

## View Point



### The Challenges Associated with SaaS Testing

---

Vijayanathan Naganathan, Shubha Bellave

#### Abstract

Today, organizations are increasingly getting interested in readily available business applications, with extremely short time to market. This interest is being driven by the lack of capital budgets for software development and on-premise deployments, as well as the rapid evolution of cloud. These factors have led to an increase in the demand for SaaS (Software as a Service) based business applications, in turn triggering the demand for more SaaS testing.

Testing SaaS application comes with its own set of challenges like SaaS upgrades, short validation cycle times, impact on multiple subscriber organizations, data integrity and privacy needs, testing of live upgrades and above all, the primary demand of high quality. These challenges require SaaS testing to be run through multiple validation cycles, under stringent timelines. This paper takes you through what is SaaS and provides you with an in-depth review of the challenges encountered by organizations while validating SaaS based applications.

## Introduction

Software as a Service (SaaS) is a model which delivers business applications as a service. In other words, SaaS is a software delivery model where the software vendor hosts the software and its associated data. These SaaS environments are usually hosted in a cloud by the respective SaaS service provider.

The high demand for SaaS based business applications has been fuelled by multiple factors like the need for quick deployment, improved availability & reliability, reduced internal system dependencies and the organizations inclination to move expenditure from a primary CAPEX model to an OPEX model. In line with the same, SaaS offers organizations the necessary flexibility to scale resource usage according to business needs. Some of the other great features SaaS offers include multi-tenant servicing, higher system accessibility, ease of configuration and flexible pricing based on pay-as-you-use models.

SalesForce.com's CRM, a CRM application, is a great example of a very successful SaaS based application. Organizations can manage their sales immediately with this CRM application and most importantly can uniquely customize it according to their business needs and requirements.

Table 1: Key Attributes that Differentiate SaaS based applications from Traditional applications

ATTRIBUTE	SAAS APPLICATIONS	TRADITIONAL APPLICATIONS
Time to Market	Can begin business immediately with readily available applications that are configurable	Applications are built and hosted within the customer / hosting partner's data center
CAPEX	Can avoid CAPEX as procurement and maintenance costs are not needed	Involves large CAPEX for procurement, setup and maintenance
OPEX	Utility/usage based in nature, which provides greater OPEX control	Vendor lock-in period with a minimum time frame for availing services
Shelf ware Risk	Applications help reduce the risk of shelf ware of applications which helps focus on innovation	Existence of shelf ware risk of the application and the hassle to manage multiple versions of applications
Total Cost of Ownership (TCO)	TCO is low since application maintenance and upgrades costs are minimal	TCO is high since applications are available in multiple versions which translates to high costs for maintenance and upgrades

The recent advent and accelerated growth of Cloud has led to an increase in the demand for SaaS based business applications. According to IDC's report '[Worldwide and Regional Public IT Cloud Services 2011–2015 Forecast](#)', the public cloud IT spending by 2015 is likely to be 72.9Billion USD and that three quarters of this will be accounted by SaaS applications<sup>3</sup>. Further, SaaS has seen an increased level of participation from vendors like SAP, Microsoft, IBM and Oracle in the construction and roll out of SaaS based business applications. This increase in SaaS adoption has further led to an increase in the demand for SaaS Testing.

## SaaS Testing – What is it?

SaaS testing comprises of validating SaaS applications with business workflows, data integration, application/network security, compliance, performance, availability, scalability, multi-browser compatibility, multi-tenancy, disaster recovery and live upgrade testing.

SaaS Testing also includes the category of applications which are tested with cloud based resources. The primary areas of focus of testing here are for performance, security and compatibility. An example of such a scenario is the usage of HP LoadRunner (SaaS) or SOSTA's CloudTest to test the performance of an internet based application, which can be accessed globally.

## Components of SaaS Testing

SaaS testing focuses on the core components of application, network and infrastructure.

### Application

SaaS applications mandate a very high degree of testing as subscribing organizations perceive them as complete end-to-end products, with a critical impact on business operations. Hence, SaaS testing needs to cover aspects like testing component functions, end-to-end business workflows, browser compatibility, data security, data integrity and access privileges.

SaaS applications also require security testing in the form of SQL injections, cross-site scripting, testing cookies, multi-tenant-isolation and access privilege validations for roles and application data. In case access control service / claim based identity federation is employed then identity federation mechanism testing would be mandatory. Testing also needs to be carried out for standards and government regulatory compliances.

Once functional and security testing is carried out for the application, the focus then shifts to performance testing. All high impact flows that are critical to business need to be tested with realistic usage patterns. The realistic usage patterns are simulated with large user base volumes and loads, from different geographies, based on the actual user distribution. It is always recommended that performance testing for SaaS applications is carried out on an isolated network. This helps in identifying network related issues, which can then be relayed to the respective service provider immediately. Subsequently, the tests can also be carried out for remote accessibility from distributed geographies.

### Network

Testing of the network would need to be carried out from a security perspective for controlled access, flow of sensitive data and encryption techniques such as Secure Socket Layer and Transport Layer Security. Apart from this, testing of various network bandwidths is carried out to ensure availability of data, and its transfer, from a SaaS application to a client network and client application components.

### Infrastructure

When it comes to SaaS applications, tests are conducted on infrastructure, which has production like configurations, as this is likely to have a large impact on the end user experience. It is recommended to execute live upgrade and disaster recovery tests, to ensure the reliability and availability of SaaS applications to end users. The emphasis here is on testing backups, storage policies and secure connections. The infrastructure also needs to be validated for regulatory compliances.

