

Cloud testing

*gaining a clear view
through the cloud*

Cloud testing as a complete end-to-end solution that includes elements such as resources, environments, test management, reporting and management information is a relatively new concept thrust into the limelight as a result of some unique external factors. These include the global recession since 2007, the uptake of simplified applications for the mobile and tablet markets and the increase in companies looking at new footprints in global emerging markets.

The business case to switch to 'testing in the cloud' has never been stronger based on the need to save costs, deliver more and take advantage of new cloud based tools and applications.

As with any new testing concept, a set of fundamental principles are yet to be established and agreed widely within the testing community. This has resulted in the term 'cloud testing' being used inconsistently, with different service providers focussing on one or more elements.

This whitepaper discusses one view of what a cloud testing solution can look like and how it will overcome some of the challenges of traditional testing.

So what do we mean by cloud testing?

It is now widely accepted that the term 'Cloud Computing' was first coined by engineers at Compaq in 1996. They described it as users 'increasingly accessing software, computer power and files over the web instead of their desktops.'

So now we understand that accessing any computing power, software or files over the internet can be termed 'Cloud'. With this concept firmly in our minds the testing community is able to approach the delivery of testing from a whole new angle.

Organisations are increasing their take up of cloud testing as they want to manage quality within more complex and dynamic projects while still managing their costs. They rightly need to be assured of the reliability and scalability of the service as well as the performance of the software under test.

What constraints do organisations face?

Test delivery is hampered by the same constraints across large programmes of work including:

- Recruiting qualified resources within the locality
- Accessing multiple test environments from multiple project locations
- Ability to manage a testing cycle using a single test management tool across multiple vendors and geographies
- Ability to truly utilise independent end users (crowd testers)
- Ability to ramp up and down resource profiles when delays occur in the project
- Reducing the cost of hardware for multiple test environments
- Reducing the strain on the project office floor space – testers desk sharing

The above list is by no means exhaustive or based on prioritisation, but deals with common challenges across large migration and transformation programmes.

A true cloud solution addresses many of these constraints, which can be simplified into four key deliverables:

- 1 Resources
- 2 Environments
- 3 Increased efficiency and reduced costs
- 4 Management of delivery across geographies

Resources

People

There are two types of resource, those with specialist testing experience and those with specific end user skills. The former concentrate on test analysis, script writing, test execution and bug reporting during system, integration, performance and security test phases, while the latter concentrate on execution and bug reporting during business and user acceptance test phases.

On the surface this does not seem different from how you would task traditional test resources, but testing in the cloud requires a change in approach to the management of these teams. The nature of cloud testing is such that resourcing is typically not dependent on location, so we can take advantage of resources located either offsite, offshore, near-shore or home based.

At this point we should make a distinction, 'cloud testers' are those resources who have formal testing experience, qualifications or training. 'Crowd testers' are those who may or may not have the knowledge or experience of the cloud testers. Indeed they may be users and not industry qualified testers but have the advantage of being independent of the specialist testers and are primarily engaged for business or acceptance testing execution.

The ability of crowd testers to be mobilised at short notice for Web, iOS and Android applications with their own devices (BYOD) allows for greater coverage both in terms of physical devices and operating systems but also the breadth of coverage in end user profiles covering age, gender, race and social background. Typically crowd testers are recruited based on the demographic that the application / software is aimed at.

Tools

We mentioned earlier that there is a change in approach to test management. In cloud testing the 'Test Basis' (information needed in order to start the test analysis and create test cases. Possible test basis are requirements, functional design, technical design, user manual, use cases, source code, business experts etc.) has to be accessible online in real time under formal change management, using tools such as Huddle and SharePoint which can be hosted and accessed via a web portal. The testing strategy will reflect the level of accessibility and the associated roles.

The second key cloud application would be a test management tool where cloud and crowd testers can create, access and execute scripts, as well as manage scheduling, reporting, MI and bug recording. Such applications vary in their complexity but both vendor and freeware tools can be hosted and accessed via the web.

The cloud testers now have the tools they require to start creating test scripts outside of the confines of a static office location and the crowd testers have access to the scripts when and where they choose.

Environments

Environments can be easily hosted and accessible via web portals or Virtual Private Networks (VPN). The cloud allows both private and public hosting to cater for these preferences and is determined by the hosting solution required.

Once the decision is made as to how and where the applications under test are to be hosted, the next issue is around the availability and number of environments. A common issue both inside and outside the sphere of cloud is the cost of replicating environments from one phase to another or the dilemma of losing an environment in order to continue to the next phase. A secondary issue is the ability to create an end-to-end environment for the early stages of testing thus shifting project risks to the right on a programme or project.

Service Virtualisation, ideally developed to work as a cloud based application, is an ideal solution to these issues. Service Virtualisation tools enable smart and intelligent stubs (a stub is a small program routine that substitutes for a longer program or functionality, to be loaded or integrated later or that is located remotely) to be virtualised relatively easily. The distinct advantage is that these applications can be virtualised without having to wait for integration testing because of the record and playback features of these tools.

These tools also have the ability to configure any additional changes as well as change the outputs for the project's specific needs along with a host of other features. Once virtualised, multiple environments can be created in this space in a relatively short time and without the need for additional hardware however this is dependent on the size of the original hardware and how many virtual environments are required and the size of each.

