

THE POWER OF PaaS

Platform as a service tools provide a path toward agility while reducing IT costs.

Executive Summary

At a time when budgets are especially tight, organizations may find it hard to justify investments in the latest programming tools and testing platforms. Platform as a service (PaaS) solutions provide a viable option: They deliver the underlying infrastructure and development tools required to build and deploy cloud applications while also offering opportunities for increased agility and reduced IT costs.

PaaS is one of the cornerstones of the cloud computing model, providing computing resources on demand. The services include all the essential building blocks necessary for an IT staff to construct and run its own custom software, as well as the entire computing stack to test and run the proprietary programs.

Because the tools are cloud-based, organizations don't have to budget for capital expenditures (CAPEX), other upfront hardware and software investments, or hire skilled IT workers to be responsible for ongoing maintenance and management of servers, storage systems, network gear and other components. The best PaaS offerings include a range of additional capabilities, such as an application builder for nontechnical users, app integration systems and business intelligence resources.

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PaaS also can help organizations reduce current costs. The multitenancy model of cloud computing allows multiple entities to share the same IT resources, reducing the overall costs that any single customer pays. In many cases, this represents a money-saving alternative to traditional technology investments, which require each organization to bear the full burden of the costs for all its IT services.

Further savings may result from lower fuel costs for powering and cooling the equipment in the development environment and from less need for high-priced specialists to keep everything running at optimum levels.

But the PaaS market is still evolving. Before IT managers commit to a long-term deal, they must fully understand the rewards and risks of this cloud-computing model.

PaaS Ready for Primetime

When it comes to being able to develop an advantage over competition or quickly provide the enhanced services that workers and customers demand today, the IT department stands out among other business units. But creating new applications or making key additions to existing programs to meet these needs requires modern and agile development platforms. Many organizations may not have the budget to invest in the latest programming tools – not to mention comprehensive testing platforms that can validate new code before it is introduced into production environments.

This is where the value of PaaS becomes clear. According to a recent market analysis by Yefim Natis, a Gartner distinguished analyst, “The fundamental appeal of PaaS is the opportunity for IT organizations to create new software solutions with minimal capital expense and without the hassle of provisioning and configuring the underlying infrastructure.”

But the PaaS market is still evolving. “Of all the cloud technological aspects, infrastructure as a service (IaaS) and software as a service (SaaS) are the most mature and established from a competitive landscape perspective, while PaaS is the least evolved,” says Fabrizio Biscotti, research director for the enterprise software team at Gartner.

“For this reason, PaaS is where the battle between vendors and products is set to intensify the most,” he adds. “It comes as no surprise that the PaaS competitive landscape is still in flux, with traditional application infrastructure vendors facing competition from new, large players moving into the market and myriad specialized PaaS pure players cutting into their slice of profits.”

This means that although IT managers must explore PaaS in their ongoing efforts to keep their organizations successful, they also must fully understand the provider’s PaaS model before committing to a long-term deal.

Get to Know PaaS

Platform as a service is one of the cornerstones of cloud computing, embodying the core characteristic of delivering computing resources as needed. Other essential elements include resource pooling and rapid elasticity, in addition to expansion of development capabilities.

Along with being free from upfront infrastructure costs, PaaS can offer increased accessibility to the latest tools for making developers more productive. This in turn can shorten the time it takes to give business users or customers enhanced services.

The National Institute of Standards and Technology formalizes this concept within its definition of cloud computing: “A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

What capabilities come with a typical PaaS offering?

Most significant, PaaS delivers all of the essential building blocks necessary for the IT staff to create and run its own custom software. This includes the development environment and programming library for creating custom applications, as well as the entire computing stack to test and run the proprietary programs.

What other standard features routinely come with a PaaS solution? Developers key in on four essential resources:

1. Source code development: The wide range of PaaS solutions available today give programming teams the full range of language choices they find in traditional environments, including stalwarts such as Java, Perl, PHP, Python and Ruby.

