Cloud Client Computing

We wrote the book on thin clients.
Now comes the next chapter.

Dell cloud client-computing:
End-to-end solutions
from a single source.

Organizations around the world deploy desktop virtualization to establish a secure, manageable and cost effective IT environment. Dell cloud client-computing offers the most advanced and extensive suite of desktop virtualization solutions on the planet, allowing our customers to benefit from moving their content and apps into the secure data center, while recognizing gains in employee productivity and IT manageability.

We make migrating to virtual desktops easy with the most complete set of end-to-end desktop virtualization solutions that span from the data center to the endpoint. Our Dell servers, storage, networking and Wyse endpoints combined with Dell Services allow any customer to match the ideal VDI solution to their own business needs.

On behalf of everyone at Dell, I invite you to learn how can help better secure your data and give your workforce more freedom and flexibility.

Sincerely,

Steve Lalla
Vice President and General Manager
Dell Cloud Client-Computing

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Dell cloud client-computing: Any user. Any app. Any device.

Your increasingly mobile workforce requires anytime, anywhere access to key data and applications — without complicating the management, security and support duties of your IT team.

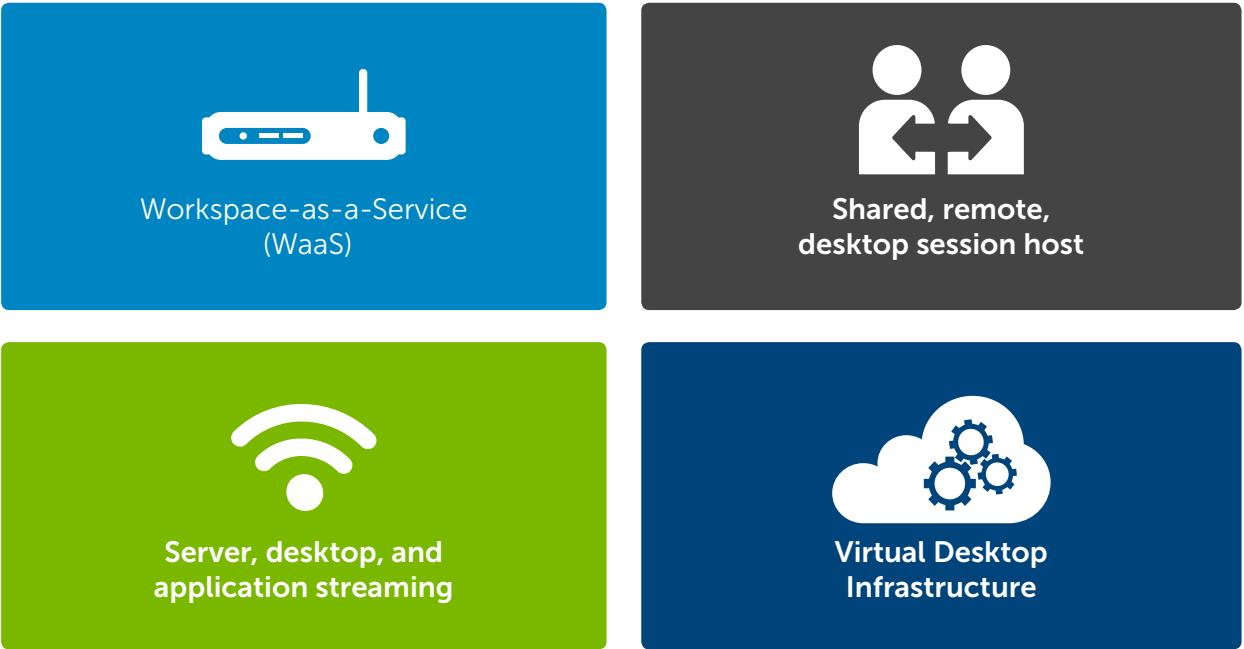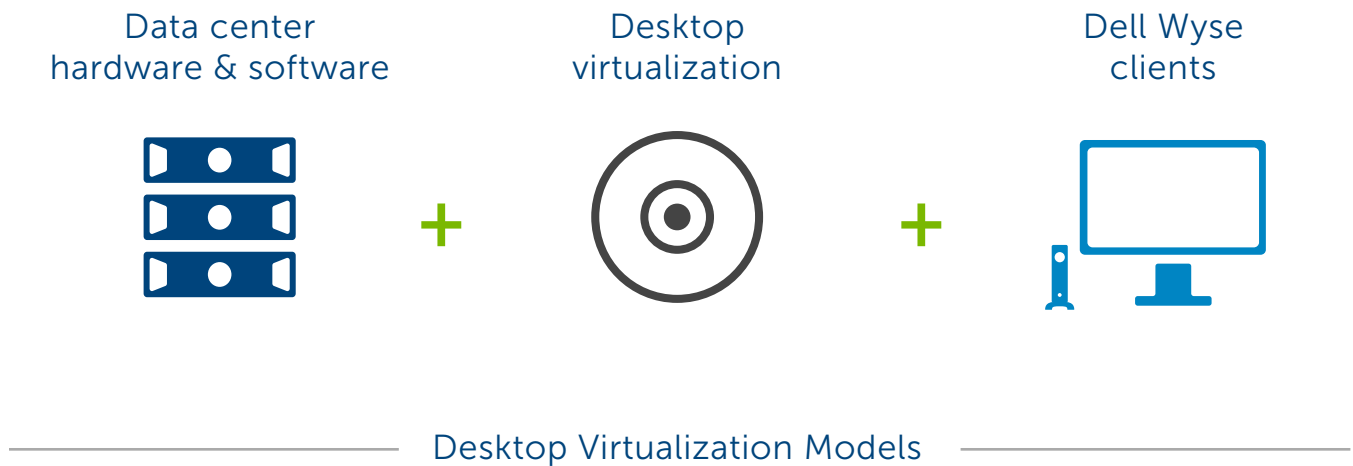## Desktop virtualization: How it starts, how it works.

