Software as a Service (SaaS)

A look at the migration of applications to the web

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Introduction

Software has traditionally been a packaged good that consumers and businesses purchase and install on local computers. Over the past several years, however, we are seeing a gradual shift in how software is delivered to customers. Rather than building applications that run locally on a computer, software developers are building applications that run remotely on multiple servers, which can then be accessed from any computer with an Internet connection. This shift in strategy has many implications for both new and existing software companies, as well as for the open source community. With major players such as Microsoft, Apple, Google, and Amazon all moving towards the “cloud”, we are without a doubt moving into a different era of computing.
Overview

What is SaaS?

SaaS stands for “Software as a Service”, and it essentially refers to software that is hosted on servers and is provided as a service. Some initial uses for SaaS included customer relationship management offerings, content management systems, video conferencing, and e-mail communication systems. SaaS applications are provided over the web, which means they can be accessed from any computer without any special software installed. In fact, many applications are designed to run through a standard web browser. When updates to a SaaS application need to be installed, they are simply installed on the server, which immediately ensures that all users are running the latest version. Unlike traditional software applications that require an upfront purchase, SaaS applications typically offer subscription-based pricing and are usually licensed on a per-user basis.

Adoption

Many of the early adopters of SaaS were small businesses, primarily due to the low upfront costs and simplistic integration. Larger enterprises, however, have taken a somewhat more cautious approach to implementing SaaS solutions within their organization, particularly for mission-critical applications. Forrester Research conducted a survey in 2006 and 2007 to determine the SaaS adoption rate in enterprises. The survey was given to IT decision-makers in enterprises across North America and Europe. In 2006 they received 667 responses, and 450 responses in 2007. According to the 1,017 respondents, the most popular uses of SaaS included human resource offerings, customer relationship management, and collaboration tools. The graph on the following page shows a gradual increase in the adoption of SaaS offerings among large enterprises between 2006 and 2007. More recently, research from Gartner indicated that worldwide SaaS revenue was up 27 percent, reaching an all-time high of $6.4 billion. Gartner also predicted that sales revenue would exceed $14.8 billion by 2012 (Wailgum, 2008).
How interested are you in adopting software as a service?

- Interested or planning to pilot
- Already using or planning to pilot
- Not at all interested

2006
- 41% Interested or planning to pilot
- 12% Already using or planning to pilot
- 46% Not at all interested

2007
- 37% Interested or planning to pilot
- 16% Already using or planning to pilot
- 46% Not at all interested

Implementations of SaaS

The following are some of the more popular implementations of SaaS:

Salesforce.com

Perhaps one of the earliest implementations of SaaS is SalesForce.com. Initially launched in 1999, SalesForce.com has become a major player in the market for customer relationship management (CRM) software services. The company was founded by former Oracle executive Marc Benioff, and has consistently grown year-after-year into a billion dollar company. SalesForce.com has over 47,700 customers scattered around the globe that use their CRM services. In 2007, the company launched a new platform called force.com. Force.com is a “platform as a service”, which allows developers to build plugins for their CRM solutions. The plug-ins run on the force.com platform and are hosted by salesforce.com. In conjunction with their force.com platform, the company also launched an AppExchange. The AppExchange serves as an online marketplace where developers can sell their plug-ins for use in other CRM applications.

MobileMe

Apple Inc. originally launched iTu00e0ils in 2000, which later became .Mac in 2002 and ultimately MobileMe in 2008. MobileMe is Apple’s suite of online applications for iPhone, iPod touch, Mac and PC users. Customers can sync their e-mail, contacts, calendars, photos, etc. with the MobileMe online service using their computer or mobile device. Many of their online applications make use of advanced AJAX technologies, which allows for the online services to appear more application-like than traditional websites. Users can, for instance, drag and drop messages from their inbox to other folders just as they do with their traditional mail application. While iTu00e0ils and .Mac served primarily as an extension for Apple’s Mac operating system, MobileMe stands by itself as a true SaaS offering.
Google Apps

