Enterprise workloads are increasingly becoming heterogeneous, leveraging multiple infrastructure abstractions and architectures. Organizations, large and small, should look for a cloud services provider that offers a comprehensive portfolio of infrastructure services and platform capabilities, security features, and consistent performance.

Heterogeneous Workloads Require a Comprehensive Portfolio of Infrastructure and Platform Services

May 2021

Written by: Sriram Subramanian, Research Director, Infrastructure Systems, Platforms, and Technologies Group

Introduction

Enterprise adoption of cloud-based infrastructure has been increasing steadily. IDC forecasts that the worldwide cloud market will surpass $1 trillion by 2024, growing at a CAGR of 15.7% during the 2019–2024 period. Because business applications are the lifeblood for enterprises, IT organizations need to ensure the business continuity of applications through enhanced availability and redundancy of IT infrastructure. Traditional IT processes are designed to avoid any disruption to this continuous availability. Application development practices in such environments also are targeted toward minimal disruption to application availability and follow traditional software development life-cycle practices such as waterfall.

In contrast, modern, cloud-centric application architectures (cloud native, serverless, microservices based, etc.) enable applications to be more scalable, fault tolerant, and interoperable. According to IDC's *Worldwide Server Workloads Forecast, 2020–2024: Investment Expands Despite the Ongoing Pandemic* (IDC #US46646020, July 2020), more than 30% of all categories of enterprise workloads and most workloads, such as content and collaboration applications, application development and testing, and web serving applications, will be deployed on cloud-based infrastructure by 2024. Modern application architectures enable enterprises to deploy the applications on any suitable infrastructure platform. Agile development processes enable application developers to develop and release product features faster. This combination of flexibility in infrastructure platforms and development agility enables developers to build faster, thus enabling enterprises to innovate faster.

AT A GLANCE

KEY STATS

» About 60% of enterprise respondents to a global IDC survey indicated that they are actively using hybrid cloud infrastructure.

» The infrastructure-as-a-service market is expected to grow at a 2019–2024 CAGR of 29.6%, reaching about $178.8 billion by 2024.

» The dedicated cloud-as-a-service market is expected to grow at a 2019–2024 CAGR of 159.7%, reaching about $24.6 billion by 2024.

WHAT'S IMPORTANT

Drivers for hybrid cloud platforms include optimal workload placement, application migration to the public cloud, and data/storage tiering needs.

In IDC's 2020 *IaaSView Survey*, about 60% of enterprise respondents reported that they are actively using hybrid cloud infrastructure. In the same survey, respondents indicated using hybrid cloud platforms for optimal workload placement, application migration to the public cloud, and data/storage tiering needs. Respondents also indicated skill set limitations, unclear ROI, and lack of off-the-shelf products as reasons for not leveraging hybrid cloud infrastructure. This is in line with other IDC research, which shows lack of skill sets, lack of consistency in tooling, and mismatched expectations on total cost of ownership (TCO) as the primary challenges to adopting hybrid cloud platforms.
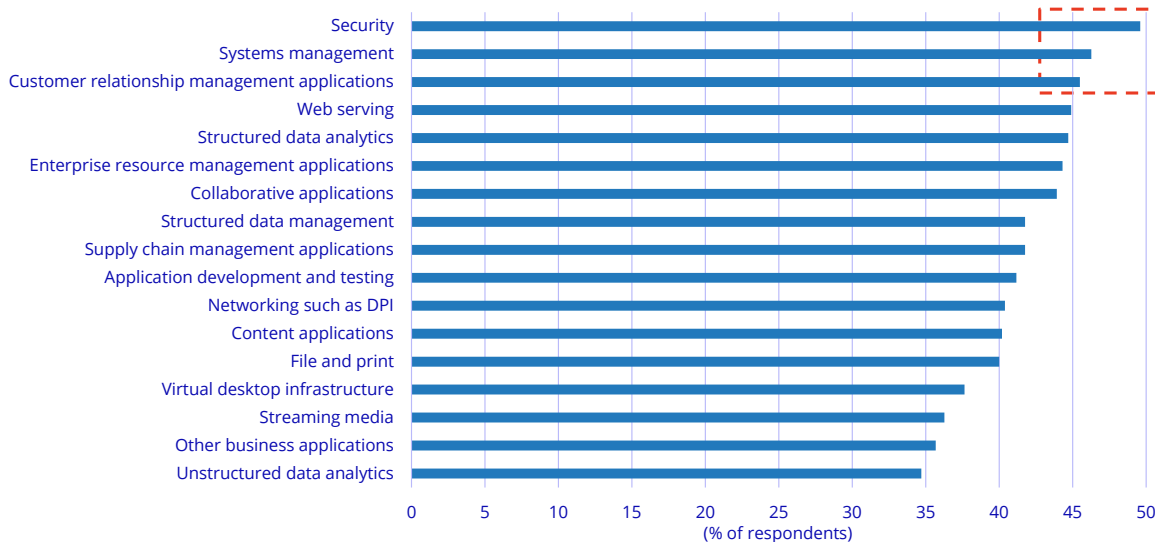
Oracle Cloud Infrastructure (OCI), through its comprehensive portfolio of infrastructure services, offers on-premises and public cloud infrastructure as well as high-performing and secure platform capabilities for heterogeneous enterprise workloads, helping enterprises overcome the previously mentioned challenges.