Our approach enables you to extend the benefits of desktop virtualization from the data center to regional offices, and from remote branches to roaming individuals, keeping your team connected to their data via LAN, WAN or wireless networks.

Your cloud data center   **Any network**   **Your employees**

Keep your team connected to their data, wherever they roam, via LAN, WAN or wireless networks.

Cloud client-computing, your way.

Dell cloud client-computing offers a comprehensive set of robust, reliable and scalable solutions. From the data center to the desktop, we can provide infrastructure, software and device management tools that can securely deliver the applications and content your organization relies on every day.

Data center hardware & software   +   **Desktop virtualization**   +   **Dell Wyse clients**

Desktop Virtualization Models

Workspace-as-a-Service (WaaS)

Shared, remote, desktop session host

Server, desktop, and application streaming

Virtual Desktop Infrastructure

Slideshow: Real-world challenges, solved.

No matter your organization's size, Dell cloud-client computing solutions can help you reach your goals while addressing serious concerns faced by every business, from budgets and data management to disaster recovery and compliance.

Real-world numbers.

With the rollout of a Dell cloud client-computing and desktop virtualization solution, organizations are reducing costs and energy consumption while enabling greater productivity.
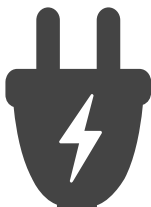
75%   **Western Wayne School District** reduced IT costs by 75% and redirected those resources to more strategic tasks, like expanded desktop coverage.

$100,000,000

The **San Jose International Airport** standardized on a Dell cloud client-computing solution and saved $100 million in project costs by building fewer gates because of common-use technology.

