From Public Cloud to Cloud Operating Models

New Thinking on Infrastructure Modernization and Implications for Workload Placement

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Hybrid/multicloud is the default organizing principle of enterprise IT, with public cloud infrastructure and modernized on-premises IT environments coexisting as primary workload execution venues. IaaS/PaaS/public cloud continues to gain momentum as a primary workload deployment venue alongside (and not necessarily at the expense of) modernized on-premises IT environments.

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Executive Summary

Introduction

Hybrid/multicloud is the default organizing principle of enterprise IT, with public cloud infrastructure and modernized on-premises IT environments coexisting as primary workload execution venues. As the market moves away from the public cloud vs. on-premises IT binary, the broader notion of "cloud operating models" begins to emerge. Determining optimized workload placement, an outcome involving both art and science, is a challenge IT vendors and buyers struggle with. As "cloud anywhere" solutions gain market traction, workload placement issues will take on even greater importance as IT environment decisions lay the groundwork for further evolution of organizations' IT and digital business strategies.

About This Report

Reports such as this showcase insights derived from a variety of market-level research inputs, including financial data, M&A information, and other market data sources both proprietary to S&P Global and publicly available. This input is combined with ongoing observation of markets and regular interaction with vendors and other key market players.

This report specifically includes data from the following sources. See the Methodology section at the end of the report for more details.

– **451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Workload Placement 2022,** a global survey of enterprise IT decision-makers familiar with cloud technology, fielded during January and February 2022.

Key Findings

– **The cloud wars are over.** The on-/off-premises IT paradigm is giving way to the cloud operating model as organizations build, operate, manage and secure workloads "here, there and everywhere" with public, private and edge clouds. IT environments are diverse, with 31% of organizations currently using modern on-premises IT infrastructure with core cloud functionality as their primary IT environment and 26% relying primarily (but not exclusively) on IaaS/PaaS infrastructure.

– **As businesses undergo digital transformation, IT considerations are not just about IT.** Digital transformation is business transformation. The two are becoming more intertwined as application (52%), data protection/privacy (49%) and business requirements (46%) stand out among the most influential factors in determining the best execution venue for workloads and applications.

The Take

Flexibility and scalability are must-haves for IT environments in the digital era. The cloud operating model – where cloud is a way of doing things, not a specific destination or workload deployment venue – includes both private and public clouds. However, organizations' decisions about primary IT deployment environments still matter because these choices will shape the IT architectures on which digital business is built. Moreover, organizations' trusted advisors will be those vendors best able to navigate the complexity of managing and securing workloads and applications in hybrid/multicloud operating environments.

# Workload Placement and Evolution of the Cloud Operating Model

Now that the on-premises vs. off-premises IT wars are over (spoiler alert: clouds of all stripes won), IT vendors and the hyperscalers have settled into more or less peaceful coexistence. However, organizations still need to determine how and where to run their workloads. Best execution venue (BEV) strategy (i.e., the art and science of determining optimal workload placement) involves an array of factors, including cost, data governance concerns, security and application performance requirements. Historically, workload placement has been about the "where" – in a company-owned/-operated datacenter, colocation facility, third-party managed services provider (MSP) or global systems integrator (GSI) environment, or in a hyperscaler cloud. While these considerations remain relevant, the "how" of workload execution is becoming more important as the industry converges around the cloud operating model – a consumption-based, service-driven discipline that delivers the cloud experience anywhere, with software-defined functionality enabling the physical hardware and associated provisioning and management workflows.

451 Research has tracked workload deployment venue trends for years in its Voice of the Enterprise: Cloud, Hosting & Managed Services surveys, analyzing the landscape through the lens of specific on-premises and off-premises IT environments. We took a different approach this year, looking at the BEV question in terms of modernization (e.g., use of the cloud operating model).