In 2004, Google launched an invitation-only e-mail service called Gmail. At the time of launch, there were already other free e-mail services available, such as Yahoo! Mail and Microsoft’s Hotmail. What set Gmail apart from the competition, however, was its simplistic interface and abundant storage. Expanding on the success of Gmail, Google developed many other online offerings that complement their existing services. Google Calendar was introduced in 2006, which also relied heavily on AJAX technologies to provide a more application-like experience. To compete with Microsoft Office, Google acquired Upstartle, which was the company responsible for creating an easy-to-use online word processor called Writely. Google created an online spreadsheets application to complement the word processor, and officially launched Google Docs in the summer of 2006. A year later Google acquired Tonic Systems, which added a presentation application to their online office suite. Google offers all of these services to anyone with a Google Account, but they also offer them to their Google Apps customers. Google Apps allows organizations to use the online services (Gmail, Calendar, Google Docs, etc.) through a customized domain.

Microsoft Office Web

Microsoft Office version 14, the successor to Office 2007, will have a web-based version to go along with the standard desktop application. While the details of this launch are still unknown, it is expected that Microsoft will release sometime next year online versions of Microsoft Word, Excel, PowerPoint, and OneNote. This strategic move is in direct response to Google Docs, which has grown in popularity since its initial launch in 2006. Unlike traditional SaaS offerings that are 100% web-based, Microsoft is referring to Office Web as software plus services. Rather than moving their entire suite to the web and killing their standard Office sales, they will continue to offer traditional software applications in conjunction with their web-based offerings.

Amazon EC2 & Microsoft Windows Azure

Amazon launched a cloud computing initiative in 2006 called EC2, which allows developers to build scalable applications that run on their cloud. To use the cloud, developers only pay for the computing power that they actually use. This opens the door to many opportunities, particularly for smaller businesses that cannot afford to run their own data center. EC2 supports both Microsoft Windows and Linux solutions. In October 2008, Microsoft announced their own
cloud computing initiative called Windows Azure. Like Amazon’s Ec2, Axure will allow
developers to tap into the computing power of Microsoft’s hosted cluster, while only paying for
the actual usage. Perhaps one of most interesting prospects for Azure is the large developer
community that Microsoft already has. Microsoft would not be where it is today without 3rd party
developers. If they can appeal to the developers and make it relatively easy to develop solutions
for their cloud, we may very well see a huge increase in the number of SaaS offerings over the
next couple of years. Microsoft also stands to gain an advantage over other cloud-hosting
providers (i.e. Amazon, etc.), by offering more competitive pricing. Amazon, for instance, has to
license Microsoft Windows for use in the cloud. Microsoft on the other hand, could offer the
same services without any licensing fees since they are the makers of the software.

Photoshop.com

Since the early 1990’s, Adobe has dominated the photo editing market place with their
Photoshop application. After seeing the success of many other photo sharing websites, such as
Flickr and Picasa, Adobe launched a new service of its own at Photoshop.com. Like many other
photo sharing websites, Photoshop.com offers a limited amount of free photo storage (currently
2 GB), and several upgrade options for purchasing more space. To add more value to their
service, Adobe has also pushed many of their photo editing tools from their Photoshop
application to their online service. Users can login to Photoshop.com and have access to many
photo editing tools absolutely free. This was a major step for Adobe, especially considering their
Photoshop Elements version retails for around $140.

NetSuite

With the financial backing of Larry Ellison (CEO of Oracle), Evan Goldberg founded NetSuite in
1999. NetSuite was one of the earliest SaaS offerings on the market, and its primary purpose is to
provide integrated business management software to midsize organizations. Their NetSuite
application includes a comprehensive set of features, including customer relationship
management (CRM), order fulfillment, inventory, accounting and finance, product assembly,
ecommerce, website management, and employee productivity. NetSuite fully supports multiple
languages, which gives customers the ability to conduct business globally while properly
handling different currencies, taxation rules, and reporting requirements.
Advantages

Pay-as-you-go Elastic Pricing Model

Unlike traditional software applications that are typically purchased upfront, many SaaS offerings are subscription-based and are usually priced on a per-user basis. Because the cost is extended over a subscription period, the initial cost for obtaining the software is significantly lower than traditional upfront purchases. This can be an attractive option for small businesses that do not have the capital to purchase expensive software licenses (i.e. Microsoft Office) for every person in the company. In fact, even larger corporations are looking at SaaS as a way to make their IT budget costs more consistent (Fonseca, 2008). With subscription-based pricing, companies know exactly how much to plan for in their operating budget.

