SmartStart Scripting Toolkit Win32 and Linux Edition Tutorial

Presenters:
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Industry Standard Server

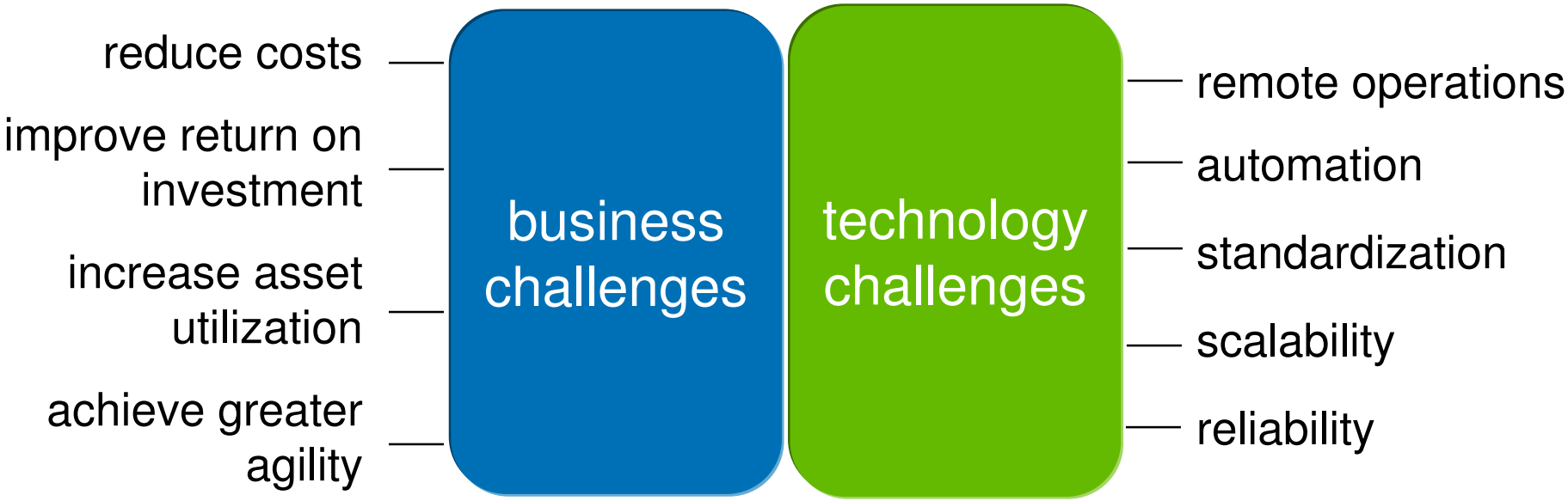
Agenda

- Background
- Technical Overview
- Win32 Edition

- Linux Edition
- Support and Resources

HP WORLD 2004
Solutions and Technology Conference & Expo

What we hear from customers



Server Deployment Trends

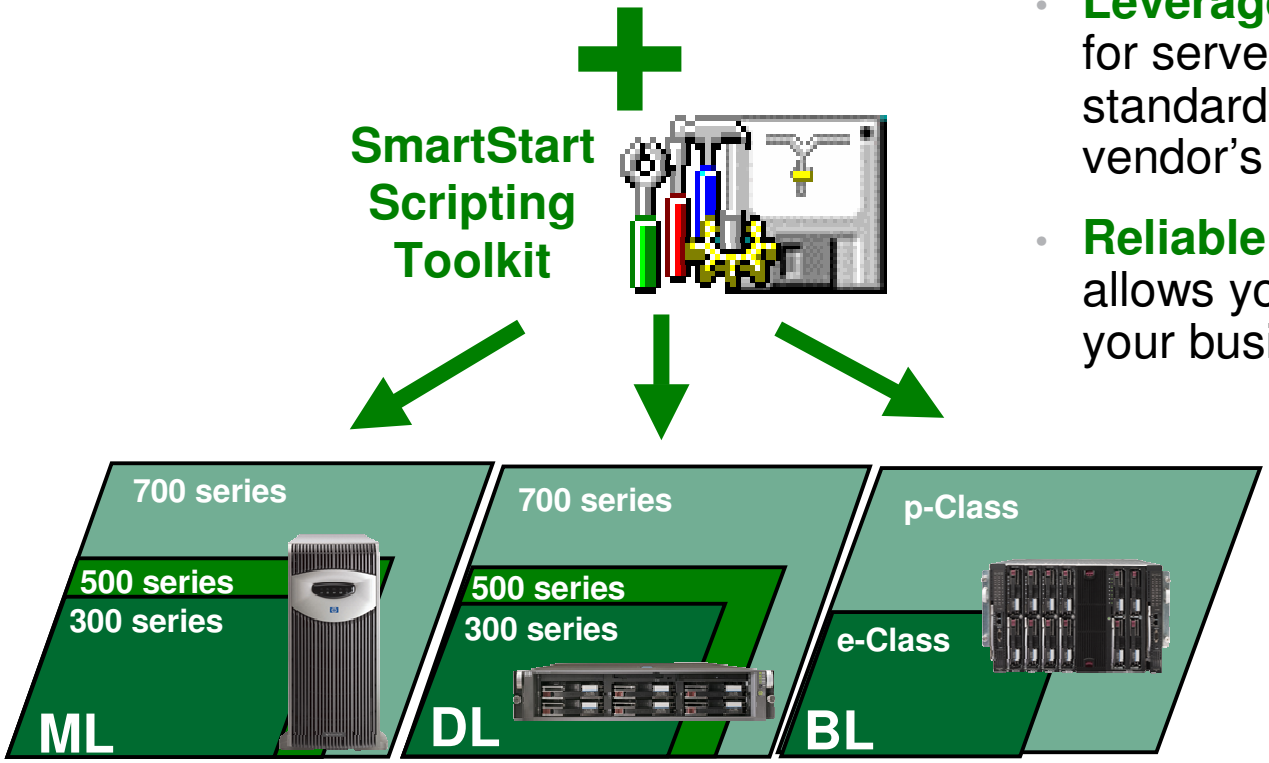
Trends

- Ultra-dense rack mounted servers
- Adoption of PXE standard on server platforms
- Remote server deployment
- Growing use of automating server setup: OS and software installations

