High Performance,

Cost effective

Bladecenter Based Hosting

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1.0 Executive Summary

This document provides a high level technical brief outlining hosting of client environments in a Bladecenter ecosystems and SCON (server consolidation) of discrete servers into Bladecenters and virtual workloads. Workloads provide a container based model that enables systems to be categorized and mobilized based on the application (or use ; web server, database, file, application, etc…) and usage model (heavy CPU, high disk I/O, etc…). The goal of this document is to provide an outline for categorization of workloads and integration of those workloads in a consolidated, hosted environment that maximizes flexibility, while minimizing TCO.

2.0 Strategy

2.1 Project Management

Vigilant employs PMP methodologies and uses the Capability Maturity Model to manage Software engineering principles.

2.2 Blade sever technology

A Blade Server physically consolidates server hardware by combining power, cooling, management, and networking into a single highly redundant chassis. This reduces management cost and improves availability. A Blade Server can require approximately a 10% higher initial investment, but quickly make up for it in a 20-40% lower Total Cost of Ownership (TCO). Because they are highly self contained and simple to install and maintain, they are ideal for hosting environments. A critical aspect of blade server technology is investment protection, i.e. ensuring that the core components will remain compatible with improvements in technology

2.2.1 Why Bladecenter

IBM Bladecenter servers where used primarily because of highest investment protection, ease of use and flexibility.
IBM Bladecenter highlights/advantages over other systems;

- Consistent form factor allows re-use of all existing blade systems with new technology
- Legacy I/O integration
- Layer 2/7 network integration
- Redundant back plane

2.3 Design methodology.

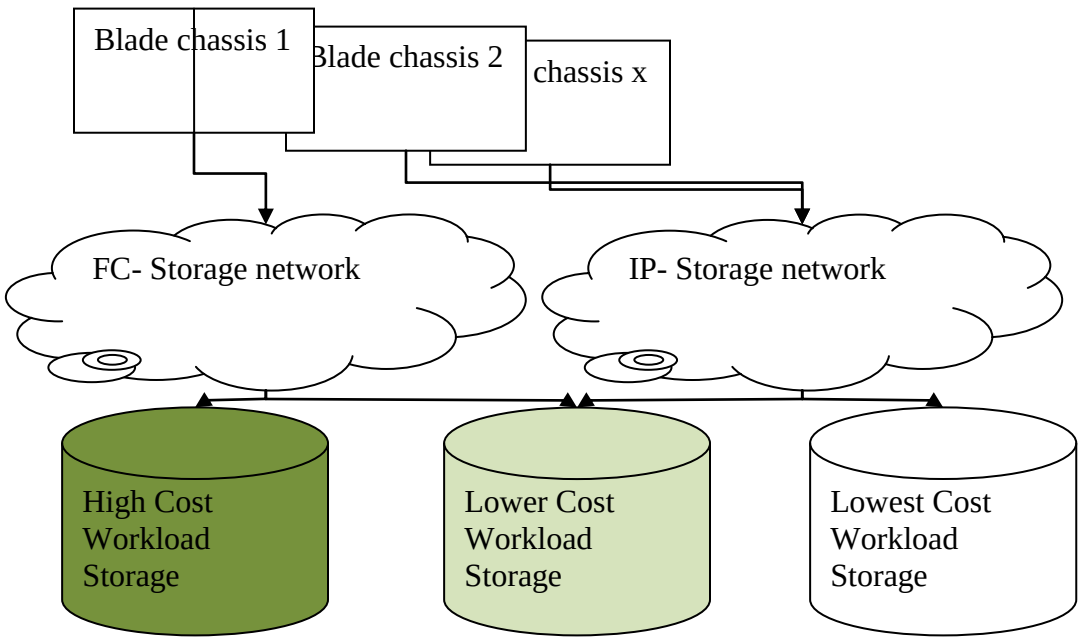
Prior to developing the physical infrastructure, a feasibility analysis is done to develop a workload model for the existing systems. Based on the workload and margin analysis, each work load is assigned a cost factor that is used to determine the overall blade/storage ecosystem architecture and requirements .

