ThinPrint®

Microsoft's Virtualization Solutions

Optimized remote printing in Microsoft's desktop virtualization

ThinPrint

White Paper

Contents

Brief outline

With the preview to Azure RemoteApp, Microsoft is taking another step towards the cloud and virtual desktop. By now, a whole host of different terms, solutions, and forms of distribution are buzzing around from terminal server and RemoteApp and from on-premises to Azure. The various challenges that arise on this subject in the different remote desktop scenarios will be subjected to particular examination. In addition, this white paper will also present appropriate solutions.

Situation: **Microsoft is offering new and extensive desktop virtualization functions**
The nature of the modern world of work has led Microsoft to think ahead and now offer even more comprehensive support for desktop virtualization. With Windows Server 2012 R2 and Azure, Microsoft is offering a comprehensive portfolio of solutions in the virtualization field. This includes two basic models for corporate use, depending on the application areas. Session-based desktops and applications, as well as virtual desktops.

Problems. **With the virtualization concept, insufficient attention is paid to printing.**
Desktop and session virtualization are intended to allow users to be able to work productively anywhere, just as they do at their usual workplace. For example, the number of people who work from home at least once a week is constantly increasing.1 They would like to be able to perform their duties at their workstation at home just as they actually would at work. Of course, this also includes printing. However, the switch to virtualized processes can itself represent a problem if print management software is used that cannot be integrated flexibly into Microsoft's different business models.

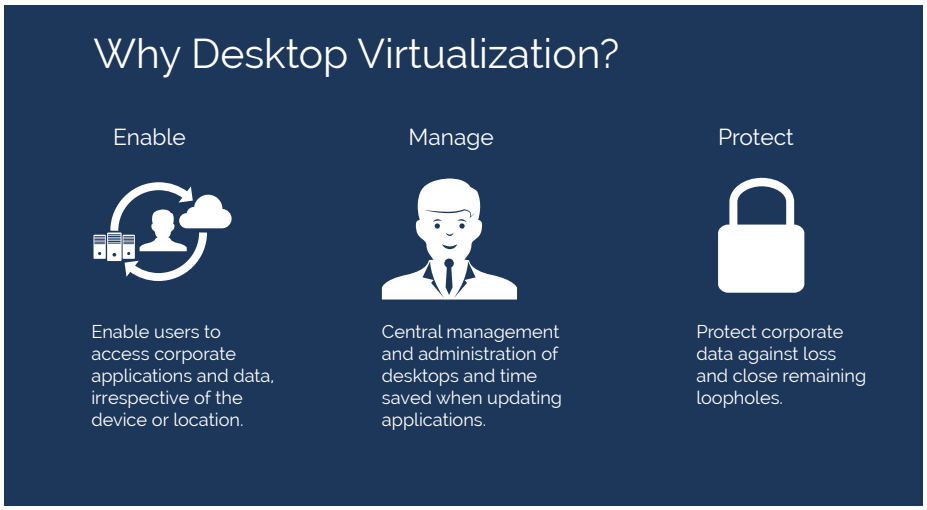
Solution. **With ThinPrint, printing is possible without any problems even in Microsoft's various virtualization models.**
The following core aspects worry administrators when they attempt to harmonize printing with virtualized environments: Printer driver management, bandwidth availability, speed of printouts, pressure on resources, and support for different printer models and for a wide variety of workplace hardware (from iPad to ThinClient) along with the provision of all print functions. These are among the challenges that ThinPrint can overcome.

Result: **Microsoft's virtualization in combination with ThinPrint: First class user experience and efficient central management**
The desktop virtualization technology from Microsoft allows companies to organize the traditional, cost, and time-intensive lifecycle management of desktop PCs more efficiently. ThinPrint supports Microsoft's centralization strategy and can be seamlessly integrated into it. This ensures that users can also print easily, quickly, and reliably from session-based and virtual desktops. This applies to a very wide variety of scenarios and for all printers, including special print functions. IT gains complete flexibility in its architecture design. This includes a comprehensive check on data streams at minimal effort for print management, resulting in fewer inquiries to the help desk.[1]

1 Garside, Juliette: Many more of us will work from home – or a cafe – says BT futurologist (2014), URL: http://www.theguardian.com/money/2014/jan/02/working-from-home-communications-technology-bt-futurologist (June 20, 2014)

1. Desktop virtualization with Microsoft

Virtualized desktops are still considered as a worthwhile alternative to the PC. On paper, the benefits of desktop virtualization are obvious. Compared to fat client PCs, the centralized operation of virtualized desktops simplifies management, increases the security and availability of the systems, and cuts costs as regards operation, hardware, and energy consumption. It also increases the flexibility of the entire IT infrastructure, since new desktops can be provided within seconds, for example for new staff or for short-term special tasks.



Microsoft offers an extensive portfolio of virtualization solutions, in order to meet today's challenges in everyday business life.

1.1 The challenges of everyday working life and Microsoft's solution

The challenges of everyday working life are multifaceted:

1. They begin with the employee. Nowadays, he expects to be able to work anywhere, and to access his own work resources irrespective of his location.

2. At the same time, resources include not only the PC - there are also a range of new devices and operating systems. Developments have progressed particularly rapidly in the mobile sector. The standard that applied in corporate IT for years no longer holds true.

3. As well as the devices, there are a variety of apps or applications such as e-mail, word processing, CRM, video, etc., which can prove difficult to manage across different platforms.

4. Last but not least, it is important to combine the functions of providing data that enables employees to be productive while ensuring corporate data security.

1.2 What exactly is Microsoft Desktop Virtualization?

In the past, Microsoft found it difficult to offer a comprehensive package for the various application cases. That has changed, particularly with the release of Windows Server 2012 R2. As you would expect from such a major manufacturer, Microsoft's objective is to offer a complete VDI software stack from virtualization through to management. From on-premises virtualization through hybrid environments to Microsoft Azure, Microsoft can now provide a comprehensive package.