Impact

- Headless servers
- Automated network boot from system ROM
- Drive server deployments from standard scripts
- Reliable server configurations
- Rapid deployment of OS takes minutes, not hours

Automating ProLiant server configurations



- **Saves valuable IT resources** by shaving hours off of deployment time and enabling remote automated server deployment.
- **Leverage industry standards** for server deployment and standard operating system vendor's installation process
- **Reliable server deployment** allows you to adapt quickly to your business growing needs.

SmartStart Scripting Toolkit

Suite of tools and utilities designed to automate configurations of ProLiant servers.

- Customized installations using leading-industry standard scripting methods.
- Unattended configuration of server and option hardware
- Flexibly integrates with existing deployment solutions:
  - Unattended installations of Windows and Linux operating systems
  - Third party imaging tools
  - Your own bootable CD environment
- Supports across the network installations, or via customized bootable CD
- Designed for the IT expert experienced with scripting Windows and Linux operating systems and ProLiant installations

HP ProLiant Deployment Tools

SmartStart

single server

interactive, assisted install

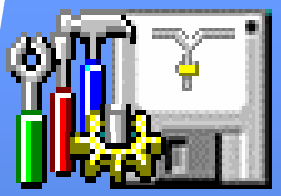
interview-based

Supports BL/ML/DL 300,500,700

novice user

available from hp.com

SmartStart Scripting Toolkit



multiple server

customer-created scripts

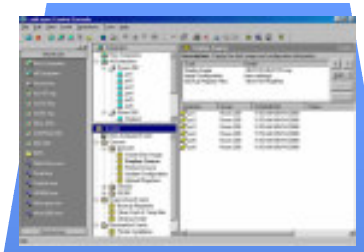
automated w/ boot media or network

supports BL/ML/DL 300,500,700

expert user

available from hp.com

Rapid Deployment Pack



multiple server

automated from remote console

pre-packaged deployment events

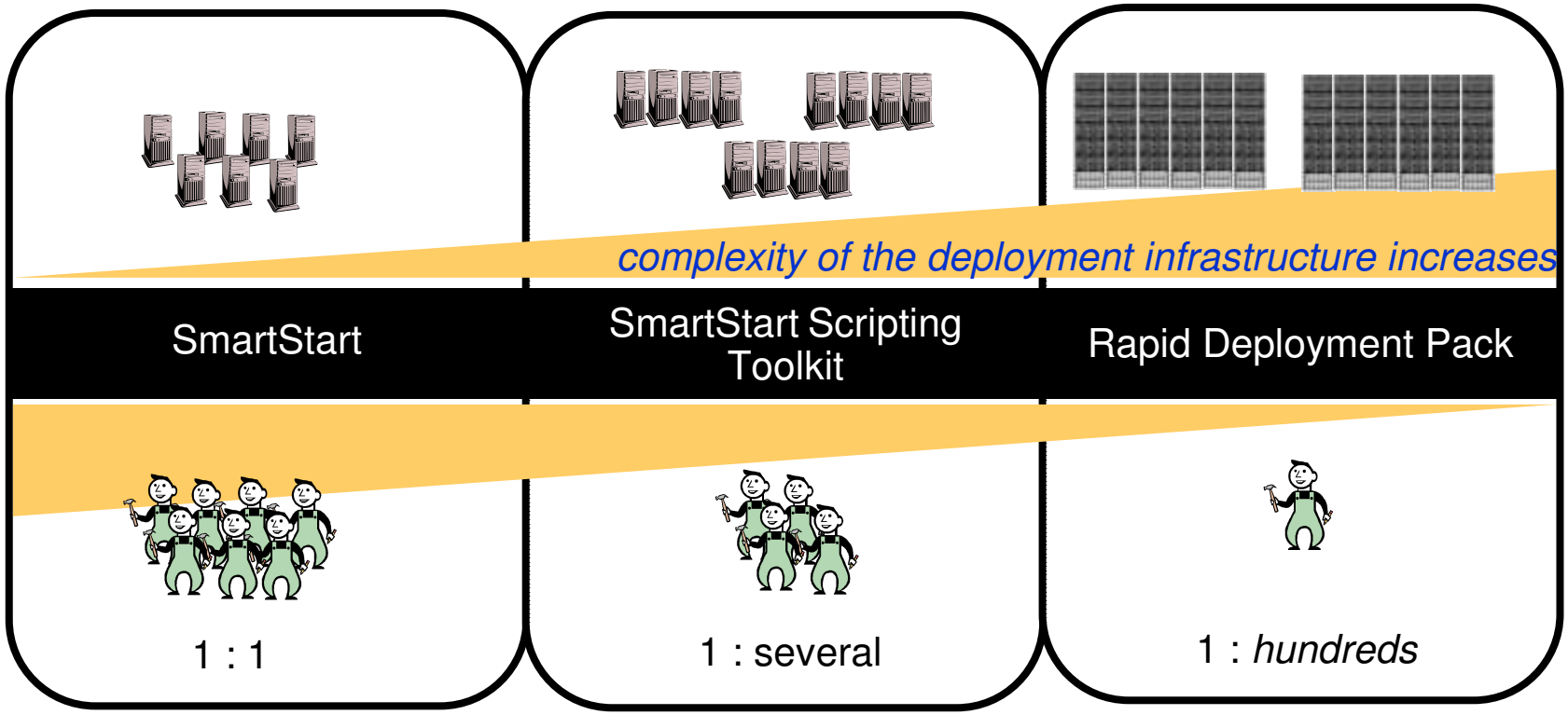
supports ML/DL 100,300,500,700

intermediate user

requires a license

Scaling server deployments

number of servers deployed increases



number of people required per server decreases

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- Linux Edition
- Key Takeaways

