Desktop Consolidation

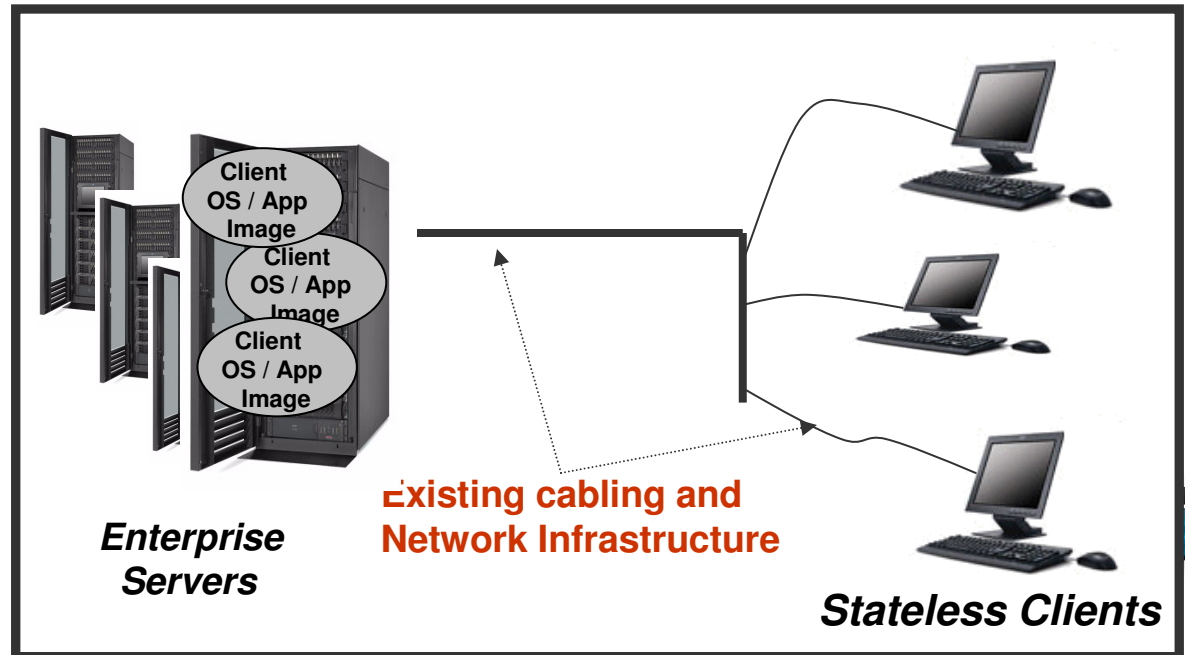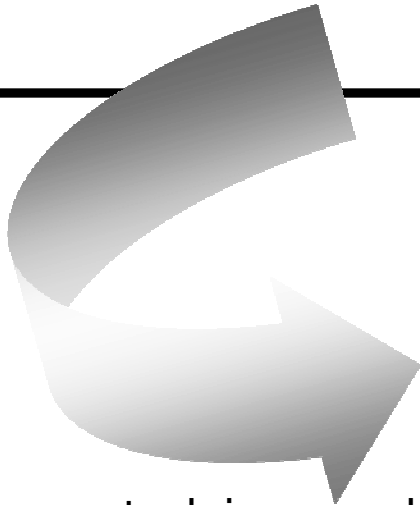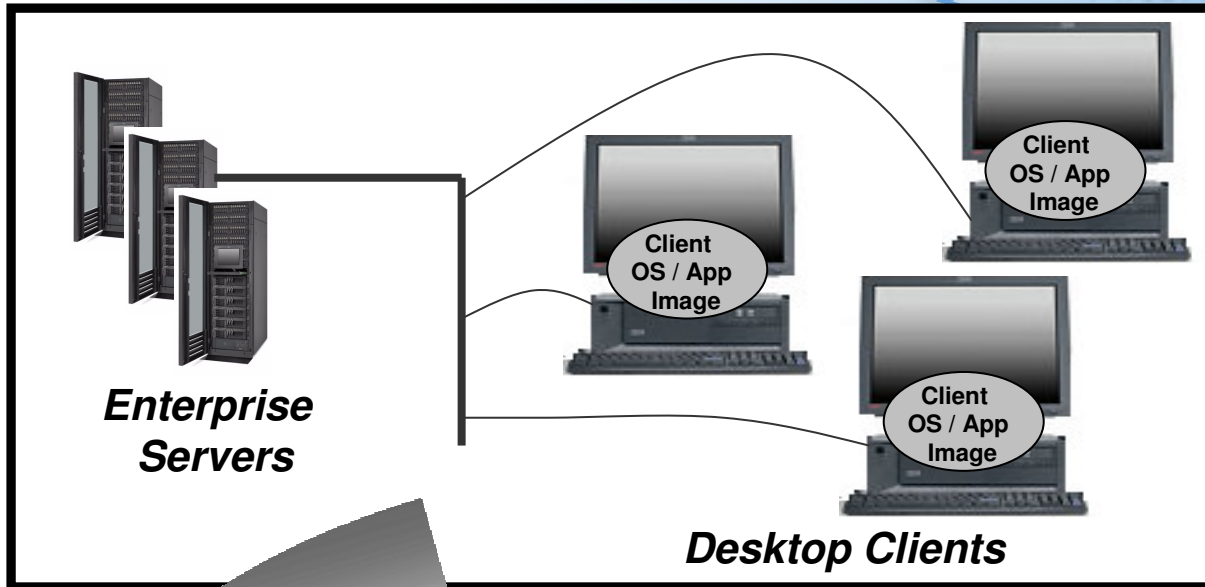Stéphane Verdy, CTO Devon IT

