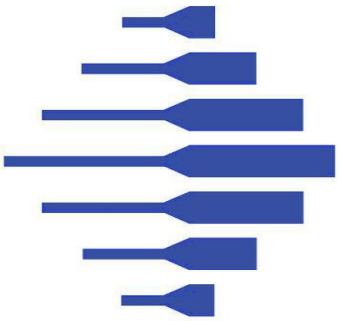
35 YEARS OF PERFORMANCE MANAGEMENT



VELOCITY SOFTWARE

What's new with Velocity Software (what is left to do after 35 years?)

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VELOCITY SOFTWARE

35 years of Constant Delivery

1988: XAMAP (then ESAMAP, now zMAP) (First to market….)
1989: XAMON (then ESAMON, now zMON)
1990s: Applications, Tuning guides, best practices
1999: ESATCP (TCPIP “snmp” network monitor, now zTCP)
2000: ESAWEB (generalized cms based webserver, now zVWS)
2002: Linux Performance Management, best practices research
2005: The Velocity Mib for Linux
2007: zTUNE – configuration and performance analysis
2013: zPRO V1 – failure, used IBM SMAPI architecture
2014: VSEMON….
2018: zPRO V2 – (no smapi, competed against WAVE/SMAPI….)
2019: zOSMON, CICS – delving into an interesting market
2021-2023: zPRO: zSchedule, zSpool, zBackup, zDIRECT
2022: Tuning guide for zVM and Linux, docker, ssc and more
2023: OpenShift, zVRM, more zPRO

Velocity Software Performance Management highlights

- Docker performance management
- MongoDB (MongoDB has withdrawn snmp support)
- Splunk (think “data pump”)
- Collectd for SSC (secure container)
- CPU Pools

VSE Enhancements

- CICS /DMF support (no charge feature)
- BSI/CSI TCPIP (net work monitoring) support

zPRO enhancements (or is the 40 year old interface still good for you?)

- zDIRECT
- zScheduler

Velocity Software Performance Management highlights

- **Openshift** performance management (rancher, docker, zCX too)
- **Corrected SMT CPU** – CP monitor numbers are not correct
- **zVRM** (The resource manager that works)
- **The Tuning Guide** continues to evolve
- **Dash boards**: grafana (IBM dashboard + VSE +Linux)

zPRO enhancements (simplify z/VM management)

- (or is the 40 year old interface still good for you?)
- Skills are number one issue world wide
- Many organizations are finding zPRO their answer
- zPRO provides a front end for managing z/VM
  - For the enterprise, For operations, For systems programmers

Data Accuracy

Correct data history

- Linux in virtualized environments was very wrong (bogomips?)
  - Linux CPU corrected by Velocity with prorate technology
- “stealtime” implemented by IBM, but often misunderstood

Linux in SMT environment – challenging (not intuitive)

- Capacity of SMT environment increases by how much?
- Customers complain that charge back models are broken
- (http://VelocitySoftware.com/SMT.HTML)

Capture ratio research (is the data valid?)

- Do we know where and how much resources are utilized?
- Compare data from multiple sources (HMC, z/VM, Linux, etc)
- (“http://VelocitySoftware.com/handouts/capture.html”)

CPU SMT Data Corrections

CPU data provided by IBM in SMT environment not correct

- (IBM provides 3 metrics, traditional/thread, “equivalent”, prorated
- **VSI Prorated** based on HMC and MFC data

```
Report: ESAUSP5       User SMT CPU Consumption Analysis
Monitor initialized: 03/08/23 at 07:00:01 on 8562 serial 040F78
-------------------------------------------------------------------
         <------CPU Percent Consumed   (Total)---->  <-TOTAL CPU-->
UserID   <Traditional> <MT-Equivalent> <IBM Prorate> <VSI Prorated>
/Class   Total  Virt   Total  Virtual  Total Virtual Total  Virtual
-------- ----- -----   -----  -------  ----- ------- ----- --------
07:02:00 414.9  408.0  322.7    317.3  239.7   235.8  208.2   204.7
 ***User Class Analysis***
OpenShif 355.0  350.3  276.0    272.3  204.9   202.2  178.1   175.7
 ***Top User Analysis***
RHOSCP1  142.4  140.8  110.1    108.9  82.93   82.01  71.43   70.65
RHOSCP3  125.2  123.8  97.38    96.34  72.35   71.60  62.80   62.14
RHOSCP2  86.79  85.04  68.00    66.64  49.31   48.30  43.55   42.67
```

Openshift / Rancher / Docker

- Openshift nodes are “closed”
- Solution is an agent running in container

Velocity Software container

- Provides full snmp access to server
- Same 20 year old very efficient technology
- And it works on z/OS zCX!!!

