Monthly Report for GIM

Produced by Performance & Capacity Management/TA&E
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Analysis Period: 01-Apr-06 to 28-Apr-06

Introduction

The monthly check-up serves to validate whether the application is experiencing abnormal utilization or violating thresholds as per our proactive monitoring standards. Further details are available in the Details and Analysis section.

The Capacity and Performance Management Team have created several rules for analyzing various aspects of UNIX, Linux, and MS-Windows servers. These rules help our Team determine if further analysis is required, or if the server is performing within normal parameters and without capacity concerns.

- The following rules will analyze different aspects of each server. If none of the servers break a particular rule during the analysis period, the rule returns "No Matching Data".
- The results of rules within current parameters, which would normally be indicated in green, are omitted from this report.
- For each day a rule is broken, the number of days in violation will be highlighted yellow for 1-6 days, and red for 7+ days.
- Normal Business Hours is defined as Monday-Friday, 8am to 5:59pm EST.
- For each rule, this study will use the following color-coding:

	Within parameters.
Yellow	Exceeding parameters.
Red	Consistently exceeding parameters.

Rating for the Month

Green	The analyst will fill in this summary area, on a monthly basis.

Overview

Rule 1 – Processing Capacity
This rule analyzes the processing capacity of each server, and is a trigger for a possible lack of CPU resources during the analysis period. This rule examines the CPU Utilization and Run Queue Length metrics for each server in the group. Each row in the table represents the number of days the rule was broken during the month. The table contains two columns per server: CPU Utilization and Run Queue Length per Processor. For further details, refer to the CPU section below.

> **The rule:** Count the number of days during the analysis period where CPU utilization is over 80% and Run Queue Length is greater than 1 per CPU, for 1 or more hours that day.

Rule 1: CPU Util and RunQ						
	hqgimpu1:CPU Utilization	hqgimpu1:Run Queue Length per Processor	ccgimpu1:CPU Utilization	ccgimpu1:Run Queue Length per Processor	ccgimpu2:CPU Utilization	ccgimpu2:Run Queue Length per Processor
2006_04	13	13	2	2	2	2

Rule 2 – Memory Capacity (a)
Analyzing memory capacity is difficult, and requires two different rules. The first memory rule examines two metrics for each server in the group during the analysis period, business hours only:

1. Virtual Memory (Swap) Utilization
2. The CPU Time used by the processes charged with managing the server's memory (both physical and virtual).

Once all of the server's virtual memory has been allocated to specific applications, the server cannot start new programs and executing programs may fail if they try to grow. Elevated CPU time for memory management usually indicates memory contention, and is a capacity / performance trigger for a detailed analysis of the memory requirements for the server. For further details, refer to the Memory section below.

> **The rule:** Count the number of days during the analysis period where Swap Utilization is over 80%, or CPU utilization for memory processes is greater than 5%, for 1 or more hours that day.

No Server Broke this Rule

Rule 3 – Memory Capacity (b)
The second memory capacity rule analyzes each server's paging activity during the analysis period, for business hours only. Page Ins occur when an application/process requests data that has been "swapped out" to virtual memory by the server's operating system. Page In activity usually indicates memory contention and is a capacity/performance trigger for a detailed analysis of the memory requirements for the server. For further details, refer to the Memory section below.

> **The rule:** Count the number of days during the analysis period where Memory Page Ins is above 5 pages/second for more than one hour that day.

Rule 3: Pg Ins	Memory Pg Ins
hqgimpn1	1
hqgimpu1	3
ccgimpu2	2
ccgimpu1	1
ccgimpn1	1

Rule 4 - File Systems

An application may experience abnormal behavior when a critical file system is full, and the application is no longer able to write to it. It is recommended that all file systems on a server be kept under 80% utilized. This rule analyzes the utilization for all File Systems and MS-Windows Logical Devices for each server during the analysis period. For further details, refer to the Storage and File Systems section below.

> **The rule:** Count the number of days during the analysis period where any file system has less than 20% free space for a total of 3 or more hours that day.

Rule 4: File Systems over 80	Is an FS over 80
hqgimpu1	9
ccgimpu2	13
hqgimpn2	6
ccgimpu1	4

Rule 5 - Disks

Usually, expert configuration of the disk resources is necessary to sustain transfer rates above 200 IOs/second. This rule analyzes the Transfer Rate for all disks for each server during the analysis period. This rule is intended to trigger the capacity/performance analyst to research the disk configuration to ensure that it is architected properly. For further details on the storage subsysem, refer to the Storage and File Systems section below.

> **The rule:** Count the number of days during the analysis period where any disk has a transfer rate above 200 IOs/second for a total of 3 or more hours that day.

Rule 5: Disk over 200 IOs per sec	Is Disk over 200
hqgimpu1	17
ccgimpu2	2
ccgimpu1	6

Rule 6 – Connections to the Disks

Usually, expert configuration of the paths to the disks is necessary to sustain transfer rates above 2,500 IOs/second. This rule analyzes the Transfer Rate for all disk controllers for each server during the analysis period. This rule is intended to trigger the capacity/performance analyst to research the disk and controller configuration to ensure that it is architected properly. It is expected and acceptable for MS-Windows servers to not have this data. For further details on the storage subsystem, refer to the Storage and File Systems section below.

> **The rule:** Count the number of days during the analysis period where any controller has a transfer rate above 2,500 IOs/second for 1 or more hours that day.

Rule 6: Controller over 2500 IOs per sec	
	Is Controller over 2500
hqgimpu1	7
ccgimpu1	1

Rule 7 - Backups During Normal Business Hours

Backups executing during normal business hours can have a significant impact to the normal operations of an application, and should be scheduled for off-hours. This rule analyzes each server identifying if backups are executing during normal business hours. For further details, refer to the Backups section below.

> **The rule:** Count the number of days during the analysis period where backups were executing during normal business hours.

Rule 7: Backups during Business Hours	
	Backups Active Bus Hrs
hqgimpn1	18
hqgimpu1	13
ccgimpu2	4
ccgimpu1	5
ccgimpn1	1

Details & Analysis

Collection Status

This section analyzes the data collections that provide the data used to do this analysis, by server for the analysis period. The table lists the number of hours of collected data per day by server. Normally, we collect data 24 hours a day.