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Agenda - Desktop Consolidation

- Migrating from PCs to Hosted Desktops

- Desktop Centralization Deployment
    - Graphics Compression
    - PCs vs. Thin Clients TCO
    - User segmentation
    - Benefits and limitations of each strategy

- End User Segments and Benefits

- HC10 and PC-over-IP

- Storage Centralization strategies

- Power Considerations

- Scalability

- The Hosted Desktop Pyramid

- Future

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Migrating from PCs to Blade-Hosted Desktops

Client OS / App Image

Client OS / App Image

Client OS / App Image

Enterprise Servers

Desktop Clients

Client OS / App Image

Client OS / App Image

Client OS / App Image

PC software stack is moved into the Datacenter
Desktop PCs are replaced with a stateless device

Enterprise Servers

Existing cabling and Network Infrastructure

Stateless Clients

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Deployment Scenarios For Desktop Consolidation

Physical 1:1
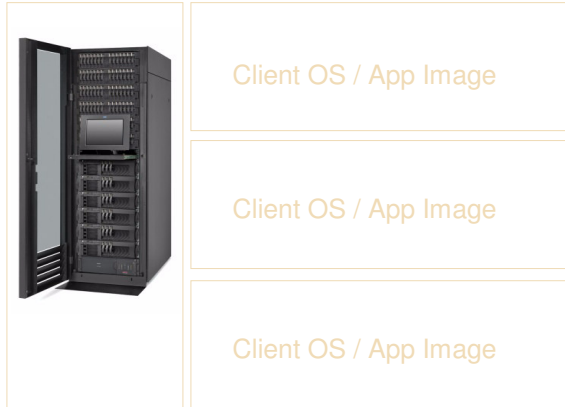
Client OS / App Image

Client OS / App Image

Client OS / App Image

Virtual Machines

Client OS / App Image	Client OS / App Image	Client OS / App Image
Virtualization		

Client OS / App Image	Client OS / App Image	Client OS / App Image
Virtualization		

Client OS / App Image	Client OS / App Image	Client OS / App Image
Virtualization		

Shared Desktop

Client Application & Desktop view

Client Application & Desktop View

Client Application & Desktop View
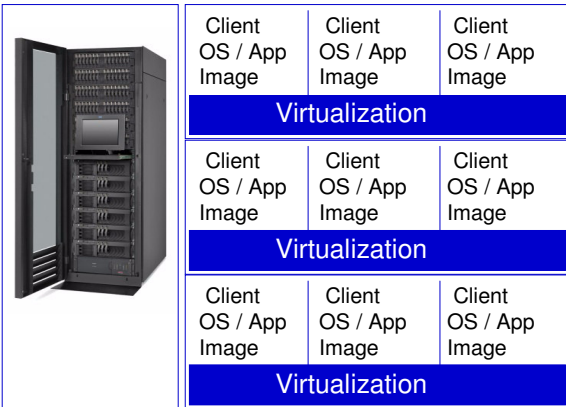
IBM BladeCenter HC10

