lock-in issues, seamless downtime and network traffic load distribution, monitoring metrics, and tools for transforming existing non-cloud compliant services into compliant cloud services.	Ivon Miranda Santos
Bainomugisha2022-Crane_cloud_A_resilient_multicloud_service_abs	VENDOR LOCK-IN > Vendor Lock-in	Its main ingredients include resilience to network partitions, support for microservice orchestration, support for migration of services between private and public clouds to avoid vendor lock-in issues, seamless downtime and network traffic load distribution, monitoring metrics, and tools for transforming existing non-cloud compliant services into compliant cloud services.	Ivon Miranda Santos
Brogi2014-SeacLOUDS_Seamless_adaptive_multi-cloud_management_of	VENDOR LOCK-IN > Difficulty portability between clouds	By increasing service and application portability in a vendor-neutral ecosystem, TOSCA aims at enabling portable deployment to any compliant cloud, smoother migration of existing applications to the cloud, as well as dynamic, multi-cloud provider applications.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_c	VENDOR LOCK-IN > Vendor Lock-in	To overcome the vendor lock-in problem, various standardisation efforts are currently ongoing, such as OASIS Cloud Application Management for Platforms (CAMP, [4]), DMTF Cloud Infrastructure Management Interface (CIMI, [5]), Virtualization Management (VMAN, [6]), or OASIS Topology and Orchestration Specification for Cloud Applications (TOSCA, [7]), just to mention some of them.	Ivon Miranda Santos

Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Difficulty portability between clouds	Several approaches exist that target formal verification and adaptation of orchestrated services, but, to the best of our knowledge, none of these approaches has been extended to the cloud environment. Challenges such as heterogeneity of cloud platforms and migration to different cloud providers have to be addressed, as well as the different standards emerging from distinct vendors. Therefore, existing approaches should be (substantially) extended to operate on heterogeneous cloud providers.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Difficulty portability between clouds	Challenges in orchestration and adaptation for the cloud SeaClouds will address the following challenges in order to extend service-oriented approaches to the cloud: • Adaptation contracts need to take into account cloud providers characteristics and Service Level Agreement (SLA). • Violations of Quality of Service (QoS) properties need to be monitored across different cloud platforms. • Dynamic architecture reconfiguration might involve migrating some components of the application to other cloud providers at runtime. The latter two challenges (addressed by O2 and O3) are discussed further in the following sections.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Vendor Lock-in	Cloud4SOA facilitates developers in the deployment and lifecycle management and monitoring of their applications on the PaaS offering that best matches their computational needs, and ultimately reduces the risks of a vendor lock-in.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Vendor lock-in risk	Cloud4SOA facilitates developers in the deployment and lifecycle management and monitoring of their applications on the PaaS offering that best matches their computational needs, and ultimately reduces the risks of a vendor lock-in.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Vendor Lock-in	The SeaClouds project goes one step further, and expects to allow the migration over all platforms, so as to strongly mitigate the vendor lock-in problem.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Vendor Lock-in	This allows organisations to embrace cloud solutions and avoid risks of unreliability and vendor lock-in.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Vendor lock-in risk	This allows organisations to embrace cloud solutions and avoid risks of unreliability and vendor lock-in	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Vendor Lock-in	It facilitates developers in the deployment and lifecycle management of their applications on the PaaS offering that best matches their computational needs, and ultimately reduces the risks of a vendor lock-in.	Ivon Miranda Santos
Brogi2015-Adaptive_management_of_applications_across_multiple_clouds	VENDOR LOCK-IN > Vendor lock-in risk	It facilitates developers in the deployment and lifecycle management of their applications on the PaaS offering that best matches their computational needs, and ultimately reduces the risks of a vendor lock-in.	Ivon Miranda Santos
Caceres2022-State-of-the-art_architectures_for_interoperability	VENDOR LOCK-IN > Vendor Lock-in	Extensive research in industry and academia has partially addressed the problem of vendor lock-in for cloud migration, however, no solutions are known to enable running applications in a dynamic multi-cloud infrastructure on a permanent basis.	Ivon Miranda Santos
daSilva2013-From_the_desktop_to_the_multi-clouds_The_case_of_mobile_apps	VENDOR LOCK-IN > Vendor Lock-in	The main consequence of this heterogeneity is the so-called vendor lock-in, i.e. clients are "locked into" providers solutions just because migrating to different providers would cost too much to them.	Ivon Miranda Santos
daSilva2013-From_the_desktop_to_the_multi-clouds_The_case_of_mobile_apps	VENDOR LOCK-IN > Vendor Lock-in	This project intends to develop the designing and runtime tools necessary to allow us to design our application on a cloud provider independent way, avoiding the pitfalls of the vendor lock-in.	Ivon Miranda Santos
daSilva2013-From_the_desktop_to_the_multi-clouds_The_case_of_mobile_apps	VENDOR LOCK-IN > Vendor Lock-in	(i) avoiding vendor lock-in; (ii) supporting risk analysis and management and (iii) guaranteeing predefined quality of service agreements.	Ivon Miranda Santos

daSilva2013- From_the_desktop_to_the_multi- clouds_The_case_of_mo	VENDOR LOCK-IN > Vendor Lock-in	The main advantage of such model driven approach is that it reduces the vendor lock-in, by basing much of the models in provider independent concepts.	Ivon Miranda Santos
daSilva2013- From_the_desktop_to_the_multi- clouds_The_case_of_mo	VENDOR LOCK-IN > Vendor Lock-in	We want to avoid vendor lock-in by avoiding specialized (provider specific) frameworks and deployment formats.	Ivon Miranda Santos
