

# Migration Capacity Planning

*The Bookends of Migration.*

Lund Performance Solutions

240 Second Avenue SW  
Albany, OR 97321

Phone: (541) 812-7600

Fax: (541) 926-7723

[www.lund.com](http://www.lund.com)

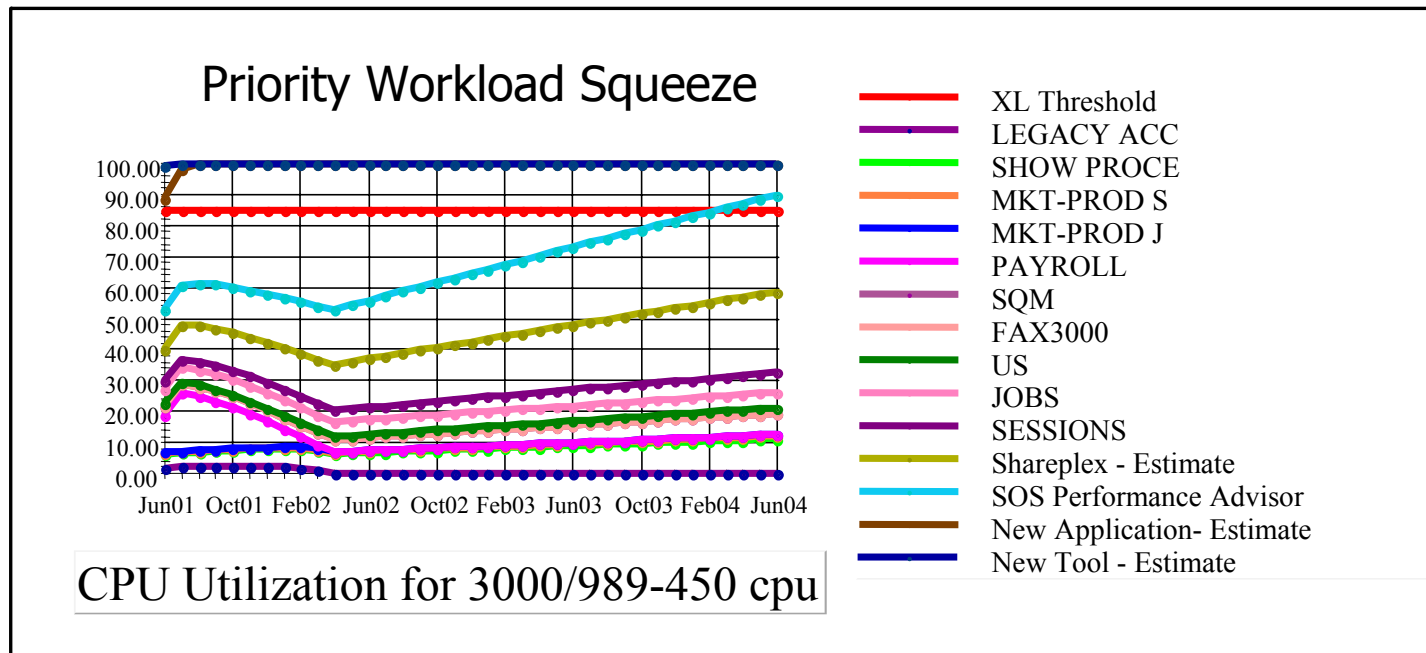
Presented by:

D. Scott Pierson



# Capacity Planning

- The Lund Methodology
- Case Studies



# Understand Your Environment

- Know what five applications **MUST** complete at the sacrifice of all others
  - vital applications
  - needs of users and development team
  - capabilities and limitations of operating system and third party software

# Environment – Objectives

## Questions

Imminent merger?  
Addition of users or processes?

Processing bandwidth for the peak season?

Upgrade to a refurbished box?

Purchase our current equipment?

Move to new technology?

Re-lease the same equipment?

Hardware lease renewal?

## Objectives

# Environment –

# Answering the Tough Questions

Identify the purpose of the report and specifically answer the questions at hand.

## Winter Registration 2001 – Impact of Web Implementation

The first concern to address is the 2001 Winter Registration. The question was asked, "What is the impact of the web implementation on the current system?" The web08 and web09 workload groups combined to represent over 50% of the CPU utilization during the web test study period. This increase is significant over the previous utilization seen on this system. The level of this utilization likely caused a phenomenon known as priority workload squeeze, which is further explained in the Workload Increase section of this report.

## Accommodating the Web Implementation

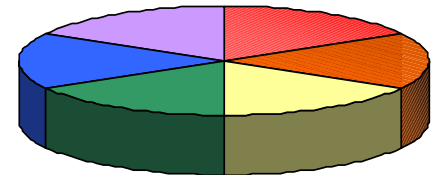
The second concern was whether the current system would be able to accommodate the heavy processing load of the full implementation of the web registration processing. The current 969/120 system will likely be able to handle the fall registration, however due to plans to implement additional web process and to open online registration to other student groups (juniors and, sophomores), a future upgrade is in order.