- 1:1 dedicated blade
- Highest Per-user Acquisition Cost
- Application compatibility ensured
- Compatible with existing chassis
- Preferred for power users (graphics)
- Clients secure in Datacenter
- Graphics acceleration with TC10

VDI

- 25:1 (two-socket dual-core)
- Technology developed for servers
- Full desktop experience
- Dedicated performance/reliability
- Choice of Operating Systems
- Improved Security & TCO
- Leverage existing software & skills

Shared Services

- 50:1 (two-socket dual-core)
- Single OS, Published Applications
- Shared performance/reliability
- No fault isolation or failover
- No load balancing of sessions
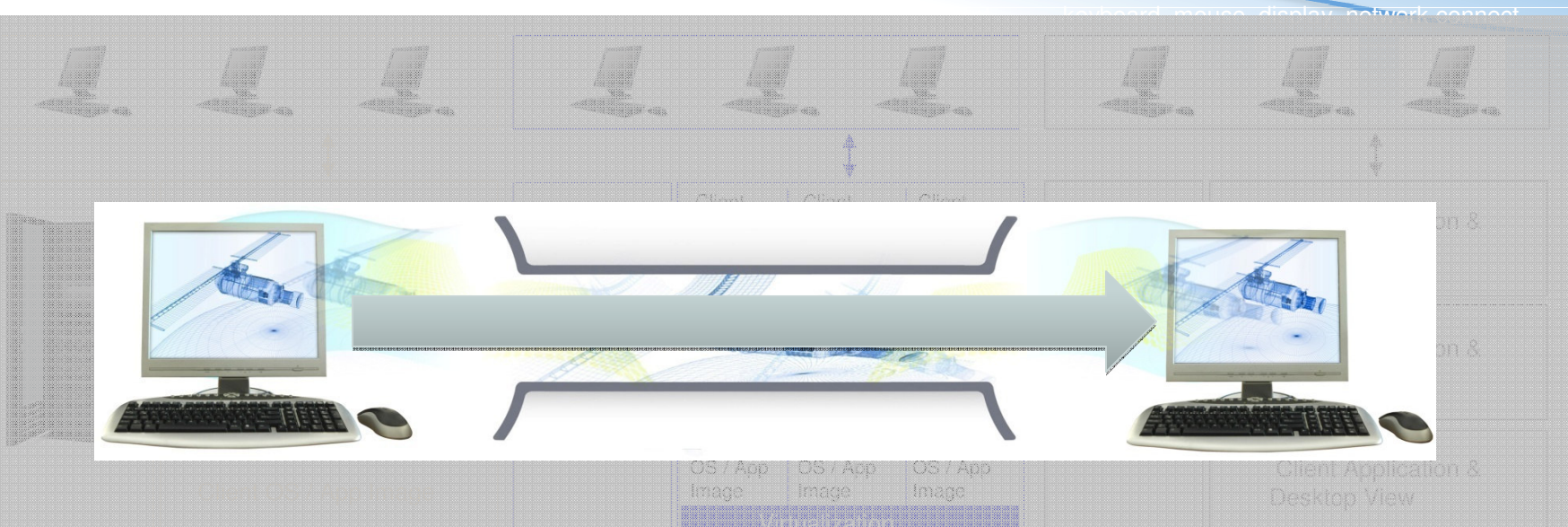- More difficult to deploy & manage
- Skills not transferable

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Hosted Desktop Graphics Compression

Physical 1:1	Virtual Machines	Shared Desktop

Physical 1:1
- PC-over-IP Preserves Complete PC Environment
- Dedicated Real-time Bridging Hardware
- Independent Host and Portal Processes
- Simple Decoder Client
- Constant Universe Client