200 hours   By implementing an end-to-end Dell cloud client-computing solution, **Oklahoma Emergency Management** has saved 200 hours of IT staff time and ensured 100% readiness in case of a disaster.
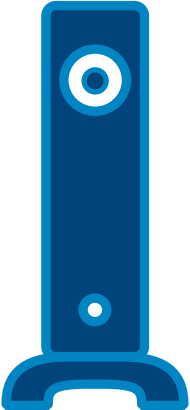
$1,000,000   **Daughters of Charity Health System** increased data security while giving doctors anytime access to patient records and saving an estimated $1,000,000 in IT costs.

Dell thin clients and datacenters: Already optimized for VDI.

Implement virtual desktop infrastructure (VDI) without starting over. Our tightly integrated data center hardware, management software, end points and services work seamlessly with Citrix, Microsoft, VMware and Dell Wyse vWorkspace.

Our reference architectures simplify the means for customers to consume the content and implement the solution, as well as provide sizing guidance, best practices and additional validation. These reference architectures have been tested and validated by logging more than 100,000 hours of testing on Dell and non-Dell hardware, and with the mindset that our customers need to leverage existing infrastructure. Therefore, we provide guidance and support to include implementation into existing environments.

Dan O'Farrell
Senior Director, Product Marketing
Cloud Client Computing

Optimized for education, healthcare and government.

Additional steps have been taken for federal, healthcare and education organizations, including considerations for packaging, testing and integration into third-party software and hardware to make the virtual desktop solution more useable for those verticals. As always, you can count on us for guidance and support as you implement into existing environments.
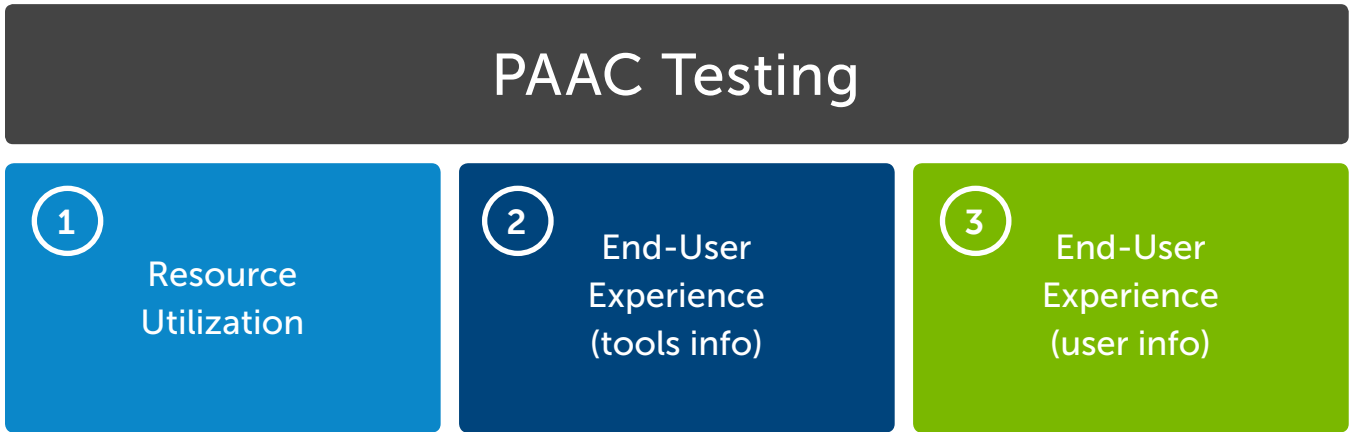
Engineered for compatibility with key platforms.

Whether you're running Citrix, Microsoft, VMware or Dell Wyse vWorkspace, Dell cloud client-computing solutions are optimized for your environment. Whenever Citrix, Microsoft, or VMware develops a new version of their virtual desktop client software, Dell receives that software at the earliest possible date to qualify on our endpoint platforms. We often act as an "extended QA lab" for our key partners. That should offer a glimpse of how closely we work together. In some instances, there is an actual product integration factor that shows up on our products. For example, our Xenith zero clients for Citrix can be managed from the Citrix XenDesktop management console.

