No more VDI performance problems!

Why a structured use of load testing in desktop virtualization is crucial for your (business) health
No more VDI performance problems!
No more VDI performance problems!

Why you should read this white paper

More and more organizations are migrating their employees to centralized Windows-based desktop environments, where multiple users share centralized resources like servers, storage and software. The most compelling business drivers organizations mention for this move towards ‘virtual desktop’ environments, are security, flexibility, easier user management, and where possible, cost reduction.

A structured approach towards testing in every phase, both in project and production, combined with the best tools available in the industry today, will help organizations that are using virtualized desktop environments, to enjoy well-performing centralized desktop infrastructures at the lowest cost possible.

We see two cases in which the value of testing will easily be demonstrated:

- **In the early project stages the main value of testing is to build the best possible infrastructures at the lowest cost possible.** Testing all different options provides the objective data needed to help make educated decisions.

- **In the latter project, and production stages, testing helps to avoid the risk of an user infrastructure slowdown or even a total failure.** Integrating testing as a standard and ongoing business practice into the virtual desktop product life cycle is key to avoid costs and irritations of potential problem solving and business interruptions.

The indirect value of testing makes the direct capital investments (think time, team, tools) needed to execute testing, sometimes hard to justify. The goal of this white paper is to help all involved to better understand, and to be able to explain, the business case behind virtual desktop infrastructure testing.

Who should read this white paper

This white paper is intended for everybody:

- Working in an end-user organization or consultancy organization and involved in, or responsible for designing, building, and managing centralized Windows-based virtual desktop infrastructures.

- Using VDI or Server Based Computing environments like Citrix XenDesktop, Citrix XenApp, VMware Horizon View and Microsoft Remote Desktop Services (RDS), formerly known as Microsoft Terminal Services, or any other virtual desktop environment.

- Looking to understand, or wanting to explain, the business case behind VDI testing.
No more VDI performance problems!

1. In centralized user environments performance is the crucial factor

The challenge IT departments responsible for hosted desktops face is to offer their virtual desktop users the same functionality as they were used to in their ‘old’ fat client environments, at the same (or even better) performance levels.

Because of the centralized processing of functionality and the central storage of data, the speed and capacity of the central servers are a key success factor for these environments.

“A bad desktop performance is the number one end-user annoyance in virtual desktop environments”

Desktop performance problems have a very negative impact on the organization and its people:

- Employees will not be able, or at least be very unmotivated, to work (frustrated users)
- IT staff responsible for managing the systems will get a lot of pressure (stressed IT-staff)
- The performance problems users experience may seriously disrupt the day-to-day business
- Performance problems may result in very upset customers that will be motivated to leave you
- In well-known organizations, system failure can seriously damage the organization’s reputation

A structured approach towards testing in every phase, both in project and production, combined with the best tools available in the industry today, will help organizations that are using virtualized desktop environments, to enjoy well-performing centralized desktop infrastructures at the lowest cost possible.

The risks of not testing quantified

The risks avoided with VDI testing – in terms lost productivity, time to repair and restart, and the effects on third parties such as clients and partners - can add up to hundreds of thousands of dollars. An example may help quantify the potential costs involved. Imagine a company with eight million US dollar in revenue, 100 virtual desktop users and 2 IT-staff to support the virtual desktop infrastructure.

The financial damage at a 1% performance loss may be quantified for each group affected, as follows:

- Frustrated users may cost the company about $ 40,000 a year as a result of a 1% performance reduction (100 users at an average salary cost of $ 40,000 a year). Stressed IT-staff responsible for the virtual desktop infrastructure (average salary cost of $ 60,000 a year) will add to the damage.
- If as a result of business interruptions, 1% of upset customers decide to leave and look for another vendor, the lost revenue equals $ 80,000. And if 1% of potential new customers decide to choose for another company due to reputation loss, the revenue damage rises with another $ 80,000. The longer term damages to loyalty and reputations will even be bigger.
2. Testing in transformation projects helps to optimize spend

In the early project stages the main value of testing is to help build the best possible infrastructures at the lowest cost possible, by providing the objective data needed to help make educated decisions.