This paper discusses the benefits of OCI and best practices to leverage OCI for successful digital transformations. IDC recommends iterating on a multiphased, workload-centric approach for migrating workloads to the cloud. IDC also recommends that IT decision makers (ITDMs) consider solutions over services, select the right infrastructure abstractions for their workloads, and treat the cloud as an operational model to succeed in their digital transformations.

Enterprise Workloads on Public Cloud

Enterprises are quickly adopting modern infrastructure paradigms such as cloud platforms, cloud-native technologies, and artificial intelligence/machine learning (AI/ML) technologies for their business-critical applications. According to a recent IDC survey, security, systems management, and customer relationship management (CRM) are the top 3 enterprise workloads to be migrated to public cloud infrastructure (see Figure 1). Another IDC study shows that more than half of the respondents are utilizing packaged solutions for their business applications, such as enterprise resource planning (ERP), CRM, and supply chain management (SCM) workloads. Most of the enterprise workloads that are being migrated to the public cloud are being rehosted (commonly referred to as "lift and shift'"), with scope for future optimization through application modernization techniques. Respondents cited scale, TCO, and resource consolidation as primary drivers for migrating these applications to public cloud infrastructure.

FIGURE 1: *Enterprise Workloads on Public Cloud*

n = 510

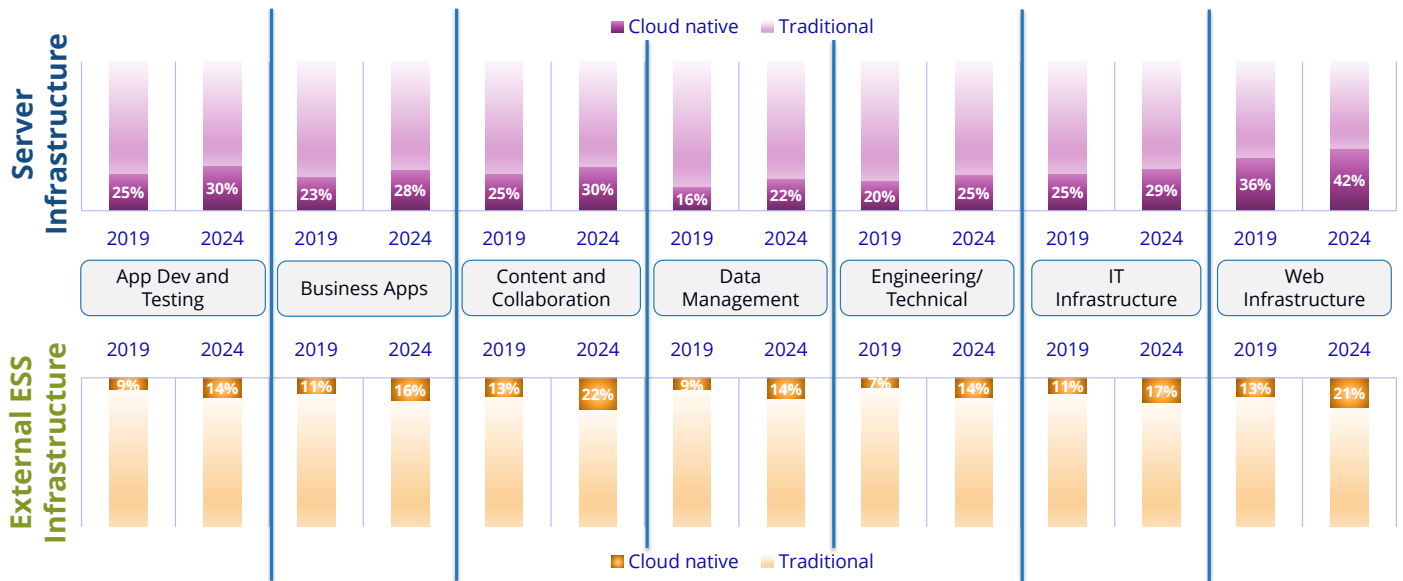*Source: IDC's Public Cloud Infrastructure Workloads Survey, December 2019*