Performance analysis

We use a holistic methodology that monitors both hardware resource utilization and end-user experience during load-testing to ensure the optimal combination of end-user experience, cost-per-user and performance analysis and characterization (PAAC) on Dell Wyse Datacenter solutions. This methodology is based on the three pillars shown below. Login VSI is currently the load-testing tool used during PAAC of Dell Wyse Datacenter solutions; Login VSI is the de-facto industry standard for VDI and server-based computing (SBC) environments.

Dell Wyse Datacenter Solution Architecture

PAAC Testing

1 Resource Utilization	2 End-User Experience (tools info)	3 End-User Experience (user info)

Resource utilization

On occasion, some users may have a sub-par experience when attached to a virtual desktop. This is almost always due to either some form of resource contention caused by inadequately configured hardware (e.g., servers, storage) or networking constraints causing inadequate bandwidth. Fortunately, proper planning and design resulting in adequate and appropriate hardware, software and networking can result in consistently good user experiences.

To prevent diminished performance, PAAC on Dell Wyse Datacenter solutions monitors the relevant resource utilization parameters and applies relatively conservative thresholds as shown in the table below. These thresholds are used to decide the density of virtual desktops that can be hosted by a specific hardware environment (i.e. combination of server, storage and networking).

Resource Utilization Threshold

Parameter	Pass/Fail
Physical host CPU utilization	85%
Physical host memory utilization	85%
Network throughput	85%
Storage IO latency	20 ms

"More than 200 million people interact with Dell Wyse solutions every day. We continue to raise the bar for thin client manageability, security, performance and value, as well as lead the way with innovative hardware designs and OS support."

Jeff McNaught
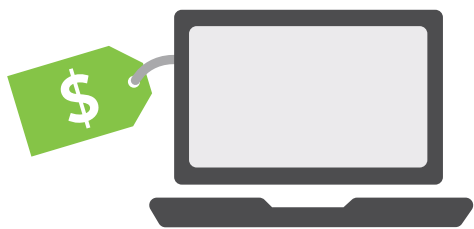**Executive Director, Marketing**

Pearland ISD saves millions of dollars with PC renewals & BYOD

With nearly 10,000 PCs on hand, some dating back to 2001, Pearland schools desperately needed an affordable and manageable way to deliver updated PC capabilities to students and staff.

According to desktop services manager Jonathan Block, many students and teachers found the older PCs to be practically useless because they lacked the processing power and memory to run today's educational programs and the latest Microsoft Office Suite. Through consultation with Dell, it became clear that there was a much more cost-effective solution: Dell cloud client-computing.
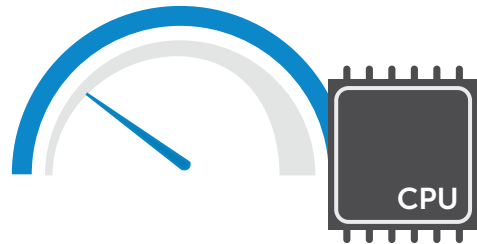
Because it didn't have to buy all-new PCs, the school district saved about $4 million. It also **centralized system management** and enabled **BYOD** with full remote access, all with **Dell cloud client-computing.**

The challenges

Excessive cost
The estimated $6.4 million required to replace all of their old PCs far exceeded the school district's financial resources.

