IT BEST PRACTICES: SERVER VIRTUALIZATION

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BACKGROUND

Inefficient use of servers consumes excessive energy resulting in higher operation costs and increase in emissions. Servers are often deployed with a one-to-one server to application ratio. Computer rooms may have numerous servers, each providing a single application, which operate at low rates of utilization.

Server virtualization is the process of hosting multiple distinct server operating systems – or multiple instances of a given operating system – on one physical server. The hosted systems are often referred to as 'guests'. The hardware resources, such as the Central Processing Unit, memory, hard disk, and network services, provided by the physical server are shared between the guests, allowing for greater hardware utilization.

Each 'virtual server' is provided access to the system resources via a 'hypervisor'; a layer of software that lies between the guest operating system and the physical device hardware. Each virtual server operates independently of all other virtual servers on the same physical device and the hypervisor ensures that each virtual server is partitioned for security.

This recommendation is in line with the California 2009 IT Strategic Plan Concept 5: Economic And Sustainable Strategy 1: Promote practices that protect the environment and reduce energy usage; Strategy 2: Ensure the disaster resiliency of state's IT infrastructure [1].

BENEFITS

As indicated below, server virtualization reduces costs and energy consumption, while improving flexibility and recoverability.

1. Server virtualization provides the opportunity to maximize the hardware utilization, reduce the number of physical servers, and reduce the power consumption, climate conditioning, and maintenance efforts required.

2. Server virtualization provides business continuity, high availability and disaster recovery capability. Services that are provided using virtual servers can be moved between physical devices, or physical locations, with little or no interruption to users [1].

3. Server virtualization increases the server to administrator ratio, reducing maintenance costs and increasing efficiency.

4. Server virtualization increases flexibility. New virtual servers can be created and deployed in minutes instead of days. Virtual servers can also be removed when no longer needed to provide additional capacity for other services.

5. Server virtualization reduces maintenance costs, computer room square footage, power and cooling, and staff maintenance hours.

RECOMMENDED STRATEGIES FOR IMPLEMENTATION

- Assess the current environment to identify the services provided and the resources that each service consumes.
- Create a baseline by collecting and analyzing server utilization and disk usage over a time period that accounts for both normal and peak usage.
- Select a virtualization solution that accommodates Physical to Virtual (P2V) conversions.
- Avoid virtualizing applications that have high utilization rates and/or demonstrate high rates of disk input/output.
- Ensure each service is distributed across virtual servers that reside on separate physical servers to provide redundancy.
- Plan for sufficient hardware resources to accommodate application growth.
- Determine whether the hosted applications need logical or physical separation to ensure appropriate security.
- Review licensing requirements for 'guest' operating systems and hosted applications.
- Ensure software implemented in the virtual environment is supported by the manufacturer or determine risk for unsupported software.
- Agencies and departments should incorporate the above recommendations in compliance with the business and technology Strategic Planning, IT Capital Planning efforts and in development of Enterprise Architecture. [2] [3] [4]

REFERENCES

[1] California IT Strategic Plan: http://www.itsp.ca.gov/

[2] State of California Administrative Manual Section 4900; 4900.1; 4900.2; 4904
http://sam.dgs.ca.gov/TOC/4800/default.htm

[3] Office of State CIO IT Policy Letter number 09-03, issued April 15, 2009.

[4] SIMM Section 58-Statewide Enterprise Architecture Guidelines:
http://www.cio.ca.gov/Government/IT_Policy/SIMM.html

Additional References

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