Growth of Heterogeneous Workloads

Business applications within an enterprise organization typically tend to be on a homogeneous stack of infrastructure, operating system, middleware, and application layers. These applications also tend to be monolithic, built with similar application architecture, and managed through similar life-cycle management processes across the organization. IDC observes that with the increasing adoption of the right infrastructure abstraction for the right workload paradigm, enterprise organizations are leveraging heterogeneous applications, including custom-built applications, for their business needs.

For example, enterprises leverage cloud computing and cloud-native technologies for applications that need massive scale and elasticity. They are embracing AI/ML technologies for new business use cases deployed across cloud, core, and edge locations. They are also modernizing legacy enterprise applications to gain agility, competitive advantage, and lower TCO. Popular methods to modernize applications include containerization, refactoring, and rearchitecting. IDC forecasts that more than 30% of all categories of enterprise workloads and a majority of certain workloads, such as content and collaboration applications, application development and testing, and web serving applications, will be deployed on cloud-based infrastructure by 2024 (see Figure 2).

FIGURE 2: *Growth of Cloud-Native Applications*

By 2024, more than 30% of infrastructure spend on enterprise workloads is expected to go to powering cloud-native applications.
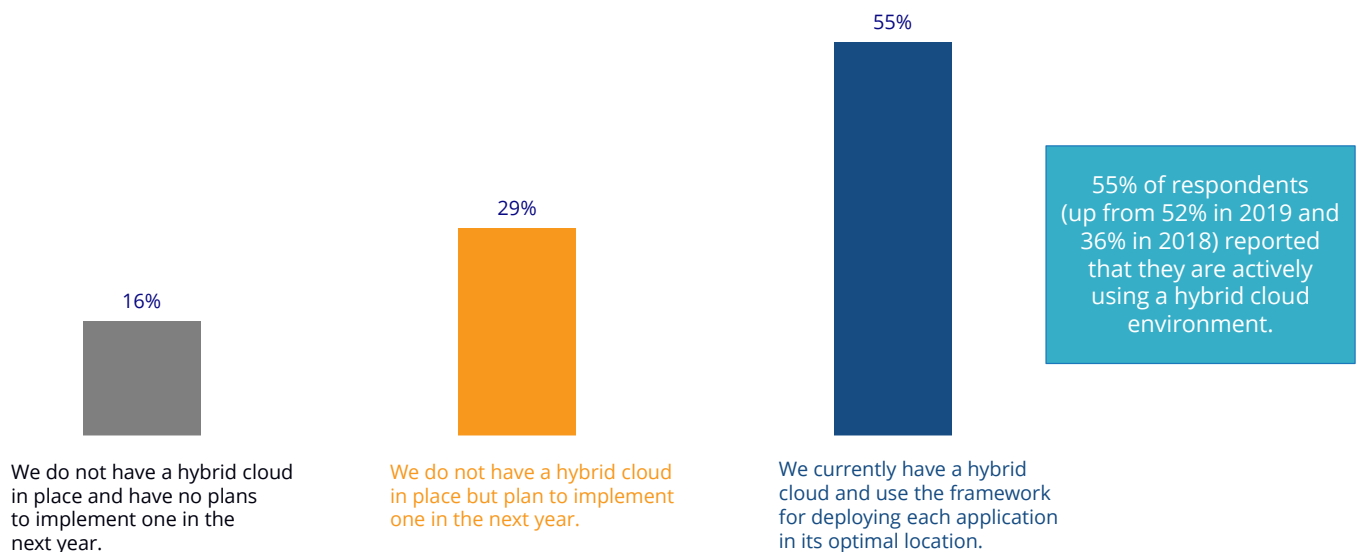
Source: IDC, 2021