The main concern voiced centered on the CPU bandwidth for the online registration processing. As a result, multiple price performance points were selected to accommodate a 3 plus year return on investment. There are several models with similar HP assigned Relative Performance Statistics. However, based on the expected growth, expansion needs, and a desire for 64-bit architecture, we have selected the following HP e3000 models for review in this capacity plan.

One option might include a CPU upgrade to the 969/120 lifting the system to a model 969/220 providing additional CPU bandwidth. A second option would be to upgrade to a 989/200. The 989 model is already employing 64 bit technology allowing a maximum memory configuration of 8 gigabytes. Finally, the current "A" and "N" Class solutions offer the latest in HP technology.

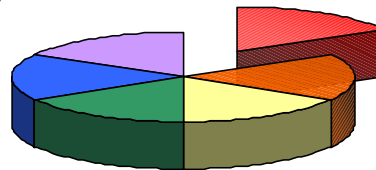
# Methodology

- Statement of Assumptions
- Baseline of Activity
- Projected Growth over 3 years
- Costing of Performance Upgrades
- Scaling of Projected Solutions
- Timing of the Implementation



# Statement of Assumptions – Lund

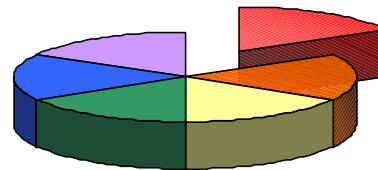
- Lund is not engaged in hardware sales
- Lund uses both modeling and linear techniques in the capacity planning process
- The system information and acceptance of the analyzed time slice were based on data provided and deemed representative
- The report provides recommendations based on the environment seen **only** on the specified system as it existed on the date of the study



- **Assumptions**
- Costing
- Baseline
- Scaling
- Growth
- Timing

# Statement of Assumptions – Customer

- Qualify why are you doing a capacity plan?
- Quantify goals of report
- Quantify growth
  - Maintenance costs
  - Operations Methods for your environment



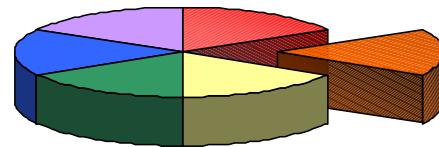
- **Assumptions**
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# Baseline of Activity

- Setting a Baseline is the first and most important decision in the capacity planning process
- Base projections on small window

**The Baseline is the foundation for Capacity Planning projections.**

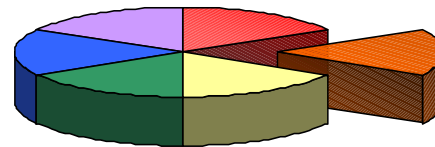
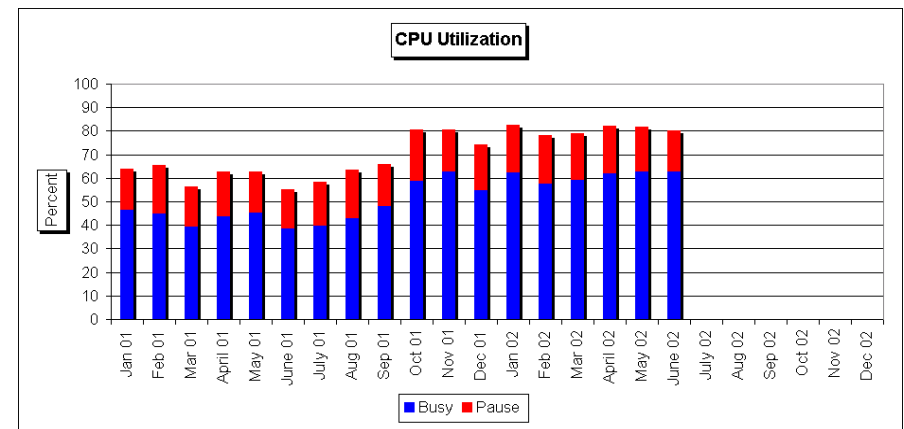


- Assumptions
- **Baseline**
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# Baseline of Activity

Identifying the utilization level – Average, Peak, or Combination

- Average day's utilization
- Peak utilization such as month end
- Combination of the two offering a balance between month end or the holiday season and every other day of the year

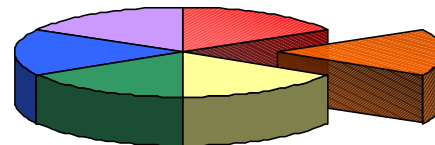


- Assumptions
- **Baseline**
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# Baseline of Activity

