

Parallels® Virtuozzo Containers

White Paper

Virtual Desktop Infrastructure

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Enterprise Desktop Computing Challenges

Desktop computing has become one of the cores of the enterprise IT infrastructure. Unfortunately, the desktop PC wasn't designed to handle the requirements of an enterprise infrastructure. As distributed end-points, desktops are very difficult to manage, maintain and secure.

Today, the largest cost component for desktops is operational, including staff to provision, manage, patch, backup and support. In fact, spending for operational expenses alone is higher than for every other component combined, such as software, hardware and environmental. As a result, desktop computing is simply not scalable

These and other factors have prompted an examination of how to reduce the cost and improve the reliability of desktop computing. While alternatives such as server based computing have emerged, none have gained widespread acceptance in the enterprise. This white paper proposes a new approach to desktop computing that leverages new technologies to overcome many of the limitations found in early approaches and also allows, for the first time, broad user adoption. This approach, called the **virtual desktop infrastructure or VDI**, combines all of the benefits and flexibility of server virtualization with the power and personalization of traditional desktop computing.

WHAT IS VIRTUAL DESKTOP INFRASTRUCTURE (VDI)?

Virtualization seems to be setting all of the trends in computing. With the pervasive acceptance of virtualization on servers and the obvious management benefits that technologies such as OS virtualization provide, administrators are now seeking to extend the manageability, availability and control of server virtualization to desktop systems. Managing desktops is one of the most challenging tasks for IT teams. Deploying an infrastructure that controls those environments and centralizes them for simple management can be a tremendous benefit for both the IT department and the organization as a whole. Fortunately, Virtual desktop infrastructure was formulated to respond to these growing needs and challenges.

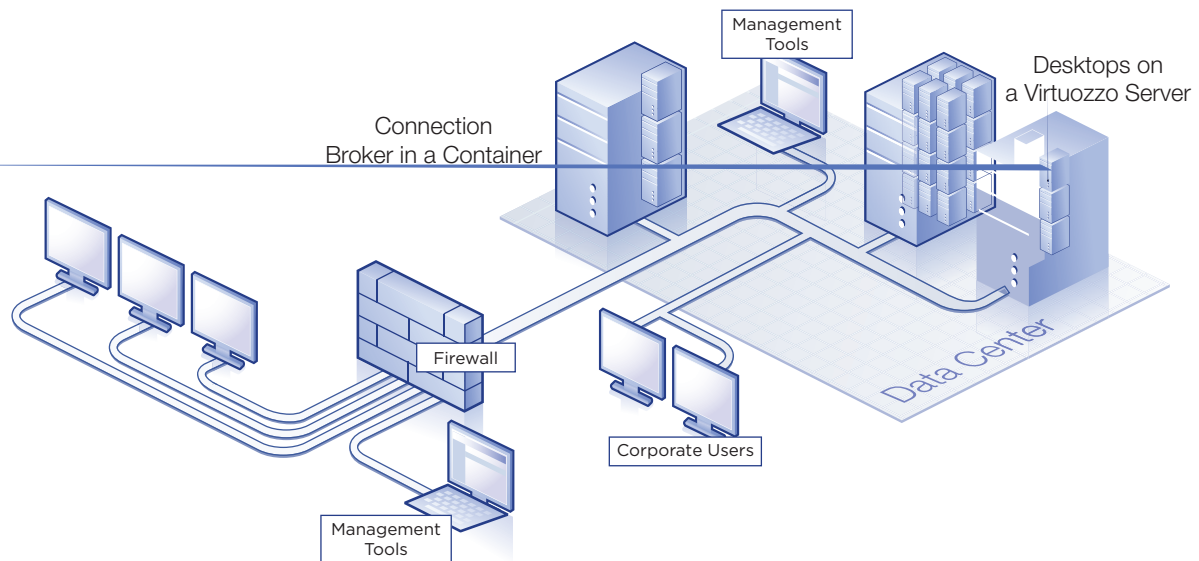
VDI FAST FACTS

House user desktops on a centralized server.

VDI is a combination of 5 technology components, virtualization is one key component.