Virtual Machines
- Breaks Optimized PC Platform Architecture
- Interferes with Graphics Stack
- Encoding Image Loads the CPU
- Communicates Over Host Network
- Client Dependent Performance
- Software I/O Redirection
- Complex Client

Shared Desktop
- Breaks Optimized PC Platform Architecture
- Remote Rendering
- Limited Device Type Bridging
- Standard Thin Client
- Device Drivers Required on Client
- Client Dependent Capability and Performance

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PCs vs. Thin Clients

- Overall design hasn't evolved in the last decade:
  - separate components for CPU, memory controller, graphic card, network card, etc.

- Produces noise and heat High costs, high complexity

- High failure rate
  - 3 years MTBF

- High power consumption

- 'PC on a chip': a single chip implements CPU, memory controller, graphic, audio and network interfaces.

- No moving parts. Hard Drive is replaced by flash memory

- Fanless, totally silent

- Low cost

- Low failure rate
  - 7 to 10 years MTBF

- Low power consumption

Thin OS

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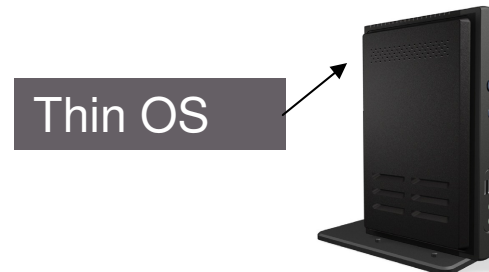
End User Segments

End user segments

Task Oriented	Basic Productivity	Knowledge Worker	Workstation Class

Virtual Desktops

Terminal Server / Server-Based Computing

IBM Workstation Blade

+

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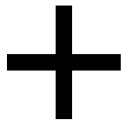
Desktop Consolidation Benefits By Segment

Physical 1:1	Virtual Machines	Shared Desktop
- **Best performances (no sharing means no overhead)** - **Physical isolation between users** - **Higher cost and lower density**	- **Good density** - **Same desktop OS means easier migration and no application incompatibility** - **Virtualization adds complexity** - **No GPU (GPU can't be virtualized... yet)**	- **Highest density and lower per user cost** - **One size fits all: limited flexibility** - **Possible applications incompatibility** - **No GPU**

IBM BladeCenter HC10   VDI   Shared Services

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HC10 Workstation Blade Solution Alternative Desktop Computing

The Client Blade consists of three components

- IBM HC10 Workstation Blade
    - Blade form factor delivers flexibility and simplicity for workstation application
    - Workstation-class processor and graphics
    - Innovative I/O and Graphics Transmission Adapter delivers compressed and encrypted graphics and USB over TCP/IP network in real time without special device driver
    - Designed for Microsoft Windows
    - Extends and leverages the capability of the BladeCenter family

- TC10/CP20 desktop device
    - Advanced desktop appliance that includes a UI Decompression component in combination with a Compression component on the Client Blade and a UI Compression protocol instead of RDP.

- Devon Connection Manager Software
    - High-functionality software, installed on a server, that enables users to connect from any client (thin client, PC, or Devon IT 'TC10') to server-based resources (Terminal Server, Virtual Machine or PC Blade).

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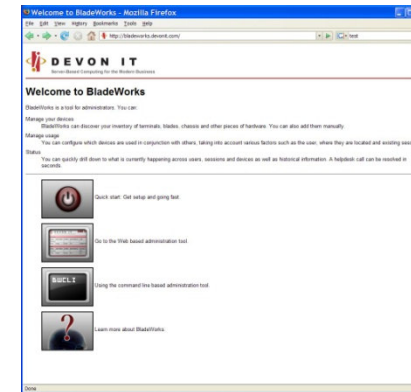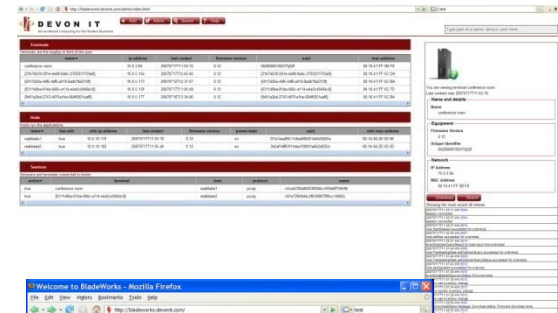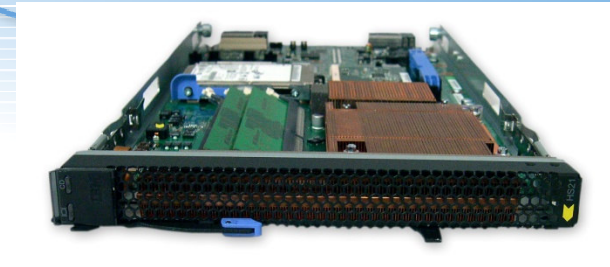
HC10 follow on – the HC12 Remote Workstation

