Choosing a Cloud
HOW ENTERPRISES CAN FIND THE BEST LOCATION FOR APPLICATION WORKLOADS

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About this paper
A Pathfinder paper navigates decision-makers through the issues surrounding a specific technology or business case, explores the business value of adoption, and recommends the range of considerations and concrete next steps in the decision-making process.

ABOUT THE AUTHOR

CARL BROOKS
ANALYST, SERVICE PROVIDERS
Carl Brooks is an Analyst for 451 Research’s Service Providers Channel, covering cloud computing and the next generation of IT infrastructure. Previously, he spent several years researching and reporting on the emerging cloud market for TechTarget. Carl has also spent more than 10 years supporting small and medium-sized businesses as an IT consultant, network and systems integrator, and IT outsourcer.
Executive Summary

There are now more choices for where to run business workloads, and they’re easier to consume than they’ve ever been for those who have the right skills and knowledge to implement them. Most enterprises today are involved in substantial IT transformation and application-modernization efforts, and as part of that effort, they want to take advantage of this opportunity to choose where to run workloads.

The rewards are high: join the modern technology generation and put your IT infrastructure to work in better ways; develop and iterate faster and more efficiently than before; and increase access to booming markets such as mobile platforms and the millions of new endpoints that are part of the Internet of Things (IoT). However, there are also risks involved, which include making mistakes in choosing the right venue for the workload; missing the chance to improve performance and cut costs; or ending up with a project that’s a boondoggle. This report will help enterprise IT organizations contextualize the infrastructure venue choices available today and demonstrate some ways to make informed, effective choices about modernizing IT with tangible results.

Key Findings

• More than 90% of enterprises now consume cloud computing platforms in various capacities.
• There is a range of mature, highly accessible platforms and providers to choose from.
• Most enterprises are in the process of transforming their IT organizations to reflect this.
• Having a deliberate process and rational framework for selecting the best execution venues by workload is essential.

Technological Discussion

When Everything is Cloud: What Operating IT Looks Like Today

Today’s IT market has completed a fundamental change to follow the cloud computing model pioneered commercially by Amazon Web Services beginning in 2008. It stipulates that compute and storage resources no longer need to be, or should be, treated as discrete, unique installations requiring hands-on maintenance and attention. Instead, resources are pooled and consumed via software application programming interfaces (APIs) on demand, elastic, scalable and available over the network.

Software, infrastructure and platforms as a service (SaaS, IaaS, PaaS) are available as private cloud (owned by the enterprise), public cloud (hosted by a provider) and in between (hosted private cloud), and an overwhelming number of enterprises (90%) now consume some or all of them today. The cloud model is the de facto standard for new IT deployments across almost every kind of workload and a default objective of IT upgrade and transformation efforts. After all, there’s no way to keep up with the pace of change in today’s IT-driven market without grasping the radical gains in efficiency that are on offer.
All that being said, overall adoption is scattershot (see Figure 1 below). Enterprises are presented with a plethora of choices from vendors and providers, most of them technically mature and attractive, and each with different benefits and drawbacks. So, the real problem facing enterprises today isn’t access to technology or lack of a drive to consume modern cloud-style infrastructure; it’s figuring out how to make the right choices.

Figure 1. Deployment to various cloud and hosted service venues
Source: 451 Research’s Voice of the Enterprise: Cloud, Hosting and Managed Services, Budgets and Outlook 2018
Q: Which of the following types of cloud or hosted services, if any, does your organization currently use?

- Software as a service (SaaS) and hosted applications: 66%
- Infrastructure as a service (IaaS)/public cloud: 44%
- On-premises private cloud: 39%
- Colocation/third-party datacenter facilities: 36%
- Platform as a service (PaaS): 32%
- Hosted, non-cloud infrastructure: 26%
- Hosted private cloud: 25%

% of respondents (n=590)

Finding the best execution venue for any given workload is an immediate problem for any enterprise that wants (and almost all of them do) to increase the rate and effectiveness of their IT operations transformation and cloud migration plans.
Private, Public, Multi and Hybrid Cloud Options

First, finding the best execution venue requires an understanding of the available choices. It’s important to have an accurate and comprehensive view of the details. The first step is to separate ownership of and responsibility for infrastructure and software services.

