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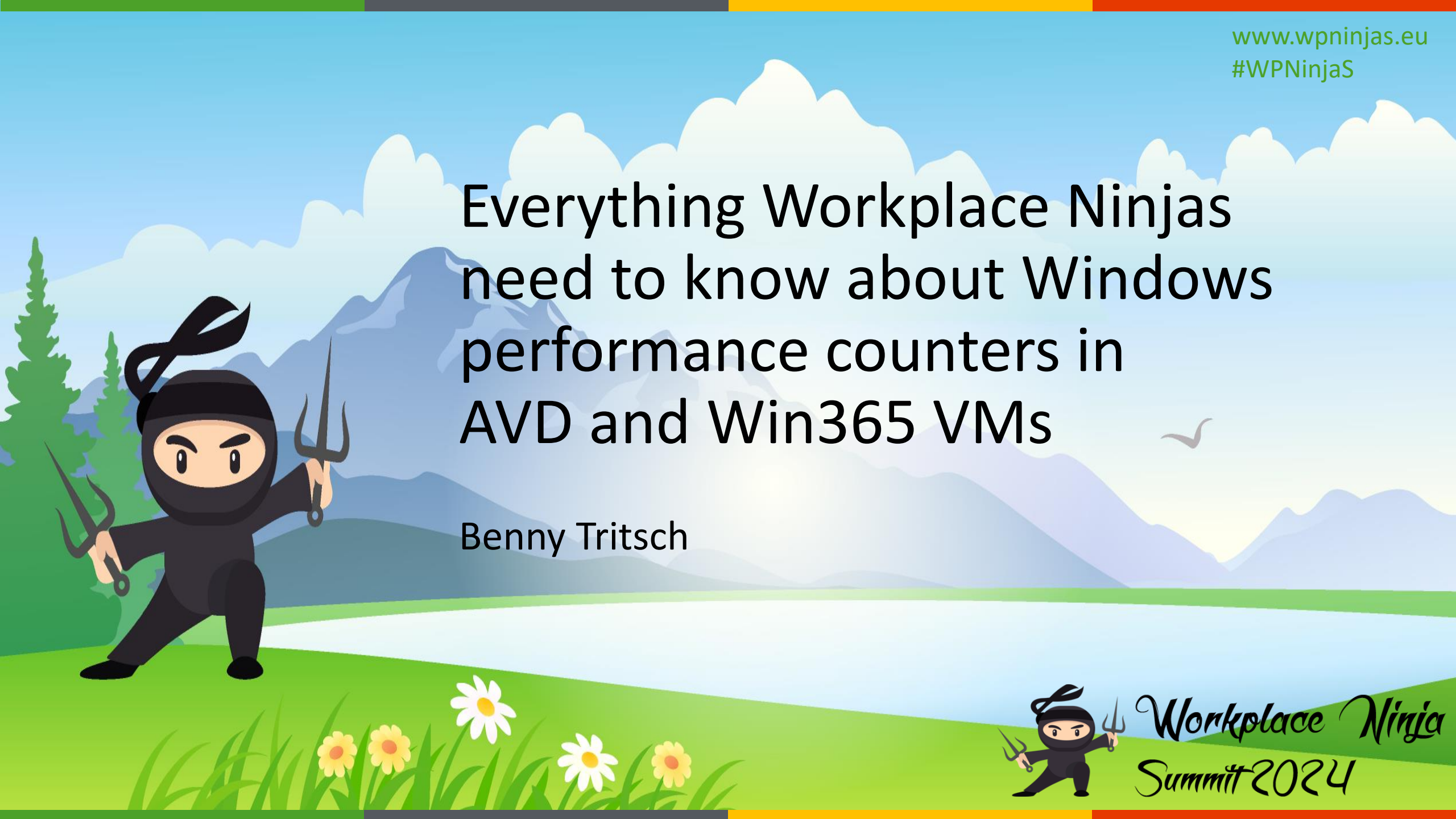
Everything Workplace Ninjas need to know about Windows performance counters in AVD and Win365 VMs

Benny Tritsch



Workplace Ninja Summit 2024

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About Benny Tritsch

Focus

EUC Evangelist and Chief Scientist
Parallels RAS Product Manager

From

Dr. Tritsch IT Consulting, Germany

My Blog

https://drtritsch.com
https://eucscore.com

Certifications

Microsoft MVP, Omnissa Tech Insider,
Citrix CTP , NVIDIA NGCA

Hobbies

DEX benchmarking and building the
EUC Score toolset for the community

Contact

info@eucscore.com

Agenda

- Windows Performance Counter Terminology
- Performance API Consumers
- Scripted Access to Performance Counters
- Azure Virtual Desktop and Windows 365 Use Cases
- Performance Counter Examples from the Field

Key takeaways:

- **Windows Performance Counter fundamentals**
- **Most relevant metrics in digital workplaces**
- **Insights into Task Manager, Resource Monitor, Performance Monitor**

Why Performance Counters Matter

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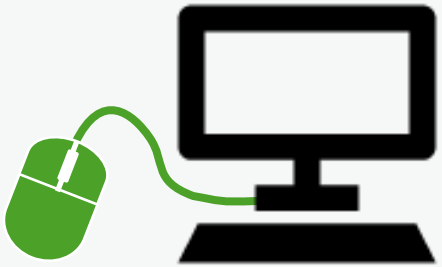
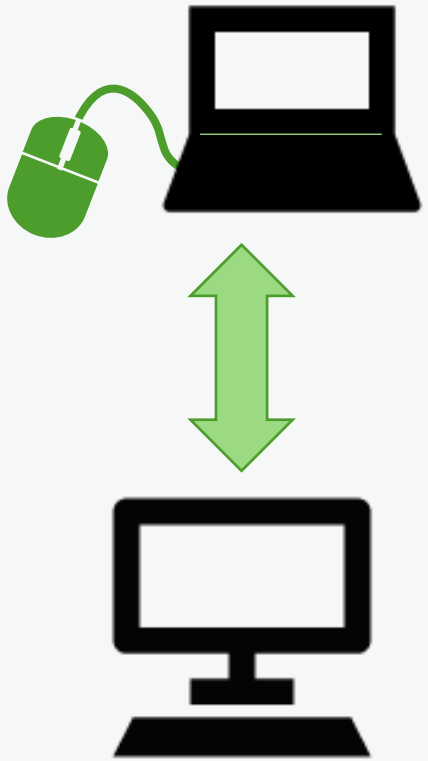
Less control over Windows-specific telemetry data

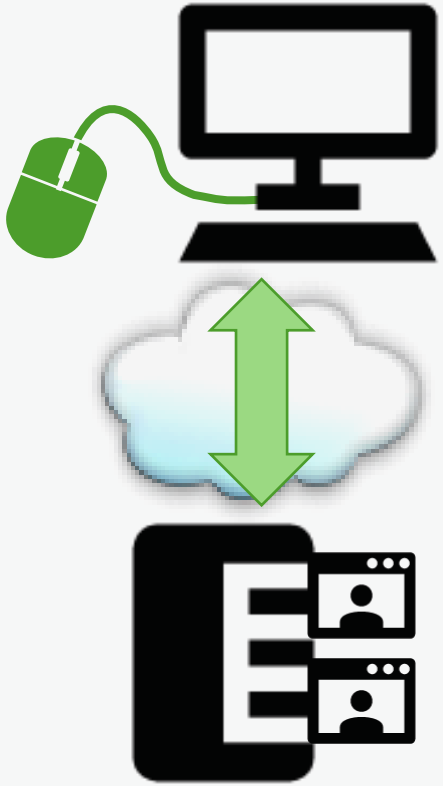
On-Prem Windows



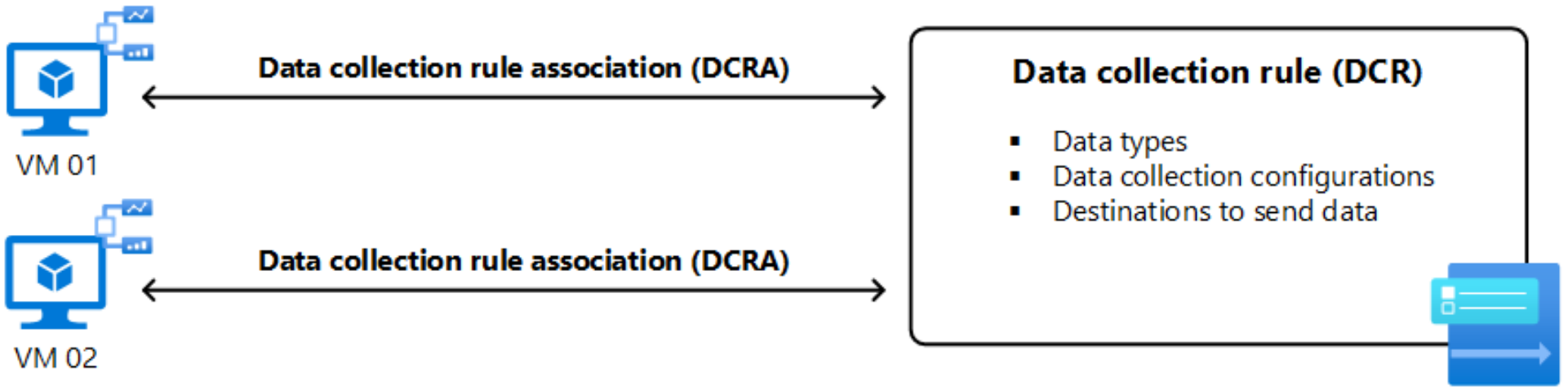
VDI / RDSH on LAN



AVD / Win365



Azure Monitor Agent



https://learn.microsoft.com/en-us/azure/azure-monitor/agents/azure-monitor-agent-overview

Project Hydra | OneDrive Dev Cent... | Screenshot provided by Marcel Meurer | All Bookmarks

Microsoft Azure | Search resources, services, and docs (G+/) | Copilot | mm-admin@ITProClou... ITPROCLOUD.DE

Home > Data collection rules > microsoft-avdi-westeurope

Data collection rules
ITProCloud.de

Create | Manage view | ...

Filter for any field...

We are previewing a new Browse experience. Click to switch.

Name

- hydra-itpc-dev
- microsoft-avdi-westeurope

Page 1 of 1

microsoft-avdi-westeurope | Data sources
Data collection rule

Search

- Overview
- Activity log
- Access control (IAM)
- Tags
- Settings
  - Locks
- Configuration
  - Data sources
  - Resources
- Automation
  - Policies (Preview)
  - CLI / PS
  - Tasks (preview)
  - Export template
- Security
  - Identity
- Monitoring
  - Alerts
  - Metrics
  - Diagnostic settings
  - Logs
- Help
  - Support +

Add | Delete

Filter by name...

Data source
Performance Counters
Windows Event Logs

Add data source

Azure Monitor Agent
Azure Log Analytics
AVD Insights

*Data source | Destination

Select which data source type and the data to collect for your resource(s).

Data source type *: Performance Counters

Choose Basic to enable the collection of performance counters. Choose Custom if you want more control over which performance counters are collected.

None | Basic | Custom

Configure the performance counters to collect, and how often they should be sampled:

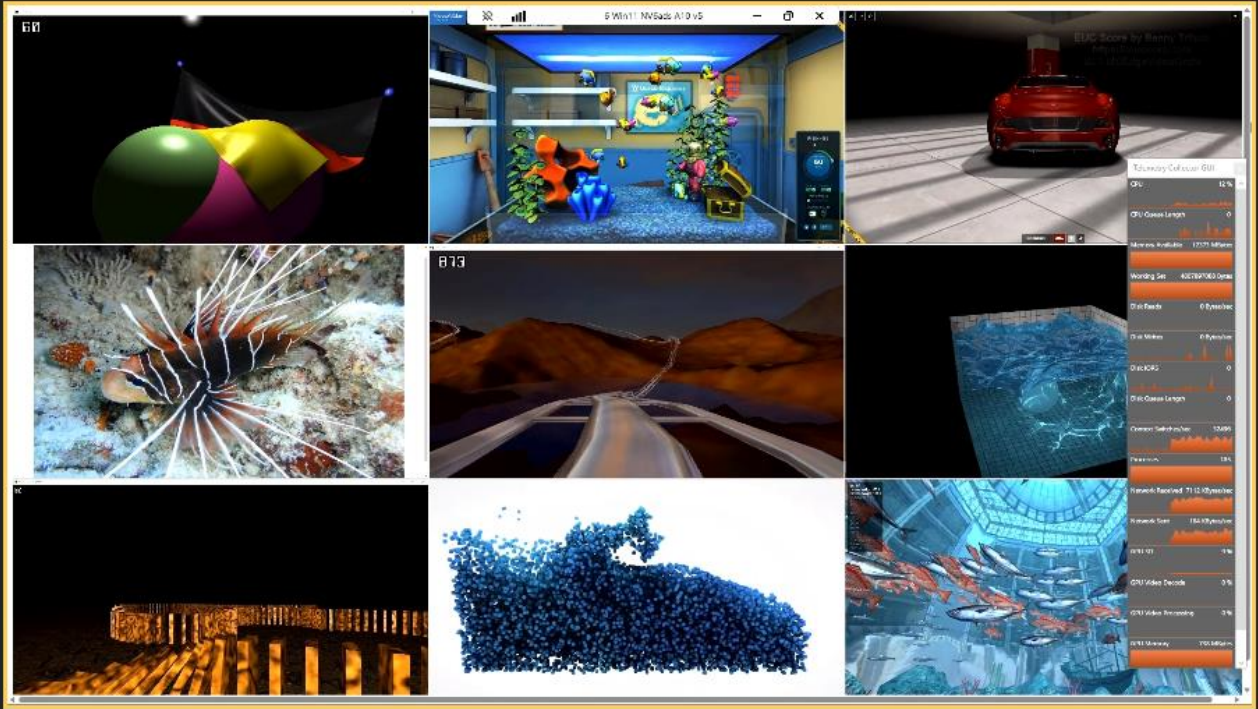
Add

Performance counter	Sample rate (seconds)
\Memory\% Committed Bytes In Use	30
\Memory\Available Bytes	60
\Memory\Committed Bytes	60
\Memory\Cache Bytes	60
\Memory\Pool Paged Bytes	60
\Memory\Pool Nonpaged Bytes	60
\Memory\Pages/sec	30
\Memory\Page Faults/sec	30
\Process(_Total)\Working Set	60
\Process(_Total)\Working Set - Private	60