Identifying the appropriate season – Year, Month, Week

January 2002	February 2002	March 2002
S M T W T F S	S M T W T F S	S M T W T F S
30 31 1 2 3 4 5	1 2	1 2
6 7 8 9 10 11 12	3 4 5 6 7 8 9	3 4 5 6 7 8 9
13 14 15 16 17 18 19	10 11 12 13 14 15 16	10 11 12 13 14 15 16
20 21 22 23 24 25 26	17 18 19 20 21 22 23	17 18 19 20 21 22 23
27 28 29 30 31	24 25 26 27 28	24 25 26 27 28 29 30
		31
April 2002	May 2002	June 2002
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5 6	1 2 3 4	1
7 8 9 10 11 12 13	5 6 7 8 9 10 11	2 3 4 5 6 7 8
14 15 16 17 18 19 20	12 13 14 15 16 17 18	9 10 11 12 13 14 15
21 22 23 24 25 26 27	19 20 21 22 23 24 25	16 17 18 19 20 21 22
28 29 30	26 27 28 29 30 31	23 24 25 26 27 28 29
		30
July 2002	August 2002	September 2002
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5 6	1 2 3	1 2 3 4 5 6 7
7 8 9 10 11 12 13	4 5 6 7 8 9 10	8 9 10 11 12 13 14
14 15 16 17 18 19 20	11 12 13 14 15 16 17	15 16 17 18 19 20 21
21 22 23 24 25 26 27	18 19 20 21 22 23 24	22 23 24 25 26 27 28
28 29 30 31	25 26 27 28 29 30 31	29 30
October 2002	November 2002	December 2002
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5	1 2	1 2 3 4 5 6 7
6 7 8 9 10 11 12	3 4 5 6 7 8 9	8 9 10 11 12 13 14
13 14 15 16 17 18 19	10 11 12 13 14 15 16	15 16 17 18 19 20 21
20 21 22 23 24 25 26	17 18 19 20 21 22 23	22 23 24 25 26 27 28
27 28 29 30 31	24 25 26 27 28 29 30	29 30 31 1 2 3 4
		5 6 7 8 9 10 11



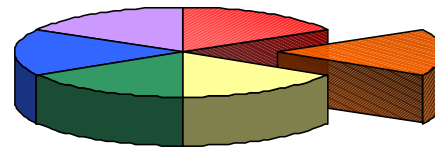
- Assumptions
- **Baseline**
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# Baseline of Activity

Identifying the granular time period – Day

September 2002						
S	M	T	W	T	F	S
25	26	27	28	29	30	31
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5

After the appropriate year, month and week have been identified, the **granular time period** must be identified.



- Assumptions
- **Baseline**
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# Baseline of Activity

## Identifying the granular time period – Day

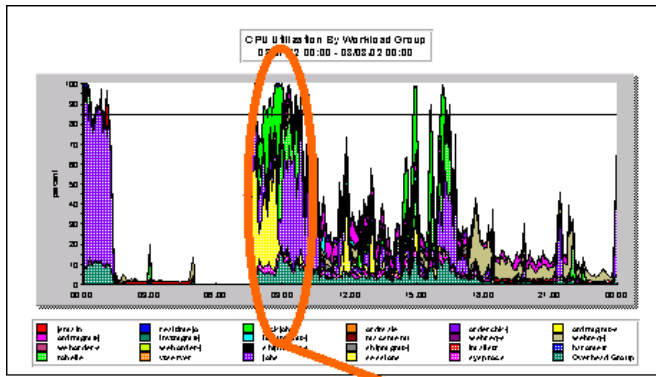
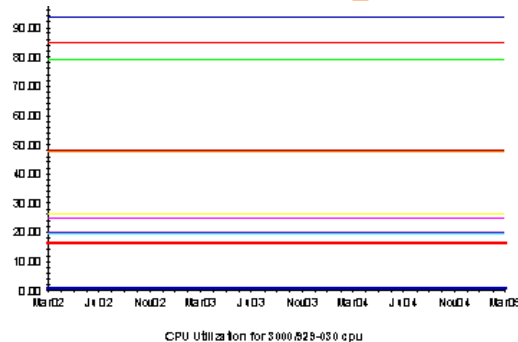


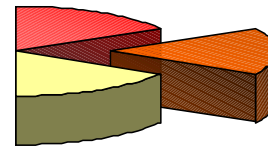
Figure 1. CPU Utilization By Workload Group



CPU Utilization for 2000-02-03

The last step in setting the baseline involves choosing a **time slice** that is suitable and representative in your environment and that meets the objectives set forth for your analysis.

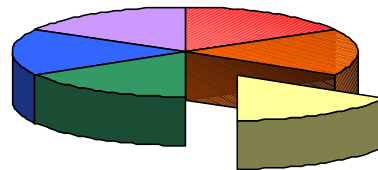
- XL Timeold
- SESSDMS
- JOBS
- VISERVER
- ROBELLE
- MASTR
- WEBREQ-J
- MACSMENU
- TEHMGINT-J
- ORDRMCINT-J
- ORDRCHK-J
- PCKJOB
- REALTIMEJO



- Assumptions
- **Baseline**
- Growth
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- Timing

# Projected Growth

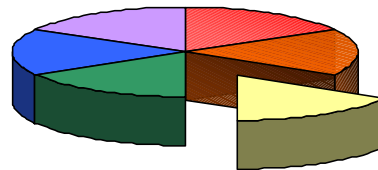
Projecting growth involves quantifying growth of the **technology utilization** in your company and is not simply a reflection of the growth of your company as a whole.



