WHITE PAPER

VMWARE AND FUJITSU – JOINT SOLUTIONS FOR DESKTOP VIRTUALIZATION

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1 Abstract

Desktop virtualization has initiated intensive discussion concerning the best methods for delivery and management of IT workplaces. Many organizations have taken advantage of virtualization technologies in their data centers and naturally consider the advantages that virtualization could bring to the desktop environment, too. VMware® is a pioneer in desktop virtualization and the leading provider of virtualization technologies. Fujitsu is known for best-in-class infrastructure products and services across all project and lifecycle phases. Based on market leading virtualization technology from VMware, Fujitsu offers Virtual Workplace, flexible end-to-end desktop virtualization solutions, designed to assist customers in improving service quality whilst reducing cost and delivering a great end user experience at the endpoint device.
2 Fujitsu and VMware – together since the beginning

As a VMware worldwide OEM partner, Fujitsu has offered VMware virtualization technologies in its infrastructure solutions from the very beginning. There is a huge joint customer base with a considerable number of attractive use cases and success stories. Fujitsu PRIMERGY® servers and ETERNUS® storage systems are certified for the latest releases of VMware ESX Server resp. vSphere®, and for VMware Site Recovery Server. In fact, the first server ever shipped with an embedded ESX hypervisor was a PRIMERGY server from Fujitsu.

Both companies are working closely together to deliver value-add virtualization solutions and services. Fujitsu has integrated the ESX hypervisor into the FlexFrame® for SAP® solution and uses VMware virtualization technologies in its “Infrastructure-as-a-Service” offering, which are both key building blocks of the Fujitsu Dynamic Infrastructures strategy.

When VMware expanded its portfolio to desktop virtualization, it was quite natural for Fujitsu having a full portfolio of client access devices to expand the existing collaboration to VMware’s View technology. As a core component of the Virtual Workplace infrastructure solution, Fujitsu offers VMware View to customers, who want to extend the benefits experienced with server virtualization to their client infrastructure. In most cases, the step from server virtualization to desktop virtualization is quite a simple one, requiring only that an organization expands the existing virtualized server infrastructure to execute desktop operating systems instead of server operating systems. To ensure highest compatibility FUTRO® Thin Clients and the Zero Client from Fujitsu are fully certified for VMware View too, and constitute optimal access devices or a VMware View environment.
3 Virtual Desktop Infrastructure (VDI)

How can organizations manage desktops more efficiently? How can company data on desktops and notebooks be protected from theft and loss? Which solution is ideally suited to be implemented in remote offices? Are there any alternatives for traditional PC architectures?

These are typical questions expressed by organizations seeking to provide optimized client infrastructures. Over time, many answers have been found, such as simple text terminals, net-boot clients, solutions for terminal services and fully managed desktop infrastructures.

Virtual Desktop Infrastructure (VDI) represents the latest approach. Based on virtualization technology, VDI differs dramatically from previous solutions: VDI offers more choices, increased business assurance, and multiple benefits such as simplified management and rapid desktop deployment. Additionally VDI delivers a much better answer to a very critical success factor of all IT client solutions; the acceptance by the end user. With VDI users work in a fully functioning and highly productive desktop environment, enjoying a great user experience, almost indistinguishable from fat client desktop solutions they have already used, quashing any acceptance issues. For IT administrators, VDI reduces the work spent for deploying, patching and upgrading desktops, and can offer the organization the ability to migrate to new versions of operating systems or applications easily and quickly in response to business requirements. Finally organizations can reduce their overall costs whilst operating a more secure, more flexible and more stable desktop infrastructure.
4 Solutions from market leaders

Changes made to the IT architecture often means subsequent changes to technologies and processes, which in turn may introduce significant risks. Experience shows that most organizations require tested and proven end-to-end solutions, which assure a seamless and trouble-free adoption of the new IT architecture, as opposed to selecting individual components and integrating them using their own IT resources.

Organizations deciding for the Fujitsu Virtual Workplace solution can count on best-in-class infrastructure products, profound knowledge and experience, and market-leading virtualization technologies from VMware. The opportunity to obtain everything from one source simplifies adoption and reduces risk.