Poor performance
Teachers found the older PCs to be practically useless because they lacked the necessary processing power and memory.
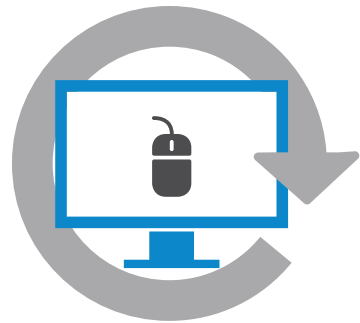
Complicated management
With so many PCs of different ages, there was no standardization across the district, making support extremely challenging.
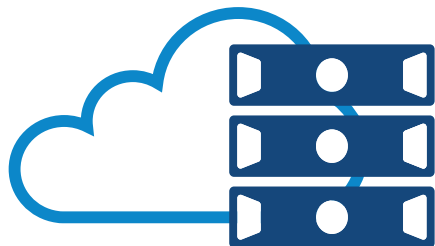
The solution

New life for old peripherals
Virtual desktop integration through a Dell cloud client-computing solution in the school district's data center enabled teacher and student access to software running on the servers via the same peripherals they've always used.

Reliable infrastructure
Running virtual desktop software via new servers in the data center increased uptime and reliability.

BYOD readiness
Teachers and administrators can access the software and peripherals they've always used from any platform or any location.

Benefits

- Improved the learning environment for 20,000+ students.
- Saved the district approximately $4 million by not having to replace 4,500 legacy PCs.
- Reduced IT desktop systems management services by 75%.
- Enabled a Bring Your Own Device (BYOD) initiative.
- Reduced classroom disruptions by centrally managing more than 90% of desktop changes.
- Provided the ability for students and staff to have full remote access to applications and files when outside the network.

Building the best value from many options

Dell's cloud client-computing solution for PISD is comprised of Dell PowerEdge M710 and M620 blade servers and Dell EqualLogic PS Series storage arrays, which operate from a Dell PowerEdge M1000e enclosure in the district's data center.

The district chose Dell Networking PowerConnect 8100 switches to provide the necessary 10GbE performance needed to deliver responsive virtual desktops. "System reliability from a hardware perspective was of the utmost importance and was crucial in the selection of the Dell platform," explains Greg Bartay, director of technology.

PISD chose the Citrix® software suite for its VDI software, which includes XenDesktop®, XenServer®, XenApp® and Provisioning Services (PVS) that provide flexibility, mobility and delivery of applications and desktop instances. Teachers and students can now access their desktops and application from anywhere with internet access and without the cost associated with setting up a VPN for each user.

Letting BYOD take care of itself

Additional advantages included streamlined preparation for mandated online testing, which sometimes requires last-minute updates to the software platform. Block noted that in the past he and other IT staff had to pull all-nighters to take care of those updates; now they can be done **in less than an hour**. "Now BYOD can almost take care of itself."

Read the full story   **Access more customer case studies**

Success stories

With Citrix

Mater Health Services wanted to replace their desktops and laptops to improve the delivery of services through highly mobile, flexible access to clinical data. They rolled out Dell Wyse Xenith zero clients to provide access to clinical applications and resources via Citrix® XenDesktop™. Dell PowerEdge™ servers were deployed to support the virtual desktop environment.

"Where previously it would take up to five minutes for a clinician to login to a new session on the traditional desktops, on the Wyse zero clients, it now takes them less than one minute to have access to the clinical data needed to treat a patient. This means that the clinicians are able to focus more on what is important – the patients." *—Mal Thatcher, CIO, Mater Health Services*

With Microsoft

Tokyo-based For Needs was looking to refresh its client security and control of operational load management. It wanted to follow a step-by-step approach to improve its IT infrastructure. Dell blade servers and virtual storage deliver the flexibility and scalability to build an IT platform with an integrated desktop/server virtualization solution from Microsoft, as well as an authentication solution.

"The solution wasn't limited to issues with our client PC environment. Dell examined the IT infrastructure of our whole organization and highlighted where the issues were and how to solve them. They then worked with us in putting together an end-to-end solution that would satisfy our present needs as well as secure the future." *—Daizen Tanaka, Director of the Management and Planning Office, For Needs*

With VMware

Blue Quills First Nations College needed to replace aging computers with a more flexible solution that would allow it to focus on new initiatives such as distance learning. With help from its trusted IT advisors Imperium Inc. and Dell Premier Partner Redapt, Inc., the college implemented a Dell Desktop Virtualization Solution with VMware® View™ and Wyse™ zero clients.