- Assumptions
- Baseline
- **Growth**
- Costing
- Scaling
- Timing

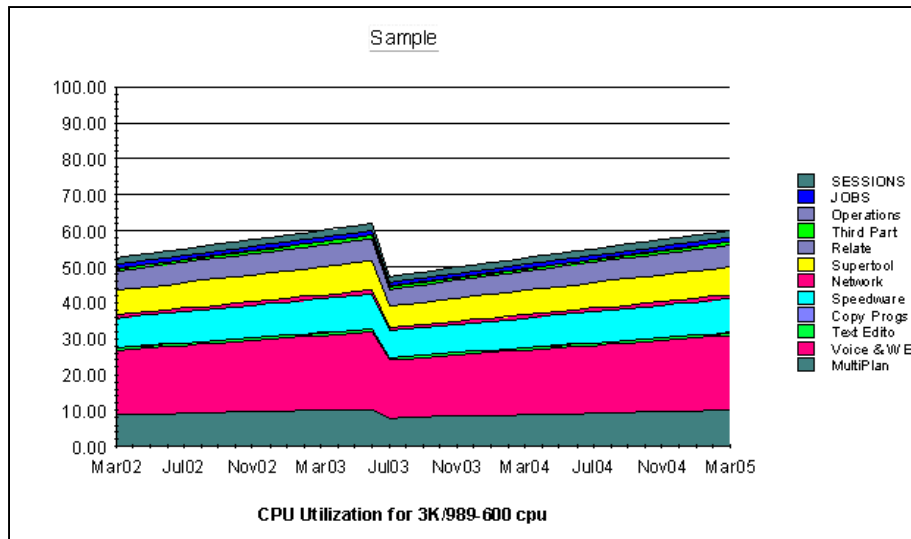
# Projected Growth

- Quantifying Growth over three years to justify the Return on Investment
- For example: your company may not anticipate outstanding growth, but management has decided to no longer outsource your payroll processing. That will not affect the **growth rate** of the company, but it will likely have a significant impact on your system environment.

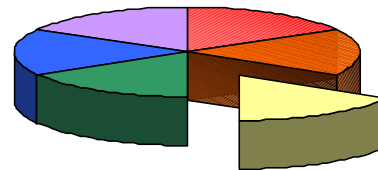


- Assumptions
- Baseline
- **Growth**
- Costing
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# Projected Growth



Using modeling techniques  
with Forecast Capacity  
Planner™



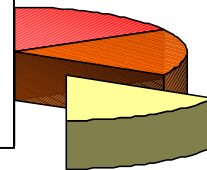
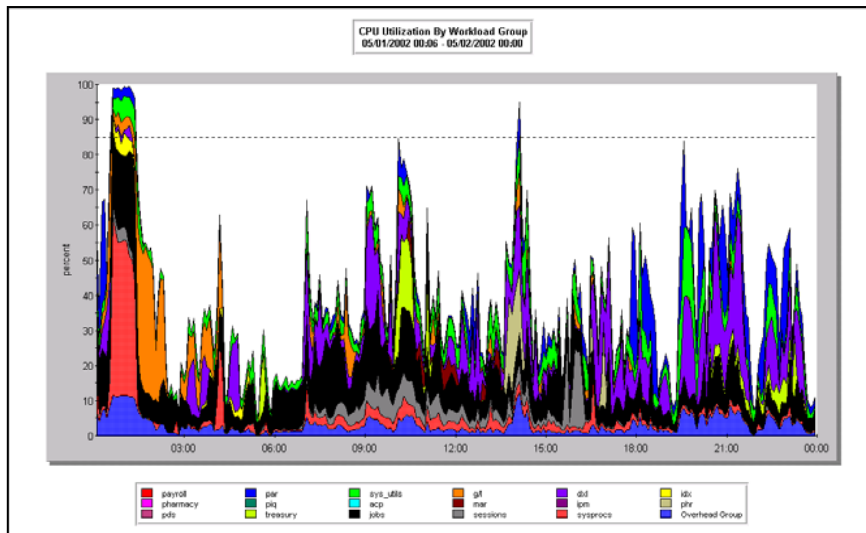
- Assumptions
- Baseline
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# Projected Growth

Using linear techniques with Performance Gallery Gold™ and Microsoft Excel

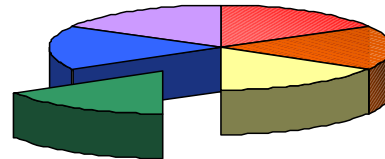
Take a snap shot of today's performance and model it into the future as a **forecast of utilization** using percentages extrapolated from trending or other company statistics.



- Assumptions
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# Costing of Performance

- Addressing low, medium and high budget options/price performance (when available)
  - **Low** - Board upgrade
  - **Medium** - Refurbished box
  - **High** - New Technology
- Look at the benefits of new systems specifically with regard to maintenance costs, Return on Investment (ROI), and migration

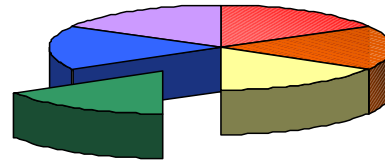


- Assumptions
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# Costing of Performance – <sup>Low</sup> Board Upgrade

Board upgrade within the same box

- Spend fewer upgrade dollars on hardware
- Software upgrade costs
- Often scaling issues to consider

