Document: Stratusphere SpotCheck #'s for Physical Machines
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Document Purpose: Define metrics and thresholds for a SpotCheck as it relates to User Experience in a physical machine environment utilizing Liquidware Stratusphere UX.

This document is designed to bring together the recommendations from many experts in the industry about the metrics that need to be monitored and the thresholds that are deemed acceptable as it relates to user experience. This document does not make recommendations on changes needed due to the many industry, usage, costing, and application variables that are in play.

What is a "SpotCheck"

A SpotChecks is basically a point in time health check that focus on key user experience metrics with known levels of acceptable performance. Review of data from multiple dates and times is critical before making recommendations or changes in the environment. The thresholds represented below are at a 1 hour level of granularity unless otherwise specified in the description and are key areas that affect user experience. Normal and High Usage dates and times should be examined based on the industry and user requirements.

CRITICAL NOTES:

A) Know your company!

Knowledge of the industry/company/department work habits, loads and applications are critical for data interpretation and threshold evaluation.

Example 1: Moderate/High Storage Latency may be acceptable during shift changes with lots of people logging in and out. BUT, Not Acceptable during work hours as this impedes productivity.

Example 2: Law firms and Hospitals generally demand sub 10 second login times whereas most other industries are satisfied with under 30 second.

B) Know your data!

There are many monitoring and diagnostic systems on the market. Each of the solutions available collect data in different ways and with different levels of granularity. They all also render/report the data in different ways and granularity with roll ups that can vastly change the data and perspective for the viewer. For this reason, the metric values represented in this document are only for Liquidware Stratusphere and may not apply well to other products.

Examples:

Depending on the view, you could be looking at averages, peaks or peak averages.
Did the data come from the OS, "In Band" or "Out of Band"?
How much impact did the "In-Guest" Agent put on the OS?
How much impact and time lag is on the "Out of Band" Agent?

C) Good Blogs

SpotCheck Methodology
Grey Matter is Required – Automated Solutions don't work
Monitoring vs. Diagnostics

Documentation needed for analysis, conclusion and recommendations:

Multiple Spot Check Dates:

MM/DD/YYYY (Monday), MM/DD/YYYY (Wednesday), MM/DD/YYYY (Friday)

Multiple Time Frames Examined on each date:

(Time frames for review are based on business requirements)

9-10AM, 10-11AM, 2-3PM, 4-5PM

The system(s) should be examined on multiple dates and times for the following information based on the max values shown below. Don't make a change based on a single data point.

Critical Sections for Review:

1. Machines/OS Criteria:

Login Delay (Industry Average is under 30 Seconds – This is a company preference)
- See Appendix "L" for more details.

Application Load Time (Industry Average is under 3 Seconds – Company Preference)

CPU Utilization (Max 80%) – Higher than 50% generally is bad over 60 Minutes
- This generally denotes a stuck or run-away process on the machine.

CPU Queue (Should not be more than 2 per CPU Core)
https://technet.microsoft.com/en-us/library/Cc940375.aspx

Memory Usage (Should be less than 75%)
Best Practice – to reduce Windows Paging

Page File Usage (Should be as close to zero as possible)
You cannot stop Windows from paging.
Soft Page Faults are in memory – Hard Page Faults are to disk.
Do Not turn off the paging file in windows. Set to Minimum Size.
Do NOT use "System Managed" – Set the page file start size to ¼ the memory.
Windows Paging causes extra CPU and Disk Overhead and should be reduced whenever possible.

Disk Queue (Should be ZERO for 99% of Users)
Disk Que shows that the OS is waiting on disk reads and writes.
This can be caused by slow disk or virus protection holding up the IO or latency of the disk sub system.

Graphics Intensity will be noted has high when over 100.
- This must be examined to see if GPUs are working properly.
- See Appendix "G" for more details.

Applications Non-Responsive – (1 per Day/Per Machine/App is OK)
Any more than this and you need to investigate the apps and services needed by the app.

