

## 22 – Virtual Servers and Desktops

### Action Item Template Response

#### General Action Item Information

Lead Division/Office: Enterprise Infrastructure

Action Item Number: 22

Action Item Short Name: Virtual Servers and Desktops

Dependencies with other EP Action Items:

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#### I. DESCRIBE YOUR PLANS FOR IMPLEMENTING THIS ACTION.

This action item covers two distinct needs. Though both items recommend virtualization as a solution to promote sustainability and environmental responsibility, the tactical implementations, technical solutions, and communities impacted vary greatly. For that reason, they are subdivided as follows:

##### **22A. IU should promote widespread use of its extensive investments in hardened data centers, networks, virtualized servers, and virtualized storage to promote energy efficiency by reducing the number of required servers and enabling longer equipment lifecycles.**

Indiana University has a well established strategy for leveraging the strengths and benefits of virtualization by creating the Intelligent Infrastructure. Over the past 7 years, that architecture, strategy, and approach have benefited IU in a variety of ways, including cost savings, business continuity (BC) improvements, disaster recovery (DR) improvements, reduced power consumption, high availability (HA) of systems, rapid deployment of new systems, flexibility for research initiatives and an overall reduced total cost of ownership (TCO).

IU Intelligent Infrastructure (IUII) is a suite of services provided by the University Information Technology Services (UITS) Enterprise Infrastructure Division. It offers remote access to the same high-performance and high-availability hardware and security devices UITS uses to deliver mission-critical university applications and services.

This service model reduces hardware and maintenance expenses, frees up space, and prevents over- or under-committing resources based on future hardware and backup predictions. There are three principle components:

- Virtual systems supply the infrastructure and network capacity necessary to host applications, while optional disk storage on UITS enterprise-class SANs (storage area networks) ensures files are extremely secure and always available.

- Backup solutions provide cross-site backups and cross-campus failover options, which protect against potential disasters by hosting applications within hardened data centers.
- Storage solutions provide scalable capacity for data storage and input and output (I/O) cycles.

#### Virtual Systems.

The continued deployment of virtual hardware provides significant flexibility to meet unique compute workloads, leveraging IU's investment in secure computing facilities. The virtualized environment allows access to compute, RAM, network and storage. It removes the need to have dedicated, isolated hardware resources. IUII offering extends the compute offering for core service delivery to all IU departments.

The hardware supporting the IUII should be reviewed for proficiency to meet current workloads and future needs. Lifecycle funding must be allocated to ensure required compute resources are in place for existing and future growth (hardware and software licenses). Hardware choices must factor in compute, energy efficiency and interoperability. Hardware replacement must also factor software licensing into total cost; it is quite possible that hardware replacement may provide more compute cycles with less licensing costs.

Maintaining a consistent hardware vendor provides the greatest benefit from a staffing perspective. The ability to manage a pool of common hardware decreases the need for staff to intimately learn multiple vendor management and support protocols. Also, maintaining a common vendor for hardware delivery provides the opportunity to build relationships with vendors to effectively leverage partnerships.

#### Backup Solutions.

As the IUII environment evolves and continues to expand, data protection needs to be a key part of the service. The ability to offer scalable resources is only valuable if data are protected against catastrophic or administrative problems. The catastrophic protection needs to continue to utilize disaster recovery (DR) best practices and leverage both data centers for data protection.

Protection for administrative data needs to include allowing access to data that were impacted by application or administrative processing that resulted in accidental deletion or data corruption. The ability to recover data quickly and restore services in a timely fashion needs to be implemented.

The current implementation of Tivoli Storage Manager (TSM) is a huge step in the right direction. The environment provides a consolidation platform for several diverse backup solutions in both ICTC and IUB data centers. Data movement takes place via traditional TCP networking; alternate data movement should be reviewed because of increased data processing requirements. As the data volumes increase, the ability to protect data needs to be increased proportionally (i.e. continued funding is required to support data protection).

The backup technology needs to be prepared to leverage best-of-breed technologies, such as fiber channel data movement, data duplication, virtual tape libraries, disk storage pools, tape pools, compression, and encryption technologies.

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#### Storage Solutions.

One of the key components of IUII is the ability to leverage abstracted storage subsystems to support

the needed capacity for data storage and input and output (I/O) cycles. The storage subsystem needs to be positioned to grow exponentially as processing needs increase.

The storage subsystem needs to be positioned to leverage best-of-breed technologies, such as virtualization, tiered-storage solutions, dynamic provisioning, seamless data migration across tiers of storage (without impact to client data access), and data duplication, where appropriate. Significant lifecycle and support funding should be available to ensure success in the virtualized environment. The ability to virtualize storage subsystems may provide longer lifecycle for aging subsystems. Provided the hardware maintenance and energy efficiency is within an acceptable level, virtualized storage may significantly lengthen the life of disk subsystems. The older subsystem could be utilized for a tiered solution, providing adequate capacity for certain workloads.

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**22B. Similarly, technologies such as desktop virtualization should be explored to help reduce the costs and extend the lifecycles of personal computing devices.**

Emerging virtual technologies in the desktop and thin client space have also begun to increase the value proposition for IU schools and departments by providing a more compelling technology to consider and deploy, for same rationale stated in 22A. Current market forces are placing demands on university IT models in ways that differ from the computing models of the 1990s and early 2000s. Students, staff, and faculty are becoming accustomed to the emerging consumer and self-service world for their technology solutions. People today expect the delivery of information technology in a way that is personal and fits their lifestyle.

Virtualization is providing opportunities for central deployment and management of commonly used operating systems and applications across university units. The resulting opportunity for IT managers is reduced overhead for local desktop resource requirements, support overhead, and standardization for security. Additional benefits to the physical desktop include potential reductions in power and cooling resources, more flexible work spaces and environments, and improved user experience.

Action Item 22b delivers a locally managed, central enterprise virtualization service. This service is managed and maintained by UITS for schools and departments who want to deploy and manage their virtualized operating systems, applications, and file storage. It promises to open new ground for collaboration between UITS and all units of the university. Together we will explore this service as resource tool to improve effectiveness and efficiency through scope leveraged at the center for the benefit of information technology professionals at the edge. Realizing the promise of Action item 22b will introduce a new model for delivering operating systems and applications in support of research, teaching, and administration.

## **II. WHAT ARE THE POLICY AND PRACTICE IMPLICATIONS OF YOUR PLANS?**

For 22B: Define a thorough planning, evaluation, and rollout model with emphasis on:

- Establishing a capacity planning model
- Establishing models for governance
- Optimization
- Management, control, and governance of
  - Central IT
  - Edge IT

- Building out the data center to support all campuses and all clients
- Storage costs for persistent builds
- Network stability and saturation
- Modeling above-campus services

### **III. IDENTIFY STAKEHOLDERS.**

For 22B:

- IU departments and schools
- Learning Technologies
- Communication and Support
- Enterprise Infrastructure
- Enterprise Software
- Staff
- Students
- Faculty