daSilva2013- From_the_desktop_to_the_multi- clouds_The_case_of_mo	VENDOR LOCK-IN > Difficulty portability between clouds	First of all, the Administration Service needs to be extended with the support monitoring QoS on multiple clouds. We intend to work on the monitoring resource status information such as the available and used memory and disk space, and the CPU consumption. We consider such pieces of information to be important for allowing our customers to decide upon when migrations need to be performed. Our current prototype actually has no monitoring capabilities. The challenge in monitoring such pieces of information is that a different set of measurements is provided by each cloud provider, making it hard to implement the monitoring code and to present a homogeneous user interface to the developers.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Vendor Lock-in	One such problem is the so-called vendor lock-in since different cloud providers offer peculiar and often incompatible services, which results in the automatic migration impossibility of the application between cloud providers.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Difficulty portability between clouds	One such problem is the so-called vendor lock-in since different cloud providers offer peculiar and often incompatible services, which results in the automatic migration impossibility of the application between cloud providers.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Difficulty portability between clouds	This issue becomes even more problematic when thinking of future applications composed of services or components hosted by different cloud providers in a multi-cloud environment. Dealing with ven-dor lock-in in multiple clouds requires addressing two important challenges: interoperability and portability. Some solutions have been proposed to deal with both problems, but most of them fail to provide flexibility.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Vendor Lock-in	Dealing with ven-dor lock-in in multiple clouds requires addressing two important challenges: interoperability and portability.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Vendor lock-in concern	Dealing with ven-dor lock-in in multiple clouds requires addressing two important challenges: interoperability and portability. Some solutions have been proposed to deal with both problems, but most of them fail to provide flexibility. Therefore, we propose PacificClouds, a novel architecture based on microservices for addressing interoperability in a multi-cloud environment. PacificClouds differs from previous works by providing greater flexibility due to the microservices architectural pattern. In this article, we also propose a definition of microservices and a comparative analysis of the works related to PacificClouds. Finally, we show the main challenges of PacificClouds, and we point out the future directions.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Challenge of vendor lock-in	Dealing with ven-dor lock-in in multiple clouds requires addressing two important challenges: interoperability and portability.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Vendor Lock-in	Thus, the problem known as vendor lock-in arises as a consequence the user applications are dependent on a single cloud provider technology.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Vendor Lock-in	, 2015), vendor lock-in is one of the barriers to the adoption of cloud computing.	Ivon Miranda Santos
deCarvalho2018- Pacificclouds_A_flexible_microservic es_based_arc	VENDOR LOCK-IN > Vendor Lock-in	The research further points out that organizations' desire to adopt the cloud for their benefit is primarily related to capacity, scalability, and speed, but they consider urgent the vendor lock-in treatment.	Ivon Miranda Santos

deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Vendor Lock-in	One method for treating vendor lock-in is the use of multiple clouds, although a small number of enterprises adopt this approach, their popularity is increasing. One reason for the low adoption of multiple clouds is cloud providers interest lack to promote interoperability and portability (Grozev and Buyya, 2014). According to this context, (Opara-Martins et al., 2015) observes the need for dealing with in-teroperability and portability in order to mitigate the problem of vendor lock-in. Section 2 describes mul-tiple clouds, interoperability and portability.	Ivon Miranda Santos
deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Vendor Lock-in	In addition, (Opara-Martins et al., 2015) still notes that no approach exists that meets the needs of enter-prises. Some of the reasons there is no proposed so-lution widely adopted to mitigate vendor lock-in are: most solutions are inflexible; software architects must adopt specific technologies for the application deve-lopment with a steep learning curve, (Petcu, 2013).	Ivon Miranda Santos
deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Vendor lock-in concern	In addition, (Opara-Martins et al., 2015) still notes that no approach exists that meets the needs of enter-prises. Some of the reasons there is no proposed so-lution widely adopted to mitigate vendor lock-in are: most solutions are inflexible; software architects must adopt specific technologies for the application deve-lopment with a steep learning curve, (Petcu, 2013).	Ivon Miranda Santos
deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Vendor Lock-in	In this work, we propose a novel architecture based on microservices to address interoperability for a multi-cloud environment, called PacificClouds, in or-der to mitigate vendor lock-in and aid to obtain full cloud advantages.	Ivon Miranda Santos
deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Vendor Lock-in	However, the multiple clouds bring several challenges, as well, e.g., interoperability and portabi-lity related to mitigating vendor lock-in. We consider portability the ability to allow customers to migrate data and systems from one cloud to another and inter-operability capacity to allow customers to use servi-ces across multiple clouds (Rezaei et al., 2014).	Ivon Miranda Santos
deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Difficulty portability between clouds	We consider portability the ability to allow customers to migrate data and systems from one cloud to another and inter-operability capacity to allow customers to use servi-ces across multiple clouds (Rezaei et al., 2014)	Ivon Miranda Santos
deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Vendor Lock-in	In this section, we describe an overview of the six most relevant works related to PacificClouds in regars to treating the interoperability in multiple clouds, in which each of them proposes a different solution to mitigate vendor lock-in.	Ivon Miranda Santos
