Leveraging ITIL to Manage Your Virtual Environment

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Agenda

- Introduction
- VMware: Great promises, but some significant challenges
- Impact of virtualization on specific ITIL operational processes
  - Fault and Performance Management: Monitoring the health and performance of a virtual environment
  - Configuration Management: discovering and tracking virtual Configuration Items
  - Capacity Management: managing the growth of your virtual infrastructure
- Conclusion
Introduction

- IT Organizations small and large have steadily been adopting x86 server virtualization over the past 5 years
- VMware is approaching mainstream as a production-ready technology, and moving beyond being only a test and development platform
- However, as virtual machines are moving to production, their management is becoming critical to the success of IT operations

“The tools and management capabilities related to x86 server virtualization are still relatively immature”

Gartner, Server Virtualization Produces a Shift in Server Shipments
3 April 2006

Jeffrey Hewitt, Thomas J. Bittman, John Enck, Jonathon Hardcastle, Adrian O’Connell, Errol Rasit, George J. Weiss
VMware: Great promises,
but some significant challenges
VMware – a paradigm shift with great promises

- Lower Hardware costs
- Better utilization of infrastructure
- Agility to roll out new services
- Zero down-time for hardware maintenance
- Smaller overall footprint

Did you achieve this promise?
Stages of a Virtual Deployment

- Business Case
- Pilot and Testing
- Operational Readiness
- Production Deployment

Risks:
- Rolling out VMware without planning for operational impact
- Perception that VMs will be managed like physical servers
- No strategy to integrate VMware tools into Enterprise System Management architecture
- Tool-focused approach that neglects operational processes
Do you have issues...?

- Controlling the sprawl of VMs
- Assessing the impact of a change on VMs and applications
- Tracking where VMs have run in the past, and where they run now
- Measuring how much resources VMs use
- Reporting on SAN storage used by each VM
- Viewing your infrastructure end-to-end
- Understanding the impact of a hardware fault on VMs, applications and end-users
VMware: a paradigm shift

It used to be one server in one box using one LUN...

...now we have multiple servers in the same box and on the same LUN and they move around!

Management of large virtual environments requires an integrated approach
VMware poses specific operational requirements

**Facilities**
- Integration of VirtualCenter console into other consoles and portals
- Planning for KVM phase-out or consolidation
- Review of sizing of HVAC and Power

**People**
- Documentation for required skillsets to manage a VMware environment
- Hiring VMware specialists
- Developing training plan for VMware, VirtualCenter, P2V…
- Organizing your teams
- Training on updated processes

**Processes**
- Re-engineering of processes where significant impact exists, e.g. Change Management
- Re-writing procedures, for example server reboots
- Investigation of new key performance indicators and reviewing the old

**Technology**
- Integrating VirtualCenter into enterprise management tools
- Developing a strategy for the management of the new VMware Infrastructure “layer”
- Developing a plan to remediate the implications of VMotion (“servers can move”)
Impact of virtualization on ITIL operational processes
What is ITIL?

ITIL is the IT Infrastructure Library, a definitive industry library focused on “Best Practices” for the management of Information Technology.

- De-facto industry standard for IT Service Management
- Developed by the CCTA of the UK Government
- Standardized Approach & Terminology
- Publicly Available
- Industry Supported Software and Tools

ITIL® is a registered trademark of the OGC (Office of Government Commerce)
The goals of ITIL

ITIL is aimed at maximizing the ability of IT to provide services that are cost-effective and meet the expectations and needs of the business

- Streamline service delivery and support processes
- Develop and document repeatable procedures
- Reduce number of service incidents and outages
- Implement standards to do things right the first time
- Perform proactive analysis, prevention and resolution
- Plan for, and ensure, future capacity
- Define clear services and service targets
- Accurately allocate and recover costs
- Audit, manage and improve IT processes
IT Service Management is the best known and most mature aspect of ITIL.

Service Delivery
- Planning focused
- Business Facing
- Requires solid Service Support disciplines

Service Support
- Ongoing IT work
- “Oil and Grease”
- Event Driven
- More reactive in nature

Planning to Implement Service Management

The Business Perspective

IT Service Management

ICT Infrastructure Management

Security Management

Application Management

More challenging for traditional IT organizations, provides the planning for business alignment

Good starting point for implementation, immediate relief
The ITIL Service Management processes provide a great foundation for an IT operations process model, and may be complemented with other relevant functions and models.
Impact of virtualization on ITIL functions

Almost all ITIL and Service Management functions are impacted by the move to a virtual infrastructure.

