AAPA Port Technology Seminar
May 16, 2013

Virtual Desktop Infrastructure
Implementation in the Port of Halifax

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Agenda:

- Introduction/Background
- IT Operational Challenges
- The Response
- The Solution
- Lessons Learned

A Canadian Strategic Asset

- Shortest ocean transit times on North Atlantic & Suez routes than any other East Coast Port
- PostPanamax capable today
- Connected to central Canada and beyond
- Direct, multiple services to Europe, Middle East and Southeast Asia

Catchment area allows access to 40% of North American population

Serving Over 150 Countries on Every Continent

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Halifax Port Authority

- One of 18 Canadian Port Authorities
  - Independent federal agencies governed by the Canada Marine Act

- Mandate to develop, market and manage our assets to promote trade & transportation
  - Serve as a catalyst for local, regional & national economies

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Three Lines of Business

- Cargo (2012 figures)
  - Containerized Cargo: 416,572 TEU
  - General Cargo: 444,494 MT
  - Bulk Cargo: 5,586,734 MT
- Cruise (2012 figures)
  - 134 vessel calls
  - 252,847 passengers
- Real Estate
  - Manage 260 acres
  - Highest and Best Use of managed properties

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IT Responsibilities

- Supporting user base
  - 75 full time staff located in 7 buildings in Halifax
  - 20 contract security staff (24x7)
  - 20 students, contractors and temporary staff
  - 5 remote offices (US – 2, Europe, India, Asia)
  - Several "road warriors"
- Administrative systems and applications
  - Microsoft Office Suite
  - Financials (GL, AR, AP, FA)
  - Port Management (vessels, cargo, services)
  - Real Estate Management

IT Responsibilities (Cont'd)

- Security systems and applications
  - Video analytics (cameras, controllers)
  - Access control (biometrics, gates, turnstiles)
  - Perimeter fence monitoring (fencing, PFMS cables)
  - Marine domain awareness (radar, AIS feeds)
- Miscellaneous systems and applications
  - Digital signage
  - Seaport lighting systems (decorative)
  - Video conferencing
  - VOIP phone system
  - Mobile device support

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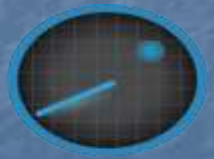
IT Responsibilities (Cont'd)

- Innovation
  - Air Gap Management System (2 harbour bridges)
  - Dwell Time Management System
  - Key Performance Indicators (Rail service level agreement)
  - Interactive HalifaxGetsItThere website
  - Transit Time Calculator
  - Interactive Route Map
  - Container Tracking
  - Technology as Infrastructure – Supply Chain Efficiency



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IT Challenges

- Increase value of IT to the business
  - Reduce time spent supporting infrastructure
  - Increase time spent on supporting the business
- Multi-year workstation replacement strategy
  - Running some older hardware at the workstation level
  - Inconsistencies among desktop hardware
  - Hard to manage and upgrade workstation software
  - Running older versions of software (WinXP, Office 2003)
  - Inconsistencies among desktop software versions

IT Challenges (cont'd)

- High rate of desktop failures and issues
- Challenges with remote support
- Lack of control over desktop environment
- User desire for improved system access
  - Consistent user experience
  - Access to all services
  - Any time
  - Any place
  - Any device

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The Response

- **Desktop Services Delivery Study**
  - Review available technologies and emerging best practices
  - Assess against desired characteristics
  - Select preferred solution
    - Preliminary design
    - Order of magnitude cost
    - Cost/Benefit analysis

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Alternatives considered

1. Evergreen Strategy

Replace/upgrade **all** desktop hardware and applications on a regular cycle (3-4 years)

2. Virtual Session

One OS and one application image on the server is accessed by all users within their own individual sessions (Remote Desktop Connection)

3. Virtual Desktop Infrastructure - Preferred Solution

"Desktops" run on centrally managed pool of virtual machines located on a server in the data centre; each user has their own virtual machine

Virtual Desktop - Concepts

- Each user's desktop runs as a separate, unique virtual machine resident on a centralized server in the data centre
- Separates desktops from access points
  - Can use multiple devices to access the same desktop
  - Uses efficient protocols to pass mouse clicks, keystrokes, and display output between access device and server
- Separates user profiles, operating system, applications and data
  - A user is assigned an available VM on the server, and their 'desktop' is assembled when they connect