Collection Status by Server and by Date							
	hqgimpn1	ccgimpn2	hqgimpu1	ccgimpu2	hqgimpn2	ccgimpu1	ccgimpn1
2006_04_01	24	10	24	24	10	24	10
2006_04_02	22	14	22	22	14	22	14
2006_04_03	24	0	24	24	0	24	0
2006_04_04	24	0	24	24	0	24	0
2006_04_05	24	0	24	24	0	24	0
2006_04_06	24	0	24	24	0	24	3
2006_04_07	24	0	24	24	0	24	17
2006_04_08	24	10	24	24	10	24	10
2006_04_10	24	0	24	24	0	24	0
2006_04_11	24	0	24	24	0	24	0
2006_04_12	24	0	24	24	0	24	0
2006_04_13	24	0	24	24	0	24	0
2006_04_16	24	14	24	24	14	24	14
2006_04_17	24	0	24	24	0	24	0
2006_04_18	24	0	24	24	0	24	0
2006_04_19	24	0	24	8	0	24	0
2006_04_20	24	0	24	24	0	24	0
2006_04_21	24	0	24	24	0	24	0
2006_04_22	24	10	24	24	10	24	10
2006_04_23	24	14	24	24	14	24	14
2006_04_24	24	0	8	24	0	24	0
2006_04_25	24	0	24	24	0	24	0
2006_04_26	24	0	24	24	0	24	0
2006_04_27	24	0	24	24	0	24	0

A. CPU Utilization – the Application as a Whole

This section analyzes the CPU resources for the **entire** application. By combining the CPU resources and their usage across all servers, this section attempts to identify the key resource utilization periods.

Table: Busiest Business Hour for the Application, with CPU Utilization for the Business Day

The Application's Busiest Business Hour, CPU%	
Time	hqgimpn1
Apr 12 2006 17:00	47

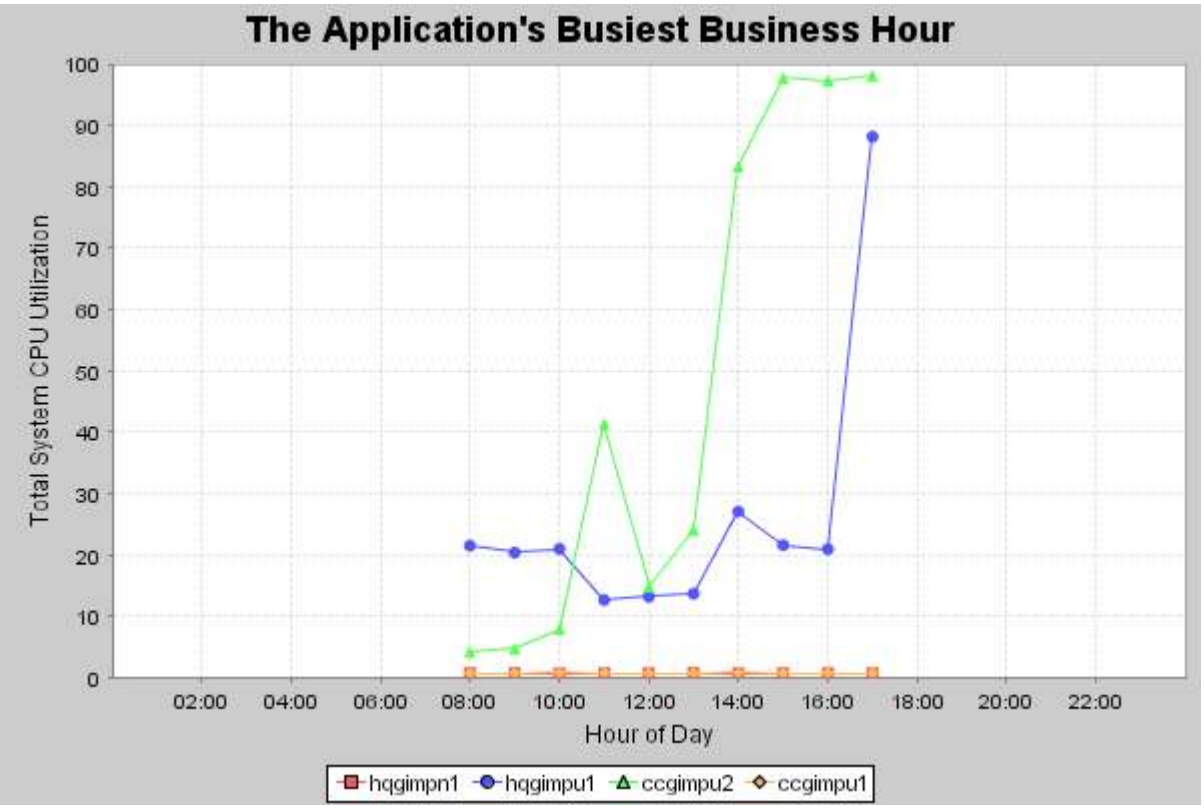
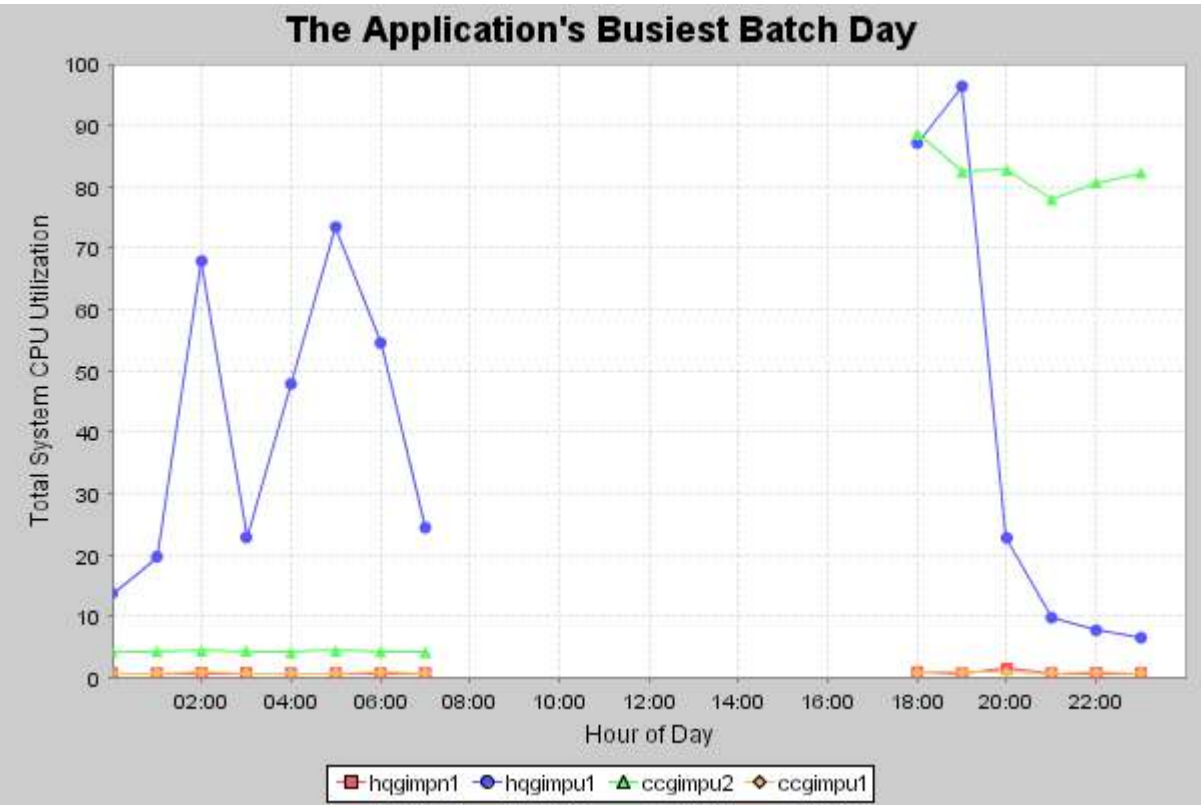