Showing 11 - 20 of 59 results. < 1 2 3 4 5 >

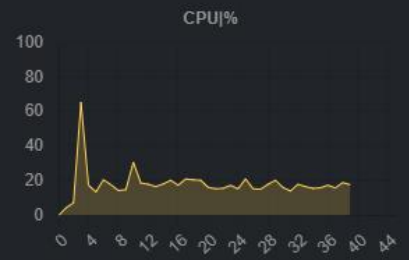
Save | Next : Destination > | Cancel

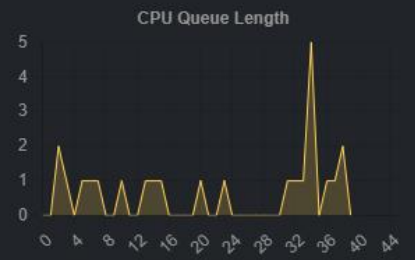
SL1-MSEdgeVideoGrid9 on Azure NV6ads_A10_v5 | SxS RDP UDP (15ms RTT)

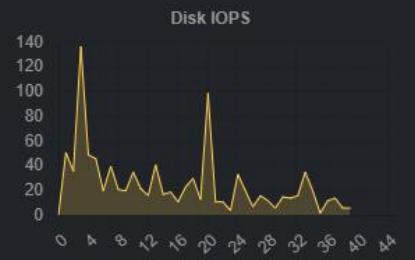


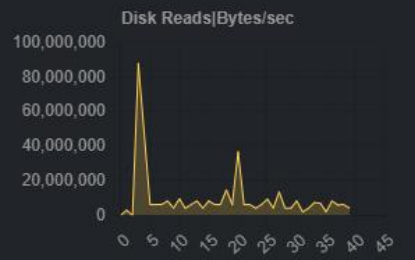
SL1-MSEdgeVideoGrid9 on Azure NV6ads_A10_v5 | SxS RDP UDP (15ms RTT)

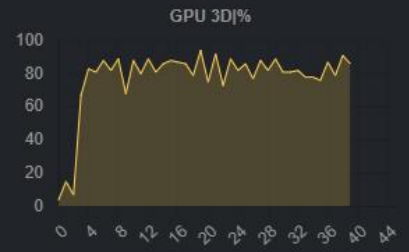
```
00:00:00.500  Date: 2023/09/21 Time: 16:36:52.374 AppName: msedge.exe
00:00:00.500  Simload: SL1-MSEdgeVideoGrid9 Computername: bt-avd6-VM-0 Username: btritsch
00:00:00.500  Number of Monitors: 1 Default Monitor: 1 (0 | 0 | 1920 | 1080)
00:00:00.500  Pre-Simload countdown screen was visible for 1 sec
00:00:00.500  Delay between Simload start time and activity log start time: 1.087 sec
00:00:02.632  App launch time: 1027 ms
00:00:02.883  Run action initiated
00:00:03.886  Press F11
```

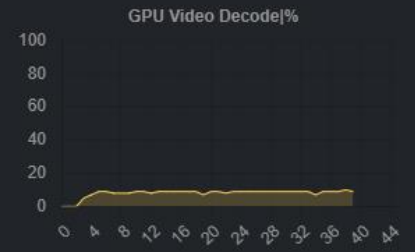


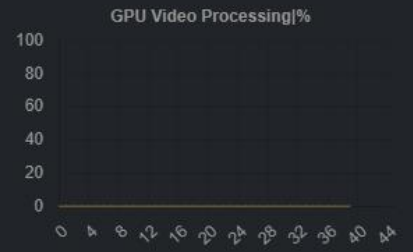


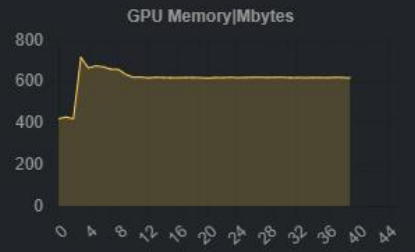


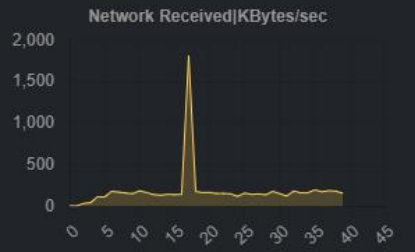


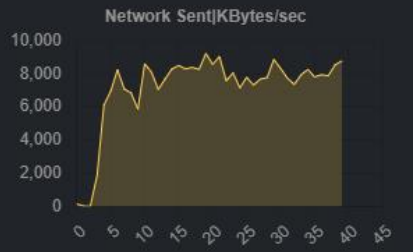












00:00:38 00:00:44 Help Report

Windows Performance Counters

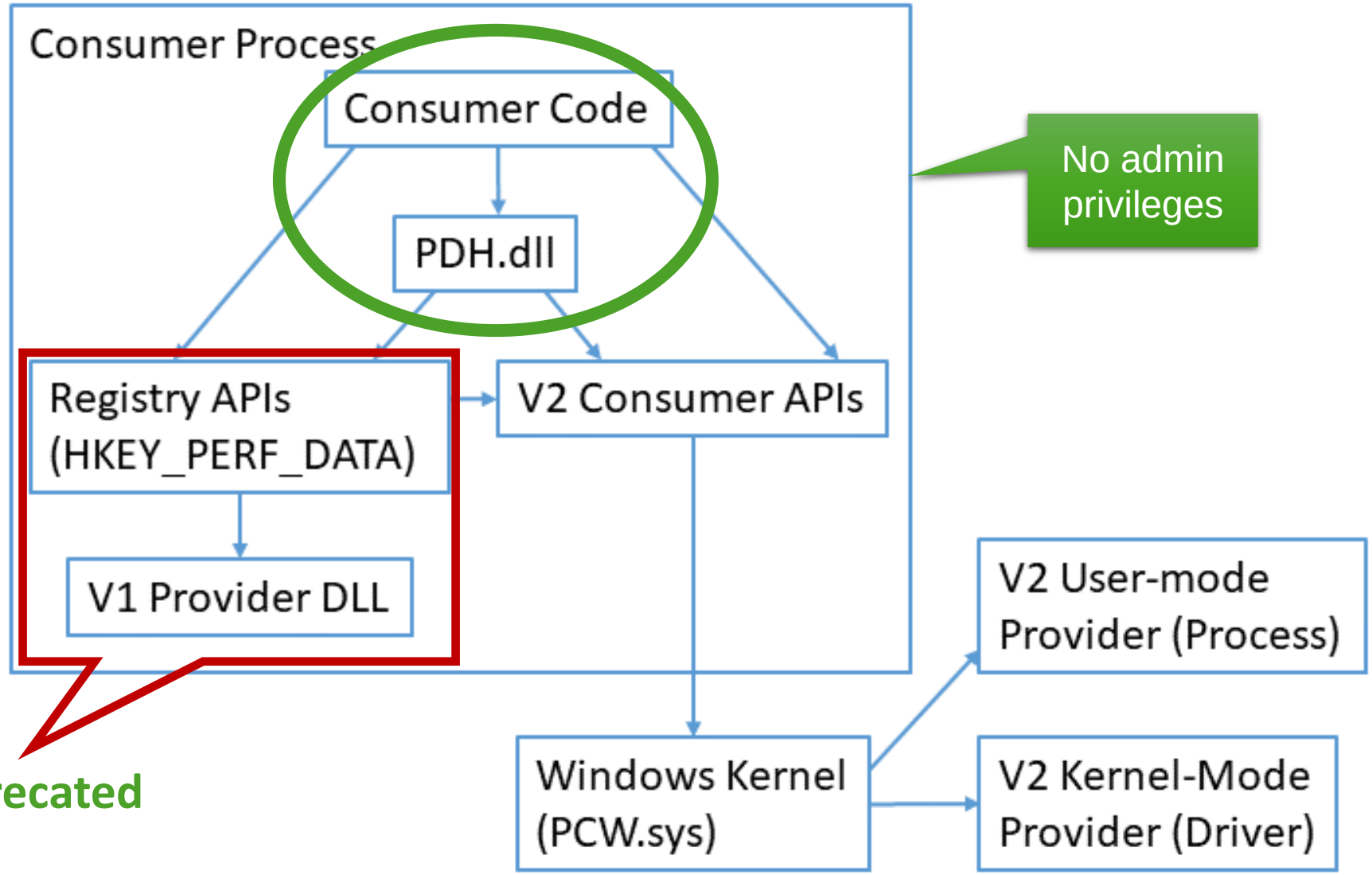
Consistent interface for collecting various kinds of system data

- A **provider** is a software component that generates and publishes performance data
- A **counterset** (or **object**) is a grouping of performance data within a provider
- A **counter** is the definition of single piece of performance data
- An **instance** is an entity about which performance data is reported
- A **counter value** is the value of a single piece of performance counter data
- The **counter type** indicates the type of the counter's raw value and indicates what the counter's raw value represents

Windows Performance Counters

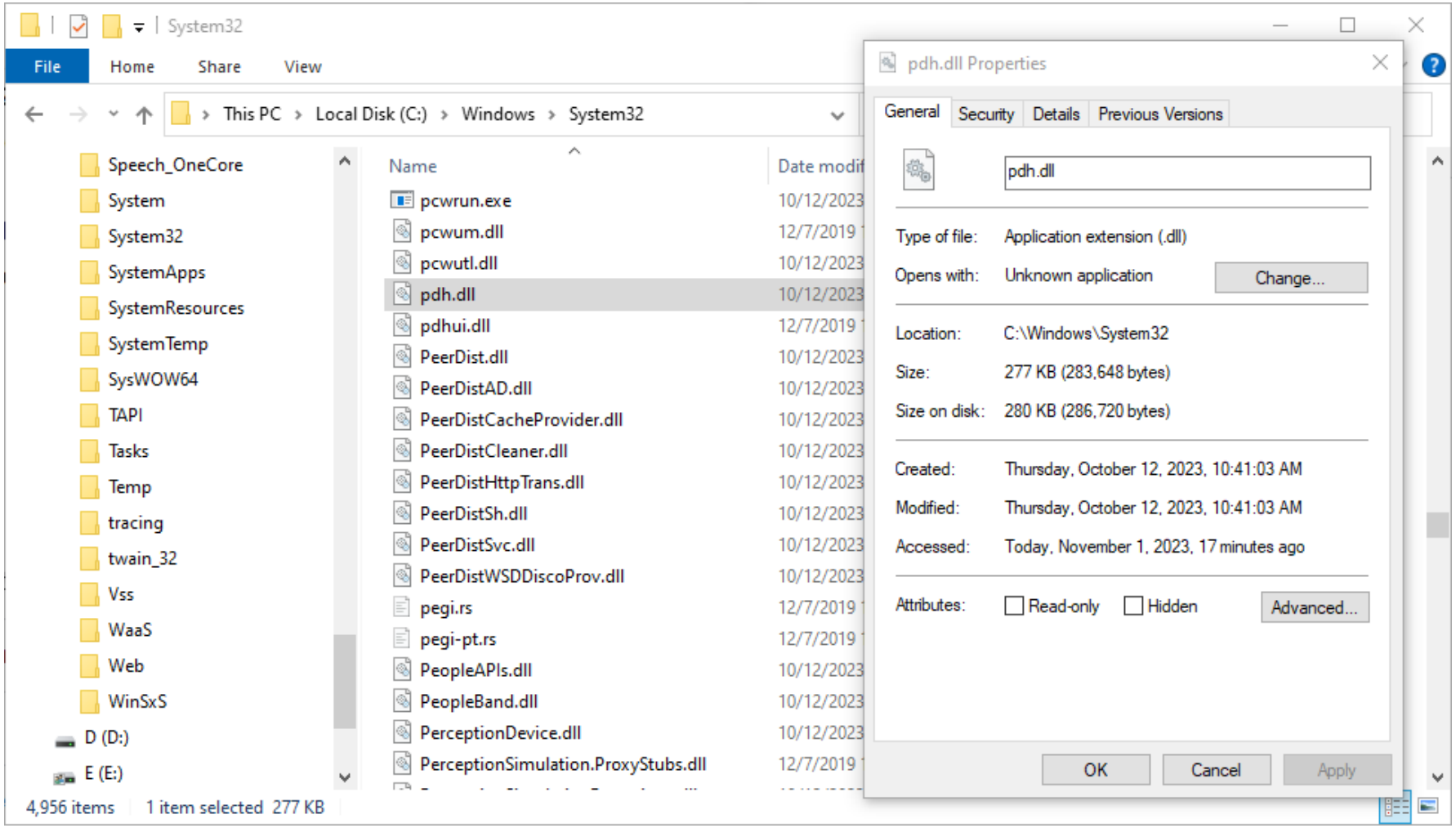
- **Single-instance countersets** always contain data for exactly one instance
- **Multi-instance countersets** contain data for a variable number of instances
- A **consumer** is a software component that makes use of performance data. It periodically collects and records the data from a provider's counterset:
  - GUI: Task Manager, Performance Monitor, Resource Monitor, and Sysinternals Process Explorer
  - CMD: Typeperf.exe, Logman.exe, and Relog.exe
  - Service: Azure Monitor Agent, agents provided by monitoring solutions
  - EUC Score: Simload Base Counters, Data Miner, Telemetry Collector