It is worthwhile to take a closer look at Microsoft's virtualization universe. The renaming of terminal server as Remote Desktop Session Host (also RD Session Host) and terminal services as Remote Desktop Services still takes some time to get used to. This happened in parallel with the release of Windows Server 2008 Support Pack 2. However, this renaming is just the starting point for Microsoft desktop virtualization . With this release, Remote Desktop Services were expanded to incorporate virtual desktop infrastructure (VDI). Since then, remote desktops can include applications (Session Host) and virtual desktops (Virtualization Host) at the same time.[1]

Microsoft also distinguishes between the solutions that are possible on-premises (the customer acquires the software and operates it in his own data center), and those offered in the cloud, as well as the so-called mixed forms (hybrid cloud).

1.2.1 On-premises: sessions and virtual desktop infrastructure

Three usage models can be distinguished in the on-premises infrastructure:

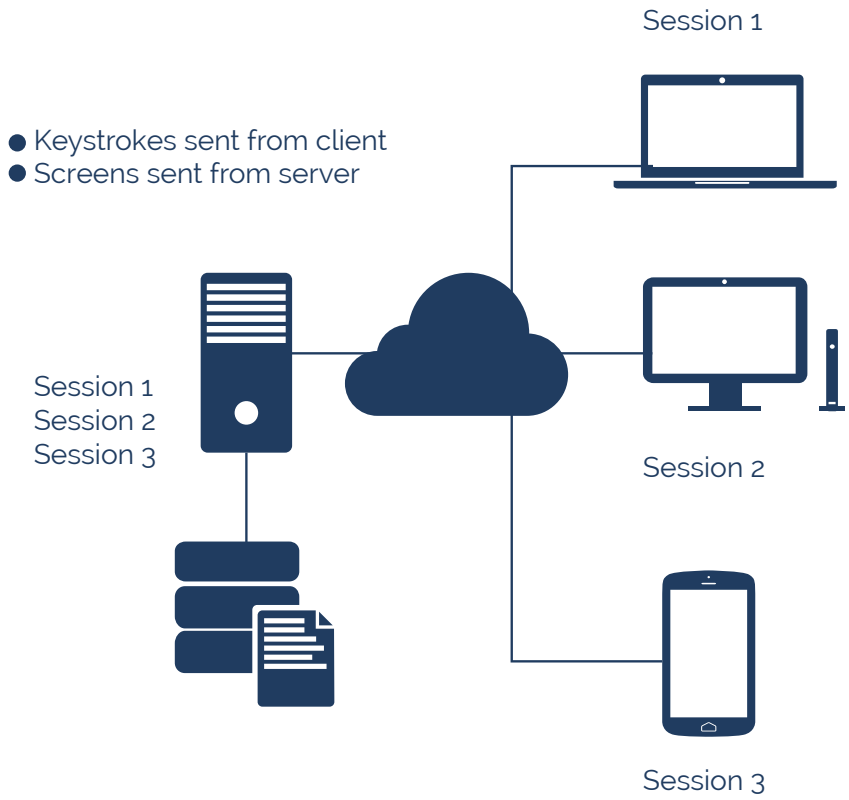
A) Server-session-based

B) Server-session-based apps (RemoteApp)

C) Virtual desktop

1 Gaskin, James E.: Microsoft Terminal Services Became Remote Desktop Services (2010), URL: http://www.itworld.com/virtualization/100788/microsoft-terminal-services-became-remote-desktop-services (June 20, 2014)

A) Server-session-based desktops



A) In **Session-based virtualization**, users press keys to access a central installation of a desktop on the Windows server or the **Remote Desktop Session Host** and this server transmits the relevant screenshots to them.

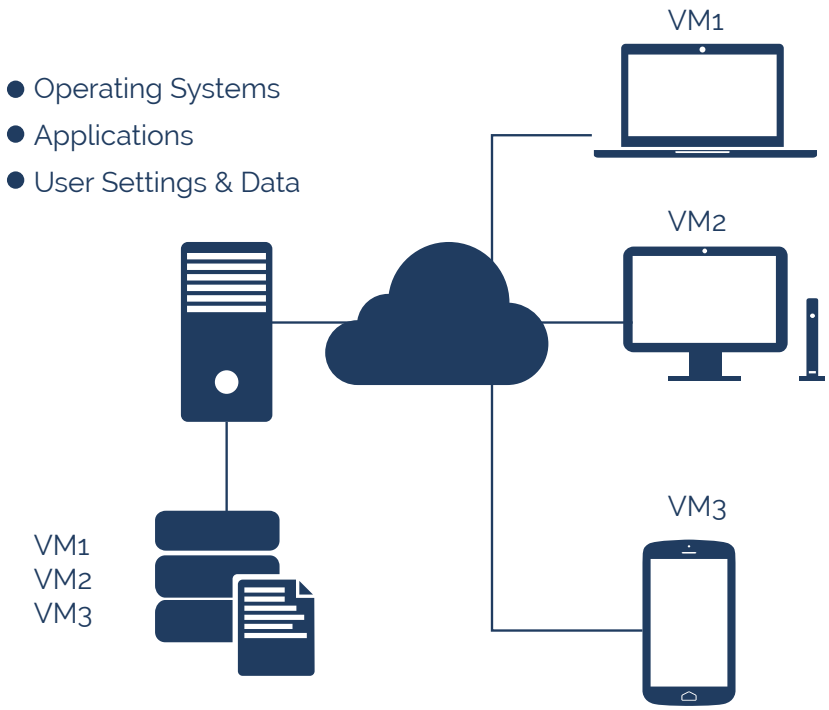
This provision of desktops does not require as many resources as virtual desktops, but it also does not allow users to install their own applications, personalize the environment, or have administrative rights.[1]

1 Kline, Sean: What is Desktop Virtualization? VDI vs. Session Virtualization (2011), URL: http://www.turbotekcomputer.com/resources/small-business-it-blog/bid/52886/What-is-Desktop-Virtualization-VDI-vs-Session-Virtualization (June 20, 2014)

B) Server-session-based apps (RemoteApp)

In the sessions area, it is also possible to provide users with individual Windows-based programs instead of complete desktops by using **RemoteApp**. The RemoteApp is installed on the Windows server1 (as part of the RD Session Host role service) and the users can access it via their local applications (via the terminal services) as well as remotely.