The HC12 is a high performance dual socket rack workstation that provides an industry-standard alternative to blade workstations

- Additional standard PCIe and PCI slots for excellent flexibility

- Windows Logo'd

- Next Generation Intel 5400 Chipset

- Choice of Dual and Quad Core processors

- Follow on to HC10 and TC10

- Industry standard Rack Mounted, (not specific to BladeCenter)

- Wide Choice of workstation class OpenGL graphics cards

IBM Part No.

NEW - Anticipated Availability 1Q09

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PC-over-IP advantages over RDP

- DVI and USB over IP, OS independent, Microsoft Logo

- Full USB support

- Dual independent monitor support
  - Up to 1920*1200 on single monitor
  - Up to 1600*1220 with dual monitors

- Protocol is handled in hardware so:
  - CPU is fully available to run applications
  - Graphics performances don't decrease when CPU is maxed out as with protocols implemented in software
  - Full control (remote power, BIOS)
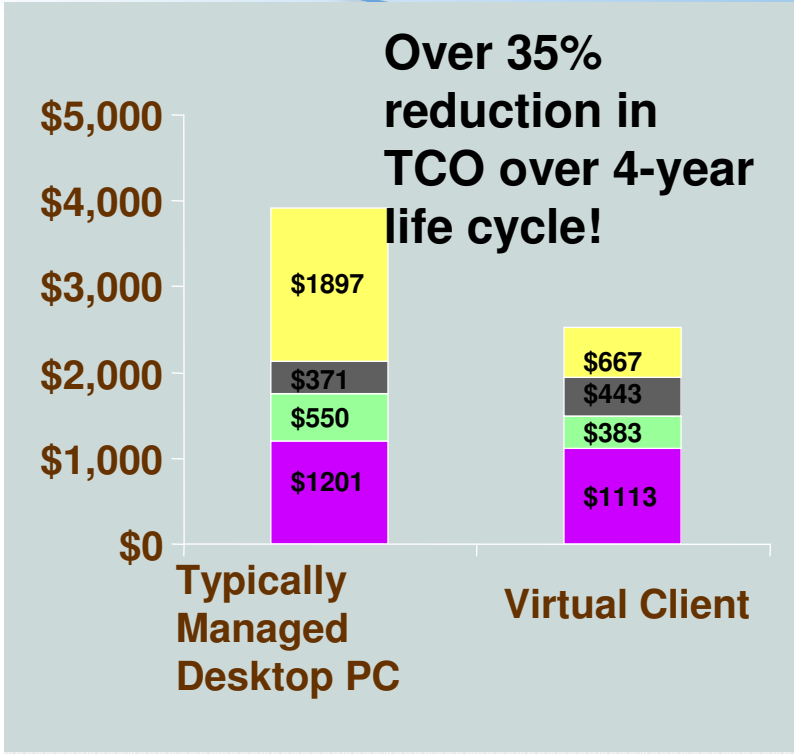
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Desktop Storage Centralization Strategies

- Individual PCs hard drive are replaced with virtual disks stored on NAS/SAN

- Reliability is increased

- Blades or Virtual Machines can be diskless:
    - Workstation or hypervisor images can be streamed using OS Streaming software (for instance Citrix Provisioning Server, ex-Ardence)

- Storage capacity needs can be reduced by using:
    - shared images
    - Data de-duplication software

- Ethernet based protocols (iSCSI, NFS, etc) can be used to lower blade costs.