Acceleration Through Hybrid Cloud

IDC defines a hybrid cloud as using IT services (including IaaS, PaaS, and SaaS) across one or more deployment models and locations using a unified framework. This includes a combination of on-premises traditional IT, private cloud, and public cloud deployment models across multiple deployment locations. Hybrid cloud provides organizations with flexibility and infrastructure to deploy business applications and consistent operational experience across heterogeneous environments.

IDC observes that enterprise adoption of hybrid cloud environments is increasing steadily. In IDC's July 2020 *IaaSView Survey*, 55% of all respondents (and 60% of respondents from enterprise organizations) indicated that they are actively using hybrid cloud environments, up from 52% in 2019 (see Figure 3). In the same survey, respondents reported that they are using hybrid cloud platforms for optimal workload placement, application migration to the public cloud, and data/storage tiering needs, indicating their intent to accelerate their digital transformational journeys through hybrid cloud infrastructure.

Because of the ongoing pandemic, more enterprise organizations are also leveraging hybrid cloud infrastructure to enable a more distributed workforce, strengthen security outside the datacenter perimeter, and respond to supply chain limitations. IDC expects to see continued adoption of hybrid cloud platforms among enterprises during the post-pandemic recovery. Respondents also indicated skill set limitations, unclear ROI, and lack of off-the-shelf products as reasons for not leveraging hybrid cloud infrastructure.

FIGURE 3: *Hybrid Cloud Adoption*

16%

We do not have a hybrid cloud in place and have no plans to implement one in the next year.

29%

We do not have a hybrid cloud in place but plan to implement one in the next year.

55%

We currently have a hybrid cloud and use the framework for deploying each application in its optimal location.

55% of respondents (up from 52% in 2019 and 36% in 2018) reported that they are actively using a hybrid cloud environment.

n = 1,500

Source: IDC's IaaSView Survey, July 2020

Considering Oracle Cloud Infrastructure

Oracle Cloud Infrastructure offers infrastructure services and platform capabilities across the infrastructure continuum of cloud, core, and edge to mitigate common challenges cited by enterprises. Oracle also offers a suite of enterprise applications for business functions such as ERP, human capital management (HCM), and CRM. These packaged applications include E-Business Suite, PeopleSoft, JD Edwards, Siebel, and Hyperion.

One of the salient advantages of OCI is its reportedly superior economics. Oracle offers uniform pricing for OCI across all its global locations — an industry first. In addition, a study conducted by Oracle asserts that the AMD compute instances on OCI show 3x superior price performance compared with AMD instances on AWS.

Infrastructure Services

Oracle Cloud Infrastructure offers a comprehensive portfolio of infrastructure services, including:

» Compute (bare metal/VM/containers/serverless, CPU/GPU/high-density cores across Intel, AMD, and Arm)

» Storage (block/file/object/archive, support for NVMe, data tiering, data transfer)

» Networking (VLAN, load balancer, gateways, VPN, FastConnect, DNS, email delivery, and more)

Platform Capabilities

OCI also enables higher-order cloud-based services, including:

» Data management (support for transactional databases and data warehouses: MySQL, NoSQL, Exadata, Oracle, and Autonomous Database on bare metal and VMs; database migration; data integration; Hadoop-based data lake; Data Flow; Data Catalog)

» Applications (support for cloud-native applications and serverless/event-driven applications; ability to integrate with Oracle SaaS applications)

» Application development (support for developer tools, frameworks, and environments; infrastructure as code [IaC]; and continuous integration/continuous delivery [CI/CD])

» Analytics (Oracle Analytics Cloud, Oracle Fusion Analytics, Oracle Cloud SQL)

» Integration (Oracle Integration, Oracle SOA Suite, Oracle GoldenGate, Oracle Data Integration)

All these services are secured through security capabilities such as isolated network virtualization, hardware root of trust, key management, identity management, and encryption (at rest and in transit). OCI also enables DevOps/DevSecOps personnel to have greater visibility into and control over cloud resources through the Observability and Management Platform (monitoring, logging, events, alarms, cost analysis, tagging, etc.).