4.1 Fujitsu infrastructure products

An essential part of such end-to-end solutions are robust servers, storage systems and access devices. Fujitsu has been successfully delivering these for a long time in the form of PRIMERGY servers, ETERNUS storage solutions, FUTRO Thin Clients and the new Zero Client, notebooks and other PC products to customers. However, understanding all of the components including VMware’s virtualization products, such as vSphere and View, as well as guest operating systems and applications, is a critical and important factor, whilst assessing this in the context of the specific situation and requirements a particular customer has.

4.2 Proof of Concept and cost reduction guarantee

Fujitsu offers – on or off customer premise – a Proof of Concept configuration, which enables organizations in evaluating, configuring, testing and tuning a future VDI production environment. While the Proof of Concept addresses all technical questions, Fujitsu offers very attractive complementary solutions for financing a VDI implementation in addressing budget questions too. Furthermore, Fujitsu can assure, that this solution will lower the overall costs compared with the cost of previous concepts. In this way, Fujitsu is able to offer a cost reduction guarantee for a period of time, which allows a financial risk-free implementation. With VDI, customers change to a better managed desktop infrastructure - with the support by Fujitsu, this change is technically pre-checked and mitigates any financial risks.

4.3 Market-leading hypervisor technology

Over the last 10 years VMware developed the leading hypervisor for x86 processors. Today VMware ESX Server is known as the most reliable, robust software, which customers can run on PRIMERGY servers today. On average, VMware customers achieve zero downtime over more than three years. Using this hypervisor for VDI will not only ensure the maximum of uptime – it will also allow customers to host a maximum number of virtual desktops for improved efficiency.
5 Offering flexibility in supporting change

The Fujitsu infrastructure product portfolio, as well as Fujitsu services and VMware View enable greater flexibility for customers in selecting desktop infrastructure solutions which meet their ongoing business requirements. In addition, by selecting Fujitsu, customers have a broader choice in selecting from a portfolio of flexible operation models, with complementary flexible financial support, enabling shorter project duration and a faster return on investment.

5.1 More choice for the end user device

VMware View currently supports almost the entire range of devices, employees are using for business purposes. The View Client, an application establishing the connection to the virtual desktop, supports traditional desktop PCs and notebooks with Microsoft® Windows® and Linux® operating systems in addition to cost- and energy-saving FUTRO Thin Clients, and the most energy efficient and maintenance-free Zero Client solution.

Additionally, VMware View supports a new trend in IT: Employee-owned devices. Instead of purchasing PCs or notebooks, companies encourage their employees to purchase their own PC or notebook, which then of course can also be used for private purposes. Very similar to well-established company car policies, the employee has the freedom to choose the device most suited to his or her requirements. Such a concept not only increases the motivation of employees in using computer technology; typically the user handles a “private” device with more care, so that outages of such devices are reduced.

5.2 More choice in delivering user- and work-specific desktops

VMware View allows the creation of different virtual desktops, which cover usage models which are designed to either meet specific user requirements or support specific application sets. In this way, user requirements such as highly secured virtual machines, sophisticated environments with additional applications or just a simple database access client are easily realized with virtual desktops. VMware View can also deliver a desktop for a single application, making such a desktop available for all users - in addition to the user-owned desktop. Users can therefore decide during their logon process between those virtual desktops and could use, for example, a specific desktop for selected applications to support specific tasks.

5.3 More control over major software version upgrades

Within many IT departments the rollout of a new version of the Microsoft Windows operating system or applications is a complex task, which requires preparation and additional support after the upgrade. Virtual desktops greatly simplify and accelerate such rollouts and reduce preparation work as well as the subsequent support significantly. Due to the virtual hardware of a virtual desktop, all compatibility issues are eliminated. New software is tested once – for hundreds of virtual desktops. In addition employees can easily switch between the old and new OS versions with a simple logout / logon process. With the View component ThinApp, it’s even possible to run different versions of an application inside the same virtual desktop, which enables a smooth migration to a new application version.
5.4 Flexible support for the entire solution

Fujitsu is known for flexible and customer-oriented methods to support companies in managing their infrastructures. VDI offers more choices to manage and administer desktops. IT managers can opt for a complete self-managed approach, counting on Fujitsu support for VMware View in the context of their Virtual Workplace infrastructure solution. In this mode, customers continue to completely control and manage their infrastructure and are professionally supported by Fujitsu whenever necessary.