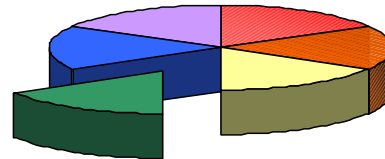


- Assumptions
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# Costing of Performance – Medium Refurbished Box

## Refurbished box

- Lower cost
- High quality solution option
- Subject to availability in the refurbished market

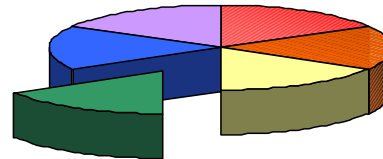


- Assumptions
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# Costing of Performance – High New Technology

## New technology

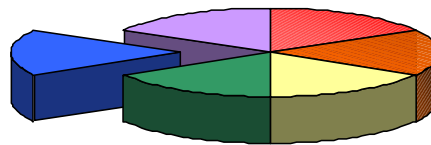
- Never a bad option to research
- Might not always meet the requirements of management and company policy



- Assumptions
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# Scaling of Solutions

Scaling of solutions involves identifying multiple models based on price performance that meet the criteria outlined by the objectives.



- Assumptions
- Baseline
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- **Scaling**
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# Scaling of Solutions – Selection

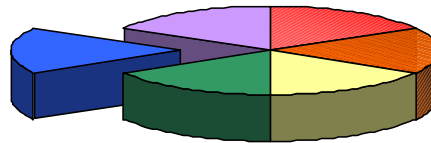
- Selecting the capacity comparison options:  
**variable sizes**
- Scaling is the stage when you would determine whether there is a single box, simple solution for upgrade and expansion absorption in your environment, or whether you will need to employ a phased implementation to a solution



- Assumptions
- Baseline
- Growth
- Costing
- **Scaling**
- Timing

# Scaling of Solutions – Implementation

- Phased approach to implementing new hardware options
- Scaling is the stage when you make decisions to ensure that your system environment has **room to grow** within in the tier and can upgrade further to accommodate your future growth as needed.



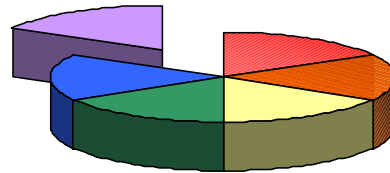
- Assumptions
- Baseline
- Growth
- Costing
- **Scaling**
- Timing



# Methodology – Timing of the Implementation

Timing is everything.

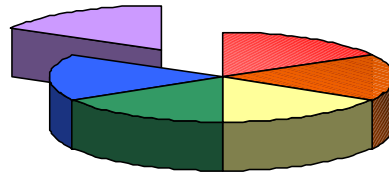
Planning makes timing easier.



- Assumptions
- Baseline
- Growth
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- Scaling
- **Timing**

# Methodology – Timing of the Implementation

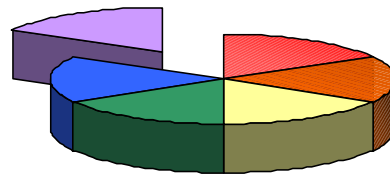
- **Planning** for capital appropriations
- **Planning** for budget cycles and budget requests
- Laying out the plan of when to do the analysis, when to submit the **Capital Appropriation Request**, planning the significant event itself and realizing that it is possibly a long window for implementation are all part of Timing the Implementation.
- There are issues of budget cycles and forecasted expenses. Business decisions that are often overlooked until the dollars are needed fall into this stage.



