

Systems Engineering Methods and Tools for Efficient IT Project Testing in the Cloud

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1. Introduction

The main concerns in the maintenance of test and development environments analyzed by the IBM Systems Engineering, Architecture and Test (SEA&T) Team:

1. **Test environment resource availability** - both hardware and people resource
2. **Lack of a good scheduling process for shared resource**
3. **Test server waste** because of lack of management.
4. Required testing **cost and time**

- **Systems engineering (SE)** Systems Engineering is an interdisciplinary approach to enable the realization of successful systems.
- SE focuses on how to design and manage complex engineering projects over their life cycles.



- In Cloud Computing, **applications, data, and IT resources** are rapidly provided to users over the web in a flexible pricing model.
- It dynamically ***provisions, configures, reconfigures, and de-provisions*** the computing resources such as servers as needed.
- Cloud Computing platform basically deployed in a **public, private or hybrid** way

2. The Challenge for Test Environments

- **30% to 50%** of all typical IT environment servers are dedicated to test
- Most test servers run at **less than 10% utilization**, if they are running at all!
- 30% of all **defects** are caused by wrongly configured test environments
- Testing **backlog** is often very long and single largest factor in the delay new application deployments
- Testing procedures can take a long **time and effort**.

3. Cloud for Testing Environments

SEA&T team listed how cloud helps improve testing efficiency:

- **Wide variety of performance test environments**
- **Moving to cloud resolves time challenges**
the time for provisioning and setup of servers could take anywhere from several days to several weeks
- **Cloud can resolve cost challenges for the requested servers**
- **Reduce the time that needed for application install which can be automated.**
- **Automate the breakdown and reuse of servers.**

4. System Engineering Testing Methods

Application Virtualization (AV)

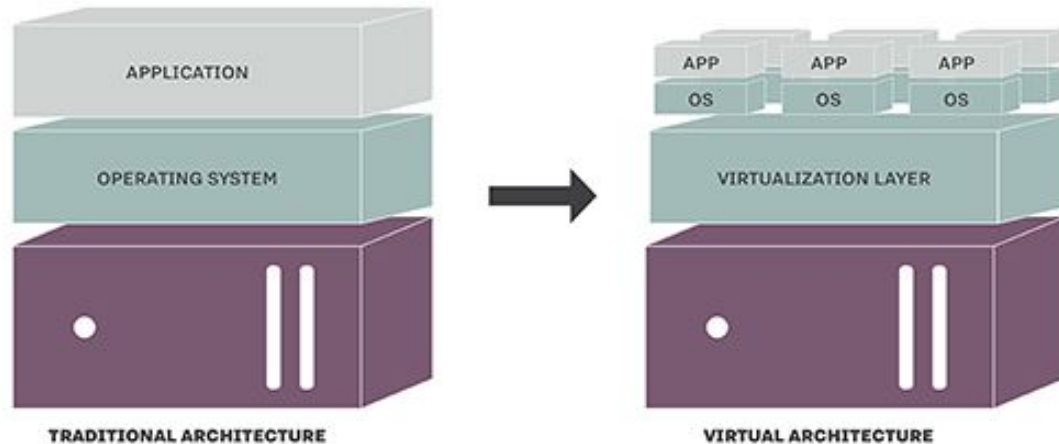
Is a primary System Engineering tool used for simulating the behavior of a physical asset in a software emulator, and hosting that emulator in a virtual environment.

- **Rapidly** creating multiple virtual test environments for each testing team
- Provide testing teams with **24/7 availability** for testing as needed.
- **Shorten** release cycles and reduce **risks**

A virtualized IT Environment

Multiple customized virtual test environments parallel development across interdependent teams.

TRADITIONAL AND VIRTUAL ARCHITECTURE



Typical financial savings from the use of Application Virtualization, based on IBM's experience for both internal and customer IT projects:

Application Virtualization Typical Savings	
Reduced cycle time	Up to 40%
Reduced defects	Up to 30%
Increased speed to market	Up to 30%
Reduced capital cost	50+%

5. Combine cloud computing and application virtualization

Prior to use of Cloud and AV	With use of Cloud and AV
Required a long process for procurement, installation and configuration	On demand resources with minimal time required for setting up the environment
limited ability to simulate real business scenarios	Simulate real test scenarios rapidly with reduced resource requirements
Maintain large development and test environments that might not be fully utilized	The ability to scale up and down and repurpose resources

6. Case Study: Private Test/Dev Cloud for Cell Phone Company

The company was experiencing very typical concerns

- Test environment resource **availability** with a not good **scheduling** process for shared resources.
- There was significant amounts of test server **waste** (Lower than 12.97% usage of the allocated testing CPU).
- 40% - 60% - estimated **spend** on maintaining current IT testing infrastructures versus adding new capabilities
- There were 231 **End of Life servers** as of April, 2010.

Based on the analysis, a private cloud was proposed to manage the company's virtualized test environments and that will:

- Greatly **reduce time** to procure test servers/systems
- Allow **tight scheduling** and governance of test systems
- Significantly **reduce number of servers and people** used for test
- Private cloud eliminate cloud **security** concerns
- Servers provisioned for testing are **released when testing is completed**.

So that, 280 application test/dev environments were moved to a private cloud:

- the number of servers could be reduced by **62%**.
- Time to provision the test environments reduced from **33 days to 5 - 4 days**
- The number of test team members reduced from **16 members to 2 members**.

1) Speed in setting up test environments

2) Saving hardware, software, and labor for testing.

7. BANK CASE STUDY USING PRIVATE CLOUD FOR DEV / TEST SYSTEMS

- In this case study, emphasis is made on the significant **energy savings**.
- The involved teams for building and maintaining the testing environment are:
 - The infrastructure team
 - The Open systems Storage team
 - The DB2 Support team
 - The Data Security team
 - The Application Integration and Security team

Each of these teams has to perform a variety of other duties as part of their job.

So that a private cloud platform now dynamically provisions, configures, reconfigures, and de-provisions virtualized testing and development servers as needed.

- Manage the **automated installation and configuration**
- reduces the risk of **deployment errors**,
- Provide **dependency** validation for software installations.
- provide an **accurate view** of project resource usage

The scheduling and management are done through a web-based interface.

Speed: Test system setup that previously took **two weeks** now takes **two hours**.

Energy Savings: The bank reported a reduction of virtual servers **by half**, reducing power and cooling **in half**.

8. Conclusion

System engineering tools such as Application Virtualization combined with the cloud are an ideal way to move forward with solving the issues in many of today's test and development environments.

- Reduced time, number of servers and number of people needed for test.
- Tight scheduling and governance of test/dev systems; used for test.
- Reduced dev/test server waste.
- Significant energy savings.

Thank You