Alternatively, customers can opt for the Fujitsu Managed Services approach “Managed Virtual Workplace”. This option enables IT professionals to focus on business relevant projects rather than daily routine tasks related to maintenance and service of their virtual desktop infrastructure. The service delivery “Managed Virtual Workplace” is based on a customer-specific service level agreement, and the customer is charged on a monthly price per seat basis.

Even more flexibility and agility can be achieved by using the Fujitsu “Workplace-as-a-Service” offering. With “Workplace-as-a-Service”, the requirement for customers to invest in hardware and software is eliminated. Instead, Fujitsu hosts and maintains the customer’s virtual workplaces, in one of its data centers. This allows customers to simply sign service level agreements – all the remaining work of providing the infrastructure, as well as deploying and hosting virtual desktops is managed by Fujitsu.

Additionally, customers also have the flexibility in moving between the different services as they roll-out their virtual desktop infrastructure. Choosing “Workplace-as-a-Service” in the beginning is by far the most inexpensive approach. “Workplace-as-a-Service” delivers a quick and easy-to-implement solution for testing virtual desktops. For access to this service, existing PCs and notebooks can be used, eliminating the requirement for purchasing any new hardware.

Once the tests are successfully completed and a greater number of employees require virtual desktops, IT departments have the option to build their own infrastructure and just copy and paste the already-created virtual desktops from the Fujitsu data center to their own, without disrupting end user operation: users just continue to use their virtual desktops, without the knowledge that they are hosted elsewhere.

And finally, the customer can decide for the operation of a specific part of the virtual desktop infrastructure to be fulfilled by Fujitsu.

5.5 Solid and intelligent financial solutions

In this discussion an important enabler for companies deciding on realizing the benefits from virtual desktop infrastructures are the associated financing solutions. And again, companies are also well served by various Fujitsu options supporting customers in the purchasing process. One-off payments, leasing concepts, possibilities to rent any necessary equipment and even buy-back solutions are made available by Fujitsu. And this support is not limited to hardware equipment only; this support covers the entire project costs including software and services as well.
6 Business assurance

VMware View and Fujitsu infrastructure products are more than just software licenses and computer hardware. Once implemented and in operation, companies will experience many advantages, enabling them to become more competitive and agile in utilizing the advantages in driving and supporting their ongoing businesses objectives.

6.1 Business requirements are changing constantly

Today’s business requires more flexibility and agility. Companies are merged or acquired, and the success of mergers and acquisition often depends on the flexibility of the IT infrastructures in place. New business models such as outsourcing specific services or adding such services on a contractual basis require secure and fast IT adoptions. New business support tools are very often IT based, which creates the requirement for companies to adopt new technology faster than ever before. Off-shoring, expanding business to other regions, changing or adding go-to–market models, building and maintaining the web presence of organizations– there are many areas where a virtual desktop infrastructure provides better answers, enables faster reactions and increases the support in meeting business requirements.

6.2 New answers with superior Fujitsu support

Due to intensive analysis and tests Fujitsu delivers only proven and robust solutions. Virtual Desktop Infrastructure solutions are based on mature concepts, which help deliver reliable services from the very first day. A proof point can be seen in a contractually assured cost reduction Fujitsu offers to their customers.

As discussed, customers are free to test this solution themselves: they can either access the Fujitsu Proof-of-concept environment remotely, or enter into a customer-specific proof-of-concept in their own datacenters. Within the Proof-of-Concept, Fujitsu and VMware together support the customer in testing how such technologies meet the customer’s business objectives, in order to finally provide an optimum solution. A Try & Buy Package for up to 100 users makes the customer’s decision easier to get started in taking the first steps into the world of desktop virtualization.