"Our new infrastructure provides us with a stable base to operate from, which allows us to concentrate more of our time and energy on enhancing the learning experience." *—Sherri Chisan, Coordinator of Leadership & Management/Indigenous Artists/Doctoral Studies Programs, Blue Quills First Nations College*

What our customers say about Dell cloud client-computing

Daughters of Charity Health System automates processes and virtualizes IT, saving more than $1 million

"What sets our Dell Wyse VDI solution apart is its integration with Imprivata OneSign, because it allows us to provide users with one-click access to a virtual desktop that runs in the Dell Cloud. Employees can tap their badge on a scanner and within 8 to 10 seconds, they have their virtual desktop presented to them anywhere in the hospital — and it appears just as it did when they left the previous location." —*Justin Johnson, Network Design Senior Advisor at DCHS*

Read the full story

City of Round Rock improves maintenance and services with an efficient, virtualized IT platform

The City of Round Rock, Texas, uses virtualized Dell solutions to better serve residents, empower employees and prepare for the future: "We can get our jobs done faster with the Dell technologies we have in place, so we can be more in touch with our citizens' needs. Every minute we're not sitting at a desk processing data is a minute we can be out in the community having a positive impact on a resident." —*Brooks Bennett, CIO, City of Round Rock*

Read the full story

Chengdu University of Information Technology (CUIT) collaborates with Dell to devise energy efficient VDI

Chengdu University of Information Technology wanted to enhance learning programs through cloud and thin client computing and develop a commercially viable solution for institutions and organizations across China. "We collect the requirements for the experiment and create a template to roll out across the lab's Wyse thin clients. The whole process takes half a day rather than up to three days, enabling more experiments across the university. Our efficiency has increased significantly, giving students and teachers more time to drive innovation." —*Fan Li, Director, Cloud Computing Laboratory, Chengdu University of Information Technology*

Read the full story   **Read more customer stories**

Simplify management and scale effortlessly.

Deliver a personalized high-fidelity experience for end users across a wide variety of devices with data center solutions from the Dell cloud client-computing portfolio.

As you strive to optimize your IT environment, we can help you find a solution offering all of the capabilities you need.

Featuring flexible, scalable and validated solutions and reference architectures for Virtual Desktop Infrastructure (VDI), Dell Wyse Datacenter solutions allow you to deploy optimized virtual desktop solutions on premise for Citrix, Microsoft, VMware, and Dell vWorkspace desktop virtualization environments.

Wyse Datacenter for VRTX

Dell VRTX provides enterprise-level virtual desktop capabilities within a converged infrastructure which can be used in a normal office environment. The solution uses Dell purpose-designed reference architectures to speed time-to-value and streamline day-to-day operations and management. It's best suited for organizations with 250-600 users needing efficient deployment and management of their infrastructure through desktop virtualization as a service.

Wyse Datacenter

Ideal for organizations with a sophisticated IT environment and IT resources that are interested in robust, flexible and highly scalable desktop virtualization supporting a range of graphics and collaboration capabilities, which provides the optimal price/performance ratio for their workload. The solution is available with blade or rack mount server architectures. It enables a high degree of choice through an array of pre-qualified components, while still pre-engineered to speed time-to-value. Dell Wyse Datacenter simplifies the deployment of virtualized desktops for environments ranging from 50 to 50,000+ users.

Wyse Datacenter for Virtual Workstations

Delivers high-end, workstation class virtual desktops through a scalable, configurable and highly flexible approach that provides an ISV-certified solution with high-performing Dell infrastructure components. The solution is the only single-vendor end-to-end virtualized workstation available in the market today, serving from a handful to thousands of users. It incorporates certifications for key applications and Dell Solution Centers provide a process for certifying additional applications and proof-of-concept testing.

Dell Wyse thin and zero clients: Evolve to a simpler state of IT.