Table: Busiest Batch Day for the Application, with CPU Utilization for the Batch Day

The Application's Busiest Batch Day, average CPU%	
Time	hqgimpn1
Apr 12 2006	20



B. CPU Utilization by Server

This section examines the CPU utilization for each server on the busiest day, the average day, the busiest business day, and the busiest batch day during the analysis period. Please note that for all three charts, each server's particular day may be different. Refer to the tables that contain the particular dates for each server. The Busiest Day is calculated by examining each server's CPU utilization for every hour of the day during the analysis period, and determining which 24-hour period used the most CPU time. The Average Day is calculated by averaging each hour across all days of the analysis period (all midnights, all 1AMs, all 2AMs, etc.). The Busiest Business Day is calculated by examining CPU utilization only during normal business hours. The Busiest Batch Day is calculated by examining CPU utilization for non-business hours.

Table: Busiest Day by Server, with Average CPU Utilization for the Entire Day

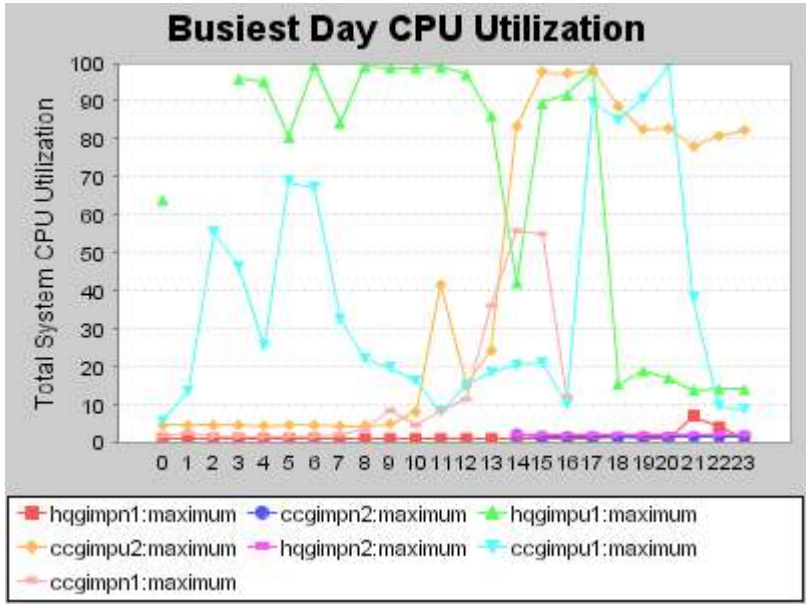
Busiest CPU Day by Server, average CPU%							
Time	ccgimpn2	hqgimpn2	hqgimpu1	ccgimpn1	ccgimpu1	hqgimpn1	ccgimpu2
Apr 02 2006			69				
Apr 07 2006				12			
Apr 12 2006							42
Apr 19 2006					37		
Apr 21 2006						1	
Apr 22 2006	1	2					

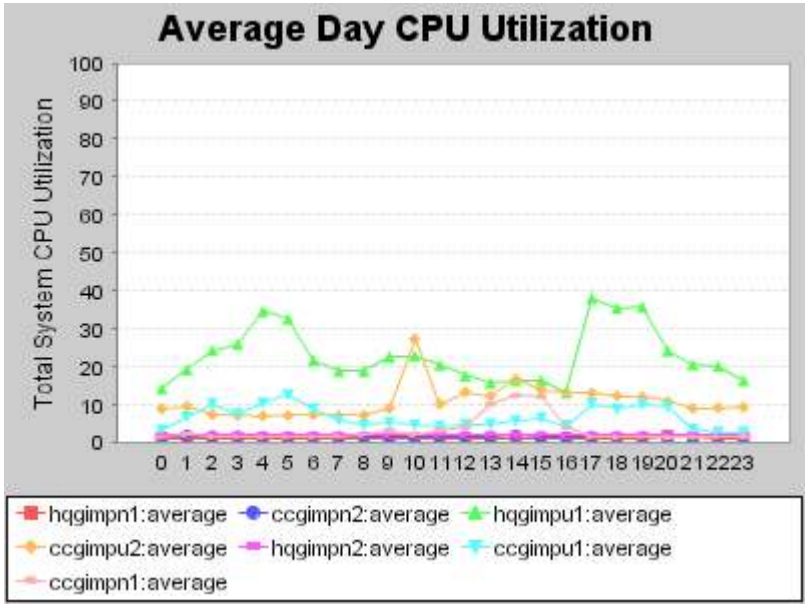
Table: Busiest Business Day by Server, with Average CPU Utilization during Business Hours

