

**Information Technology Policy
Commonwealth of Pennsylvania
Governor's Office of Administration/Office for Information Technology**

ITP Number:	ITP-SYM008	
ITP Title:	Server Virtualization Policy	
Issued by:	Deputy Secretary for Information Technology	
Date Issued:	November 20, 2009	Date Revised: December 20, 2010
Domain:		
	Systems Management	
Discipline:		
	Servers	
Technology Area:		
	Virtualization	
Revision History		
Date:	Description:	
12/20/2010	ITP Refresh	

Abstract:

The purpose of this Information Technology Policy (ITP) is to establish virtualization policy and standards for the Commonwealth's enterprise network.

Virtualization is a key component of an effort designed to increase efficiency and security while decreasing the complexity and overall cost of ownership. The implementation of virtualization technology offers tangible benefits that can be easily measured and quickly realized. Cost savings are a direct result of increased resource utilization, reduction in physical footprint, and reduced support overhead through enhanced provisioning abilities and centralized management. In addition, a virtualized environment provides a cost-effective medium for disaster recovery planning.

Problem Statement

Virtualization and hypervisor technology are not new concepts. Mainframes, for example, have been utilizing virtual machines for many years. Running a hypervisor or a virtualization technology on an Intel or x86-based server platform, however, is a newer development. Until recently, the benefits of a virtualized environment were constrained to mainframe environments and the general mindset for maintaining and provisioning hardware in an x86-based server environment called for adding servers per applications on a nearly one-for-one basis. Administrators would often deploy one physical server to dedicate to each individual application performing at least one important task. This problem is further compounded when, as is typically the case, enterprise applications require multiple physical servers for their various components (e.g., the application itself, middleware, database server).

The consequence of current information technology (IT) practice is gross resource under-utilization as most applications do not require constant machine utilization, but rather only for relatively short bursts at various intervals (e.g., specific times of day, weekly). Applications need to reside on a server robust enough to handle the times of peak utilization, regardless of how short the duration might be of the peak utilization. In addition to resource underutilization, current practices result in other inefficiencies, costs, and challenges including but not limited to:

- Large network infrastructure and physical space footprint;
- Logistical and time difficulties ordering, purchasing, and setting up of new servers;
- Planning of legacy application migration;

- Scalability of existing and new hardware; and
- Planning for disaster recovery.

Reducing or eliminating servers can result in reducing complexities in these other areas with the potential for tremendous cost savings.

Solution Statement

Virtualization technologies provide solutions that can help mitigate all of the problems previously mentioned. It does so by increasing the efficiency of existing resources, increasing the ability to scale existing infrastructure, and substantially reducing the time and effort involved in provisioning new servers while reducing the overall physical footprint of the server environment.

Industry research consistently reveals that servers in a distributed computing environment sit mostly idle. Forrester analysts state that Windows servers typically run at 8 percent to 12 percent of their full capacity and UNIX servers use only 25 percent to 30 percent. IBM stated that when they conducted baseline testing, they observed CPU utilization rates of 3 percent to 7 percent. IT departments that virtualize their environments generally see an average CPU utilization in the 40 percent to 80 percent range, depending on the setup and the type of applications that are virtualized.

Legacy application migration to new hardware platforms is a point of contention for IT support staffs. Changes in hardware technology due to innovation and the need to upgrade or scale to gain more performance make it difficult for staff to maintain applications and operation systems throughout the various and relatively short hardware life cycles. Porting applications to the latest hardware platforms can be difficult, or even impossible, because of lack of backwards compatibility and support. Virtualization provides a solution for this problem because it utilizes industry standard hardware in its virtualized environment to ensure backwards compatibility. The virtualization layer itself provides a buffer between the actual physical hardware, so as far as a server running inside as a virtual machine is concerned, it is unaware that it has been migrated and is now running on a new hardware platform.

Another substantial benefit that virtualization provides is ease of server provisioning. In larger enterprises, the development, testing and deployment of applications across environments can be a relatively demanding proposition. Typically, a server needs to be setup physically before an application begins a development and testing process. Once complete, the application is moved to another server for production deployment. The original server setup for development and/or testing may then need to be physically removed or reconfigured for some other purpose. Because servers can simply be created and deleted logically as necessary, the use of virtualization for provisioning, in this scenario, provides significant costs savings by greatly reducing the time and effort involved. Servers can be created and deployed for use literally in minutes instead of days or weeks.

General:

This ITP applies to all departments, boards, commissions and councils under the Governor's jurisdiction. Agencies not under the Governor's jurisdiction are strongly encouraged to follow this policy.