Superior Network Infrastructure

Running a data center can be a very complicated and challenging task. For small to medium-sized organizations, it can also be very expensive to provide high availability with limited resources. UPS battery backups, diesel generators, secondary power supplies, and multiple dedicated high-speed lines to the Internet can all be extremely expensive for data centers that are only supporting a limited infrastructure. Many SaaS vendors understand this challenge, and help alleviate the problem by offering their own hosted service to its customers. Often times these vendors have very large data centers with enormous resources to provide top-notch performance, availability, and security. In fact, many organizations can achieve a higher level of security by hosting their data offsite in these data centers than hosting it in-house using their own resources.

Intellectual Property

Software piracy has continued to be an uphill battle for many developers. Microsoft and other companies have taken steps to combat this problem, but they are somewhat limited in what they can do when the software is ultimately being run on a client computer. Hackers are extremely talented at breaking any type of piracy protection placed on the software. SaaS, however, offers developers a new form of protection that was not possible with traditional applications. Because
the software is run on a server and not on client computers, the vendor has more control over who has access to the services. If a customer login ID is distributed over the Internet, for instance, the login account can simply be disabled. The vendor also does not have to worry about competitors reverse engineering compiled computer code, since the code is securely stored on the server.

Software Maintenance

Both developers and consumers benefit from SaaS when it comes to software maintenance. Traditional software applications are designed to run on certain pieces of hardware, and often times have software requirements of their own (i.e. OS version, drivers, etc.). It can be quite challenging for developers to support the vast array of hardware and software configurations on the market. SaaS on the other hand, runs in a controlled environment on a hosted server. Developers only need to ensure that their software applications runs correctly in the server platform that they support. Consequently this makes updating the software a much easier task. Since most SaaS applications are accessed through a traditional web browser, little or no action is required from the consumer when updates are applied. This can be especially advantageous for IT departments supporting large groups of people. Rather than pushing updates to each individual PC, the SaaS application can simply be updated on the server.

Mobile Computing

Since many SaaS applications can be accessed over the Internet, mobile computing devices have opened up a new avenue for software deployment. SaaS developers can not only build software that can be accessed over the Internet, but they can also develop applications specifically for mobile devices. Apple’s iPhone, for instance, has an App Store that provides thousands of software titles that can be easily downloaded to the device. Many SaaS developers are already taking advantage of this resource. SalesForce.com released an iPhone application that is freely available to subscribers of their unlimited plan. This gives their customers easy access to their data without the need for a computer. Google has also developed a customized user interface for their Gmail application for use with the iPhone.
Disadvantages

Long-term Sticker Shock

While SaaS subscription-based pricing can certainly be cheaper in the short-run, many organizations are concerned about facing “sticker shock” in the long-term. Some analysts with Forrester Research have noted that many SaaS offerings seem quite affordable on the surface, but can end up costing much more when various services are added in (Wailgum, 2008). For instance, additional charges can occur when organizations purchase a support service, require configuration services, and go beyond the preset storage limitations. Organizations may find it difficult to enforce Service Level Agreements (SLA), and they may also be hit with unexpected expenses at the end of a contract term.

Lack of IT Involvement

SaaS vendors know that purchasing decisions are more often than not made by the business users and not by IT. For this reason, many vendors purposely bypass IT departments and market their products directly to the business users. As a result, IT departments are sometimes left out of the purchasing decisions completely. This can be particularly problematic when business users later find out that the SaaS application does not meet a certain functionality requirement, and turn to their IT department for support. Problems can occur as well if users are pushing sensitive data into the hosted SaaS application, without any regard to the organization’s security or regulatory requirements.