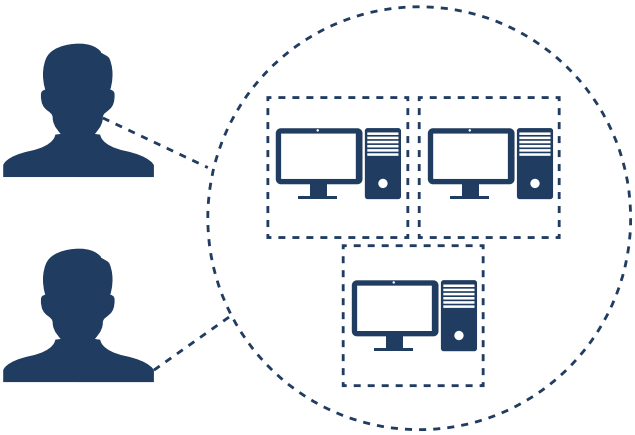
C) Virtual desktop infrastructure



In general, **virtual desktop infrastructure** can be described as follows: VDI makes it possible for complete virtual machines, including the operating systems, applications, and user data to be run on a Windows server.

Microsoft subdivides virtual desktop infrastructure further: The virtualization of desktops not only involves transferring traditional Windows installations, along with applications and user settings, to the data center. The management cost of hundreds and thousands of individual images would be too great and the costs of storage far too high. Depending on the requirements, two virtual desktop variants have therefore developed - pooled and personal virtual desktops.

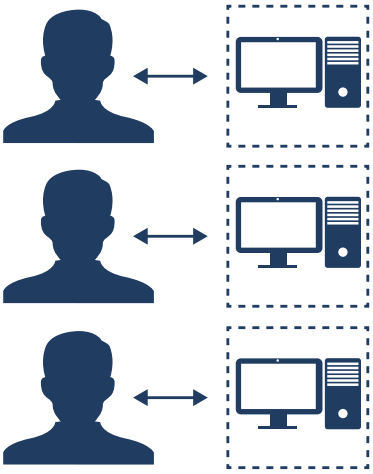
C1) Pooled Virtual Desktops



The simplest possibility to provide virtual desktops is the pooled variant. This can also be described as a non-persistent desktop. Here the virtual machines, configured in specific groups on the Remote Desktop Session Virtualization Host (➔ this is the Remote Desktop role service contained on the Windows server) are grouped together in a standard image. Users can then access this as they wish, by means of the Remote Desktop Connection Broker (The mediator between the respective client and the virtualization host) for a single session.

All users see the same desktop and cannot undertake any permanent personal changes. If the user leaves the session, all the changes are rejected. When a new login takes place, everything looks just as it did at the start.

C2) Personal Virtual Desktops



There is the possibility of personal virtual desktops for personalized desktops. These can be described as the virtual counterpart of the personal computer in the physical world. The user is connected to the virtual machine (via the Remote Desktop Connection Broker), that is only available to him. Assuming the appropriate rights exist, the user can install programs there and adjust the system, and the changes will remain after the end of the session.

1.2.2 Cloud

In the desktop virtualization field, Microsoft offers cloud computing as an alternative or an additional component. Microsoft Azure is the basis of Microsoft's cloud operating system.

Essentially, all remote desktop services that are offered on-premises are also possible in the cloud. The applications and databases are available in the cloud and are used on a network basis.

Two offerings should be mentioned in the remote desktop service area:

A) Infrastructure as a Service

B) Azure RemoteApp

A) Infrastructure as a Service (abbreviation: IaaS)
With "Remote Desktop Service in IaaS," it is possible to provide virtual desktops or machines and networks on your own server which is in the cloud. These servers are managed by Windows.

IT can therefore transfer the VDI infrastructure to the cloud and no longer has to worry about purchasing and setting up servers and databases in its own data center. Test runs and integration into the network can also be avoided. In the traditional way, all this can last for up to six months, but with Microsoft Azure everything takes place far quicker. Only a few clicks are needed in Microsoft's online management portal[1] to set up the server and provide it with all the virtual components required for the user on the server. Since the launch of Microsoft Azure three years ago, at first only "Platform as a Service" was offered, but since April 2013 Microsoft claims that the general availability of IaaS is assured.

1 http://bit.ly/1qG8Kaw

B) Azure RemoteApp
Another cloud service is the Azure RemoteApp. Here (as in the on-premises version of RemoteApp), applications are provided on Windows, Mac OS X, iOS, or Android devices. The difference is that these applications run on a Windows server in the Azure cloud and are already set up and completely ready. Users have remote access to the apps from their tablets, smartphones , or laptops via the Internet (as an option parallel to other locally provided applications or those provided via IaaS). Azure RemoteApp (taking the example of Microsoft Word, PPT, and Excel) is currently in the Beta phase.

