



Rocket Performance Essential increases your I/O rate

Joris Cornette
jcornette@rocketsoftware.com



Performance Challenges are increasing



- Online availability requirements are increasing
 - High demand for information access and up to the minute data
 - A salesman wants to know his customer's current account status, not the one from yesterday evening

- Service Level Agreements are more stringent
 - You must adhere to the SLA, no exceptions allowed

- Determining system-wide impact of application tuning activities is difficult
 - The mainframe application is just one element in a long chain

- Batch windows are getting smaller
 - However, batch jobs get bottlenecked by extensive I/O, blocking their ability to run at maximum speed of the processor
 - And sadly, there is no room to experiment with batch job optimization

3 Availability Challenges are increasing too



- Batch processing window constraints still exist
- Legacy application integration with e-business lead to conflicts
- Multiple resources compete for data access
 - Data mirroring for parallel access is not an option
- Manual tuning doesn't get the job done in today's resource constrained environment
 - You have millions of data sets and jobs, but 2 hands

- Very often root causes are inefficient I/O characteristics
 - One-to-one write ratio inside Control Intervals
 - Redundant formatting of Control Areas
 - Different buffering requirements for direct vs. sequential

■ CPU Cycles

- This is solved every year (z9, z10, z196, EC12, EC13 ...)

■ Memory

- This is also solved

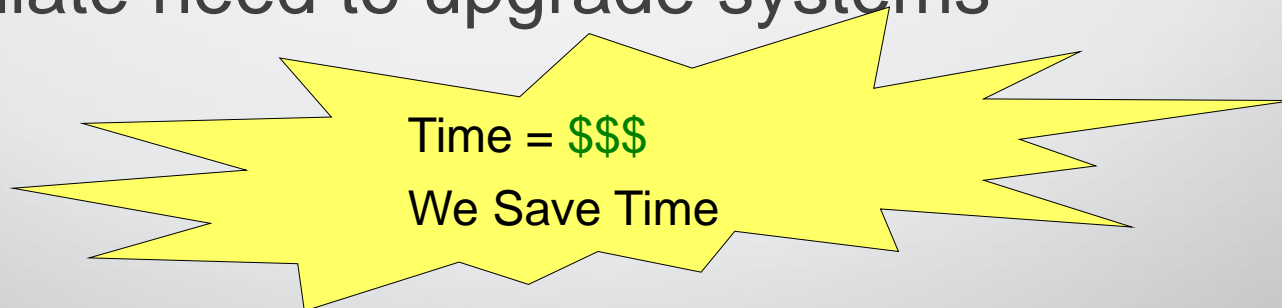
■ I/O

- How can I/O constraints be reduced to improve batch elapsed time?

Why is Optimization of I/O Important?



- Growth and batch processing window constraints
- Today's business needs become out of alignment with the historical application design and behavior
- Legacy application integration with e-business
- Data center consolidations
- Extending business functions without the immediate need to upgrade systems



