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## Building VDI Thininfrastructure Top to Bottom

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## Executive Summary

Virtual Desktop Infrastructure (VDI) technology has given new life to thin client implementation possibilities. In a recent survey, Info-Tech asked clients about their interest in the various forms of virtualization. Forty-five percent of respondents indicated they were interested in or planning to deploy a VDI solution – 21% higher than the interest in and plans for traditional presentation virtualization.

VDI is comprised of several parts:

- » Thin client end user terminal.
- » Network connection and connection broker.
- » Virtual server.

This note explores the vendors who have offerings in these areas, how the pieces fit, and the cost of pulling it all together.

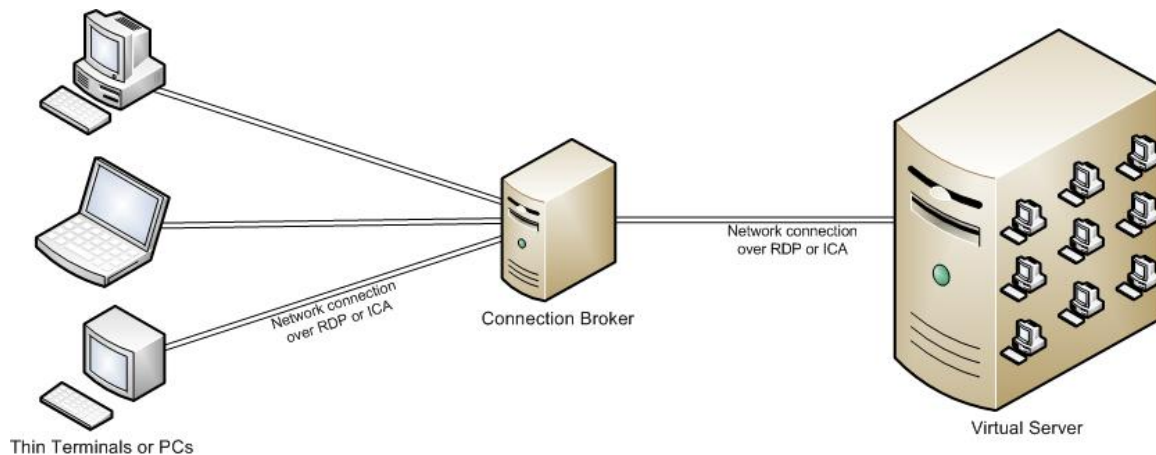


## Technology Point

Virtual Desktop Infrastructure (VDI) is not synonymous with thin client. Thin client is simply one of the benefactors of a VDI implementation. This note looks at how a VDI is constructed from the front to the back end. For information on how virtualization in general works, please refer to the ITA Premium research note, "[Peeling the Virtualization Onion without Tears.](#)"

**Figure 1. VDI Puzzle Pieces**

Source: Info-Tech Research Group



### 1. End user terminals

Both fat and thin clients, as well as a combination of both, can be used in a VDI implementation. Enterprises can choose to leverage the traditional desktops currently deployed in the workplace or do a full replacement with thin client terminals. The main vendors in the thin space are [Wyse](#), [Pano Logic](#), [ClearCube](#), and [HP](#). The market leaders in the space are Wyse and HP. HP achieved this position via their [acquisition of Neoware](#) in 2007. ClearCube is another front runner, while Pano Logic is a relative newcomer.

Note that the table below is intended as an overview of what is available. Not every model will support each feature. For example, ClearCube's MVX model supports up to four monitors; however, it does not supply any USB ports. Also, the maximum resolution is affected by the selection of 16-bit or 24-bit color.



Feature	ClearCube	HP	Pano Logic	Wyse
Monitor (# supported and max. resolution)	1-4; 1600x1200	1-2; 1920x1440	1-2; 1600x1200	1-6; 1600x1200
USB (# and version supported)	0-4; versions 1.1 and 2.0	2-6; version 2.0	3; version 2.0	3-4; version 2.0
Laptop Form Factor	No	Yes	No	Yes
Audio Support	Yes, most models	Yes, most models	Yes	Yes

It is common to find support for audio output on most thin terminal models; audio input depends on the connection protocol – either Microsoft’s Remote Desktop Protocol (RDP) or Citrix’s Independent Computing Architecture (ICA). RDP does not support audio input; while input/output is available for ICA 8.0 and later. For more information on the limitations of RDP’s handling of multimedia, please refer to the ITA Premium research note, [“Thin Client in a VoIP World.”](#)

In terms of pricing, HP’s *starting* prices range from \$199-\$550 for regular client models and \$725-\$969 for monitor/laptop options. Pano Logic has one offering which includes the virtual desktop software, management server, and the Pano Logic client for \$300 per client (plus an additional \$60 per year for support) or \$25 per month (including support). Neither ClearCube nor Wyse indicate pricing on their Web sites.