Policy:

New projects implementing the use of virtualization technologies are to adhere to the policy and standards contained in this ITP. If an agency is considering utilizing virtualization for its server farm, it is recommended that a baseline be performed and that a cost/benefit

analysis be conducted. Information obtained from the baseline and cost/benefit analysis is to be made available to other agencies. Typical baseline generation is to be conducted over a two- to four-week period and is to track statistics including: CPU, memory, disk, and networking utilization.

Agencies that desire virtualization products for enterprise mission-critical servers requiring high availability are to complete an IT Procurement Request and submit it to the appropriate agency [CoP Planner](#).

Note: This ITP defines mission-critical servers as systems that require 100 percent guaranteed support and significant liability to maintain business continuity is placed on the supporting vendor(s). Not all independent software vendors (ISVs) will commit to providing support for their products running in a virtualized environment. Obtaining full ISV problem resolution services for ISV products running in a virtualized environment may require agencies to recreate the problem in a non-virtualized environment. Agencies are to factor criticality of the application, ISV support terms and conditions, and plan problem resolution procedures into the decision to execute an application in a virtualized environment.

Definitions of Terms:

Host Operating System- the underlying operating system is installed on the physical system and used to manage the virtual environment.

Guest Operating System- an operating system that runs inside the virtualization application. It is also referred to as a virtual machine (VM).

CURRENT STANDARDS

(These technologies meet the requirements of the current architecture and are recommended for use.)

Technology	Platforms	Technology Classification
Production, Test & Development VMware ESX Server 3.5 VMware ESX Server 4.0	Does not need a host Operating System (OS). Servers are to be compatible**	Current
Test & Development only VMware Workstation 6.0 VMware Workstation 6.5	Workstations running Linux or Windows OS	Current
Test & Development only MS Virtual PC 2007	Workstations running Windows only	Current

CONTAIN

(These technologies no longer meet the requirements of the current architecture and are not recommended for use. They will be phased out over time. No date has been set for their discontinuance.)

Technology	Platforms	Technology Classification
VMware ESX Server 2.5 VMware ESX Server 3.0	Does not need a host OS. Servers are to be compatible.**	Contain
Test & Development VMware Server 1.0 (Replaces GSX)	Servers running Linux or Windows OS	Contain
Test & Development only MS Virtual Server 2005 Enterprise R2	Servers running Windows OS only	Contain
Test & Development only MS Virtual Server 2005 Standard R2	Servers running Windows OS only	Contain
MS Virtual Server 2005 Enterprise	Servers running Windows OS only	Contain
MS Virtual Server 2005 Standard	Servers running Windows OS only	Contain
VMware Workstation 5.5 VMware Workstation 6.0	Workstations running Linux or Windows OS	Contain
MS Virtual PC 2004	Workstations running Windows only	Contain

RETIRE

(These technologies are being phased out. Plans are to be developed for their replacement, especially if there is risk involved, such as lack of vendor support. A date for retirement has been set.)

Technology	Platforms	Technology Classification
VMware ESX Server versions prior to 3.0	Does not need a host OS. Servers are to be compatible**	Retired
VMware GSX Server – all versions	Servers running Linux or Windows OS	Retired

VMware Workstation prior to 5.5	Servers running Linux or Windows OS	Retired
Connectix Virtual PC for Windows	Workstations running Windows only	Retired

EMERGING / RESEARCH

(Emerging technologies have the potential to become current standards.

At the present time, they are to be used only in pilot or test environments where they can be evaluated. Use of these technologies is restricted to a limited production mode, and requires approval of a waiver request. Research technologies are less widely accepted and time will determine if they will become a standard.)

Technology	Platforms	Technology Classification
Limited Production, Test & Development Xen-based virtualization products	Linux only	Research
Test & Development only VMware Workstation 6.5	Workstations running Linux or Windows OS	Research
Limited Production, Test & Development Microsoft Hyper-V	Windows Only	Research

**Current VMware ESX hardware compatibility list can be found at: http://www.vmware.com/support/pubs/vi_pubs.html

Refresh Schedule:

All standards identified in this ITP are subject to periodic review and possible revision, or upon request by the Enterprise Architecture Standards Committee (EASC).

Exemption from This Policy:

In the event an agency chooses to seek an exemption, for reasons such as the need to comply with requirements for a federally mandated system, a request for waiver may be submitted via the Commonwealth of PA Procurement and Architectural Review (COPPAR) process. Requests are to be entered into the COPPAR Tool located at <http://coppa.pa.gov/>. Agency CIO approval is required. Contact your agency [CoP Planner](#) for further details or assistance.

Questions:

Questions regarding this policy are to be directed to ra-itcentral@pa.gov.