Reach higher levels of security, speed and management efficiency across Citrix®, Microsoft®, VMware® or Dell-based platforms with our fully customizable, end-to-end cloud client-computing solutions. These virus-immune solutions include a choice of zero, thin and cloud clients that help you access your virtual desktops from any device — securely and simply.

Wyse thin clients

5000 series D class
Versatile, compact and efficient. Dual core thin client capable of delivering 3D graphics and HD multimedia.

5000 series All-In-One
Secure all-in-one, delivers an excellent virtual desktop experience, with extreme ease of use and management.

Wyse Cloud Connect

Wyse Cloud Connect allows you to securely access and share work and personal files, presentations, applications and other content from your business or your home.

Wyse enhanced Linux thin clients

3000 series T class
Offers an excellent web, Citrix, Microsoft, and VMware VDI user experience on a budget.

5000 series D class
Versatile, compact and efficient. Dual core thin client capable of delivering 3D graphics and HD multimedia.

7000 series Z class
Powerful thin clients made for the most demanding applications.

7000 series X class
Mobile thin clients offering a rich integrated WiFi, Bluetooth® option, and 3G card support.

Wyse Windows Embedded Standard thin clients

Intel-based 3000 series
Dual-core Intel-based thin client that offers excellent multimedia performance and broad connectivity.

5000 series D class
Versatile, compact and efficient. Dual core thin client capable of delivering 3D graphics and HD multimedia.

7000 series Z class
Powerful thin clients made for the most demanding applications.

7000 series X class
Mobile thin clients offering a rich integrated WiFi, Bluetooth® option, and 3G card support.

Wyse zero clients

Extremely secure and easy to deploy and manage, Dell Wyse zero clients are purpose-built for your particular VDI environment to provide instant-on, hands-off operation and performance that meets the demands of your most power-hungry applications.

1000 series E class
Entry-level zero clients for Microsoft Windows MultiPoint Server for low-cost, quick connectivity via USB or Ethernet cabling.

5000 & 7000 series P class
Created for VMware Horizon View users, offers performance PCoIP zero client workstations for 3D modeling and other demanding applications.

3000 & 5000 series Xenith
Built for Citrix XenDesktop and XenApp published desktops. Minimal delays, easy to manage and extremely secure.

Wyse cloud desktops

With the full power of a high-end PC and the security of server-based content and data storage, Dell Wyse cloud desktops offer all the familiar benefits of PC computing with none of the shortcomings. Wyse cloud desktop: It's the PC that's not a PC.

5000 series D class
Versatile, compact and efficient. Dual core cloud PC capable of delivering 3D graphics and HD multimedia.

7000 series Z class
Powerful cloud PC made for the most demanding rich media and graphics-intensive applications.

7000 series X class
Mobile cloud desktop offering a rich integrated WiFi, Bluetooth® option, and 3G card support.

Complete the desktop experience with recommended Dell monitors

Enhance productivity throughout your office with award-winning Dell monitors. Offering a broad range of screen sizes and resolutions designed to address every use case, only Dell monitors are tested and certified to offer ideal performance with Wyse endpoints.

To find the right Dell monitor for your virtual desktops, visit our interactive **monitor selector tool.**

Innovation for an outstanding customer experience.

Today, businesses and organizations across diverse industries and market sectors around the globe depend on Dell cloud client-computing and our cost-effective, secure and energy-efficient desktop virtualization solutions based on reliable innovations and expertise.

Product Innovation

#1 Global leader in thin clients sold and 220+ patents

73% better desktop virtualization performance with Dell servers

42% lower cost per desktop with Dell storage

Solution Innovation

4 unique delivery models offering greater choice to customers

88% fewer tools to provision a desktop

1 point of support contact

Customer Experience

42k+ dedicated services professionals active in 90 countries

95% customer satisfaction with Dell ProSupport

#1 in customer satisfaction for IT Service & Support

Links to additional information

For more information on Dell cloud client-computing and the full end-to-end solution please contact your **Sales account manager** today or Dell channel partners.