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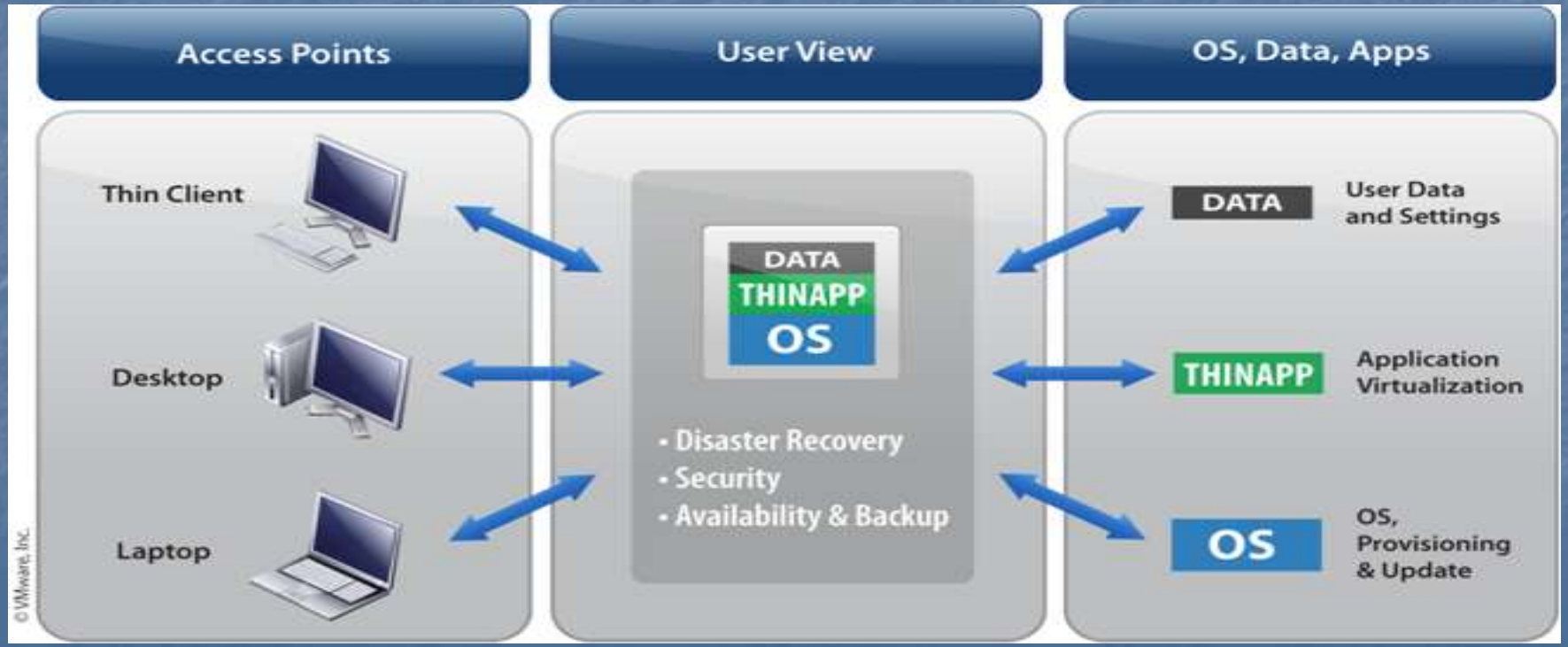
Virtual Desktop – Conceptual Diagram