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A Hidden Cost of Desktop Computing

Total Cost of Ownership for Traditional PC Environment

End-user Costs — 47%

Acquisition Costs — 30%

9%

14%

Administration

Operations

50%	29%	88%	78%
Reduction Setup time & deploy	Reduction IT operations costs	Reduction worker downtime	Increase IT staff productivity

Over 35% reduction in TCO over 4-year life cycle!

$5,000
$4,000
$3,000
$2,000
$1,000
$0

Typically Managed Desktop PC
- $1897
- $371
- $550
- $1201

Virtual Client
- $667
- $443
- $383
- $1113
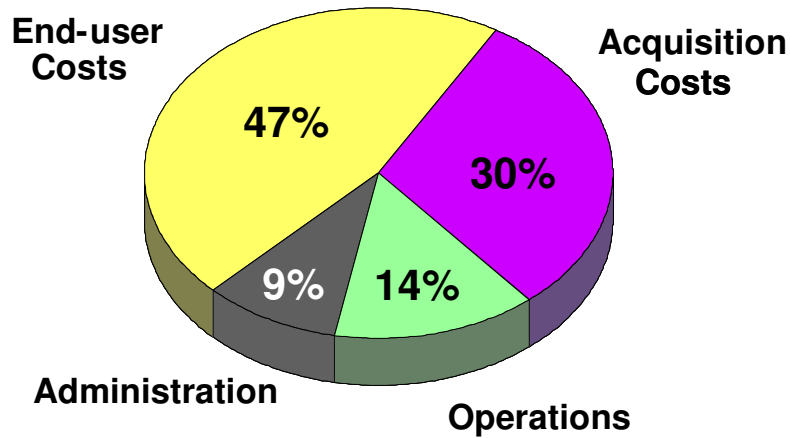
$4000 TCO per desktop ($1200 acquisition cost)
$7600 TCO per laptop ($1900 acquisition cost)

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Source: Gartner Inc (3/08), IDC (11/05), and Wyse Estimates

