

Multi-tenancy Matters

The architecture that makes On-demand, SaaS and Cloud Computing possible

A brief history of SaaS

Software as a Service (SaaS) has always provided multiple benefits based on its unique delivery model but application service delivery alone was never touted as a major benefit. It simply came with the package.

Ironically, the first attempt at delivering software purely as a service was a failure. In the late 1990's and the early part of this decade independent hosting vendors began offering what amounted to facilities management services for conventional client-server software. They were known as ASP's or Application Service Providers.

What these pioneers discovered was that the limitations of conventional client-server applications followed them into the hosting realm. The applications were expensive to operate, they required a great deal of labor and were no easier to integrate simply because they were delivered over the Internet. Worse still these conventional applications created significant overhead on server infrastructure. All this made it impossible for the ASP's to achieve the economies of scale they needed to reach profitability and the ASP's went the way of numerous other good ideas that turned out to be impractical.

At the same time, a different school of thought emerged that called for a new and better architecture for computing over the Internet that would enable the needed economies of scale. The so-called "multi-tenant architecture" was innovated by Web site developers at companies like Amazon.com. It enabled many thousands of users to access needed server resources with snappy response times, scalability and very low costs.

All that was left was for entrepreneurial software companies to adapt the architecture to business applications and the race was on. Of course, there were doubters. It takes a good deal of work to transform a "single tenant" application into a multi-tenant service and many software vendors decided to wait while the model proved itself. Today the wait is over and those software vendors are trying to join the cause. However, many are still reluctant to re-architect and some have found halfway measures that offer the appearance of SaaS but provide only a few of the benefits.

What is multi-tenancy any way?

Multi-tenancy literally means enabling many users from different customers to use the services of a central utility, in this case computing resources. The analogy is often made

to conventional utilities like water or electricity.

With electricity for instance, one service provider generates and transmits power to many customers who use it as they see fit and they are charged according to how much power they use. A whole infrastructure is in place to ensure that I get my electricity and you get yours and that's that. The system has worked well for over one hundred years in some cities.

Multi-tenant software delivered as a service is analogous. A server and disk "farm" supports the applications and data and sophisticated management software ensures that you get your data and I get mine and that's that.

The approach has many benefits. There is only one application to develop and maintain, one database and operating system whose intricacies are shielded from the customer. When updates occur, everyone gets them and the sophisticated management software keeps customizations and enhancements (or business logic, as we call it) for each customer separate from the core application so that no upgrade ever overwrites them.

Multi-tenant SaaS architecture uses one copy of the software and one database segmented by smart management software. When the vendor upgrades the software every customer gets the upgrade resulting in fast deployment and intuitive applications. And because the vendor has fewer management issues to spend resources on, more effort can go into enhancing and improving the service. Multi-tenant SaaS vendors typically have multiple release cycles per year.

Finally, many SaaS providers have gone through elaborate efforts to ensure up time and provide redundancy and security. Often SaaS infrastructure is better than what a well-funded IT department can provide. Today, the infrastructure part of a SaaS operation is lights out and even a SaaS vendor's employees are often precluded from entering parts of the physical hosting location.

Multi-tenant from the ground up

Multi-tenant SaaS applications are fundamentally different from conventional applications regardless of how they are delivered. As you can see, multi-tenancy is not something that can be added on as the last step in the development process. Just like quality, it has to be built in from the ground up.

For many years after the demise of the ASP's multi-tenant SaaS had the market to itself. The chief competition was between solution providers who offered answers for particular business problems as either SaaS or as conventional applications, but usually not both. Along the way multi-tenant SaaS was seen as a "disruptive innovation" something that was so superior it would eventually replace the preceding paradigm. This is happening right now.

For several years, the software industry has been in a paradigm shift, but this shift takes time. As interim steps, some vendors are adopting SaaS attributes, notably software functionality delivered over the Internet. These vendors often position their offerings as a choice for customers enabling them to decide for themselves whether to host their applications in their own data centers or to use a server located in the vendor's facility — both are single tenant approaches. In this scenario, customers can also determine whether they want to have their applications on a shared server or have exclusive use of a server.

Table 1 Multi-tenant SaaS solution providers.