Figure 2: Venue choices
Source: 451 Research

- Public cloud (e.g., AWS, Azure)
- Private cloud (e.g., OpenStack, VMware)
- Hosted private cloud (e.g., IBM, Rackspace)
- SaaS (e.g., Microsoft Office 365, Salesforce)
- Multi-cloud and hybrid cloud

The example venue choices in this list delineate the different domains:

- Public cloud providers, for example, own 100% of their hardware and services delivery platform and guarantee very little in terms of outcome. Users are guaranteed uptime, datacenter security, network availability and access, but they are responsible for their data, workloads, performance and application security.
- Private cloud vendors and open source cloud software platforms such as VMware and OpenStack provide virtual infrastructure automation, support and compatibility with other platforms, but users are responsible for their own datacenter operations.
- Hosted private clouds are physically or logically separated environments run by a service provider that offers a range of guarantees and services – from network and application security to application support – in addition to operating the cloud environment.
- SaaS applications are consumed without any responsibility to the enterprise other than user error.
- Multi-cloud is a destination for enterprises that want to consume separate platforms side by side and enjoy some commonality of management and operations. Hybrid cloud refers to multiple cloud environments managed through a single plane of glass. It enables developers to use any appropriate mix of public or private cloud in a single application, depending on the perceived relative strengths and weaknesses of each.
Containers and Platforms

The cloud paradigm has led to many trends in application development. Most notable are the rise of containers in enterprise computing and the advent of PaaS as a way for developers to short-circuit the process of dealing with IT operations for manual tasks. Containers are a long-established technology in the web hosting world. Based on Linux, they are now being used by enterprises to create microservices that run best in the context of distributed computing and serve everything from mobile and IoT applications to packing in data collection and processing for traditional monolithic enterprise applications now exposed to online data sources.

Because it is such an important trend in enterprise development, container support has to be a factor in best execution venue choice since vendors and public cloud providers approach container support in their own ways. Some public cloud providers support native microservices built directly on their platform as well as third-party container technologies such as Docker and Kubernetes. Several now offer on-premises datacenter appliances that replicate and link public cloud with private datacenters so that customers can engage with containers as part of a hybrid cloud strategy.

PaaS platforms and providers flatten the field for developers by removing repeatable processes from coding and turn software creation into a kind of infrastructure of its own, with modular application construction and runtimes that free a developer (within reason) from having to request admins to support these processes. Public clouds have their own iterations of PaaS as well. All of these choices and platforms are nominally interoperable thanks to APIs – so how should enterprises go about choosing?

Enterprise Cloud Adoption Patterns

As noted earlier, enterprise cloud adoption crosses all venue choices, and 451 Research surveys reveal that less than 10% report no use of cloud-style infrastructure at all. However, only 37% of enterprises report broad adoption across the organization – most enterprises are in an incomplete phase of transition. Likewise, a strong majority (60–70%) report that they plan to increase spending on cloud in the immediate future.

SaaS adoption leads the way because it is the easiest, most accessible and most mature part of the public cloud market. It has also undergone significant evolution in terms of API enhancements and integrations. Many SaaS platforms can be integrated into enterprise applications to the point of invisibility, or used directly in a browser, allowing for broad implementation scenarios that include hybrid and multi-cloud. The flip side of this adoption is the expectation from enterprises that hybrid cloud is the goal: 57% today say that hybrid cloud is their primary strategic approach to using cloud. This means that there will always be a complex interplay of application venues and choices to make as IT transformation continues.
Finding the Best Execution Venue

What it Means

Put simply, the best execution venue for any given application or workload is the one that provides the best outcome based on any number of business factors set by the organization. In the past, constraints to IT resource development were limited by investment capacity, accessibility of network or datacenter capacity, and the ability (or lack thereof) of IT to serve a particular need. Those restrictions essentially do not apply to the vast majority of enterprises today; almost every available infrastructure resource can be had on demand, instantly and with broad compatibility into existing applications and workloads. There has been a sea change in how enterprises should consider infrastructure choices, from ‘This is the best we can do’ to ‘What is the best we can get?’

Why it Matters

Workloads are increasingly diverse in their requirements and optimal running states. Some, such as email, haven’t fundamentally changed for many years. Applications that required datacenter infrastructure a decade ago can run on mobile devices today. It makes sense to push these kinds of workloads into SaaS instead of wasting resources on running them in-house. Other workloads require traditional on-premises infrastructure or can’t easily be decoupled from business process and stay in-house.
Figure 4 below illustrates why venue choice matters and how to take an analytic approach to the process. Core business functions – database, data processing, line-of-business applications, etc. – show a heavy reliance on traditional on-premises infrastructure today, with an expectation that these workloads will eventually shift toward SaaS and private and public IaaS. These applications are complex, unwieldy and often encompass legacy systems such as mainframes or midframes. Justifying and implementing the transition to cloud is expensive and difficult.