Business assurance is not only provided by a better answer to changing business and a robust pre-tested solution. Business assurance is built into the technology as well. VMware View provides all the advantages of VMware’s hypervisor technology: Virtual desktops are automatically load-balanced using VMware VMotion® across available PRIMERGY servers from Fujitsu; they can be made highly available so that virtual desktops will restart automatically in case of a hardware failure. VMware VMotion allows the migration of virtual desktops from one server to the other without downtime.
6.3 New solutions with VMware technology

“Virtual is better than physical” – that’s definitely true for the operational security of virtual desktops. Virtual desktops are hosted inside a secure data center, where the IT administrator can use data center technologies also for desktops. High performance SANs, enterprise backup solutions based on central tape libraries instead of many individual tape drives, coupled with the physical security of a data center: virtual desktops can leverage from a great deal of already established solutions.

Likewise, virtual desktops are better protected against malware than physical devices. VMware VMsafe® enables to run virus scan engines, firewalls, intrusion detection systems or other security related software outside your virtual desktop. VMsafe is completely integrated into the hypervisor and allows such software to scan network and storage traffic of virtual desktops through that interface. Security software itself will run inside a complete protectable virtual appliance. Even with administration security rights inside the virtual desktop, it is not possible to stop security software, something that in comparison would not be possible in the case of a traditional physical desktop.
7 Why companies decide to change today?

Fujitsu and VMware experienced that their customers decided to change for a number of reasons. Many companies use virtual desktops to significantly reduce the risks they are faced with when using classical PCs and notebooks:

- Risk of losing confidential or business-critical data
- Risk caused by downtime due to hardware failures, viruses, incompatible software or just caused by the daily backup jobs running on everybody’s devices
- Risk of falling behind their direct competitors, not being able to adopt new technologies requested by their customers and partners fast enough
- Risk of delegating tasks to freelancers or external companies and granting them access to corporate data or tool kits
- Risks simply caused by replacing software versions or entire PCs

Another reason for deciding, and perhaps the most significant one, is seen in the achievable and significant cost savings by implementing the joint VDI solution from Fujitsu and VMware. It is important that companies evaluate the total costs of a specific solution over a given period. This will make cost savings more visible, since due to the initial investment, the direct cost of a virtual desktop could be equal or higher compared to a physical desktop device. Over time however customers will see, that VDI uses more reliable infrastructure: instead of less reliable PC technology, it utilizes more robust and high-performance PRIMERGY server hardware; much more reliable storage and backup systems and a hypervisor with the best available efficiency in the market. More reliable hardware represents one cost saving factor, but more important are the savings achieved in indirect costs.

In addition, all the management advantages only possible in virtual desktop environments, will pay off too, and will reduce the operational cost significantly.

Indirect costs are difficult to measure exactly, but several studies at the end of this whitepaper present the total cost including indirect costs of VDI in comparison with traditional physical desktop infrastructures.

As described before, Fujitsu supports customers with flexible financial offerings to realize cost savings already during the investment phase, so that customers can benefit financially and technically from VDI from the very first day.
8 Fujitsu Virtual Workplace with VMware View

The joint solution for a virtual desktop infrastructure contains several technologies, combined to address major customer requirements:

- **User experience**
  Enhanced display support, multimedia redirection, support for many peripheral devices, PCoIP protocol or offline desktop are keywords of functions, which deliver a better user experience than traditional architectures. Together with VMware’s leading desktop virtualization technology, Fujitsu completes this with powerful servers, storage systems and client devices. The new Fujitsu Zero Client provides unmatched user experience in delivering “just enough hardware” for accessing the virtual desktops.

- **Management**
  IT administration is enabled to manage virtual desktops more efficiently than with traditional physical desktops. Virtual desktops are given more performance, are forced to use secure connections and are booted from a single managed image. Fujitsu further simplifies management tasks with eLux, an operating system designed for thin clients. It allows a central management of the complete thin client and eliminates local onsite services. For Windows based thin clients, Fujitsu offers Altiris® Deployment Server for the same purpose.