Performance API Architecture



PDH.dll

Windows Performance Data Helper DLL



API: https://learn.microsoft.com/en-us/windows/win32/api/pdh/

Task Manager – Performance Tab

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Task Manager

Performance

Run new task

CPU
12% 1.22 GHz

Memory
9.8/15.9 GB (62%)

Disk 0 (C:)
SSD
1%

Wi-Fi
Wi-Fi
S: 16.0 R: 0 Kbps

GPU 0
Intel(R) UHD Graphics 620
4%

GPU 1
NVIDIA GeForce GTX 1060
0% (56 °C)

GPU

NVIDIA GeForce GTX 1060

3D 0%

Copy 0%

Video Encode 0%

Video Decode 0%

Dedicated GPU memory usage 6.0 GB

Shared GPU memory usage 8.0 GB

Utilization
0%

Dedicated GPU memory
0.0/6.0 GB

GPU Memory
0.0/14.0 GB

Shared GPU memory
0.0/8.0 GB

GPU Temperature
56 °C

Driver version: 27.21.14.6140
Driver date: 1/22/2021
DirectX version: 12 (FL 12.1)
Physical location: PCI bus 2, device 0, function 0
Hardware reserved memory: 90.0 MB

Task Manager – Detail Tab

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Task Manager

File Options View

Processes | Performance | App history | Startup | Users | Details | Services

Name	PID	Status	User name	CPU	Memory (a...	UAC virtualizat...	GPU	GPU engine
System Idle Process	0	Running	SYSTEM	97	8 K		00	
Taskmgr.exe	17940	Running	Benny	01	19,232 K	Not allowed	00	
Greenshot.exe	13732	Running	Benny	01	40,016 K	Disabled	00	
dwm.exe	1852	Running	DWM-1	00	79,524 K	Disabled	00	
chrome.exe	12008	Running	Benny	00	89,148 K	Disabled	00	
svchost.exe	1860	Running	NETWORK...	00	3,620 K	Not allowed	00	
csrss.exe	1012	Running	SYSTEM	00	1,480 K	Not allowed	00	
chrome.exe	16080	Running	Benny	00	120,872 K	Disabled	00	
POWERPNT.EXE	10020	Running	Benny	00	360,752 K	Disabled	00	
OUTLOOK.EXE	21672	Running	Benny	00	186,696 K	Disabled	00	
g2mlauncher.exe	14868	Running	Benny	00	17,144 K	Disabled	00	
PowerToys.exe	10764	Running	Benny	00	2,896 K	Disabled	00	
StreamDeck.exe	1612	Running	Benny	00	69,428 K	Disabled	00	
System interrupts	-	Running	SYSTEM	00	0 K		00	
PowerToys.Peek.UI.exe	13408	Running	Benny	00	12,972 K	Disabled	00	
ctfmon.exe	5024	Running	Benny	00	3,920 K	Disabled	00	
ControlCenter.exe	11940	Running	Benny	00	52,388 K	Disabled	00	
msedge.exe	7464	Running	Benny	00	173,968 K	Disabled	00	
explorer.exe	2232	Running	Benny	00	57,292 K	Disabled	00	
Skype.exe	10256	Running	Benny	00	69,572 K	Disabled	00	
ElgatoAudioControl...	15472	Running	Benny	00	824 K	Disabled	00	
slack.exe	17296	Running	Benny	00	167,384 K	Disabled	00	
chrome.exe	5540	Running	Benny	00	94,548 K	Disabled	00	
chrome.exe	8684	Running	Benny	00	14,828 K	Disabled	00	
mmc.exe	12184	Running	Benny	00	18,144 K	Not allowed	00	
Skype.exe	17704	Running	Benny	00	159,664 K	Disabled	00	
svchost.exe	9924	Running	Benny	00	10,588 K	Disabled	00	

Fewer details

End task

Performance Monitor

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Performance Monitor

File Action View Window Help

- Performance
  - Monitoring Tools
    - Performance Monitor
  - Data Collector Sets
    - User Defined
      - AllCPU
      - EUC Score
    - System
    - Event Trace Sessions
    - Startup Event Trace Ses
  - Reports
    - User Defined
    - System

100
80
60
40
20
0

9:18:12 PM 9:18:25 PM 9:18:35 PM 9:18:45 PM 9:18:55 PM 9:19:05 PM 9:19:15 PM 9:17:45 PM 9:17:55 PM 9:18:11 PM

Last 2.880 Average 1.960 Minimum 0.000 Maximum 12.936 Duration 1:40

Show	Color	Scale	Counter	Instance	Parent	Object	Computer
☑		1.0	% Processor Time	_Total	---	Processor Information	\\SBOOK15
☑		1.0	% Processor Time	_Total	---	Processor	\\SBOOK15
☑		1.0	% User Time	_Total	---	Processor	\\SBOOK15
☑		1.0	% Privileged Time	_Total	---	Processor	\\SBOOK15
☑		0.01	Interrupts/sec	_Total	---	Processor	\\SBOOK15
☑		1.0	% DPC Time	_Total	---	Processor	\\SBOOK15
☑		1.0	% Interrupt Time	_Total	---	Processor	\\SBOOK15
☑		1.0	DPCs Queued/sec	_Total	---	Processor	\\SBOOK15
☑		1.0	DPC Rate	_Total	---	Processor	\\SBOOK15

TaskMan versus PerfMon

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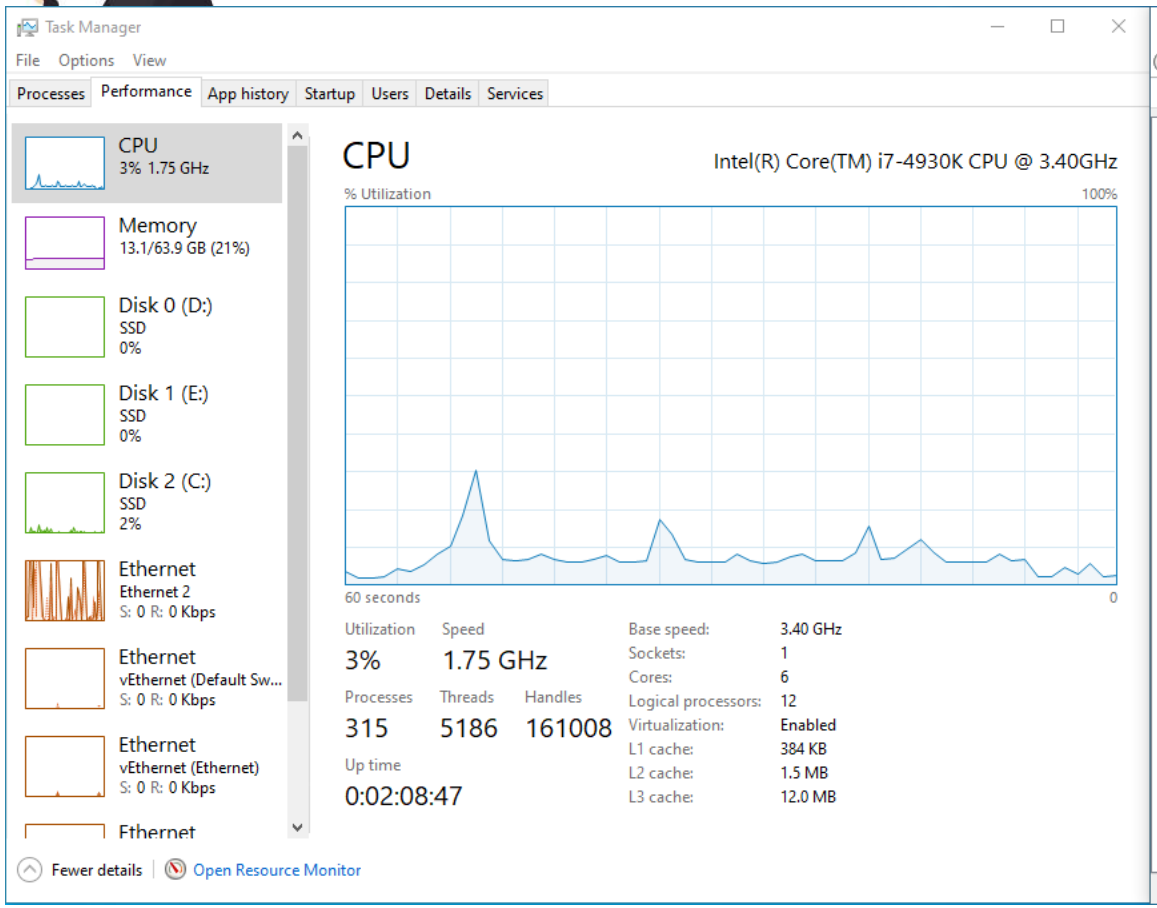

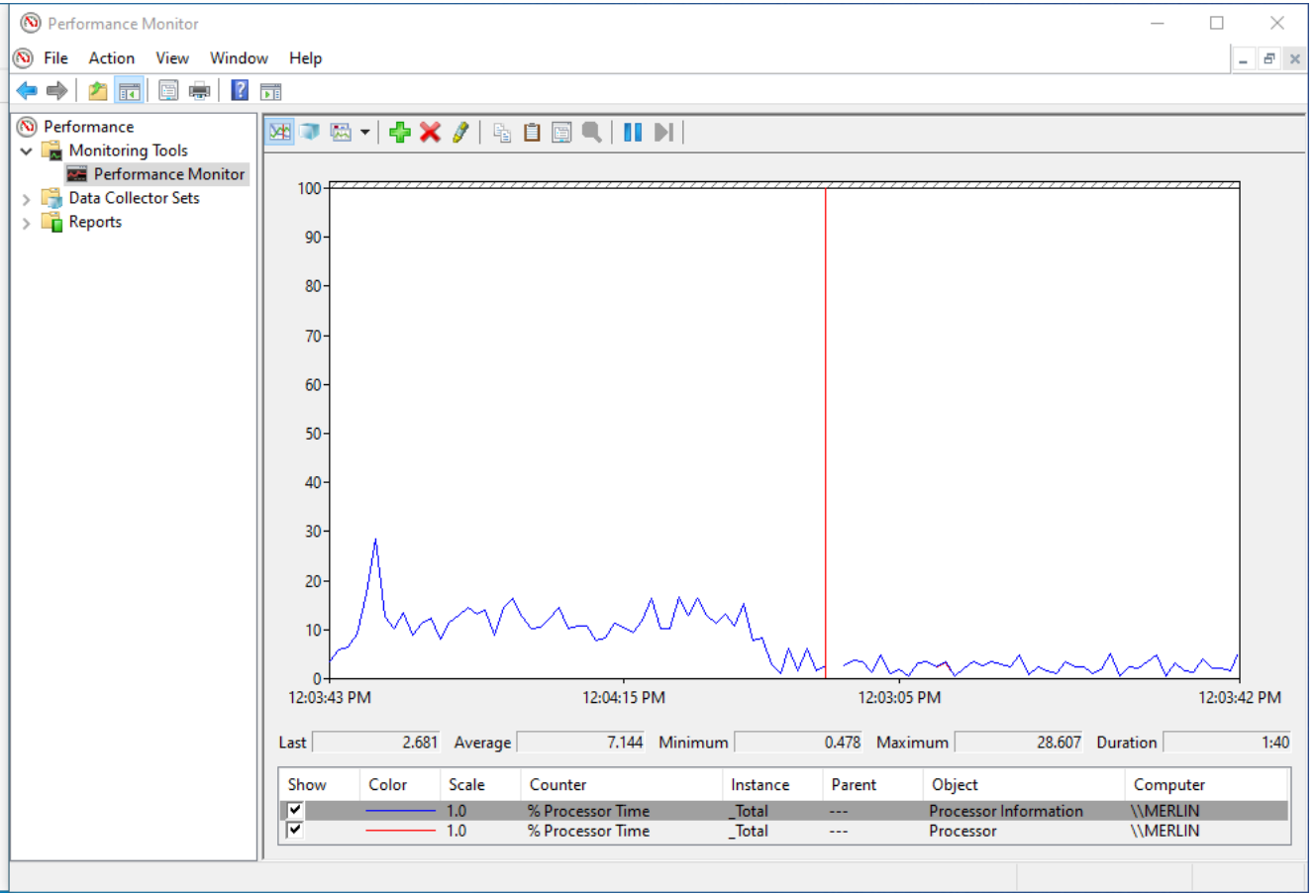

Windows 10 Task Manager '% CPU' skew – A Tale of Two Metrics by Jeff Stokes
https://illuminati.services/2021/03/17/windows-10-task-manager-cpu-inaccurate-a-tale-of-two-metrics/

Task Manager's CPU numbers are all but meaningless by Aaron Margosis
https://aaron-margosis.medium.com/task-managers-cpu-numbers-are-all-but-meaningless-2d165b421e43

PerfMon – Save Settings

Performance Monitor

File Action View Window Help

Performance
Monitoring Tools
Performance
Data Collector Set
Reports

Add Counters

Available counters

Select counters from computer:

<Local computer>

Browse...