- Assumptions
- Baseline
- Growth
- Costing
- Scaling
- **Timing**

# Methodology – Timing of the Implementation

Planning the significant event itself



- Assumptions
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- **Timing**

# Case Studies

Standard – 15%

Latent Need

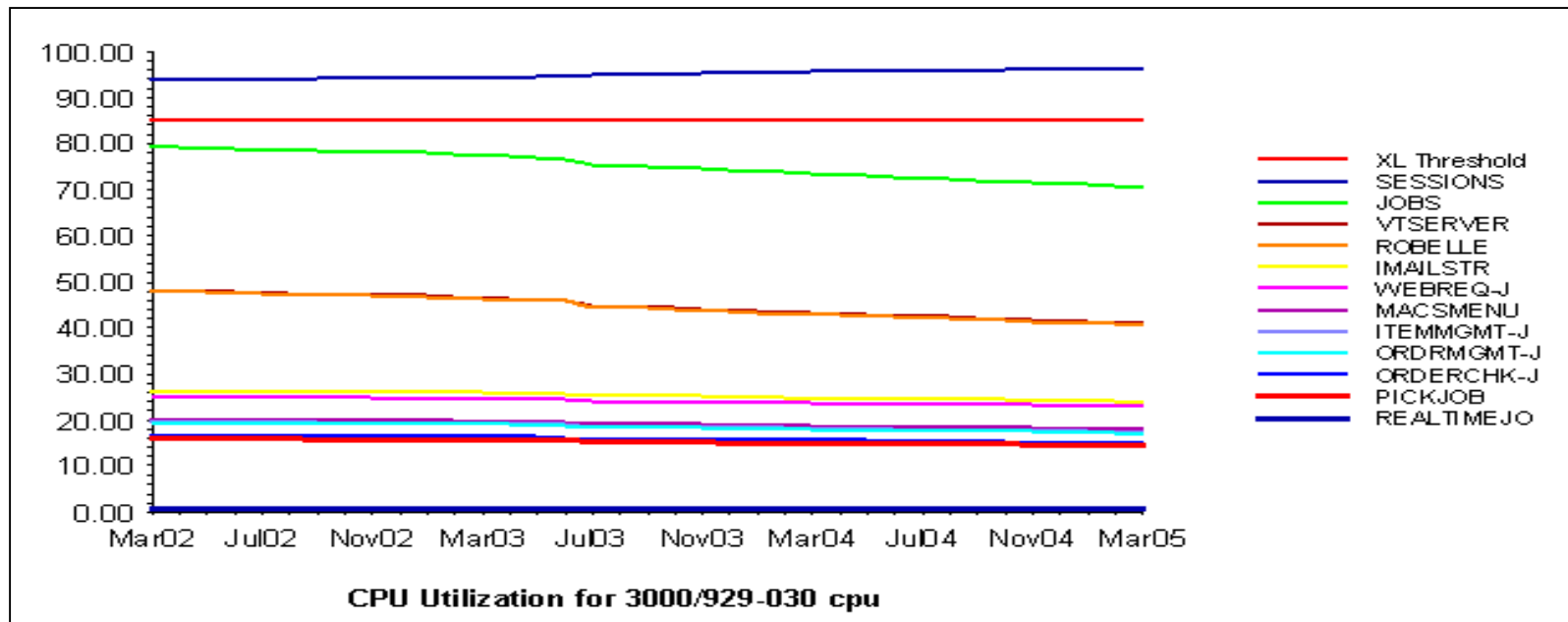
Merger of Multiple Systems

Trending

2-system Solution

# Examples – Standard: 15%

Growth Description	Estimated CPU Growth Percentage
Expected potential growth in the following year	15%
Decrease due to workload migration (Mid-2003)	3%



## Examples – Standard: 15%

If you are unable to quantify the growth rate, choose three percentages to use in projecting and project all three workload increases separately. This will give you an understanding of multiple possibilities and responses to growth.

**Aggressive**                      15%

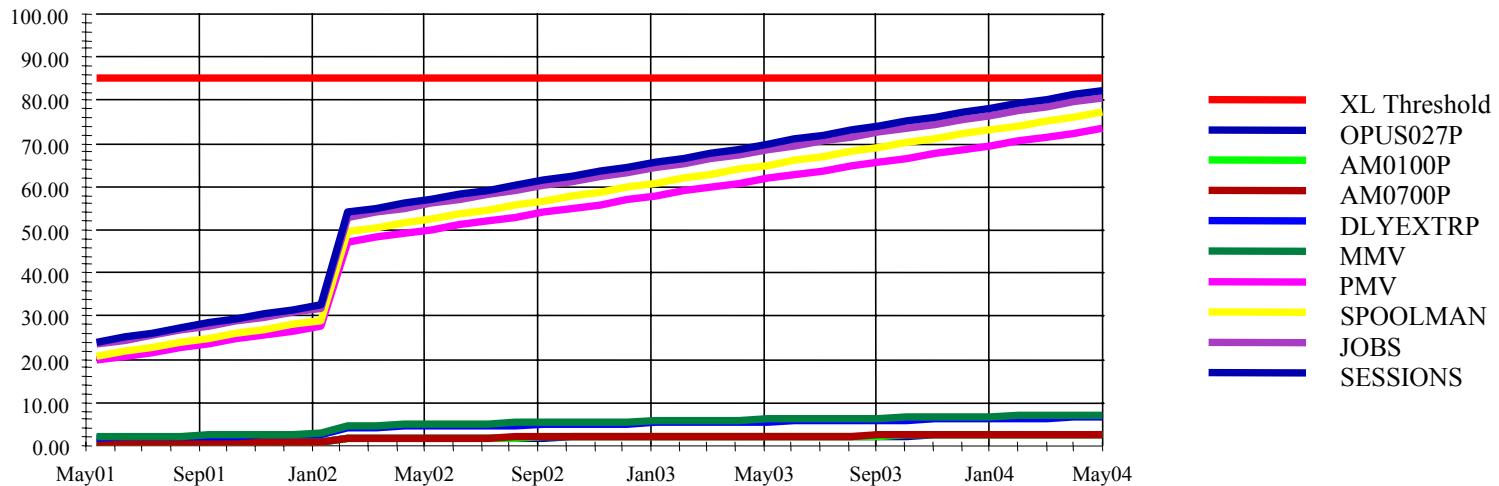
**Conservative**                    10%

**Backed off**                        5%

# Examples – Latent Need

Growth Description	Estimated CPU Growth Percentage
Latent need	60%
Expected potential growth in the following year	10%
Addition of applications and data sets	75%