- **Platform support**
  VMware View supports FUTRO Thin Clients with Microsoft Windows XP Embedded or the Linux derivative eLux RL. Both also run on traditional Fujitsu PC desktops and notebooks.

  An ideal endpoint for a virtual desktop infrastructure with VMware View is the Fujitsu new Zero Client, an intelligent front-end display device without processor, memory, power supply, operating system, software licenses or management.

  VMware View is now also fully compatible with VMware vSphere and vCenter, VMware’s business infrastructure management suite.

8.1 Fujitsu FUTRO Thin Clients

The product portfolio covers all envisaged requirements: all-round devices for standard office environments, advanced devices with lean configurations, and superior devices which are configurable to customer needs. For specific requirements, Fujitsu offers with the ESPRIMO C and E models even more powerful solutions, which deliver performance comparable with traditional PCs. Alternatively customers may decide for the ESPRIMO Mobile D, a mobile thin client solution based on standard notebook technology.

In addition to Microsoft Windows Embedded 2009, Fujitsu offers the thin client specific eLux operating system. It’s designed for thin clients and reduces the CO₂ footprint with an average power consumption of 10W. For both environments, the customer can select a dedicated professional management solution. eLux clients can be centrally managed using SCOUT Manageability Server, which offers complete remote management capabilities including power functions and flash memory management. With Microsoft Windows Embedded Standard 2009 Fujitsu offers both Altiris Deployment Server and Scout Enterprise for managing the installed software and applications.
8.2 Fujitsu Zero Client

The Fujitsu new approach on client devices for virtual desktops is designed for lowest energy consumption, zero maintenance and radically reduced complexity. This device is fully integrated into a TFT monitor. In addition, the Zero Client attracts even more interest since it will be possible to use Power-over-Ethernet technology, which makes it a real one-cable solution.

The ability to use Power-over-Ethernet demonstrates the maximally reduced energy consumption of the Zero Client. Since only one cable is required (wireless mouse and keyboard and one cable for network/power), any user can exchange such device in case of breakages. In addition, as the Zero Client does not require any local operating system, all maintenance and service work is eliminated.

This device is designed to work with VMware ESX/ESXi and delivers a stable, energy efficient and easy to operate client, which is universally accepted due to its unparalleled simplicity.

8.3 Fujitsu server and storage technology

In addition to delivering robust and flexible client devices, Fujitsu is ideally suited in supporting IT administration in the more important area of servers and storage systems in the data center.

Fujitsu offers PRIMERGY servers to satisfy every customer requirement. PRIMERGY servers are equipped with the latest Intel technology and are available as tower, rack mountable of blade server models. The PRIMERGY RX300 recently demonstrated best performance in utilizing VMware VMmark® benchmark when compared with servers from competitors. Almost all PRIMERGY servers are certified for the latest VMware product releases and are rigorously tested with VMware hypervisor and management products.

Fujitsu offers leading storage technology solutions and integrates products from Fujitsu, NetApp® and EMC® into virtual desktop infrastructures. This wide product portfolio allows customers to select the best available technology for their specific requirements. Fujitsu ETERNUS storage products are certified and compatible with VMware products, and they are integrated with VMware Site Recovery Manager, a disaster recovery solution for virtual machines.

8.4 VMware View

Hardware devices are one part of the complete solution. With VMware View, VMware delivers the hypervisor and the software for creating, delivering and hosting virtual desktops. With the latest version View 4.0 VMware introduced its own dedicated PC-over-IP protocol and enhanced its solution in many areas.

8.5 Enhanced Display Support

- Up to four monitors supported simultaneously
- Up to 1920 x 1200 resolution support (for each monitor)
- Variable resolution support (each monitor can have a different resolution)
- Clear Type font support
- Monitor pivot support for landscape (horizontal) and portrait (vertical) support
- 32 bit color support for delivering true color images
- CPU model name: Intel(R) Xeon(R) Nehalem CPU E5530 @ 2.40GHz

8.6 PCoIP Protocol

- Rich Media and Graphics – supports pictures/graphics and rich media such as video and flash content
Multimedia Redirection – redirects content to be rendered on the client device instead of the ESX server, and allows to use local resources for delivering the best user experience

Progressive Build of Graphics – sends enough bits of the image to be productive. Over time the full resolution image will be sent as appropriate.