Objectives

- Familiarize users with the SmartStart Scripting Toolkit capabilities and the new deployment options
- Identify challenges the users will have to overcome
  - Building WinPE and Linux media
  - To PXE or not to PXE, the question
- Explore Deployment Infrastructure options

How does the Toolkit work?

1

Create reference or base server using SmartStart

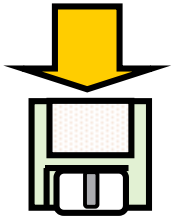
2

Integrate server configuration and scripts files into a bootable CD

server data file

options data file

script file



3

Configure new server and install OS

bootable disk or over-the-network install

install OS from CD or network share

SmartStart Scripting Toolkit DOS Edition

Background

- First-to-market for scripting multi-server systems
- Introduced July 2000
- Integrates SmartStart Technology
- Uses embedded ProLiant configuration tools – RBSU (ROM-based setup utilities)
- Toolkit is scripting engine for HP's rapid deployment product - ProLiant Essentials Rapid Deployment Pack

DOS Limitations

- Memory is limited to 1 MB
- Network Driver Availability
- Subject to virus traffic overflowing network buffer
- DOS availability is an issue
- Limited script functionality (batch files)
- Slow file transfers from network or media

Features Comparison

	DOS	Linux	WinPE32
Memory Space >1MB	No	Yes	Yes
Runs 32 bit applications	No	Yes	Yes
Fits on Floppy (1.44 MB)	Yes	No	No
Works with PXE	Yes	Yes	Yes
Perl/Advanced scripting Support	No	Yes	Yes
Visual Basic Support	No	No	Yes
WMI Support	No	No	Yes
Online for capturing system info	No	Yes	Yes

Linux and Win32 Tools

- **CONREP** – Configuration Replication Utility

  Generates a hardware configuration script file used to duplicate the hardware configuration of one ProLiant server onto another

- **ACU** - Array Configuration Utility (replaces ACR functionality)

  Configures the SMART-2, Smart Array, and RAID Array 4000 (RA4000) controllers on a target server. ACR reads the configuration information from a script file and applies the configuration to the controllers in the target server

- **HPONCFG** - Lights Out Configuration Utility

  Configures RILOE II and iLO settings

- **HWDiscovery** – Hardware Discovery

  Create an inventory of the system being deployed. Information includes System name and ID, processor(s), PCI devices, and memory, etc

- **Migration Utility** – For current DOS Toolkit users

  Converts DOS Conrep data files to XML data files to be used in both WinPE32 or Linux environment.

- **Assorted utilities**

  Utilities that handle the details of keeping track of the system state between reboots, creating and formatting partition.

Deployment Infrastructure Challenges

- Linux and WinPE bootable environments do not fit on a floppy disk.
- The OS being deployed will not easily fit onto the same CD as the scripting environment
- Planning and preparation: local and remote deployment
  - Content management
  - Control of process

Deployment Infrastructure Considerations

- Network environment
  - Dead Net (no production network connections)
  - Production Network
  - No Network
- DHCP and PXE services
  - No DHCP allowed
  - DHCP allowed, no PXE
  - Both DHCP and PXE Allowed
- Low bandwidth branch offices
- Lights-Out Virtual media
- Review Best Practices documentation for more information

What's best for me?

- What is your primary deployment operating environment?
- What operating systems are you going to install?
- What is your experience level?
- Are you a Microsoft Volume License customer?
- What restrictions are within your networking infrastructure?
- How do you manage your deployment environments?

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Toolkit Win32 Edition Agenda

- Win32 Edition Overview
- Boot Environments
- Networking Infrastructure
- OS Installation
- Key Takeaways

Toolkit Win32 Edition Overview

- Based on Win32 environment and has been tested with a pre-released version of Windows XP SP2 WinPE (Windows PE 2004)
- ~160MB footprint for WinPE with PnP and WMI enabled. HP ProLiant drivers and Toolkit utilities add additional ~20MB
- Utilities can be scripted and run unattended in WinPE boot environment
- Requires custom build of WinPE with HP ProLiant drivers and software
- Boot methods supported
  - PXE
  - CD/DVD
  - HDD
  - iLO/RILOE II Virtual Media (CD Based)

What is WinPE?