Processor

% C1 Time
% C2 Time
% C3 Time
% DPC Time
% Idle Time
% Interrupt Time
% Privileged Time
% Processor Time

Instances of selected object:

_Total
<All instances>
0
1
10
11
2
3

Search

Add >>

Added counters

Counter

Remove <<

Show description

OK Cancel

E2EVC.tsv - Notepad

File Edit Format View Help

```
Reported on \\MERLIN
Date: 10/30/2023
Time: 12:45:57 PM
Time: Default
Data: Current Activity
Interval:  1.00 seconds


Computer: \\MERLIN

Object: Processor

                _Total
        % Processor Time        3.956

Object: Processor Information

                _Total
        % Processor Time        3.956
```

Ln 1, Col 1 100% Windows (CRLF) UTF-16 LE

12:50:22 PM

1:40

1.0	% Processor Time	_Total	---	Processor Information	\\MERLIN
1.0	% Processor Time	_Total	---	Processor	\\MERLIN

Computer

Resource Monitor

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Resource Monitor

File Monitor Help

Overview | CPU | Memory | Disk | Network

CPU — 19% CPU Usage — 92% Maximum Frequency

Image	PID	Description	Status	Threads	CPU	Average CPU
backgroundTaskHost.exe	9592	Background T...	Suspended	18	0	0.53
ShellExperienceHost.exe	16496	Windows Shel...	Suspended	28	0	0.00
backgroundTaskHost.exe	6224	Background T...	Suspended	8	0	0.00
backgroundTaskHost.exe	24532	Background T...	Suspended	11	0	0.00
backgroundTaskHost.exe	26656	Background T...	Suspended	12	0	0.00
backgroundTaskHost.exe	22884	Background T...	Suspended	7	0	0.00
Secure System	108		Suspended	-	0	0.00
vmmemCmZygote	10500		Suspended	-	0	0.00
SystemSettings.exe	23964	Settings	Suspended	44	0	0.00

Disk — 239 KB/sec Disk I/O — 7% Highest Active Time

Image	PID	File	Read (B/sec)	Write (B/sec)	Total (B/sec)	I/O Priority	Response T...
System	4	C:\Window...	0	1,771	1,771	Normal	31
Registry	152	C:\Users\Be...	0	46,694	46,694	Normal	31
System	4	C:\Users\Be...	0	241	241	Normal	31
MsMpEng.exe	6580	C:\Program...	2,185	0	2,185	Normal	31
System	4	C:\Users\Be...	0	141	141	Normal	31
DropboxUpdate.exe	9060	C:\Program...	15	0	15	Normal	31
System	4	C:\Users\Be...	0	86	86	Normal	31
Greenshot.exe	16092	C:\Window...	98,304	0	98,304	Normal	30
SearchIndexer.exe	12540	C:\Program...	447	0	447	Normal	30

Network — 37 Kbps Network I/O — 0% Network Utilization

Image	PID	Address	Send (B/sec)	Receive (B/sec)	Total (B/sec)
OUTLOOK.EXE	19484	52.98.179.34	703	57,160	57,862
svchost.exe (utcsvc -p)	5876	20.189.173.23	851	1,271	2,122
backgroundTaskHost.exe	26656	20.199.58.43	468	970	1,437
POWERPNT.EXE	29308	52.178.17.3	548	844	1,392
POWERPNT.EXE	29308	52.109.89.19	654	460	1,114
OUTLOOK.EXE	19484	20.82.21.145	294	685	979

Views

CPU 100%
60 Seconds 0%
Disk 1 MB/sec
0
Network 100 Kbps
0
Memory 100 Hard Faults/sec
0

Sysinternals Process Explorer

Process Explorer - Sysinternals: www.sysinternals.com [DARCOLABS\Benny]

File Options View Process Find Users Help

<Filter by name>

Process	CPU	Private Bytes	Working Set	PID	Description	Company Name
Secure System	Susp...	184 K	138,840 K	88		
Registry						
System Idle Process						
System						
Interrupts						
smss.exe						
Memory Compression						
csrss.exe						
wininit.exe						
services.exe						
svchost.exe						
WmiPrvSE.exe						
WmiPrvSE.exe						
MoUsoCoreWorker.exe						
dllhost.exe						
StartMenuExperience...						
RuntimeBroker.exe						
SearchApp.exe						
RuntimeBroker.exe						
WhatsApp.exe						
RuntimeBroker.exe						
ShellExperienceHost....						
RuntimeBroker.exe						
dllhost.exe						
PhoneExperienceHos...						
RuntimeBroker.exe						
RuntimeBroker.exe						
dllhost.exe						
RuntimeBroker.exe						

CPU Usage: 5.15% Commit Charg

System Information

Summary CPU Memory I/O GPU

CPU

3.20%

Totals	
Handles	164,327
Threads	5,326
Processes	323

CPU	
Context Switch Delta	15,329
Interrupt Delta	8,579
DPC Delta	678

Topology	
Cores	6
Sockets	1
Logical Processors	12

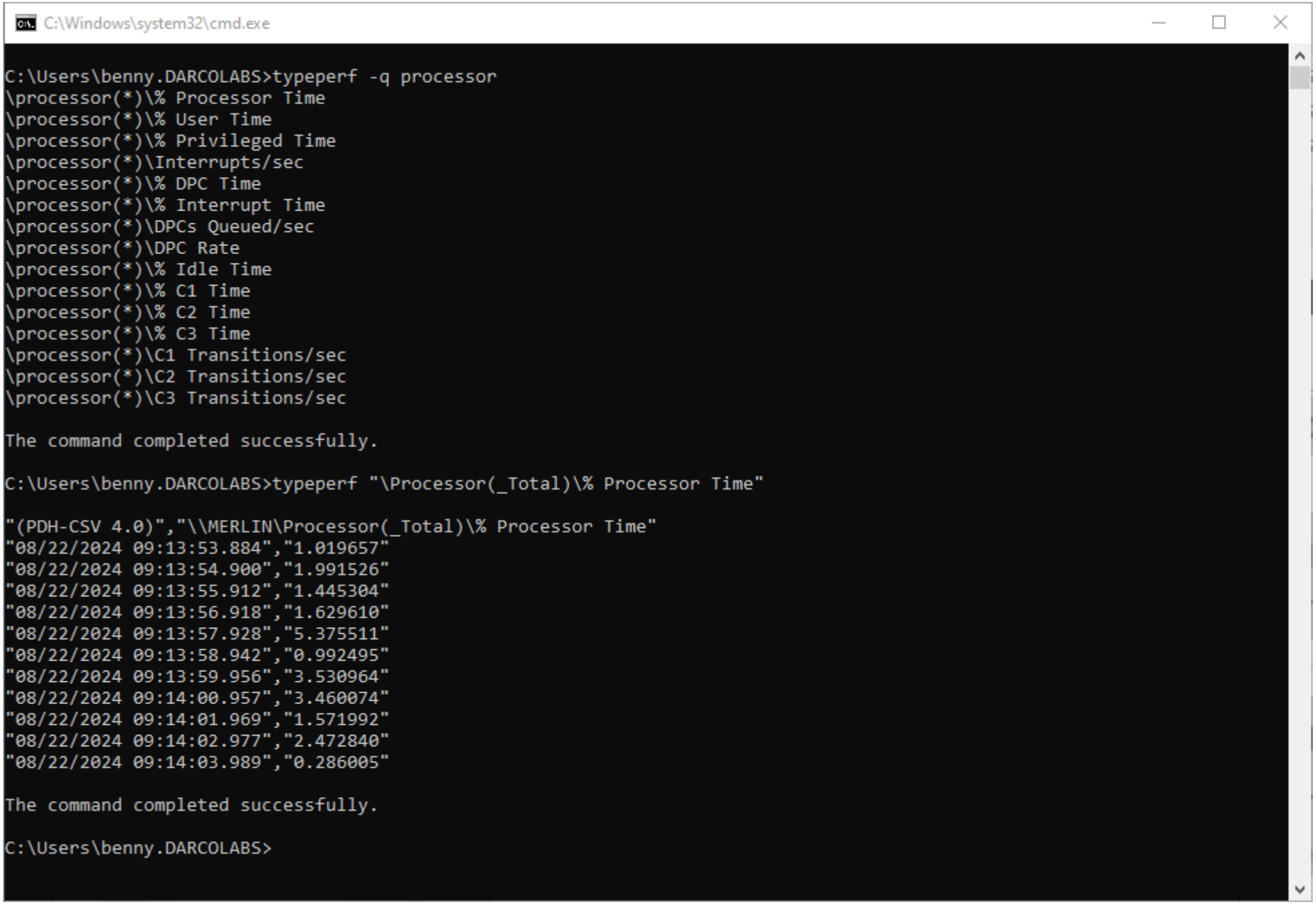
Show one graph per CPU

OK

Command-Line Consumers

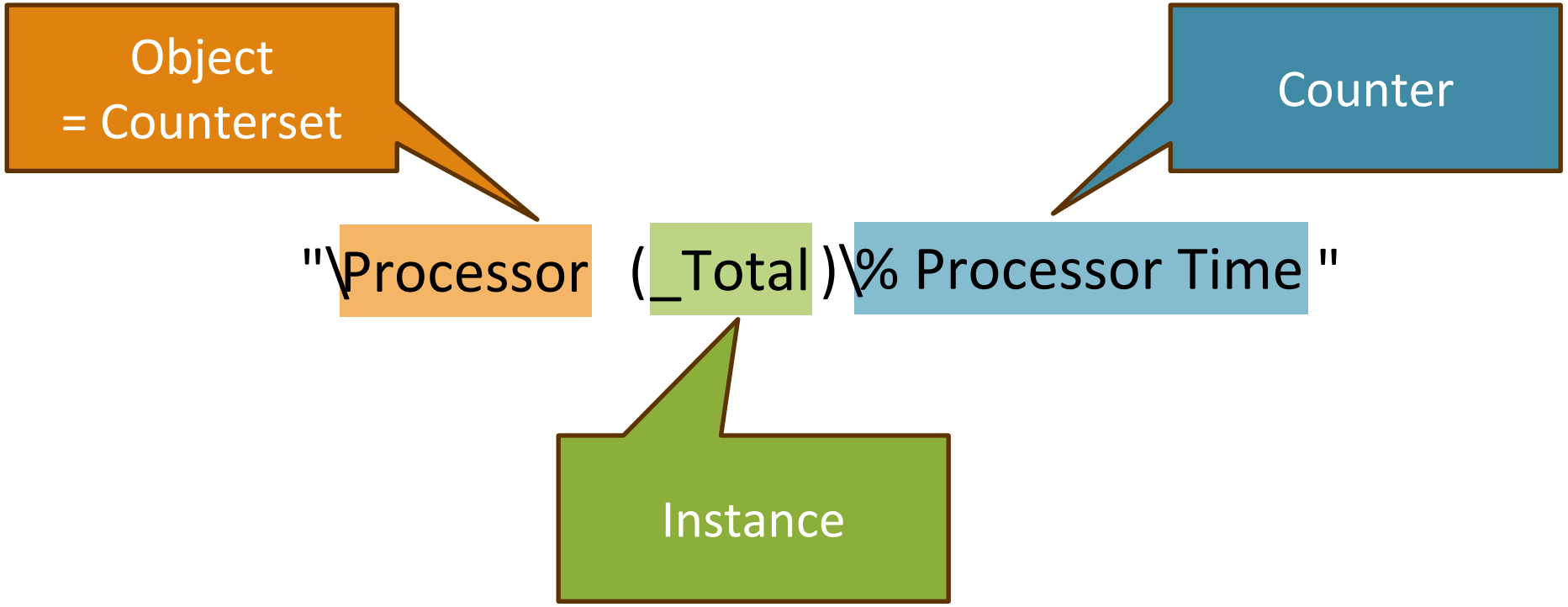
- **Typeperf** writes performance data to the command window or to a log file https://learn.microsoft.com/en-us/windows-server/administration/windows-commands/typeperf
- **Logman** creates and manages Event Trace Session and Performance logs and supports many functions of Performance Monitor from the command line
- **Relog** extracts performance counters from performance counter logs into other formats, such as text-TSV (for tab-delimited text), text-CSV (for comma-delimited text), binary-BIN (BLG), or SQL