Workloads with tremendous latent need and additional applications



CPU Utilization for 3K/N4K-1220 cpu

# Examples – Latent Need

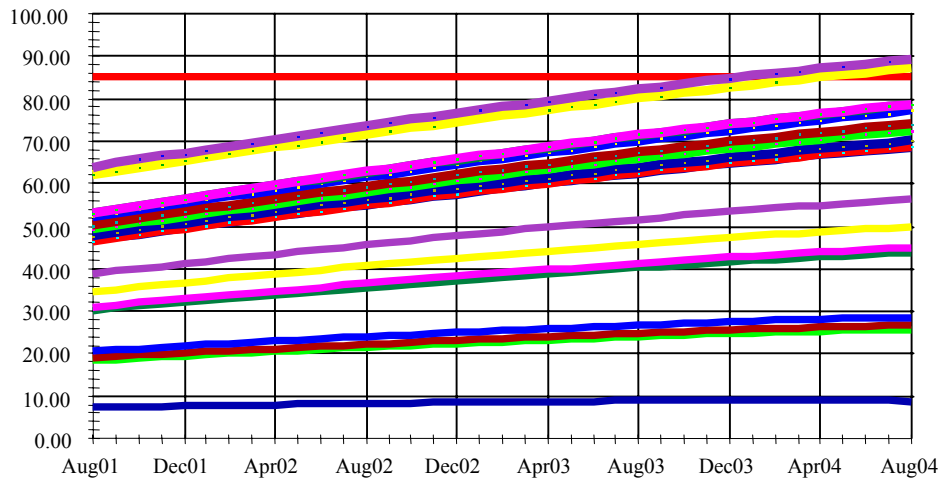
**Latent need is defined as bandwidth needed to accommodate current processing requirements.**



# Examples – Merger of Multiple Systems

Growth Description	Estimated CPU Growth Percentage
Estimated Company growth affecting System 1	20%
Estimated Company growth affecting System 2	20%
System 2 current load	15%

Workload Consolidated on one System



CPU Utilization for 3000/997-800 cpu

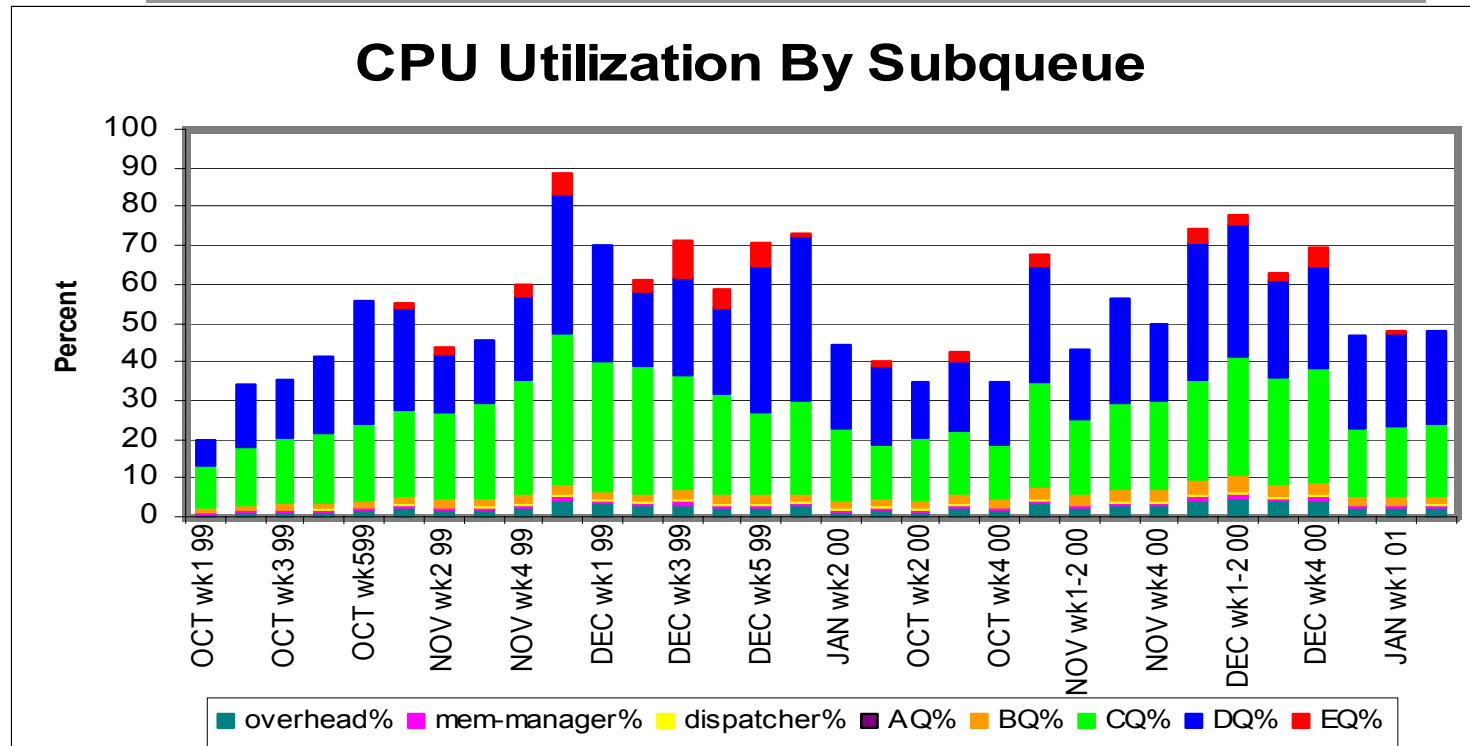
- XL Threshold
- MultiPlan
- Voice & WE
- Text Edito
- Copy Progs
- Speedware
- Network
- Supertool
- Relate
- Third Part
- Operations
- JOBS
- SESSIONS
- Sys2 - Voice & WE
- Sys2 - Speedware
- Sys2 - Network
- Sys2 - SESSIONS
- Sys2 - JOBS
- Sys2 - Supertool