The pivot to IaaS/PaaS/public cloud continues, with nearly 40% of organizations pointing to public cloud infrastructure as the primary venue for workload deployment by 2024, up from 26% in 2022 (see Figure 1). However, modern on-premises IT environments are holding steady as a primary workload venue thanks in large part to migration from legacy on-premises IT environments, while IaaS/PaaS expansion is coming from both modern and legacy on-premises IT.

Regardless of location, more than three-quarters of organizations leverage cloudlike environments as the primary workload venue. This encompasses public cloud infrastructure (IaaS/PaaS) and infrastructure-abstracted application clouds (SaaS), as well as "modernized" on-premises IT environments (previously known as on-premises private clouds) featuring flexible architecture, scalable infrastructure and automated orchestrated resource provisioning.

Figure 1: Primary Workload Execution Venue, 2022 and 2024
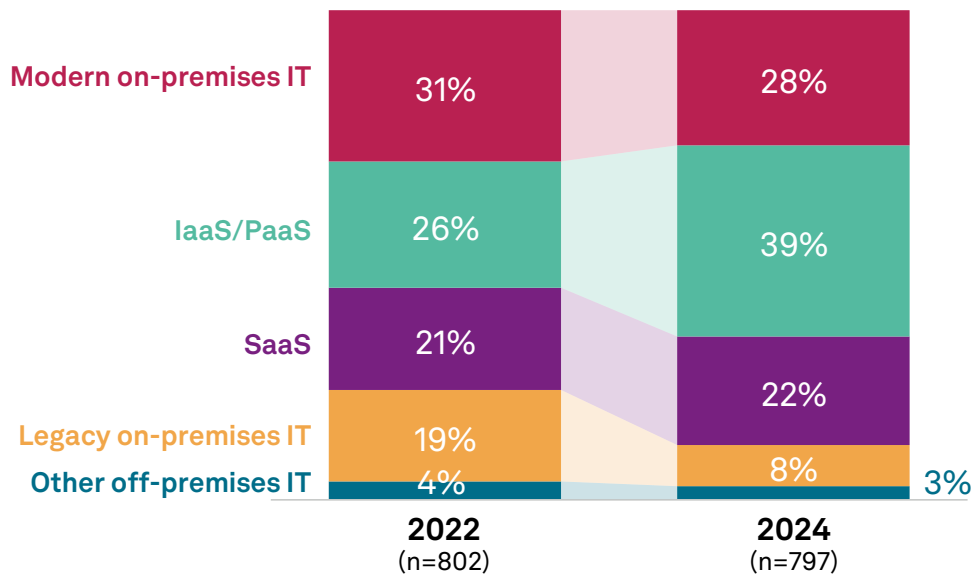
Q. Which of the following best describes the primary IT environment used to operate your organization's workloads today?
Q. And which of the following best describes the primary IT environment your organization will use to operate workloads two years from now?
Base: All respondents
Source: 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Workload Placement 2022

From Public Cloud to Cloud Operating Models

The on-/off-premises IT paradigm is giving way to a more expansive design approach as organizations seek to build, operate, manage and secure workloads "here, there and everywhere" with public, private and edge clouds. Modern, digital-era IT environments built on the cloud operating model involve more than just a choice between on- and off-premises IT resources and operations. It's about how enterprises want to consume infrastructure, how they want to pay for it, and who is best placed to supply it to deliver specific technology and business outcomes.