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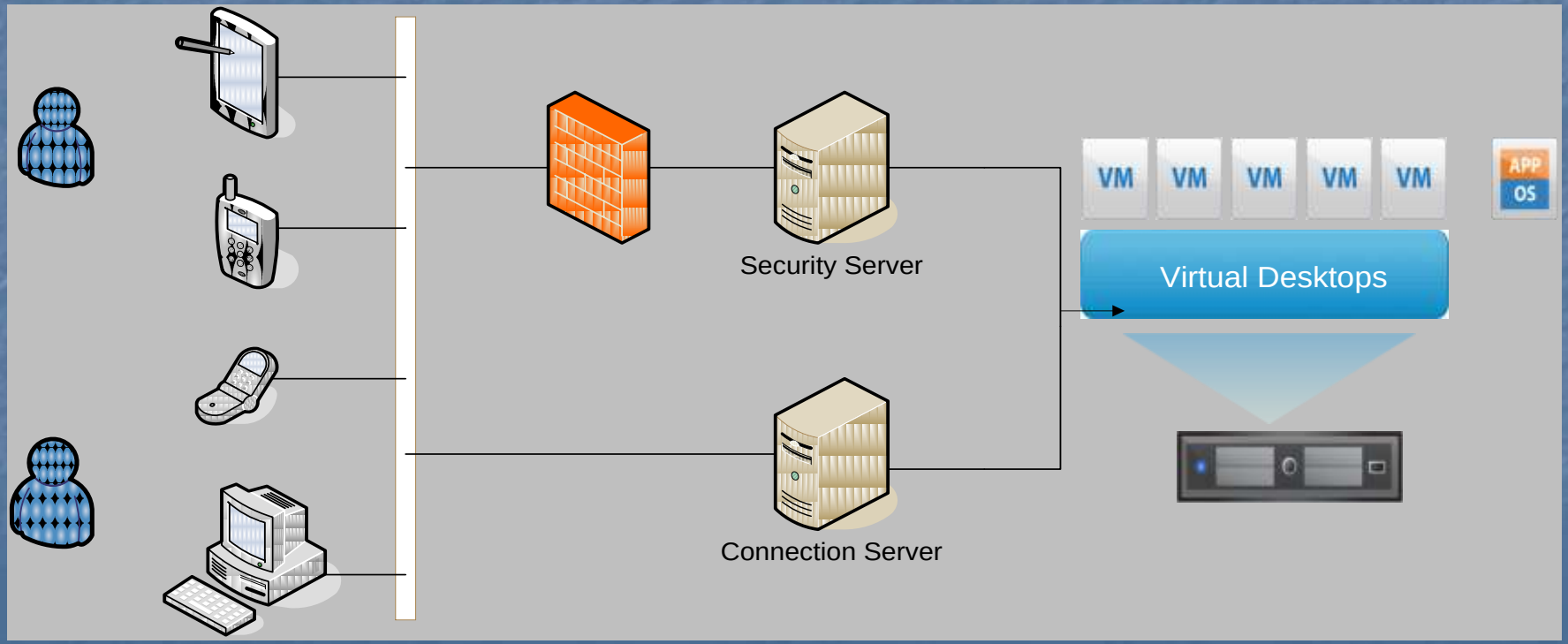
Virtual Desktop – Basic Architecture



Virtual Desktop - Benefits

- Reduce hardware and application deployment and support costs through centralized desktop/app deployment and management, and improved desktop reliability
- Better manage software licenses and associated licensing costs
- Lower capital costs by extending the life of desktop hardware and enabling the use of low cost 'Thin Clients'
- Lower power consumption and related expenses – a greener solution

Virtual Desktop - Benefits (cont'd)

- Bolster security of user data, and simplify Disaster Recovery by separating workstation processing and storage from workstation hardware – data remains in the data centre
- Boost productivity and flexibility by providing users with anywhere and any device access to their work

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The Approach

➢ VDI Proof of Concept

- Insure all HPA applications work as expected, including resource intensive apps
- Evaluate performance: as good as or better than current environment
- Gauge user experience
- Determine ease of set-up, administration and management
- Evaluate Vendor Support

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Alternatives considered

1. VMware View
- View Client Desktop
- Teracici PCoIP protocol
- ThinApp for application packaging and deployment

2. Citrix
- XenDesktop
- Citrix HDX protocol
- XenApp for application packaging and deployment

Decision was made to proceed with VMware View solution, primarily due to superior local support availability.

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The Solution

- Hardware acquired and installed
  - HP DL360 servers
  - HP P4300 ISCSi SANs
  - Dell Wyse P20 Zero Clients
- VMware View installed and configured
- Created Base Image - Windows 7 and Office 2010
- Packaged common applications
- Provisioned initial pool of desktops

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The Solution (cont'd)

- User Training
  - Groups of 10
  - VDI Concepts
  - Windows 7
  - Office 2010

- Roll-out
  - Installed client hardware and migrated each group after training
  - Currently have approximately 30 users migrated
  - Roll out continues

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Lessons Learned

- VDI can be complex
  - Leverage support from hardware and software vendors
  - Leverage experience with server virtualization
- Build a robust environment
  - Insure your network is performing optimally
  - Fast, efficient storage is a must
  - Network, server and storage redundancy is a must
- Change management is critical
  - User expectations must be managed
  - User perception must be managed

Lessons Learned (cont'd)

- Make good use of application provisioning
  - Keep the base image small
  - Distribute applications using application packaging tools
  - Be prepared to package more applications than you expect
- VDI is not optimal for all applications
  - Graphic intensive apps may not perform as well as desired
  - Investigate the use of virtual GPU technology for these applications
- VDI may not be cost effective for smaller operations
  - Initial capital cost of hardware and software
  - Operating cost savings depend on scale of operation

Lessons Learned (cont'd)

- VDI delivers benefits
  - Central control and management of desktops
  - Easy to do mass software upgrades
  - Easy to roll back to prior versions of software
  - Flexibility to run older versions of applications (even those that require an older version of an operating system)
  - Virtual client software extends life of existing desktop hardware
  - Zero, or thin, clients save power and desktop real estate
  - Data is kept securely in the Data Centre
  - Performance via Internet similar to LAN performance
  - Users have access to familiar desktop and all of their apps any time, anywhere, any device (within reason)

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Thank You

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