These tools are very powerful, but not easy to use


C:\Windows\system32\cmd.exe
C:\Users\benny.DARCOLABS>typeperf -q processor
\processor(*)\% Processor Time
\processor(*)\% User Time
\processor(*)\% Privileged Time
\processor(*)\Interrupts/sec
\processor(*)\% DPC Time
\processor(*)\% Interrupt Time
\processor(*)\DPCs Queued/sec
\processor(*)\DPC Rate
\processor(*)\% Idle Time
\processor(*)\% C1 Time
\processor(*)\% C2 Time
\processor(*)\% C3 Time
\processor(*)\C1 Transitions/sec
\processor(*)\C2 Transitions/sec
\processor(*)\C3 Transitions/sec
The command completed successfully.
C:\Users\benny.DARCOLABS>typeperf "\Processor(_Total)\% Processor Time"
"(PDH-CSV 4.0)","\\MERLIN\Processor(_Total)\% Processor Time"
"08/22/2024 09:13:53.884","1.019657"
"08/22/2024 09:13:54.900","1.991526"
"08/22/2024 09:13:55.912","1.445304"
"08/22/2024 09:13:56.918","1.629610"
"08/22/2024 09:13:57.928","5.375511"
"08/22/2024 09:13:58.942","0.992495"
"08/22/2024 09:13:59.956","3.530964"
"08/22/2024 09:14:00.957","3.460074"
"08/22/2024 09:14:01.969","1.571992"
"08/22/2024 09:14:02.977","2.472840"
"08/22/2024 09:14:03.989","0.286005"
The command completed successfully.
C:\Users\benny.DARCOLABS>

Performance Counter Path Syntax

\\ComputerName\ObjectName(ObjectInstance)\ObjectCounter



A *counterset* is a grouping of performance data within a provider
A *counter* is the definition of single piece of performance data
An *instance* is an entity about which performance data is reported

Relevant AVD/Win365 Perf Counters

- \Processor(_Total)\% Processor Time
- \System\Processor Queue Length
- \System\Context Switches/sec
- \System\Processes
- \Memory\Available MBytes
- \Process(_Total)\Working Set
- \PhysicalDisk(_Total)\Disk Read Bytes/sec
- \PhysicalDisk(_Total)\Disk Write Bytes/sec
- \PhysicalDisk(_Total)\Disk Transfers/sec
- \PhysicalDisk(_Total)\Avg. Disk Queue Length

Base Counters

- \Terminal Services\Active Sessions
- \Terminal Services\Total Sessions
- \Processor(_Total)\Interrupts/sec
- \Processor(_Total)\% Interrupt Time
- \System\File Read Operations/sec
- \System\File Write Operations/sec
- \Memory\Free System Page Table Entries
- \Memory\Page Faults/sec
- \Memory\Pages/sec
- \Memory\Pool Nonpaged Bytes
- \Memory\Pool Paged Bytes

Relevant AVD/Win365 Perf Counters

- \Terminal Services Session(RDP-Tcp x)\% Processor Time
- \Terminal Services Session(RDP-Tcp x)\Working Set
- \User Input Delay per Session(Max)\Max Input Delay
- \Network Interface(*)\Output Queue Length
- \Network Interface(*)\Current Bandwidth
- \Network Interface(*)\Packets Received Unicast/sec
- \Network Interface(*)\Packets Received Non-Unicast/sec
- \Network Interface(*)\Packets Sent Unicast/sec
- \Network Interface(*)\Packets Sent Non-Unicast/sec
- \Network Interface(*)\Bytes Received/sec
- \Network Interface(*)\Bytes Sent/sec
- \Network Interface(*)\Bytes Total/sec

Relevant AVD/Win365 Perf Counters

\RemoteFX Network(*)\Current TCP Bandwidth	TCP Bandwidth detected in bits per second (bps)
\RemoteFX Network(*)\Current TCP RTT	Average TCP round-trip time (RTT) detected in ms
\RemoteFX Network(*)\Current UDP Bandwidth	UDP Bandwidth detected in bits per second (bps)
\RemoteFX Network(*)\Current UDP RTT	Average UDP round-trip time (RTT) detected in ms
\RemoteFX Network(*)\Loss Rate	Loss percentage
\RemoteFX Network(*)\Retransmission Rate	Percentage of packets that have been retransmitted
\RemoteFX Network(*)\TCP Received Rate	Rate in bps at which data is received over TCP
\RemoteFX Network(*)\TCP Sent Rate	Rate in bps at which data is sent over TCP
\RemoteFX Network(*)\UDP Received Rate	Rate in bps at which data is received over UDP
\RemoteFX Network(*)\UDP Sent Rate	Rate in bps at which data is sent over UDP

Relevant AVD/Win365 Perf Counters

- \RemoteFX Graphics(*)\Graphics Compression ratio — Ratio of bytes encoded to bytes input
- \RemoteFX Graphics(*)\Average Encoding Time — Average frame encoding time
- \RemoteFX Graphics(*)\Frame Quality — Quality of the output frame
- \RemoteFX Graphics(*)\Input Frames/second — Number of sources frames
- \RemoteFX Graphics(*)\Output Frames/second — Number of frames sent to the client
- \RemoteFX Graphics(*)\Source Frames/second — Number of frames composed by source
- \RemoteFX Graphics(*)\Frames Skipped/second – Insufficient Client Resources
- \RemoteFX Graphics(*)\Frames Skipped/second – Insufficient Network Resources
- \RemoteFX Graphics(*)\Frames Skipped/second – Insufficient Server Resources

Windows Management Interface

- WMI has preinstalled providers that monitor system performance on both the local system and remotely
- WMI can be used from scripts or from C/C++ applications
- The WmiPerfClass provider creates the classes derived from Win32_PerfRawData and from Win32_PerfFormattedData
- The WmiPerfInst provider supplies data dynamically to both raw and formatted classes
- Example: Get-CimInstance -Query "select Name, PercentProcessorTime from Win32_PerfFormattedData_PerfOS_Processor" | Select Name, PercentProcessorTime

CAUTION: WMI overhead can be significant!

Performance Counters

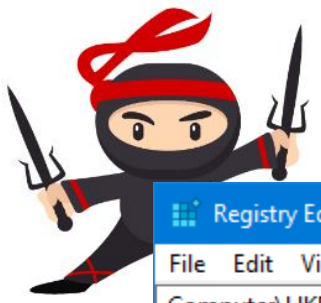
- Get-Counter -ListSet "Processor"
- (Get-Counter -ListSet "Processor").Paths
- (Get-Counter -ListSet "Processor").PathsWithInstances
- Get-Counter -Counter "\Processor(_Total)\% Processor Time" -SampleInterval 2 -MaxSamples 3
- $CounterList = "\Processor(_Total)\% Processor Time", "\System\Processor Queue Length", "\Memory\Available MBytes", "\Process(_Total)\Working Set", "\PhysicalDisk(_Total)\Disk Read Bytes/sec", "\PhysicalDisk(_Total)\Disk Write Bytes/sec", "\PhysicalDisk(_Total)\Disk Transfers/sec", "\PhysicalDisk(_Total)\Current Disk Queue Length", "\System\Context Switches/sec", "\System\Processes“
- Get-Counter -Counter $CounterList -SampleInterval 1 -MaxSamples 45

Localized Perf Counter Names

- The most severe limitation of Get-Counter are the localized counter names
- There are two API functions you can use to convert localized counter names to id numbers and vice versa
  - Get-PerformanceCounterId takes a localized performance counter name and translates it to a language-agnostic id number
  - Get-PerformanceCounterLocalName does the opposite and translates the id number to the appropriate local name

https://powershell.one/tricks/performance/performance-counters

https://powershellmagazine.com/2013/07/19/querying-performance-counters-from-powershell/



Localized Perf Counter Names

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Registry Editor

File Edit View Favorites Help

Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Perflib\CurrentLanguage

- Perflib
  - _V2Providers
  - 009
  - CurrentLanguage
  - PerHwIdStorage

Name	Type	Data
(Default)	REG_SZ	(value not set)
Counter	REG_MULTI_SZ	1 1847 2 System 4 Memory 6 % Processor Time 10 File Read Operations/sec 12 File Write Operations/sec 14 File Co...
Help	REG_MULTI_SZ	3 The System performance object consists of counters that apply to more than one instance of a component proce...

Registrierungs-Editor

Datei Bearbeiten Ansicht Favoriten Hilfe

Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Perflib\009

- Perflib
  - _V2Providers
  - 007
  - 009
  - CurrentLanguage
  - PerHwIdStorage

Name	Typ	Daten
(Standard)	REG_SZ	(Wert nicht festgelegt)
Counter	REG_MULTI_SZ	1 1847 2 System 4 Memory 6 % Processor Time 10 File Read Operations/sec 12 File Write Operations/sec 14 File Co...
Help	REG_MULTI_SZ	3 The System performance object consists of counters that apply to more than one instance of a component proc...

Registrierungs-Editor

Datei Bearbeiten Ansicht Favoriten Hilfe

Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Perflib\CurrentLanguage

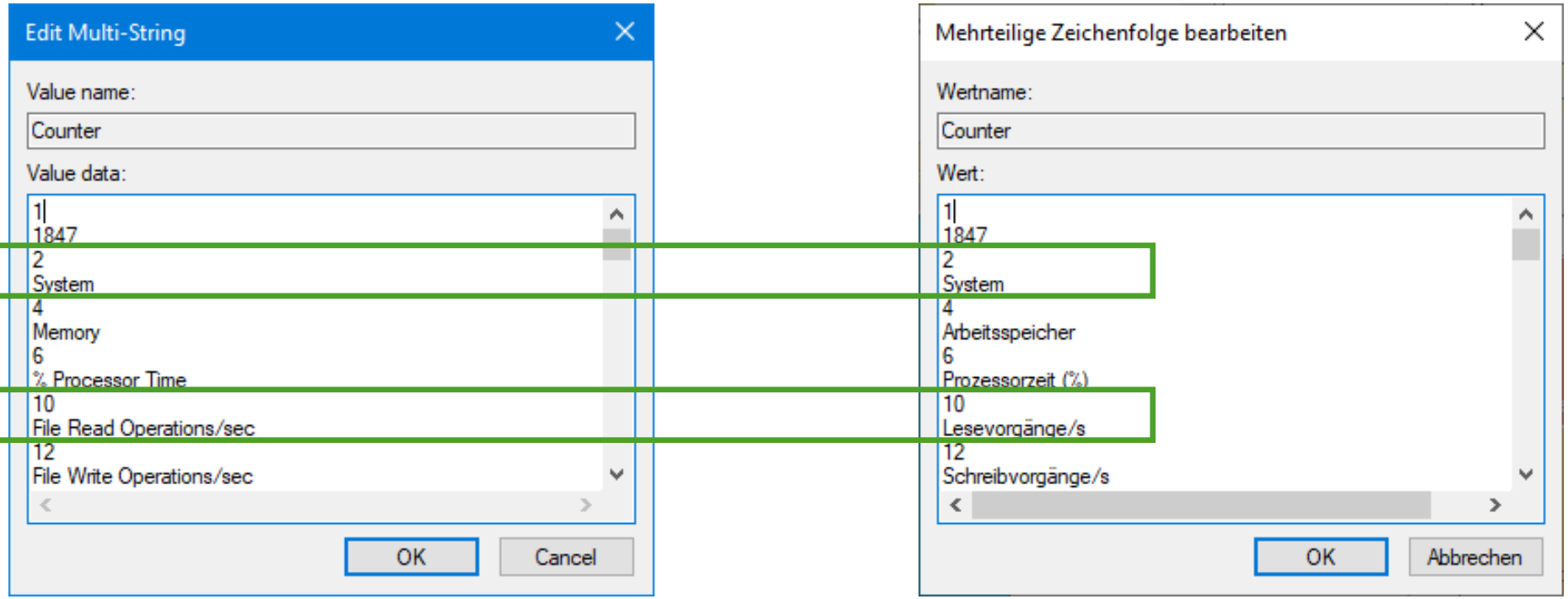
- Perflib
  - _V2Providers
  - 007
  - 009
  - CurrentLanguage
  - PerHwIdStorage

Name	Typ	Daten
(Standard)	REG_SZ	(Wert nicht festgelegt)
Counter	REG_MULTI_SZ	1 1847 2 System 4 Arbeitsspeicher 6 Prozessorzeit (%) 10 Lesevorgänge/s 12 Schreibvorgänge/s 14 Dateisteuervorg...
Help	REG_MULTI_SZ	3 Das System-Leistungsindikatorenobjekt besteht aus Leistungsindikatoren, die für mehrere Instanzen eines Komp...