There are many options to consider in both software (e.g. which broker, hypervisor, antivirus solution) and hardware (e.g. which server, CPU, storage solution). And all vendors will make the claims that will fit them best. This generates the need for an objective approach and a serious benchmarking of all potential options, to make sure the wrong options are avoided and the best options are considered.

Start with reading the available vendor test reports

A best practice is to start reading all the test reports, validated designs and reference architectures that the vendors publish based on the industry standard benchmarking tool Login VSI. The standard out-of-the-box simulated user workloads (light for a task worker, medium for a knowledge worker and heavy for a power user) make comparisons between the claims of different vendors possible.

Login VSI makes it possible to compare apples to apples in this complex and fast-changing marketplace. All papers based on Login VSI test data are available for free at: [www.loginvsi.com/whitepapers](http://www.loginvsi.com/whitepapers).

Test different infrastructure options in your own environment

Where the white papers give a good overview of the capabilities of the different software and hardware options in clean lab environments, the actual performance and scalability of the different options may be different in your own production environment, where other influences will play a role.

Testing under production load reveals all potential flaws in a vendor proposed infrastructure and helps not only to choose the best performing, but even more important, the most cost-effective solution.

Perform Proof of Concepts with the intended production user numbers

Ideally you would want to perform your Proof of Concepts with the intended production user numbers. There are many examples of VDI infrastructure tests using small numbers of real users that performed well initially, but later on experienced fundamental performance and capacity issues when production roll-out was scaled up.

As tests with real users are often expensive and hard to organize, it is the tendency to keep the test group small. Load testing tools like Login VSI allow for easy to execute, cost-effective real-world full production load tests that will reveal and validate the true capacity of the proposed infrastructure.

---

**Business case: objective benchmarking helps international bank to optimize infrastructure choices**

A large international bank used Login VSI to compare Intel and AMD processors. Where one was faster but also more expensive, the test-data allowed for a fair comparison based on costs per VM. The same bank also used Login VSI to objectively choose the best hypervisor for their environment out of Citrix, VMware and Quest and to compare the performance impact of server side versus client side rendering.
3. Testing in production helps to avoid failure and associated costs

In the later project and production stages testing is the way to avoid user infrastructure slowdown or failure including the resulting costs and irritations of problem solving and business interruptions.

Organizations that experience this type of problems are seeking for a way to solve them. Organizations that are quite happy with the current performance are looking for ways to make sure it stays that way. The many real life business cases throughout this paper not only demonstrate the value of testing to prevent problems, but also the fact that these problems can happen to anyone, and may happen more often that you want.

Every update, upgrade or any other change may have a very negative effect on your virtual desktops. It pays to be prepared for these scenarios, as prevention is always better than cure.

**Business case: testing helps to stay out of trouble, how to avoid 20% performance loss**

Lab tests show that the upgrade from Microsoft Office 2010 to Office 2013 results in a 20% reduction in performance. Most upgrades in software applications mean more functionality and a richer user environment. So a degradation of performance, or the need for more infrastructure, is inherent. For this reason it must be a standard procedure to test all software upgrades upfront to measure the exact impact, and necessary extra hardware resources, before implementation into production. Any untested upgrade may result in unhappy users, IT-staff stress, and business productivity losses. This is obviously true for larger but also for smaller production environments (of 50 to 100 desktop users).

**Business case: insufficient testing puts 25% of workforce out of business**

A European fundraiser for healthcare research relies on a Server Based Computing environment based on Citrix XenApp, to provide a productive desktop environment for 600 telephone fundraisers. The intended update to the PVS image was tested by a subset of 60 real users. This small scale test with real users did not reveal any performance problems and the update was rolled out into production. The next day 150 of the 600 staff were unable to work for a number of days causing serious loss of income. Management was very upset and ordered VDI testing to be fully integrated into the business continuity processes. All VDI related infrastructure changes are now tested full-scale with Login VSI before being implemented, and monthly stress tests are executed to prepare for other unforeseen potential issues.