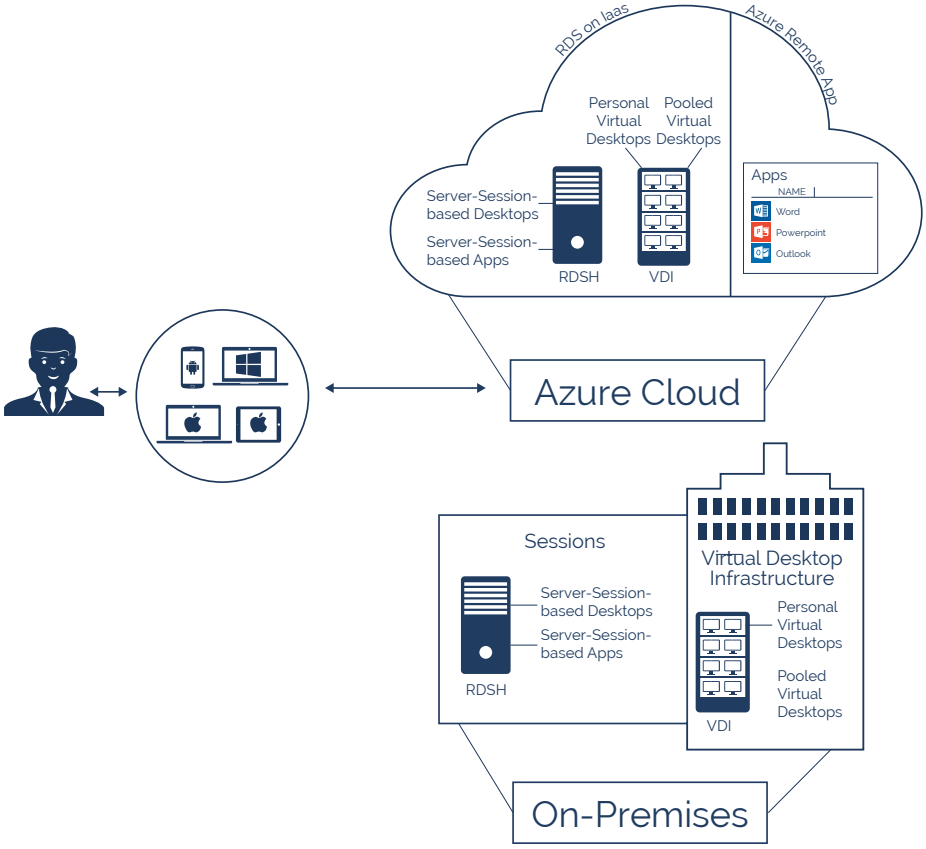
1.2.3 Hybrid environments

The **virtual network** and the **virtual machines in the cloud** can be seamlessly connected to the customers' data centers, according to Microsoft. Thus companies can flexibly combine on-premises solutions with cloud solutions.

For example, different user groups can be supported in different ways and/or different procedures can be used for different applications. One and the same user can, for example, use different applications from the cloud and from on-premises servers at the same time, ideally without even being aware of this himself.

This scenario is particularly interesting for the gradual expansion of customers' existing on-premises infrastructure with cloud solutions. One motive for this may be the rapid scaling of existing on-premises solutions, another a slow migration into the cloud. If the cloud turns out not to be the right option after all, it is always possible to change back to a purely on-premises variant.

2. Summary: Central and simple productivity solutions for staff, companies, and IT administrators



Microsoft has pledged that users should be able to access practically any application and Windows environment irrespective of time and place. For this purpose, the focus is on the central management of the different user scenarios. The crucial factor is the natural and uninterrupted user experience. According to Microsoft, the employees' individual user interface "… remains the same on different devices. Thus companies can offer their employees flexible, location-independent work and at the same time standardize compliance and management by means of a centralized and unified infrastructure on a more comprehensive platform. […] Microsoft desktop virtualization thus enables IT to standardize IT operations with physical and virtual resources on a centralized infrastructure."[1]

1 Microsoft: Microsoft Desktop Virtualization, URL: http://www.microsoft.com/en-us/windows/enterprise/products-and-technologies/virtualization/default.aspx (June 20, 2014)

Up to now, the major disadvantage of Windows virtualization was that a variety of dispersed tools were required to set up and manage the virtual environment. In addition, this management was separated from the management of the Remote Desktop Session Host. Here 2012 R2 is helping by introducing the plugin to the Remote Desktop Management Service (RDMS) for the new server Manager. RDMS is a central management console for all RDS roles. Thus, the IT administrator can install resources such as software programs centrally and then distribute them according to groups and users.

At this point the technology package RemoteFX should also be mentioned as part of the RDP protocol, which optimizes usage via WAN connections. A variety of measures are used to accelerate data transmission and thus reduce the bandwidth requirement for the provision of virtual desktops.[1] Remote FX was already part of Windows server 2008 R2.

However, after explaining Microsoft's virtualization solutions, the question arises of how the printing process can be integrated into the various scenarios. This is because here too, managing everything centrally, productively, and simply is also a priority.

3. The Challenge of integrating printing systems into Microsoft's virtualization solution

However versatile the presentation of Microsoft's desktop virtualization universe, the topic of printing is often overlooked in this context. This can seriously impair the user experience in virtualized environments.

However the user must also be able to print. Ideally he must be able to do so without even without noticing that he is working in a virtualized environment or without the user becoming aware of the change in IT.

3.1 What problems arise when printing?

There are some factors in the printing process during desktop virtualization that have a major influence on printing and productivity.

The user experience regarding printing behavior is mainly influenced by **a)** how quickly the printout is ready, **b)** how good the printout quality is, and **c)** to what extent the virtual system is adversely affected by the printing process.

1 Microsoft: Microsoft RemoteFX (2011), URL: http://technet.microsoft.com/en-us/library/ff817578%28v=ws.10%29.aspx (June 20, 2014)

Load behavior

On the hardware side, Windows PCs are well equipped for most use cases. Typically, current processors and sufficient RAM do not cause bottlenecks for print jobs. However with the case of desktop virtualization, things look very different. Here, the **users share CPU, RAM, and hard drive capacity**. Even if Microsoft straightens out this bottleneck through dynamic resource management, so that the users do not influence one another so negatively, the printing process can seriously hinder users in accomplishing their tasks.

Without proper regulation, the printing process absorbs all the resources it can get. This can lead to considerable latencies and even to the user feeling that his session is freezing.

Bandwidth

It is quite clear that the available bandwidth has increased considerably in the last few years and Microsoft has, for example, improved its connection protocols through compression. On the other hand, applications are also becoming more and more "bandwidth-hungry." Videos impose a considerable strain on the lines, for example. It could be said that greater bandwidth increases the demand in general for bandwidth, which means that bandwidth-saving services remain very welcome.

