

The Power of Strategic IT.

N'compass White Paper: Capacity Planning

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Abstract

It is estimated that within the next two years most data centers will be obsolete. Many organizations will need to begin the process of expanding, remodeling or relocating data centers. This White Paper outlines the role of Capacity Planning for your data center and recommends a three prong approach, allowing any organization to maximize their business' IT investment.

Table of Contents

Introduction2

Building a Plan Around Data Center Facilities..... 2

Stuck in the Middle 4

Virtualization, Virtualization... Who’s Got Virtualization?.....4

The Great Storage Paradox.....5

It’s All a Matter of Perspective 6

Using ITIL...Time to Move Forward 6

You Talk the Talk. It’s Time to Walk the Walk. 7

About the Author 9

About N’compass Solutions, Inc.....9

Introduction

Somewhere, just around the corner, there is an 800 pound gorilla that will threaten your data center and the way your IT organization functions, if it hasn't already. Recent analysis from The Gartner Group estimates that sometime in the next 12 months, half of the world's data centers will be insufficient in meeting the power and cooling demands of the new high density technologies. That means in the next year or two, most organization's data centers will be obsolete and will need to begin the process of expanding, remodeling or relocating their data centers.

To further complicate the data center crisis, IT is faced with meeting the growing demands of the business while balancing a stagnant budget. As IT has begun taking steps to utilize newer technologies to lower costs, it has also created a situation where consolidation of servers through virtualization and blade servers has not effectively reduced server hardware and server efficiency has not been maximized. Storage within the data center has seemingly grown exponentially and is continuing to use valuable data center resources when current storage is not being effectively utilized.

So why are companies faced with the two very serious quandaries described above? The answer is lack of capacity planning. IT and facility teams have never placed much emphasis on strategic planning, as data center culture in the past has been more reactive than proactive. What's more, when working in and around data centers, responsibilities have crossed over individuals and teams, resulting in separate priorities, goals and communication. Today, this separation is quickly diminishing as organizations look to reduce bottom line expenses and bridge the gaps between teams. Capacity planning for facilities and IT, with the assistance of ITIL process, is what organizations are turning to in order to prolong the life of data centers and make them more efficient and economical.

Capacity planning, by definition, is the process that supports the optimization and cost effective provisioning of IT services. Most organizations have some form of capacity planning, but those plans are often inconsistent with the processes and/or frequency of the planning. Capacity planning for your data center should be looked at from a three prong approach: Data Center Facilities, IT Environment and Process. Focusing on these three areas of your data center will provide up-to-date and comprehensive views and can allow any organization to maximize their enterprise IT investment.

Building a Plan Around Data Center Facilities

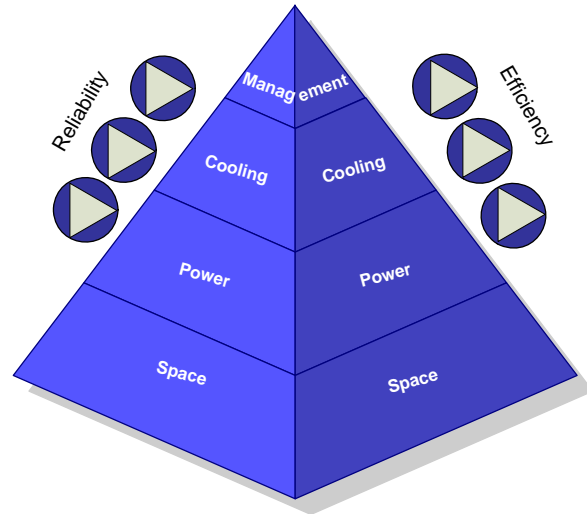
When designing and building data centers, steps are taken to ensure that it can support the growth of your business into the future. However, many companies did not expect that their IT environment and businesses would grow so quickly. How could a 10,000 square foot data center fill up so fast? That is not the right question to be asking. Instead, you should be asking, "Are we utilizing the data center as well as we could?" The answer to that question lies in the master facilities plan documentation, and most organizations don't have a complete plan built around their data centers.

When planning your data center capacities, you need to focus on four main areas: Space, Power, Cooling and Management. These four factors are the life line that feeds your business' most important organ, the data center. All four of these factors are linked together and need to be defined and planned around to maximize your data centers' operation.

Defining and planning around space should be indicative of your overall data center strategy. For example, if the goal to build a new data center is to ensure capacity for the next five years, your overall design layout should correlate to that end goal. Items to consider when defining your space strategy will vary based on the detail and depth you wish to document.