Although the flexibility of the Bladecenter chassis provides a solution for any workload, it also adds complexity to the design. Using IBM reference data and 4 years of practical experience integrating Bladecenter servers in a hosted environment, Vigilant has qualified blade servers form factors based on application models and resource usage. For example, some Blades are better suited for web workloads, while others are better suited for database work loads. Furthermore, some blades work better in FC SAN solutions while others work better in IP-SAN implementations. We have found that some blades (such as the HS series XM models) can be used in a broad variety of workload applications

Based on the expected work loads and planned ROI, the systems are configured for either FC or IP-SAN, High I/O or low I/O usages and workload integration methodology (Virtualization, Para-Virtualization, Consolidation, migration, custom engineering solution, etc…).

The storage networks and blade servers are then organized based on the client/workload based cost factors. Figure 1 illustrates a typical blade server ecosystem topology optimized for cost factor based work load management.

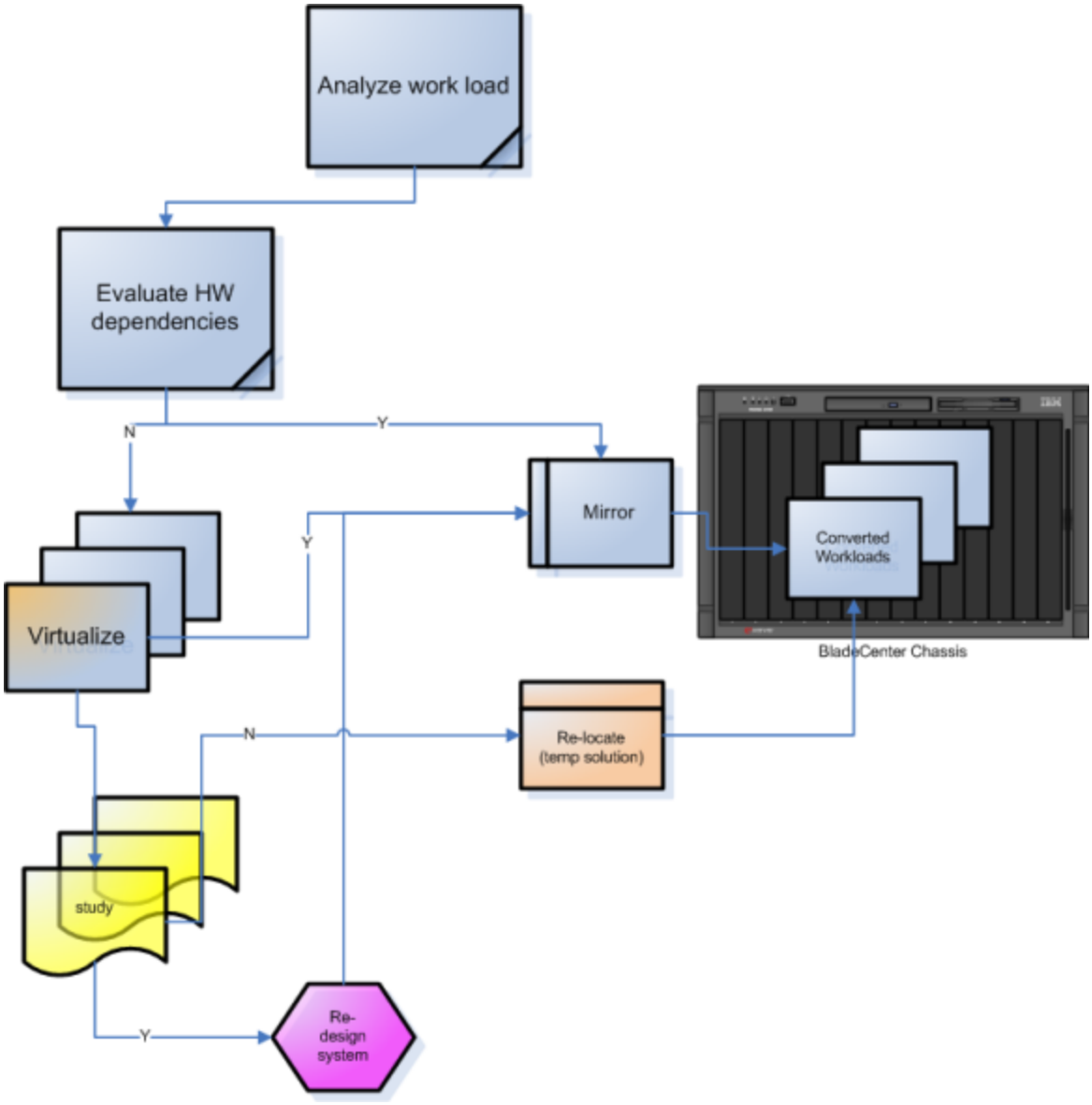
Figure 1 Cost Based Workload Architecture