Figure 4: Enterprise workloads – primary execution venues of today and tomorrow for core business applications (left) and employee productivity applications (right)
Source: 451 Research's Voice of the Enterprise: Cloud, Hosting and Managed Services, Workloads and Key Projects 2019
Q1. Which of the following best describes the primary environment used to operate your organization’s core business functions today?
Q2. Which of the following best describes the primary environment in which your organization’s core business functions will be operated two years from now?

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<tr>
<th>CORE BUSINESS FUNCTIONS</th>
<th>EMPLOYEE PRODUCTIVITY FUNCTIONS</th>
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<td>On-premises ‘traditional’ resources and infrastructure</td>
<td>On-premises ‘traditional’ resources and infrastructure</td>
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On-premises 'traditional'
SaaS and hosted applications
On-premises private cloud IT resources and infrastructure
Hosted, non-cloud infrastructure
IaaS/PaaS/public cloud
Hosted private cloud

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<thead>
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<th>CORE BUSINESS FUNCTIONS</th>
<th>EMPLOYEE PRODUCTIVITY FUNCTIONS</th>
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<tr>
<td>Today n=93</td>
<td>In next two years n=89</td>
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<tr>
<td>Today n=95</td>
<td>In next two years n=91</td>
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On the flip side, employee productivity workloads are heavily reliant on SaaS as a primary resource with the expectation that legacy productivity applications will shrink. These applications – such as email, collaboration, desktop backup, customer relationship management and human resource management – are highly mature, non-remunerative for enterprises, and a fixed cost either in the operating expense of datacenter or online services. From either a technical or a business standpoint, it’s hard to justify any enterprise running its own email servers today. There will always be exceptions, but these decisions are no longer limited by much other than business choices.
Strategies for Understanding Best Execution Venue Options

Choosing an Approach

The first task is to assess the IT organization: best execution venue choice should be data-driven when possible and as comprehensive as possible when not. For large organizations, network and asset discovery (including software licenses) can come into play, and applications need to be generally mapped and matched with organizational requirements, starting with compliance and security. Cloud represents few technical barriers to compliance today, but it can be one of the areas requiring the most organizational effort to adjust. After that, it’s necessary to assess the importance and requirements of applications that the organization wants to target. For example, a desktop productivity application used by one business group might be a good candidate for a weekend migration to SaaS with some support time budgeted in for the coming week, but a line-of-business application operating 24/7 and spanning multiple revenue generating operations would not.

Most enterprises have found success in a ‘small bites’ approach – identifying the applications that can migrate with the lowest impact as the first candidates. This approach allows the organization to gain experience with the process with relatively low risk, and helps it allocate scarce resources efficiently in the beginning. More complex applications, especially those that are broadly used or have a long history of internal development, require more planning and staging; in some cases, the bar to migration may be too high, or the gains to low, to justify the process.

A relatively small number of enterprises (19%) set organizational goals of being ‘all in’ and migrating their entire infrastructure to a public cloud provider; there’s nothing wrong with that as a long-term goal, but the migration process should still be a measured one, and it should provide options as cloud service providers grow and evolve in different directions. For example, a few years from now, the venue choices for a given application may have changed enough to warrant another move. Every migration or transformation effort needs to have the goal of making the next migration an easier one.

Once the organization has established a solid application overview, it is important to create a framework to understand the basic choices and factors that come into play when selecting the best execution venue. First, organizations should determine the importance of basic strategic goals involved in moving, migrating or transforming. What are the primary motivations and most important planning goals? These can be different for each workload, and enterprises can arrive at different solutions for each situation. Broadly speaking, strategic goal-selection criteria are as follows:

- Lower operating costs/better operating efficiency
- Performance issues
- IT modernization and transformation
- Hybrid cloud
- Cloud-native technology
This list is short, broad and deliberately does not dive into specific choices that enterprises will have to make for their unique situations – such as choice of software or development platform (including PaaS), virtualization technology, networking stack, use of an existing provider and vendor preferences, and so on. What it does give is a direct way of looking at the core considerations for finding the best execution venue for a given workload. Decision-makers need to draw out the primary purpose of migrating and/or transforming a given workload to accurately assess the benefits. These can be concrete (better performance, lower costs) or more strategic (fitting workloads into an overall hybrid cloud scenario for better management, or a shift to cloud-native application deployment).

For example, an aging, monolithic HPC application based on specialty dedicated hardware could be an excellent candidate for public cloud where high-performance compute instances are readily available for very low investment and can easily be scaled up and down to deliver HPC application performance that far outstrips on-site capacity. That tackles the issue of cost and performance.