2. Dynamic pages: Whether the underlying technology is JavaServer Pages, open source PHP, Microsoft’s ASP and .NET, or another option, developers can quickly create dynamic web pages that load data and images as they’re being accessed by end users. The foundational tools help developers update and deliver new web applications to meet the fast-changing needs and requirements of their user communities.

3. Websites: PaaS solutions can provide environments for creating and running entire sites, including tools for user interfaces, databases and security controls.

4. Developer sandboxes: When it’s time to tweak a small section of code prior to a more formal test, PaaS can provide a dedicated “sandbox” area to safely see how the snippet performs. A widely used resource in development environments, sandboxes do more than help teams refine code quickly. They also promote collaboration by providing an area where other programmers can view a project, offer additional ideas and suggest changes or fixes to bugs.

These tools are cloud-based, so organizations don't have to budget for upfront hardware and software investments or pay skilled IT workers for ongoing maintenance and management of servers, storage systems, networking gear and other components. PaaS solutions also maintain the programming platform, including security patches and upgrades to hardware and operating systems. The result: The in-house development staff has the tools it needs to create innovative programs and more time to put those tools to use.

The best PaaS offerings include a range of additional capabilities. These include an application builder, which allows nontechnical users to create custom apps tailored for their unique requirements, and application integration systems, which seamlessly tie together cloud and on-premises applications. Top PaaS offerings also provide business intelligence and database resources to jump-start the creation of dashboards, reporting systems and data analysis applications.

The broader PaaS category comprises an alphabet soup of subcategories that focus on business process management (BPM PaaS) and messaging. Of these, application PaaS (aPaaS) represents the biggest portion of the market, accounting for more than a third of all PaaS spending in 2012, according to Gartner.

A Showcase for Clouds

A platform as a service solution can play an important role in organizationwide cloud strategies by acting as a pilot for more extensive on-demand services.

For example, application development is a good candidate for cloud evaluations because programmers often have to quickly gather server and networking resources for a short period of time to stress-test new code and then reassign the capacity to other tasks once the tests are complete.

PaaS gives developers the flexibility to build up and tear down test beds, which in turn provides a model for demonstrating how one department benefits from dynamically allocated services without racking up new capital costs. By showing a services-based approach to IT in action, PaaS can help an organization decide how and when to move mission-critical services to the cloud.

PaaS vs. SaaS & IaaS

PaaS differs from the more mature SaaS model in significant ways. The software as a service model provides a complete, cloud-based application on demand. But with SaaS, a service provider's customers don't actually own any applications. The client is often forced to accept programs as is, with little or no opportunity to fine-tune them to its unique requirements.

That may have benefits from a budgetary standpoint: Having a large number of customers share use of a plain-vanilla application is a proven way for service providers to keep acquisition costs low for everybody. But there's a trade-off: The lack of individualization also means the provider's clients can't use the software to deliver unique services that give their enterprises a competitive advantage.

By contrast, PaaS supports innovation by giving in-house developers the underlying platform they need to create innovative, proprietary solutions, while also offering cost savings and agile, on-demand services unavailable in traditional on-premises programming environments.

PaaS also differs from the third major cloud option, infrastructure as a service. IaaS delivers on-demand processing power, storage capacity, network bandwidth and security technologies that IT managers can quickly provision or deprovision to meet prevailing requirements.

These resources, typically made available via a provider's service catalog, support general-purpose needs, such as additional processing power to meet a spike in demand during the holiday season. PaaS resources, on the other hand, are devoted specifically to creating and running an organization's custom apps.

The Big Payback

PaaS may offer some clear alternatives to other cloud computing models, but what's the payoff for an IT department under pressure to provide more services to the larger organization while managing resources more closely than ever?

The short answer is that the benefits of PaaS go beyond just relieving the burdens of managing servers, operating systems, development frameworks and related technologies. PaaS resources can be deployed or expanded quickly – within days or minutes in some cases – because the IT department doesn't have to install a host of on-premises software and hardware for programming operations.

PaaS also may help organizations reduce costs. The multi-tenancy model of cloud computing allows multiple entities to share the same IT resources, which reduces the costs the provider's customers each pay.