VDI is an integrated solution of hardware, software and management tools to provide a replacement for standard desktop deployments. In the simplest terms, VDI places user desktops on centralized server.

Five Components of a VDI Solution



There are five components that comprise the VDI solution. In order of user to centralized server these are: the end user access, a connection broker that manages end user to server connections, a virtualized desktop instance, a virtualization engine to create the desktops and finally, the management tools to manage the virtualization.

END USER ACCESS

VDI changes the way the user accesses his or her desktop. Most users are not as technical as the typical administrator, so it is important to make the transition straightforward. Ideally using the VDI technology must be as easy or easier than it was to use a dedicated workstation or laptop. It is possible to use Terminal Services or other remote access protocols on a regular PC, but many organizations decide to deploy a thin client solutions to make things simple for its end users. There are several choices for thin clients, Wyse, Neoware and Computer Labs are some examples of thin client offerings. The thin client works with a hardware monitor. It is a very thin OS that boots and manages interaction with one of many remote connectivity technologies. Some thin clients come pre-packaged with a connection broker.

CONNECTION BROKER

The simple purpose of the connection broker is to manage the end user connections with the virtualized desktops. In smaller installations, a connection broker isn't absolutely necessary, however in installations in excess of 100 users, it is essential. Some examples of connection brokers are Provision Networks Remote Desktop Broker and Leostream Virtual Desktop Connection Broker.

VIRTUALIZED DESKTOP AND VIRTUALIZATION ENGINE

The last important component of the VDI solution is the management toolset used to deploy the virtual desktops. It's critical to have a good management toolset to accompany the deployment. Software and OS patches must be simple and controllable, while desktops need to be simple to create and modeled to provide a consistent desktop to users.

Why Consider a VDI Deployment?

VDI is moving the computing from the end-user to a centralized location. This is a dramatic change in any organization. The main benefits of VDI include:

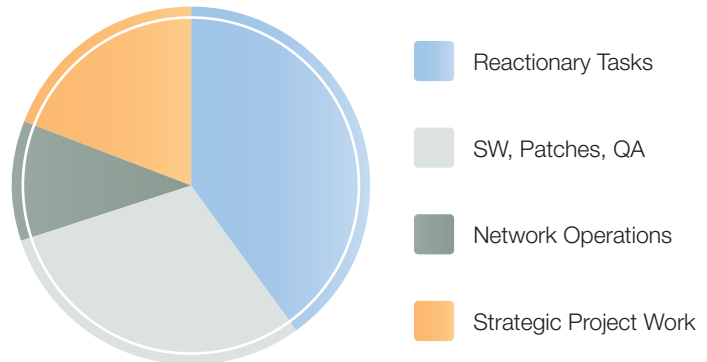
- Centralized software management is much simpler and more cost effective for the IT organization.
- OS and application patches can be done quickly, reliably and managed centrally.
- Increased resource efficiencies- centralizing the processing onto a server ensures that resources are used fully and efficiently. Some desktops may only use a small percentage of processing capability, while others constantly exceed processing capabilities.
- Data security- Data backups can be completed easily and quickly without user interruption. Typically laptop or workstation backups would be done while the end-user was using the system, slowing processing and detracting from the end-user productivity. As a result, many laptops and workstations are only backed up piecemeal, and instigated by the end-user, if at all. The server could also be a highly reliable and redundant configuration with high RAID and SAN configurations to ensure availability and data access.
- Data is secure and is only accessed by the end-user. For example, there have been instances of laptops with highly secure customer or government data that has been lost by employees.
- Creating a desktop for a new user can be done with only a couple of clicks and in less than two minutes.
- Freeing IT staff from many of the mundane and time consuming tasks of managing and maintaining the desktop computing infrastructure. Forrester conducted a survey regarding the time use of IT desktop administrators. VDI eliminates or drastically reduces 80% of the desktop administrator's workload.

VDI FAST FACTS

Centralized server enables complete control over user applications and OSs and patch management.

Desktop security is simplified with centralized access and control.

Desktop data protection is ensured, all data can be systematically backed up. New users are very simple to support and deploy.



Why is Parallels Virtuozzo Containers a Great VDI Technology?

