Case Study 2

Linux Servers Disconnecting From the Network

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Velocity Software solves performance problems.

- As a valued customer, we want to pass this knowledge on to you.
- The following is a case study of a solved real-life performance issue.
- This case study will show:
  - The problem as reported by users
  - The problem observations
  - What was found in the Velocity Software data
  - What was suggested to the customer
  - If provided, follow up from the customer

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The Problem:

Multiple Oracle servers were disconnecting from the network.

Problem Observations:

- On several days around the same time, multiple Oracle servers were disconnecting from the network/VSWITCH
- There was an error message – The QETH device driver failed to recover an error on the device

ESAUSRC –
User Configuration showed:

- Multiple Linux servers with two vCPUs that are not needed

ESAOPER – Operator System Log showed:

- Virtual switch failures

```
Report: ESAOPER      Operator/System Log                          Veloc
Monitor initialized: 07/07/22 at 00:00:01 on 3906 serial 03FCD8    First
----------------------------------------------------------------------------
01:15:17 QDIO Device Deactivate:xx2C
01:15:17 QDIO Device Deactivate:xx6C
01:16:00 L111T      vcpu stopped:        0
01:16:00 L111T    : VM VCPU: 00 is in stop state
01:17:45 Virtual Switch Failure: VSW3       owned by: VSW3      DTCVSW1
01:17:45                         Address: xxx6
01:17:45 QDIO Device Deactivate:xxx6
01:17:45 DETACH Device B0B6 FROM System
01:18:02 Virtual Switch Failure: VSW4       owned by: VSW4      DTCVSW1
01:18:02                         Address: xxx0
01:18:02 DETACH Device B0B7 FROM System
01:18:23 DETACH Device B0B8 FROM System
01:17:00 L228T      vcpu started:        0
01:18:52 QDIO Device activated:xx2C
01:20:10 QDIO Device activated:xx6C
.
.
.
01:17:00 VSIMAP1206 At 01:17:00, 122-second interval exceeds active
01:17:00        interval parameter value of 60.
01:19:00 VSIMAP1206 At 01:19:00, 122-second interval exceeds active
01:19:00        interval parameter value of 60.
.
.
.
01:22:05 QDIO Device activated:xxx6
01:22:05 Virtual Switch Recovery: VSW3     owned by: VSW3      DTCVSW1
```

ESALPARS – Logical Partition Analysis Summary showed:

- The %Assigned Total at the time of the issue was 100% or close to 100%

```
Report: ESALPARS    Logical Partition Summary              Velocity Software Corporate   ZMAP 5.1.4 07/11/22   Pg
Monitor initialized: 07/07/22 at 01:00:00 on 3906 serial 03FCD8   First record analyzed: 07/07/22 01:00:00
-----------------------------------------------------------------------------------------------------------------
          <--Complex--> <--------Logical Partition-------> <-Assigned Shares---->                   <LPAR Capping> Entit
          Phys Dispatch            Virt CPU <%Assigned>  <---LPAR--> <VCPU Pct>  Wait <-Thread->   On/ Capping   CPU C
Time      CPUs    Slice Name   Nbr CPUs Type Total  Ovhd Weight Pct /SYS /CPU  Comp Idle   cnt    Off Value
--------  ----  -------- ------- --- ---- ---- ----- ---- ------ ---- ---- ---- ---- ------ ----   ---- -------- ------
07/07/22
01:13:00   11  Dynamic Totals:  00  16 IFL  398.7  0.3  1135  100
                       XXX4      03   2 IFL  178.2  0.0    60 44.4 22.2 88.9   No    0     2    No      .    1.78
01:14:00   11  Dynamic Totals:  00  16 IFL  398.0  0.3  1135  100
                       XXX4      03   2 IFL  177.4  0.0    60 44.4 22.2 88.9   No    0     2    No      .    1.78
01:15:00   11  Dynamic Totals:  00  16 IFL  391.5  1.1  1135  100
                       XXX4      03   2 IFL  179.9  0.1    60 44.4 22.2 88.9   No    0     2    No      .    1.78
01:16:00   11  Dynamic Totals:  00  16 IFL  399.3  0.2  1135  100
                       XXX4      03   2 IFL  176.7  0.0    60 44.4 22.2 88.9   No    0     2    No      .    1.78
01:17:00   11  Dynamic Totals:  00  16 IFL  399.6  0.2  1135  100
                       XXX4      03   2 IFL  176.5  0.0    60 44.4 22.2 88.9   No    0     2    No      .    1.78
01:19:00   11  Dynamic Totals:  00  16 IFL  399.9  0.1  1135  100
                       XXX4      03   2 IFL  176.4  0.0    60 44.4 22.2 88.9   No    0     2    No      .    1.78
01:21:00   11  Dynamic Totals:  00  16 IFL  400.0  0.1  1135  100
                       XXX4      03   2 IFL  176.2  0.0    60 44.4 22.2 88.9   No    0     2    No      .    1.78
01:22:00   11  Dynamic Totals:  00  16 IFL  400.0  0.1  1135  100
                       XXX4      03   2 IFL  175.8  0.0    60 44.4 22.2 88.9   No    0     2    No      .    1.78
*********************************************************Summary*************************************************
Average:   11  Dynamic Totals:  00  16 IFL  394.2  0.8  1135  100
                       XXX4      03   2 IFL  167.7  0.5    60 44.4 22.2 88.9   No  29.08   2    No      .    1.78
```