In many cases, this represents a money-saving alternative to traditional technology investments requiring an organization to bear the full cost for all its IT services. The costs are predictable, even with the ups and downs of demand cycles, because the fees are prenegotiated monthly expenses.

Further savings can come from lower costs for the fuel to power and cool the equipment in the development environment, as well as from fewer high-priced specialists needed to keep everything running at optimum levels.

Automated backups, improved business continuity and disaster recovery are other advantages. Rather than investing in dedicated equipment that mirrors the production environment for backups, organizations can contract with PaaS providers to handle backups automatically. Cloud-based systems, such as PaaS, also offer the advantage of sending critical data to a distant location that likely won't be threatened if a local or regional disaster hits on-premises environments.

Meeting Real-world Challenges

On paper, PaaS options offer a lot to like. Their benefits are even more compelling when IT administrators consider some common use cases.

Challenge 1: Organizations need to increase the agility of their IT and business divisions while maintaining tight control over budgets.

Commercial and public-sector organizations are under constant pressure to provide new services to meet competitive demands and address the needs of users. For example, many commercial and public-sector organizations are launching innovative mobile apps, and they need a framework for securely delivering applications and data to employees wherever they happen to be working.

Cloud solutions can use Internet browsers or a lightweight mobile app to enable mobile devices to access centralized resources maintained in data centers. This both results in anywhere, anytime access to information and facilitates greater collaboration among workforces.

With PaaS, IT managers have an available infrastructure to create on-demand resources in the cloud and scale them to meet prevailing end-user demand. This enhances agility by reducing the time between when a new service need is identified and when the resulting application begins to deliver value.

Challenge 2: IT staffs are overworked and underutilized.

Managing and maintaining test and development environments can sap IT departments of financial and personnel resources. The result: While IT workers fill their days scrambling to meet routine demands, the organization isn't taking full advantage of their valuable skills for creating new applications. PaaS shifts the maintenance burden to the service provider, whose dedicated staff manages software upgrades and optimizes the hardware infrastructure.

Challenge 3: Budget constraints mean fewer resources for maintaining and modernizing IT infrastructures.

Even as IT budgets experience some loosening of the tight monetary controls of recent years, IT administrators still must closely manage CAPEX. This means optimizing any

investments in additional on-premises hardware and software for mission-critical applications and considering the cloud for many of the remaining systems.

The costs of PaaS solutions are billed as monthly service fees that the IT department can budget for operational expenses, which are often easier to get approved than big-ticket capital costs. At the same time, the pay-as-you-go characteristics of PaaS increase the chances that IT departments will get the exact services and volumes needed at prices that are in line with their current budgets.

PaaS also can help organizations gain clearer insights into their IT-related costs through the resource monitors that are common with public cloud services. Metering allows for accurate financial oversight of IT services and can hasten the ability of IT departments to become service providers to users within their organizations.

Upward Trend

Worldwide revenues for PaaS solutions could top \$1.2 billion when the final results are tallied for 2012, which represents a sizable boost of \$300 million over 2011. Forecasts suggest steady growth for the PaaS market, totaling \$2.9 billion by 2016.

SOURCE: Gartner

Challenge 4: Organizations need ready access to resources to reduce development times.

By shifting IT management burdens to an outside service provider, PaaS keeps developers more engaged with strategic programming activities. The on-demand nature of the solution lets organizations quickly scale up the testing environment to create test beds that can fully evaluate new code before it goes live, without cutting corners because of inadequate testing resources or siphoning capacity from production systems.

PaaS also helps the IT staff avoid having to provision and implement new servers and storage devices, a process that can take weeks or months. Instead, developers simply dial up needed testing capacity from the PaaS provider for as long as resources are required.

Challenge 5: Integrating cloud and on-premises applications increases complexity for IT staffs.

New applications or significant changes to existing programs rarely exist in a vacuum. The new capabilities must be blended into the larger IT department. The best PaaS solutions offer embedded integration capabilities that ease the burdens of merging legacy and on-premises systems with cloud-based applications.

Challenge 6: Business intelligence apps are becoming ubiquitous.