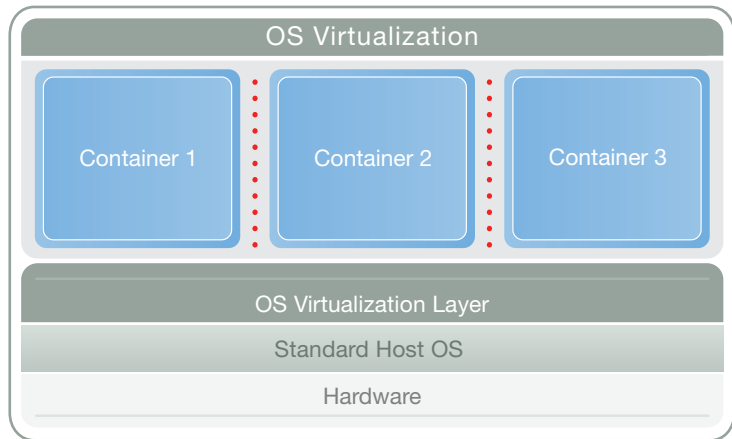
There are several choices for the virtualization technology. OS virtualization, and Virtuozzo Containers in particular are extremely well suited for a VDI deployment. The key concept for OS virtualization is that it deploys a single OS. The vast majority of desktops in the world are Windows desktops, with the small exception of some Linux desktops. *For VDI, a single OS is not only possible, it is preferred.*

The benefits increase dramatically when you consider the applications. Virtuozzo Containers also has the capability to install an application one time on a server and deploy templates in each virtual environment that link down to the host copy application.

WHAT IS PARALLELS VIRTUOZZO CONTAINERS?

Parallels Virtuozzo Containers is a patented OS virtualization solution. Virtuozzo Containers creates isolated virtual environments (Container) or containers on a single physical server and OS instance.

Taking a look at the technology building from the bottom up on the diagram on the right, the hardware and the OS are standard. This is one of the benefits of the technology, all of the software, hardware, driver technology and advances are merely leveraged by the virtualization layer rather than recreated. Using existing technology enables fast support for technologies such as multi-core, and also ensures there is no performance degradation through rewriting drivers and other proprietary information.



Next the virtualization layer controls the resource management, scheduling and isolation required by the virtual environments. Finally, the virtual environments themselves contain mere links back the standard OS, and only contain the application or workload. This architecture is unique in that it does not introduce multiple layers of processing (rather than using real and virtualized hardware) and it only uses a single OS (rather than a hypervisor modified Linux and a guest OS). The architecture does not add additional layers of processing so it can be the closest to native server performance of any virtualization technology. Because of the single OS and memory usage, OS virtualization also has the highest density (most Containers) on a single server.

Obviously the single OS makes it extremely simple to manage, and with toolsets and other enhancements, OS Virtualization is making big gains in improving virtualized server management in comparison to virtual machines or hypervisor deployments. The only two productized types of OS virtualization are Parallels' Virtuozzo Containers on Linux and Windows and Sun's Solaris containers.

WHAT ARE THE BENEFITS TO DEPLOYING AN OS VIRTUALIZATION SOLUTION FOR VDI?

- A single OS enables the most efficient use of all resources on a server. With one OS, only one space is taken in memory. Only one copy of the OS is residing on the hard drive. These efficiencies translate to a much higher density of virtual environments, and therefore desktops, on the same server.

¹ There are limits to memory on 32 bit systems; memory pools on Windows servers fill and limit the total number of virtual instances allows. Deploying on a 64 bit system eliminates this bottleneck completely.

- Add applications into the efficiency equation. With a single application on a server, the densities of potential virtual desktops on a server become even better.¹
 - One of the major advantages to centralizing the desktops is the increased IT control and manageability. With a single OS, all desktops can be updated with a couple of clicks and in seconds. The need to use patch management software may be eliminated.
 - With Virtuozzo Containers in particular, there is extensive support for standardizing as well as customizing virtualization deployments. There is templating technology and a sample Container configuration that paired together can produce a simple, repeatable virtual desktop.
 - Most VDI solutions are working to keep operations uniform. Virtuozzo Containers has very flexible resource management and it is very simple to provide different types of desktops to different types of users. A super user could get admin rights to his virtual desktop, a not-so-super user could get a very restricted desktop that didn't allow changes.
 - The flexible resource management provides the flexibility that is required to make your users feel more comfortable with moving to a VDI solution. Virtuozzo Containers is the only solution that will allow you to change hard drive, CPU and memory all in real-time to respond to any immediate processing requirements.
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Sizing the VDI Environment