With remote and virtual desktops, the application is often located far away from the user's printer. However, printing is normally launched directly in the application. In the process, print data can assume huge dimensions, compared to the original size of the file. For example, a PowerPoint presentation of 1.67 MB is enlarged to 218 MB during the printing process. During printing itself, a considerable increase in graphic elements and scanned images (one example of this is embedded images in PDF files) can also lead to larger print jobs, which in turn reduces the advantages of the increase in available bandwidth.

For this reason, the available bandwidth is important on the one hand for the print speed, but on the other, large print jobs put pressure on the line, which is being used for other processes at the same time.

Another point on the subject of bandwidth is that, depending on the setup of the IT infrastructure, the transfer volume becomes an additional cost factor for services in the Azure cloud. On top of the actual hosting charges for the servers and server services, there are extra costs for the data transfer.[1] A considerable part of this cost falls on the print services.

Stability and driver compatibility

Desktop virtualization, whether on-premises or in the cloud, imposes serious demands on the stability of the network. The reason for this is that when problems arise, they affect not only individuals, but many users at the same time.

Stability is closely connected to the issue of whether the printer drivers are compatible with the RD Session Host technology and the printers currently in use. In order to enable as inexpensive and smooth a printing process as possible, in many cases today companies use virtual desktops with universal printer drivers. Thus the number of drivers on the Remote Desktop Session Host servers is kept to a minimum. However, the drivers then have to be installed on all client systems (which is impossible, for example, with many thin clients or iPads). Usually, universal printer drivers can also only give reliable support to the standard functions of printers and also

1 Microsoft Azure: Data Transfers Pricing Details, URL: http://azure.microsoft.com/en-us/pricing/details/data-transfers/ (June 20, 2014)

cannot support all printer models. That is a particular problem with multi-function printers with advanced functions such as finishing options (➔ punching, stapling, and folding, etc.).

Even with virtual desktops, the appropriate technology is required to avoid having to install printer drivers on the individual virtual machines. However, this means in the end that administrators are constantly having to worry about updating the printer drivers. This is an expensive exercise that ultimately leads the idea of virtualization to absurd results. Thus, printing can become a horror subject for IT administrators, even though originally it was rolled out to make everything easier. It becomes particularly complicated when the servers are already based on 64-bit Windows systems and so no-one can use the traditional 32-bit printer drivers any longer. This means that special 64-bit versions of the printer software are required. However, for many older printer models such drivers do not exist and they are no longer being enhanced for 64-bit systems.

Integration of print servers

In order to avoid manual installation of printer drivers on remote or virtual desktops, one option is the use of print servers. These are already available in many companies for other purposes. If a print server is used in combination with RD Session Host or virtual desktops, printer drivers are loaded to the RD Session Host server by default via Point and Print. However, this ultimately leads to reduced network stability, since the printer drivers ultimately are transferred back to the RD Session Host server and thus may adversely affect the Remote Desktop Services. In addition, printing takes place on print servers using TCP/IP. Thus the benefits of RDP/Remote FX are not available (which brings us back to the subject of bandwidth) and printers on the client side (e.g., USB printers) cannot be dynamically integrated into the session. Printers in masked networks can also not be addressed.

Another challenge when using print servers with remote or virtual desktops is the question of how to provide every user with the desired printer automatically if possible.

V4 driver model

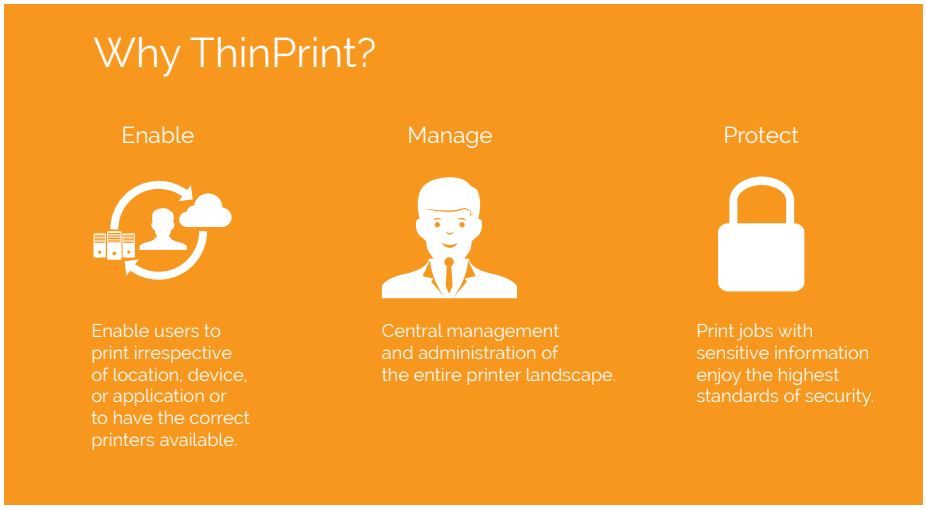
Another approach of Microsoft to simplify driver management is the new V4 driver model. This is intended to minimize the number of native printer drivers on the RD Session Host. However, the prerequisites for this are Windows Server 2012 R2 and Windows 8 clients (with installed printer drivers). In times of Bring Your Own Device (BYOD) and increasing mobile use, this is a massive restriction, and in many cases an impractical one. Furthermore, printer manufacturers also presuppose the provision of V4 drivers. However, this does not apply to all printer models, and ultimately not all print functions can be offered on the devices supported.

3.2 Summary

IT feels trapped in an endless loop of printing problems that have an adverse effect either on the architecture structure, the choice of hardware, the print performance, or the print quality. In many remote or virtual desktop projects, these challenges may represent a knock-out blow. Fortunately there is a solution for all of these problems: ThinPrint.

4. The ThinPrint printing solution in combination with Microsoft Desktop Virtualization

Desktop virtualization is all about reducing resources and costs, maintaining employee productivity at the same level irrespective of where and when they are working and which device they are using, and at the same time enabling central management. This strategy should not be frustrated by printing. The three key arguments for desktop virtualization from Section 2 can all be applied to ThinPrint simultaneously.



