



ENHANCING SOFTWARE QUALITY

## **InCloud - OS VIRTUALIZATION**

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## 1 Physical or Virtual

In today's IT world more scope is for the web usage and there is always a need for the web applications to be stable across all environments. Compatibility has become the key for all the web apps since the invention of multiple devices and platforms.

The biggest challenge is for testing group to ensure that the web app is compatible with all platforms. A lot of investments needed for setting up the infrastructure and resources.

To overcome this contest and to test efficiently without compromising, an optimization technique is must. Virtualization mechanism helps in experimenting test approach in an effective way.

## 2 What is Virtualization?

It is the creation of a virtual form of something instead of the actual one. It can be an operating system, a storage device, a platform or resources concerned with networks. OS level virtualization is a part of this technique which serves best when looking for compatibility testing.

We create virtual computers from the existing physical computer resources without making any changes to the installed OS. Everything is run from the network using a kind of virtual disk which makes the user look and feel like working on a real server. This methodology is termed as a Server Virtualization method. There are two types of virtual disk used in this.

One is a Private virtual disk and the other is Shared/Common virtual disk. Each has its own features in which the former can be utilized by one client alone. The information can be stored by the user and can retrieve settings whenever needed. In shared virtual disks, multiple users can access at the same time. A kind of imaging technique is used here.

## 3 Utilization

Normally in the systems we work, most of the resources are not utilized fully. Most of the system resources are wasted. Nowadays the latest computers are integrated with powerful processors, large spaced hard disk and more RAMs which increases the scope of wasting more system resources. On the whole, approximately 25% of our resources are used. In order to utilize the wasted resources, we create virtual computers inside our working physical computer.

Organizations generally invest more on maintaining servers and other resources. By the usage of virtualization technique, there are more chances of eliminating the above problems and firms do not require high investment on maintenance.

## 4 Why Virtualization in Compatibility Testing?

In compatibility testing, the key approach is to test web application across different environments. This also includes testing across different configurations, looking for performance when integrated with other applications like Java plugins, add-ons, third party software and different versions. In order to make these configurations ready, more system resources are needed and complete testing coverage on all environments is not possible.

Virtualization plays an important role here. By using this technique, we can even test with different environment, moreover we can experiment with platform that are not in the scope and can understand the behaviour of the application better. It makes the testing approach more flexible. For example, in a same machine we can run Windows & Mac operating systems and switch between both frequently and simultaneously.

## 5 Case Study

### 5.1 Requirement

The testing assignment is to test a java based application in the given matrix of OS and Browsers.

Client suggests a list of platforms in which the application has to be tested with the supported plugins and testing has to be completed within the given time frame and delivered successfully.

There are more than 10 OS/Browser combinations requested for a week. The following are the constraints that come with the testing assignment

- Setting up the required environment
- Coverage of the functionalities
- Delivery timeline
- Limited resources

With the limited dedicated test machines, the given platforms have to be setup. Here comes the solution for the requirement – virtualization.

## 5.2 Process

Using the concept of virtualization, we create multiple platforms in a single physical machine. Virtual OS is created in the dedicated machines and the setup is ready for the test execution.

The test process is as follows:

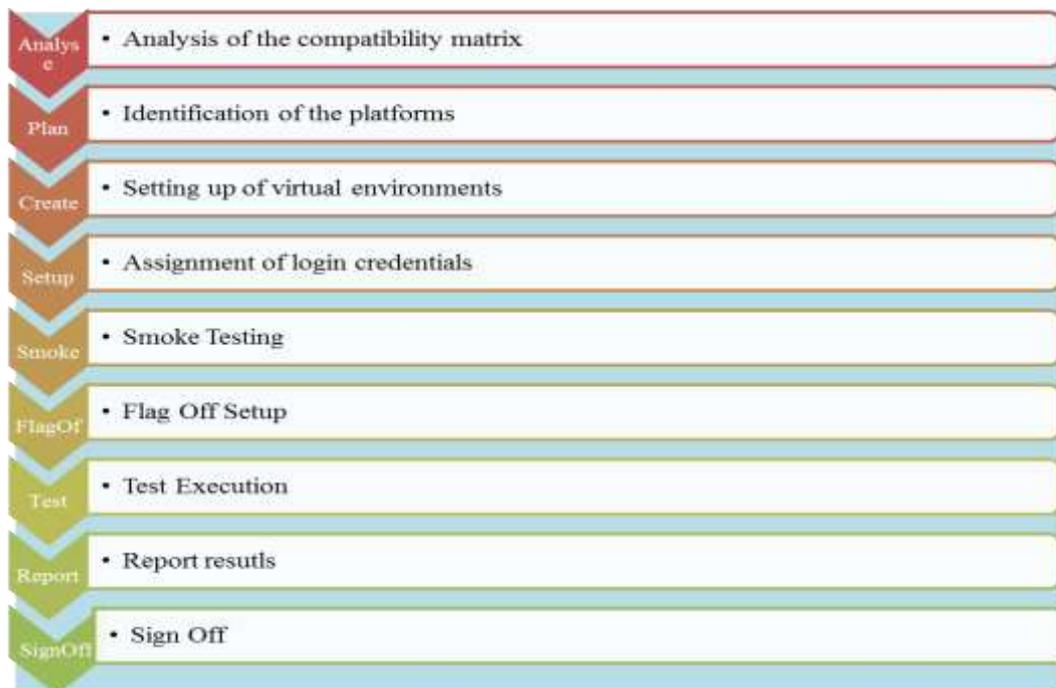


Fig 1

- Analysis of the given compatibility matrix
- Identification of the platforms to be virtualized
- Setting of the virtual environments
- Assignment of login credentials
- Smoke testing
- Flag off test bed setup
- Test Execution phase
- Report results
- Sign Off

## 6 Virtualization – How?

The fig 2 below is the steps involved in implementing the OS virtualization process.



Fig 2

## 7 Metrics

1) System usage - Before Virtualization/After Virtualization

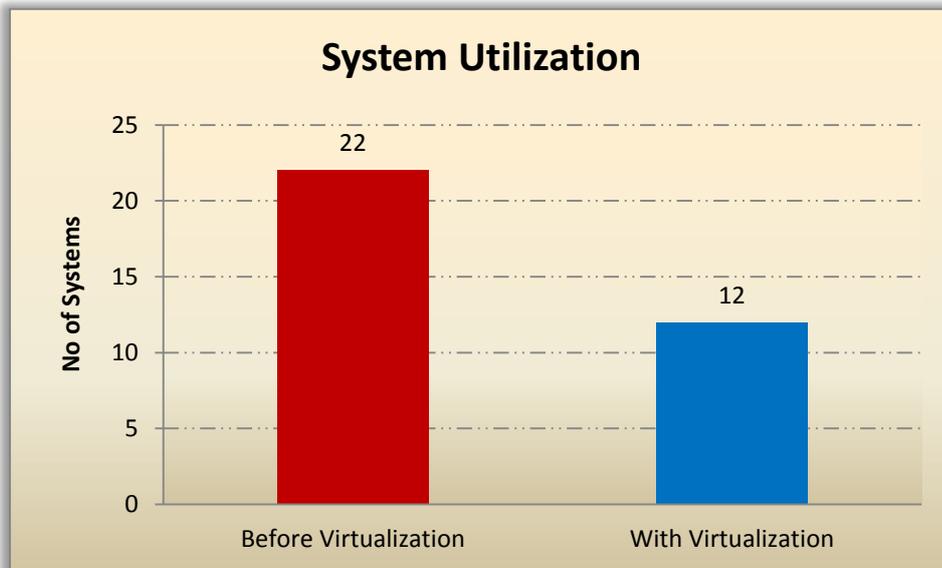


Fig 3

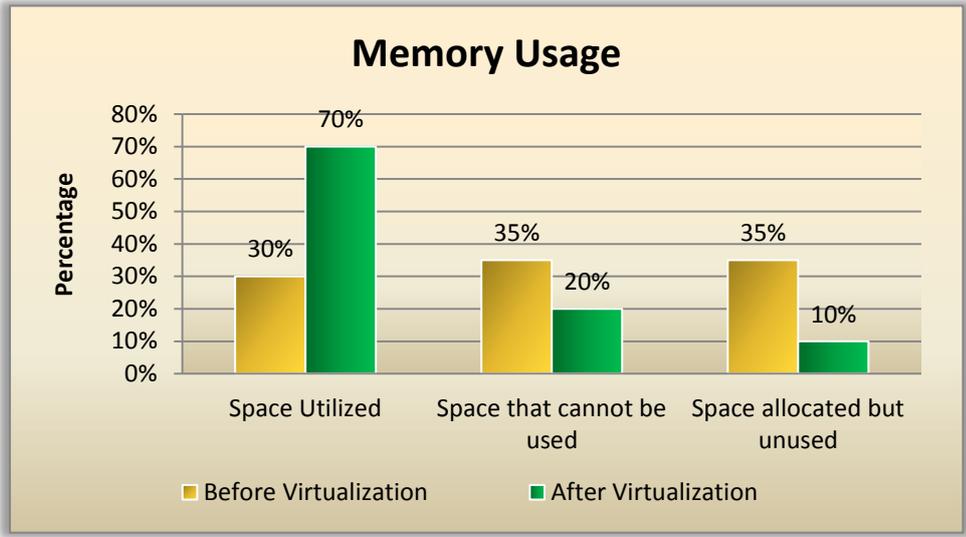


Fig 4

The Fig 3 represents the decrease in the system usage. Before using virtualization technique, totally there were 24 systems which include both Windows and Mac systems. This number has been reduced to 11 after implementing this technique. Fig 4 represents the utilization of memory. It clearly shows the how the memory of the systems is effectively utilized.