Let's examine a sample Windows desktop consolidation project. Pre-consolidation, you have a thousand desktops and laptops, with 2GB of physical memory, dual 1 GHz CPU, average utilization 10%. The VDI server configuration will be a quad core dual 3GHz CPU server, with 8GB of memory available.

Let's calculate the consolidation ratio we can expect with Virtuozzo Containers. Since the operating system will serve all of the virtual desktops, we should reserve a significant amount of the 8 gigabytes of memory for the operating system. In this case we reserve 2GB which should be more than adequate. That leaves 6GB to be used by the virtual desktops. Each virtualized desktop will be running in separate virtual environment, which has its own memory footprint. Measurements show that it may be anywhere from 30 to 50 megabytes, so let's assume it is 40.

Adding the 300 MB application requirement to the footprint of the virtual environment is a total of 340 MB. However, we didn't consider resource sharing. A part of this footprint is coming from the shared libraries (dll), or application images, and will be shared among multiple Containers on the same server, eventually increasing the desktop's memory footprint. Another part is rarely used and may be safely stored in the swap file. Very conservative sharing assumptions will bring the footprint back to the original 300MB (in real life it would be closer to 250MB, but let's stay on a safe side, we don't want our desktops or users to suffer).

Now let's calculate the consolidation ratio. 6GB/300MB give us 20 VM per server, with again, plenty CPU power per desktop. With more memory, we increase the consolidation ratio. 16GB of RAM, with 3GB given to the operating system leaves 13GB for our desktops, or about 43 Containers per server – and still plenty of CPU power for good desktop performance. However if you are running a 32bit OS, you may run out of kernel memory, that's where a 64 bit OS becomes invaluable because of the unlimited memory capabilities.

Parallels Virtuozzo Containers VDI Customers

Two types of VDI deployments will be showcased in this section. There are complete customer success stories Please visit the Customer Spotlights section of the Virtuozzo website for more information about the following customers.

COX COMMUNICATIONS

The customer support branch of Cox needed a solution to its growing issue with an internal proprietary call center application. The application in question was a very dated application that did not support a multi-tenant configuration. In addition, Cox needed to make the application available to a large and growing remote workforce that needed to access the application. Cox deployed Virtuozzo Containers in a VDI configuration to allow the remote users to connect into a specific application. This deployment enabled Cox to avoid a large development effort, and allowed them to deploy its application on Virtuozzo Containers virtual environments in a couple of weeks. Benefiting from the templating and other efficiencies with OS virtualization, Cox was able to deploy 60 virtual desktops on an average server. Cox had a very common server architecture: Dell 2850 with 2.8 GHz dual-core processors and 4 GB RAM. It was also extremely easy to manage; a single administrator was able to manage and update the configuration in addition to many additional administrative duties.

KALEIDO

Kaleido is a data warehousing company that specializes in data for the Oil and Gas industry. With a world-wide and highly diversified development staff Kaleido had some very unique challenges. With a development staff in India, the US and the UK, Kaleido needed to provide a way for their highly diversified development staff to get into a centralized development server. The supporting applications and environments were extremely large and resource intense from a desktop perspective, and the traffic was huge, topping a GB in traffic daily. Kaleido considered other virtualization options, but found that once the infrastructure and the supporting applications were loaded, there was no room left for actual processing. Kaleido deployed a very sophisticated remote development desktop for its engineers quite successfully. The keys to this deployment were the performance and overhead gained by moving to a Virtuozzo Containers infrastructure.

Conclusion

VDI is a new technology that gives IT departments some choice and control over how to manage their exploding desktop infrastructure. With a set of components, deploying a VDI solution can be an effective way to centrally manage and control desktop instances and delivery. Virtuozzo has an extremely effective architecture and design that fits the implementation and goals of a VDI deployment.