"In a lot of cases, we have a cloud-first strategy already. Sure, we can still do it on-premises, but the idea is to have [workloads] more and more in the cloud because of the advantages there."
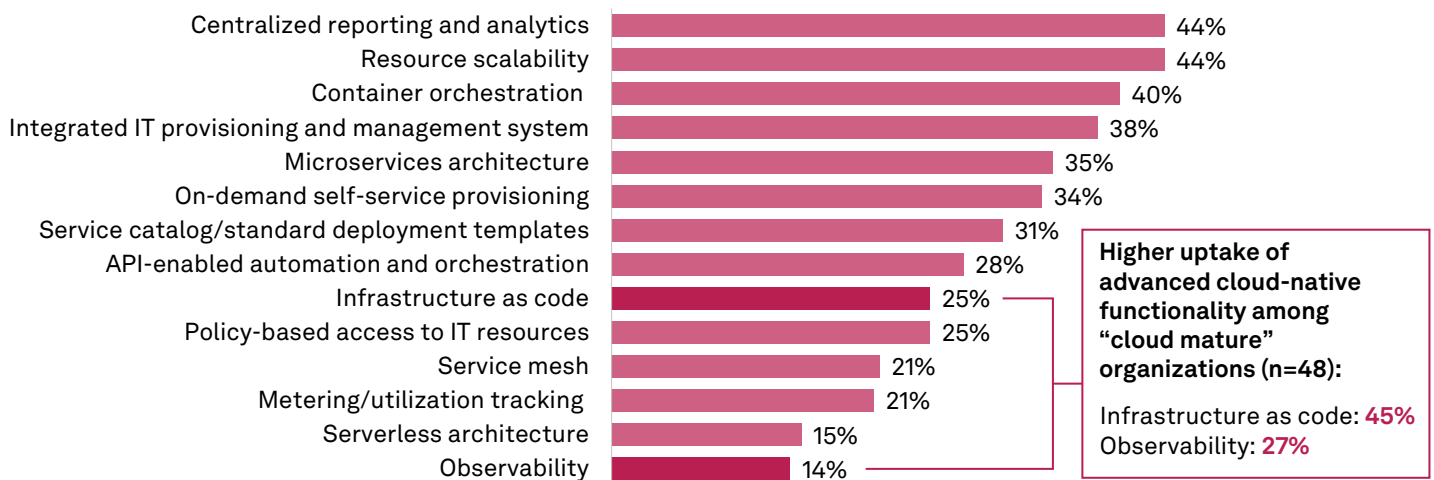
IT/engineering manager/staff, 50,000-99,999 employees, $10B+ revenue, manufacturing

On-Premises IT Environments Get an Upgrade

The market has converged on hybrid and multicloud as offering the best of both worlds: the flexibility and scalability of seemingly infinite capacity on public cloud, plus the predictability and familiarity of operations done on company-owned or leased infrastructure. Private cloud, once a custom, slow-to-provision, capex-heavy investment, has started to become more flexible. To remain relevant in a cloud market dominated by the hyperscalers, IT hardware vendors such as HPE, Dell, Lenovo, Hitachi, Cisco and others are bringing the consumption-based, self-service public cloud experience to private infrastructure through the implementation of flexible infrastructure, a new approach to hardware that offers the benefits of a consumption-based opex model while enabling enterprises to retain the familiar fixed-cost/variable-cost procurement and accounting model.

The hyperscalers have had more than a decade to refine the cloud IT experience, forcing IT vendors to follow suit. There is still time, however, because many organizations currently using modern on-premises IT architectures as the primary workload execution venue are lacking key elements and capabilities that enable the cloudlike experience (see Figure 2).

Figure 2: Modern On-Premises IT Environment Elements Currently in Place

Element	%
Centralized reporting and analytics	44%
Resource scalability	44%
Container orchestration	40%
Integrated IT provisioning and management system	38%
Microservices architecture	35%
On-demand self-service provisioning	34%
Service catalog/standard deployment templates	31%
API-enabled automation and orchestration	28%
Infrastructure as code	25%
Policy-based access to IT resources	25%
Service mesh	21%
Metering/utilization tracking	21%
Serverless architecture	15%
Observability	14%

Higher uptake of advanced cloud-native functionality among "cloud mature" organizations (n=48):

Infrastructure as code: **45%**
Observability: **27%**

Q. Which of the following infrastructure and application elements are currently part of your organization's on-premises modern IT architecture? Please select all that apply.
Base: Organizations that operate workloads today primarily with modern on-premises IT environments (n=227)
Source: 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Workload Placement 2022