Offerings for Hybrid Cloud

Oracle extends OCI's infrastructure services and platform capabilities to core and edge locations through offerings such as Oracle Dedicated Region Cloud@Customer and Oracle Roving Edge Infrastructure. Further, all these services and capabilities are well integrated with other on-premises offerings such as Oracle Private Cloud Appliance, Oracle Exadata Cloud@Customer, and Oracle Exadata Database Machine. Through these products and services, Oracle enables a consistent cloud experience across the infrastructure continuum of cloud, core, and edge for applications and data.

Support for Enterprise Workloads, Including Oracle Packaged Applications

» Oracle offers capabilities for SaaS (Fusion ERP, CRM, HCM, etc.). In addition, the company offers Oracle packaged applications/enterprise workloads for ERP/HCM/CRM through E-Business Suite, PeopleSoft, JD Edwards, Hyperion, Siebel, and other software.

» The Oracle packaged applications/enterprise workloads can be lifted and shifted to OCI without rearchitecture.

» With OCI, Oracle provides single-vendor support for these packaged applications/enterprise workloads.

» Oracle packaged applications/enterprise workloads on OCI reduce manual configurations through automatic updates and patching, help consolidate on-premises/third-party cloud application silos, and keep customizations intact.

» Oracle Cloud Lift Services provide free migrations for small deployments through assistance from dedicated Oracle cloud engineers.

» Oracle Integration (and related products) offers the capability to integrate these packaged applications/enterprise workloads with third-party offerings and custom applications/heterogeneous applications that are built within the enterprise.
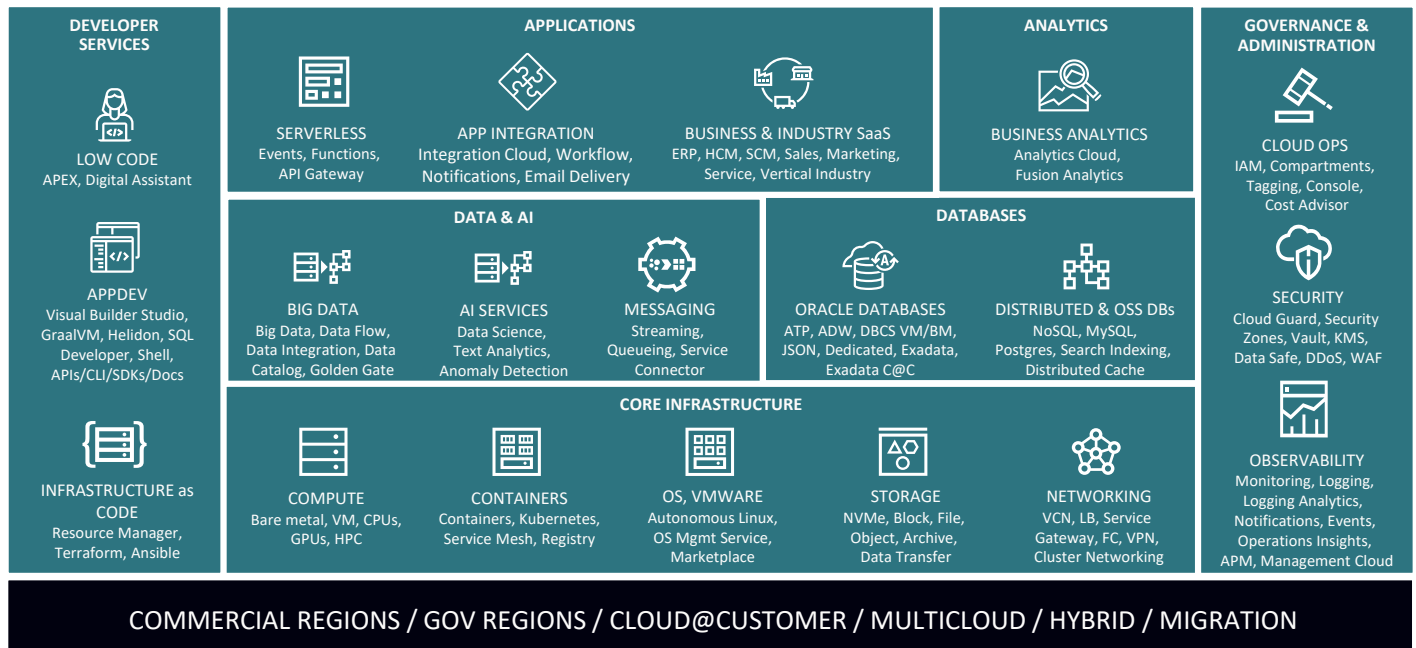
Support for Heterogeneous Workloads