Appendix L: Login Delay

Time consumed with users logging into a machine is a large part of the user experience. Stratusphere can breakdown the machine boot and login processes. Due to the complexity of active directory and the environments we can only offer a few guiding hints in this document. For a complete login breakdown session please engage your Liquidware SE or partner.

1. Domain Controller(DC) Discovery Time
    a. DC Discovery happens at boot and login time.
        i. Healthy response times are 300-500 milliseconds.
        ii. Changing of the DC during boot and login shows a potential issue.
    b. DC Discovery Times over 500ms:
        i. DC Overloaded – Cannot process request fast enough.
        ii. Network latency from the machines to the DC.
        iii. Sites and Services – Machine/User is talking to a DC in another location.
2. Long running processes
    a. AD GPOs, Item Level Targeting and Scripts
        i. Need to review these in Stratusphere Login Breakdown.
            1. AD Lookups and Local machine WMI Queries are very slow.
            2. Mapping a drive/printer to a machine that does not exist or the user does not have access to can cost a lot of time.
    b. Antivirus Scanning
        i. Don't forget that batch files, PowerShell, VB Scripts are all interpreted languages. Meaning that each line in the batch file or script is executed one line at a time. AV systems scan each line then all the previous lines of the script to ensure it is not a virus.
3. Broken and/or Corrupt GPOs
    a. Yearly (At Minimum) reviews of the GPOs should be done by all companies.
    b. Example: IE7 GPOs should not be applied to Windows 10!!
    c. Review of the GPOs can help dramatically with user login times and security.
4. Sites and Services
    a. This is one of the top issues found at client sites with Stratusphere login break down.
    b. If the machine is in New York it should not be authenticating from a domain controller in Canada.

Good Videos:

Boot and Login Breakdown

Appendix G: Graphics Intensity

Graphics rendering is a large part of the user experience. Depending on the application it can use MS GDI, DirectX, OpenGL, or many other video interface drivers/protocols.

You may be thinking that you don't run any graphic intensive apps. But this is not true. The Windows OS and normal MS Office applications have a lot of graphics requirements. Think about any desktop/laptop built in the last 10 years. They all have a GPU (Graphic Processing Unit). These processors are used by the OS and applications to offload drawing of boxes, circles and other complex shapes from the main CPU and rendering them on the monitor.

GPUs are not all the same! Manufactures pick from many vendors to meet a cost point for the desktop or laptop they are selling.

Laptops: Tend to have energy/heat constrained GPUs.

Desktops: Have many tiers and options for expansion with more power and cooling available.

Driving multiple monitors at high resolution can often overload the built in GPU and then offload that back onto the main CPU.

Improperly installed video drivers and older versions can also cause off load back to the main CPU.

Graphic rendering does not show up in Task Manager, Resource Monitor or Stratusphere because this is a Kernel process and very hard to break out.

When looking at a physical machine with no obvious constrains on memory or disk we must look at CPU Utilization and CPU Queue. Low to moderate CPU utilization with HIGH CPU que is sign of overloaded graphics process. Also examine the GDI (Graphics Device Interface) objects in Task Manager or Stratusphere. GDI Objects average for the machine over 1 hour greater than 100 is consider high graphics intensity.

Example Application GDI Usage:

MS Outlook:

First Monitor (1024x768) – 800-900 GDI Objects
Second Monitor (1320x1024) – 1,200-1,400 GDI Objects

This is a complex topic and often difficult to identify. Stratusphere does show GPU utilization for many of the manufactures on the market. If you see no GPU load in Stratusphere for a physical machine the GPU is not reporting information, supported, drivers are bad, or resolution is not supported by the GPU/Driver.

If you find that you are overloading the GPU in the machine you have 2 options. First, turn off hardware acceleration for the applications or second, buy machines with faster GPUs.

MS Office, Google Chrome and Firefox all have GPO settings to turn off hardware acceleration.

Good Videos:

Machine and Application GPU Usage