Power has really become a hot button issue for data center facilities over the last year, and for good reason. The Gartner Group estimates that anywhere from 30% to 60% of the energy in a data center is wasted. With those statistics, and with

business shifting more and more data center expenses to IT's bottom line, power is the first and



Space Planning Framework

1. Rack and Rack Unit layouts: Maximize row and rack layouts based on floor space and define your hot/cold aisles.
2. Ensure proper maintenance clearance for all hardware equipment in the data center.
3. Modularize your data center: Design your Rack and Row layout around the cooling layout and capacities.

Power Planning Framework

1. Defined current and forecasted equipment and power requirements of equipment.
2. PDU capacities that includes available poles and availability to add additional PDU capacity.
3. UPS capacities and defined criteria around the data center reliability rating (N, 1N, 2N).
4. Generator capacity and outage switch over capabilities.

foremost focus area for efficiency improvements. A data center plan should also include power capacities and a complete understanding of the following needs to be defined and designed around.

If one was to ask a facilities manager what their biggest pain point is in their data center, they would more than likely say cooling.

Cooling needs to be examined from two main perspectives: under cooling and over cooling. In an environment that is constantly changing, cooling also needs to fluctuate with the environment.

Cooling Planning Framework

1. Balance cooling units based on the modularized floor plan defined in the space portion of the plan.
2. Balance the high density computing areas around your cooling, not the other way around.
3. Define and communicate rack/cabinet thresholds based on cooling capacities.
4. For raised floor data centers, define and design the under floor architecture to be organized to prevent blockages and obstructions.
5. Installation of and cycling procedures for cooling units.

The management around data centers does not fall squarely on IT's shoulders. Facilities should also have clearly defined metrics and management processes in place that align with IT. The management of the facilities needs to focus on the processes, controls and metrics that will safeguard the master plan that has been defined and implemented. The efficiencies gained through these

management processes will not be recognized immediately, but throughout the life of the data center, these efficiencies will be recouped two fold.

Stuck in the Middle

Currently, most IT groups and/or project teams do some form of capacity planning, but this planning is not done on a repeatable or consistent basis.

Capacity planning from an IT

perspective can take many forms and should focus on all areas and aspects of an IT environment. For the purpose of this conversation, server and storage infrastructure will be the main focus. Every process or project needs to start somewhere, and these two infrastructures are the typical problem areas for most IT environments. When defining capacity planning from an IT environment stand-point, one needs to understand utilization. Understanding and determining utilization in your environment will allow the infrastructure to work harder with less hardware.

Process Planning Framework

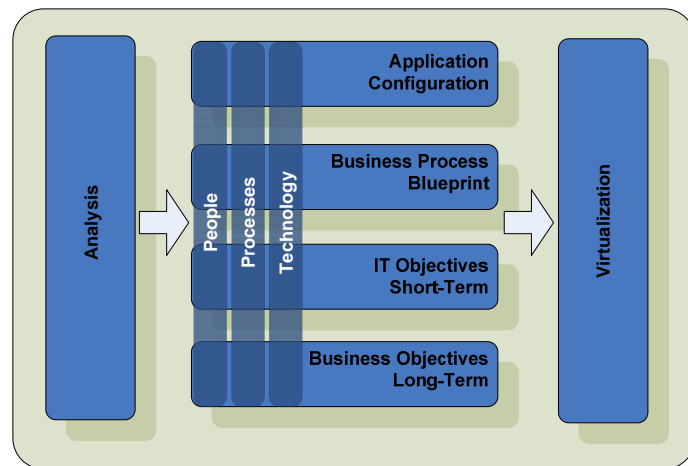
1. Defined instructions on monitoring and measuring utilized and available space, power and cooling
2. Formal change control processes that provide direction and communication to all teams involved in data center activities
3. Detailed documentation around security, standard and emergency operating procedures.

Virtualization, Virtualization... Who's Got Virtualization?

Server sprawl was recognized many years ago as a serious data center capacity issue. And as servers became more powerful, utilization of those servers and applications dropped. According to IDC Research Center, the average server utilization is around 5% to 15%. Worldwide, there are over \$140 billion dollars wasted in excess server capacity. Virtualization was introduced to help consolidate hardware and reduce overall expenses. Although virtualization technology has begun the consolidation movement for organizations, most companies did not implement proper capacity planning before moving multiple systems and applications onto virtualized servers.