Resource consumption by pod, container, by process

- Even some pretty pictures

Configuration: RHOS

Container Configuration RHOS much larger (snmp in container)…

```
Report: ESAK8S1       Kubernetes Configuration Report                  Velocity Sof
Monitor initialized: 06/22/23 at 00:00:00 on 8562 serial 040F78    First record
-------------------------------------------------------------------------------
Linux    <---OpenShift Pod Configuration-->  <----------Container Configuration
Node/                                                        <--Process Ide
Time     PodName                 PodIndex      Name                 ProcessID Pro
-------- ----------------------  ------------  -------------------- --------- ---
00:15:00
rhoscp1
         insights-operator-7f    ba92ef4e1b29  insights-operator        13075 ins
         multus-admission-con    bbb779ebae39  kube-rbac-proxy          14520 kub
                                               multus-admission-con     12865 web
         etcd-rhoscp1.vsi1.ve    c6088570034c  etcd                      2276 etc
                                               etcd-metrics              2389 etc
                                               etcd-readyz               2941 clu
                                               etcd-health-monitor       3594 clu
         prometheus-operator-    c7875e16a183  prometheus-operator-     11955 pro
         kube-state-metrics-5    d5e9800a6a6c  kube-state-metrics       11658 kub
                                               kube-rbac-proxy-main     12519 kub
                                               kube-rbac-proxy-self     13456 kub
         prometheus-k8s-1        45f9f5becfa0  prometheus               14548 pro
                                               thanos-sidecar           15191 tha
                                               prometheus-proxy         15372 oau
                                               kube-rbac-proxy-than     15931 kub
                                               kube-rbac-proxy          15508 kub
                                               config-reloader          14820 pro
         packageserver-5f99c6    662518f1bc49  packageserver            13044 pac
         vsi-snmpd-vk5vd         7e583397ff6e  vsi-snmpd                19285 snm
         multus-9fj4w            8e5c35c1b612  kube-multus               4922 /en
```

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CPU By pod/container (Rancher)

CPU for performance management down to pod/container

```
Report: ESAK8S2      Kubernetes Resource Utilization Report          V
Monitor initialized: 10/11/23 at 20:25:46 on 8562 serial 040F78      F
-------------------------------------------------------------------------

NODE/                          <---Container-->  <--Container CPU------->
Time/ PodName                  <--Process ID-->  <------CPU Percents---->
Date    ContainerName           ProcID ProcName   Tot  sys user syst usrt
----------------------  ------ --------  ---- ---- ---- ---- ----
20:27:00
rancha1
   rancher-7c5dbf46fc-z
    rancher                      3225 tini      0.50 0.20 0.30    0    0
   cert-manager-webhook
    cert-manager                 3050 webhook   0.12 0.02 0.10    0    0
   rke2-canal-5n722
    calico-node                  2496 runsvdir  4.66 0.22 0.12 0.75 3.58
    kube-flannel                 2533 flanneld  0.27 0.02 0.02 0.17 0.07
rancha2
   fleet-agent-86bcc746
    fleet-agent                  2450 fleetage  0.15 0.03 0.12    0    0
   rancher-7c5dbf46fc-7
    rancher                      3392 tini      0.40 0.13 0.26    0    0
   fleet-controller-7bb
    fleet-controller             2185 fleetcon  0.13 0.03 0.10    0    0
   rke2-canal-xl77b
    calico-node                  3749 runsvdir  5.28 0.30 0.18 0.91 3.89
    kube-flannel                 3783 flanneld  0.30 0.02 0.02 0.20 0.07
ranchs1
   etcd-rancher-server
    etcd                         2075 etcd      1.35 0.42 0.93    0    0
```

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ram by container (rhos)

By virtual storage Consumption by container

```
Report: ESAK8S2       KubeVelocity Software Corporate   ZMAP 5.1.5 06/2
Monitor initialized: 06/2First record analyzed: 06/22/23 00:00:00
--------------------------------------------------------------------------
NODE/                          <--Container Memory---->  <-Container----->
Time/ PodName                  <---Storage metrics(mb)>  <-Faults/Second->
Date   ContainerName            Size RSS Peak Swap ptbl  min maj mint majt
-----------------------  ---- ---- ---- ---- ----  --- --- ---- ----
00:15:00
rhoscp1
   etcd-rhoscp1.vsi1.ve
    etcd                    12K 1858 177K    0 58.4   22   0    0    0
    etcd-metrics           711   30  11K    0 2.43   36   0    0    0
    etcd-readyz           1474   66  22K    0 4.51    0   0    0    0
    etcd-health-monitor   1402   67  21K    0 4.51    0   0    0    0
   kube-controller-mana
    kube-controller-mana  1476  109  23K    0 5.74    2   0    0    0
   apiserver-d84c8f947-
    oauth-apiserver       1476   96  23K    0 5.42    1   0    0    0
   apiserver-5d795f8cd7
    openshift-apiserver   1647  220  25K    0  9.6   16   0    0    0
   prometheus-k8s-1
    prometheus              12K 1970 312K    0 71.2   72   0    0    0
   authentication-opera
    authentication-opera  1680  150  25K    0 8.26  133   0    0    0
   packageserver-5f99c6
    packageserver         1808  151  27K    0 11.6  193   0    0    0
   kube-apiserver-rhosc
    kube-apiserver        4168 1976  63K    0 67.5  144   0    0    0
   kube-controller-mana
    kube-controller-mana  1003  251  15K    0 10.1   69   0    0    0
```