Learn More

Wyse cloud, virtualization and management software solutions

Endpoint virtualization software

Dell delivers an integrated portfolio of **endpoint software** designed for optimal delivery of applications and virtual desktops that offers virtualization, cloud and management features.

Wyse cloud software

Wyse vWorkspace

Enable the seamless delivery of desktops and applications to users based on their unique needs. You can use vWorkspace to deploy, monitor and manage a blend of hosted VDI, RDSH and application virtualization from a single pane, with simple deployment and operation, high performance and scalability while minimizing per-seat costs.

Wyse WSM™

Combine the local processing power of a PC with the management and security benefits of your private cloud using Wyse WSM. This management solution offers full desktop functionality without complexity by streaming everything a user needs — operating systems, media-rich applications and documents — on demand to cloud PCs or diskless PCs. Included as part of the Wyse vWorkspace offering.

Wyse virtualization software

Wyse thin clients can be enhanced with Wyse virtualization software that is designed to help further improve the user experience, reduce network bandwidth needs and expand server scalability.

Wyse TCX Suite™

This virtualization software provides an outstanding user experience in virtualized environments by allowing both desktop and mobile users to run diverse multimedia formats (including Flash) across multiple monitors, plug-in USB devices and voice applications.

Wyse PC Extender™

This software solution allows you to repurpose much of your existing PC harware for use in a virtualized computing environment for greater cost effectiveness.

Wyse management software

As your number of cloud clients grows, Wyse offers management software that makes it easy to configure, monitor and control your Wyse thin clients, zero clients and cloud desktops.

Device Manager™
Enables low TCO through scalable remote monitoring, management and reporting of Wyse clients.

Configuration Manager™
Automates deployment of Dell Wyse Windows-based thin clients through your private cloud or server.

Cloud Client Manager
Enables secure management of thin clients, mobile devices, and employee access to corporate applications and content all from a single cloud-based console.

A single point of service for your entire solution

Desktop virtualization at your service

Dell and its qualified PartnerDirect community offer a full suite of services to support your desktop virtualization needs, whether you choose to host the infrastructure on-premises or you prefer to let Dell or a Dell partner host and manage the infrastructure.

Why choose Dell desktop virtualization services?

Dell can help position your business for success — from early virtual desktop infrastructure (VDI) strategy development to ongoing optimized management of the end-user VDI experience. Dell delivers:

- Deep desktop virtualization experience in simplifying the move to VDI with a track record of success in planning, deploying and maintaining virtualized desktops.
- Certified cloud and vertical technology experts who work with you to ensure your virtual desktop deployment delivers maximum value and performance.

Dell Managed VDI Service

If your business keeps its VDI on-premises, the fast and efficient path to managing and supporting that infrastructure is Dell Managed VDI Service. By choosing **Dell Managed VDI Service**, you will maximize your virtual desktops' uptime because Dell proactively helps prevent VDI issues, enabling a positive and consistent end-user experience.

Dell Workspace-as-a-Service

For large enterprise organizations, your fastest path to desktop virtualization is **Dell Workspace-as-a-Service**. In as few as 15 days, you can deliver secure, full-featured virtual desktops to your users, without the expense and delays of building an entire VDI environment on your own. If your business requires fewer than 500 virtual desktops, the streamlined path to desktop virtualization is Dell Workspace-as-a-Service with U2Cloud, which delivers a secure and reliable hosted desktop infrastructure.

Dell partner services

Dell cloud client-computing solutions and services can be delivered worldwide by qualified partners who have completed Dell PartnerDirect competency requirements and are recognized as experts in desktop virtualization.

Learn more about Dell Services.

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Get started today.

For more information on Dell cloud client-computing and the full end-to-end solution please contact your Sales account manager today or your Dell channel partner.

Learn more at **Dell.com/wyse**