Reducing Batch I/O Constraints with Performance Essential

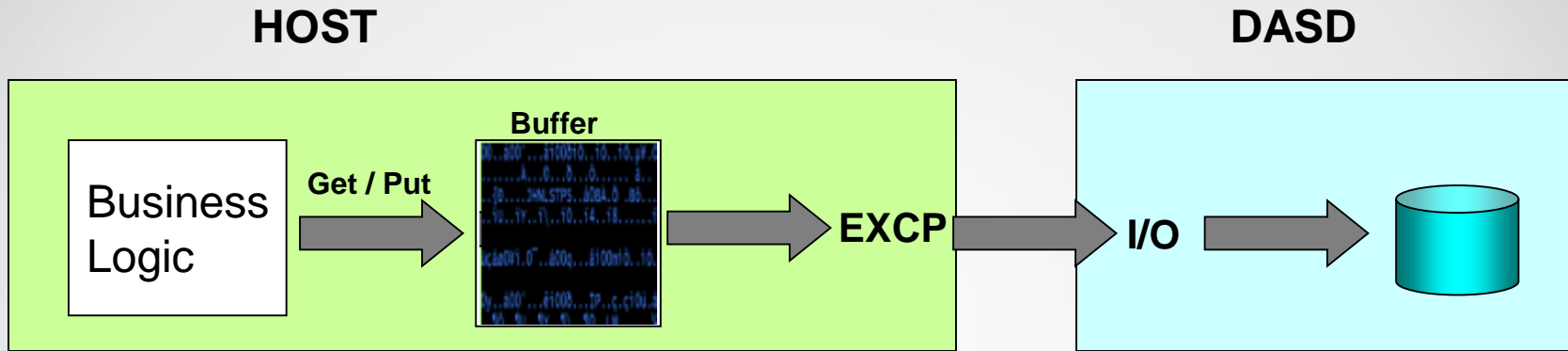


- Performance Essential is an intelligent, intuitive and integrated optimization tool to:
 - Significantly reduce elapsed times of batch processing
 - Reduce batch processing requirements
- Performance Essential improves I/O performance of mission-critical systems and applications by automatically enhancing I/O buffering
- Performance Essential is storage platform independent

I/O Not Using Performance Essential



Small buffer size → Many I/O operations



Inefficient I/O operations

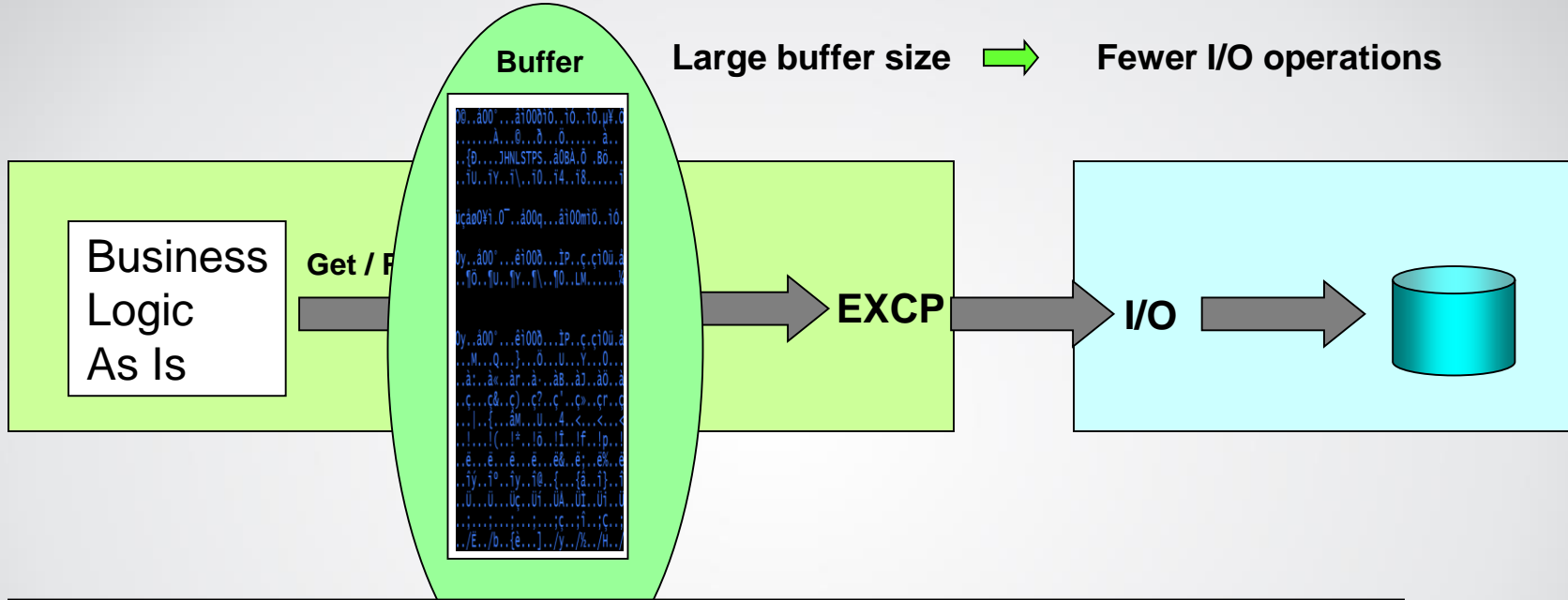
- Relying on system defaults
- Improper tuning
- Lack of flexibility when change is required from sequential access to random access or vice versa