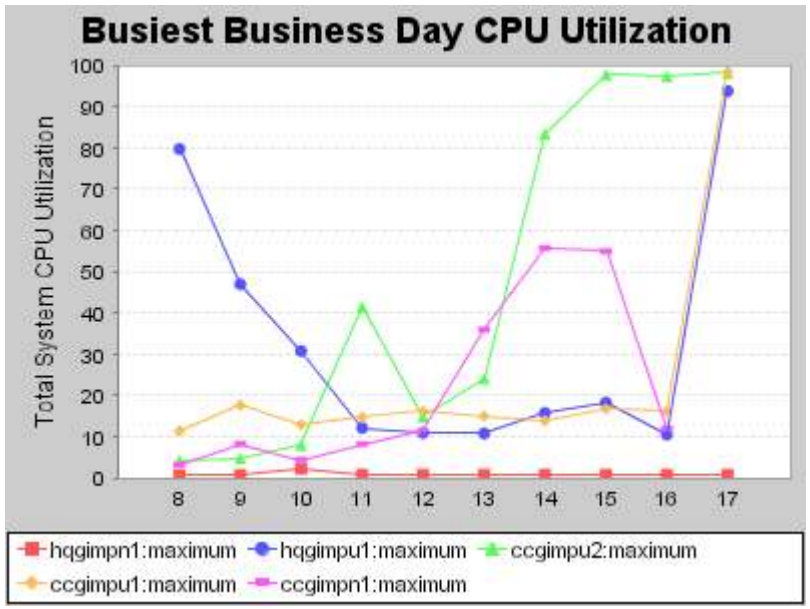
Busiest Business CPU Day by Server, average CPU%							
Time	ccgimpn2	hqgimpn2	hqgimpu1	ccgimpn1	ccgimpu1	hqgimpn1	ccgimpu2
Apr 06 2006			53				
Apr 07 2006				22		1	
Apr 12 2006							47
Apr 19 2006					24		

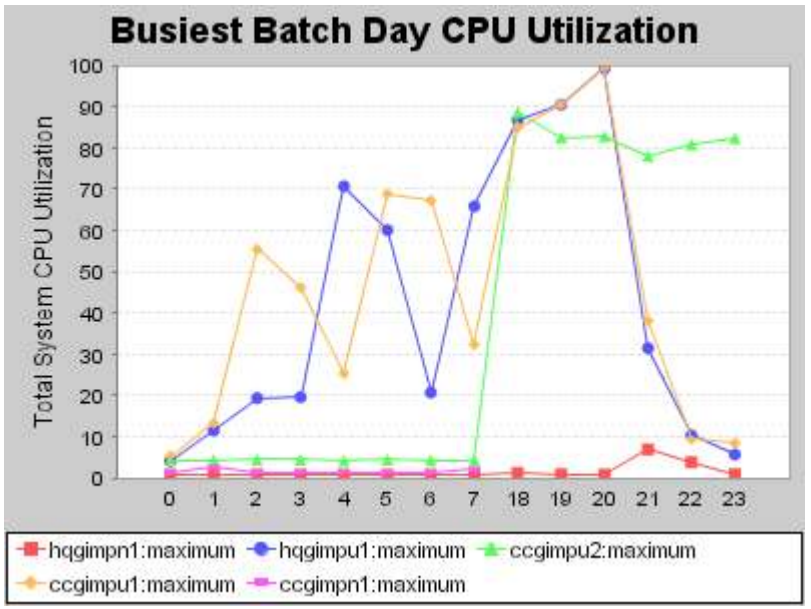
Table: Busiest Batch Day by Server, with Average CPU Utilization during Batch Hours

Busiest Batch CPU Day by Server, average CPU%							
Time	ccgimpn2	hqgimpn2	hqgimpu1	ccgimpn1	ccgimpu1	hqgimpn1	ccgimpu2
Apr 02 2006			69				
Apr 07 2006				2			
Apr 13 2006							39
Apr 19 2006					46		
Apr 21 2006						1	
Apr 22 2006	1	2					


Busiest Day CPU Utilization
Total System CPU Utilization
hqgimpn1:maximum
ccgimpn2:maximum
hqgimpu1:maximum
ccgimpu2:maximum
hqgimpn2:maximum
ccgimpu1:maximum
ccgimpn1:maximum


Average Day CPU Utilization
Total System CPU Utilization
hqgimpn1:average
ccgimpn2:average
hqgimpu1:average
ccgimpu2:average
hqgimpn2:average
ccgimpu1:average
ccgimpn1:average


Busiest Business Day CPU Utilization
Total System CPU Utilization
hqgimpn1:maximum
hqgimpu1:maximum
ccgimpu2:maximum
ccgimpu1:maximum
ccgimpn1:maximum