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ESALPARS – Logical Partition Analysis Summary – Cont.:

- There are four total IFL processors shared over the 16 virtual processors (from the previous page)
- During the time of the issue, the 4 total IFL Processor busy was close to 100%

```
Totals by Processor type:
<---------CPU-------> <-Shared Processor busy->
Type Count Ded shared   Total   Logical Ovhd Mgmt
---- ----- --- ------  ------  -------- ---- ----
CP      3    0      3   245.8     241.3  1.7  2.7
IFL     4    0      4   395.0     393.4  0.8  0.8
ICF     3    3      0     0.0         0    0  0.0
ZIIP    1    0      1    11.9      11.5  0.1  0.3
```

ESAXACT – Transaction Delay Analysis showed:

- Multiple servers were waiting on CPU

```
Report: ESAXACT         Transaction Delay Analysis                    Velocity Software C
Monitor initialized: 07/07/22 at 01:00:00 on 3906 serial              First record analyz
-------------------------------------------------------------------------------------------
             <-----Percent non-dormant (Wait states)------------------->
UserID    <-Samples->                    E-  D-  T-       Tst <Asynch>           Lim  Pct
/Class    Total   In Q Run Sim CPU SIO Pag SVM SVM SVM  CF Idl I/O Pag Ldg Oth Lst Elig
--------  ----- ----- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ----
******************************************************Totals********************************************
System:   3306  2340 7.7 1.1  34   0 0.0   0   0 0.1 0.1  57 0.1   .   .   0   0   0
Hi-Freq:  237K  145K 8.0 1.9  31 0.0 0.0   0 0.8 0.1 0.3  59 0.1 0.0 0.0 0.1   0   0
******************************************************User Summary*************************************
LaaaT     3598  3598  43 6.9  40   0 0.1   0   0   0   0  10 0.2   0   0   0   0   0
LbbbT     3598  3598  41 4.5  36   0 0.1   0   0   0   0  19   0   0   0 0.1   0   0
LcccT     7196  7196  15 2.9  44   0 0.0   0   0   0   0  38 0.1   0   0 0.0   0   0
LdddT     3598  3598  20 1.9  43   0 0.2   0   0   0   0  35 0.2 0.0   0   0   0   0
LeeeT     3598  3598  18 0.1  32   0 0.4   0   0   0   0  50 0.0   0   0   0   0   0
LfffC     7196  7196 8.3 0.7  21   0 0.0   0   0   0   0  70 0.2   0 0.0   0   0   0
LgggT     3598  3588  15 2.1  44   0   0   0   0   0 3.6  34 0.1   0   0 1.8   0   0
LhhhT     7196  7196 5.3 2.3  42 0.0 0.0   0   0   0 0.3  49 0.4 0.0 0.0 0.0   0   0
LjjjC     3598  3598  11 1.1  36   0 0.1   0   0   0   0  51 0.1   0   0   0   0   0
LkkkT     7196  7196 3.6 0.1  26   0   0   0   0   0   0  70   0   0   0   0   0   0
LmmmT     3598  3598  10 2.0  40   0 0.2   0   0   0   0  47 0.1   0   0   0   0   0
LnnnC     3598  3598  10 6.4  34   0 0.1   0   0   0   0  48 0.4   0   0 0.0   0   0
LpppC     3598  3598 8.3 1.9  46   0   0   0   0   0   0  43 0.2   0   0   0   0   0
```