2.4 Workload Validation

Prior to landing a existing or planned workload, the workload needs to be charactized based on known or estimated usage models. The fisrt step is to determine if the work load can be mobilized. Many systems cannot be mobilized because of unique hardware /software dependencies. For, example, some systems require a special hardware based key that reduce the portability of the system. The flow for determining server mobilizations is as follows;

Figure 2 workload mobilization process



2.4.1 Discrete server characterization

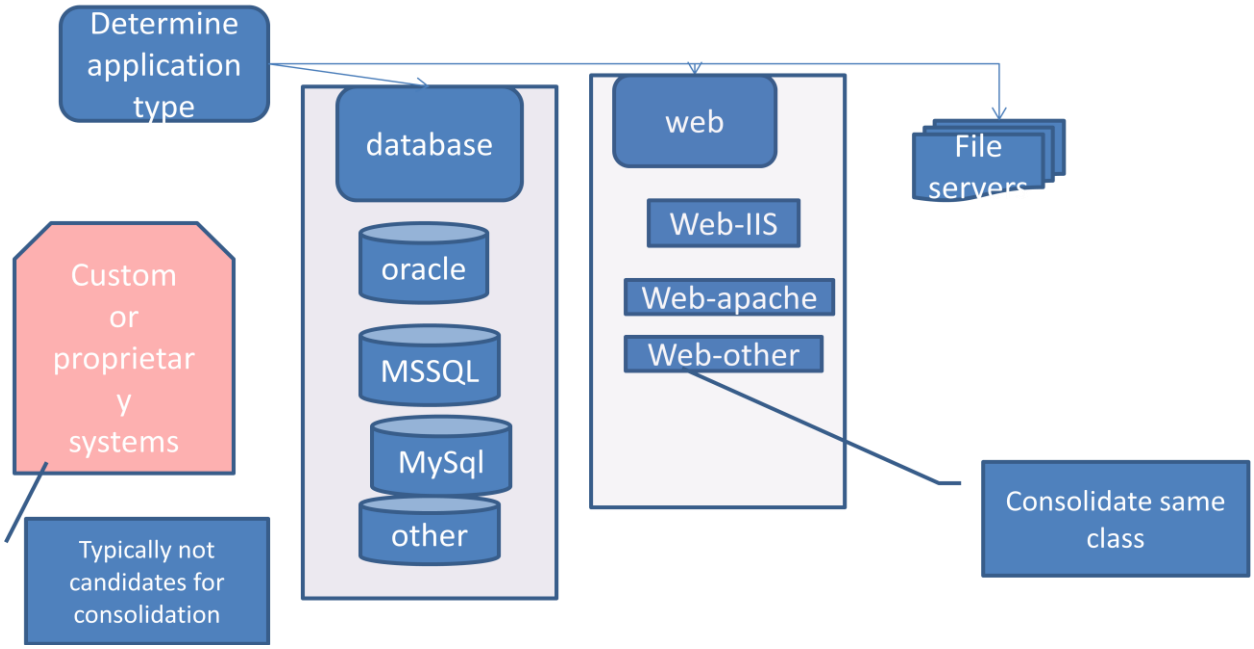
Each system in evaluated an categorized by the following;