- Virtual Clients require less power than traditional desktops
  - Ex. Assume 800 desktops
    - **Traditional desktop power consumption: 120,000**
      - 800 users * average 150 watts per PC
    - **Virtual Client power consumption: 11,200 watts**
      - 800 Thin Clients * 8 watts (6400 watts)
      - 1 BladeCenter + 14 HS21 XM blades* + 16GB memory + DS4200 Storage (4800 watts)
    - **Cost savings is estimated at over 130 watts per desktop**
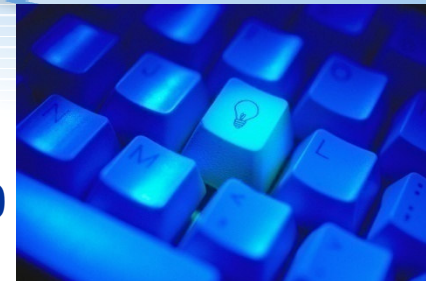
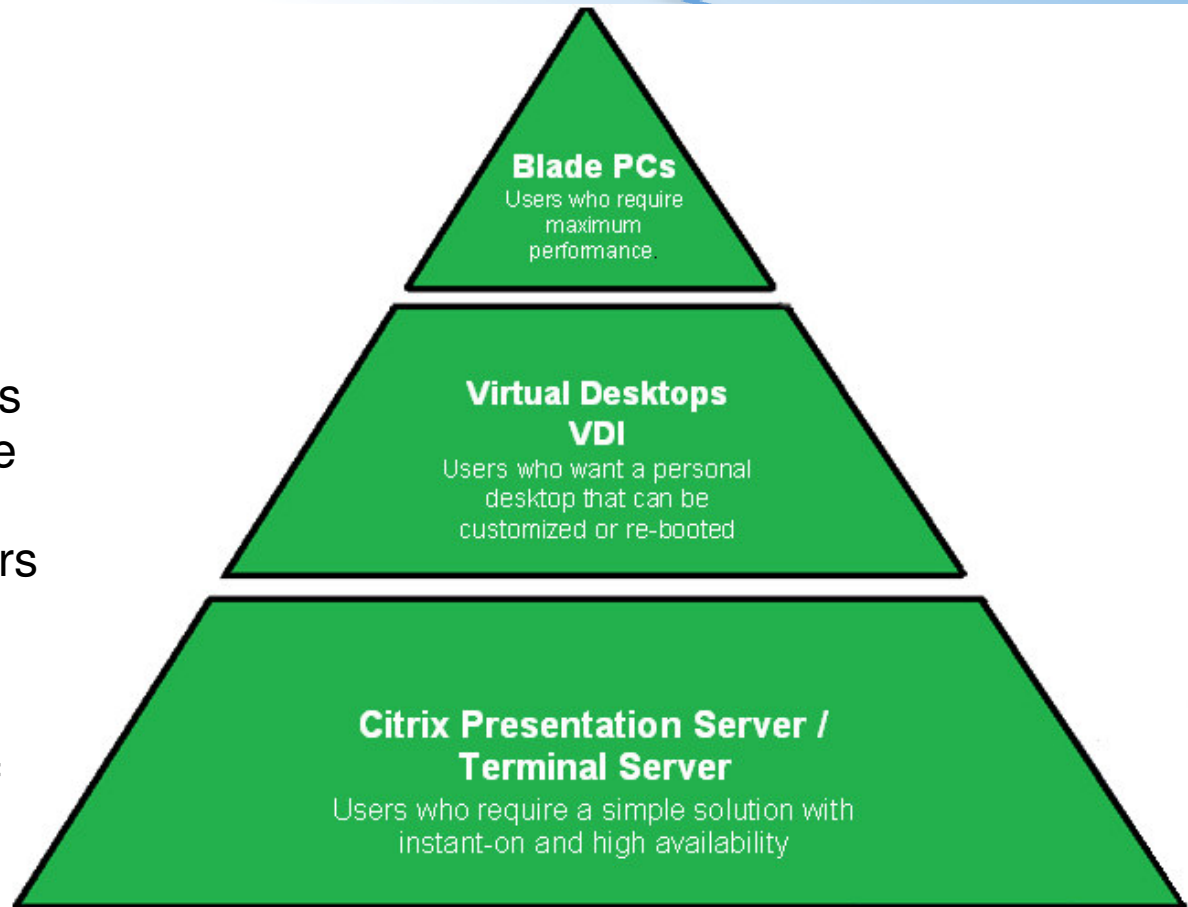Power savings alone pays for the thin clients!

- Assumes 10 cents per KwH with desktops operational for 8 hours per day, 250 days per year.
- Servers operational for 24 hours per day, 365 days per year.

Over 90% reduction in power consumption!

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Consolidated Desktops Are GREEN

- Companies save about 7,000 kilowatt hours for every software application put onto a virtual machine

- Each server removed through virtualization saves 12.5 tons of carbon dioxide emissions, which is equivalent to taking 1.5 cars off the road

- PC's average 124 watts of Power, Thin Clients range from 10-30 watts
  - 85% decrease in power used at each desktop!

Blade PCs
Users who require maximum performance.

Virtual Desktops VDI
Users who want a personal desktop that can be customized or re-booted

Citrix Presentation Server / Terminal Server
Users who require a simple solution with instant-on and high availability

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Scalability Guidelines

- CPU: 5 to 8 users/core

- Memory:
  - 500MB to 1GB/user
  - Hypervisors are getting better at memory sharing