USB redirection – Locally plugged-in USB devices will appear on the virtual desktop. This allows users to continue using mass storage devices, USB printers, scanners, etc. inside their virtual desktops.

8.7 Enhanced Single Sign-On (SSO)

Users of virtual desktops are not required to provide three times their credentials:

- Login at the access device (desktop PC or thin client)
- Authenticate with the connection server
- Log into the virtual desktop

Enhanced Single Sign On simplifies the authentication process and will ask the user only one time and pass the credentials to the other instances

VMware View also integrates with 3rd party SSO solutions to extend Single Sign On capabilities beyond View Manager and desktop authentication

VMware View supports the use of Smart Cards

8.8 Restricted Entitlements

Restricted Entitlements are used to control the user’s access to desktop pools based on the connection server being used to authenticate

Restricted entitlements can also be used to control desktop access based on authentication methods.

This enables IT administration to offer different desktops / applications to users, depending on their location or their authentication method
8.9 vSphere Support

Better scalability

- Memory Over-Commit - reduce memory required for each VM enabling better consolidation while minimizing cost
- Distributed Resource Scheduling (DRS) – ensure capacity on demand for CPU, memory, storage and network
- VM to LUN ratio – increase density and reduce storage costs to overall solution

Availability

- Concurrent Boot - improve performance for a large number of concurrent VMs boot ups (also known as boot storms)
- Suspend & Resume – improve performance for VM suspends & resumes to ensure desktop responsiveness
- VMware VMotion – ensure zero downtime, zero data loss failover for all virtual machines in case of hardware failures
9 Packaging

VMware View is licensed by the number of concurrent users. Therefore, it is possible to provide a single user more than one virtual
desktop without purchasing additional licenses. “Add-on” licenses are suitable for customers, using already VMware ESX Server and
vCenter. They can use these licenses to add VMware View to their existing virtual infrastructure.

Customers can start with a 10-user package (available for Enterprise and Premier Editions as a complete package, or as an “Add-on”
package). Or they select a 100-user package. They can expand the number of licenses in steps of 10 users. It is also possible to upgrade
from the View Enterprise to the View Premier Edition.

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10 View Enterprise Edition

View Enterprise is the entry solution for desktop virtualization from VMware and meets already the requirements of many customers. It includes the components vSphere, vCenter and View Manager.

10.1 VMware vSphere 4

VMware vSphere 4 hypervisor is the fourth generation of x86 hypervisors and was developed over more than 10 years. It is just a hypervisor – without all the unnecessary software and security issues you are faced with when using a classical operating system with an add-on hypervisor. The recently introduced new architecture for ESX (available as the ESX installable or ESX embedded, which is integrated inside PRIMERGY servers) is even more secure and highly performing, since VMware reduced the size to a few MBs and eliminates potential security holes by completely removing the console and the operating system required for the console.

10.2 VMware vCenter 4

VMware vCenter 4 is the central management server for all servers with a VMware hypervisor. It simplifies and accelerates the management of thousands of virtual desktops. With VMware vCenter 4, IT administrators can take advantage of the following important virtualization functions:

- **VMware VMotion for Servers and Storage**
  Maintenance with zero downtime by migrating running virtual desktops between servers and storage systems

- **VMware Distributed Resource Scheduling**
  Fully automated load balancing, by continuously migrating virtual desktops, depending on the current workload, to free ESX server resources

- **VMware Distributed Power Management**
  Significantly saving energy and cooling by automatically powering off unused physical servers and switching them on when their resources are required again

10.3 VMware View Manager

VMware View Manager is the connection broker and therefore the key component in the VMware View solution. It connects users through a web-based interface to their virtual desktops. In addition, View Manager can also connect users to their physical machines and to published applications hosted on Windows Terminal servers.

With View Manager, IT administrators enforce secure connections between users and their virtual desktops, and allow users access to one or more virtual machines.
11 View Premier Edition

In addition to View Enterprise, View Premier contains additional products delivering more enhanced functions for a virtual desktop environment.