In the interest of time, we will now focus on:

- Fault and Performance Management
- Configuration Management
- Capacity Management

… but there is a lot more to be said! Stay tuned
Fault and Performance Management
Monitoring the health and performance of a virtual environment
Fault and Performance Management Overview

**Fault Management**: Detect and handle conditions within the IT infrastructure that could lead to service degradations.

**Performance Management**: Ensure that the maximum value of IT infrastructure resources is obtained through pro-active threshold monitoring, trend data collection, performance tuning and meaningful reporting.

**Key Objectives:**
- Proactively detect conditions that can lead to service disruption
- Determine root cause and business impact of failures
- Quickly and consistently handle IT infrastructure events/faults
- Support proactive performance adjustments and planning
- Ensure resources and services perform according to SLAs
## Impact of Virtualization on Fault and Performance Management

<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact of Virtualization</th>
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<tbody>
<tr>
<td>Define thresholds and alerts</td>
<td>New Virtual Infrastructure layer <strong>needs to be instrumented</strong></td>
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<tr>
<td>Instrument monitoring technologies</td>
<td><strong>New tool purchase or development</strong> may be required</td>
</tr>
<tr>
<td>Automate filtering and correlation</td>
<td>Discovery and mapping of ESX servers, VMs, and the applications and IT services</td>
</tr>
<tr>
<td>Document troubleshooting procedures</td>
<td>Some <strong>updates and re-writes</strong> of troubleshooting procedures required</td>
</tr>
<tr>
<td>Provide performance reports</td>
<td>New Virtual Infrastructure <strong>data collections and reports</strong> have to be defined and implemented</td>
</tr>
<tr>
<td>Optimally tune infrastructure</td>
<td>New opportunity: <strong>tune server characteristics</strong> on the fly to optimize performance</td>
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Addressing the challenges

- **Determine** relevant and actionable metrics and alerts
- **Instrument** the ESX virtual layer
- **Discover** and **map** the topology
- **Update** procedures
- **Define** reporting requirements
Illustration - Sample reference architecture

Manager of Managers
(Event correlation)

Collection

Performance DB

VM
Agent

ESX Server

Legend
- Events
- Performance
- Topology
- Other
1. A monitoring agent reports a physical NIC failure on an ESX server. The alert is sent to the Correlation layer of the MoM.

2. The correlation engine analyzes the flow of alerts from various sources (e.g. Hardware agent, VirtualCenter) against the topology data, and determines the NIC failure is the root cause. The root cause alert is forwarded to the Manager of Managers (MoM).

3. The MoM displays the root cause alert in the console, as well as the potential business impact: a finance application running on the ESX server may risk losing network connectivity, if the second bonded NIC also fails.

4. An operator reviews the alert. After reviewing the potential business impact to the finance application, he follows the procedure to move it to a “safe” ESX server using VirtualCenter.
Configuration Management
Discovering and tracking virtual configuration items
Configuration Management Overview

**Configuration Management:** Identify, control and audit the information required to manage IT services by defining and maintaining a database of configuration items, their status, lifecycle and relationships, and any information needed to manage the quality of IT services cost-effectively.

**Key Objectives:**
- Capture Configuration Items (CIs), i.e. components that make up the IT infrastructure required to deliver IT services
- Act as an authoritative source for relationships of IT components to IT components, and IT services / Business Functions
- Support other functions and processes by making configuration information available to them (e.g. problem management, change management, asset management..)
- Support IT inventory audit and reconciliation efforts
- Support root cause analysis and business impact to improve problem solving
Impact of virtualization on Configuration Management

**Activity**

- Provide information on relationships
- Keep the CMDB up to date
- Support root cause analysis
- Support the Change Management process
- Support IT Financial and Asset Management

**Impact of Virtualization**

- Need to distinguish between **physical and logical servers** in the CMDB
- Some **CI attributes** become more dynamic in a virtual world
- Manual updates difficult due to the **dynamic nature** of ESX-to-VM relationships
- Need to link **applications and business functions to IT components** (ESX, VMs)
- **Root cause analysis** needs to know what VM runs where, and when
- Provide information on physical servers, VMs and applications for **change impact assessment**
- Tracking of application resource usage for **total cost of ownership**
Addressing the challenges