deCarvalho2018-Pacificclouds_A_flexible_microservices_based_arc	VENDOR LOCK-IN > Difficulty portability between clouds	In this section, we describe an overview of the six most relevant works related to PacificClouds in regars to treating the interoperability in multiple clouds, in which each of them proposes a different solution to mitigate vendor lock-in. Cloud4SOA introduces a broker-based architecture whose primary goal is to address semantic in-teroperability challenges at the PaaS layer, based on SOA architecture (Dandria et al., 2012).	Ivon Miranda Santos
dePaula2016-A_systematic_literature_review_on_cloud_computing_a	VENDOR LOCK-IN > Vendor Lock-in	vendor Lock-in factor and also present a set of assessment activities and guide-lines to support migration to the Cloud by adopting SOA and Cloud modeling standards and tools.	Ivon Miranda Santos
dePaula2016-A_systematic_literature_review_on_cloud_computing_a	VENDOR LOCK-IN > Impact of vendor lock-in	The paper [S33] investigated the migration costs of several deployment options using benchmarks and concluded that application characteristics such as workload intensity, growth rate, storage capacity, and S/W licensing costs produce complex combined effects on overall costs. In [S34], a critical review and impact of vendor lock-in for enterprise adoption from a technical, business and legal viewpoint was presented.	Ivon Miranda Santos

dePaula2016- A_systematic_literature_review_on_c loud_computing_a	VENDOR LOCK-IN > Vendor Lock-in	In [S34], a critical review and impact of vendor lock-in for enterprise adoption from a technical, business and legal viewpoint was presented.	Ivon Miranda Santos
Elgedawy2015- Sultan_A_composite_data_consisten cy_approach_for_s	VENDOR LOCK-IN > Vendor Lock-in	Abstract—Migrating business services to the clouds creates many high business risks such as "cloud vendor lock-in".	Ivon Miranda Santos
Elgedawy2015- Sultan_A_composite_data_consisten cy_approach_for_s	VENDOR LOCK-IN > Vendor lock-in risk	Abstract—Migrating business services to the clouds creates many high business risks such as "cloud vendor lock-in". One approach for preventing this risk is to deploy business services on different clouds as SaaS (i.e., Software as a Service) services. Unfortunately, such SaaS multi-cloud deployment approach faces many technical obstacles such as clouds heterogeneity and ensuring data consistency across different clouds.	Ivon Miranda Santos
Elgedawy2015- Sultan_A_composite_data_consisten cy_approach_for_s	VENDOR LOCK-IN > Vendor Lock-in	Moving business services to global clouds as SaaS services has many benefits (such as flexibility, scalability, reducing capital expenditure on capacity investment), however many businesses are still reluctant to do the move due to its high business risks such as "cloud-vendor lock-in".	Ivon Miranda Santos
Elgedawy2015- Sultan_A_composite_data_consisten cy_approach_for_s	VENDOR LOCK-IN > Vendor lock-in risk	Moving business services to global clouds as SaaS services has many benefits (such as flexibility, scalability, reducing capital expenditure on capacity investment), however many businesses are still reluctant to do the move due to its high business risks such as "cloud-vendor lock-in". The cloud-vendor lock-in risk makes businesses vulnerable to price increase and/or changes to the cloud-vendor services.	Ivon Miranda Santos
Elgedawy2015- Sultan_A_composite_data_consisten cy_approach_for_s	VENDOR LOCK-IN > Vendor Lock-in	The cloud-vendor lock-in risk makes businesses vulnerable to price increase and/or changes to the cloud-vendor services. As a result, businesses do not have the freedom to change their cloud-vendors whenever they like as their services and data are locked-in due to clouds heterogeneity and data migration costs.	Ivon Miranda Santos
Elgedawy2015- Sultan_A_composite_data_consisten cy_approach_for_s	VENDOR LOCK-IN > Difficulty portability between clouds	One approach for preventing such risk is to deploy business services on different clouds. SaaS multi-cloud deployment provides better performance and lower costs compared to the usage of a single cloud, as it provides better availability, responsiveness, and resources utilization [1]. However, SaaS multi-cloud deployment approach faces many technical challenges such as cloud heterogeneity, ensuring data correctness, and security.	Ivon Miranda Santos
Fowley2018- Cloud_migration_architecture_and_pr icing_-_Mapping_a	VENDOR LOCK-IN > Difficulty portability between clouds	Tools have been provided by many cloud service provider to migrate for instance data using data loaders. In [21], the top 10 challenges for start-ups are summarised, that also reflect the concerns for migrations by software vendors inexperienced in cloud technologies, particularly if the cloud context is a novel environment.	Ivon Miranda Santos
Gholami2016- Cloud_migration_process—a_survey _evaluation_framework	VENDOR LOCK-IN > Vendor lock-in risk	The need for a systematic approach is particularly important when organisations are heavily dependent on legacy applications that have been in operation and stored critical data over the years. Moving to the cloud raises many concerns such as security, interoperability, and vendor lock-in.	Ivon Miranda Santos
Gholami2016- Cloud_migration_process—a_survey _evaluation_framework	VENDOR LOCK-IN > Vendor lock-in concern	The need for a systematic approach is particularly important when organisations are heavily dependent on legacy applications that have been in operation and stored critical data over the years. Moving to the cloud raises many concerns such as security, interoperability, and vendor lock-in.	Ivon Miranda Santos
Gholami2016- Cloud_migration_process—a_survey _evaluation_framework	VENDOR LOCK-IN > Vendor Lock-in	Moving to the cloud raises many concerns such as security, interoperability, and vendor lock-in.	Ivon Miranda Santos

Gholami2016-Cloud_migration_process—a_survey_evaluation_framework	VENDOR LOCK-IN > Difficulty portability between clouds	These issues face developers to heterogeneities across the application tiers, which imply a certain level of development effort, specifically in migration types I, II, III, IV, and V. As advancements in the cloud computing is still on-going track and there is not a common standard for development cloud services, application portability is a challenge when its components are to move from a provider to another provider, but there is an incompatibility between underlying technologies of these providers (e.g. APIs).	Ivon Miranda Santos