Analytics and business intelligence capabilities used to be complex, discrete systems available only to those with the specialized skills to fully take advantage of these tools. Now, BI is becoming a standard tool for many types of applications to help business and program managers with strategic decision-making processes.

Some PaaS solutions specialize in BI application development by providing the necessary database, dashboard, reporting system and data analysis systems.

But Wait – PaaS Does More

The previous list of challenges are all compelling reasons to choose PaaS. But as new technologies and IT needs surface, the PaaS model continues to offer a growing list of benefits.

Mobile integration is a case in point. No longer reserved only for road warriors, mobile apps are becoming a staple in enterprise environments for users who need access to data and applications while they're traveling, working from home offices or collaborating during a meeting in a conference room.

With PaaS, programmers can use the development environment to build targeted mobile apps that run securely on a cloud-based IT infrastructure and database. When a discrete mobile app isn't the best choice, PaaS resources let developers create and support browser-based programs that can run on the wide range of hardware common to bring-your-own-device (BYOD) environments.

Organizations need to improve developer collaboration, and the integrated social networking capabilities available in the best PaaS solutions can enhance this area. Developers can gather virtually within their own private social-media network inside the PaaS framework to carry on online conversations and share insights about upcoming projects. These resources complement the developer's sandboxes, providing a safe place to publish and share code snippets.

As organizations grow, they traditionally launch solutions that often solve particular business problems yet don't easily work with other related systems, even if they share similar processes and data. One option is to hard code custom interfaces to get separate systems to work together, but PaaS can integrate business processes more easily and with less strain on the development staff.

The best PaaS solutions come with a combination of industry standard and proprietary application programming interfaces (APIs) for stitching applications together into seamless processes. Other APIs are available to connect separate clouds that can further promote the sharing of data and processes.

Finally, some platforms integrate useful ancillary tools, such as search engines that enable users to locate data associated with the applications created by the PaaS solution.

Also important are analysis and reporting tools that are embedded within the platform to track app usage levels and assess app performance.

PaaS Pause: Consider This

As the common-use cases cited earlier show, there is a range of incentives for organizations to consider PaaS solutions. But that doesn't mean PaaS is a cure-all for every technology challenge. To achieve success, organizations must understand some important trade-offs with the computing model itself and in the differences among individual service offerings.

The most fundamental consideration is whether a public cloud option is appropriate for the particular apps that will be created and supported by the PaaS platform. For example, although reliable technologies are available to separate accounts within multitenant cloud environments, the successful use of these technologies hinges on how well service providers implement these controls. This may raise questions about how well a public PaaS platform conforms to internal security policies as well as to any formal regulatory controls individual organizations may operate under.

Another key concern is vendor lock-in. With their intellectual property under the control of a third-party provider, organizations require formal assurances that they will have ready access to their data in standard formats that will make it possible to switch providers if they desire. Even if the organization's IT managers are satisfied that security and information management questions have been addressed adequately, other deployment issues remain, including service costs, negotiating the right service-level agreements (SLAs) and vendor management.

Fortunately, these concerns aren't necessarily deal breakers, as long as organizations evaluate potential PaaS providers carefully and button down their SLAs.

Selecting the right provider begins with a comprehensive request for proposals (RFPs) that clearly delineates the organization's top selection criteria. First, IT managers must understand who's actually maintaining the PaaS infrastructure and whether that environment is reliable and compatible with the organization's needs. Some service providers operate their own PaaS data centers; others contract for services from larger cloud providers. Either option could work; the key is finding the right set of resources.

One option is to choose a provider that not only has strong relationships with the largest, most reliable PaaS companies in the industry, but also can help customers launch on-premises app solutions. This ability to understand the pros and cons of both types of models, without a vested interest in one or the other, will be a valuable resource for guiding decisions about which choice makes the most technological and business sense.

IT managers must also determine whether their development staff is comfortable with the PaaS provider's choices for programming languages, interfaces, development tools and database support. Related to this is a provider's history of adopting new technologies. An organization should understand how quickly a provider implements updates to the programming environment and makes new tools available to customers so they can take advantage of the latest innovations.