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Traffic by interface for example

```
Report: ESATCP4       TCPIP Hardware Layer/Int
Monitor initialized: 10/11/23 at 20:25:46 on
-----------------------------------------------
Date/          <Total Octets> Avg  <-Subnet pa
Time           <-Per second->   Q  <-Unicast->
Node       IFT Input  Output  Len  Input Outpt
-------- ---- -----  ------  ---- ----- -----
20:27:00
rancha1  -   1 405.3  405.31     0  3.76   3.8
         -   2 16191  6576.8     0 32.82  32.7
         -   3 303.0  2300.1     0  3.78   4.2
         -   4  3312  1146.0     0  4.83   1.6
         -   5 100.1  102.54     0  1.03   1.1
         -   6 119.8  153.01     0  1.33   1.8
         -   7  2624   11180     0 23.64  24.2
         -   8  1082  1109.1     0  0.58   0.7
         -  10 46.37  203.63     0  0.53   0.6
rancha2  -   1  1484  1484.2     0  6.55   6.6
         -   2 30250   11844     0 61.76  59.6
         -   3  1573  4852.1     0 10.56  11.6
         -   4  1573  4825.4     0 10.69  11.4
         -   5 307.5  2281.1     0  3.86   4.1
         -   6 95.61  100.52     0  0.99   1.1
         -   7 117.6  191.38     0  0.83   0.8
         -   8  1970   11107     0 18.95  20.1
         -  10 118.5  205.86     0  0.83   0.9
         -  11  1323  2610.1     0  7.50   8.0
         -  12 22463   82.61     0 50.51   1.2
```

zVRM Overview (Resource Mgr)

Velocity Software Resource Manager

- Dynamically adjust Linux servers resources to meet current workload requirements

Centrally managed via zPRO

- By enterprise, By node group, By node

zVPS provides feedback and performance metrics

- One minute granularity

CMM "balloon" used for storage management

- Current storage meets current workload demands!

CPU vary on / off

- Uses the zPRO command interface
- Manages CP Relative Shares
- Threshold to ensure minimum vCPU counts
- Target utilization controlled by zVRM

Velocity Software's Tuning Guide "VelocitySoftware.com/customer"

Tuning Topics Table of Contents

- **Performance Tuning and Analysis**
  - **z/VM Performance**
  - **Linux Performance**
  - **z/VSE Performance**
  - **z/OS Performance**
  - **CICS Performance**
- **Chargeback / Accounting**
  - **z/VM Performance Chargeback**
  - **Linux Performance Chargeback**
  - **z/VSE Performance Chargeback**
  - **z/OS Performance Chargeback**
  - **CICS Performance Chargeback**

Dashboards

Lots of different dash boards, people like “pretty”

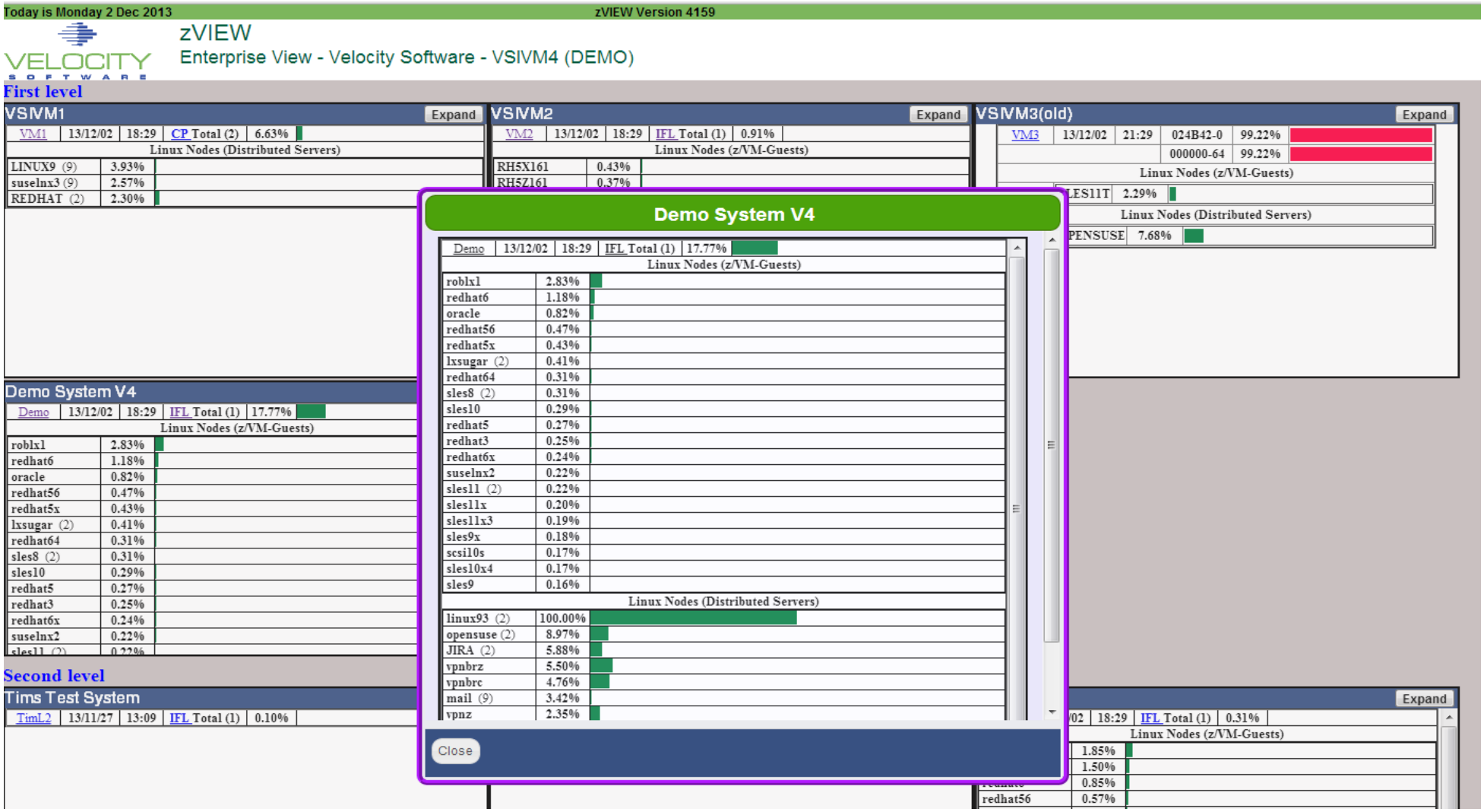
Over 35 years, lots of “modernization” going on.