- WinPE - **Win**dows **P**reinstallation **E**nvironment
- WinPE is available for Microsoft volume license customers with a Select or Enterprise Agreement
- Microsoft's DOS replacement for 32-bit pre-OS environment for OS deployment, test, diagnostics and system recovery
- Minimal Win32 subsystem based on Windows kernel running in protected mode
- Built using WinPE Build Tools, available through the OEM Preinstallation Kit (OPK)

Versions

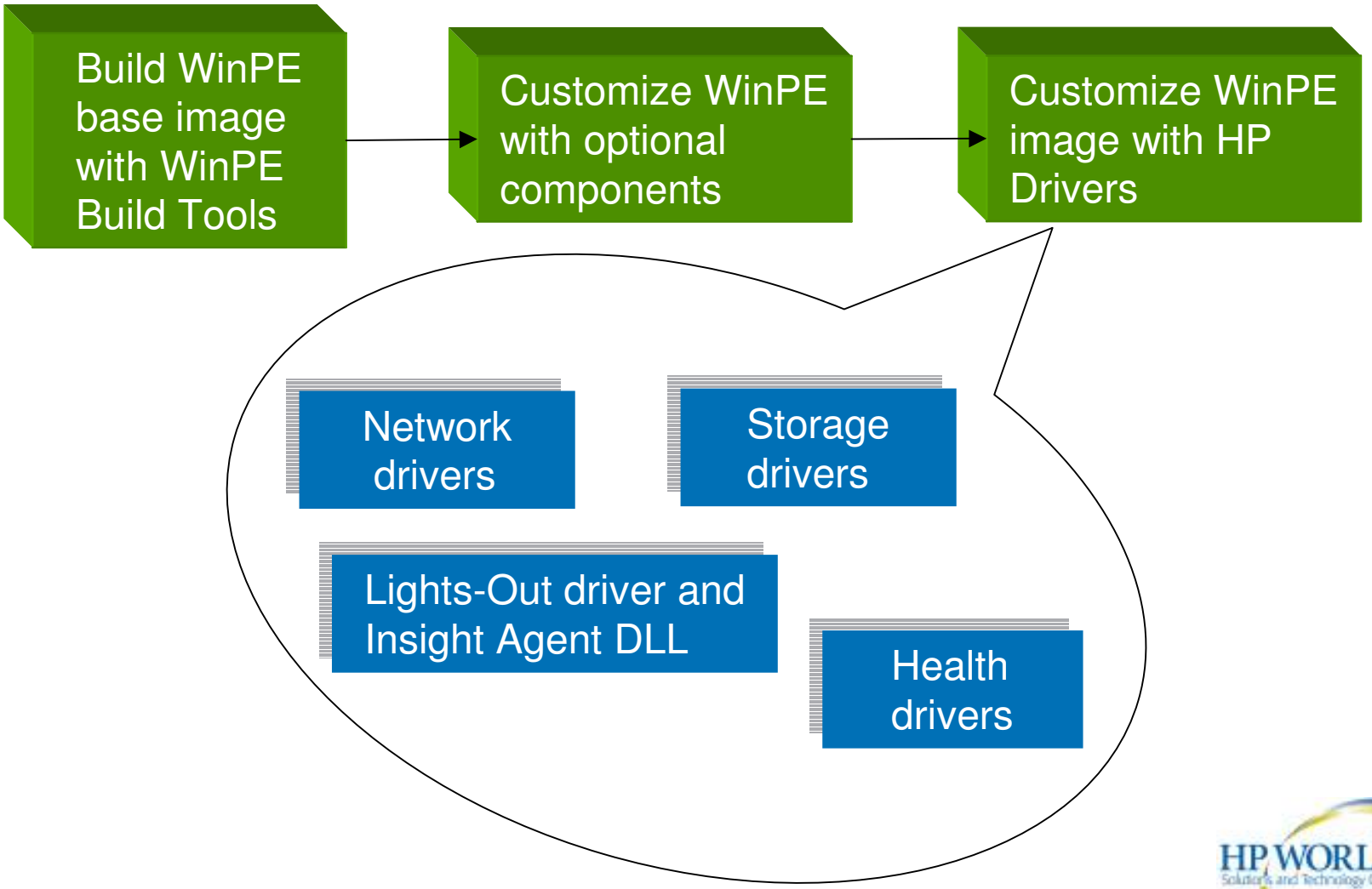
- Current: WinPE Version 2002
  - Built using XP, XPSP1 or Windows 2003
- Late 3Q04: WinPE Version 2004
  - Built using XPSP2
- Late 4Q04: WinPE Version 2004
  - Built using XPSP2 or Windows 2003 SP1

SSTK Win32 Edition only works with WinPE Version 2004 or later

Windows PE Version 2004 Features

- **Can run PnP to load WDM drivers**
- WMI support with providers for diagnostic tools
- Network support with built in firewall enabled by default
- Support for all storage devices with ability to add new storage drivers
- **Subset of Win32 APIs**
  - Command-line interface capable of running batch files
  - Support for Windows Script Host (WSH), HTML Applications (HTA), and ActiveX® Data Objects (ADO)
  - Includes I/O (disk and network) and core Win32 APIs
- **Automatically stops running after 24 hours**
- Does not support network access to files or folders on WinPE computer from another location
- Does not support .NET framework or CLR
- Does not support WOW32 and WOW64
- Size is relatively big, but can be reduced
- **Windows 2003 SP1 WinPE supports**
  - Fully RAMDISK loadable
  - While both versions support USB Flash Device, only Windows 2003 SP1 can be booted from USB Flash Device

Customizing WinPE Build Environment



Customizing WinPE with HP ProLiant Drivers

- Users need to add the following drivers to ensure full access to HP ProLiant servers from WinPE
  - Network drivers for Windows 2003
  - Storage controller drivers for Windows 2003
  - Health Driver for Windows 2000 (“iLO Advanced and Enhanced System Management Controller Driver” and “Advanced System Management Controller Driver)
  - Lights-Out Interface Driver for Windows 2003 (“iLO Management Interface Driver” and “Remote Insight Lights-Out II Board Driver”)
  - Shared memory to user management agent component (*sm2user.dll*)
- Toolkit includes the above drivers and a script, *hp_winpe_customize.cmd*, to simply process for customizing WinPE

