Hints & Tips Of Dataset I/O Performance

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Agenda

- Why Do We Need To Analize SMF 42 Records?
- How is the life of I/O in MVS ?
- Dataset Access Types
- What is in SMF 42 ?
- SMF42 Dataset I/O Statistics
- Sample Studies Using SMF 42
  - Batch Bottleneck Problem
  - SSD Analiz Using SMF42 Dataset I/O Statistics
  - Effect Of Changes in DB2 I/O Management

Who is GT ?

- A wholly-owned subsidiary of Garanti Bank, the second largest private bank in Turkey owned by Doğuş Group and BBVA.
- One of the largest private internal IT service providers in Turkey
- Most up-to-date IT infrastructure
- Tightly integrated and fully in-house developed, custom-fit IT solutions
- Uninterrupted transaction capability and infrastructure security
- Well-reputed as a company of "firsts"
- Visionary and continuous investment in technology since 90's

- Fast decision making and strong communication from top to down
- Centralized management reporting systems, enable management to take timely actions
- Advanced CRM applications
- Paperless banking

Why Do We Need To Analyse SMF 42s ?

Large Volumes – Device Responetime Relationship

Batch Run Performance Problem Troubleshooting
-Including DB2 TableSpaces
Merging With SMF 30s

More information related to most loved onces

….And many other important items related to dataset activity

Way to understand what Is going on in each DB2 I/O management changes

If you start using SSD, analysis of dataset I/O performance becomes greate periodic method to monitor performance

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Life OF I/O Flow

User APP AS

Get/Put/Read/Write ①

Access Method Services

VSAM / QSAM /BSAM

Modules Translate Application Requests To Access Method Services ②

Builds CCWs & EXCP is used to pass I/O Request To I/O Supervisor

IOSAS – I/O Supervisor

I/O Drivers ③ **Excepts Channel Program via STARTIO macro,Translates All Virtual Addresses To Real For Buffers**

④ **Waits Until ALL previously issued I/O requests to device has been served,and that device is free**

⑤ **Send Command To Channel Subsystem Using SSCH**

⑤a **Moves ORB to subchannel**

⑤b **Places Subchannel in HSA queue (Initiative Queue)**

HSA(Memory)

Initiative Queue

UCW

Subchannel
Subchannel
Subchannel
Subchannel
Subchannel
Subchannel
Subchannel

⑪ **Handles I/O Interrupt & Notifies Acc Method with SRB**

Channel Subsystem

CHANNELS

SAP

Link Buffers ⑦ **Waits For Path To Be Available**

Link Buffers

Link Buffers ⑧ **Passes CCWs To Disk subsystem**

⑥ **Executes UCW Picks The Best Path To Send The Operation (Choose Path using posible onces in Subchannel Information- PathMask)**

Disk Subsystem

I/O Enclosure – HOST Adapters

Cluster | **Cluster**

NVS | **NVS** — **XRC**

Cache | **Cache** — **PPRC**

⑨ **Decodes CCWs Performs I/O Operation First tries to use cache (I/O complete) If not,issues SCSI commands To HDDs**

⑩ **Reads & Writes Data Using SCSI commands to physical disk Disk Enclosure**

Which Period Of Time Causes I/O ResponseTime Components ?

User APP AS

Get/Put/Read/Write 1

Access M...

VSAM

Channel Subsystem

Modules Translate Application Req...
Access Method Services

5 -3 IOSQTime

Builds CCWs & EXCP is used to pass I/O Request
To I/O Supervisor

2

SAP

Data Transfer ConnectTime

7 Waits For Path To Be Available

IOSAS – I/O Supervisor

Link Buffers

I/O Drivers

3 Excepts Channel Program via
STARTIO macro,Translates All
Virtual Addresses To Real For
Buffers

6 Executes UCW
Picks The Best
Path To Send
The Operation
(Choose Path
using posib...
onces in...
Subch...
Infor...

Link Buffers

Passes CCWs
To Disk subsystem

4 Waits Until ALL previously issued I/O requests to
device has been served,and that device is free

5 Send Command To Channel Subsystem Using SSCH

5a Moves ORB to...