SaaS Maturity Market

As SaaS becomes increasingly popular, more vendors are popping up offering their own “latest and greatest” solution. Unfortunately these vendors can disappear quickly, leaving customers empty-handed. As a result, vendor selection is crucial when choosing a SaaS solution. Large organizations simply cannot afford to place their trust in a new SaaS startup firm that could quite easily shut their service down at any time. Even vendors that have a long-standing reputation for offering quality software must be carefully considered. SAP, one of the largest providers of ERP
software in the world, recently scaled back their plans to offer an on-demand SaaS application called *Business ByDesign*. The company underestimated the challenges involved in offering a SaaS solution capable of meeting the comprehensive needs of large-scale enterprises. Organizations must have a clear understanding of the business objectives they are trying to achieve, and choose a SaaS offering that has had time to mature, thus reducing the overall risk.

**Integration Problems**

Often times when business users choose a particular SaaS offering, little or no thought is given into how they will integrate the solution with their existing systems and data. Organizations may, for example, have legacy systems that must be capable of integrating easily with the SaaS solution. This reiterates the importance of having IT involved in the decision making process. According to a Gartner report by Benoit Lheureux, the following integration options exist for SaaS applications (Wailgum, 2008):

- a SaaS vendor’s application programming interfaces (APIs) and technology
- a third-party vendor’s SaaS integration technology
- an integration-as-a-service (IaaS) solution
- a professional services or a system integrator

The difficulty, Lheureux notes, is choosing which integration option is right for the organization.

**Vendor Lock-in**

Most businesses would like to retain customers over the long-term, but this is especially true for vendors offering subscription-based SaaS products. Vendors clearly have a vested interest in making it difficult to switch to a competitor’s SaaS offering. This of course holds true with traditional software applications as well, but the very nature of SaaS makes this a slightly different issue. Many desktop software applications today offer API access that developers can use to access various parts of the system and data. This allows developers to create migration applications that can pull data out of the old system and transform it into the new system. While some SaaS vendors do provide limited API access to their online web application, users may not be able to easily port their data to a new service.

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Software Changes/Enhancements

While SaaS applications can reduce the operating costs in supporting in-house applications, IT managers are still concerned over the inability to control software changes or enhancements for vendor-hosted applications. This is especially true since IT departments are often times the ones providing technical support for the business users. When a vendor makes an update to the software that drastically changes the functionality of the SaaS application, business users will turn to IT for support. While similar problems can certainly occur with traditional software applications, IT often times has control over when those updates are pushed to the client computers. With SaaS offerings, IT departments have little or no control over when the vendor will update their service.
Carr’s Perspective

In Nicholas Carr’s book, *The Big Switch*, Carr offers an interesting perspective on the future of cloud computing. He draws many parallels between the electrification of America and the current move towards cloud computing and SaaS. Early in the book, Carr provides some historical background on Edison’s invention of electric power distribution. While Edison was interested mostly in selling the equipment used to generate electricity, Samuel Insull (Edison’s right-hand man) saw enormous opportunity in creating an electrical grid. By centralizing power stations and selling electricity to manufacturers as a service, Insull realized this would change everything. Insull eventually left Edison’s company and began working for a Chicago firm, where he was able to turn his vision of an electrical grid into a reality. As a result, mostly all manufacturers abandoned producing electricity themselves, and purchased much cheaper electricity from the grid.

Based on this historical trend, Carr believes that cloud computing will ultimately prevail. As a testament for this possibility, he mentions the enormous power of fiber optic technology. During the early days of the Internet, we were limited in the amount of data that could be transferred around the world. Today, however, our possibilities are greatly enhanced with higher bandwidth speeds and virtually unlimited amount of growth potential. Carr believes that our traditional desktops will be replaced with thin clients, which will connect to virtualized machines directly over the Internet. The thin clients will be substantially cheaper to roll-out on a large scale (i.e. corporations, etc.), and will eventually kill the PC manufacturing business.