**Business case: large government agency avoids disaster roll-out to 5000 users**

A large Dutch government agency was moving towards 15,000 virtual desktop users. They negotiated a fixed price deal, including all hardware needed, with a large service provider. When the first block of hardware for 5,000 users was implemented based on sizing estimations, the customer decided to validate the infrastructure before starting roll-out to the production end-users. The scalability tests with Login VSI showed that the infrastructure installed could only support 3,500 users. The numbers were used to negotiate a larger environment with the service provider, and a great disaster was prevented.
4. Traditional testing suites made testing expensive and awkward

Testing with traditional testing environments used to involve a very tangible capital investment in large test-software suites and specialized test-hardware.

The traditional test process involved weeks or sometimes months to install the test software and again lots of time to build and perform the actual tests.

Professional testing engineers were needed to install the test environment, to build and run the tests, and to read and understand the performance test-results.

So even if organizations were mature enough to recognize the risks of not-testing, the costs (in time, money and hassle) of the use of traditional testing environments were still so high that many organizations opted to ‘just see what happens’. A strategy with sometimes disastrous results...

Business case: Fortune 100 health care company avoids disaster roll-out to 2000 users

A Fortune 100 US health insurance company, used Login VSI to safely migrate to a new storage platform to better support their hosted desktop environment. Conventional tests by the different vendors of the separate components (storage, server, hypervisor) all showed all good performance. But tests of the complete infrastructure (all servers instead of a single server) with Login VSI hinted at possible problems. Further research showed a significant error in the storage configuration that would have caused serious performance problems when this system was rolled-out to all intended 2000 users.

Business case: How testing before production helped a US law firm IT-director to keep his job

For a successful migration project from fat clients to a centralized user environment providing a good user experience is key. After the original capacity planning based on assessments and best practices the IT director decided to validate the environment by load testing with Login VSI before going production. The tests showed that the planned infrastructure for 300 users, was only able to support 78 users. Logon times exploded from 12-20 seconds to 200-500 seconds. The tests also revealed serious mistakes in the way the storage and servers were configured. The original intention was to start the roll-out of the new virtual desktop environment to senior staff of the law firm. The testing with Login VSI not only prevented serious business disruptions at the law firm, but also an abrupt end to an IT directors career.
No more VDI performance problems!

5. Login VSI makes VDI performance testing easy and cost effective

Login VSI simulates out of the box workloads and does not require any additional infrastructure. Login VSI was designed by experienced VDI and SBC specialists, who created a tool that was easy to implement and easy to use, based on their own wishes and needs. Because Login VSI can be deployed very quickly it allows you to profit from the benefits of testing in every phase of your desktop virtualization project.

Login VSI is designed for easy installation
Where traditional test environments used to take up to four weeks to be installed and started, Login VSI can be installed and ready for use in less than four hours.

Login VSI makes test creation and execution easy
The industry standard workloads make starting a test easy and quick. The flow-based interface makes test building and execution easy for non-test professionals.

Login VSI produces easy to understand results
The index VSImax, indicating the maximum number of virtual users that can be served by the tested infrastructure with an acceptable performance, is easy to understand, making scalability comparisons between different tests comprehensive for all.

An investment in Login VSI pays for itself
Where traditional testing environments were very costly to buy, and to maintain, Login VSI introduces very competitive pricing models, based on a one time purchase of the software and yearly maintenance.

Login VSI makes testing virtual desktop environments available and cost-effective for all
By lowering the costs (in time and money) of VDI testing dramatically, Login VSI makes VDI performance testing accessible to all. This way we help organizations to reach the intended benefits of virtual desktops, without the risks and dangers of performance problems.

A structured approach towards testing with Login VSI lets leading organizations in the world to build more flexible user environments, increasing their organization’s productivity, while reducing costs.
6. Investing in VDI performance testing: CAPEX and OPEX

In financial management two terms are used to describe investments in IT (or other business costs).

- Capital Expenditures (CAPEX) refers to the original investments made in innovation projects. In IT this means all the costs needed to buy (hardware and software) and build a new infrastructure. Typically these type of costs are the responsibility of project managers.

- Operational Expenditures (OPEX) refers to the returning costs of products, systems or organizations. In IT this means the yearly operational costs for the management and maintenance of an IT infrastructure. Costs include people, support and maintenance contracts and more. Typically these type of costs are the responsibility of (e.g. virtual desktop-) infrastructure managers.