9-6 Pend Time

5b Places Subchann... ...itiative Queue)

9,10+ PPRCCopyTime+XR C-WP DisconnectTime *10-Cache Miss (Subchannel is busy but device is not connected)

...ters

Handles I/O Interrupt & Notifies Acc
Method with SRB

11

HSA(Memory)

Initiative Queue

UCW

Subchannel

Subchannel
Subchannel
Subchannel
Subchannel
Subchannel
Subchannel

Cluster

NVS

Cache

Cluster

NVS **DeStaging** **XRC**

Cache **PPRC**

9 Decodes CCWs
Performs I/O Operation
First tries to use cache (I/O complete)
If not,issues SCSI commands To HDDs

10 Reads & Writes Data Using SCSI
commands to physical disk
Disk Enclosure

Staging

Life Of I/O Terms That We Need To Remember

- Each Device Has UCB in SQA in MVS
- Each Device Has Corresponding Subchannel Number maintained by Channel Subsytem
- UCB contains subchannel number,device type,
  List of users that have outstanding request for I/O on device

- Channel Subsystem Identifies Device Through Subchannel Number
- UCW are created during POR /dynamic IODF activation,located in HSA
- UCW(Unit Control Word) contains control blocks with subchannel description & status

Complete your sessions evaluation online at SHARE.org/SFEval
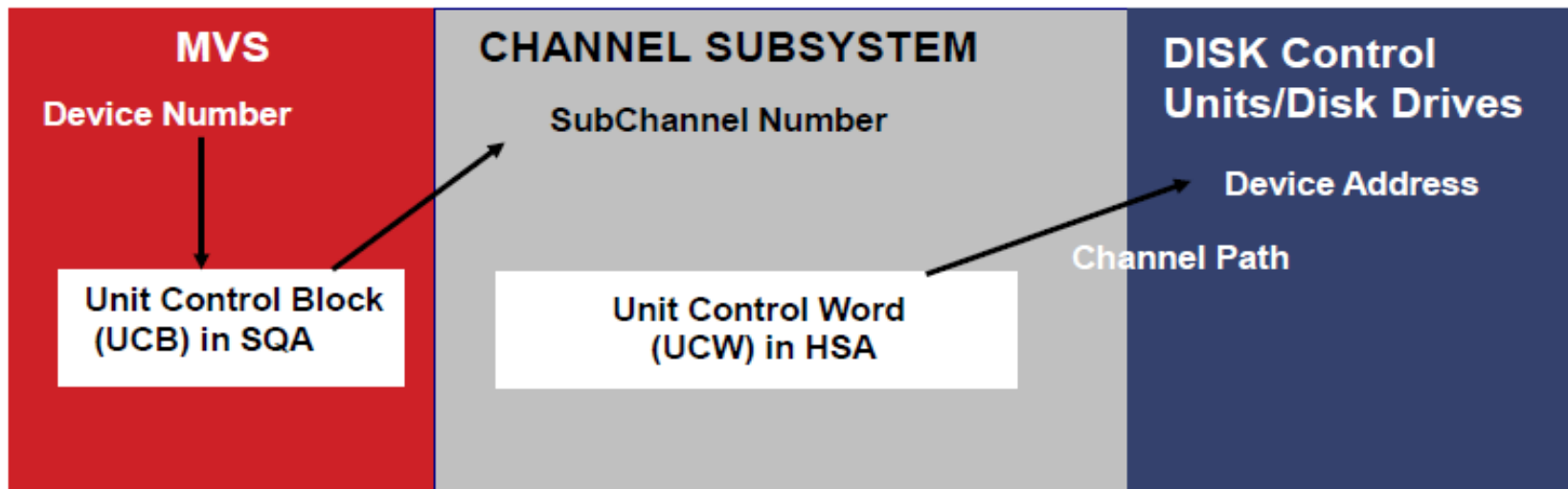
Life Of I/O – TERMs To Remember

❑ **SSCH : Start Subchannel Instruction - Created By IOSAS**

Specifies SubChannel Number & ORB (Operation Request Block)