- OS
- Application catalog
- Resource Usage
- Resource model (client contract resource guarantee level)
- Replication/Back-up requirements

2.4.2 Workload integration

Once the client workloads have been categorized and catalogued, they are integrated into the Blade Server Ecosystems based on their usage model and workload integration methodology. For example, IIS 6, W2K3 based low usage work loads would be integrated onto blade servers using low cost Virtualization software with cold failover and while the same server in a high resource client guarantee model would be located on Virtual platform that supports hot failover and replication.

Figure 3 WorkLoad Categories



2.5 System migration

System migration moves a system from it current environment into the workload management environment of the Bladecenter ecosystem. In most cases, system migration accelerators can be used can extract a discreet server and import it into the blade environment. OEM licenses can cause license prevent direct migration, and may have to be upgraded thru the OEM or converted to SPLA based license. Vigilant employs 3 methods for migration;

1. Mirroring
2. Imaging
3. Hot export

2.5.1 Staging

Converted workloads are tested in a staging environment where they are tested and verified by engineering and the client as required, and then migrated to production workload environment. Unused systems are waterfalled into staging, management or development workload groups or they can

2.5.2 Acceptance testing.

System is used by client in production with expanded technical support services to ensure customer satisfaction and smooth the transition period.

3.0 Summary

To develop a cost effective hosting platform that utilizes the high performance of blade server technology, storage area networks and virtualization technology requires the proper mixture of cost based workload management. The TCO can further be reduced by employing solid software engineering practices to minimize impact from unplanned systems failures and provide an effective proactive system management program.

4.0 References

4.1.1 Case Studies

Case Study
Bay Area Government Contractor
Number of employees; >400
Project; Small IT staff to support a large user base over a global regional area. To minimize backend workload, and eliminate failures due to hardware, we performed a workload analysis to determine a proper solution that would have low TCO, high flexibility ad scalability.
The business does special projects and uses both windows and linux based solutions (Oracle (on linux), MSSQL, IIS, Primevera and proprietary accounting systems).
Based on the information and customer preferences, a Bladecenter system was chosen, using a DS4700 SAN. The system was setup to boot esx from the SAN, and the existing workloads were migrated onto the blades. (they were able to host 5-10 servers per blade, with some blades dedicated to database servers). The ESX server where clustered, allowing them to have a failover in the event of a Blade server failure.
A alternate site was designed and is being used to replicate the virtual workloads to a remote datacenter using DoubleTake and Acronis. Direct SAN replication was considered, but determined to not be cost effective based on the Business process RPO/RTO's.

Case Study
South West Financial Services
Number of employees; >20
Project; Needed a scalable infrastructure to replace aging discreet servers that failed often under heavy workload of large finance database.
The Direct Attached Storage, (DAS), could not handle the workload, causing the database server to crash on a weekly/daily basis. The application install was using legacy software running on windows 2000, that was extremely difficult to install.
The systems where converted to virtual workloads using custom imaging technology and Virtualization accelerators. The system was then cloned to multiple servers, allowing it to be scaled to support over 9K users.
To support Disaster recovery, the large Database was replicated using Array based replication and MSSQL subscriptions. Vigilant also developed a design to migrate the system from a legacy Java environment to a robust .Net environment with web services, and a flexible DAL.

Case Study
Large Metro Area government agency
Number of employees; >200
Project;
The municipal organization has a legacy environment, limited budget and long procurement cycle, but needed a system that could support the existing environment while supporting the rapid growth within the procurement process constraints and limited budget.
Solution;
Vigilant work with the organization to understand Business Functions and develop a workload model that would provide the organization with the mobility to grow rapidly. A solution was