## 2. Network connection and connection broker

The connection broker sits between the thin client terminals and the virtual server to manage and allocate end-user logins to the correct virtual machine. While not always necessary, a connection broker is recommended for large implementations. A broker assigns users to the virtual PC instances hosted on the virtual server in a number of ways. A user can be assigned a specific virtual machine that they will access with each login so they are able to customize their applications or install specific software. Alternatively, users can be assigned a dynamic desktop that may vary with each login. No customization is allowed, and there may also be the option to completely delete the virtual instance after use and create a clean copy of the desktop at each login.



In addition, a connection broker manages the manner in which resources are allocated. When a user logs off, the resources used by that virtual instance can be returned to the VM pool for distribution to other users. Failover and redundancy can also be managed by a connection broker by setting up a second server and balancing the loads between the primary and secondary virtual servers. Full redundancy would also require a second connection broker in case the primary broker fails.

Some of the vendors in the space include:

- » [VMware Virtual Desktop Manager \(VDM\)](#). VDM is part of VMware's Virtual Infrastructure and will only manage a VMware infrastructure.
- » [Leostream Hosted Desktop Connection Broker](#). Leostream's independent solution manages connections for VMware's VirtualCenter. The main difference between Leostream and VDM is that Leostream can also manage physical machines.
- » [Citrix Desktop Delivery Controller \(DDC\)](#). DDC is the connection broker for Citrix's soon-to-be-released XenDesktop solution.

Ensure that the connection broker supports the appropriate protocol. For example, an RDP connection is required to use VMware VDM. This is mitigated by the fact that VMware does work with third-party connection brokers and ICA connections can be supported by leveraging alternative solutions.

### 3. Virtual server

The virtual server is the backend of the VDI deployments. Kept in the data center, the server hosts all of the virtual PC instances being accessed by the end users. The top three virtualization vendors are Citrix, Microsoft, and VMware. Citrix's VDI solution, XenDesktop, is set to be released May 20, 2008, although a beta version was also in use. Although pricing is not available for XenDesktop at this point, VMware pricing for 100 desktops ranges from \$180 to \$250 per desktop to implement a VDI environment. This price includes VDM, [Virtual Infrastructure 3 Enterprise Edition](#), and [VirtualCenter Management Server](#). The price varies according to the associated support contract.



Enterprises have to consider server sizing and scaling in terms of a VDI deployment. VMware's white paper, "[VDI Server Sizing and Scaling](#)," provides good information for balancing the number of virtual machines hosted depending on the workload placed on the server. For its tests, VMware set up its VDI solution on HP ProLiant DL 385 G1 servers with two dual-core 2.2 GHz Opteron processors. The tests examined at a heavy-load scenario (e.g. knowledge workers: data mining, desktop publishing) and a light-load scenario (e.g. data entry: clerical, manufacturing). According to the results, each server can host 42 light-load virtual instances or 26 heavy-load virtual instances.