Low performance

System is not utilized to its maximum capacity

I/O Using Performance Essential



Performance Essential automatically adjusts the buffers

Reduces number of I/O dramatically

Increases performance and frees system resources

- Improve both VSAM and Non-VSAM Performance
 - Automates VSAM and non-VSAM buffering and tuning
 - Also improves VSAM data set LOAD process
 - Also when working with sequential QSAM / BSAM files
 - Significantly reduces batch processing time through I/O buffer optimization
 - Frees virtual storage for use by applications
 - Achieves performance improvements without any JCL changes or application changes

- Automated Batch I/O Tuning Solution
 - Significantly improves system-wide performance for VSAM and non-VSAM batch processing
 - Reductions of batch elapsed time possibly in the range of 25-75% or more

- Performance Essential accomplishes this by:
 - Reducing CPU overhead associated with I/O (EXCPs)
 - Exploiting “locality of reference” principle in real storage
 - Adapting NSR/LSR buffering to changes in file processing
 - Enabling VSAM LSR and Hiperspace for high level code

VSAM NSR – Non-Shared Resources



- Each data set has its own non-shared set of buffers
- Technique to use for sequential processing
- Index set look-asides
- No data or key sequence set buffer look-asides for direct processing
- Read-aheads performed for sequential processing of data component

- Default VSAM buffering technique

VSAM LSR - Local Shared Resources



- Buffers are shared among data sets in the resource pool
- Technique to use for direct processing
- Data and index buffer look-asides
- No data read-aheads for sequential processing

- Must be requested by Performance Essential user via:
 - System Default Record in CONREP
 - Or Specific CONREP entry
 - Or JCL
 - Or ACB
 - Or ENABLE parameter

The Control Repository (CONREP)



- The Performance Essential configuration data set that contains definitions to control Performance Essential processing by:
 - JOB / STEP / PGM / DD combination
 - DASD Volume
 - ICF Catalog
 - Data set name
- Implemented as a VSAM data set
- Supports concurrent access on multiple LPARs
 - Specify the MULTISYSTEMS parameter
 - Tables are automatically synchronized on the LPARs

A sample CONREP Entry



JobName
StepName
ProcStepName
ProgramName
DDName

```

----- PSP CONTROL REPOSITORY PROCESS RECORD -----
Comman      Interactive-Maintenance <<MODIFY          ...: PAGE
PROCE       select with an S to specify keywords-
             § -LOAD S -VSAM S -NONVSAM
Prima
Line       -----
C I MO      PROCESS...: CSCORN12.*.*.*.*
M S HV      CONREP...: CSCORN.JHN0401.CONREP
*****     CTLHLQ...: §      CONREP record high-level qualifier
             -----
SVCLVL...:   (service-Level)
ENTER Process  PF1 Help  PF3 Cancel
  
```

Options you can change

(globally or per data set or through DD options)