The good news: All the challenges discussed in Section 3 dealing with challenges presented by printing on virtual desktops, can be overcome with ThinPrint.

4.1 On-premises and cloud computing

ThinPrint can be integrated perfectly and simply into the session environment and virtual desktop environments of Microsoft both on-premises and in the cloud (as Infrastructure-as-a-Service - IaaS-service) or when using Azure RemoteApp). There are many flexible possibilities for integrating ThinPrint. However, all the options are ultimately based on three solution architectures:

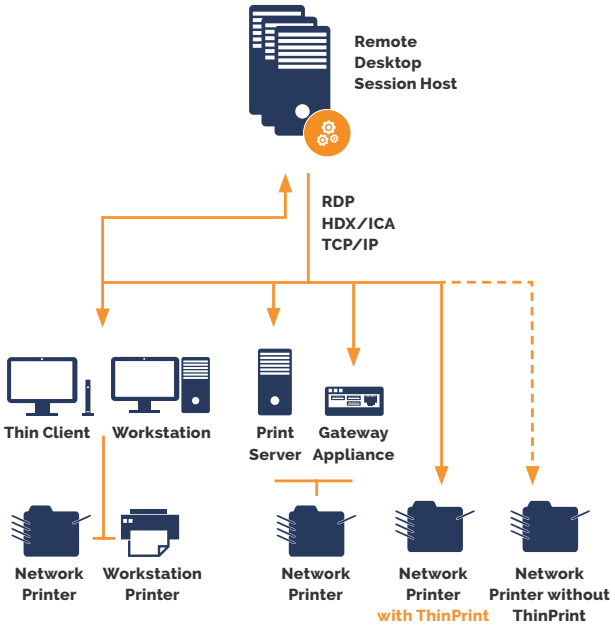
1. ThinPrint on RD Session Host...
...is the simple and quick solution for all session-based Microsoft solutions, whether for entire desktops or individual applications (RemoteApp), as on-premises or as IaaS in the cloud.

2. A dedicated ThinPrint server...
...is the solution architecture for virtual desktops. It offers many additional benefits. That is why we also recommend it in most session-based scenarios.

3. ThinPrint Cloud Printer...
...enables printing to be transferred to the cloud as a service. No server software components are required. ThinPrint Cloud Printer is therefore the ideal solution in combination with Microsoft Azure RemoteApp and for printing from native apps (e.g., from Apple or Android devices).

4.1.1 ThinPrint on RD Session

ThinPrint Engine software can be easily installed with on all RD Session Host server(s) in just a few clicks. To take advantage of all the benefits of this solution, a ThinPrint client component should be used. This can be installed on the clients (Windows, Mac, Linux, broad support for almost all thin clients on the market is also guaranteed). The client component can also be integrated as a service on local print servers or in particular printer models. It can also be obtained on gateway appliances (for directly supported printers and print servers, see http://www.thinprint.com/en-us/resourcessupport/resourcecenter/supporteddevices.aspx).



An overview of some of the most important functions for these scenarios:

Driver-free printing

When using ThinPrint you no longer need any native drivers on the RD Session Host server(s). The **ThinPrint Output Gateway** will ensure this. This is the virtual driver used on the Remote Desktop Session Host services, which replaces all the printer drivers there. The respective native drivers are only found on the clients. This avoids driver conflicts and a slowing down of RD Session Host server application processes. The printer drivers are only installed on the client PCs or on local print servers (if available). The following is also important to note: The ThinPrint Output Gateway supports all printer models, along with special print functions such as finishing options of multi-function printers (punching, stapling, and folding, etc.). When printing, the user is given a user interface for all printer models so that he always finds the various functions in the same place.

Advanced adaptive compression

The unique print data compression of ThinPrint analyzes the individual components of the print job before transfer and compresses them with the best possible algorithm. Thus up to 98 percent compression can be achieved for every print job. In addition, the level of compression is optimized to fit the available bandwidth.

ThinPrint compresses print jobs for its own virtual driver (the ThinPrint Output Gateway), but also for use with native drivers. Thanks to ThinPrint, a low data volume for

printing is guaranteed on all connection paths, from the client to server, during session-in-session printing, from server to client, and even up to the printer, if desired.

Bandwidth control

With ThinPrint you can check precisely how much maximum bandwidth printing will require. Thus the remaining bandwidth is available again for the respective session or for other desktop functions. Thanks to the unique, connection-oriented bandwidth control, this is also possible when multiple users are printing at the same time.

Performance tuning

Streaming the print data launches the print transfer and thus also the printout immediately, or as soon as the first page has been processed, not merely after the processing and transfer of the entire print job. In addition, **SpeedCache** checks every print job to see whether it contains repeated graphic elements. If that is the case, they are not unnecessarily transferred on several occasions, but only once.

AutoConnect

AutoConnect, ThinPrint's flexible printer mapping service, always flexibly displays the desired printers when accessing virtual or physical desktops.

Encryption

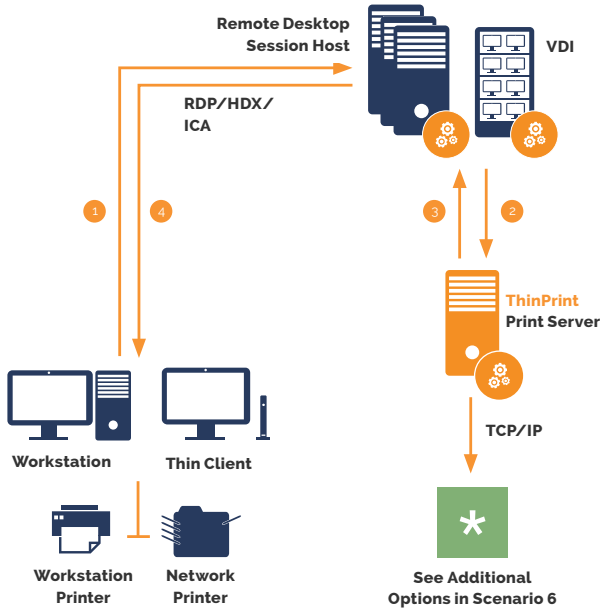
Print jobs may contain sensitive data. With ThinPrint you can protect print data from the server to client with SSL/TLS encryption, depending on the scenario and the hardware used, right up to the printer itself.