Through its comprehensive portfolio of infrastructure services and platform capabilities, security features, and platform performance, OCI proves to be an ideal platform for heterogeneous workloads, including traditional enterprise applications (see Figure 4).

Heterogeneous workloads are based on varied application architectures and thus have varied infrastructure, performance, and availability requirements. For example, traditional enterprise applications rely upon underlying infrastructure for high availability and redundancy. Database applications need low latency and high performance and therefore may be best run on bare metal servers. Web-scale and cloud-native applications are elastic in nature and can be scaled up or down based on the application load. They are also less dependent on the underlying infrastructure for their continuous availability.

The OCI portfolio of infrastructure services and platform capabilities caters to the wide range of requirements of heterogeneous applications, thereby enabling enterprises to run their legacy and modern applications on OCI. According to Oracle, evidence of heterogeneous applications that leverage OCI includes independent software vendor products from Zoom and 8x8 as well as custom applications developed by organizations such as BBVA, which used OCI for its Behavioral Economics Learning Algorithm (BELA).

FIGURE 4: *Oracle Cloud Infrastructure*

Source: Oracle, 2021

Challenges

Oracle Cloud Infrastructure stands out for its ability to run workloads at scale, but selling the emerging public cloud may still be a challenge in an industry that has dedicated early-mover advantages to other cloud vendors. Oracle's IaaS remains a differentiated play, offering tangible benefits in performance and openness as well as costs that typically undercut those of competitors by more than half, according to Oracle's established customer claims. Customers such as Mazda and Zoom have used Oracle Cloud Infrastructure for enterprise and heterogeneous/custom workloads. If this trend continues, Oracle will establish broader mindshare among cloud customers for these types of applications.

Conclusion

IDC recommends that organizations take a workload-centric approach to selecting the right infrastructure for the right workload at the right location. Enterprises should consider cloud services providers that can offer a portfolio of end-to-end solutions such as analytics, data management, high-performance computing (HPC), and integration rather than just infrastructure services such as compute, storage, and networking. IDC further recommends that enterprises treat the cloud as an operational model instead of a destination. By doing so, they can leverage an as-a-service model of infrastructure consumption across all locations.

Oracle provides a cloud operating model across infrastructure, platform, and software (IaaS, PaaS, and SaaS). It is a credible choice for enterprise and heterogeneous/custom workloads.

> Oracle Cloud Infrastructure, through its offerings across regions globally, proves to be a credible choice for enterprises to place their enterprise and heterogeneous workloads strategically across cloud, core, and edge locations.

About the Analyst

Sriram Subramanian, *Research Director, Infrastructure Systems, Platforms, and Technologies Group*

Sriram Subramanian is a Research Director within IDC's Infrastructure Systems, Platforms, and Technologies Group (ISPTG), covering three focus areas — Infrastructure for Enterprise Workloads, Operating Systems and Environments, and Artificial Intelligence (AI) for Enterprise Workloads. Mr. Subramanian's coverage on Infrastructure for Enterprise Workloads includes the intersection of modern applications (such as cloud-native applications, microservices, AI/ML/DL workloads, and AI-enabled applications) and modern infrastructures (such as service mesh architectures, specialized hardware, and accelerated hardware) and how they impact each other.

IDC Custom Solutions

The content in this paper was adapted from existing IDC research published on www.idc.com.

This publication was produced by IDC Custom Solutions. The opinion, analysis, and research results presented herein are drawn from more detailed research and analysis independently conducted and published by IDC, unless specific vendor sponsorship is noted. IDC Custom Solutions makes IDC content available in a wide range of formats for distribution by various companies. A license to distribute IDC content does not imply endorsement of or opinion about the licensee.

External Publication of IDC Information and Data — Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.