WinPE Build Tools Commands

- ***mkimg.cmd***
  - Builds the WinPE file set using files from the Windows CD, optional components for this command are PnP and WMI
- ***drvinst.exe***
  - Used for adding NIC and other WDM drivers to the WinPE file set
  - Requires WinPE be built with PnP
- ***oscdimg.exe***
  - Used for building WinPE ISO image from the WinPE file set

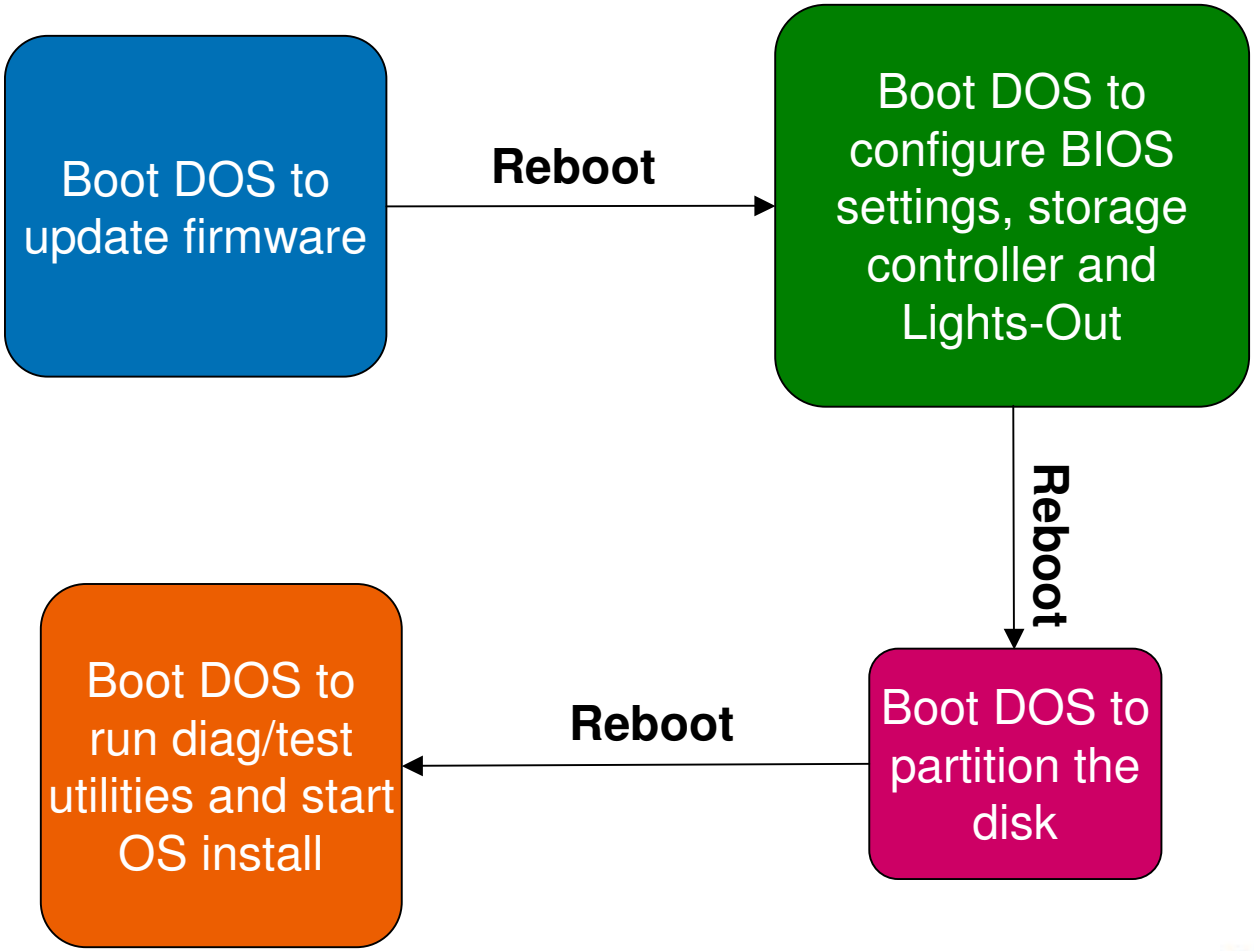
Boot Environment

- **CD/DVD**
  - Most common form of boot media
  - RILOE II/iLO supports virtual CD
- **PXE**
  - Microsoft's Remote Installation Services (RIS) is the only PXE server that WinPE currently supports, others have not been tested
- **HDD**
  - WinPE can be booted from hard drive