15

```
----- PSP CONTROL REPOSITORY PROCESS RECORD DISPLAY -- Row 18 of 21
Comma      VSAM Related keywords <<DISPLAY-ONLY>>
PROC      PSP component: VSAM
Prim      More:  +
Line
-----
C I M     S -NOANALYZE   -AUDIT      -CTLSEQ     -DEFER
H         S -FORCELSR    -MULTISTRING -SIS        -NODEFER
H         -FORCENSR    -NOMULTISTRING -SMF       -NOSMF
H         -STATONLY    -STATS      -SUPPRESS
S S H     -NOSTATONLY  -NOSTATS    S -NOSUPPRESS
H         -REBUFLSR    -NOREBUFLSR -SIO        -NOSIO
*****   -FIXSIO     -NOFIXSIO   -NOWTOBUF   -WTOBUF

ENTER Process  PF1 Help  PF3 Cancel  PF7 Up  PF8 Down
```

- Performance Essential offers modeling capabilities that predict system behavior based on Performance Essential activation
 - The ANALYZE and AUDIT options allow Performance Essential to analyze batch characteristics
 - And to generate/update CONREP entries
 - STATONLY reports “before” statistics
 - Useful for evaluating performance impact in simulation mode

Application Performance Analyzer (APA)



- APA is a simple-to-use low-overhead tool that finds high activity candidates using SMF data
 - Input:
 - SMF records 14, 15, 30 and 64
 - Outputs:
 - Listing of summary of total projected savings by using Performance Essential
 - VSAM / LOAD / NON-VSAM
 - Listing of top candidate jobs for usage under Performance Essential
 - VSAM / LOAD / NON-VSAM
 - Listing of LSR Active jobs steps for usage under Performance Essential
- We can install APA for an assessment in 15 minutes and show you the potential benefits

IVP Program – Step Stats without Performance Essentia Rocket

```

XDC.PSPNO.TXT - Notepad
File Edit Format View Help
-----
RKT SW01I
- Step Termination Statistics
-
- Program Name          PSPPGM22                HH:MM:SS.hh
- Step Name             IVPSTP25                Elapsed Time  00:00:01.09
- Procedure Step
- Step Number           6                TCB CPU Time   00:00:00.05
- Substep Number        0                SRB CPU Time   00:00:00.01
- Return Code           04               Other CPU Time 00:00:00.03
- Tape Mounts           0                Total CPU Time 00:00:00.09
- Total I/O             3015             Connect Time/ms 384
-
- Region size           2048K
-
- -----Below 16Meg-----
- Private Area          9192K            Private Area    1811456K
- Max Allocated         56K              Max Allocated   196K
- LSQA And SWA          280K             LSQA And SWA   11320K
-
- DDName    Unit    blksize    I/O
- JOBLIB    A4A5    32760      2
- INFILE    A4AE     0          2989
-----

```

IVP Program – Step Stats with Performance Essentials 

```
XDC.PSPYES.TXT - Notepad
File Edit Format View Help

RKTSW01I-----
- Step Termination Statistics -
-
- Program Name          PSPPGM22          HH:MM:SS.hh -
- Step Name             IVPSTP25          Elapsed Time 00:00:00.19 -
- Procedure Step
- Step Number           6          TCB CPU Time  00:00:00.02 -
- Substep Number        0          SRB CPU Time  00:00:00.00 -
- Return Code           04         Other CPU Time 00:00:00.01 -
- Tape Mounts           0          Total CPU Time 00:00:00.03 -
- Total I/O             255         Connect Time/ms 51 -
-
- Region size           2048K
-
- -----Below 16Meg-----
- Private Area          9192K      Private Area   1811456K -
- Max Allocated         36K        Max Allocated  1252K -
- LSQA And SWA          292K        LSQA And SWA  11320K -
-
- DDName   Unit   blksize  I/O
- JOBLIB   A4A5   32760    2
- INFILE   A3B0    0        208
-----
```