# Examples – Merger of Multiple Systems

**Consolidation feasibility is quickly becoming a standard in capacity planning as the industry appears to be moving toward processing centralization.**

# Examples – Trending

Growth Description	Estimated CPU Growth Percentage
Expected potential annual growth	10%
November 2001 growth for holiday season representation	10%



# Examples – Trending

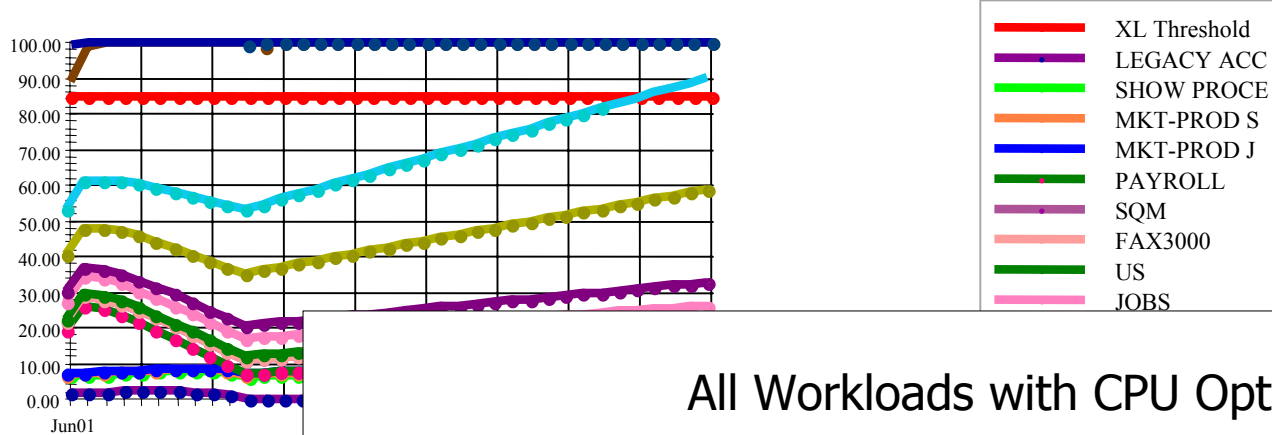
**Trending allows you to utilize past data to determine fluctuations and an expected growth rate.**

# Examples – Trending

**Trending validates the future projections and allows you a measure of assurance as you look ahead to things to come.**

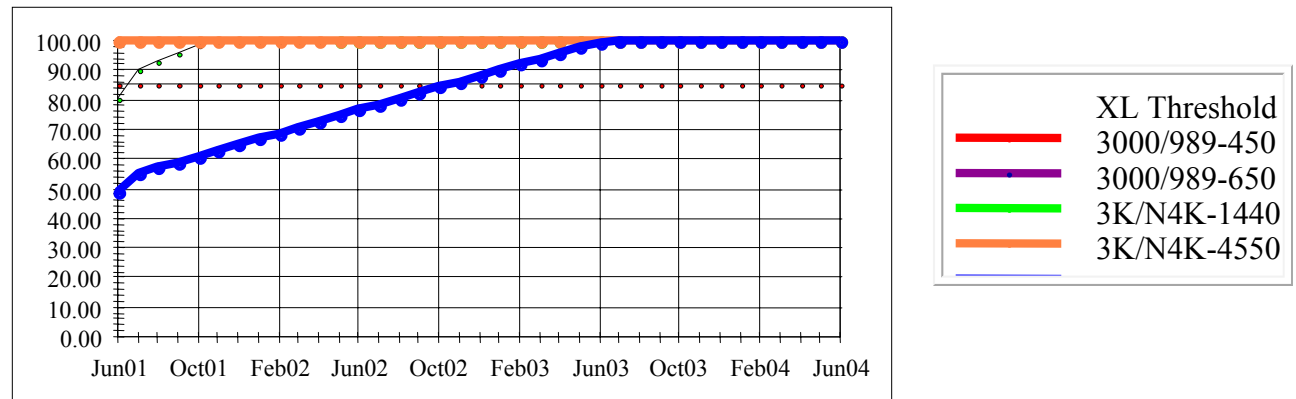
# Examples – Two System Solution

All Workloads on Current System



CP

All Workloads with CPU Options



CPU Utilization for all workloads

# Examples – Two System Solution

Know your company's requirements for  
Return On Investment.

# Capacity Planning (in review)

- Understand your environment
- Know your objectives before you begin
- Methodology
  - Assumptions
  - Baseline
  - Growth
  - Costing
  - Scaling
  - Timing