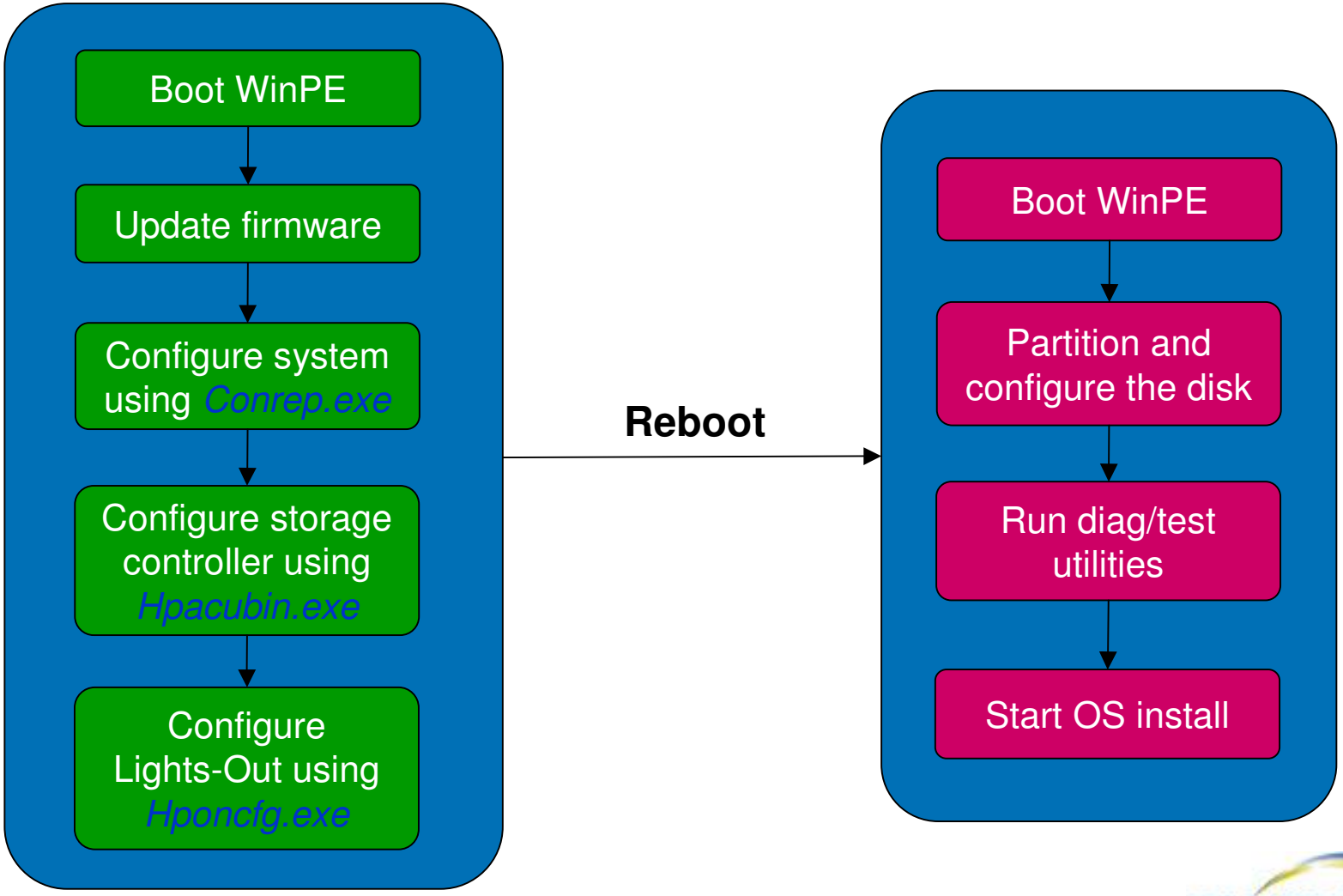
Network Infrastructure

- WinPE supports TCP/IP and NetBIOS over TCP/IP
  - No support for IPX/SPX network protocol
- No network requirement
  - For using WinPE from CD/DVD and HDD
- WinPE with RIS
  - Requires DNS, DHCP and Active Directory

OS Installation Process with Toolkit DOS Edition



OS Installation Process with Toolkit Win32 Edition and WinPE



This can be fully automated!

System Installation Tips

- **Modify *Startnet.cmd*** to put customized scripts at the end of the WinPE boot environment
- **Store configuration scripts and utility data files** on a network share so that WinPE image is generic - single image works on multiple systems
- **Utilize *Statemgr.exe*** to keep track of different states during the installation process
- **Edit *Unattend.txt*** to do unattended Windows OS installation and install HP Support Paq drivers after the Windows is fully installed

Key Takeaways

- Obtain your own copy of the Microsoft OPK
- Review the Toolkit Win32 Best Practices guide
- Users must customize WinPE image with HP drivers
  - See HP supplied scripts
- Keep WinPE boot environment generic
  - Separate boot environment from customized files, such as data files, utilities, and specific scripts for various deployment scenarios
- For current DOS Toolkit users
  - The Migration Utility converts DOS Conrep data files to the new XML format

10 Minute BREAK

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Toolkit Linux Edition Agenda

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- Boot Environments
- Networking Infrastructure
- OS Installation
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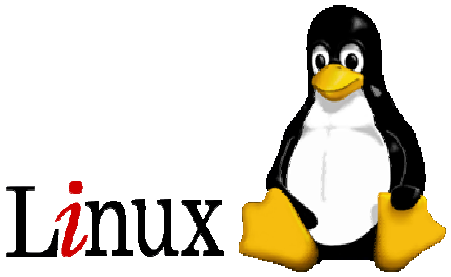