Another example might be line-of-business applications that access sales and customer data. Because of the need for those applications to be close to the data and the need for compliance with regulations regarding sensitive personal information, a modernization path would likely lead to a better outcome in a private cloud environment, where both latency and regulatory compliance are easier to achieve.

Cloud-native application deployment would be picking applications that can benefit the most from refactoring in ways that make the most of the capabilities of a cloud platform and enable modern development practices.

There can be multiple considerations for every workload, so it’s important to have priorities. But what does this mean in practical terms?

### Practical Considerations

After understanding the overall picture of organizational ambitions and requirements, practical considerations must come into play. Most enterprises report compatibility with existing technology and a lack of human resources (IT skills) as barriers (following security and compliance). An affinity for, or deep base of experience in, open source software might make PaaS an easier move for refactoring an application, or an existing investment in enterprise-class commercial hardware and software could lead to providers that explicitly support those integrations.

### Understanding Risks

There are two categories of risk when engaging in this process. One type of risk is existential and includes problems such as thinking too big or too small: pushing for a total organizational makeover without a deep and thorough understanding of the situation on the ground, for example, can lead to boondoggles. Failing to consider the long-term benefits of refactoring, or re-architecting applications to benefit from new capabilities, and simply taking a more conservative lift-and-shift approach can lead to short-term gains but a long-term mess in a somewhat
improved locale. When picking the right venue for any given workload, it’s important to bear in mind that the best venue will likely change over the application’s lifecycle, and the goal should be to make it easier to move applications around as opportunities present themselves.

The second category of risk comprises the unique variables in every organization’s IT transformation effort – for example, in a situation where two business units overlap and changing the venue could allow the organization to streamline two venues into one. If one business unit uses a commercial application and another uses open source, picking one approach over the other could introduce significant risk of complexity and headaches. That’s why it is imperative that the first step be a rational, accurate and comprehensive overview of the organization and what matters where.

Common Obstacles

The most common barriers to pushing cloud transformation and applying a best execution strategy are almost entirely rooted in changing organizational practices and acquiring or redirecting the skills and human resources needed. In large organizations, changing the way IT operates can be an uphill battle against existing constituencies and long-established domains such as network operations vs. IT operations vs. development groups, all of which have a (presumably) effective way to get things done.

Finding and convincing stakeholders isn’t as simple as heading straight to C-level executives for a mandate because there can be many different parties involved at a practical level. Assessment of available talent and skills and a plan for retraining or reassignment is also a good idea. Declaring that one technology is now necessary and that it will replace an existing set of tools without explanation would likely scare the wits out of personnel who need to be onboard for the transition to be successful!

Likewise, administrators and managers that consider reliability and security their personal responsibility will need proof to alleviate their skepticism. Technology is easy these days – anyone in IT can fiddle with APIs and understand an application-dependency map – but changing established processes and operations is a more challenging task with regard to cloud transformation.
Conclusions

Keys to successfully implementing best execution venues include:

- A comprehensive overview and insight into how all parts of the IT organization function and how each part relates to business processes and operations on a practical level.
- Assessment of criticality and sensitivity for each workload to determine venue options and costs associated with migration or transformation.
- Assessment of skills and resources available and what is missing or what will change.
- Deliberation in planning. Take small bites and start with the easiest workloads first.
- Careful preparation to make the choice of venue flexible and avoid lock-in where possible.

We know from the available data that most enterprises are adopting the as-a-service model in a variety of fashions. Most want their migration path to end up flexible and controlled as a hybrid and multi-cloud scenario, and we know that most enterprises are in the middle of this process; only a third have reached a broad adoption stage, and of those, not all have fully completed their transition to a hybrid governance model. A solid best execution venue strategy can help.

Starting with a comprehensive framework of assessment criteria and an understanding of the wide array of choices available today is the best way to tackle this process. Then use a realistic and practical approach to evaluate and transform existing workloads in small, manageable bites to yield the best results with the lowest risk. Overall, the mistake is not failing to act but acting in a hasty, short-sighted way that leaves the IT organization with the same mess in the clouds as it had on the ground. At some point, enterprise applications will have the capacity to pick their own best execution venues and move the needle on efficiency in service delivery yet again; IT shops that don’t pave the way for that now will miss out.
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NEW YORK
1411 Broadway
New York, NY 10018
+1 212 505 3030

SAN FRANCISCO
505 Montgomery,
Suite 1052
San Francisco, CA  94111
+1 212 505 3030

LONDON
Paxton House
30, Artillery Lane
London, E1 7LS, UK
+44 (0) 203 929 5700

BOSTON
75-101 Federal Street
Boston, MA 02110
+1 617 598 7200