The advantages at a glance:

- Long waits for printouts are a thing of the past. The printout is launched straight after the first page is processed and rapid, data-optimized transfer is ensured.
- Sessions and remote applications run smoothly and simply, and are not hindered by driver conflicts and bandwidth bottlenecks caused by print jobs that are too big: no session freezes.
- Expensive server-side installation and administration of printer drivers are avoided.
- Flexible use of all printer models and all manufacturers, including finishing options (punching, stapling, and folding, etc.).
- No printing problems even in environments in which 32/64-bit systems are being operated together.
- The correct printers are available to the users in every session.
- Seamless integration of home office users and printers.
- Security for sensitive print data.
- Even if network printers are addressed directly, they benefit from compression and encryption.
- Full control and a reliable network through connection-oriented bandwidth control.
- With ThinPrint, printing is quick, easier to operate, and delivers reliable results. This ensures a high level of user acceptance.
- Administration of the printers and print-related help desk inquiries are reduced to a minimum.

4.1.2 Virtual desktops: The ThinPrint server

A ThinPrint server is used for virtual desktops. Since there are many additional benefits, we recommend this solution for many session-based scenarios as well. The ThinPrint Engine software can either be used on already existing print servers or on a dedicated server, which for practical reasons can easily be a virtual server. It is unimportant for ThinPrint whether virtual desktops on-premises or as part of IaaS in the cloud are involved.



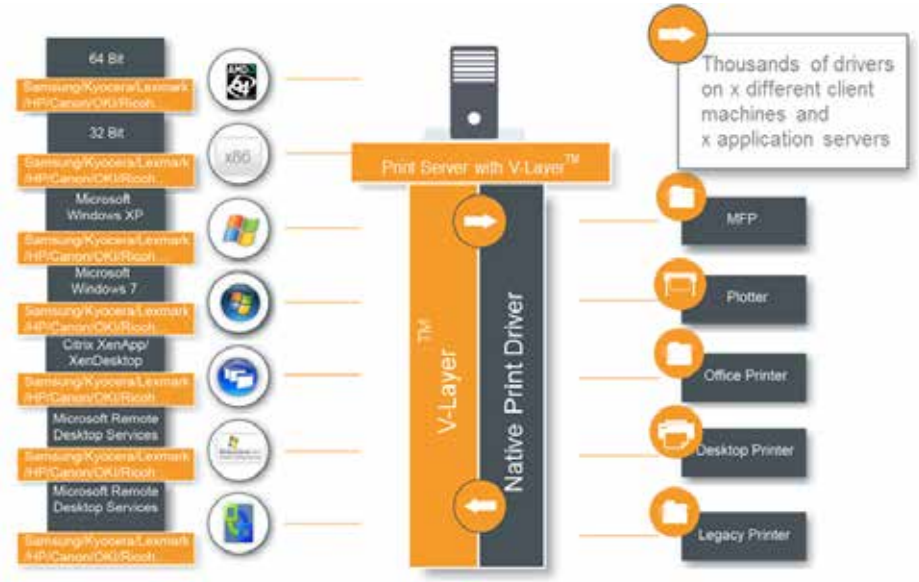
On the virtual desktops themselves, only the ThinPrint Desktop Extension is required, which is a free software component of ThinPrint for VDI environments.

The most important additional functions for these scenarios at a glance:

In this scenario, all the features and benefits come into their own that ThinPrint also offers without a print server. These were described in the previous section (see 4.1.1/ Some of the most important functions for these scenarios at a glance) and are not repeated here. Instead we will present the additional options and benefits offered by the ThinPrint server.

V-Layer™

Thanks to ThinPrint V-Layer™ technology, all clients – virtual and physical desktops – are kept free of native drivers. The original printer drivers are stored centrally on the print server, and everywhere else, only the virtual printer driver, the ThinPrint Output Gateway, (see 4.1.1/Driver free printing) is used. Thus, not only the Remote Desktop Session Host server and the virtual desktops concerned are freed from native printer drivers, but also the client PCs. For example, all the challenges concerning printer drivers can also be avoided through the combination of virtual desktops and thin clients.



V-Layer™ could be described as the central translator on the print server. The print job is first transferred via the ThinPrint Output Gateway, irrespective of devices. Thus it does not matter either which operating system is running on the physical workstations and thin clients (e.g., Windows 7, Linux, Mac O,S or Windows Embedded Compact 7). Matching with the appropriate native printer driver takes place on the print server, and as a result, also the translation or further transmission to the printer selected by the user.

Virtual Channel Gateway

Print servers print to computers, network printers, or appliances using TCP/IP – without any detour via the RD Session Host server or virtual desktops. However, if TCP/IP is not possible as a printing protocol (e.g., when printing in the home office), or not desired (e.g., with masked networks), the ThinPrint Virtual Channel Gateway permits these print jobs to be sent to the clients via the virtual channel of the RDP connection. The Virtual Channel Gateway receives the print job from the central print server, readdresses the data packages from TCP/IP to RDP and thus sends the print job to the user during the session.

Reporting/tracking

The ThinPrint Tracking Service monitors the entire print environment and in the process records printing activities across the company. With this component, print jobs and paper consumption can be assigned to individual printers and user groups. The web browser can be used to evaluate the information recorded during printing in a flexible and detailed way. Companies can use a straightforward graphic presentation to investigate what are the main causes of high printing costs and to identify appropriate potential cost savings. Building on this knowledge, capacity can be uti-

lized better and hardware can be deployed more efficiently. The ThinPrint Tracking Service meets internal and external compliance and auditing requirements in all sectors.

The additional advantages at a glance:

If you are starting to read at this point, please note the additional advantages listed under 4.1.2.