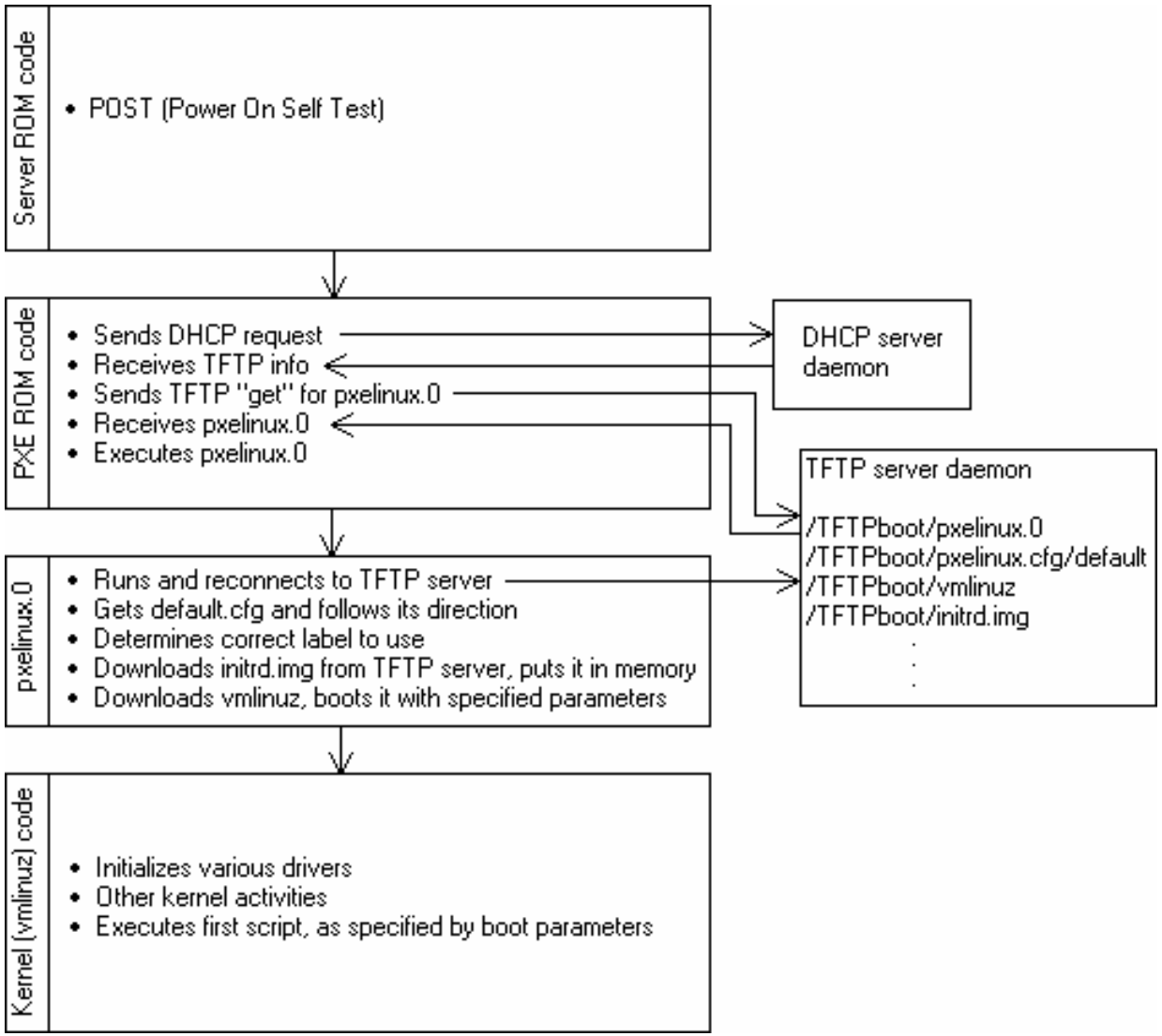
Toolkit Linux Edition Overview

- ProLiant HP drivers integrated into the boot environment
- Boot environment based on Red Hat 7.3
- 12MB footprint (11MB file system+1MB kernel)
- BASH command shell
- Boot methods supported
  - PXE
  - CD
  - USB flash drive (disk on key)
  - iLO/RILOE II Virtual Media (CD Based)
- Common components of a Toolkit Linux boot environment
  - kernel, file system, bootloader and configuration files

PXE Boot Environment

- **DHCP Service with PXE Options enabled**
  - TFTP redirect
- **TFTP Service**
  - TFTP directory tree
- **Bootloader**
  - *pxeLinux.0* + *pxeLinux.cfg*