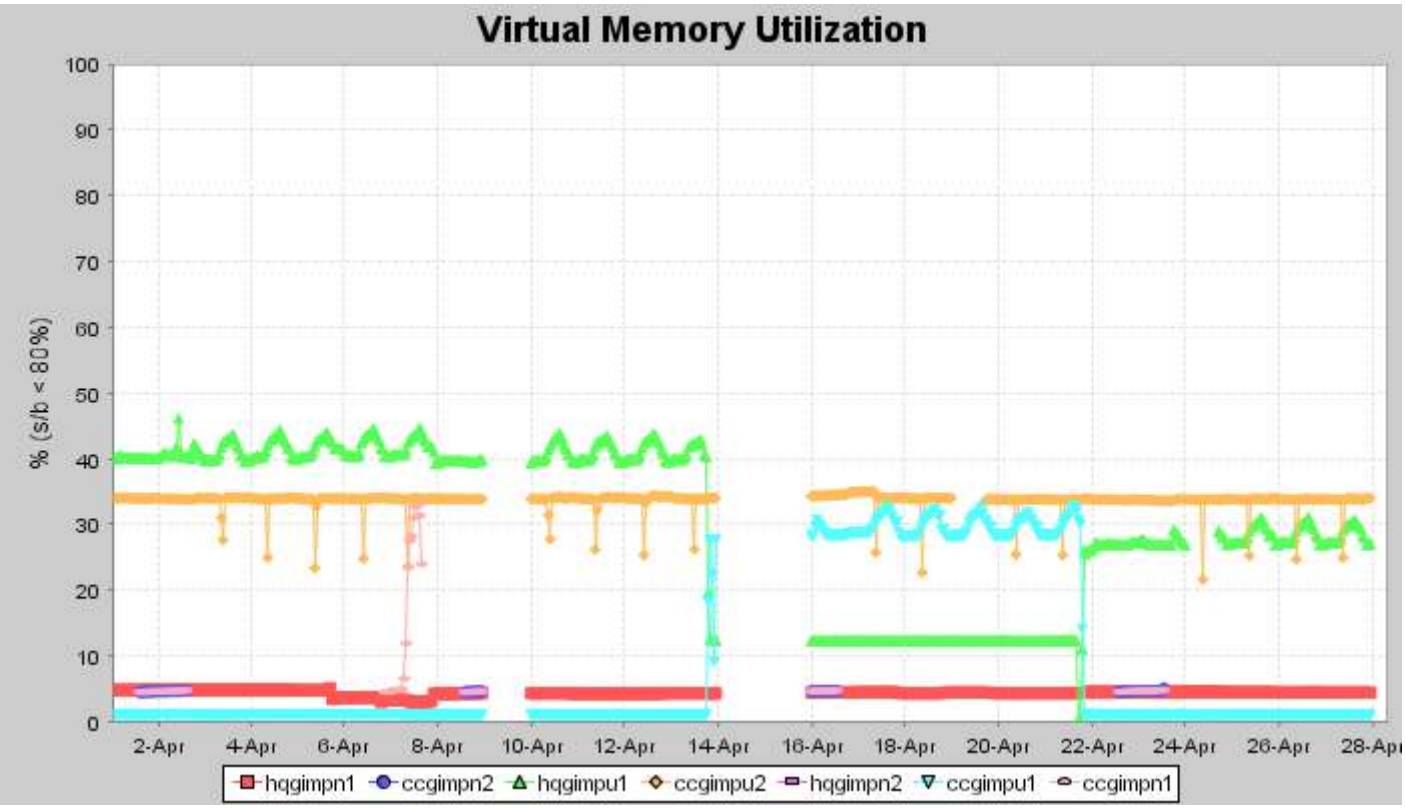

Busiest Batch Day CPU Utilization
Total System CPU Utilization
hqgimpn1:maximum
hqgimpu1:maximum
ccgimpu2:maximum
ccgimpu1:maximum
ccgimpn1:maximum

C. Memory

The following charts provide more diagnostic information for physical and virtual memory utilization, and possible memory contention. For UNIX and Linux servers, physical memory utilization is usually above 90%, and is considered normal; therefore no chart will be supplied.

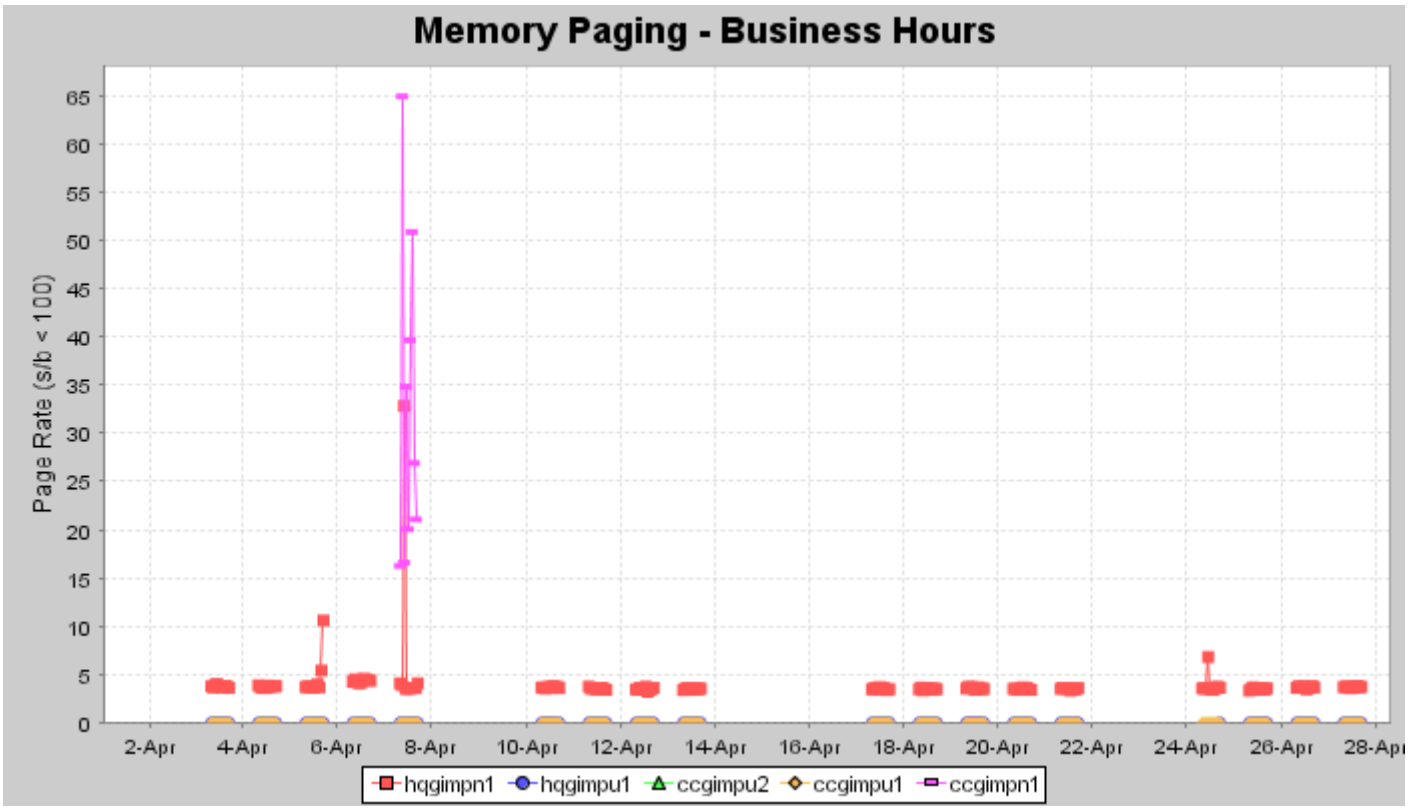
Please note that data backup and restore activity usually causes page scanning to increase, and should be taken into account. Reference the Backups section below for more details.