2) Time taken for execution – Before/After

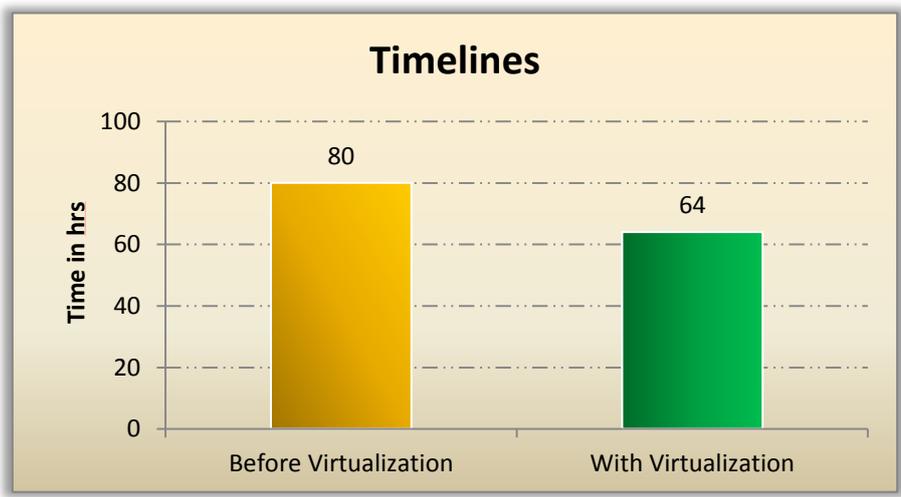


Fig 5

Fig 5 shows that how time is being saved after the implementation of this technique. Here the figure represents the time limits of the project before and after implementing Virtualization technique. This decrease is due to the flexibility in switching between multiple operating systems and the effective usage of systems.

3) Cost Saving – Before /After

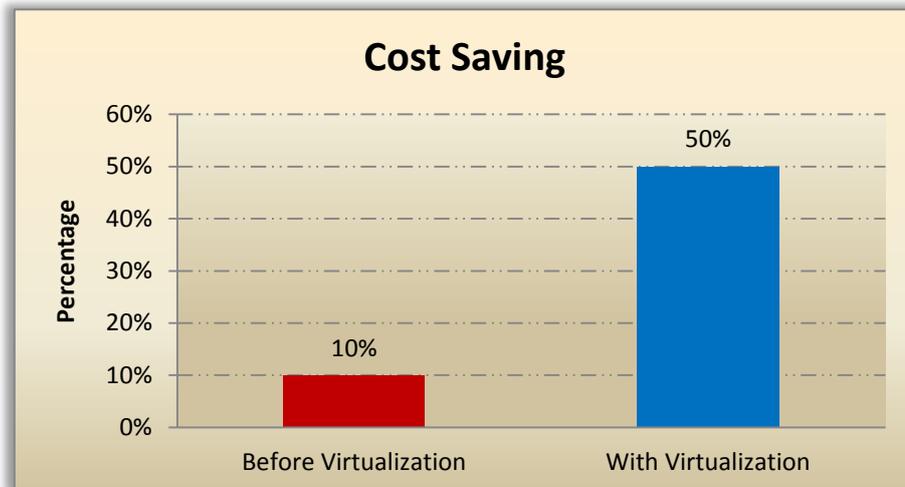


Fig 6

Fig 6 represents the cost that is being saved after the implementation of virtualization technique. There is an increase of 50% due to the saving of power and multiple systems.

## 8 Benefits

The Power, Cost, Space & Human resources are saved to a high extent. The coverage of test is more which includes testing in environments that are not in our testing scope. This is a value addition to the process and certainly helps the client to explore more on the development front.

The systems tested on the virtual machines are very identical and nothing really happens to the original OS installed (i.e. the OS installed in the host machine). Multiple OS can be operated at the same time in a single machine by a single user which reduces the human resource considerably.

There is also more savings on hardware, environmental costs, management and administration of the server infrastructure. It also provides secure, isolated conditions for running untrusted application.

### 8.1 Comparison of before and after using virtualization

Before Virtualization	After Virtualization
One machine is allocated to a particular OS	Manage multiple OS on a single machine
System resource not utilized fully	System resource utilized fully
No flexibility in testing strategy	Flexibility & Efficiency in testing strategy
Environment not identical	Environment is more identical

More investment on system infrastructure	Less investment in Infrastructure
Cost for maintenance is high	Cost for maintenance is low

The above table, metrics and results clearly show the variation of results achieved before and after using virtualization. Thus by using this technique we could able to improve and capitalize on the scope of testing. Mainly it helped us to hold the customer and satisfy them with greater results, which are the key elements for succeeding in a business.

## About Indium:

Indium Software is exclusively focused independent software testing services firm since 1999. Over the years, Indium mastered objective methods that minimize the risk of failure of applications and software products. With a global headcount of over 300 employees, Indium works for a mix of marquee Enterprise and ISV clients spread across the globe. Indium is aggressively pursuing the Social, Mobile & Cloud agenda to make these the core of our next wave of service specialization.

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