IVP Program – Stats with Performance Essentials

```

XDC.PSPSTATS.TXT - Notepad
File Edit Format View Help

1
***** V 4.1 (MO) *****
          VSAM STATISTICS
A PROPRIETARY SOFTWARE PRODUCT OF ROCKET SOFTWARE, INC.

*JOB: CSCORN12  SYSID: AR07  USERID: CSCORN  JOBCLASS: A
*GLOBAL: EXPLICIT  PSTP:  PGM: PSPPGM22  03/02/2015  10:13:40  DFP 2.1 OR HIGHER
* LSR=FORCE          NOCTLSEQ          NO SMF          WTOBUF
* NO STATIONLY      SEPOOL          NO SIS          NO SIO
* NSR CNTLBKS<16M  LSR BUFFERS>16M  MULTI-STR      NSR BUFFERS>16M
* NO RLS           NO REBUFLSR      LSR CNTLBKS<16M  NO AUDIT
* STRNO=DFLT       NSR DBUFSP=DFLT  NO RTRACE      ANALYZE
* NBUFNI=DFLT      NSRADJ%=DFLT     NSR IBUFSP=DFLT  NBUFND=DFLT
* LBUFND=DFLT      LSR DBUFSP=DFLT  LSR IBUFSP=DFLT  LSR IBUFSP=DFLT
* MAXBUFNO=DFLT    LBUFNI=DFLT      LSRADJ%=DFLT    MINBUFNO=DFLT
* EXCPHLD=100      HPS=DFLT         DDTHLD=0        LSRTHLD=DFLT
* OVL P=0          IMPHLD=DFLT      AUDTHRU=DFLT    LSRPOOL#=DFLT
* SYSOUT=*

*DD LEVEL OPTIONS:  STORCLAS= N/A  SRVCLASS= SYSOTHER  STATS          NO SMF
* LSR=FORCE          NOCTLSEQ          NO SIS          NO SIO
* NO STATIONLY      SEPOOL          DFR-WRITES     MULTI-STR
* NSR BUFFERS>16M  NSR CNTLBKS<16M  LSR BUFFERS>16M  LSR CNTLBKS<16M
* NO AUDIT          NO RLS           NO RTRACE      NSR IBUFSP=DFLT
* ANALYZE          STRNO=DFLT       NSR DBUFSP=DFLT  NSR DBUFSP=DFLT
* NBUFND=DFLT      NBUFNI=DFLT     NSRADJ%=DFLT    LSRADJ%=DFLT
* LSR IBUFSP=DFLT  LBUFND=DFLT     LBUFNI=DFLT     DDTHLD=0
* MINBUFNO=DFLT    MAXBUFNO=DFLT   IMPHLD=DFLT     AUDTHRU=DFLT
* LSRTHLD=DFLT     EXCPHLD=100     SYSOUT=*
* LSRPOOL#=255     OVL P=0

* POOLID  BUFFER SIZE:  <=2K   4K   8K   12K   16K   20K   24K   28K   32K   TOTK
* 255 #DATA BUFFERS    0     0     0     0     62    0     0     0     0     992
* #INDX BUFFERS       10    0     0     0     0     0     0     0     0     20

* BUFFER LOOKASIDE HITS FOR SUBPOOL 16384:  796
* VSAM FORCED WRITES : 0

* BUFFER LOOKASIDE HITS FOR SUBPOOL 512 : 1987
* VSAM FORCED WRITES : 0

* INFILE / CSCORN.JHN04701.IVP2
* ACTIVATE BY: VIOCTL  NOMUPPRESS.DDTHLDO.WTOBUF  SVCLVL: N/A
* DCISZ( 16384) ICISZ( 512)  MXD  ACBSTR 002  CMBSTR 001  DFR-WRITES

* OP  |  TOTAL  |  SEQ  |  DIR  |  AVG SEQ  |  TOT EXCPS  |  SEQ EXCPS  |  DIR EXCPS
* GETS |  1,000  |  4    |  996  |  3,000    |  208        |  1(D)       |  200(D)
* PUTS |  0      |  0    |  0    |  0        |  0          |  2(I)       |  5(I)
* CHECKS |  0     |  0    |  0    |  0        |  0          |  0(D)       |  0(D)
* POINTS |  0     |  0    |  0    |  0        |  0          |  0(D)       |  0(D)
* ENDREQS |  0    |  0    |  0    |  0        |  0          |  0(D)       |  0(D)
* ERASES |  0     |  0    |  0    |  0        |  0          |  0(D)       |  0(D)
* OTHERS |  0    |  0    |  0    |  0        |  0          |  0(D)       |  0(D)
* DSTOTAL  1,000  4  996  3,000  208  3  205