zVPS has the data and the “Velocity data pump”

- Data exported to MICS (Broadcom), MXG (1989)
- Data exported to SLR (1995)
- Exporting data to dashboard very easy and efficient
- zVIEW is our dashboard technology (15 year old web based)
  - Single pane of glass for enterprise, z/VM, VSE, Linux, z/OS
- Instana (SLR rebranded) “skunk works” works, but…
- Splunk – available (replaces most of splunk agents)
- Grafana – available. (SEE RICH FOR LIVE DEMO)

zVPS Enterprise View – All LPARs in Enterprise

The Velocity Software dashboards: Tailorable, expandable, zoomable



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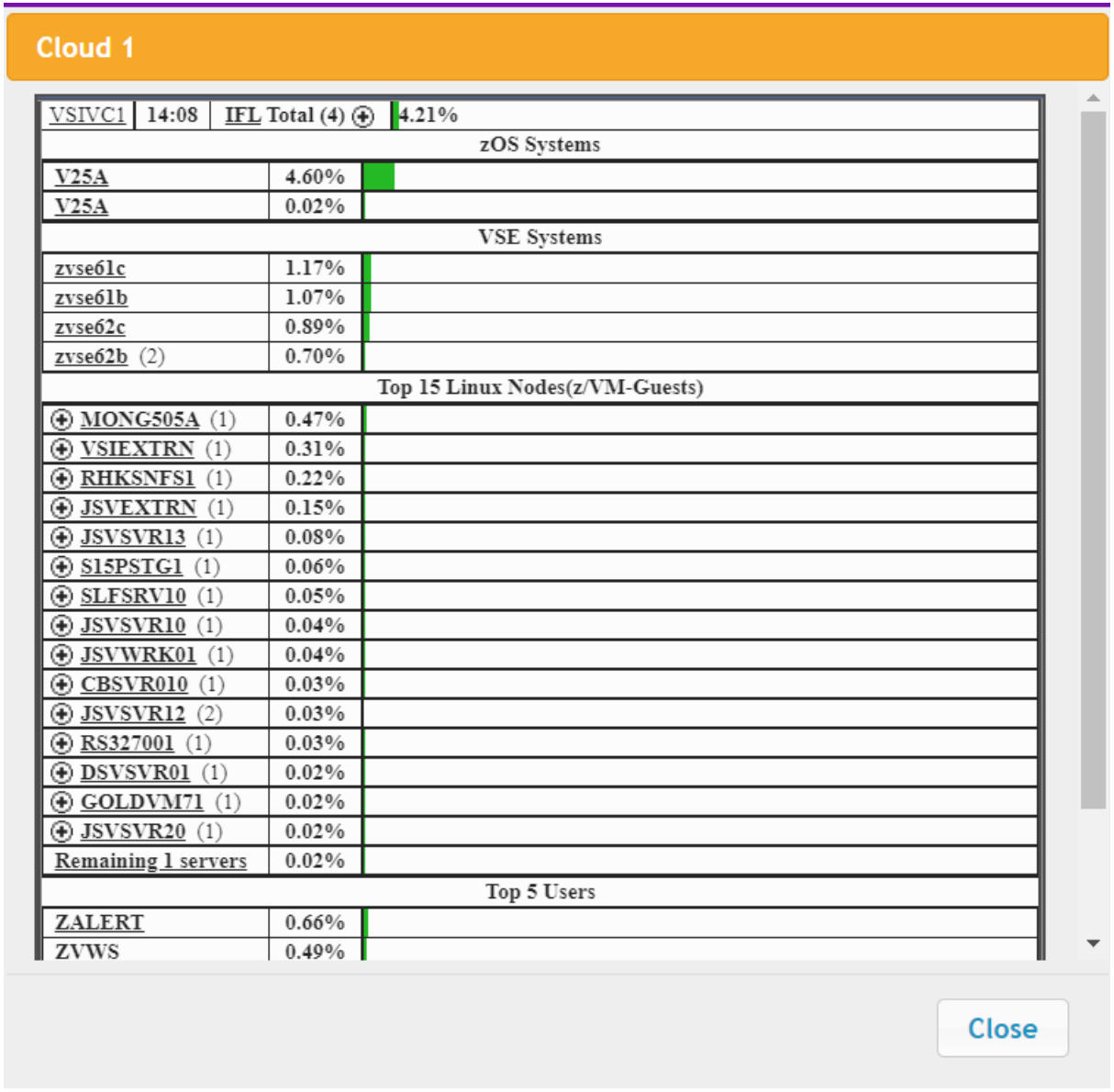
zVPS Enterprise View – Access