Localized Perf Counter Names

Perflib\CurrentLanguage\Counter
on a system with English (United States) language

Perflib\CurrentLanguage\Counter
on a system with German language



Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Perflib\CurrentLanguage

Get-PerformanceCounterId


```
function Get-PerformanceCounterId
{
    param(
        [Parameter(Mandatory)]
        [string] $Name,
        $ComputerName = $env:COMPUTERNAME
    )

    $code = '[DllImport("pdh.dll", SetLastError=true, CharSet=CharSet.Unicode)]public static extern
UInt32   PdhLookupPerfIndexByName(string szMachineName, string szNameBuffer, ref uint
dwNameIndex);'
    $type = Add-Type -MemberDefinition $code -PassThru -Name PerfCounter2 -Namespace Utility

    [UInt32]$Index = 0
    if ($type::PdhLookupPerfIndexByName($ComputerName, $Name, [Ref]$Index) -eq 0)
    {
      $index
    }
    else
    {
      throw "Cannot find '$Name' on '$ComputerName'."
    }
}
```

Localized Perf Counter Names


```
PS F:\> Get-Counter -Counter "\System\File Read Operations/sec"

Timestamp                 CounterSamples
---------                 --------------
7/30/2020 2:24:42 PM      \\host1\system\file read operations/sec :
                          359.52894517603



PS F:\> Get-Counter -Counter "\2\10"

Timestamp                 CounterSamples
---------                 --------------
7/30/2020 2:24:51 PM      \\host1\2\10 :
                          341.618616976008
```

Unfortunately, about half of the “localized” counter IDs do not work with Get-Counter

Perf Counter Use Case: Monitoring

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For example, ControlUp Management Console visualizing performance data collected by the ControlUp Real-Time Agent (a consumer)

Machine 'AZTEST-0'

Folders | Hosts | Machines | Sessions | Processes | Accounts | Applications | Storage | App. Delivery Controllers

Search Sessions

Name	Status	Operating System	OS Version	CPU Logical Processors (OS)	Memory	Uptime	Memory Utilization	Disk Queue	Disk Transfers / sec	Net Total	User Sessions	Avg. Logon Duration	Avg. App Load Time
AZTEST-0	Ready	Windows 11 Enterprise...	Version 2009 (OS Build 22621.2428)	8	32 (GB)	2:08 hours	28%	9.1	63.2	0.08 Mbps	1	15 sec	N/A

Sessions | Processes | Logical Disks | FSLogix Disks

Sessions: 1 Items

User	Machine	CPU	Memory (Private Bytes)	Memory (Working Set)	I/O Read Operations/sec	I/O Write Operations/sec	Disk Read KB/s	Disk Write KB/s	Network Sent KB/s	Network Received KB/s	User Input Delay	Logon Duration	State	Idle Time	Acti Applic
JUPITERLAB\ambtritsch	AZTEST-0	0%	637 (MB)	1.7 (GB)	75.7	0.7	0	30.27	0.01	0	47 ms	15 sec	Active		simloadru

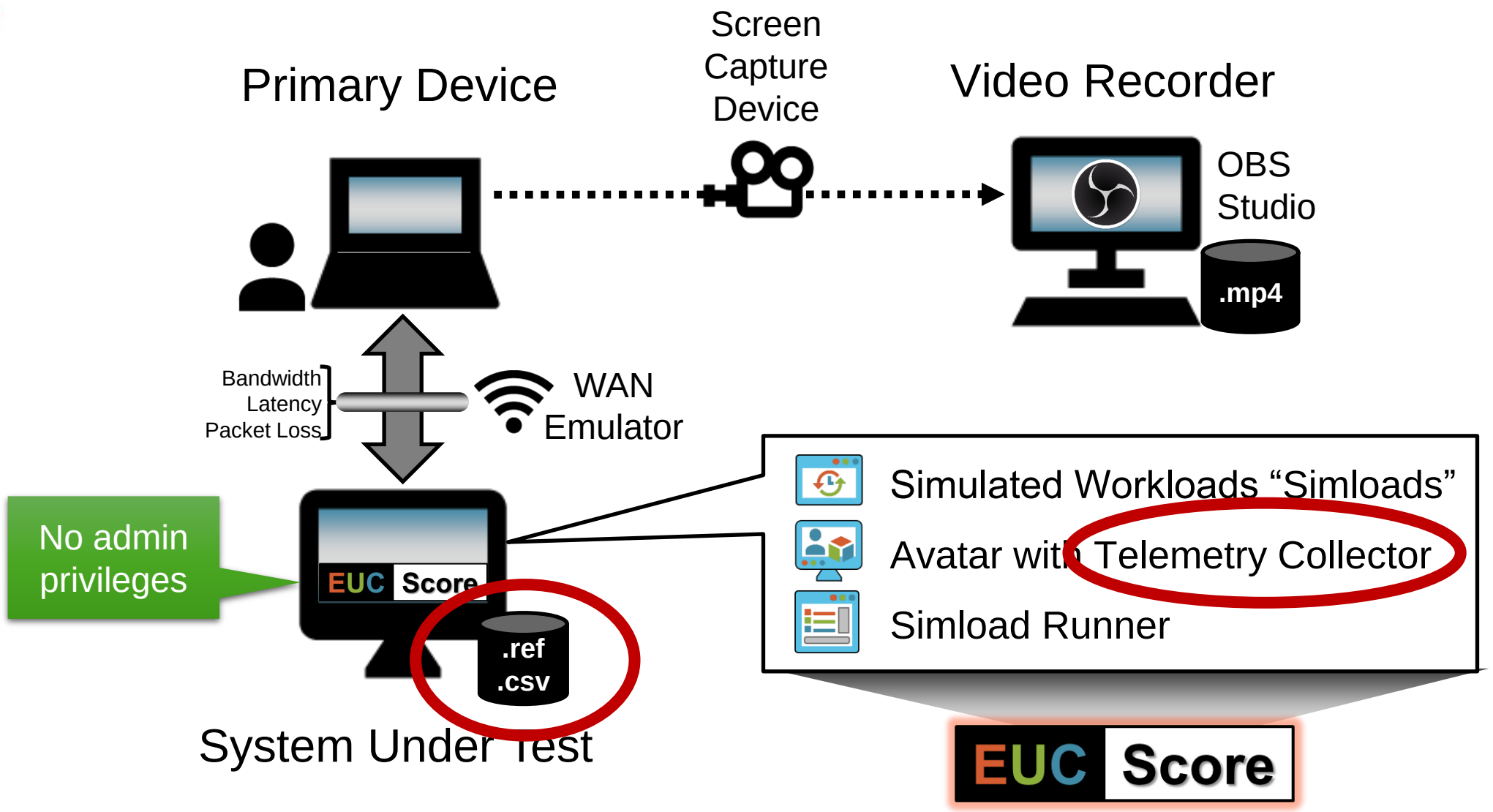
Name	Status	Operating System	OS Version	CPU Logical Processors (OS)	Memory	Uptime	Memory Utilization	Disk Queue	Disk Transfers / sec	Net Total	User Sessions	Avg. Logon Duration	Avg. App Load Time	Avg. User Input Delay	Max User Input Delay	Free Space on System Drive
AZTEST-0	Ready	Windows 11 Enterprise...	Version 2009 (OS Build 22621.2428)	8	32 (GB)	2:23 hours	17%	10.1	107.5	0.07 Mbps	1	15 sec	N/A	0 ms	0 ms	88.5 (GB) (C:\)

Sessions | Processes | Logical Disks | FSLogix Disks

Sessions: 1 Items

User	Machine	CPU	Memory (Private Bytes)	Memory (Working Set)	I/O Read Operations/sec	I/O Write Operations/sec	Disk Read KB/s	Disk Write KB/s	Network Sent KB/s	Network Received KB/s	User Input Delay	Logon Duration	State	Idle Time	Active Application	Active Application Title
JUPITERLAB\ambtritsch	AZTEST-0	0%	623 (MB)	1.7 (GB)	0.3	1	0	168	0.01	0	0 ms	15 sec	Active	2 minutes	sl3-iops.exe	Watermark

PerfCounter Use Case: Benchmarking



EUC Score Simload Base Counters

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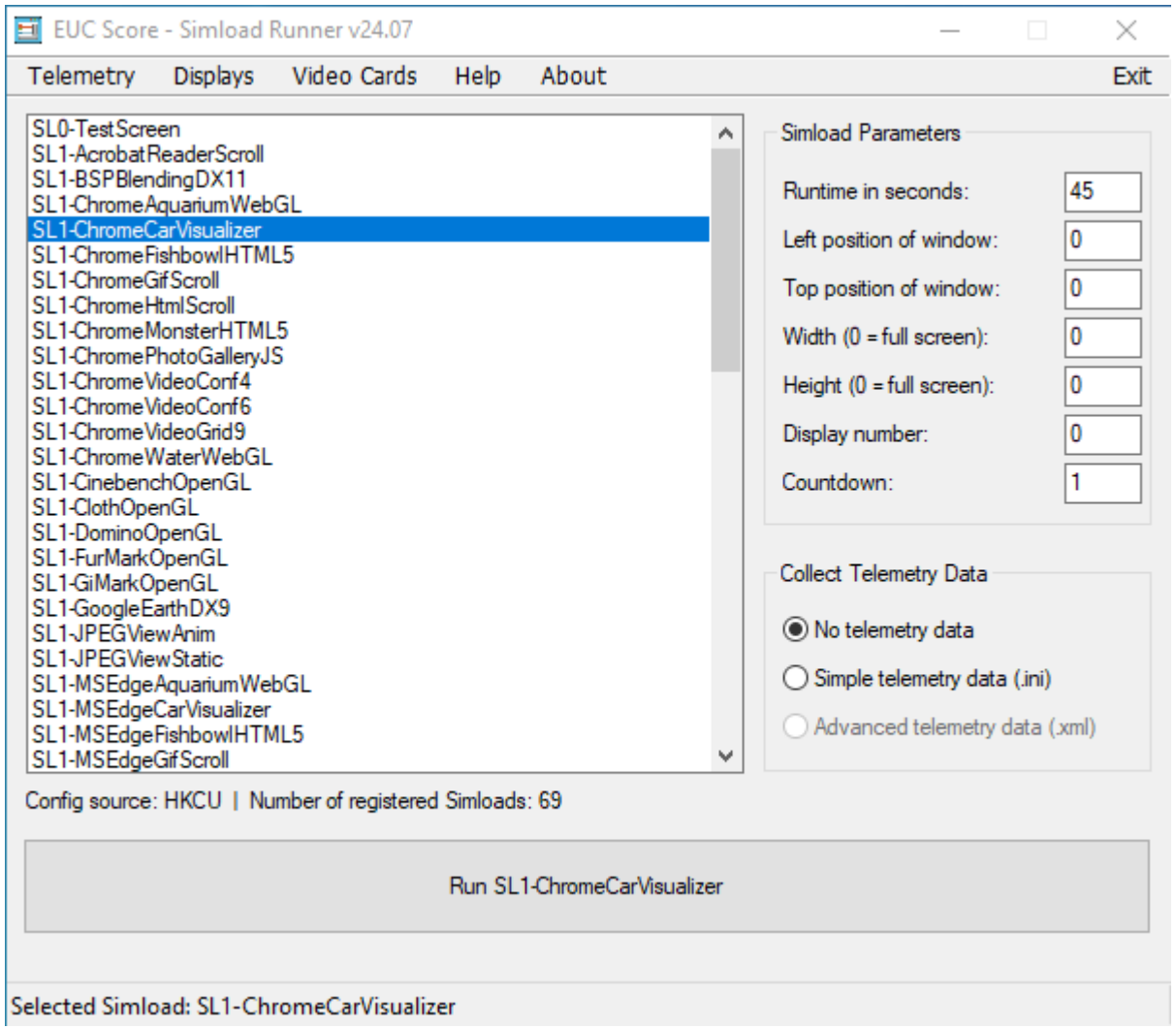
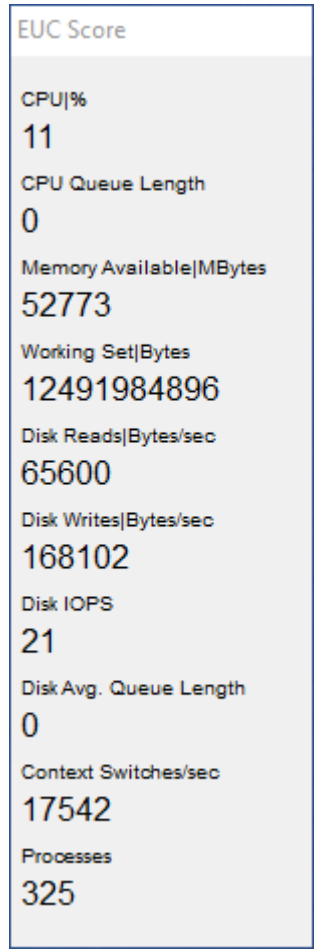