While Carr believes that grid (cloud) computing will win, he does outline several concerns. The technology will ultimately cause a drastic reduction in labor force, especially as more highly scalable services are offered over the Internet. By having our grids scattered around the world, our governments will ultimately need to decide whether we can relinquish control over the data to foreign entities. Carr also expressed concern that the “World Wide Computer” will ultimately have huge control over the human population, and that our role in society will be reduced to being mere “nodes” in the larger system.
Security is increasingly becoming more of a concern for companies wishing to migrate their services to the web. Ecommerce businesses have an incredible amount to lose when faced with a security breach. Losing sensitive customer information can not only pose significant legal troubles, but it can also have a severe and negative impact on the customer’s trust. But security issues today go well beyond the traditional challenge of securing credit card and other sensitive information. With more companies implementing SaaS solutions, the impact of security breaches becomes much more costly.

Vendors offering SaaS hosted solutions, such as Apple and Google, must be extremely vigilant in securing their services to avoid a potential security breach that could ultimately affect millions of users. If hackers compromised Google’s servers, for instance, and placed malicious code on their Gmail application, millions of users could be at risk. While evidence of these types of breaches may not be well known, they are certainly important issues that must be addressed; particularly for large organizations wishing to deploy SaaS across their entire user base (i.e. Google Apps, etc.).

Organizations wishing to use a SaaS vendor must also be careful regarding the kinds of data they push to the web. It may be financially cheaper to have a specialized data center host the organization’s applications and data, but unfortunately the security and integrity of that data is now in the hands of someone else. This may be even more problematic in some industries where there are strict regulatory requirements, such as Sarbanes Oxley and HIPAA.
Open Source vs. Proprietary

Open source has without a doubt changed the software landscape over the years. Many software applications have been developed within an open source community, and have proven to be a reasonable alternative to other proprietary solutions. Perhaps one of the more well known projects is OpenOffice.org, which is a suite of productivity applications that rival Microsoft Office. While open source certainly has gained some ground over the years, the increasing popularity of SaaS will potentially dampen the overall adoption rate in the long run.

It should be noted that most open source projects are only involved in the development of the software. Once the application is built and ready to be deployed, it is given to users “as-is.” Because open source communities are often times made up from a mix of part-time developers, support options for these applications are usually limited at best. This is perhaps one of the key reasons why large enterprises have not bought-in to the open source revolution. Businesses need service contracts, but more importantly they need someone they can call and complain to when things do not go right.

Two of the key advantages of SaaS that many businesses find compelling are the reduced operational costs of maintaining in-house software, and faster deployment times. These advantages are directly contributed from the software being offered over the Internet as a service rather than as a user-installable application. In order to provide SaaS, vendors typically use very large data centers to run their software. These data centers are very costly and do require an enormous amount of resources to maintain. It is just simply not feasible for an open source community to provide these types of services. Especially when their software is usually given away for free, and the majority of their revenue (if they have any) comes from donations. With that said, SaaS will not kill open source. In fact, many SaaS applications are actually developed using open source tools. It is also important to understand that open source technologies as well as open standards can be used in proprietary products. Webkit, an open source application framework, is utilized by many proprietary browsers (i.e. Safari, Omniweb, Adobe Air, etc.) as the primary rendering engine, which of course runs many of the SaaS applications today.
Conclusion

SaaS is without a doubt gaining momentum, and is clearly changing the way software companies deliver their products. Large enterprises are looking at the technology as a way to reduce operating costs and deployment times, and small businesses are looking at it to reduce their upfront software expenditures. While SaaS has certainly been around for a while, new and innovative technologies (i.e. AJAX, etc.) are allowing developers to provide a more desktop-like experience over the web. These technologies are already blurring the line between the Internet and the desktop, which is why we will continue to see a growing trend towards moving applications to the web. As more people utilize Internet-enabled mobile devices, they will expect to have access to the same tools that they would normally have with their desktop computers.

Although there are some technical and financial concerns that must be looked at before organizations decide to utilize SaaS, the long-term benefits gained from the technology far outweigh the risks. Organizations can significantly reduce their risk by involving IT in their purchasing decisions, and carefully choosing a SaaS vendor that has a proven tract record for delivering the product they are looking for. Within the next few years we will undoubtedly see more vendors offering SaaS solutions, and more enterprises adopting it as the technology matures.
References