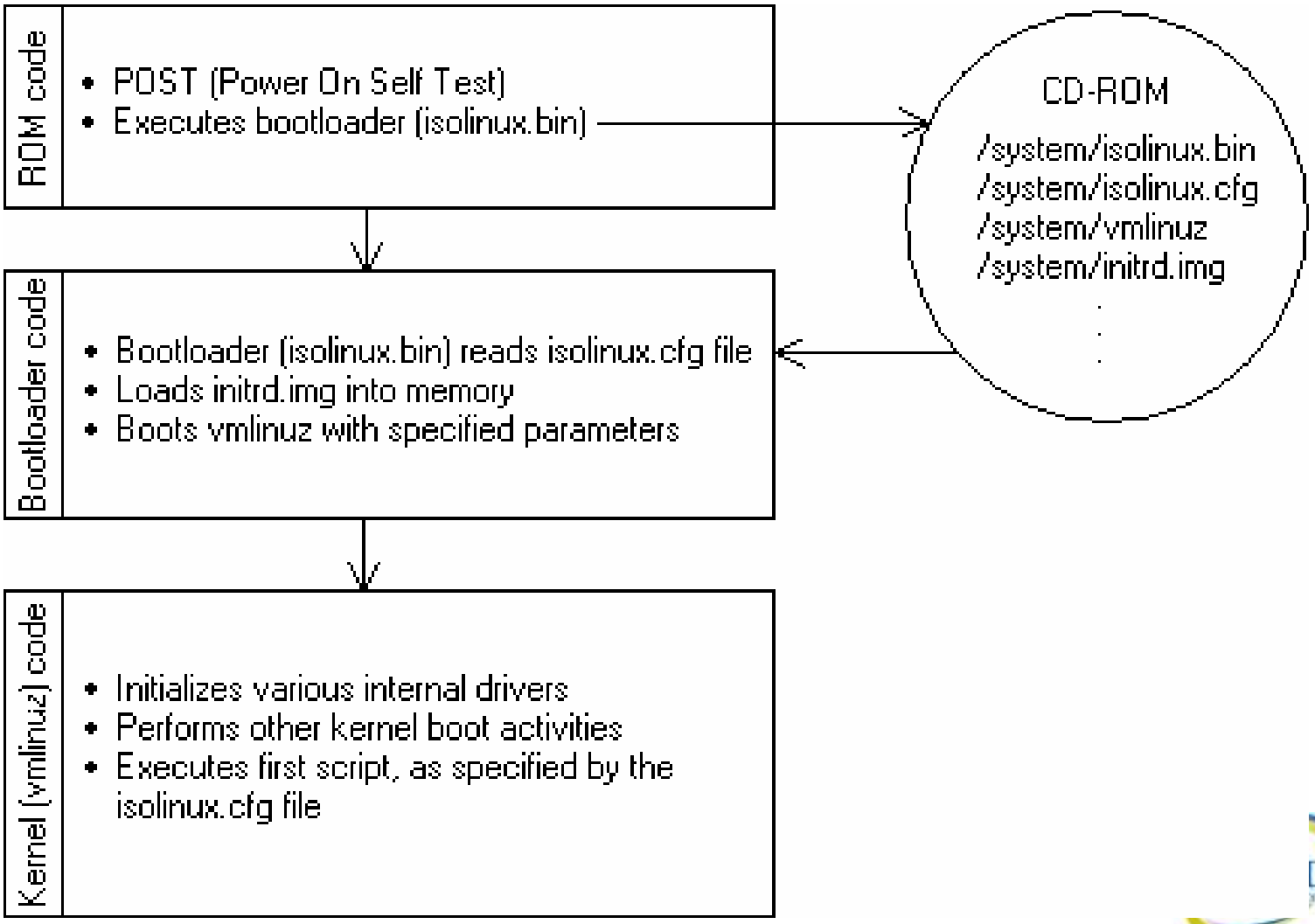
PXE Boot Process



CD Boot Environment

- Create ISO image
  - El-Torito no emulation mode
  - Mkisofs
- CD build directory contains 4 components
  - vmlinuz – kernel
  - initrd.img – file system
  - syslinux (*isolinux.bin*) – bootloader
  - bootloader configuration files
- Sample *mkisofs* command with parameters
- CD can be used with Lights-Out for remote deployment

Linux CD Boot Process



USB Flash Drive Boot Environment

- Requires newer system ROMs that support USB flash drive boot
  - ProLiant ML/DL G4s

- One method for creating bootable USB flash drive
  - Partition the USB flash drive with a FAT16 partition
  - Format the partition with *mkdosfs*
  - Use sysLinux to land bootloader and *ldlinux.sys*
  - Copy remaining bootfiles *(vmlinuz, initrd.img, syslinux.cfg*) to partition

Linux is booted, now what?

- Regardless of boot method, once the kernel is running on the *initrd.img* filesystem, the flow of control is identical
- The logical state of the Linux environment is independent of the boot method
- Bootstrap process
  - Setup network
  - Connect to network share and get redirect script
- Use hardware discovery to inventory server
- Use CONREP/ACUXE to capture or configure server and array configurations
- Flash Firmware using Linux components from HP.COM

Setting Up Network Infrastructure

- NFS share
- Best practices
  - Set up one redirect share
  - Set up one main share
  - Any auxiliary OS installation share
- Examples of other share types
  - Samba
  - FTP

Red Hat OS Installation

- Unattended, over the network installation process
  - *kickstart.cfg*
    - Create your own
    - Take from existing installation and modify
    - Refer to Red Hat User Guide for information
  - *bootnet.img*
    - Important to have recent version for newer NICs
    - Download from HP.COM
  - NFS/FTP/HTTP
- In Toolkit Linux environment, run Toolkit partition script to prepare system for Red Hat installation
- Be sure to incorporate the latest *bootnet.img* for the target machine

Audience Question

How many of you will be using the Linux Toolkit to install other operating systems?

Customizing Linux Toolkit Environment

- Why?
  - Change Linux Toolkit boot behavior
    - Customize network infrastructure configurations
    - Define Toolkit and content (OS files, data files, scripts) repositories
  - Add additional utilities
    - PERL engine
    - 3rd party utilities
    - Other
- Demo

Key Takeaways

- Review the Linux Toolkit Best Practices guide.
- Linux Toolkit integrates HP ProLiant drivers
- Toolkit delivers a Linux boot environment
- Capable of heterogeneous OS installations
- Keep Linux boot environment generic
  - Separate boot environment from customized files, such as data files, utilities, and specific scripts for various deployment scenarios

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The Toolkit Package

Win32 Edition	Linux Edition
Scripting environment: Uses CMD or batch file	Scripting environment: BASH
Uses WinPE pre-OS environment. (WinPE available for Microsoft Volume License Customers.) Configuration tools can be run online.	Uses Linux pre-OS environment Configuration tools can be run online.
Create your own bootable CD following simple instructions	Delivered with bootable Linux CD
User Guide, Best Practices, Hardware Support Matrix Supports ProLiant ML/DL300+ and BL series servers **Downloadable from www.hp.com/servers/sstoolkit**	

Website Resources

- http://www.microsoft.com/ntserver/techresources/deployment/NTserver/DeployRoadmap.asp
- http://www.microsoft.com/technet/treeview/default.asp?url=/technet/prodtechnol/windows2000pro/deploy/unattend/sp1unatd.asp
- http://www.novell.com/documentation/lg/nw51/othr_enu/data/a2zj6s4.html
- http://www.novell.com/documentation/lg/nw6p/index.html?page=/documentation/lg/nw6p/othr_enu/data/hz8pck9v.html
- http://www.Linux.org/docs/ldp/howto/KickStart-HOWTO.html
- http://syslinux.zytor.com/index.php

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