```

Projected Savings Summary Report



```
FZ50.APASUMM.TXT - Notepad
File Edit Format View Help
1
02/19/2015 APPLICATION PERFORMANCE ANALYZER (APA) V 4.1 (M0) 03:25:37 PAGE 001
APA IS A PROPRIETARY SOFTWARE PRODUCT OF ROCKET SOFTWARE, INC.

PROJECTED SAVINGS SUMMARY

REPORTED LOW-DATE: 2015.040
REPORTED HIGH-DATE: 2015.041

VSAM EXCPS FOR NON-LOADS IN CANDIDATE LIST:
ACTUAL: 55,408,507
PROJECTED WITH VSAM COMPONENT: 4,354,923
SAVINGS WITH VSAM COMPONENT: 51,053,584
PERCENTAGE (%) SAVINGS: 92

VSAM EXCPS FOR DATASET LOADS IN CANDIDATE LIST:
ACTUAL: 1,126,079
PROJECTED WITH LOAD COMPONENT: 205,171
SAVINGS WITH LOAD COMPONENT: 920,908
PERCENTAGE (%) SAVINGS: 81

NONVSAM EXCPS IN CANDIDATE LIST:
ACTUAL: 361,576
PROJECTED WITH NVSAM COMPONENT: 229,259
SAVINGS WITH NVSAM COMPONENT: 132,317
PERCENTAGE (%) SAVINGS: 36
```


Projected Savings Detailed Report



JOB: EAECSTB1
STEP: SB1J0020
PGM: NSPB10B

DDNAME	DSNAME	CURR DATA BUFF	CURR INDEX BUFF	CURRENT EXCP	PROJECTED EXCP	BLKSZ DATA	BLKSZ INDEX	COMPONENT	EXCP GAIN
FHST0ARS	EAENS.PERM.NSF0ARS	2	1	1172	94	18432	4096	VSAM NSR	91,98
SORTOUT	EAENS.PERM.NSF0ARS	2	1	10194	905	18432	4096	LOAD	91,12
FHST0ARS	EAENS.PERM.NSF0ARS	2	1	749011	191280	18432	4096	VSAM NSR	74,46
FHST0ARS	EAENS.PERM.NSF0ARS	2	1	1870	826	18432	4096	VSAM LSR	55,83
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	1172	94	18432	4096	VSAM NSR	91,98
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	9487	1848	20480	4096	VSAM LSR	80,52
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	9487	1848	20480	4096	VSAM LSR	80,52
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	749011	191280	18432	4096	VSAM NSR	74,46
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	433769	135451	20480	4096	VSAM LSR	68,77
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	433769	135451	20480	4096	VSAM LSR	68,77
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	1870	826	18432	4096	VSAM LSR	55,83
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	780	349	20480	4096	VSAM LSR	55,26
FHST0AR1	EAENS.PERM.NSF0ARS.AIX.PATH	2	1	780	349	20480	4096	VSAM LSR	55,26

Summary: Performance Essential Value



- z/OS mainframe platforms
- VSAM batch optimization
 - Tightly coupled with VSAM and DFSMSdfp
 - Automates analysis needed to set parameters for I/O tuning
- Automated – learns how the data is accessed
 - Constantly applies the optimum buffering method
- Benefits VSAM, non-VSAM and LOAD processing

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