Free Download: EUC Score Base Package
https://eucscore.com/freeware

EUC Score Simload Base Counters

Simload.ini

```
[Telemetry]
Name1=CPU|%
Counter1=\Processor(_Total)\% Processor Time
Name2=CPU Queue Length
Counter2=\System\Processor Queue Length
Name3=Memory Available|MBytes
Counter3=\Memory\Available MBytes
Name4=Working Set|Bytes
Counter4=\Process(_Total)\Working Set
Name5=Disk Reads|Bytes/sec
Counter5=\PhysicalDisk(_Total)\Disk Read Bytes/sec
Name6=Disk Writes|Bytes/sec
Counter6=\PhysicalDisk(_Total)\Disk Write Bytes/sec
Name7=Disk IOPS
Counter7=\PhysicalDisk(_Total)\Disk Transfers/sec
Name8=Disk Avg. Queue Length
Counter8=\PhysicalDisk(_Total)\Avg. Disk Queue Length
Name9=Context Switches/sec
Counter9=\System\Context Switches/sec
Name10=Processes
Counter10=\System\Processes
```

AutoIt Code Base

Only single-instance counters

```
Name1=CPU|%
Counter1:238\6\(_Total)
Name2=CPU Queue Length
Counter2=:2\44\
Name3=Memory Available|MBytes
Counter3=:4\1382\
Name4=Working Set|Bytes
Counter4=:230\180\(_Total)
Name5=Disk Reads|Bytes/sec
Counter5=:234\220\(_Total)
Name6=Disk Writes|Bytes/sec
Counter6=:234\222\(_Total)
Name7=Disk IOPS
Counter7=:234\212\(_Total)
Name8=Disk Avg. Queue Length
Counter8=:234\1400\(_Total)
Name9=Context Switches/sec
Counter9=:2\146\
Name10=Processes
Counter10=:2\248\
```

AutoIt – _PDH_PerformanceCounters

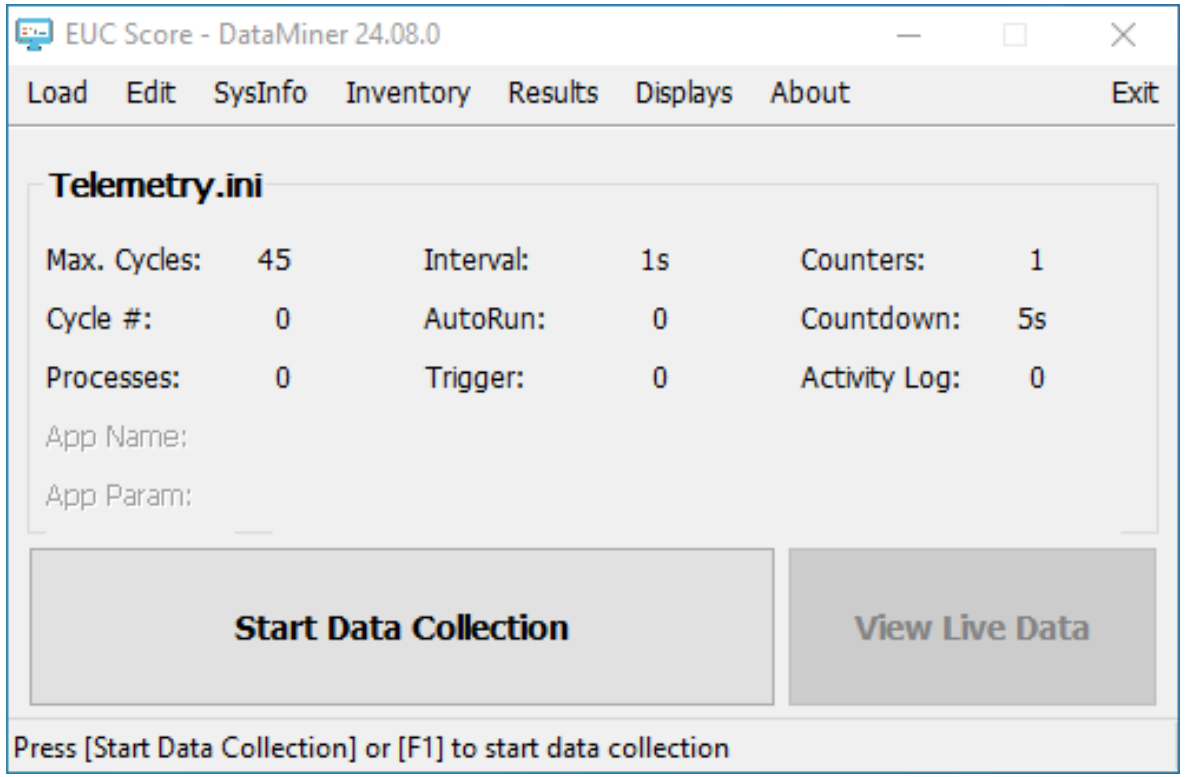

```
Func _PDH_GetCounterList($sCounterWildcardPath,$bReturnAsString=False)
    Local $aRet,$stExpandedPathList
    Local $hPDHDLL,$iBufSize,$sCounterList,$aCounterList[1]=[0]

    If Not IsString($sCounterWildcardPath) Then Return SetError(1,0,$aCounterList)

    ; Unlike other functions, getting a counter list doesn't require initialization,
    ;   though it doesn't hurt (especially if Disable Performance Counters is set)
    If Not $_PDH_bInit Then
        $hPDHDLL="pdh.dll"
    Else
        $hPDHDLL=$_PDH_hDLLHandle
    EndIf

    _PDH_DebugWrite("_PDH_GetCounterList() call, $sCounterWildcardPath='" & $sCounterWildcardPath & _
        "', PDH DLL 'handle' (or just 'pdh.dll'):" & $hPDHDLL)

    ; Non-localized string? Create localized string and add it.
    If StringLeft($sCounterWildcardPath,1)=':' Then
        $sCounterWildcardPath=__PDH_LocalizeCounter($sCounterWildcardPath)
        If @error Then Return SetError(@error,0,"")
        _PDH_DebugWrite("Localized *wildcard* counter (from non-localized string):"&$sCounterWildcardPath)
    EndIf

    ; 1st call to PdhExpandWildCardPathW - get required buffer size
    $aRet=DllCall($hPDHDLL,"long","PdhExpandWildCardPathW","ptr",ChrW(0), _
        "wstr",$sCounterWildcardPath,"ptr",ChrW(0),"dword*",$iBufSize,"dword",0)
    If @error Then Return SetError(2,@error,$aCounterList)  ; DLL Call error
```

CSV Result Files

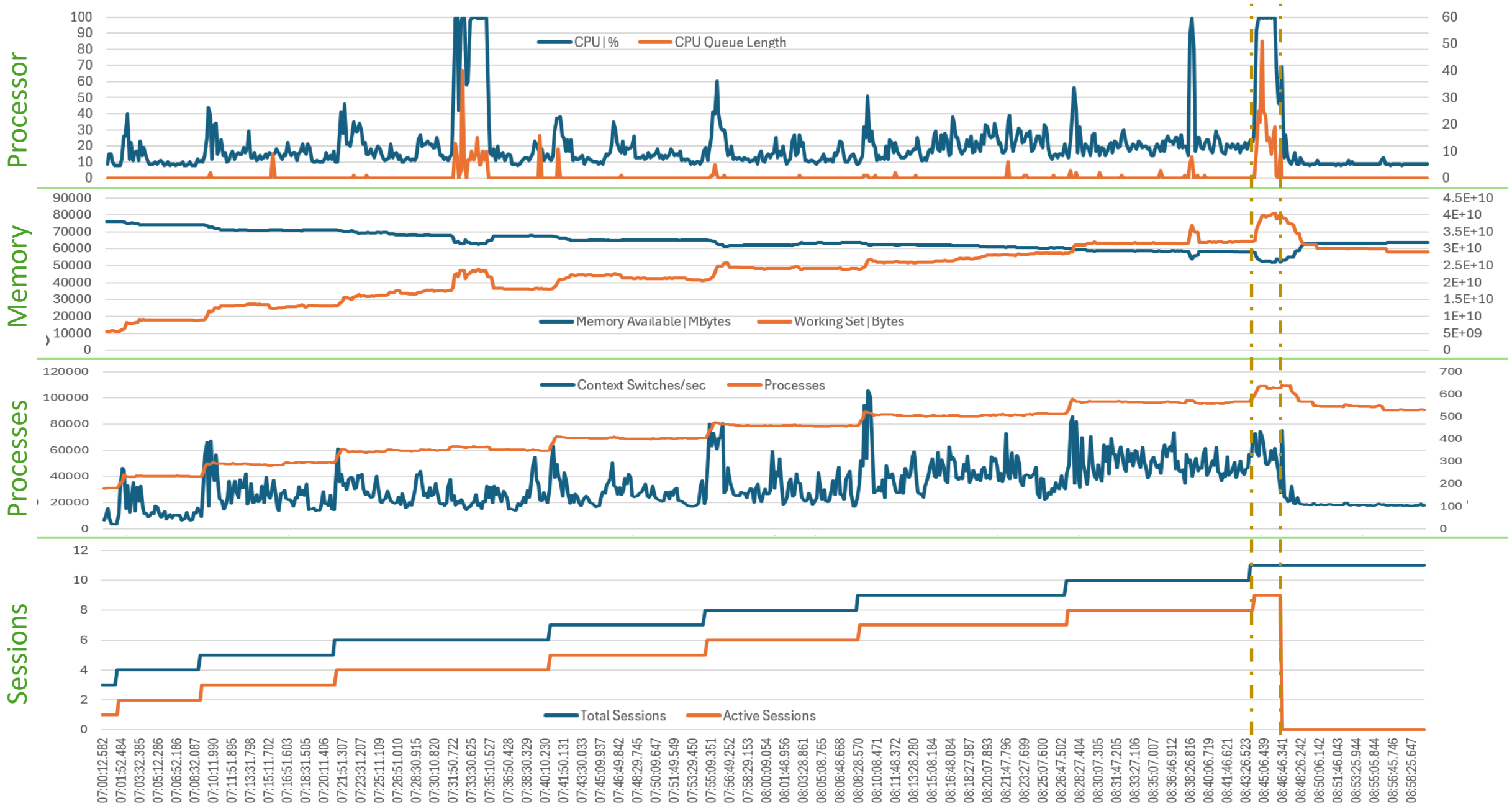
TimeStamp|1000	CPU|%	CPU Queue Length	Memory Available|MBytes	Working Set|Bytes	Disk Reads|Bytes/sec	Disk Writes|Bytes/sec	Disk IOPS	Disk Queue Length	Context Switches/sec	Processes
2024.08.08 10:30:36.730	0	1	48828	1.721609E+10	0	0	0	0	0	350
2024.08.08 10:30:37.802	16.0371	0	48808	1.72669E+10	1589410	623872.5	96.00307	0	41422.38	351
2024.08.08 10:30:38.823	16.24802	0	48806	1.728885E+10	2385041	0	19.6916	0	55233.54	352
2024.08.08 10:30:39.823	12.55208	0	48804	1.728939E+10	1083131	354221.5	30.81559	0	24862.56	352
2024.08.08 10:30:40.834	14.79185	0	48810	1.728841E+10	0	158669.5	26.8188	0	25856.44	352
2024.08.08 10:30:41.850	13.87708	0	48808	1.729144E+10	1009577	204725.7	46.0234	0	32820.31	352
2024.08.08 10:30:42.861	8.800934	1	48804	1.728834E+10	0	89528.84	6.960476	0	29901.39	352
2024.08.08 10:30:43.859	13.36615	0	48805	1.728833E+10	0	159098.4	26.89124	0	34092.06	352
2024.08.08 10:30:44.886	17.26958	0	48796	1.729805E+10	0	124779.1	24.56684	0	44967.18	352
2024.08.08 10:30:45.888	15.71634	0	48800	1.729505E+10	0	162253	24.73013	0	41759.28	352
2024.08.08 10:30:46.913	14.22636	0	48800	1.729274E+10	0	622944	21.60948	0	34674.31	352
2024.08.08 10:30:47.895	9.426932	0	48798	1.729646E+10	0	421994.3	42.42533	0	32910.01	352
2024.08.08 10:30:48.913	9.435274	0	48801	1.729297E+10	0	181588.1	34.47602	0	32947.26	352
2024.08.08 10:30:49.922	12.37798	0	48800	1.732194E+10	0	232905.4	36.62416	0	32353.19	353
2024.08.08 10:30:50.965	14.22228	0	48790	1.732325E+10	94723.96	146031	19.42027	0	32691.35	353
2024.08.08 10:30:51.940	13.66384	0	48792	1.732352E+10	0	182360	30.35652	0	34137.27	353
2024.08.08 10:30:52.945	12.97976	0	48784	1.733555E+10	0	216170.4	31.86481	0	33511.35	353
2024.08.08 10:30:53.964	8.67326	0	48781	1.733713E+10	0	81109.59	14.8483	0	29580.76	353
2024.08.08 10:30:54.988	9.81427	0	48784	1.733138E+10	0	63610.1	5.824227	0	32242.77	353
2024.08.08 10:30:55.981	7.289457	0	48784	1.733362E+10	0	140021.6	16.08899	0	31924.67	353