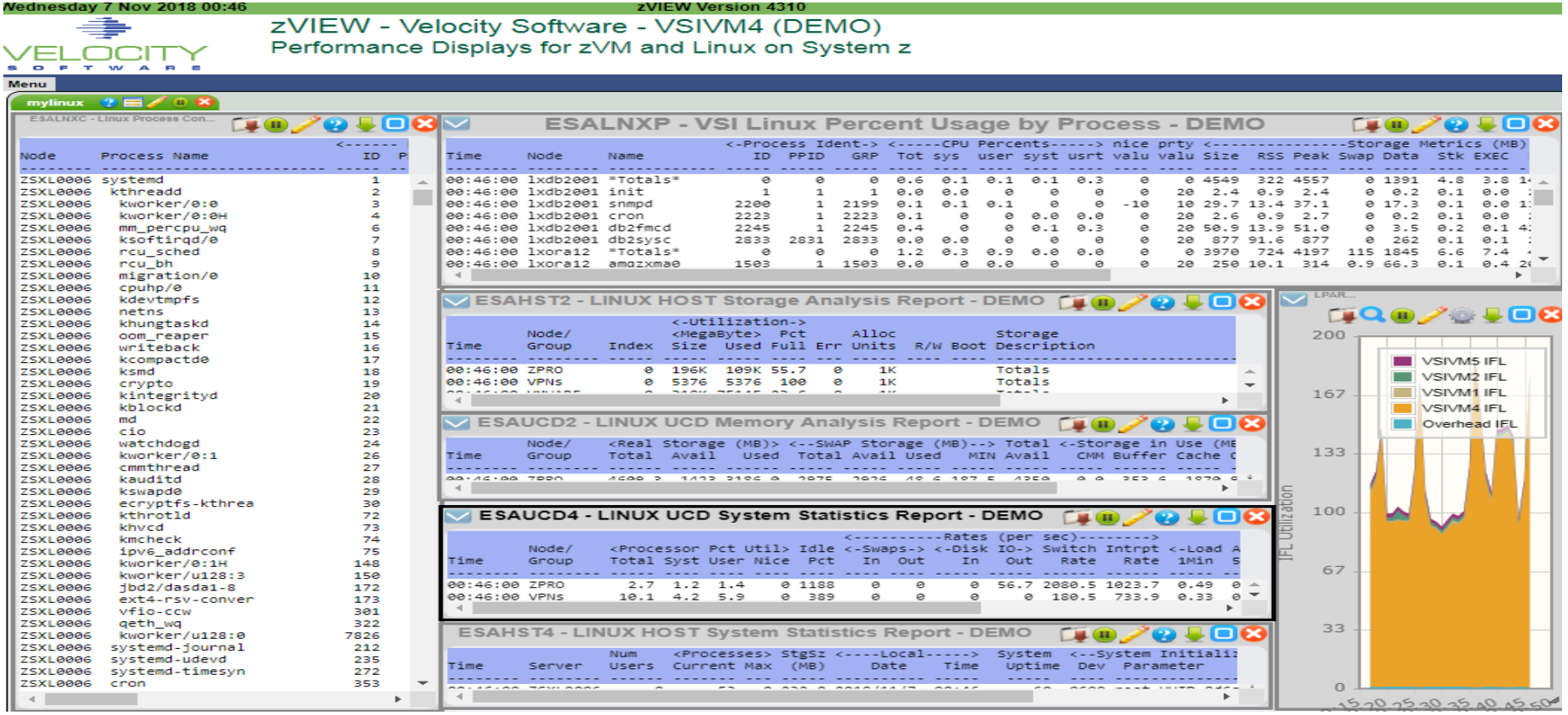
Very fast access

- VSE
- z/OS
- Linux



End users define their environment(s)

- Linux administrators get most everything in one click
- Secure, no need for logon
- Fast and efficient



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Grafana dashboards – IBM (Rob's) dashboards available

- freely available on the Grafana web site –
- (Now served by Velocity – See Rich)