## Challenges associated with SaaS Testing

While SaaS does promise a lot of advantages from a business standpoint, there are multiple challenges organizations encounter while testing SaaS based applications. The key challenges in SaaS testing are as follows:

Table 2: Challenges in SaaS Testing

### Key Challenges

**Testing SaaS upgrades – Short notice period (1-2 weeks) for a QA notification to validate the application:** SaaS service providers make upgrades and hence provide existing customers with a stipulated 1-2 week for a QA notification. Within the timeframe of 1-2 weeks, the existing customers need to be able to read the planned release notes, assess the impact of change and validate the impact of the change, to ensure that the business process or data does not get impacted. Every change to the application requires extensive effort to ensure that it does not have an impact on the existing features of the SaaS application. To warrant this, a quick validation is needed that covers the primary requirements of functional, performance and security testing. In all this, manually validating the changes to the SaaS application, within this stipulated timeframe, becomes a huge bottleneck.

**Business knowledge for effective testing of configurable and non-configurable components:** SaaS applications essentially comprise of configurable and non-configurable components/ work items. It requires competent business knowledge to be able to identify the configurable and non-configurable components as well as to understand the impact of the change done on these components/ work items.

**Validating interface compatibility:** At times SaaS upgrades involve interface upgrades. This requires the existing SaaS subscribers to be able to validate if they are able to work with the upgraded interface or not. SaaS subscribers will also need to ensure that they are able to work with the older interface of the SaaS application, since they might have some amount of integration of their internal applications with the SaaS solution.

**Data Security and Privacy:** With SaaS applications being multi-tenant in nature, SaaS testing will need to ensure that it addresses security, accessibility concerns by performing access control and multi-privilege tests with users. SaaS testing would need to ensure that one tenant's data cannot be accessed by another tenant and vice-versa; this would eventually lead to confidence in data security amongst subscribers. Performing these tests by simulating the behaviour of different users is a huge challenge.

**Enterprise application integrations:** Enterprises predominantly integrate SaaS applications with their enterprise applications. This would involve data transfers between SaaS and enterprise applications. This demands data integration validation, both inbound and outbound, from client networks to SaaS applications and vice versa. Data privacy calls for a thorough validation in order to be able to ensure SaaS subscribers of data security and 100% privacy.

**Simulating live upgrade testing:** The most unique challenge that comes up as part of SaaS testing is to ensure that live upgrades do not impact the existing connected SaaS users. This is a real big task.

**Validating data migration from the existing system to a SaaS application:** Movement from existing systems to SaaS based applications means movement of data also. Before beginning to use the SaaS application, data migration validation is required, to ensure that the existing data has moved into the SaaS applications. This is a critical and effort consuming exercise.

**Data Migration from one SaaS application to another:** Businesses might want to move from one SaaS provider to another. When such migrations happen, data migration and validation can be huge hurdles, since the database schemas would vary between the two SaaS providers. Validating such migrations from one SaaS provider to another will involve a significant effort in understanding the data fields, their relationships and how they can be mapped across the SaaS applications between the two SaaS providers.

**Frequent releases of feature rich SaaS applications:** SaaS service providers make frequent releases of feature rich applications, which increases the time taken for testing since most of the application will have a significant number of pages to cover. Repeated testing of the SaaS application manually can potentially result in missing out on defects due to oversight and delay in time to market.

## Conclusion

In this tough economic environment, SaaS based applications help organizations focus on their core business, rather than non-core areas like IT application development, procuring CAPEX heavy infrastructure, etc. SaaS also eliminates the effort required in supporting, maintaining and upgrading these “non-core” applications and systems, helping the organization free up significant amount of their management/resource bandwidth. However, the expectations of clients subscribing to SaaS application are high since they are perceived as complete products ready for consumption. Therefore a comprehensive testing effort is required so that organizations can reap all the benefits of SaaS such as higher system availability, greater reliability, higher flexibility, scalability and enhanced levels of security. Organizations need to understand and appreciate the challenges associated in enabling this end-to-end testing that SaaS applications demand. Organizations also need to realize that SaaS testing requires a competent skilled team to conduct the tests with the right strategy, to validate business applications.

## REFERENCES

1. “Testing a SaaS platform on an Agile World” by Joel Montvelisky and published by Practitest, June 2010
2. “SaaS Testing Overview” by Ram Garg and published by Software Performance Assurance, October 2010
3. IDC Report: Worldwide and Regional Public IT Cloud Services 2011-2015 Forecast (DC #228485) by Frank Gens, and published by IDC, June 2011
4. The Force.com Multitenant Architecture “Understanding the Design of Salesforce.com’s Internet Application Development Platform”, published by Salesforce.com, October 2008

## About the Authors

**Vijayanathan Naganathan** (Vijayanathan\_n@infosys.com) is a Senior Technology Architect with the Independent Validation group at Infosys. With 13 years of industry experience, he currently leads the Cloud and Service Virtualization service offerings for QA. His current work includes helping customers adopt cloud for QA environments, defining strategies and executing them for cloud based application validation. Vijay blogs at <http://www.infosysblogs.com/testing-services/>

**Shubha Bellave** (Shubha\_bellave@infosys.com) is a Group Project Manager with the RCL group at Infosys. With 14 years of industry experience, she currently leads a Retail account portfolio involving projects in functional, performance and automation testing. Her current work includes helping customers define strategies and execute program involving niche technology which includes cloud based application validation.



Building  
**Tomorrow's** Enterprise

For more information, contact [askus@infosys.com](mailto:askus@infosys.com)

### About Infosys

Many of the world's most successful organizations rely on Infosys to deliver measurable business value. Infosys provides business consulting, technology, engineering and outsourcing services to help clients in over 30 countries build tomorrow's enterprise.

For more information about Infosys (NASDAQ:INFY), visit [www.infosys.com](http://www.infosys.com).