In March 2007, Computer Associates completed a survey where 44% of 800 IT professionals' surveyed claimed they were, "unable to consider their virtualization deployments a success, due to server management issues, performance issues or return on investment (ROI) lackluster results." In other words, even though IT environments have consolidated more applications onto less hardware, utilization of those servers is still below expected usage.

Virtualization projects should begin to analyze and plan around four major factors before implementing the virtualization solution into production. These four factors are application configuration, business process blueprint, short-term IT objectives and long-term business objectives. The combination and overlay of these four factors provide the critical information needed to understand each application's and business' needs. By defining these needs, each virtualized instance will drive up the utilization of each virtualization server instance.



Virtualization Framework

- Application configuration – This configuration analysis should focus on the internal workings and mappings of each application to the OS level dynamic library, system files, and networked resources.
- Business process blueprint – This blueprint provides visual representation of the application processes, schedule and business functionality. The blueprint provides insight to IT and the business, how the business flows and can reveal overlapping processes, applications and workflows.
- Short-term IT goals – Financial benefits from virtualization is the biggest factor to move to virtualization, but additional goals, such as increasing the number of servers per server administrators and increasing server or application stability from decommissioned equipment, need to be defined.
- Long-term Business goals – The most important objectives to be established and agreed upon by both the application business units and IT. These objectives should focus on bottom-line savings and process improvements to be gained from virtualization.

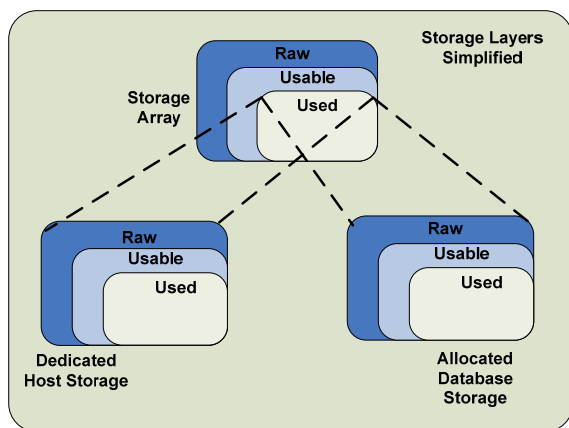
The Great Storage Paradox

If time is money and information is power, then data is, and always will be, king. The storage of data in today's data center has its place and needs to be a key focus area for all businesses. According to Symantec Corp., the average company is expanding storage by 60% a year, and

the average use of that storage is 33%. Considering that storage units require dedicated floor space, network bandwidth, power and cooling (not to mention the overall cost of storage), are companies doing a thorough job planning, preparing and measuring their storage needs and efficiencies? You have bought the storage, and you are more than likely already using parts of it, but what storage and how much space is being used, allocated, or made available? The goal is to not remove storage, but to efficiently utilize what storage is already available and slow down the growth and financial drains of the storage environment.

It's All a Matter of Perspective

When peeling an onion, you start with the exterior layer and continue to peel the layers away until you get to the layer of the onion you want to use. Storage utilization is no different. If someone wants to understand “true storage utilization” you have to begin peeling and analyzing each layer from the raw disk space in an array down to the used storage within files. This utilization analysis provides insight into everything from *what* data is stored to *how* each bit of data is stored.



Each layer adds complexity into how data is organized and stored, and the further you peel into your storage the lower your overall utilization will be. This storage utilization analysis is an imperative first step to truly understanding your business' storage needs, growth and strategies.

Once the utilization analysis results have been determined, what is the next step? Consider this three prong approach after you understand your storage issues: The first step is improving the operations and processes that surround storage.

From a development stand-point, review the storage interactions throughout the project and define key interaction points and process that need to occur during any project. The second focuses on driving up utilization. This requires active support from executive management to drive processes and operations to both the IT and business teams. There are also many software packages available that assist in driving up utilization through consolidation, de-duplication and provisioning. Lastly, begin to provide storage as a service. There are a couple of ways of looking at storage as a service. Most companies do not have financial chargeback processes in place, so think of this step as building a governance system around your environment. This allows the storage team to better define storage requirements and be a part of the project process.