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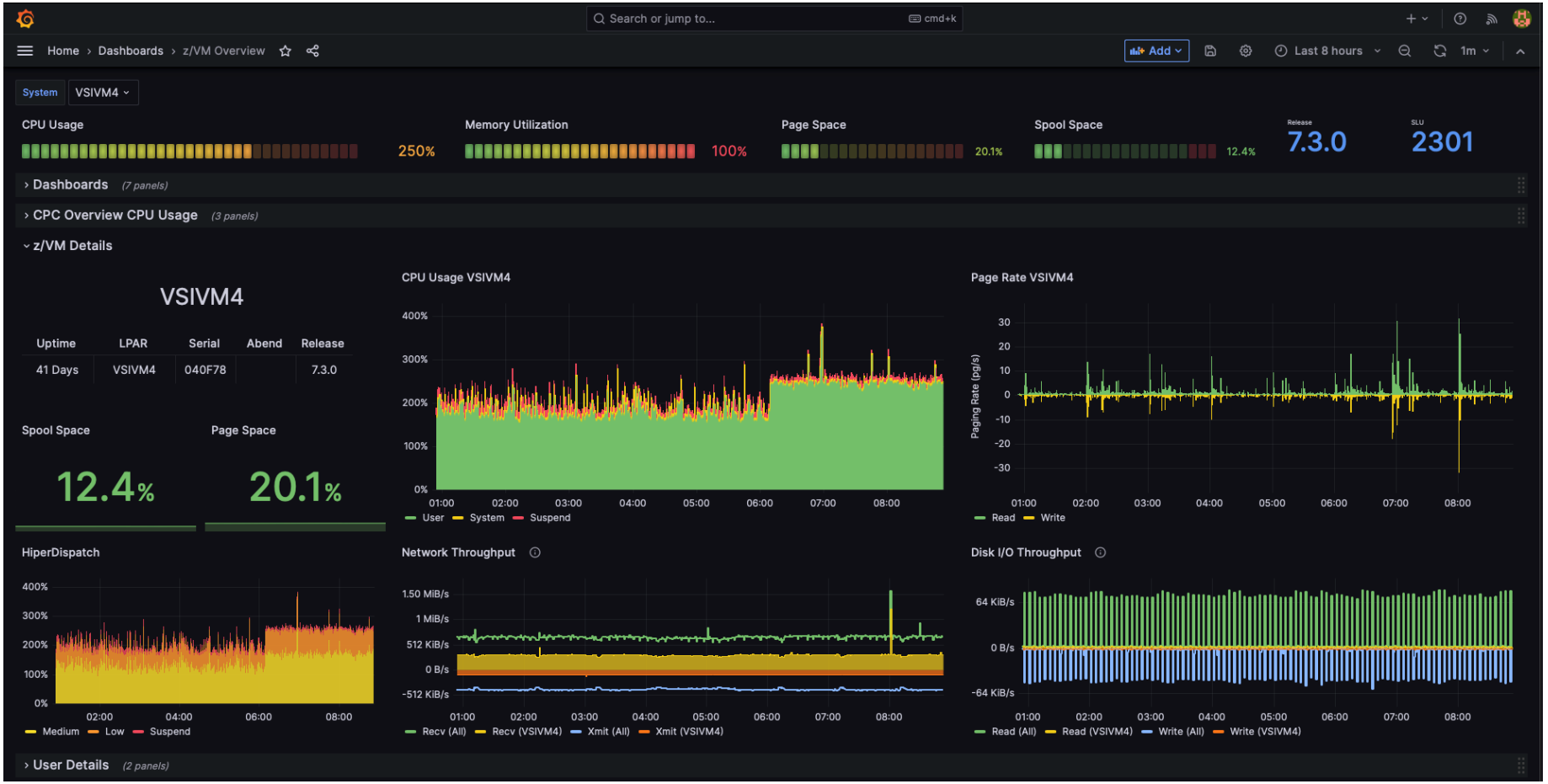
35 YEARS OF PERFORMANCE MANAGEMENT