Hajjat2010-Cloudward_bound_Planning_for_beneficial_migration_of	VENDOR LOCK-IN > Difficulty portability between clouds	In this paper, we tackle challenges in migrating enterprise services into hybrid cloud-based deployments, where enterprise operations are partly hosted on-premise and partly in the cloud. Such hybrid architectures enable enterprises to benefit from cloud-based architectures, while honoring application performance requirements, and privacy restrictions on what services may be migrated to the cloud. W	Ivon Miranda Santos
Hwang2015-Computing_resource_transformation_consolidation_and	VENDOR LOCK-IN > Difficulty portability between clouds	Existing tools aim to only provide an one-to-one migration that just copies a source image into a target image, but they do not find themselves as the comprehensive end-to-end migration toolings [8, 9].	Ivon Miranda Santos
Hwang2015-Computing_resource_transformation_consolidation_and	VENDOR LOCK-IN > Difficulty portability between clouds	It is the most of importance that many of these processes can be smoothly executed with well planned resource mappings between the source and the target upfront. In this paper, we propose a model to tackle the migration challenges that transform one resource into same or another resource in hybrid clouds based on source requirements and target availability. We investigate the transformation metrics that need to be taken into consideration for the migration resource planning, server consolidation, and server decomposition.	Ivon Miranda Santos
Kratzke2017-Understanding_cloud-native_applications_after_10_years	VENDOR LOCK-IN > Impact of vendor lock-in	(2016) Critical analysis of vendor lock-in and its impact on cloud computing migration:	Ivon Miranda Santos
Lahmar2018-Multicloud_service_composition_Analysis_survey_of_current_and_futuristic	VENDOR LOCK-IN > Vendor Lock-in	Consuming services that come from a single cloud or a combination of clouds depend on the consumers requirements. Indeed, using a single-cloud environment is still a pertinent solution for organizations that avail less cloud resources and look for avoiding overwhelming. Furthermore, depending on 1 single cloud is economic and more performant, as we do not need to worry about the network management and the intercloud communication. However, it is in some cases safely to adopt a multicloud solution. In organizations with various requirements, it will be better to use different cloud providers. This migration offers more autonomy while selecting services, as it gives the customer the possibility of choosing from the set of candidate offers the most performant one, at any given time. Furthermore, using several clouds is also successful in avoiding downtime and data waste, enhancing the enterprise performance and eschewing vendor lock-in. ²	Ivon Miranda Santos
Lahmar2018-Multicloud_service_composition_Analysis_survey_of_current_and_futuristic	VENDOR LOCK-IN > Vendor Lock-in	Among the advantages of the MCSC is eschewing vendor lock-in that forces the cloud users to choose the design and the deployment models from the beginning.	Ivon Miranda Santos
Mahmood2020-Erp_issues_and_challenges_a_research_synthesis	VENDOR LOCK-IN > Vendor Lock-in	Moreover, the vendor lock-in problem exists mostly in cloud ERP systems.	Ivon Miranda Santos

Mateen2021- A_dynamic_decision_support_system _for_selection_of_c	VENDOR LOCK-IN > Vendor lock-in risk	The market for PAAS is developers. Its main advantage is to reduce software concerns, but its major drawback is vendor lock-in. Microsoft Azure and Google App Engine are examples of PAAS. In the IAAS cloud computing structure, a repository and other resources are maintained by the service provider. The market for IAAS is network architects. Its main advantage is full control, and its major drawback is less efficiency. The examples for IAAS include Microsoft Azure and Amazon Web Service (AWS) [2]	Ivon Miranda Santos
Mateen2021- A_dynamic_decision_support_system _for_selection_of_c	VENDOR LOCK-IN > Vendor lock-in concern	The market for PAAS is developers. Its main advantage is to reduce software concerns, but its major drawback is vendor lock-in. Microsoft Azure and Google App Engine are examples of PAAS. In the IAAS cloud computing structure, a repository and other resources are maintained by the service provider. The market for IAAS is network architects. Its main advantage is full control, and its major drawback is less efficiency	Ivon Miranda Santos
Mateen2021- A_dynamic_decision_support_system _for_selection_of_c	VENDOR LOCK-IN > Vendor Lock-in	Its main advantage is to reduce software concerns, but its major drawback is vendor lock-in. Microsoft Azure and Google App Engine are examples of PAAS. In the IAAS cloud computing structure, a repository and other resources are maintained by the service provider. The market for IAAS is network architects. Its main advantage is full control, and its major drawback is less efficiency. The examples for IAAS include Microsoft Azure and Amazon Web Service (AWS) [2]. Cloud computing has three main types (public, private, and hybrid) with different benefits for each type. The public cloud is a standard cloud computing model in which resources, such as CPU, memory, a repository, and APIs, are available to all users. These services can be public websites like Daraz, or storage space like Dropbox and OneDrive. A private cloud has a restricted environment where services are available through authorization (e.g., government ministry websites). In order to get the flavor of both public and private environments, there is a hybrid cloud. This type is not commonly used owing to some security concerns. Similarly, public users do not easily accept private cloud restrictions. A community cloud is a variant of hybrid cloud that provides services within a community [3]. Figure 1 clearly shows that cloud services are dependent on the user's capability requirement and the openness of the membership. Appl. Sci. 2021, 11, x FOR PEER REVIEW 2 of 34 end-users. The advantage of SAAS is efficient	Ivon Miranda Santos
Mohamed2020- A_multicriteria_optimization_model_for r_cloud_servic	VENDOR LOCK-IN > Vendor Lock-in	amanymagdymohamed@gmail.com Summary Multicloud computing is a strategy that helps customers to reduce reliance on any single cloud provider (known as the vendor lock-in problem).	Ivon Miranda Santos