Again these virtual environments are hosted and accessed via a portal and taken offline when testing is restricted or completed.

So now we not only have the means to create all of our test assets, we can execute them over the cloud in a managed way.

Increased efficiency and reduction in costs

So far the cloud approach has:

- Saved office space where the testers were to be seated
- Allowed an end-to-end testing solution which can be offered as TaaS
- Ability to agree SLA's on outcome based deliveries (coverage of scope and resources)
- Low initial set up costs compared to on-site solutions
- Reduced time to ramp up test teams
- Created a longer working day as there are no physical office opening hours
- Cut down on expenses for resources travelling and subsistence
- Made available a diverse end user with varying degrees of competence
- Provided greater flexibility to ramp up and down crowd tester resources
- Made available an exponentially greater number of combinations of devices and operating systems
- Reduced the capital expenditure on hardware for multiple environments
- Allowed bugs to be identified earlier in the lifecycle thus shortening the length of the end of the project

Management of delivery across borders

Most large organisations will have long distance relationships nationally and / or internationally with their customers, operations or suppliers. Spurred on by greater economies of scale, organisations merge and acquire companies to increase their global footprint and market share. A quick return on investment is fundamental in these acquisitions and can be achieved by realising economies of scale. Information technology is one area that can realise these potential gains, by adopting standardization of systems and processes across their IT infrastructure.

Most managers in these large organisations recognise the need for simultaneously achieving global efficiency, national responsiveness and the ability to develop and exploit knowledge on a worldwide basis.

Having the ability to centrally undertake the following aids in the delivery of testing across borders and regions:

- Host environments
- Build environments
- Control access to environments
- Manage the test basis
- Manage the test repository (tool which allows planning, requirements, test cases and scripts to be stored)
- Assign test scripts to testers
- Manage the end-to-end test lifecycle
- Manage crowd and cloud testers

The test management role becomes key to orchestrating each of the above points. Thus ensuring availability and access to environments, test basis and test repository is closely managed to ensure crowd and cloud testers have access to the correct projects. This is made more complex if time zones across borders and regions are involved. Providing access to project, development and test teams (crowd and cloud) in a timely manner for a fixed duration can be controlled via portal access, a single sign on page controlled via active directories managing the accessibility of projects under test.

Unlike a traditional office environment where access to projects under test can be achieved once the individuals leave the office, in the cloud space access is controlled by limiting the portal availability to the projects under test.

Communication with project, development and test teams pose a delivery challenge. The nature of running a cloud based testing service means utilising a workforce which is not necessarily centrally based onsite. Managing defect triage meetings, gathering requirements and suspending and resuming test services etc require constant communication. Test teams often gain clarification before raising defects from test leads, test managers often give praise and encouragement to test teams not least when they require testers to remain behind to catch up!

The popularity of free messaging tools like WhatsApp, Viber, Telegram, TextSecure, Line, IM+ and Skype have not only reduced costs but allowed instant chat functionality with some apps offering video chat. Together with traditional conference calling products and software, managing communications during delivery becomes a planned activity which the test manager delivers again taking into account time zones.

Some challenges in delivery

We have shown that some challenges do exist with communication and managing access to projects under test but that these can be overcome with the right solutions in place as examples mentioned previously. However a couple of challenges we have not addressed are data protection and security.

Cloud presents many advantages and some security challenges, and it is security that is acting as one of the major issues holding back greater cloud adoption. Here are some of the elements we need to take into consideration. Firstly it is essential to architect the security into the application, undertaking initiatives such as code reviews and penetration testing.

Next, take a hacker's eye view of the security around the infrastructure. Ensure you are considering the data that a cloud application may hold, and making sure you understand the risks and challenges:

- These may be legal – the European Data Directive provides a new single legal framework for the whole of Europe...and it also has large penalties for security breaches
- It may be practical – understanding the physical security around a data centre hosting your data
- Or it may be procedural – ensuring you have the correct policies around authentication, what data can be accessed, when it is available and so on

Additionally, any application for HMG (local or central government) may want to use the PSN infrastructure, which has its own security considerations.

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The cloud testing model poses no threat to nationally run projects or programmes as NDA's (Non Disclosure Agreements) can be put in place, and each cloud and crowd tester can be vetted through various national agencies. However for both crowd and cloud testers across borders this may not be enough. The Data Protection Index (Taylor Wessing) ranks countries annually as to their national data protection policy and enforcement policies, India being ranked the least enforceable and Singapore being the strictest, together with Germany and New Zealand.

There is little influence a test manager will have on national data protection policies across borders or at home. However data can be managed and the appropriate cloud and crowd resources can be sourced and managed as long as due diligence and some common sense is applied to:

- Requirements
- Appetite for risk
- Degree of sensitivity of the data to be used for testing
- Nature of data to be used
- Internal data policies

Summary

We have touched upon the four deliverables vital in a successful cloud testing service and addressed how each may be utilised individually. However if used together and professionally managed and applied, they form a cloud testing service with numerous advantages.

It is possible to adopt a fully end-to-end cloud based testing solution, although there are some pitfalls to watch out for and avoid. However if you approach cloud testing in a structured and measured way, the advantages clearly can be achieved.