- **Add required CI types and sub-types for VMware**
  - ESX servers, ESX farms, Virtual Machines
  - Define level of granularity

- **(Re)define CI attributes and their lifecycle**
  - Adjust standard server CI attributes to virtual servers
  - Add attributes
  - Automatic updates of dynamic attributes or maintaining them outside the CMDB

- **Update the data model**
  - Identify authoritative data sources and how to link them
  - Define naming conventions that facilitate linking
Illustration - Sample Configuration Management Data Model in a Virtual World

- HP-UX Server
- Cisco Catalyst Switch
- Solaris Server
- Joe Smith Network

Server Farm

- Physical Server
  - Logical Server "ESX001"
  - Logical Server "SRV001"
  - Logical Server "SRV002"
  - Logical Server "ESX002"
  - Logical Server "SRV003"

- Installed Software

- Network
  - Installed Software

- Dependent

- Owned

- Application 1
- Application 2
- Application 3

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Capacity Management
Managing the growth of your virtual infrastructure
**Capacity Management Overview**

**Capacity Management**: Ensure the optimal and cost-effective use of the IT Infrastructure to meet current and identified future business needs, by understanding how IT services will be used and matching IT resources to deliver these services at the agreed levels of service.

**Key Objectives:**
- Optimize the capacity of the IT infrastructure
- Right Size at the Right Cost
- Monitor and/or influence usage
- Relate IT Policies and Procedures to the business plan
- Build Capacity for new services so that existing services are not impacted
Impact of virtualization on Capacity Management

<table>
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<tr>
<td>Optimally Size Infrastructure</td>
<td>Opportunity to right-size VM when sizing applications. Distributed Resource Scheduler (DRS) allows automated, real-time adaptive server capacity.</td>
</tr>
<tr>
<td>Monitor Usage Trend</td>
<td>New metrics to measure and track usage may be required, in particular at the ESX layer. Correlation of VM and physical server trends.</td>
</tr>
<tr>
<td>Forecasting Procedure</td>
<td>New challenges forecasting for a dynamic virtual environment. E.g. application sizing, license management, forecasting demand…</td>
</tr>
<tr>
<td>Demand Management</td>
<td>Ease of provisioning may increase demand. Variable costing allows IT to influence customer behavior.</td>
</tr>
<tr>
<td>Build Capacity Plan</td>
<td>Shrinking safety margin due to the shared resources. Capacity plan may have to be updated more often.</td>
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Addressing the challenges

- Define parameters for optimally-sized architecture
- Determine appropriate metrics for usage trending
- Update Capacity Forecasting procedures
- Define approach to influence customers’ usage behavior
Illustration – Capacity Management activities

- **Iterative Activities (Ongoing)**
  - Capacity Plan (Regularly)
  - VirtualCenter / VMware Capacity Planner
- **Demand Management (Ongoing)**
- **Modeling (Ad Hoc)**
- **Application Sizing (Ad Hoc)**

CDB is used to produce:
- Service and Component based reports
- Exception Reporting
- Capacity Forecasts

Day-to-day tuning of VMware performance
Influence demand for computing resources
Various templates or standard offerings
Predict the behavior of IT services
Model needs to account for a virtual pool of resources
Estimate the initial resource requirements
Right-size VMs for a given application
Changes based on application usage and growth
Conclusion
Who can benefit from leveraging ITIL to manage a virtual environment?

Reactive companies, that are implementing VMware, but may be introducing complexity that their current operations cannot handle.

Companies that have fairly mature operational processes, but need to improve them with best practices and apply them to VMware.

Mature organizations that are in the process of rolling out VMware, and need to adapt their existing operational processes and tools.
Conclusion

- Rolling out the capabilities to fully operate a VMware environment is a **challenging task**, but it is a necessary step to achieving end-to-end Service Management.
- VirtualCenter, and the range of VMware tools, support the **technology foundation** for a successful integration into existing IT operations tools.
- ITIL provides IT Service Management **best practices** that can be leveraged to manage a VMware infrastructure.
- Consider a **phased approach** by prioritizing ITIL functions to address:
  - Fault Management and Incident Management
  - Change & Problem Management
  - Configuration Management
  - Performance Management
  - Capacity Management
  - Service Level Management
  - Financial Management

Maturity

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