- Blades are ideal building blocks for horizontal scalability:
  - A dual socket blade with quad core processors and 32 GB memory should run 30 to 60 desktops
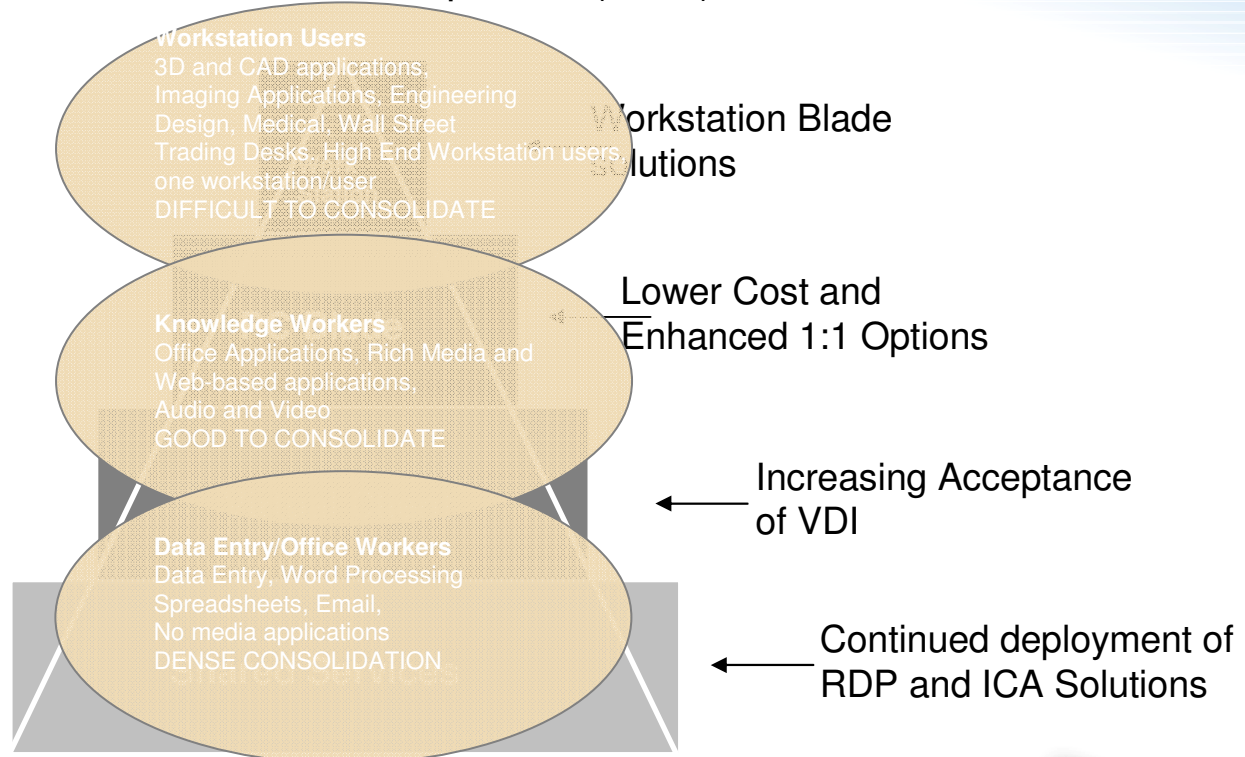
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Applications For Server Hosted Desktops

158M Total Business Desktop Units (2007)

189M Total Business Desktop Units (2009)

<u>Server-Hosted Desktop Growth will be fueled by</u>

• PC over IP Graphics Compression Technology (available today)

• Software to enhance RDP (soon)

• Connection Broker Software to manage server-hosted desktops throughout the desktop pyramid (today and future)

• PC Boards in Server Enclosures (future)

Workstation Users
3D and CAD applications,
Imaging Applications, Engineering
Design, Medical, Wall Street
Trading Desks, High End Workstation users,
one workstation/user
DIFFICULT TO CONSOLIDATE

Knowledge Workers
Office Applications, Rich Media and
Web-based applications,
Audio and Video
GOOD TO CONSOLIDATE

Data Entry/Office Workers
Data Entry, Word Processing
Spreadsheets, Email,
No media applications
DENSE CONSOLIDATION

Workstation Blade Solutions

Lower Cost and Enhanced 1:1 Options

← Increasing Acceptance of VDI

← Continued deployment of RDP and ICA Solutions

Source: IDC July 2006, Worldwide PC Client Form Factor 2006-2010

Source: Gartner, 2006 PC Market by Operating System, Worldwide, 2001-2010

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Future

- Higher density or virtual desktops per blade thanks to
  - more cores per processor
  - more addressable memory per processor and better memory throughput
  - more hypervisor friendly technologies built in silicon

- GPU virtualization

Thank You

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