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ESANIC – Virtual NIC Activity showed:

- The network lock information (wait times) rose from zero
- The rate of discards during the problem period rose from zero

ESAPLDV – Processor Local Dispatch Vector Activity showed:

- The dispatch rate during the problem period was suddenly extremely high

ESACPUA – CPU Utilization Analysis (Part 2) showed:

- There were a high amount of spin locks during the time of the issue
- It shows 4 threads (SMT on, 2 vCPUs), 2 100% busy

```
Report: ESACPUA        CPU Utilization Analysis                    Velocity Software Corp
Monitor initialized: 07/07/22 at 01:00:00 on 3906 serial 03FCD8    First record analyzed:
------------------------------------------------------------------------------------------
          <----Load---->    <CPU percents><--Internal (per second)--> SIGP <-Spin Locks-->
          <-Usrs--> Tran    Totl Ovrhead Diag Inst   SIE Fast  Page Rate Proc   ms/   rate
Time      Actv In Q /sec CPU Util Usr Sys nose  Sim intrcp path fault /sec  Pct  spin  /sec
--------  ---- ---- ---- --- ---- --- --- ---- ---- ------ ---- ----- ---- ---- ----- -----
01:19:00   43 43.0  0.6  0  100 3.1 3.6  95K  95K  96427 0.08 232.5     0 0.01 0.00 117.0
                         1  100 1.7 1.6  53K  53K  53716 9.01 164.1   0.0 0.00 0.00  98.4
                         2 76.4 1.2 1.0  35K  35K  35157 0.02 144.4   0.0 0.18 0.03 55.07
                         3 76.4 1.4 1.4  44K  44K  44524 0.08   0.9   0.0 0.17 0.03 65.27
                         ---- --- --- ---- ---- ------ ---- ----- ---- ---- ---- -----

System:                  353 7.5 7.6 227K 228K 229824 9.20 542.0   0.0 0.37 0.01 335.7
------------------------------------------------------------------------------------------
01:21:00   42 40.0  0.6  0  100 1.3 2.1  37K  37K  37745 0.05   3.6     0 0.03 0.00  2852
                         1  100 2.5 2.4  75K  75K  75839 0.16   4.8   0.0 0.02 0.00 548.3
                         2 76.1 1.9 1.8  51K  51K  50966 0.02   7.1   0.0 0.57 0.03 198.9
                         3 76.1 1.8 1.8  51K  51K  51003 0.05   1.5   0.0 0.40 0.02 223.3
                         ---- --- --- ---- ---- ------ ---- ----- ---- ---- ---- -----

System:                  352 7.5 8.1 213K 214K 215552 0.28  17.1   0.0 1.02 0.00  3823
------------------------------------------------------------------------------------------
01:22:00   37 40.0  0.5  0  100 0.5 1.2 55.3  516 1756.0 0.08  60.5     0 0.00 0.00 6.236
                         1  100 0.5 0.3 45.2  443 1626.9 0.13  56.5   0.0 0.00 0.00 7.003
                         2 75.7 0.2 0.2  149  303  622.8 0.05  17.4   0.0 0.15 0.31 4.702
                         3 75.7 0.3 0.2 26.9  341  807.9 0.10  56.9   0.0 0.13 0.28 4.652
                         ---- --- --- ---- ---- ------ ---- ----- ---- ---- ---- -----

------------------------------------------------------------------------------------------
01:23:00   37 42.0  0.4  0  100 1.4 1.8 60.6  986 3989.1 0.07  90.3   0.8 0.00 0.00 85.82
                         1  100 1.2 0.8 36.6  817 3580.2 0.05  47.0   1.8 0.00 0.00 82.28
                         2 76.1 0.6 0.5 38.2  389 1536.0 0.13  45.1   0.2 0.00 0.00 55.17
                         3 76.1 0.8 0.6 30.1  857 2200.7 0.18  37.5   0.2 0.00 0.00 58.60
                         ---- --- --- ---- ---- ------ ---- ----- ---- ---- ---- -----

System:                  352 4.0 3.7  165 3049  11306 0.43 219.9   3.0 0.01 0.00 281.9
```