Mohamed2020- A_multicriteria_optimization_model_for r_cloud_servic	VENDOR LOCK-IN > Vendor Lock-in	So, the main shortcoming in these researches is forcing the customer to accept the provider's capabilities and pricing (vendor lock-in problem).	Ivon Miranda Santos
Mohamed2020- A_multicriteria_optimization_model_for r_cloud_servic	VENDOR LOCK-IN > Vendor Lock-in	So, it is a strategy that helps customers to avoid vendor lock-in problem and improve QoS or minimize costs.	Ivon Miranda Santos
Naik2021- Performance_evaluation_of_distribute d_systems_in_multi	VENDOR LOCK-IN > Vendor Lock-in	Abstract—The design of distributed systems in multiple clouds have been gaining popularity due to various benefits of the multi-cloud infrastructure such as minimizing vendor lock-in, data loss and downtime.	Ivon Miranda Santos
Naik2021- Performance_evaluation_of_distribute d_systems_in_multi	VENDOR LOCK-IN > Vendor Lock-in	Distributed systems can be made more effective if they are designed in multiple clouds by leveraging several benefits of the multi-cloud infrastructure such as minimizing vendor lock-in, data loss and downtime [3], [4].	Ivon Miranda Santos

Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor Lock-in	Vendor lock-in is a major barrier to the adoption of cloud computing, due to the lack of standardization. Current solutions and efforts tackling the vendor lock-in problem are predominantly technology-oriented. Limited studies exist to analyse and highlight the complexity of vendor lock-in problem in the cloud environment	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	The strategies relate to contracts, selection of vendors that support standardised formats and protocols regarding standard data structures and APIs, developing awareness of commonalities and dependencies among cloud-based solutions. We strongly believe that the implementation of these strategies has a great potential to reduce the risks of vendor lock-in.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Lock-in affects cloud migration Interoperability and portability are essential qualities that affect the cloud under different perspectives [7, 13], due to the risk of vendor lock-in	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Advances in cloud computing research have in recent years resulted in a growing interest for migration towards the cloud. But due to concerns about the risks of vendor lock-in, as noted by [33], organisations would particularly welcome standards that address application migration (e.g. Open Virtualization Format (OVF)) and data migration (e.g. Amazon S3 API) because such standards mitigate lock-in concerns.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Giving answers to these questions is deceptively easy and straight-forward, but the reality is different. Presently, for many companies, there is a large amount of sensitive data and IT assets in-house which can deter them to migrate to the cloud due to risks of vendor lock-in, security and privacy issues. For these reasons, it becomes not only critical to consider security and privacy concerns but also related issues such as integration, portability, and interoperability between the software on-premise and in the cloud [35], should be taking into account.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Phase 2: quantitative survey questionnaire The goal of phase 2 was to identify and evaluate the risks and opportunities of vendor lock-in which affect stakeholders' decision-making about adopting cloud solutions. This phase of the research design is based on an online survey tool [38]. Participants were selected and invited by e-mail to participate in the survey. The aim of the survey was an in-depth study of the effect of vendor lock-in in migration of enterprise IT resources to the cloud (Additional files 1 and 2).	Ivon Miranda Santos

Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in concern	Vendor lock-in concerns and challenges in cloud migration As cloud computing adoption rate soars across the UK market, the risks of vendor lock-in is also prevalent. How lock-in critically affects an organisations' business application and operation in the cloud cannot be over-emphasized or underestimated. For example, Fig. 8 paints a clear admonitory picture of how UK businesses rate the risks of vendor lock-in against the decision to migrate/adopt cloud services. The risks (in Fig. 8) were identified from the initial pilot interviews and also from the literature [9–11, 13]. Moreover, the following risks (i.e. inability to move data and applications in/out of cloud environments, data ownership and cyber breaches) in Fig. 8 were critical themes that emerged from the unstructured interviews with IT practitioners. The results in Fig. 8, highlights that besides the risks of data breach and cyber-attack, or failure to meet agreed service levels, UK businesses are also concerned about having corporate data locked-in to a single cloud provider. These concerns affect the wider business functions where an enterprise is using cloud to perform essential business activities to keep operations running.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	As cloud computing adoption rate soars across the UK market, the risks of vendor lock-in is also prevalent. How lock-in critically affects an organisations' business application and operation in the cloud cannot be over-emphasized or underestimated.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	For example, Fig. 8 paints a clear admonitory picture of how UK businesses rate the risks of vendor lock-in against the decision to migrate/adopt cloud services. The risks (in Fig. 8) were identified from the initial pilot interviews and also from the literature [9–11, 13]. Moreover, the following risks (i.e. inability to move data and applications in/out of cloud environments, data ownership and cyber breaches) in Fig. 8 were critical themes that emerged from the unstructured interviews with IT practitioners.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Comprehending the term "vendor lock-in" is critical to further our understanding. In agreement with the definition of vendor lock-in provided in [2] by Armbrust et al., in Table 2 as many as 71 % of the participants claimed vendor lock-in risks will deter their organisations from adopting more cloud services, although some respondents were unsure.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Equally, in the case of managing the risks of vendor lock-in, it is encouraging to note that respondents expressed by a substantial majority are slightly (39.4 %), moderately (33.7 %), and quite likely (22.1 %) to use a cloud computing risk management framework to manage vendor lock-in risks and compliance requirements effectively. Furthermore, this indicates that UK businesses require effective and efficient strategies to manage lock-in risk(s) prevailing in the cloud ecosystem.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Well-informed decision making The study has found that for UK organisations, when it comes to evaluating the business risks of vendor lock-in for or against cloud migration, surprisingly, a vast majority (66.4 %) of respondents said making well-informed decisions before selecting vendors and/or signing the cloud service contract is an extremely important part of the decision-making process (refer to Fig. 11).	Ivon Miranda Santos

Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in concern	Portable hybrid IT environment To infer from discussion in the preceding section, the vendor lock-in risk is a valid concern for organisations migrating to the cloud. Considering that lock-in is un-desirable, and cannot be eradicated, then how can businesses mitigate its associated risks when migrating to the cloud? From a portability perspective, it becomes critical that organisations' data is sharable between providers, since without the ability to port data or application, it would become simply impossible to switch cloud service providers at all [60, 61].	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor Lock-in	To infer from discussion in the preceding section, the vendor lock-in risk is a valid concern for organisations migrating to the cloud. Considering that lock-in is un-desirable, and cannot be eradicated, then how can businesses mitigate its associated risks when migrating to the cloud? From a portability perspective, it becomes critical that organisations' data is sharable between providers, since without the ability to port data or application, it would become simply impossible to switch cloud service providers at all [60, 61].	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	To infer from discussion in the preceding section, the vendor lock-in risk is a valid concern for organisations migrating to the cloud. Considering that lock-in is un-desirable, and cannot be eradicated, then how can businesses mitigate its associated risks when migrating to the cloud? From a portability perspective, it becomes critical that organisations' data is sharable between providers, since without the ability to port data or application, it would become simply impossible to switch cloud service providers at all [60, 61].	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Difficulty portability between clouds	Cloud portability is a salient consideration to enable organisations migrate a cloud-deployed asset to a different provider and it is a direct benefit of overcoming vendor lock-in [62].	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	On a conclusive note, it is believed that the discussions presented herein, above all, indicate hypothetically that vendor lock-in risks will reduce cloud migration, which in turn affects the widespread adoption of cloud computing across organisations (small or large). Thus an emerging research agenda arises as to investigate: 1) ways to come up with multijurisdictional laws to support interoperability and portability of data across cloud providers platform, along with effective data privacy and security policies; and 2) novel ideas of avoiding vendor dependency on the infrastructure layer, platform, and through to the application layer as lock- cannot be completely eliminated, but can be mitigated.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	While the business benefits of cloud computing are compelling, organisations must realise that achieving these benefits are consistent with ensuring the risks of vendor lock-in and security implication of such risk is clearly understood upfront. When identified, such risks should be mitigated with appropriate business continuity plans or vendor selection, prior to migration to the cloud.	Ivon Miranda Santos

Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Potential of DevOps tools for avoiding vendor lock-in Issues with cloud lock-in surpass those of technical in-compatibility and data integration. Mitigating cloud lock-in risks cannot be guaranteed with a selection of in-dividual open (technology-centric) solutions or vendors. Instead, the management and operation of cloud services to avoid lock-in should be addressed at a standardised technology-independent manner. In this respect, we present a concise discussion on the potential of DevOps [65] and of tools (such as Chef, Juju and Puppet) that support interoperable management	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in risk	Discussion and conclusion In this paper a comprehensive analysis of vendor lock-in problems was discussed and the impact to companies as a result of migration to cloud computing was explored. A survey was conducted and revealed that the cloud paradigm has greatly impacted on many organisations subsequent to migrating IT and business applications to the cloud due to vendor lock-in. In fact, the study has shown that, while organisations are eager to adopt cloud computing due to its benefits, there is equally an urgent need for avoiding vendor lock-in risks.	Ivon Miranda Santos
Opara-Martins2016-Critical_analysis_of_vendor_lock-in_and_its_i	VENDOR LOCK-IN > Vendor lock-in concern	Discussion and conclusion In this paper a comprehensive analysis of vendor lock-in problems was discussed and the impact to companies as a result of migration to cloud computing was explored. A survey was conducted and revealed that the cloud paradigm has greatly impacted on many organisations subsequent to migrating IT and business applications to the cloud due to vendor lock-in. In fact, the study has shown that, while organisations are eager to adopt cloud computing due to its benefits, there is equally an urgent need for avoiding vendor lock-in risks.	Ivon Miranda Santos
Petcu2014-Portability_in_clouds_Approaches_and_research_opportu	VENDOR LOCK-IN > Vendor Lock-in	This diversity is an obstacle with respect to demands such as promoting portability and preventing vendor lock-in.	Ivon Miranda Santos
Petcu2014-Portability_in_clouds_Approaches_and_research_opportu	VENDOR LOCK-IN > Difficulty portability between clouds	However a third party running services on multiple Clouds and offering unique entry points to various service customers is interested to ensure that the porting process is reversible, fast and semi-automated. The most challenging scenario for portability is that in which the Cloud applications are distributed across several administrative domains of different providers simultaneously, and, moreover, at least data (if not even application and service components) are ported from one Cloud environment to another.	Ivon Miranda Santos