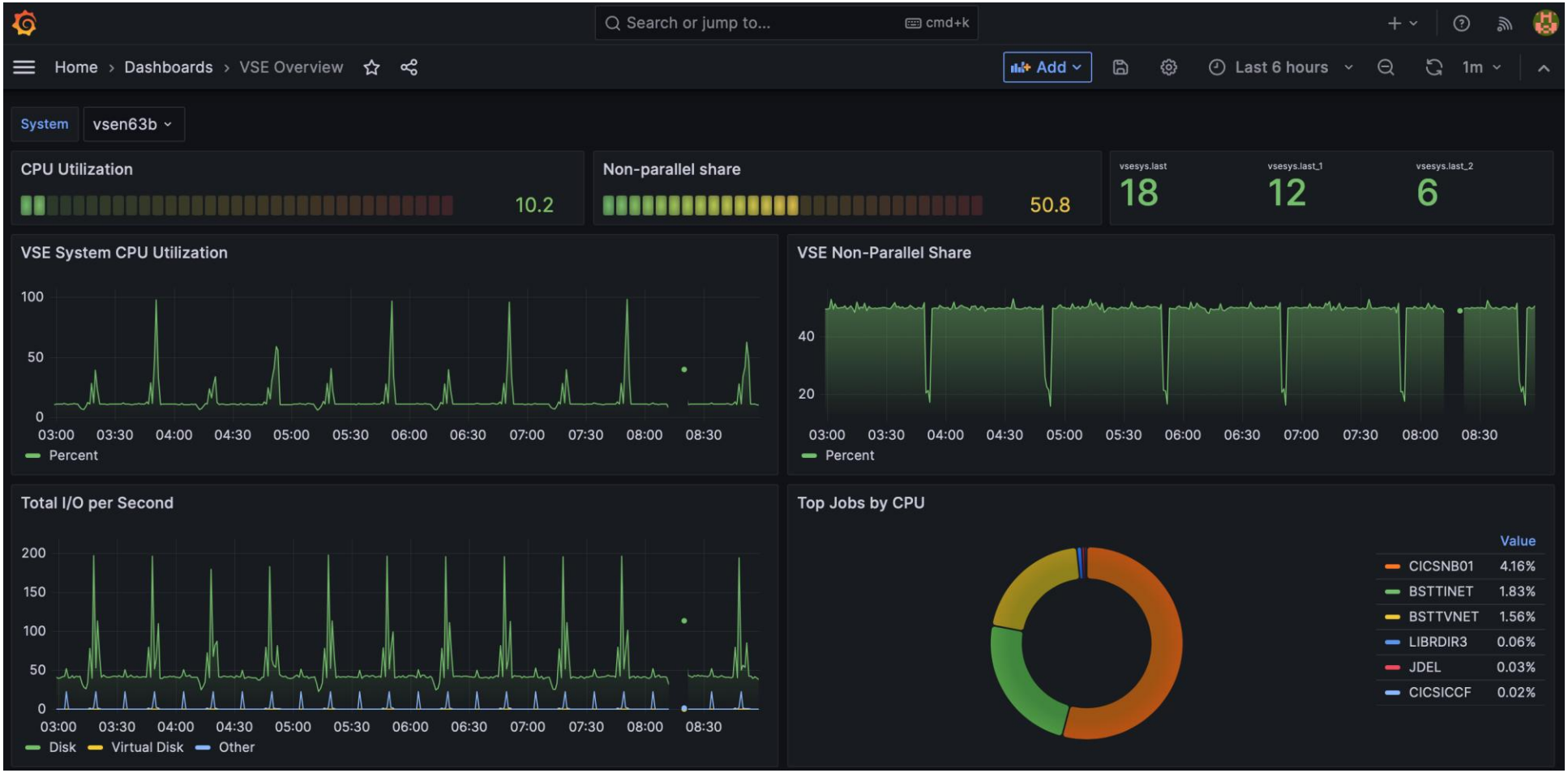
Grafana z/VM data dashboard



VELOCITY SOFTWARE

35 YEARS OF PERFORMANCE MANAGEMENT

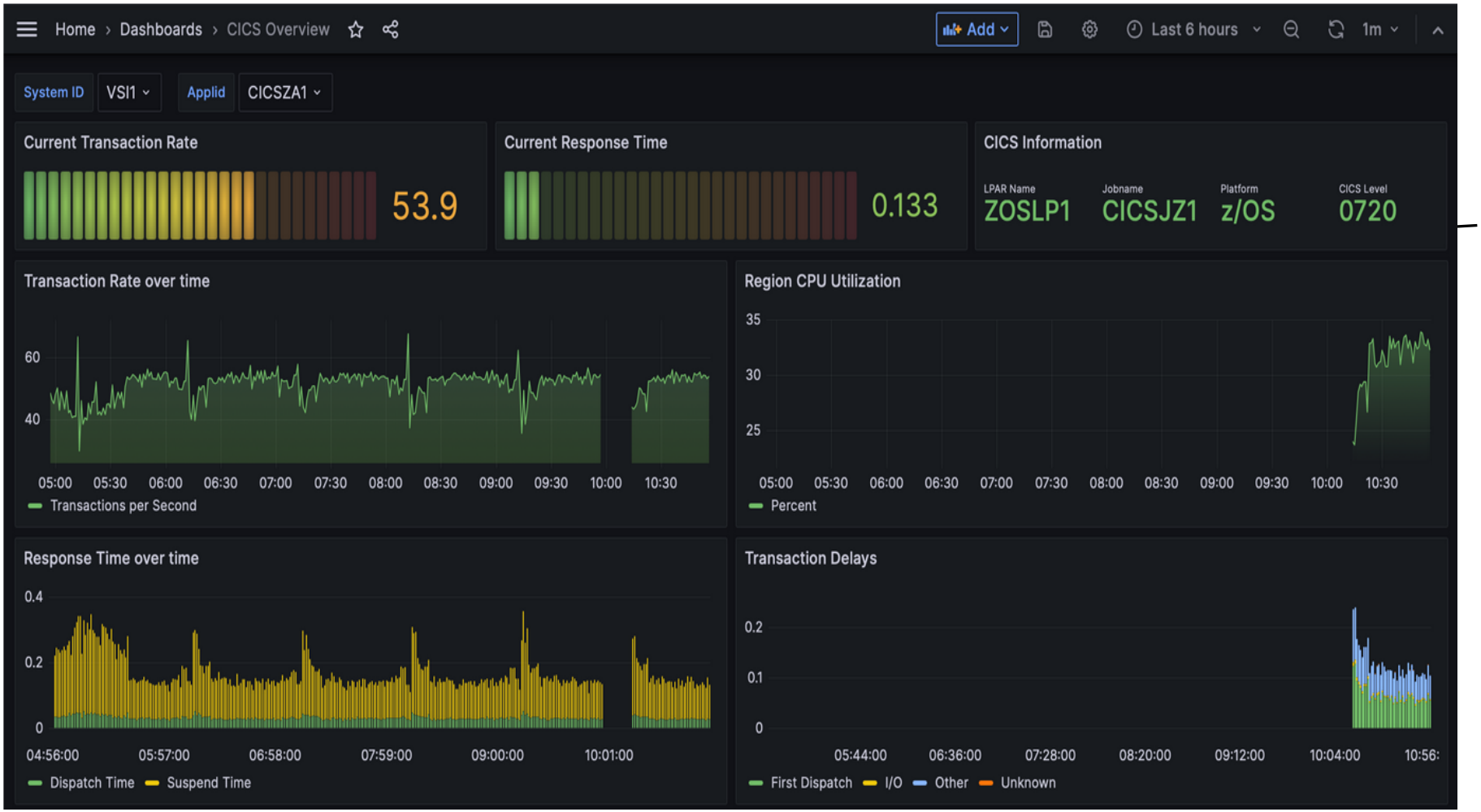
Grafana dashboard for VSE



VELOCITY SOFTWARE

35 YEARS OF PERFORMANCE MANAGEMENT

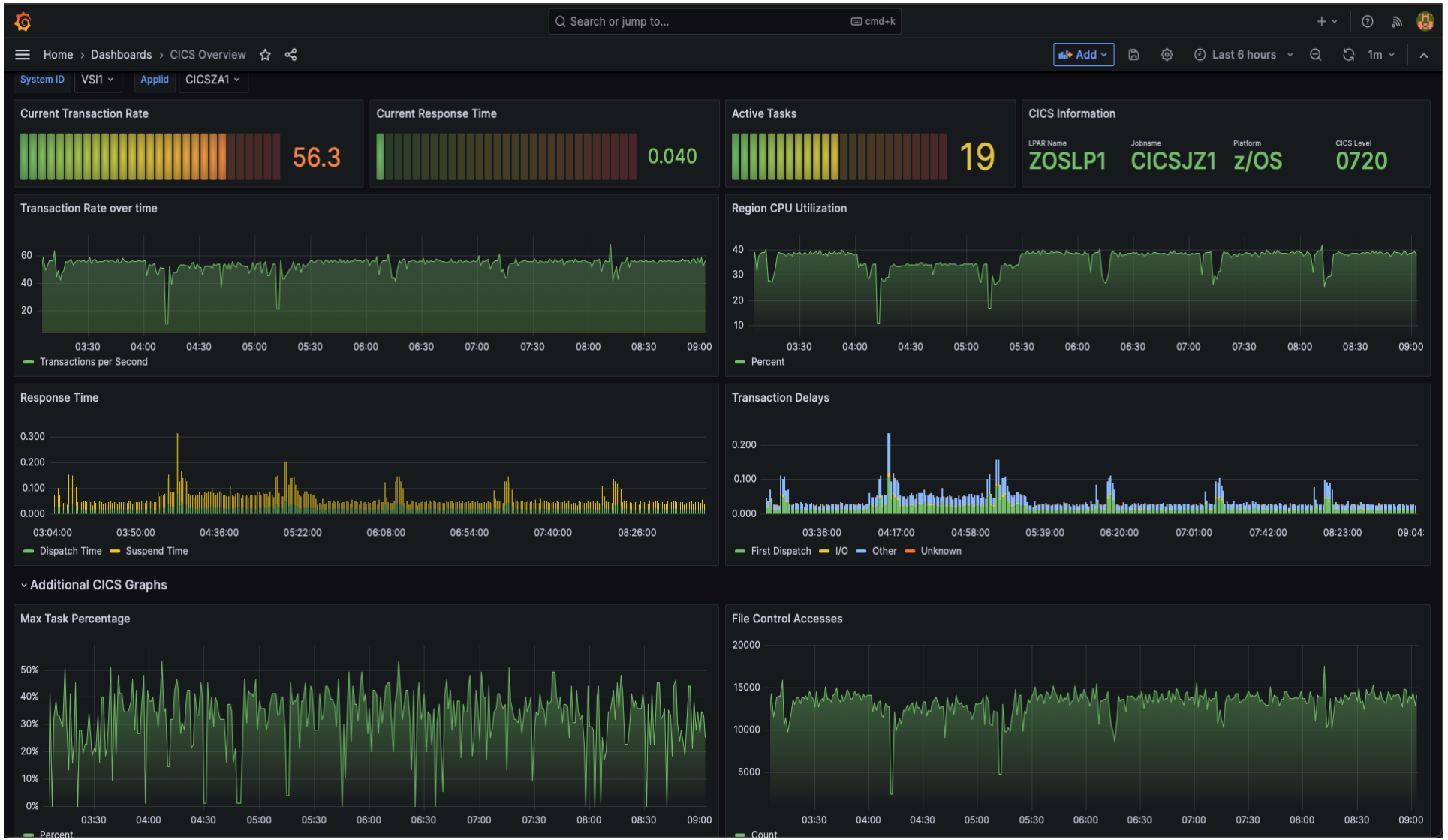
Grafana dashboard for CICS



VELOCITY SOFTWARE

35 YEARS OF PERFORMANCE MANAGEMENT

Grafana CICS Dashboard



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zPRO – Modernizing z/VM

Is the 40 year old 3270 interface still good for you?

- Skills are an issue, do more with less people, and less skills

zPRO: Web based "on prem cloud"

- Let your Linux administrators do their job without z/VM skills

zPRO enhancements – modernizing sysprog functions

- zDIRECT (replaces DIRMAINT's 40 year old interface)
- zScheduler (schedule tasks easily across your z/VM systems)
- zSPOOL (manage spool, look at open spool files – on a browser)
- Lun management – direct interface to DS8K and/or EMC
- SFS management
- Docker container management
- zPRO APIs are being used from distributed to manage z/VM
  - Watch for vmware managing z/VM soon

2023 Summary

35 years of performance management and still doing fun things

- **(See Rich for Grafana, zVRM, zPRO)**

Velocity Software provides a full z/VM stack,

- Just get z/VM and RACF from IBM

Performance Education, Tuning guide,

- VM Workshop (100+ customers attendance)

zVPS has enhancements and support for Docker/Kubernetes

zPRO provides many tools at the enterprise level

- Managing z/VM: zDIRECT, Lun management, SFS management
- Operations: server management
- Systems support: zSPOOL, directory management
- Cloning of servers (Linux, VSE, VM, z/OS) or LPARs
- And more: Docker container management