Next, evaluate the foundational components, such as the server infrastructure, storage systems, backup and recovery operations, and support offerings. For the latter, look for providers that offer 24/7 support from an experienced staff with broad expertise. Also assess the infrastructure that a provider has in place to keep the PaaS platform running without costly downtime.

For example, the cloud solution should be self-healing: If there's a problem with a virtual machine or server, the workloads should automatically switch to alternative virtual or physical machines so that a customer's developers can stay productive. Similarly, some specialized tools automatically keep workloads evenly balanced to guard against performance problems if one set of servers or memory resources becomes overtaxed while other resources are running significantly below their optimal utilization rates.

Even the best PaaS environments are no help if customers can't rely on them to be around for the long haul. So the economic viability of potential providers is another important evaluation criterion.

Providers should be asked to thoroughly explain their business plans. That way, the organization can learn how the provider plans to compete in the current market as well as how it expects to grow and strengthen operations. Any assessment of a business's viability requires an analysis of the management team's track record and the depth of expertise that exists throughout the ranks of the IT staff.

Keep It Safe & Secure

If a potential service provider passes the initial evaluation hurdles, it's time to delve more deeply into areas that will help assure that the solution will offer a reliable development environment. As security is a top concern for most organizations, PaaS evaluations should explore a potential cloud provider's capabilities for protecting their environment.

Determine whether regularly updated security certifications are available to customers. It's also important to understand the controls that are in place to administer access to the PaaS cloud resources. Data encryption should protect information while stored in a multitenancy environment and as it passes over the wire from cloud to end user and back again.

In many cases, a PaaS environment may prove more secure than an organization's own with existing in-house protections. After all, PaaS providers will likely have greater resources for hiring security experts and implementing the latest protection technologies. The challenge is that some security measures are the responsibility of the service provider, while others fall on the customer's shoulders or must be addressed by both parties.

The bottom line on security is that in addition to relying on a PaaS provider's controls, an organization should redouble its own security practices. This includes mandating that passwords be changed every 90 days and daily monitoring for new hardware and software security patches.

What CDW Offers for PaaS

As the platform as a service market continues to mature, CDW has established itself as a leading source for these solutions.

We have partnered with the largest, most reliable PaaS providers in the industry and have a team of dedicated cloud specialists available to help organizations decide what best fits their needs, whether it's a PaaS or an on-premises application development solution.

For those organizations that choose PaaS, CDW offers four important cloud-based components.

A full platform: The applications that organizations create are bound to the platform they are created in, which makes this a key consideration when evaluating providers. CDW's platform includes all of the tools and infrastructure necessary to easily create applications from scratch, greatly reducing the time to market.

Application builder: These tools are platform dependent and allow nontechnical users to build applications with predefined functionality that is easy to understand. Use of these tools is a great way to empower employees and increase productivity.

Application integration: These systems reduce complexity for users by integrating cloud and on-premises services.

Business intelligence applications and database resources: CDW's platforms specialize in the creation of BI apps, such as databases, dashboards, reporting systems and data analysis programs.

PaaS Setup & Support

Using an outside service such as a PaaS solution makes an organization dependent on network connections. Therefore, before making a move to PaaS, be sure to understand the capacities of the communications links between a service provider and its customers.

If there is a weak link in cloud performance, any glitch in the pipelines can bring operations to a standstill. High-speed wide area network or Internet connections are a must for assuring that end users receive the performance levels they need. Theoretical ratings of network connections shouldn't be taken at face value.

IT managers should analyze the traffic patterns flowing to the cloud to determine whether especially large data sets will be part of normal operations or make up occasional spikes. Applications with intense input/output computations moving multiple terabytes of information might overwhelm cloud connections.

Vendor lock-in is a concern with any public cloud engagement. Look for safeguards that will make any future switch of service providers as easy as possible.

Also, understand a provider's policies for relinquishing client applications and data associated with the PaaS solution. This is another area where finding a compatible development environment is important. Besides being familiar to the in-house programming staff, an environment built on widely used or open-source platforms will help assure compatibility with alternative solutions.