Petcu2014-Portability_in_clouds_Approaches_and_research_opportu	VENDOR LOCK-IN > Vendor Lock-in	The Cloud Work Group within Open group collaborate on standard frameworks and models for eliminating vendor lock-in.	Ivon Miranda Santos
Ravi2019-Emergence_of_middleware_to_mitigate_the_challenges_of_	VENDOR LOCK-IN > Vendor lock-in risk	Thus, this paper is a sincere initiative to understand the problem beneath multi-cloud solutions and their embrace for the mobile world. Hence, the following paper begins with a broad coverage of existing work, gives an outline of a multi-cloud middleware, and discusses existing issues with API heterogeneity which is the prime point of concern in the vendor lock-in issue.	Ivon Miranda Santos
Ravi2019-Emergence_of_middleware_to_mitigate_the_challenges_of_	VENDOR LOCK-IN > Vendor lock-in concern	Thus, this paper is a sincere initiative to understand the problem beneath multi-cloud solutions and their embrace for the mobile world. Hence, the following paper begins with a broad coverage of existing work, gives an outline of a multi-cloud middleware, and discusses existing issues with API heterogeneity which is the prime point of concern in the vendor lock-in issue.	Ivon Miranda Santos

Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Vendor Lock-in	Hence, the following paper begins with a broad coverage of existing work, gives an outline of a multi-cloud middleware, and discusses existing issues with API heterogeneity which is the prime point of concern in the vendor lock-in issue.	Ivon Miranda Santos
Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Vendor Lock-in	Multi-cloud; heterogeneity; vendor lock-in; mobile cloud computing; middle-ware; mobile device.	Ivon Miranda Santos
Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Vendor Lock-in	Gener-ally, to eliminate vendor lock-in, an application needs to be portable and purposely designed to be used across multiple clouds.	Ivon Miranda Santos
Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Vendor Lock-in	Hence, to harness the power of cloud, there is a need for an integrated solu-tion that surpasses the technical barriers of data and services mobility, application portability, and vendor lock-in.	Ivon Miranda Santos
Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Vendor Lock-in	Avoiding vendor lock-in is challenging as each provider differs by proprietary implementations with custom interfaces and APIs.	Ivon Miranda Santos
Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Vendor lock-in concern	Avoiding vendor lock-in is challenging as each provider differs by proprietary implementations with custom interfaces and APIs. However, it could be possible if interoperability and portability issues are solved.	Ivon Miranda Santos
Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Challenge of vendor lock-in	Avoiding vendor lock-in is challenging as each provider differs by proprietary implementations with custom interfaces and APIs. However, it could be possible if interoperability and portability issues are solved.	Ivon Miranda Santos
Ravi2019- Emergence_of_middleware_to_mitiga te_the_challenges_of_	VENDOR LOCK-IN > Vendor Lock-in	To understand from a broad perspective, let us give it more clarity by understanding the different views by which a cloud vendor differs from another and what does it take to avoid vendor lock-in.	Ivon Miranda Santos
Shastry2022- Approaches_for_migrating_non_cloud-native_applicati	VENDOR LOCK-IN > Vendor Lock-in	The paper first discusses the existing work relating to the subject and the drawbacks of the same. This is followed by the research approach, which includes a discussion of the platforms/tools and strategies for migration proposed by the different leading cloud vendors, and the choice of applications and migration strategies for experimentation. Then, for every chosen strategy, the paper discusses the steps taken for the migration of different applications, and the results post migration. Finally, the paper concludes by providing a generic set of steps for each of the migration strategies, and the range of applications it would apply to.	Ivon Miranda Santos
Shirvani2018- An_iterative_mathematical_decision_model_for_cloud	VENDOR LOCK-IN > Vendor Lock-in	This is because a single cloud cannot cover all types of users' func-tional/nonfunctional requirements, in addition to several drawbacks such as resource limitation, vendor lock-in, and prone to failure. On the other hand, multicloud brings several merits such as vendor lock-in avoidance, system fault tolerance, cost reduction, and better quality of service.	Ivon Miranda Santos
Shirvani2018- An_iterative_mathematical_decision_model_for_cloud	VENDOR LOCK-IN > Vendor Lock-in	Customers are charged for their exact resource usage on a pay-per-use basis rather than on a flat rate in rental conditions. ⁴ With the adoption of CC, all the expenses will be transformed from fixed costs such as capital expenditure (CAPEX) into variable costs such as operational expenditure (OPEX); consequently, it reduces the total cost of ownership (TCO) in terms of saving a large amount of money, time, and labor. ⁵ This bonanza that CC brings makes organizations and individuals concentrate more on their core businesses and competencies rather than on IT development; hence, it leads to operations being more flexible and attractive and brings agility in the organization's structure of the adopter. ⁶⁻⁸ On the other hand, there are several inhibitors such as lack of full IT control, vendor lock-in, and security concerns that snag a radical shift toward cloud adoption.	Ivon Miranda Santos

Shirvani2018- An_iterative_mathematical_decision_ model_for_cloud	VENDOR LOCK-IN > Vendor lock-in concern	<p>Customers are charged for their exact resource usage on a pay-per-use basis rather than on a flat rate in rental conditions.⁴</p> <p>With the adoption of CC, all the expenses will be transformed from fixed costs such as capital expenditure (CAPEX) into variable costs such as operational expenditure (OPEX); consequently, it reduces the total cost of ownership (TCO) in terms of saving a large amount of money, time, and labor.⁵ This bonanza that CC brings makes organizations and individuals concentrate more on their core businesses and competencies rather than on IT development; hence, it leads to operations being more flexible and attractive and brings agility in the organization's structure of the adopter.⁶⁻⁸ On the other hand, there are several inhibitors such as lack of full IT control, vendor lock-in, and security concerns that snag a radical shift toward cloud adoption.</p>	Ivon Miranda Santos