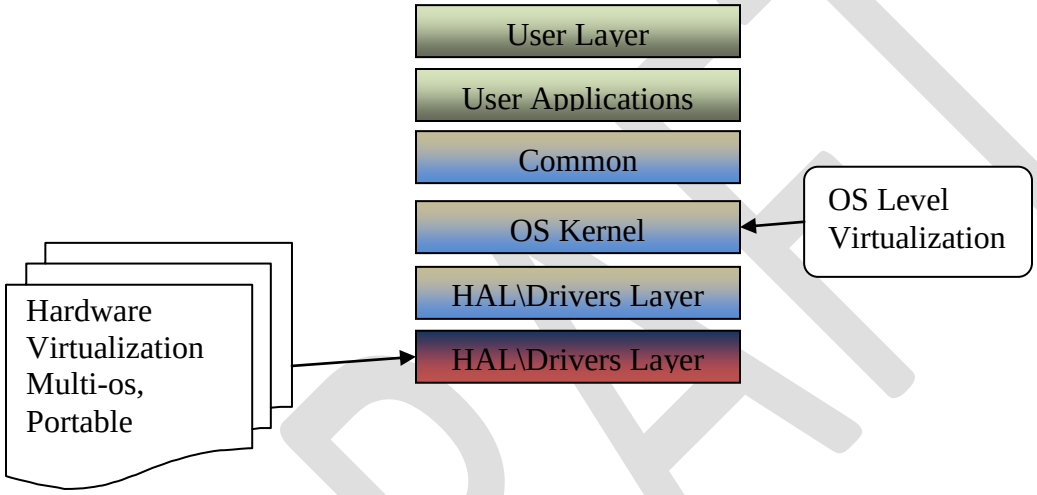
developed and implemented that provided a simple migration path to a lower cost support model that reduced dependency on vendors during normal deployment and recovery scenarios.
The organization implemented a Bladecenter H-Series solution using a NetApps IP/SAN for storage and workload. A complete infrastructure makeover was done within the budget of one system upgrade, enabling the organization to focus on upcoming growth, with less staff.
The initiative also enabled the organization to meet future development and business continuity objectives required by the federal government.

4.1.2 Reference material

4.1.2.1 VIRTUALIZATION

Virtualization is the core component of transitioning IT technology management from *hardware based management* to *workload management*. This is a critical concept in aligning IT services with business process needs in a cost effective manner. Virtualization eliminates the dependency of applications and systems on hardware, improving scalability, reliability and portability.

There are two types of virtualization; hardware virtualization, which allows consolidation of multiple server operating systems on a single physical server, and Operating System (OS) virtualization, which allows consolidation of several applications on the same OS.



OS virtualization provides lower virtualization overhead, but also provides lower availability and decreased flexibility than Hardware virtualization. A third type of virtualization, that is very promising, but still in its infancy, is para-virtualization .

Two requirements associated with virtualization are the need for structured, well planned management tools and a well thought out strategy to ensure organizational storage strategies are adjusted to meet the best practices associated with the virtual server environment

4.1.3 Reference articles

4.1.3.1 BLADECENTER

http://www-03.ibm.com/systems/bladecenter/

4.1.3.2 STORAGE MOJO

"*Everything You Know About Disks Is Wrong*"

4.1.3.3 BYTE AND SWITCH;
HTTP://WWW.BYTEANDSWITCH.COM/DOCUMENT.ASP?DOC_ID=35892&PAGE_NUMBER=7

4.1.3.4 VIGILANT
Storage research
http://support.vigilant1.com/KnowledgeBase/Research/tabid/58/view/topics/forumid/66/Default.aspx

4.1.3.5 CRN
http://www.crn.com/storage/index.jhtml

4.1.3.6 STORAGE MAGAZINE.
http://searchstorage.techtarget.com/magazineFeature/0,296894,sid5_gci1258347,00.html

4.1.3.7 RIVERBED.
http:// www.riverbed.com/technology/

4.1.3.8 SILVER PEAK. ($9K-50K)
http://www.silver-peak.com/Products/at_a_glance.htm

4.1.3.9 STORAGE NEWS (RSS).
http://feeds.feedburner.com/techtarget/Searchstorage/NewsAndTrends

4.2 Addendum