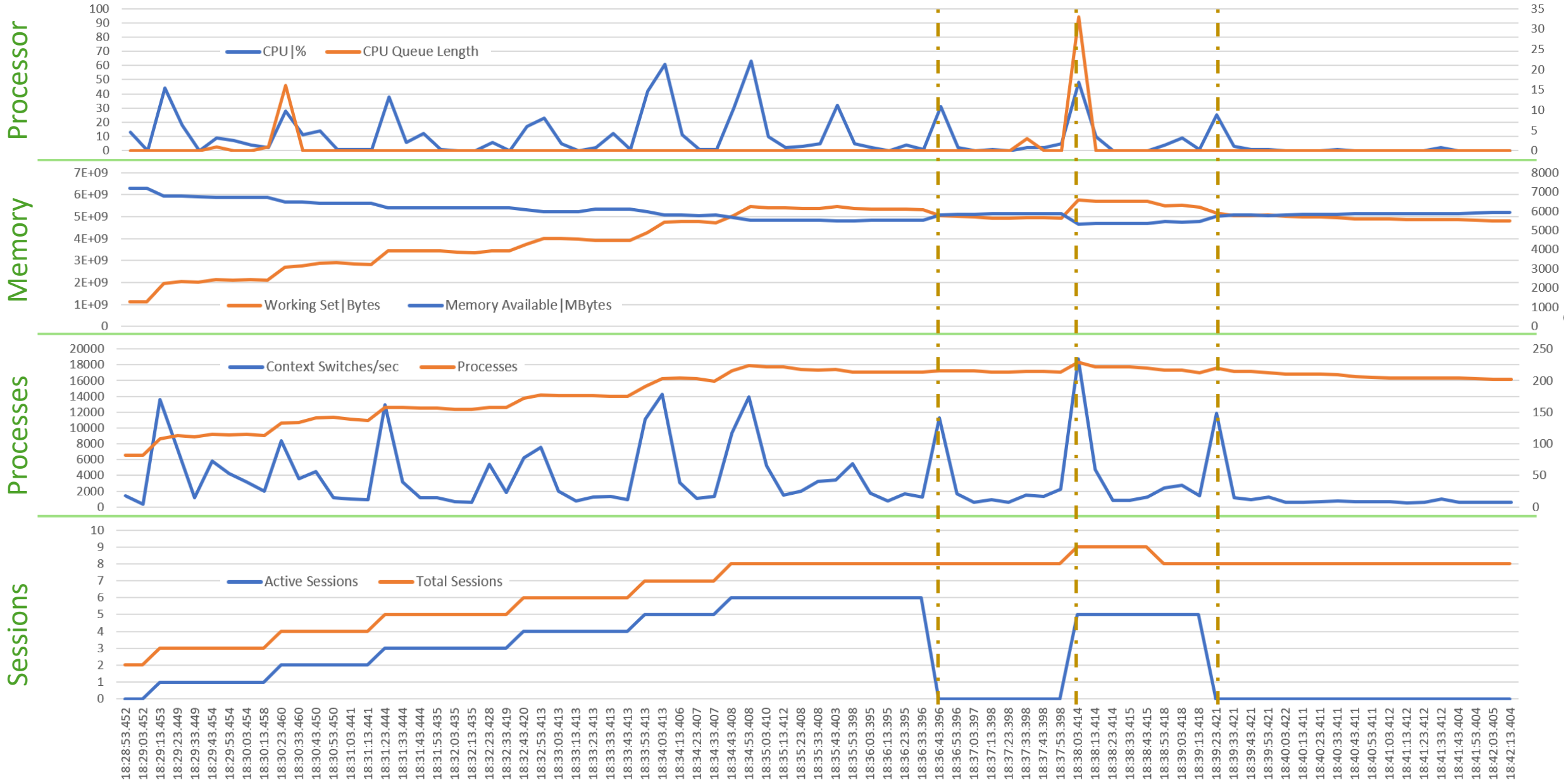
Perf Counter Use Case: Troubleshooting

- Data Miner integrates several supplementary tools
  - Collects performance counters independently of Simloads
  - Writes system information to a text file in the results folder
  - Writes multiple CSV files with inventory data in the results folder
  - Collects process information
  - Launches applications
- Data Miner can be used stand-alone by copy & paste deployment
- Free download: eucscore.com/freeware



Data Miner runs both with a GUI and from the command line


Processor
CPU | %
CPU Queue Length
Memory
Memory Available | MBytes
Working Set | Bytes
Processes
Context Switches/sec
Processes
Sessions
Total Sessions
Active Sessions


Processor
CPU|%
CPU Queue Length
Memory
Working Set|Bytes
Memory Available|MBytes
Processes
Context Switches/sec
Processes
Sessions
Active Sessions
Total Sessions

Beyond Standard Performance Counters

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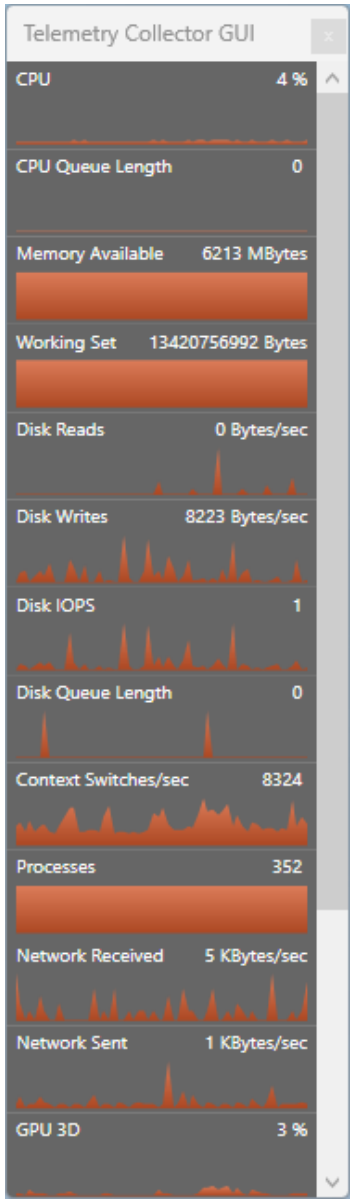
Components	Performance Counters
CPU	\Processor(_Total)\% Processor Time \System\Processor Queue Length
Memory	\Memory\Available Mbytes \Process(_Total)\Working Set
Storage	\PhysicalDisk(_Total)\Disk Read Bytes/sec \PhysicalDisk(_Total)\Disk Write Bytes/sec \PhysicalDisk(_Total)\Disk Transfers/sec (IOPS) \PhysicalDisk(_Total)\Current Disk Queue Length
System	\System\Context Switches/sec \System\Processes
Network	TC::network received(_Total) TC::network sent(_Total)
GPU	TC::GPU load(_Total)\3D TC::GPU load(_Total)\Video Decode TC::GPU load(_Total)\Video Processing TC::GPU frame buffer(_Total)



Beyond Standard Performance Counters


```
<?xml version="1.0" encoding="utf-8" ?>
<TelemetryDataConfig>
  <RefreshRate>1000</RefreshRate>
  <CounterDefinitions>
    <!-- Standard Counters -->
    <Counter Name="CPU" Unit="%">
                        <CategoryName>Processor</CategoryName>
                        <CounterName>% Processor Time</CounterName>
                        <InstanceName>_Total</InstanceName>
    </Counter>
    <Counter Name="CPU Queue Length">
                        <CategoryName>System</CategoryName>
                        <CounterName>Processor Queue Length</CounterName>
    </Counter>
    <Counter Name="Memory Available" Unit="MBytes">
                        <CategoryName>Memory</CategoryName>
                        <CounterName>Available Mbytes</CounterName>
    </Counter>
  </CounterDefinitions>
</TelemetryDataConfig>
```

C++/C# Code Base
Single-instance counters
plus additional metrics

EUC Score TC-specific Metrics

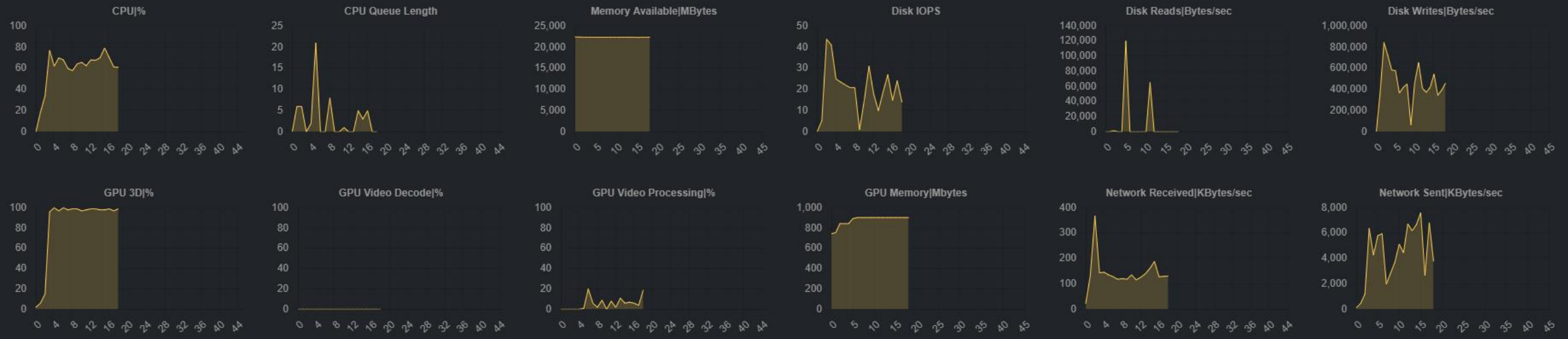

```
<Counter Name="Network Received" Unit="KBytes/sec">
        <CategoryName>TC::network received</CategoryName>
        <InstanceName>_Total</InstanceName>
</Counter>
<Counter Name="Network Sent" Unit="KBytes/sec">
        <CategoryName>TC::network sent</CategoryName>
        <InstanceName>_Total</InstanceName>
</Counter>
<Counter Name="GPU 3D" Unit="%">
        <CategoryName>TC::GPU load</CategoryName>
        <CounterName>3D</CounterName>
        <InstanceName>_Total</InstanceName>
</Counter>
<Counter Name="GPU Video Decode" Unit="%">
        <CategoryName>TC::GPU load</CategoryName>
        <CounterName>Video Decode</CounterName>
        <InstanceName>_Total</InstanceName>
</Counter>
```

```
<Counter Name="GPU Video Processing" Unit="%">
        <CategoryName>TC::GPU load</CategoryName>
        <CounterName>Video Processing</CounterName>
        <InstanceName>_Total</InstanceName>
</Counter>
<Counter Name="GPU Memory" Unit="MBytes">
        <CategoryName>TC::GPU frame buffer</CategoryName>
        <InstanceName>_Total</InstanceName>
</Counter>
<Counter Name="Session CPU" Unit="%">
        <CategoryName>Terminal Services Session</CategoryName>
        <CounterName>% Processor Time</CounterName>
        <InstanceName>TC::current RDP session</InstanceName>
</Counter>
```

SL1-BSPBlendingDX11 on Azure NC4as_T4_v3 | PCoIP (31ms RTT)

SL1-BSPBlendingDX11 on Azure NC4as_T4_v3 | PCoIP (31ms RTT)

```
00:00:00.000  Date: 2024/08/08 | Time: 11:21:36.466 | AppName: BSPBlending.exe
00:00:00.000  Simload: SL1-BSPBlendingDX11 | Computername: VM-ANYWAREGRAPH | Username: andrew
00:00:00.000  Number of Monitors: 1 | Default Monitor: 1 (0 | 0 | 1920 | 1080)
00:00:00.000  Pre-Simload countdown screen was visible for 1 sec
00:00:00.000  Delay between Simload start time and activity log start time: 1.247 sec
00:00:02.146  App launch time: 876 ms
00:00:02.406  Run action initiated
00:00:04.409  Press left arrow
00:00:05.528  Press left arrow
00:00:06.649  Press left arrow
00:00:07.766  Press right arrow
00:00:08.891  Press left arrow
00:00:10.014  Press left arrow
00:00:11.134  Press right arrow
00:00:12.259  Press right arrow
00:00:13.384  Press up arrow
00:00:14.501  Press down arrow
00:00:15.639  Press down arrow
00:00:16.789  Press right arrow
00:00:17.906  Press up arrow
```



00:00:18 — 00:00:45 — Help — Report

Call to Action

If you want to learn more about the EUC Score toolset, send an email to

info@eucscore.com

EUC Score

https://eucscore.com

NOTE: The complete EUC Score toolset is free for community benchmarking tests if the results are made freely available to the public

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We love Feedback

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Great Session!

Okay Session!

Not so okay Session!

Workplace Ninja Summit 2024

Thank You