If we expand on the numbers used earlier in this paper, we can use the following calculations as examples that can be used and adapted for your own organization’s situation.

Relative investment of Login VSI as Capital Expenditure

<table>
<thead>
<tr>
<th></th>
<th>CAPEX per User</th>
<th>Relative Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical VDI infrastructure cost (1)</td>
<td>$1,500</td>
<td></td>
</tr>
<tr>
<td>Typical Login VSI license cost (2)</td>
<td>$56</td>
<td>3,7%</td>
</tr>
</tbody>
</table>


(2) Smallest Login VSI perpetual license + 1st year support

The relative investment needed to purchase the load testing tool Login VSI is less than 4% of an average virtual desktop infrastructure (hardware plus software) investment. If Login VSI helps to make better and safer infrastructure decisions this can easily save you 4% of your total costs. Login VSI also helps to avoid serious production disturbances that can severely damage your business. As described in section 1 of this white paper, a 1% performance loss can add up to (a few) hundred thousand dollars in financial damage.

Relative investment and ROI of Login VSI as Operational Expenditure

<table>
<thead>
<tr>
<th></th>
<th>OPEX per User</th>
<th>Relative Investment</th>
<th>ROI in hours/days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total salary cost of a knowledge worker (1)</td>
<td>$40,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical Login VSI license cost (2)</td>
<td>$18</td>
<td>0,045 %</td>
<td>&lt;1 hour</td>
</tr>
</tbody>
</table>

(1) With a working year of 230 days, this makes a cost per working hour of 22usd.
(2) 250 users, 5 year write off, 20% support

The relative investment needed to include testing in your day-to-day business practice is less than a 0,5% of an end-users yearly salary cost. If testing saves each user 1 hour of trouble a year, the investment in a tool like Login VSI is already repaid. Every extra hour of trouble avoided increases the ROI dramatically.
7. The business case for VDI performance testing: a model to use

Benchmarking different infrastructure options in the **project** phase, helps you:
- Compare and select the best performing products (and avoid technical problems)
- Compare and select the most cost-effective products (which helps to save costs)
- Make choices based on objective tests (which helps to avoid discussions afterwards)
- Compare old and new environments (which helps to build sound business-cases)

Capacity planning and production readiness in the **project** phase, helps you:
- Validate sizing estimations and calculations (and avoid over-, or under-spending)
- Make a budget based on facts (and avoid financial disappointments later)
- Test the entire infrastructure before going production (and avoid performance issues)

Load testing and stress testing in the **production** phase, helps you:
- Determine your systems maximum user load (which helps to support planned growth)
- Prepare for non-standard peak-usage scenarios (which helps to prepare for unplanned loads)
- Get an objective baseline measure of performance (and reduce expensive production problems)

Testing the impact of every change in your VDI **production** environment helps you:
- Avoid unexpected performance problems (and avoid problems instead of fixing them)
- Test potential improvements upfront (and improve your infrastructure without risk)
- Safeguard the ‘health’ of your environment (and therefore reduce problems in production)
8. About Login VSI

Login Virtual Session Indexer (Login VSI) is the industry standard performance and load testing tool for virtualized desktop environments like VDI and Server Based Computing. Login VSI can be used to test the performance and scalability of VMware Horizon View, Citrix XenDesktop and XenApp, Microsoft Remote Desktop Services (Terminal Services) or any other Windows based virtual desktop solution.

Login VSI is a good choice for benchmarking and Proof of Concepts
- 100% vendor independent and 100% objective
- out of the box standard workloads make product comparisons easy
- Login VSI is used by all leading VDI-related technology vendors

Login VSI is a good choice for capacity planning and production readiness
- easy to use through out-of-the-box workloads (where sufficient)
- precise through easy workload customization (where needed)
- used for sizing by SE’s of Cisco, HP, Citrix, VMware and many more

Login VSI is a good choice for load testing, stress testing and baseline
- different standard workloads are available for different scenarios
- Login VSI allows for (close to) simultaneous logons or workloads
- workload content and phasing can be adapted to reflect real-life usage

Login VSI is a good choice for change impact prediction
- ease of use allows for testing each intended change before production
- large end-user organizations use Login VSI as a part of their DTAP street
- perpetual licenses provide value for money and lifetime protection

more information about Login VSI, or a free trial, please visit www.loginvsi.com.