SSCH	B	Displacement

General Register1

SubChannel Number

ORB
Interruption Parameter

Channel Program

CCW 1
CCW 2
…
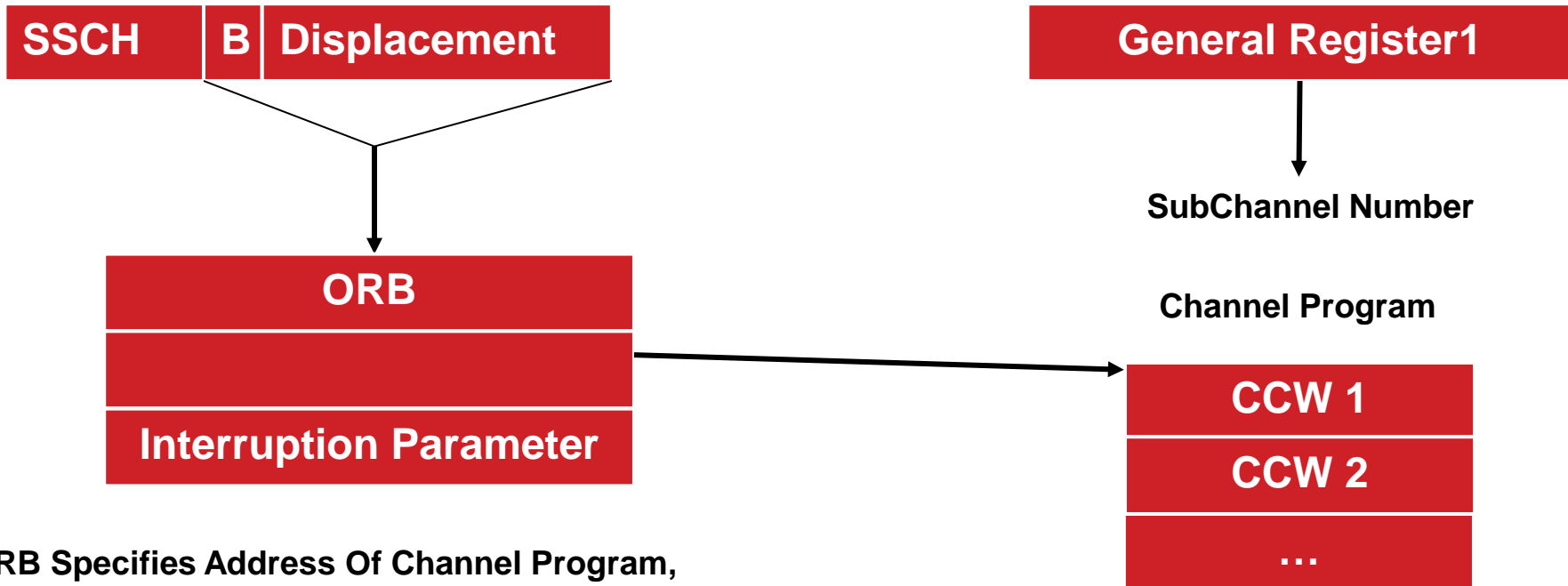
ORB Specifies Address Of Channel Program,
                    Interruption Parameter,
                    Storage Key,
                    Channel Path Mask,
                    Control Bits

❑ **Channel Program Is A Set Of CCWs**

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I/O Response Time Components