Once all of a server's virtual memory has been allocated to specific applications, the server cannot start new programs and currently running programs cannot grow. Our team recommends that virtual memory utilization remain below 80%.



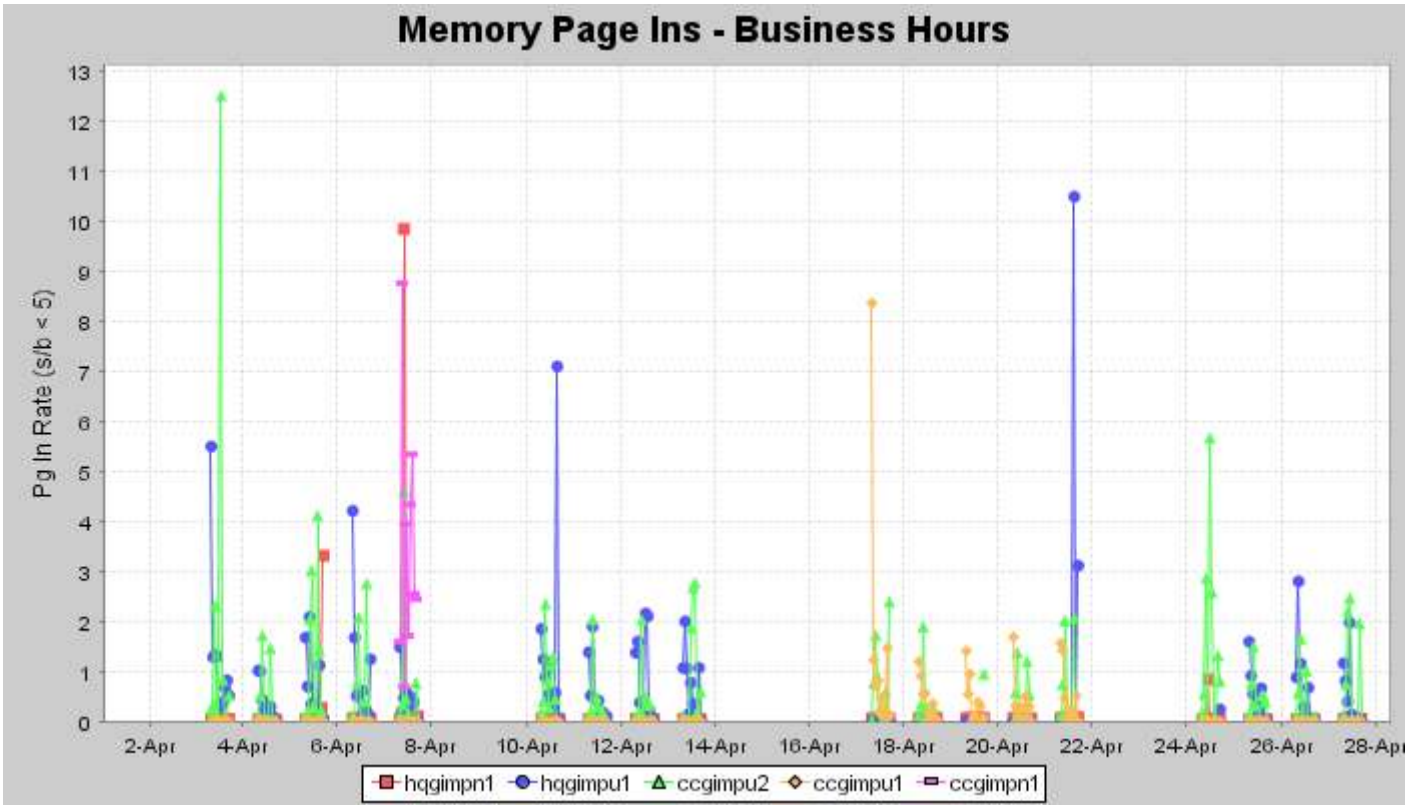
The Paging Rate by server acts as cross-platform metric to determine memory contention. High paging rates, above 100 pages per second, usually indicate memory contention. Backups can cause excessive paging without memory contention; therefore, excessive paging during backups is considered a false positive and should not be a concern.

For MS-Windows servers, paging activity can also reflect an application's request for data from the disk subsystem, and is a false positive. For example: reading a file. Nevertheless, a detailed analysis is called for to determine the root-cause of the paging rate.