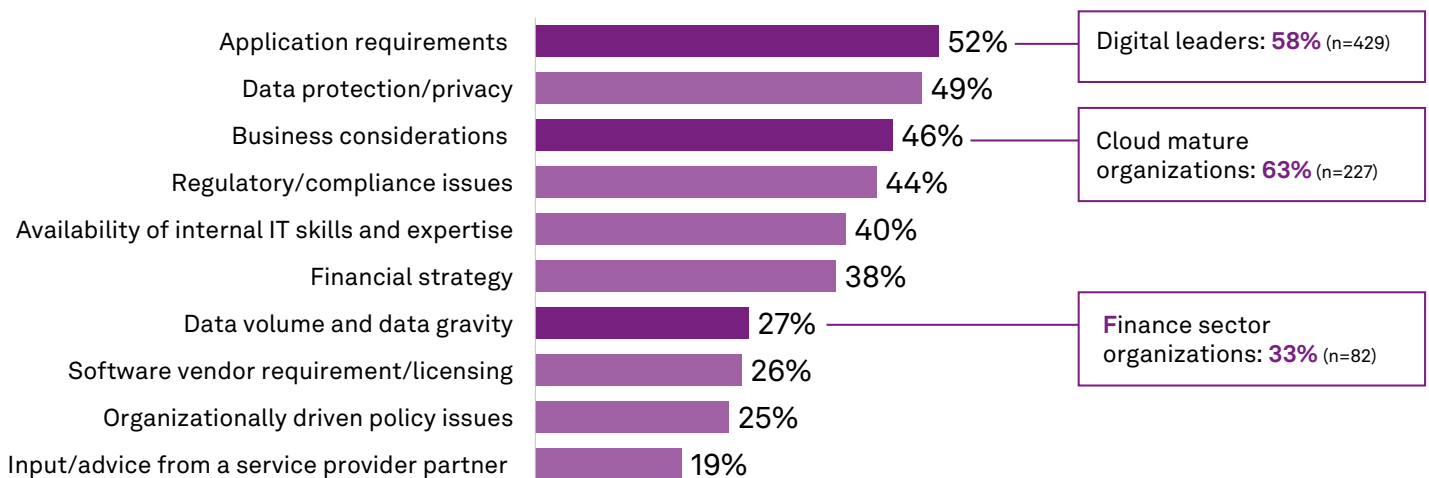**From Public Cloud to Cloud Operating Models**

Centralized reporting and analytics and automated provisioning tools for resource scalability (the elements most broadly deployed at present) are table stakes for cloudifying on-premises IT environments. Deployment of container orchestration (e.g., Kubernetes) is also emerging as a feature of modernized on-premises environments, while integration of microservices architectures, infrastructure as code, and service mesh and other cloud-native functionality is more typical of cloud-mature organizations and digital transformation leaders. Cloud native, a foundation for agile development, workload portability and "cloud anywhere" deployment options, plays a prominent role in the flexible infrastructure strategies of HPE, Dell and others. As on-premises IT vendors move beyond hybrid and embrace multicloud architectures, organizations inclined to modern on-premises IT can expect additional development at the control plane layer, as well as integration with hyperscaler cloud platforms and cloud native services and support.

Application Requirements Take Center Stage in Workload Placement

In years past, options for how and where to run workloads boiled down to in-house DIY operations (in owned and operated datacenters or colocation facilities) or third-party outsourcing/hosting/managed services. The once distinct technology and business considerations driving workload placement decisions are converging as the flexibility aspects of the cloud operating model mesh nicely with the experience- and data-driven imperatives of digital transformation.

Requirements associated with the application (and by extension, the performance and security of the overarching business process) is the top factor influencing workload decisions, followed by data protection/privacy considerations and business needs such as time-to-market, product innovation and customer experience (see Figure 3).