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ESAUSR3 – User Resource Utilization showed:

- The dispatch rates for TheUsrs group (containing the Linux servers)
- The dispatch rate during the problem period was suddenly extremely high

```
Report: ESAUSR3      User Resource Utilization - Part 2  Velocity Software Corp   ZMAP 5.1.
Monitor initialized: 07/07/22 at 01:00:00 on 390rst record analyzed: 07/07/22 01:00:00
------------------------------------------------------------------------------------------
               DASD MDisk Virt Cache            <--Messages Queued-> <Message> <Dispatch>
UserID    DASD Block Cache Disk   Hit <Transfers> <----IUCV----->    <Errors-> <Rate/Sec>
/Class     I/O  I/O  Hits  I/O    Pct  IUCV  VMCF Send Recv Reply VMCF IUCV VMCF Disp Waits
--------  ----- ----- ---- ---- ----------- ---- ---- ----- ---- ---- ---- ----- ---- -----
07/07/22
01:16:00 24742     0    6  100  0.4  5680     6    0   19    0    1    0    0 115K  115K
TheUsrs  24662     0    0  100  0.4    32     0    0    0    0    0    0    0 115K  115K
------------------------------------------------------------------------------------------
01:17:00 19247     0   33 1089  5.5  3412     6    0   19    0    1    0    0 134K  134K
TheUsrs  19169     0    0 1089  5.4   152     0    0    0    0    0    0    0 134K  134K
------------------------------------------------------------------------------------------
01:18 - data missing
------------------------------------------------------------------------------------------
01:19:00 12105     0   16  764  6.1  6365    12    9   19    0    1    0    0 230K  230K
TheUsrs  12037     0    0  764  6.0    87     0    9    0    0    0    0    0 230K  230K
------------------------------------------------------------------------------------------
01:21:00 14040     0   12  299  2.2  6371    12   14   19    0    1    0    0 216K  216K
TheUsrs  13986     0    0  299  2.1    55     0   14    0    0    0    0    0 215K  215K
```

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ESADIAG – User Resource Utilization showed:

- The amount of DIAG 44 instructions
- The rate during the problem was suddenly extremely high

Performance Enhancement Suggestions:

1 – Add another engine

- The affected LPAR had only two IFL's running
  - Each IFL was running 95-100%
  - This caused the top Linux servers to wait on CPU

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Performance Enhancement Suggestions:

2 – Change the engine count for the Linux servers

- Each of the Linux servers has two vCPUs
  - Only one vCPU is needed per server
  - Having two vCPUs per server caused unnecessary cache contention
  - Possibly update the SHARE for each server, if needed

<u>Performance Enhancement Suggestions</u>:

3 – Upgrade Linux servers to change DIAG 44 to DIAG 9C

- The Linux server group was doing a large amount of DIAG 44 instructions for locking - (Shown on ESADIAG and ESAPLDV)
    - Older Linux systems use DIAG 44 – those systems need to be upgraded to take advantage of DIAG 9C
    - DIAG 9C is a much more efficient and safe way to do locking

What the customer reported:

- Several of the Linux servers that were doing DIAG 44 instructions were decommissioned

- A third IFL was added to the LPAR

- No more issues were reported