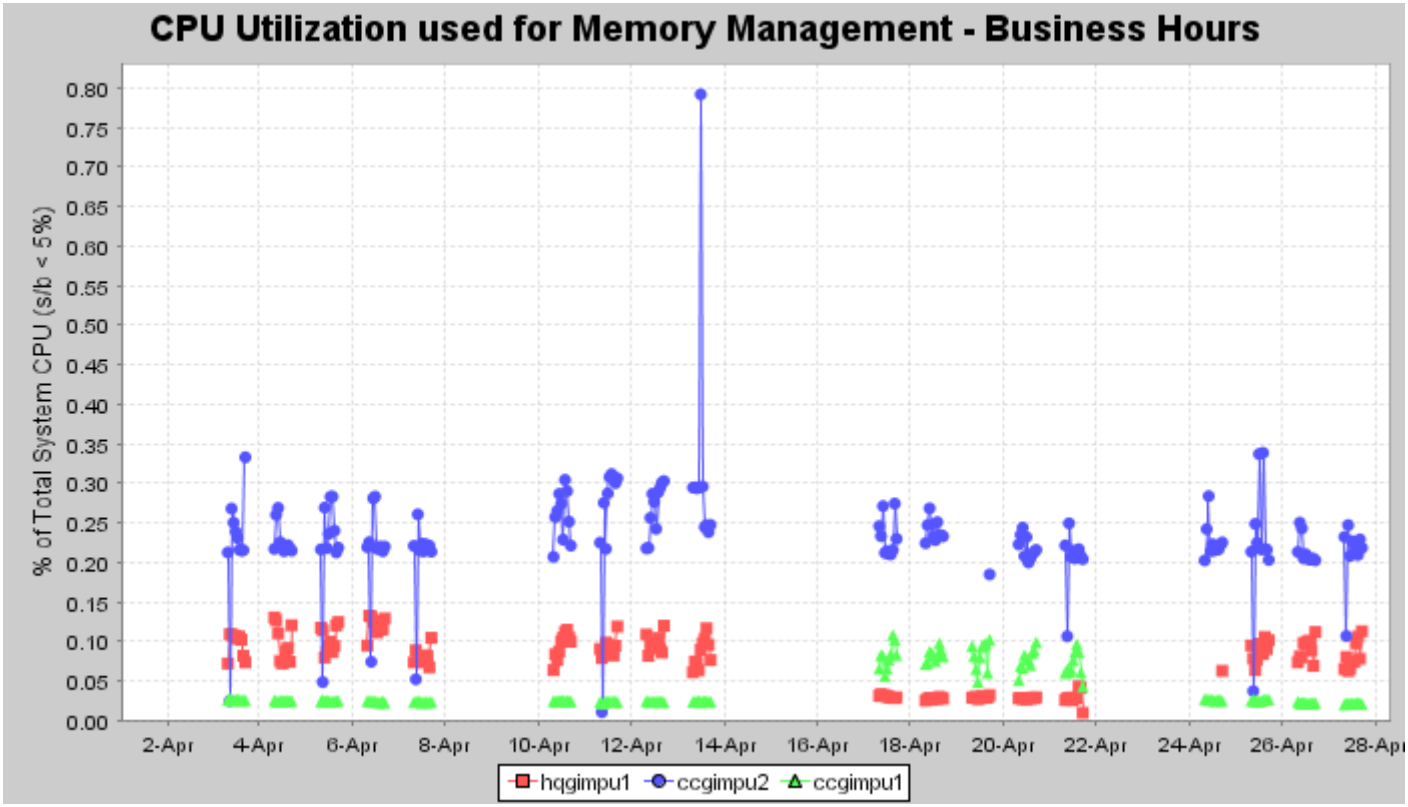


The Page Ins metric measures the rate at which the operating system is moving data from virtual memory into physical memory. Like the Paging Rate, it can be used to determine if memory contention exists.

Like the Paging Rate, this can be a false positive for MS-Windows servers due to disk I/O.

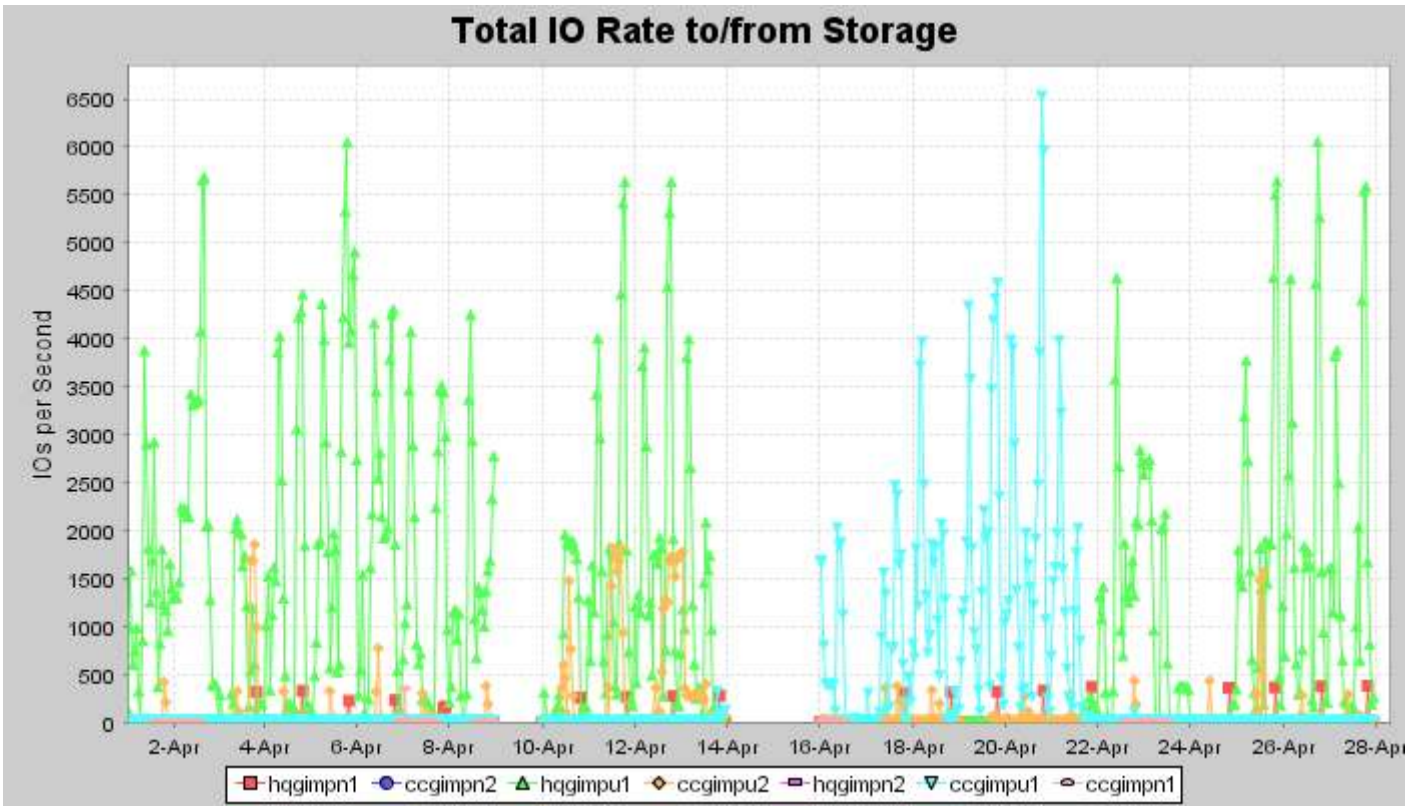


Excessive CPU time, above 5%, dedicated to memory management, is also a measure of contention. It is expected and acceptable for this chart to not be displayed for MS-Windows servers.