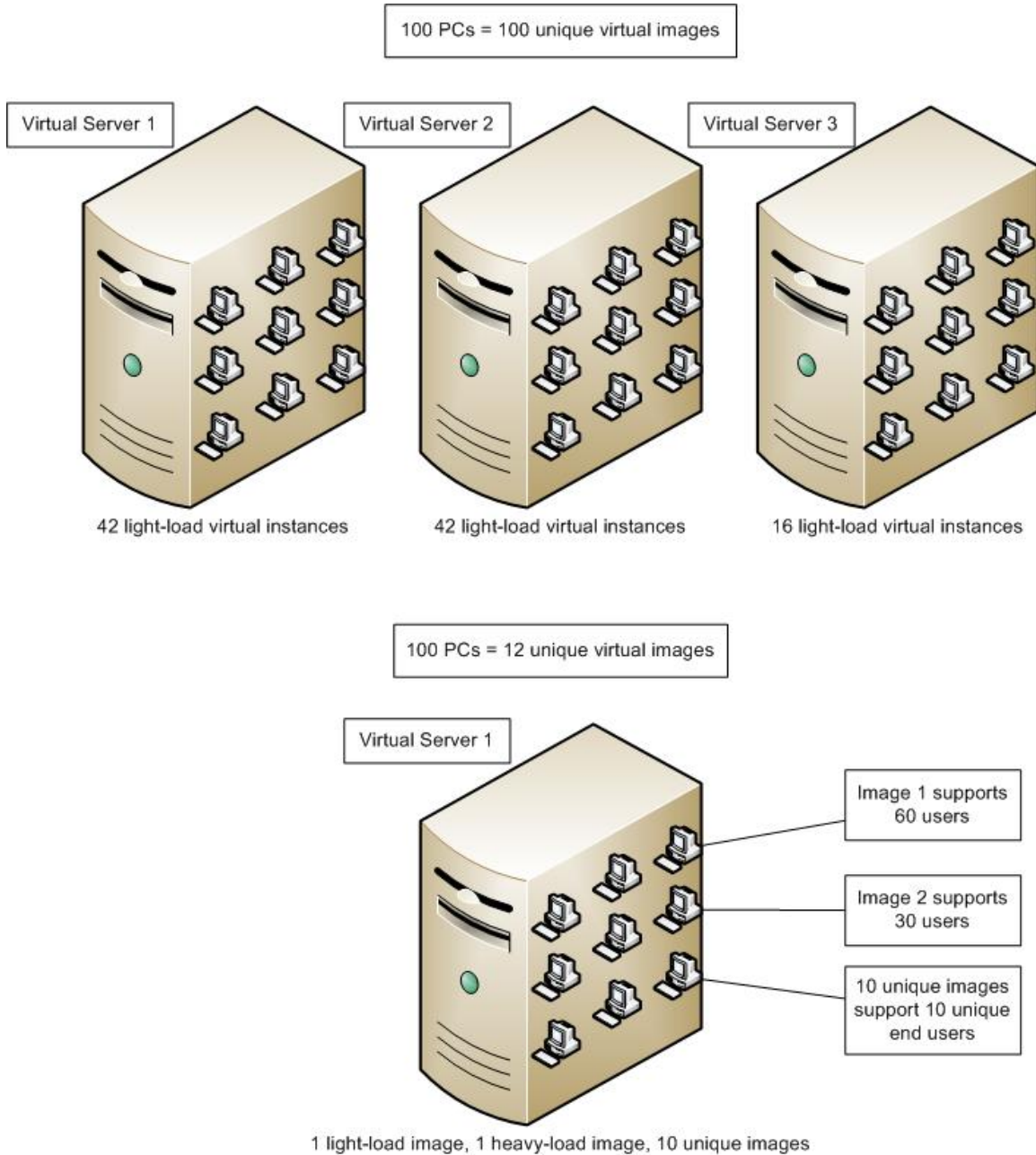
This does not mean that an enterprise will have to dedicate 39 servers to 1000 unique, heavy-load virtual instances. To improve ease of management, implementers can create desktop configurations that can be placed into groups. It may be that 700 users are all using the same applications. One PC image can support all 700 users. Perhaps another 200 are using a different set of applications. And so on. Depending on the diversity of the user profiles, there will still be some level of management of personal settings.

One of the problems with VDI has been that each virtual instance must be managed as an individual PC would be managed – each machine must be patched and upgraded individually. Citrix's XenDesktop is promising to be able to handle a dynamic end-user environment that supports multiple configurations in a more centralized manner.



## Figure 2. Managing Unique Virtual Instances

Source: Info-Tech Research Group





## Key Considerations

1. **Utilize what is already in place.** It isn't necessary to build from scratch. In many cases, enterprises will be able to leverage the current infrastructure and build out from there. For example, although VDI is a good fit with thin client deployment, it works equally well with fat clients. Some fat clients may be too far past their prime for a local Windows Vista upgrade, but they will be able to run a version of Vista hosted on a virtual PC.
2. **Management can be easier, but it's still there.** Even with grouped user profiles, the administrators will still need to manage a separate set of policies for each user. In a call center, management will be fairly straightforward. In more diverse environments, even if everyone is using the same application image, the individual users may have different storage locations, personal settings, and so on. Connection brokers often integrate with Active Directory as part of the management of the virtual images. Make sure the broker interfaces with enterprise user profiles in order to manage them more efficiently.
3. **Don't forget about storage.** As with all data, enterprises must consider the value of the data being backed up and decide on recovery objectives and tolerance for downtime. Evaluate plans for failover and redundancy to minimize downtime. As this is a considerable challenge on its own, look for a future ITA Premium research note to examine the specific challenges of backing up virtual machines.

## Bottom Line

When it comes to thin client deployment, many enterprises will be able to leverage the virtualization technology already in place. However, decision makers should understand the parts of a virtual desktop deployment, how they work together in the infrastructure, and how much a full solution might cost.

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