Benefits of Login VSI for the organization:
- No frustrated desktop users
- No costly business interruptions
- No stressed desktop managers
- No frustrated customers
- Avoid damage to reputation

Benefits of Login VSI for the IT manager:
- Maintained management support
- More successful VDI projects
- Happy end users, less complaints
- You add to the companies health
- And you may get the corner office
Appendix 1

Recognizing the risks of not testing: Questions you can ask yourself

Why invest in Benchmarking different infrastructure options

When evaluating new SBC or VDI products, are you interested in how they perform in your environment? Do you trust the claims vendors make about this? Would you trust real-life results better? Especially tested in your own environment? How would it help you if you had an easy to implement, easy to use tool to compare them on their performance and scalability? Have you or someone else ever made a wrong choice here? What are the consequences of a wrong choice.. for the users, for you, for the company, in terms of time, money, hassle, frustration? If you could test different products in a real-life but simulated environment before selection would this be of value? What would be the biggest benefit for the company? How could this make your life and the life of your datacenter staff better?

Why invest in capacity planning and production readiness

Do you plan to move from fat to thin clients? Is there growth expected in number of users. How do you test how much servers and storage you need to maintain a good user experience? How much do new servers cost? How bad is it if you bought too much capacity? How would this affect your budget, your credibility? How bad is it if you bought too little? What would be the biggest risk? What consequences? Did this ever happen? What happened then? How could it help you if you could simulate the workloads of your users to determine the capacity of one server, so you can determine how many you need? How could this help to prevent problems, save costs in hardware/ software/ datacenter space, power?

Why invest in load testing, stress testing and baseline

Do usage-peaks occur sometimes? Are they predictable (like logon-storms)? Are you 100% sure your new system is powerful enough to survive usage-peaks. Is there growth in the company? Can you handle the extra number of users? Do you know the maximum capacity of your system? How could knowing this help you? What would be the biggest problem if the system slowed down during a peak? What would be the consequences in time and money, for you, other users, other departments, and the company? What would be the biggest benefit to know the maximum load of your current system?

Why invest in change impact prediction

How important is performance? Do you ever experience issues here? Do users complain about performance? Do you know what causes these problems? Do you ever experience performance loss after installing a new version, update, upgrade, patch? What was the last time this happened? What happened? How much time was lost? Who suffered? What is the effect on the motivation of the users? What do they do when this happens? What is the effect on the business? How often does this happen? What would be the costs of this in time and money? What is the chance this happens again? Would it help if you could predict the effect on performance of all changes on beforehand? What would be the biggest advantage for you if you could predict the impact on performance of every change? What would be the biggest benefit for the company? How much money or time could you save?
No more VDI performance problems!

Appendix 2

6 Recommendations and Best Practices to avoid performance problems

1. **Read the relevant test reports, validated designs and reference architectures** that infrastructure vendors have published, based on the industry standard tool Login VSI (see [www.loginvsi.com](http://www.loginvsi.com)).

2. **Test all infrastructure options** proposed by the different vendors, **in your own business environment**.

3. **Test** hosted desktop infrastructures sized on calculations and best practices **before going production**.

4. **Test** all intended infrastructure changes **before implementation** for possible performance impact.

5. **Test with the real production number of users**. Subsets not always reveal all potential problems.

6. **Test the entire infrastructure**. Testing components or single servers, may not reveal all problems.

---

**Best Use Scenarios for Hosted Virtual Desktops, Mark A. Margevicius, Gartner**

“Problems with HVDs include scalability and application performance. Many organizations that have successfully deployed HVD in test/pilot mode experience scalability issues as the number of users grows. Simple pilots of 50 to 200 users are common and are, for the most part, successful. These pilot users are typically task-based, have the same software requirements, are LAN attached, and can be managed with traditional tools and techniques. However, as the number of users increase, so does the complexity. Organizations that create static VMs for each of their users are confronted with numerous PC images, exploding storage requirements, unique configurations for nonstandard users and general management complexity.”