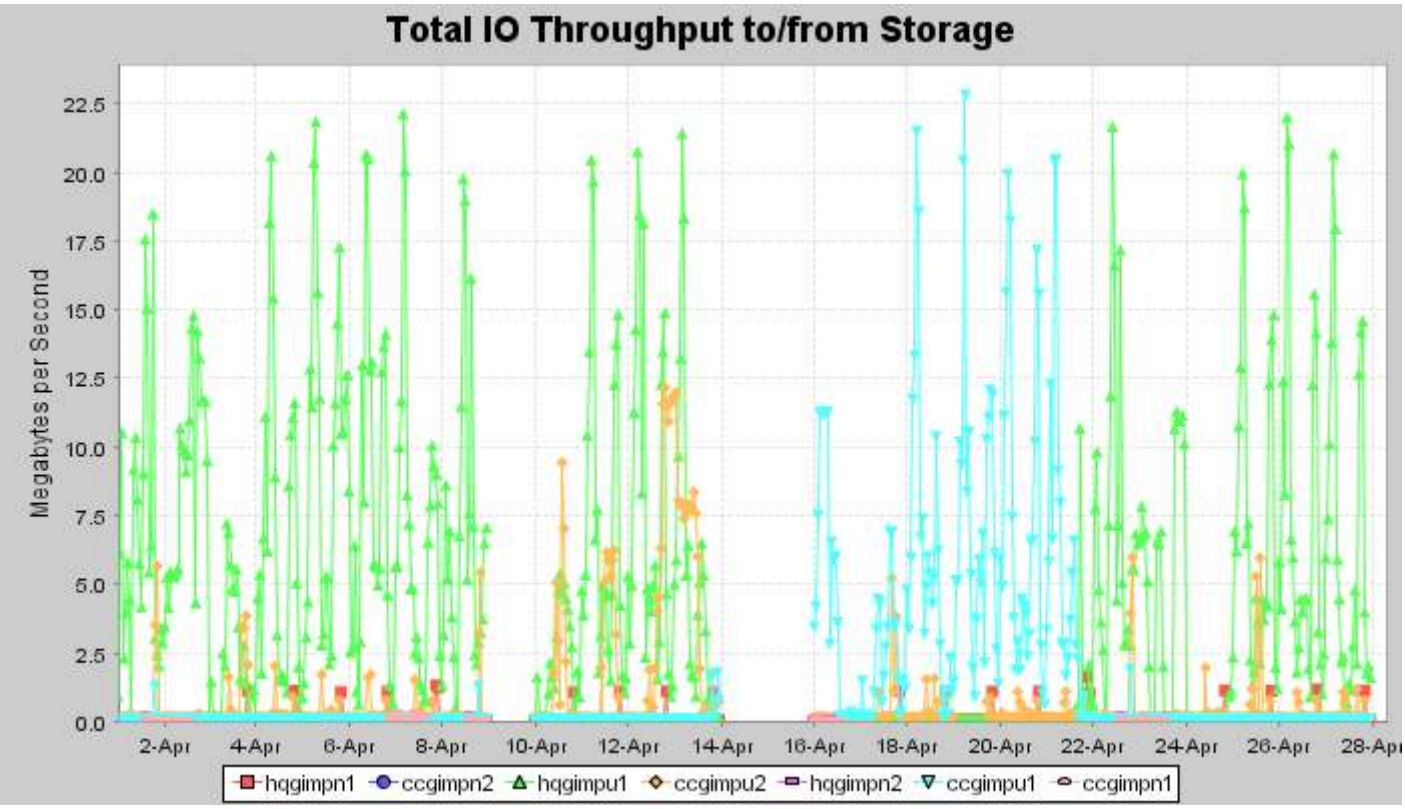


D. Storage and File Systems
The section provides more diagnostic information for the storage subsystem including disks, IO channels, and file systems.

The following chart depicts the number of IOs per second to/from the storage subsystem, both SAN and locally attached storage. Usually, expert configuration of the disk resources is necessary to sustain transfer rates above 2,500 IOs/second. It is expected and acceptable for this chart to not be displayed for MS-Windows servers.



The following chart depicts the bandwidth in megabytes (MB) per second used between each server and each server's storage subsystem. It is provided for informational purposes only.



The following table lists the number of days during the analysis period for each file system that exceeded 80% utilization.

Group Formatting Test		
System	FS	NUM DAYS
hqgimpu1	/archives (/dev/vx/dsk/appdg/archive)	9
ccgimpu2	/archives (/dev/vx/dsk/appdg/archive)	13
hqgimpn2	D:	6
ccgimpu1	/archives (/dev/vx/dsk/appdg/archive)	4

E. Backups

The following table depicts the number of business hours per business day, by server, when backups were occurring during normal business hours. The chart graphically shows the active backups during business for each server during the analysis period.

Dates when Backups were Active							
Time	hqgimpn1	ccgimpn2	hqgimpu1	ccgimpu2	hqgimpn2	ccgimpu1	ccgimpn1
Apr 03 2006	10		1				
Apr 04 2006	10		1				
Apr 05 2006	10		1				
Apr 06 2006	10		1				
Apr 07 2006	10		1				9
Apr 10 2006	10		1				
Apr 11 2006	10		1				
Apr 12 2006	10		1				
Apr 13 2006	10		1	1			
Apr 17 2006	10			1		1	
Apr 18 2006	10					1	
Apr 19 2006	10					1	
Apr 20 2006	10					1	
Apr 21 2006	10		1			1	
Apr 24 2006	10			1			
Apr 25 2006	10		1				
Apr 26 2006	10		1				
Apr 27 2006	10		1	1