Figure 3: Factors Influencing BEV Decisions

Factor	%
Application requirements	52%
Data protection/privacy	49%
Business considerations	46%
Regulatory/compliance issues	44%
Availability of internal IT skills and expertise	40%
Financial strategy	38%
Data volume and data gravity	27%
Software vendor requirement/licensing	26%
Organizationally driven policy issues	25%
Input/advice from a service provider partner	19%

Digital leaders: **58%** (n=429)

Cloud mature organizations: **63%** (n=227)

Finance sector organizations: **33%** (n=82)

Q. In general, which factors are most influential when determining the best execution venue for your organization's workloads? Please select all that apply.
Base: All respondents (n=799)
Source: 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Workload Placement 2022

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The relative weight of specific workload placement factors, which varies by organization, industry and application, is also informed by the stage of IT transformation/modernization, application lifecycle considerations and industry regulation, as illustrated in the end-user narratives below.

"If [a new application] is related to an existing application, if it's more like an optimization of our current [business] systems, which are on-premises, then the optimization will be still on-premises."

IT/engineering manager/staff, 2,000-4,999 employees, $1B-$2.49B revenue, consumer/retail

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"[For workloads that can't move to cloud] we have to wait until the regulations become relaxed or they [the regulators] understand what current technology is being offered. And so definitely, we cannot adopt a technology in a highly regulated environment if the corresponding regulatory requirements are not updated."

Mid-level manager, 10,000-49,999 employees, $10B+ revenue, financial services

Workload Mobility, Edge and Hybrid IT

Movement of applications, workloads and data between IT environments in some cases may be a one-time event (e.g., migration from legacy to modern on-premises IT or to/from public clouds). More broadly, workload mobility also describes the dynamic nature of IT in the digital economy where BEV determinations are increasingly driven by a combination of technology and business considerations.

Workload mobility (not to be confused with [repatriation](#)) is happening, but it is not necessarily a commonplace occurrence, with 48% of organizations reporting frequent or occasional movement between IT environments vs. 52% whose workloads tend to stay put (see Figure 4).

Frequent movement between different IT environments may be indicative of highly distributed business processes and workflows. Alternatively, frequent workload mobility may suggest a trial-and-error approach to BEV on the part of early cloud implementers. Regardless of the root causes, developments in cloud management and control plane technology, along with expanded cross-cloud operational integration will simplify the process of workload mobility. The end-user narratives below highlight current use cases involving application lifecycles, disaster recovery testing and distributed workplace environments.

Figure 4: Frequency of Workload Movement Between IT Deployment Venues
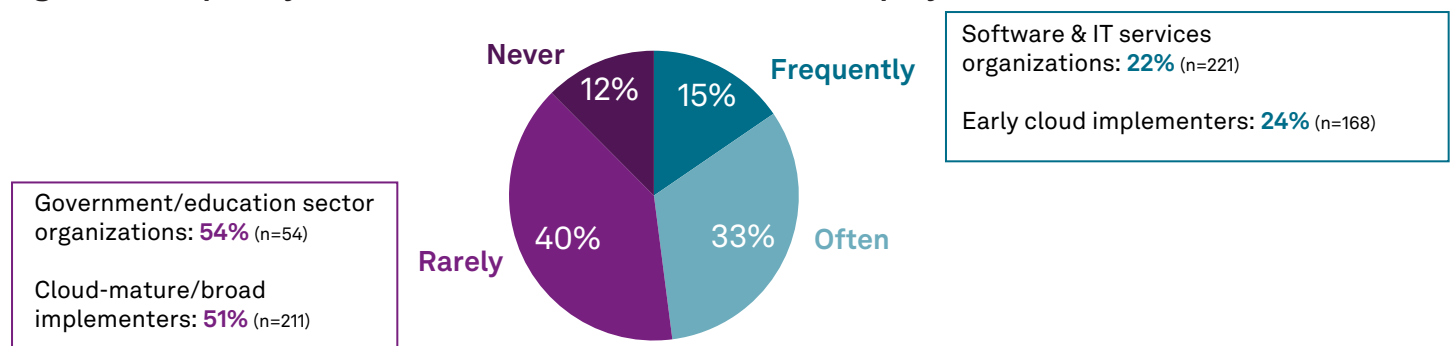
Software & IT services organizations: **22%** (n=221)