- Seamless integration of Microsoft VDI into the print environment.
- Significantly less time expended in managing printers and printer drivers.
- The virtual desktops can largely be freed from the strain caused by printing processes = stability and considerably improved utilization of resources.
- Flexible use of diverse client hardware with virtual desktops, with no disadvantages for printing. Thus driver-free printing and cost-saving thin clients can be combined, for example.
- Use of any existing print servers also for printing from virtual desktops.
- Print server consolidation by centralizing the functions on a central ThinPrint server.
- Even when users make use of virtual desktop applications on the Remote Desktop Session Host server, they are provided with the correct printers, with all the ThinPrint benefits.
- Printouts can also reach local printers or home office workstations without administrative expense (➔Virtual Channel Gateway, see 4.1.2/ The most important additional functions for these scenarios at a glance).
- Ability to control printing behavior within the company and reduce costs in a targeted way.

4.2 Hybrid scenarios

As described, one particular attraction of the Microsoft virtual desktop offering is the fact that the existing on-premises infrastructure can gradually be expanded, for example, for the rapid scaling of existing on-premises solutions or for a steady migration into the cloud.

ThinPrint can also be integrated easily in the event of cloud expansion. Assuming that you are already using ThinPrint on-premises on a dedicated print server or on the RD Session Host, the ThinPrint print server can be transferred to the cloud as a virtual server at any time. If no on-premises print server is being used, it is equally simple to install the ThinPrint Engine on the Windows server in the cloud.

A further advantage when ThinPrint is used in hybrid environments is the ThinPrint Management Center, with which the entire print landscape can be centrally managed. This provides you with a comprehensive overview of the hardware, drivers, clients, and branches. At the same time, it allows the print system to be included when migrating Remote Desktop Session Hosts or virtual desktops from the datacenter to the cloud. The Management Center is also suitable for "disaster recovery," since a backup of the SQL database can be performed with all the printers set up. This data is not lost even in the event of a system crash, for example.

4.3 ThinPrint Cloud Printer

ThinPrint also makes integration of the print environment easier in the Microsoft cloud. In the case of Microsoft Azure RemoteApp, users access the apps in the cloud remotely from their tablets, smartphones, or laptops via the Internet. Since there is no server connected to the printers and apps in the cloud, Thin Print's Cloud Printer is used here. This enables universal printing in this case as well. This also applies to **Microsoft's mobile office package for iPhone and iPad**. Since March 2014, Microsoft Office (Office 365) has also been available for mobile Apple devices. In this way, Microsoft and Apple are responding to the fact that that the Office package remains the most popular professional productivity application. Here too, Cloud Printer is ideal to use.

Cloud Printer is installed as an additional app on the mobile device and the default printers suitable for the user can be called up via the app. For example, if the user wishes to print from a Microsoft application, he opens the Cloud Printer app. Then he selects the desired file, it is prepared with an appropriate driver for the printer by the ThinPrint Cloud Printer and printed out directly on the printer chosen.

Summary

Companies are relying more and more on the introduction of desktop virtualization. With Windows Server 2012 R2 and the cloud computing solution Microsoft Azure, Microsoft has put together a package that provides comprehensive support for virtual desktops. Microsoft desktop virtualization includes on-premises sessions and virtual desktops (here there are personal virtual and pooled virtual desktops) and cloud computing with Microsoft Azure (IaaS and RemoteApp). However, along with the many benefits that desktop virtualization undoubtedly brings, the subject of printing should never be ignored. Printing is essential for a positive desktop experience and is a major challenge, in particular in virtual, distributed environments. Thus printing must be incorporated into the virtualization strategy from the outset. The difficult areas here are printer driver management, printer selection, and local and network printing.

ThinPrint can solve all this without any problems. No printer drivers need to be installed on the virtual machines or the RD Session Host servers. With ThinPrint, the stability of the server and the network is ensured. Another factor is that thanks to ThinPrint, the available bandwidth during WAN printing or WLAN printing and the load behavior in the printing process is greater in virtualized environments. In addition, the user is always provided with the correct printer with a standardized user interface in sessions, virtual desktop infrastructures, or in the cloud.

With ThinPrint, your VDI environment benefits from comprehensive print support, regardless of whether or not you are using a central print server:

- **Driver-free printing:** On the images or templates, only the virtual printer driver, the ThinPrint Output Gateway, is installed. Original printer drivers are only used where this makes sense and they are easy to manage. The virtual desktop remains driver-free. Result: Guaranteed high-performance printing in every VDI environment.
- **Optional central print server:** ThinPrint can also be used without a central print server. However, it is beneficial in most VDI environments to concentrate the printing process, printer driver management, and print management in one place.

- **Always the correct printer:** Thanks to the ThinPrint AutoConnect component, e the correct local and network printers are always available to your staff during the session. The IT department will set up a Group Policy on which printers are provided to specific users or desktops.
- **Maximum easing of the strain on the network:** Thanks to ThinPrint's advanced adaptive compression, print data is compressed to the maximum extent and transferred in an optimal way in relation to the available bandwidth. On every print job, ThinPrint compresses and reduces print data by up to 98 percent.
- **Connection of branch offices:** The Virtual Channel Gateway allows virtual desktops to print in masked networks, even when using a central print server.
- **Session-in-session printing:** Even if your staff first connect with their virtual desktop and then open an application on the terminal server (e.g. XenApp), the correct printers will continue to be displayed from the session first opened.
- **Quick, reliable print results:** ThinPrint technologies such as streaming or caching the print jobs, intelligent font management, and support for almost all advanced print options ensure the speedy delivery of constant high-quality printouts where they are needed.

Additional white papers or questions:
You can download this and many other white papers on relevant IT subjects here: **www.thinprint.com/whitepaper**

What customers think of ThinPrint?
Independent, third-party research on how customers view ThinPrint products can be found at: **www.techvalidate.com/product-research/thinprint**

Any questions?
The Cortado experts are happy to help. Contact us via one of our local offices listed on the next page or send an e-mail to **info@cortado.com**

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