Depending on an organization's industry sector, concerns about regulatory compliance may dictate the terms of a cloud relationship and could even become a deal breaker. Highly regulated industries, such as healthcare and banking, need cloud service providers that can maintain data management controls and audit trails to prove compliance with Healthcare Insurance Portability and Accountability Act (HIPAA) or Sarbanes-Oxley Act (SOX) rules, for example. Similarly, some laws governing data protection for public-sector agencies require highly sensitive information be stored in domestic facilities.

Discussions with cloud providers must address any government or internal data management and verification requirements. Important questions during these discussions include:

- Where does the data reside?
- Who has access to the data, and how is that proven for auditing purposes?
- What data protection mechanisms and disaster recovery strategies are in place?
- Will auditors be able to review the provider's overall security practices?

Finally, as with any other big-ticket, long-commitment solution, get references. Speaking one on one with other technology experts often reveals important nuances that can inform the decision-making process – even when those references are offered by a provider because of their positive relationship.

Figuring PaaS Costs

Platform as a service promises higher levels of agility for development operations and significantly reduced management and maintenance overhead for IT staffs compared to in-house operations. In some cases, subscribing to on-demand PaaS services also may be less expensive than running internal development platforms, but IT managers shouldn't assume this will be the case. Assessing the total cost of ownership of a PaaS engagement will require some upfront investigation into the costs for maintaining the current environment.

Initially, this requires the organization to understand the current development environment and its costs. This may mean combing through invoices and budgets for capital and operations spending related to hardware and software licensing fees. Add the total to expenses for IT personnel, service and support activities, upgrades, and routine maintenance. Also factor in facilities costs, including power and cooling.

Finally, estimate any unnecessary capital and operational expenses associated with excess resources, such as underutilized servers purchased to handle occasional spikes in demand. Downtime associated with upgrades and routine maintenance or the opportunities lost because of delays in adopting technology innovations should also be considered during this analysis.

Next, compare the costs of a PaaS solution using quotes from service providers for monthly subscription rates and any associated fees for getting the solution up and running. Finally, estimate how the switchover to a services model and the resulting cultural changes will affect staff productivity.

It may take time to get a bead on a clear return on investment from switching to PaaS, especially for organizations with a well-established legacy development environment. But organizations considering a long-term commitment should see the numbers move in their favor through more efficient operations, higher productivity and greater business agility.

But even if the costs are a wash, remember that PaaS offers ancillary economic benefits gained from not having to come up with large sums of cash for upfront investments in hardware and software, and the ability to shift expenses from the capital to the operations budget. These factors alone could tip the balance in favor of PaaS, especially when it means that development capabilities can be enhanced and that some ongoing IT management costs will be eliminated.

SLA Fine Print

Once an organization commits to moving to PaaS and chooses a provider, the next step is negotiating a service-level agreement that outlines the specific resources to be delivered and sets performance guarantees.

SLAs also define remediation options for customers if terms of the agreement are not met. Unfortunately, accountability may not be clear-cut in all cases. For example, although a public cloud provider is responsible for delivering the development environment and hosting services, questions may arise about responsibility if service disruptions occur as the application travels across the public Internet on its way to the user.

Adding to the challenge is the reticence of some providers to allow clients to negotiate individual agreements. From a provider's viewpoint, blanket SLAs make contract management easier and one-size-fits-all implementations maximize returns.

Fortunately, potential customers aren't without bargaining power. IT managers should leverage the financial potential their contracts represent, especially because the PaaS market is still relatively small and service providers need a steady stream of new customers to stay competitive.

Other questions to include on the SLA checklist include the following:

- How quickly will the PaaS services be up and running once the contract is finalized?
- How quickly can service levels be adjusted to the rise and fall of usage demands?
- How often will downtime occur for scheduled maintenance, and how will disruptions be scheduled?
- Will the provider accept an exit clause allowing termination of the contract without penalty in the case of recurring incidents?
- What types of service problems result in refunds? What types receive service credits? And what are the redemption procedures for each?

With a thorough understanding of business requirements and careful consideration of the development staff's needs, IT managers can successfully assess the potential value of PaaS and find a solution that reduces costs and provides the agility needed to meet today's opportunities and tomorrow's challenges.



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