Early cloud implementers: **24%** (n=168)

Government/education sector organizations: **54%** (n=54)

Cloud-mature/broad implementers: **51%** (n=211)

Never 12%
Frequently 15%
Often 33%
Rarely 40%

Q. How often would you say workloads/applications move between the different deployment venues in your organization's overall IT environment?
Base: All respondents (n=738), excluding "don't know" responses
Source: 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Workload Placement 2022

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"We've got a ton of cloud-based applications all of my colleagues largely work remotely now. And we've got a ton of client data that we have to protect. And there have to be ways that we can access that stuff without running afoul of the NDAs that we have with those clients. I think remote access and cloud are going to become blurry, and it's going to become the same thing. "

Mid-level manager, 50,000-99,999 employees, $10B+ revenue, energy

"[In 2022 we'll make] small moves where we have a lot of applications on which we are going to put a very simple straight-forward application interface, move to the cloud and present it like a beta launch product to see the reaction from consumers. Based on that, we start flowing more and more [to public cloud]."

IT/engineering manager/staff, 1,000-1,999 employees, $500M-$999.99M revenue, financial services

"On-premises to cloud, we don't move as much… Maybe a one-time thing… so it's not that frequent. But within cloud and within regions, that is possible because it's a lot easier to do. That happens especially when we have a simulated DR and tests. And we also move cloud-to-cloud, but to validate our multicloud capabilities in case of outages."

Senior management, 250-499 employees, $50M-$99.99M revenue, software/IT and computer services

Organizations are increasingly incorporating edge venues (i.e., workload deployment/execution venues outside of centralized public clouds or enterprise datacenter/third-party colocation facilities) into their IT environments. Nearly one-third of organizations currently have edge venues in use in their IT estates, and an additional 15% currently have trials underway. For enterprise workloads that support real-time data-driven business processes or highly distributed workflows and workforces, edge infrastructure (regardless of technology) may well be an ideal IT environment to extend the digital reach of the business wherever it needs to be. Not surprisingly, current use of edge venues for workload deployment tracks closely the frequency of workload movement across IT environments (see Figure 5).

Figure 5: Edge as a Workload Deployment Venue

Edge venue usage overall

All respondents (n=724)	31%	15%	15%	12%	27%

Edge venue usage by frequency of workload management

Rare/no workload movement (n=351)	19%	12%	5%	17%	47%
Frequent/often workload movement (n=350)	44%	19%	25%	6%	6%

- ■ In use
- ■ In discovery/proof of concept
- ■ Plan to deploy in next 12-24 months
- ■ Considering but no current plan
- ■ Not in use/not in plan
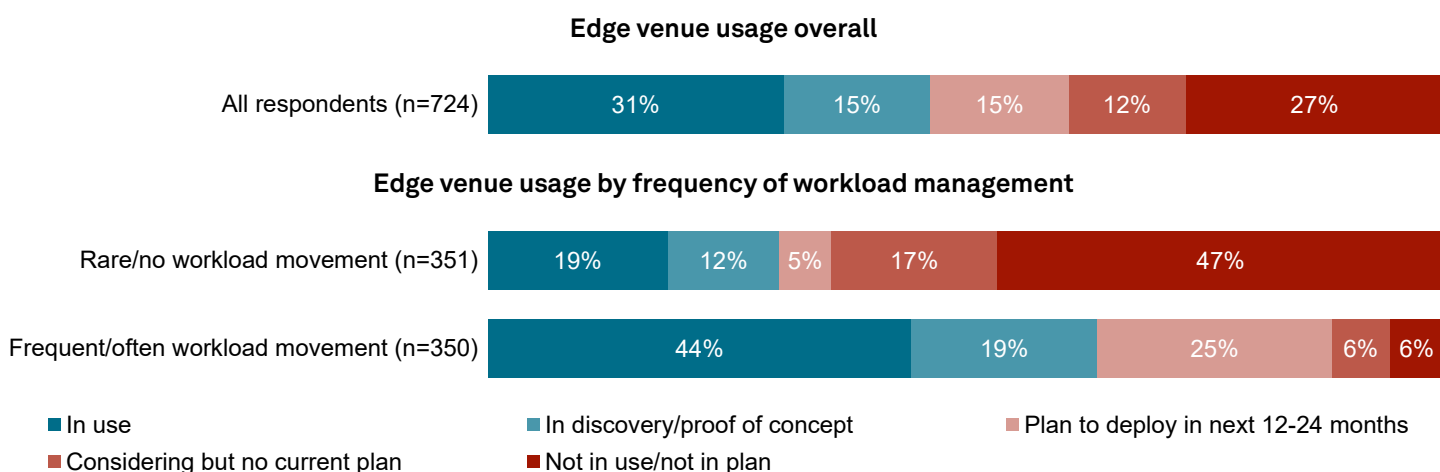
Q. Which of these describes your organization's usage of edge venues for workload deployment and execution?
Q. How often would you say workloads/applications move between the different deployment venues in your organization's overall IT environment?
Base: All respondents, excluding don't know
Source: 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Workload Placement 2022