Using ITIL...Time to Move Forward

Every organization – large to small – has some form of process. Simply put, process is a necessary function of business and IT. Some form of capacity planning process was likely initiated at one point, but it was defined as a “one time project” or no processes were defined

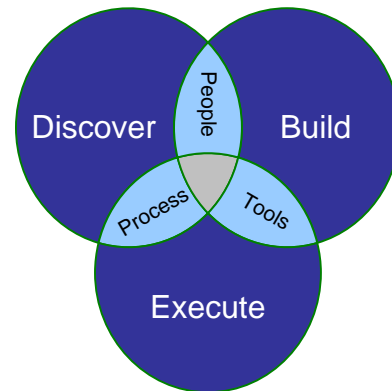
and documented and the project team moved onto other projects. While a CIO's and CFO's responsibility for the bottom line expands into the data center. The days of project-based capacity planning are over. Today's business leaders are welcoming a new, on-going "big picture" capacity management process. ITIL has begun to provide some of the processes and groundwork to ensure that capacity management can be successful in your data center and organization. The implementation and enforcement of these ITIL fundamentals can also provide success factors into a company's bottom line.

A typical scenario for organizations is each quarter facilities management receives a data center capacity report of current space, power and cooling. The IT management team also receives a similar capacity report around current network, storage and servers, all while a new infrastructure project is getting underway. That project team is also beginning to do capacity planning on current infrastructure and future project needs. The organization has just tripled its work effort on some form of capacity planning and all of that research and reporting still did not produce a complete picture of your data center. Utilizing ITIL processes allows your organization to eliminate redundant work, ensure consistent reporting across the organization, and provide steps to efficiently provisioning data center capacity. These quick wins and long-term cost savings allow senior management to stay the course and also alleviate organizational resistance.

You Talk the Talk. It's Time to Walk the Walk.

Now that you have talked a good game, how do you back it up? Process is never easy. If it was easy, every organization would be great at it and most issues would be non-existent. The good news is, ITIL can again provide some of the ground framework needed to get started. Capacity management and planning is no different than any other project, and there are three stages that must be reviewed, planned and executed for organizational adoption: discovery, build and execute.

Discovery is self explanatory, but it is possibly the single most important portion of all three stages. The discovery stage will provide the foundation on the direction, the method and the budget for the capacity planning team. The team will begin to determine the overall mission and goals of capacity management and will set those expectations to senior management. Team processes and responsibilities will also need to be defined and outlined during this phase to perform analysis on current state and future trending of capacities.



Now that you understand what the future direction of capacity planning will be and have roughly mapped out the path, it is now time to begin building a plan that will define and guide the next year's course. When building a plan, it is imperative to establish the three major components of capacity planning.

The last and most important portion of building the plan is determining the communication plan. The communication plan should include stakeholders, types of communications, frequency of communications, and also the format of communications. ITIL and capacity planning are all about repeatable processes and standardizing communication and the plan that has been built is the guide.

ITIL Process Planning

- People – Define a centralized or matrixed capacity planning team and list the pros and cons of each.
- Process – Based on the goals defined in the facilities and IT environments, map out workflows, define data inputs, information outputs, responsibilities and work processes.
- Tools – Determine the tools needed for facilities and IT. These tools can range from software packages to handheld devices to measure temperatures. Remember – don't reinvent the wheel if you don't have too. Most organizations have performed some form of capacity planning before.

Once your building plans are defined and tested, it is time for the “rubber to meet the road” and to execute your plan. This is where ITIL and capacity planning begin to show and produce real value for every organization. During the execution of the plan, communication should be the number one priority of the organization. No one can over communicate during this phase. Secondly, even though your processes were tested, there will be modifications that need to be made when conducted in a production environment. It is imperative to update processes, documentation and plans based on new findings and encountered issues, but updates should not disrupt day-to-day activities. Lastly, it is important to begin to show the value of the capacity planning. Make sure you have taken time to collect historical data to begin building your metrics and reports based on that historical data. Only then will your team, stakeholders and executives begin to see the value that ITIL and capacity planning can provide to your organization.

About the Author

Josh Verhelst is a business analyst developing repeatable business processes and business opportunities for our clients. His proven project management skills drive results for large-scale projects such as the analysis, design and testing for a national retailer's largest server infrastructure upgrade and re-architecture project (1,400 stores nationwide). Other notable projects for this national retailer include the implementation plan development and execution management of their pharmacy application and infrastructure upgrade for all pharmacy stores; the consultation and engineering of virtualization server strategy for stores nationwide; the definition and documentation of a repeatable processes for server management of all stores; and the proposal and justification of numerous other technology projects.

About N'compass Solutions, Inc.

N'compass is a Minneapolis-based technology solutions company providing The Power of Strategic IT. As an independent technology solutions firm, N'compass helps organizations bridge the gap between technology and business. While businesses IT departments, facilities departments and other business units might share a common goal, their priorities are often different. N'compass understands all perspectives and helps clients achieve their overall business and technology goals.

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