11.1 View Composer

View Composer enables the application of linked clone technology to virtual desktops. Rather than creating a full copy of the master image for each new virtual desktop, View Composer creates a “linked clone”. Once created, this linked clone is an empty virtual desktop with just a link to the master image. During operation, user-specific changes are stored in the linked clones, which is the reason why linked clones grow dynamically.

In this way, View Composer reduces the required storage space by up to 90%. Furthermore, it simplifies provisioning, patches, and upgrades, since only the master must be maintained. As soon as a new master is created, all virtual desktops start reading from it after a reboot cycle. Rebooting a virtual desktop from a “clean” master whenever required often quickly solves performance problems and other issues related to individual virtual desktops.

For each individual virtual desktop, View Composer also creates a separate second virtual drive, which stores all user data and user configurations.

11.2 Offline Desktop

Users who cannot connect to the data center can only be involved in a virtual desktop infrastructure concept, if their virtual desktop can be made available on their mobile working device for offline usage.

Offline Desktop enables mobile users to download their entire virtual machine to a local storage device on their notebook and run it on the notebook with a corresponding hypervisor installed, without the need for a connection to the data center. Thus the user can continue working while he is offline.

Once connected with the data center, Offline Desktop synchronizes collected changes back to the virtual desktop in the data center and provides the user access to it again.

The encryption of the virtual disk on the local storage device, restricting the use of the local virtual desktop to specified time periods, and other policies for the offline operation ensure that “offline” virtual desktops do not compromise the company’s security policies.
11.3 ThinApp

ThinApp provides virtualization to the applications. Applications – virtualized with ThinApp – are presented as a single executable file. As soon as the user starts this single file, the complete application is launched. With ThinApp it is possible to run different versions of an application simultaneously or to eliminate compatibility issues between applications, or even run applications which are not officially supported by a certain operating system.

ThinApp can also be used as an alternative delivery method for applications. As soon as a user starts a virtualized application stored on a network share, the application starts even before the copy process of this application to the local virtual drive is finished. Furthermore, the administrator can define that, on starting such an application, this application will be copied to the local virtual drive. Thus, the user can also use this application in an offline mode.

This delivery method also enables fast and easy patches and updates of virtualized applications: As soon as a new or patched version is available on the network share, ThinApp will load this new version instead of the former locally stored version.

By using ThinApp, virtualized applications can be restricted, so that only users logged on to the corporate domain can start this application. Any private copy of that application can therefore not be used. It’s also possible to restrict the use of applications to a domain user group in order to control the number of used licenses of virtualized applications.
12 Total cost and return of investment

Implementing VMware View and using all the previously described technologies has a very positive impact on the costs a company allocates for managing their desktops, already after a short period of time.

Analysts like Gartner, Forrester or IDC have developed direct and indirect cost models, which allow a neutral comparison between various solutions. A number of such studies are available at http://www.vmware.com/go/viewTCO.

12.1 Comparing total costs

The total cost of desktop infrastructures is divided into two major categories. There are initial acquisition costs, which can be in many cases easily calculated – but there are also operational costs over time. In case of traditional desktops, operational costs are significantly higher than acquisition costs. For example, Gartner found out that the operational costs over one year are more than 2 times higher than the acquisition costs of hardware and software.

And exactly these high operational costs are reduced in a virtual desktop infrastructure. Cost reductions are obvious for certain administrative tasks such as provisioning of new desktops or reduced hardware maintenance for the end user devices. But when having a closer look at it, you will discover many more operations, which are far less costly if virtual desktops are used:

- **Desktop Image Maintenance**
  For how many desktops do you need new images every year?
  How long does it take to build a new image?

- **Move / Add / Delete services for desktops**
  With virtual desktops it is by far easier to move from one desk or company building to another one:
  Less equipment has to be moved, and configuration tasks for restarting the operation are much simpler.

- **Application testing and validation**
  New applications are often tested and validated against a large number of different desktop and notebook models. Using virtual desktops reduces this effort, since applications must be tested only for a single virtual machine.