Implications

Cloud operating models increase complexity and heighten the need for interoperability and cross-environment management – and the need for "trusted advisors" to assist customers with their IT and digital transformation initiatives. As organizations implement cloud IT infrastructure (both public and private), vendors should be poised for opportunities to get workload placement right the first time, including Day 0 strategy/planning, design and architectural support, Day 1 migration and deployment services and Day 2 run-operate-optimize capabilities. IT vendors, GSIs, the hyperscale cloud players, ISVs and MSPs (on their own and through vendor/hyperscaler cloud ecosystems) are all vying for the title of "trusted advisor" to existing clients and prospects. Yet supply may well exceed demand as distinct IT sector categories blur and customer needs for large-scale transformation require "beyond infrastructure" capabilities and expertise, as well as holistic approaches and converged architectures. The increasing prominence of partnerships, channel sales, joint technology solutions and coordinated go-to-market initiatives, along with expanding participation in incumbent vendor ecosystems, will alter the industry landscape and result in shifting confederations of vendors in IT transformation value chains.

Further Reading

Voice of the Enterprise: Cloud Hosting & Managed Services, Workload Placement 2022

– [Survey Data Hub](#)

– [IaaS/PaaS public cloud pushing further into IT estates' best execution venues – Highlights from VotE: Cloud Hosting & Managed Services](#)

[GreenLake gets deeper at HPE Discover 2022,](#) July 2022

[IBM weighs hardware as a service, inks with AWS Marketplace for SaaS,](#) May 2022

[Dell's goal is to enable "multicloud by design",](#) May 2022

[Google, IBM punch above their weight in "cloud anywhere" plans,](#) April 2022

[Flexible Infrastructure: Bringing On-Demand to Private Cloud,](#) February 2022

Methodology

Voice of the Enterprise: Cloud, Hosting & Managed Services provides data and insights about cloud adoption and usage in enterprise IT environments, highlighting cloud's evolution from emerging technology to IT operating model.

This online survey of 808 respondents was conducted from January 11 through March 10, 2022. The margin of error for topline statistics is +/- 3 pts at the 95% confidence level.

Note: Base sizes below n=30 should be interpreted anecdotally.

Note: Due to survey routing, qualification criteria, attrition and other factors, some questions were not answered by the full sample of respondents.

Demographics

For full survey demographics, [click here to go to the Survey Data Hub](#).

About the Author

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Melanie Posey is the Research Director for the Cloud & Managed Services Transformation at 451 Research, a part of S&P Global Market Intelligence. In addition to managing the research team, she focuses on analyzing the evolution of enterprise IT through the lens of cloud and the associated transformation of IT consumption and delivery models. Melanie also manages 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services offering.

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