Vendor	Specialty
Amazon.com	On-line retailer, Platform as a Service (PaaS) provider
Google	Search vendor, On-demand application provider, PaaS provider
Salesforce.com	CRM vendor, PaaS provider, enterprise business application development tools provider
Workday	ERP and HRM provider
Xactly	Sales performance management (SPM) vendor

Source: Beagle Research Group, LLC, June 2009

These approaches do indeed provide software delivered as a service but they leave a lot on the table. Multi-tenant SaaS has become the standard platform for a variety of new capabilities that are either not available or, that can only be accessed with great difficulty. Most significantly, applications that are based on the same multi-tenant architecture integrate well and numerous vendors including Facebook, Amazon.com, Salesforce.com and others and they have made cross platform integration simple. In contrast, integration with single-tenant solutions is still taken on a case-by-case basis.

Confused? Buying SaaS

It can be confusing to evaluate and purchase SaaS solutions with so many vendors making different claims. Here are some answers to look for when evaluating vendors and the reasons they are important.

Table 2 What to look for in a multi-tenant SaaS provider.

Question	Answers to look for	Reason
What operating system/database/technology do you support?	It doesn't matter.	All of this should be hidden from the customer. You should be able to just use the application without the usual IT issues. Even integration issues should be handled at the API level.
How often do you perform upgrades?	Several times per year (3-4 is good).	With only one infrastructure to deal with, the vendor can put more resources into product enhancements and this is demonstrated by multiple releases.
Do I have to use the latest upgrade?	Yes.	Single-tenant SaaS vendors may make it possible to use an older version but this defeats one of the advantages of SaaS — rapid enhancement.

What other applications can you integrate with?	We can integrate with any application that supports an open API and standards like SOAP and XML.	Integration through standards is a hallmark of multi-tenant SaaS. This answer indicates the vendor uses a robust platform that makes integration easy.
Can I customize my instance of the service?	Yes.	You should be able to configure (without coding) most aspects of the way the application works for you. Some vendors offer a programming interface for creating enhancements or whole new applications.
What is your up-time guarantee? (SLA or Service Level Agreement)	We offer better than 99.9% uptime and you can track it on our website. We have a SaaS70 Type II datacenter.	The more “9’s” the better — 99.9% means unscheduled downtime of less than 9 hours per year, 99.99% means less than one hour per year. Check with your IT group to see what their up-time capability is. It might surprise you. SaaS 70 Type II is the highest certification for a SaaS data center. In addition to passing an audit, the data center provides exceptional security — both physical, software and electrical. It may also offer co-located back up.
What is your disaster recovery plan?	We have mirrored data centers in separate locations. Each backs up the other and can handle the whole load if needed.	This is nirvana. In the event of a disaster at one site the other would need minor reconfiguration and all users would be on-line in a matter of hours at most with little, if any, data loss.
How long would it take to recover from an outage?	A few hours at the most.	If the provider simply does a tape back up it could take days to transport the relevant back up tapes to another location, read them in and restore all users. This is one area where customers must do their homework.
Can I add or delete users any time?	Yes. You can configure as needed.	This is an on-demand service. If, on the other hand, you have to buy a certain level of service for a specific time, it could indicate that your vendor is a single tenant SaaS provider trying to optimize server use.
How many monthly fees are involved?	We charge per seat, per month.	You might want to purchase extras like consulting or training but there should be no menu of charges for application rental, server time as well as number of seats. These approaches indicate an old style single tenant model.

Source: Beagle Research Group, LLC, June 2009

Summary

Software as a service is much more than a communication option. It is rapidly becoming the defacto standard of the software industry. To achieve all of the benefits of SaaS computing including low total cost of ownership, high availability, easy integration and customization and access to Cloud Computing, a SaaS solution should be built on a multi-tenant architecture. Compromises that implement single tenant SaaS rob you of important advantages.

To the best of our knowledge, it has been several years since any conventional software company received venture funding and all emerging software companies we cover subscribe to the multi-tenant SaaS model. Established software vendors are working diligently to convert to the multi-tenant SaaS model but this will take time. Meanwhile we expect that many conventional vendors will offer partial SaaS solutions to maintain market share while they upgrade to the new standard. While these offerings have value, they are only partial solutions and could present problems to future customers that want to migrate to a true SaaS delivery model or take advantage of another emerging standard, Cloud Computing. Our advice is to carefully evaluate potential SaaS vendors and fully understand the limitations of their solutions before investing.