- **Application updates and patches**
  Using View Composer enables patching and updating a single image instead of executing such tasks for each single desktop.

- **Protecting intellectual property**
  Centrally hosted virtual desktops are more secure than distributed traditional desktops. Even if virtual desktops are used offline, VMware View protects intellectual property through encryption and mandatory security settings.

- **Compliance management requirements**
  Virtual desktops eliminate any lockdown requirements for desktops, since no data are locally stored on the end user desktop.

Besides acquisition and operational costs, organizations will also benefit in increased agility and flexibility of virtual desktops. Running a virtual desktop infrastructure, they can easily migrate to an "employee owned hardware" policy or decide in favor of outsourcing operation of their infrastructure. Mergers and acquisitions, establishing new offices or expanding the workforce are not anymore large and complex projects; virtual desktops will enable a quick, secure and efficient implementation of such business decisions.
12.2 VMware TCO Calculator

For a quick comparison, VMware offers a TCO Calculator for using VMware View. This online tool is available at: [http://www.vmware.com/calculator](http://www.vmware.com/calculator). It uses data from Gartner and IDC studies as well as industry averages and real VMware customer results.

The TCO calculator is a quick and easy start for evaluation possible cost savings when using VMware View. In addition, Fujitsu provides its ROI consulting services which determine the financial impact of VDI for a customer-specific situation. According to binding predictions and a guaranteed ROI, customers can migrate to this new technology, with a clearly proposed cost saving scenario and without any risks.
13 Conclusion

There are many reasons, why customers are changing their infrastructures. By migrating to a virtual desktop infrastructure solution from Fujitsu and VMware, customers achieve better manageability, higher agility and operational cost savings.

IT administration will benefit from a new virtual desktop infrastructure in many areas. Virtual desktops are more stable, more secure and more available compared with traditional desktops and notebooks. Virtual desktops are faster deployed, are compatible to more end devices and will significantly decrease the required storage capacity. Key management tasks such as backup and patch management are centralized and are operated with increased efficiency and control inside the data center. Furthermore virtual desktops are compatible with alternative operation models (i.e. Workplace-as-a-Service) and with future technologies, such as the upcoming bare-metal client hypervisor platform from VMware.

As discussed, a virtual desktop infrastructure decreases operational costs over time. It’s however also true, that the initial cost of implementing the required infrastructure for hosting virtual desktops might be higher compared with the cost of continuing the usual desktop / notebook refresh. Those initial higher costs are not an inhibitor for starting a VDI project today. With Fujitsu’s Financial Services, every customer has got the option to finance the initial costs over a longer time period. In addition, the additional investment can be compensated with the ongoing operational savings achieved.

However the advantages of virtual desktops are not restricted to IT administration. Every end user, every employee will immediately recognize the increased flexibility of a virtual desktop. They are – for the first time – able to use their own private notebook inside the company without violating any security requirements. They may benefit from more desk space and less clutter by using the Fujitsu Zero Client which requires only a single Ethernet cable to connect to a virtual desktop. Or they may work offline – with an encrypted, timely limited, offline available virtual desktop. Especially in this use case, the virtual desktop demonstrates many advantages compared with a traditional notebook: All data within the virtual machine is encrypted, the operation time of a virtual machine can be limited to a certain period of time, and a broken notebook can be simply replaced without complex data migration or application installation.

Fujitsu and VMware jointly deliver the leading virtual desktop infrastructure solution. All software and hardware components are tested and well integrated for ensuring a fast and seamless implementation and integration. Customers benefit from realizing everything from a single source, with the peace of mind that the close cooperation between VMware and Fujitsu brings. Moreover, customers can realize additional advantages by taking advantage of Fujitsu’s flexible support offerings for technical and financial requirements. A Proof of Concept, the ROI services, the “Managed Virtual Workplace” or the “Workplace-as-a-Service” offering will ensure a well defined, guaranteed business benefit for the customer, based on the specific requirements of the organization.
14 Additional information

http://ts.fujitsu.com/vw
http://ts.fujitsu.com/services/managed_services/managed_virtual_workplace.html
http://www.vmware.com/solutions/desktop/