Shirvani2018- An_iterative_mathematical_decision_ model_for_cloud	VENDOR LOCK-IN > Vendor Lock-in	<p>Although the speed of data communication between single-cloud modules is higher than that of mul-ticloud options, in case of failure and cybersecurity attacks, deploying multicloud and finding suitable alternatives are effective and reliable tasks due to the automated and quick reconfiguration between clouds without user intervention.²⁷</p> <p>Moreover, MCE offers low cost, better quality of service (QoS), flexibility, vendor lock-in avoidance, and reliability.²⁷ For instance, DepSky^{28,29} and multicloud database³⁰ apply data encryption and replication techniques on several datacenters, related to multiple providers in the IaaS level, to create a fault-tolerant system against failure.</p>	Ivon Miranda Santos
Shirvani2018- An_iterative_mathematical_decision_ model_for_cloud	VENDOR LOCK-IN > Vendor Lock-in	<p>Thus, the cloud economic problem is converted into a bioptimization problem, by which the model must simultaneously solve a Pareto set, compromising the service cost and security risks in terms of financial losses. Some researchers have propounded a service selection method, not a decision model, to figure out the problem with multiple criteria derived from their Delphi panelists' interview.^{42,43} However, in the related works, there are some drawbacks as well as benefits. For instance, some of the related works focus on just sheer economic or limited factors, which have less influence on security issues. Nevertheless, so far, there is yet no decision model to decide between cloud migration versus on-premises IT development with regard to cost and cybersecurity risk perspectives. Moreover, each of which is not agile enough to take into account a variety of service types, a new organization policy, new cloud pricing schemes, and multisourcing cloud for reaching a sustainable decision point. To deal with the aforementioned problem and challenges, we develop an iterative decision model to decide between the development of internal IT and cloud migration for organization. The main contributions of this paper are as follows</p>	Ivon Miranda Santos
Shirvani2018- An_iterative_mathematical_decision_ model_for_cloud	VENDOR LOCK-IN > Vendor Lock-in	<p>In contrast to a single cloud, multicloud offers choice and flexibility for users in which they can provide services in competitive markets with low price and better QoS, thus preventing long-term vendor lock-in.⁵¹ Most importantly, a single cloud has limitations in presenting high availability, data/service integration, and data confidentiality and fails in several situations.²⁸ Deploying BFs on multicloud can mitigate security risks and increase the degree of reliability.</p>	Ivon Miranda Santos
Shirvani2018- An_iterative_mathematical_decision_ model_for_cloud	VENDOR LOCK-IN > Vendor Lock-in	<p>Cloud multisourcing can offer a variety of deployment options. Multiple providers are offering different virtual devices and computing units with different pricing and security levels in the market. Multicloud also brings several benefits such as vendor lock-in avoidance and system fault tolerance.</p>	Ivon Miranda Santos

VENDOR LOCK-IN

Shirvani2018- An_iterative_mathematical_decision_ model_for_cloud	VENDOR LOCK-IN > Vendor Lock-in	Dependence/reliance on a single cloud, on the other hand, is not a rational task because a single cloud suffers from one point of failure, internal attack, vendor lock-in, resource/service limitation, etc.	Ivon Miranda Santos
Sousa2016-Automated_Setup_of Multi-Cloud_Environments_for_Micro	VENDOR LOCK-IN > Vendor Lock-in	This includes protecting applications from cloud outages or failures, but also avoiding vendor lock-in.	Ivon Miranda Santos
Stavru2013- Challenges_for_migrating_to_the_ser vice_cloud_paradi	VENDOR LOCK-IN > Vendor Lock-in	O2 External dependencies and vendor lock-ins Exit strategies and lock-in risks (ability to switch cloud providers) are important concerns for organizations exploiting Cloud Computing, as well as vendor dependencies (e.g. only using services the provider is willing to offer).	Ivon Miranda Santos
Stavru2013- Challenges_for_migrating_to_the_ser vice_cloud_paradi	VENDOR LOCK-IN > Vendor Lock-in	Vendor lock-ins (O2) might further hinder organizational flexibility and agility (e.g. as one could not change its cloud provider effortlessly and in a timely manner), while external dependencies (O2) could decrease the business value delivered to customers (e.g. due to new requirements coming from the cloud infrastructure or the organization is pressured to use specific and expensive software licenses coming from the cloud provider, etc.)	Ivon Miranda Santos
Stavru2013- Challenges_for_migrating_to_the_ser vice_cloud_paradi	VENDOR LOCK-IN > Vendor Lock-in	As seen from Table 3, the agile techniques recommended the most by the experts was Small Releases (from XP) and Sprints (from Scrum). Their arguments include receiving feedback quickly (e.g. identifying security, interoperability, privacy, etc. issues earlier in the development lifecycle), increasing responsiveness to change (e.g. limiting the impact of evolving standards on software delivery and cost/time overruns, overcoming vendor lock-ins by deploying increments on different cloud infrastructures, etc.	Ivon Miranda Santos
Weerasinghe2022- Taxonomical_classification_and_syst ematic_revie	VENDOR LOCK-IN > Vendor Lock-in	They comprise several non-functional requirements for the cloud-native applications such as elasticity, scalability, automated deployment, and vendor lock-in avoidance [10].	Ivon Miranda Santos
Alonso2023- Understanding_the_challenges_and_ novel_architectural	VENDOR LOCK-IN > Vendor Lock-in	The traditional use of cloud services, focused on the consumption of one provider, is not valid anymore due to different shortcomings being the risk of vendor lock-in a critical.	Ivon Miranda Santos
Alonso2023- Understanding_the_challenges_and_ novel_architectural	VENDOR LOCK-IN > Vendor lock-in risk	The traditional use of cloud services, focused on the consumption of one provider, is not valid anymore due to different shortcomings being the risk of vendor lock-in a critical.	Ivon Miranda Santos