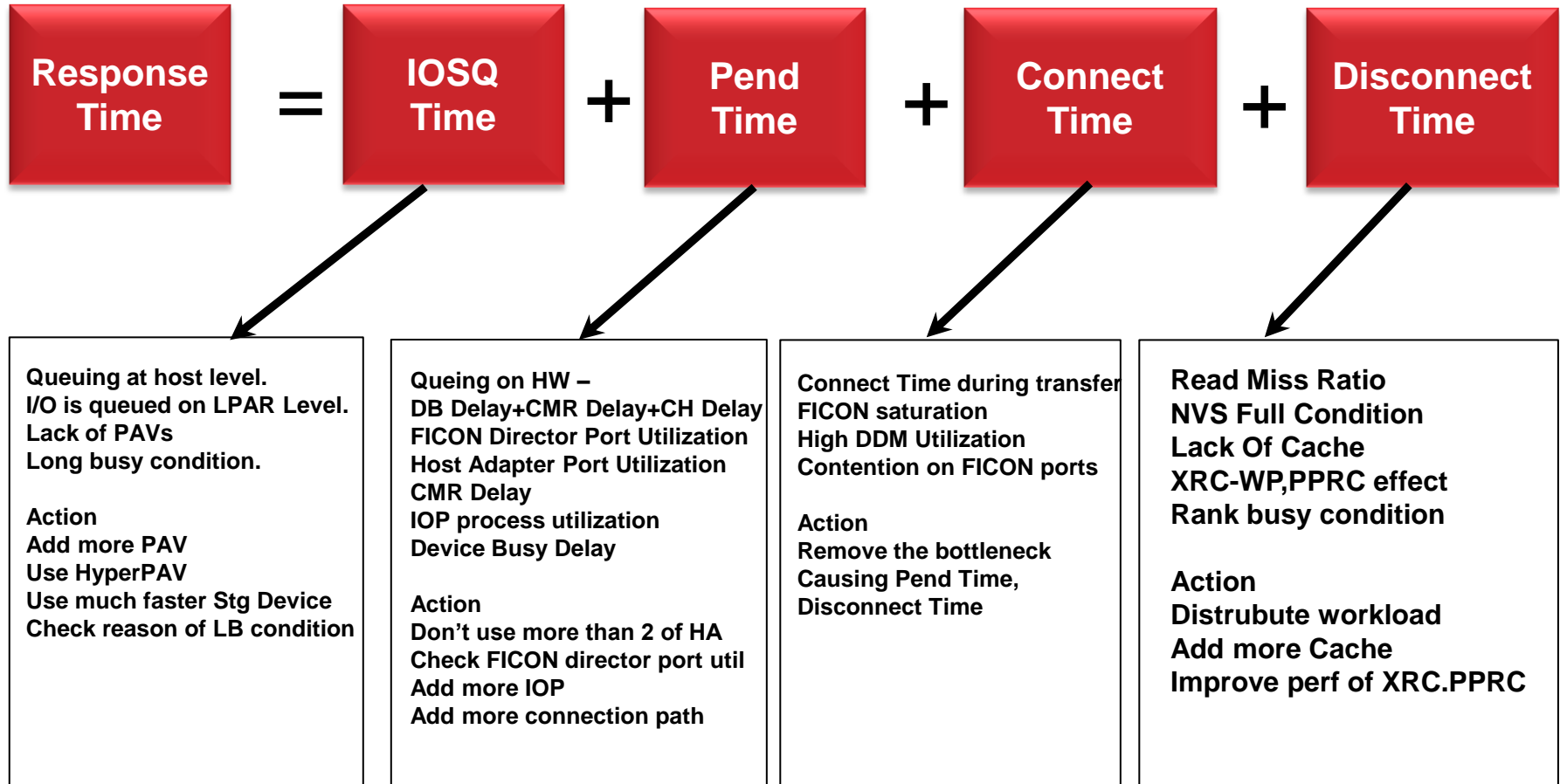**Response Time** = **IOSQ Time** + **Pend Time** + **Connect Time** + **Disconnect Time**

New Interrupt Delay Time Is Not Included In ResponseTime
This will be very usefull information

Items That Effect Each ResponseTime Component

What Are The Possible Reasons? Where To Look ? What To Do ?

Response Time = **IOSQ Time** + **Pend Time** + **Connect Time** + **Disconnect Time**

| Queuing at host level.
I/O is queued on LPAR Level.
Lack of PAVs
Long busy condition.

Action
Add more PAV
Use HyperPAV
Use much faster Stg Device
Check reason of LB condition | Queing on HW –
DB Delay+CMR Delay+CH Delay
FICON Director Port Utilization
Host Adapter Port Utilization
CMR Delay
IOP process utilization
Device Busy Delay

Action
Don't use more than 2 of HA
Check FICON director port util
Add more IOP
Add more connection path | Connect Time during transfer
FICON saturation
High DDM Utilization
Contention on FICON ports

Action
Remove the bottleneck
Causing Pend Time,
Disconnect Time | Read Miss Ratio
NVS Full Condition
Lack Of Cache
XRC-WP,PPRC effect
Rank busy condition

Action
Distrubute workload
Add more Cache
Improve perf of XRC.PPRC |

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Dataset Access Method Types

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Application Programs
DFHSM
JES2
DFDSS
DFSORT

→ **EXCP** ──STARTIO──→

Media Manager ──STARTIO──→

QSAM ──STARTIO──→

VSAM ──STARTIO──→

JES3 ──STARTIO──→

ASM ──STARTIO──→

I/O SUPERVISOR

SSCH →

CHANNEL SUBSYSTEM

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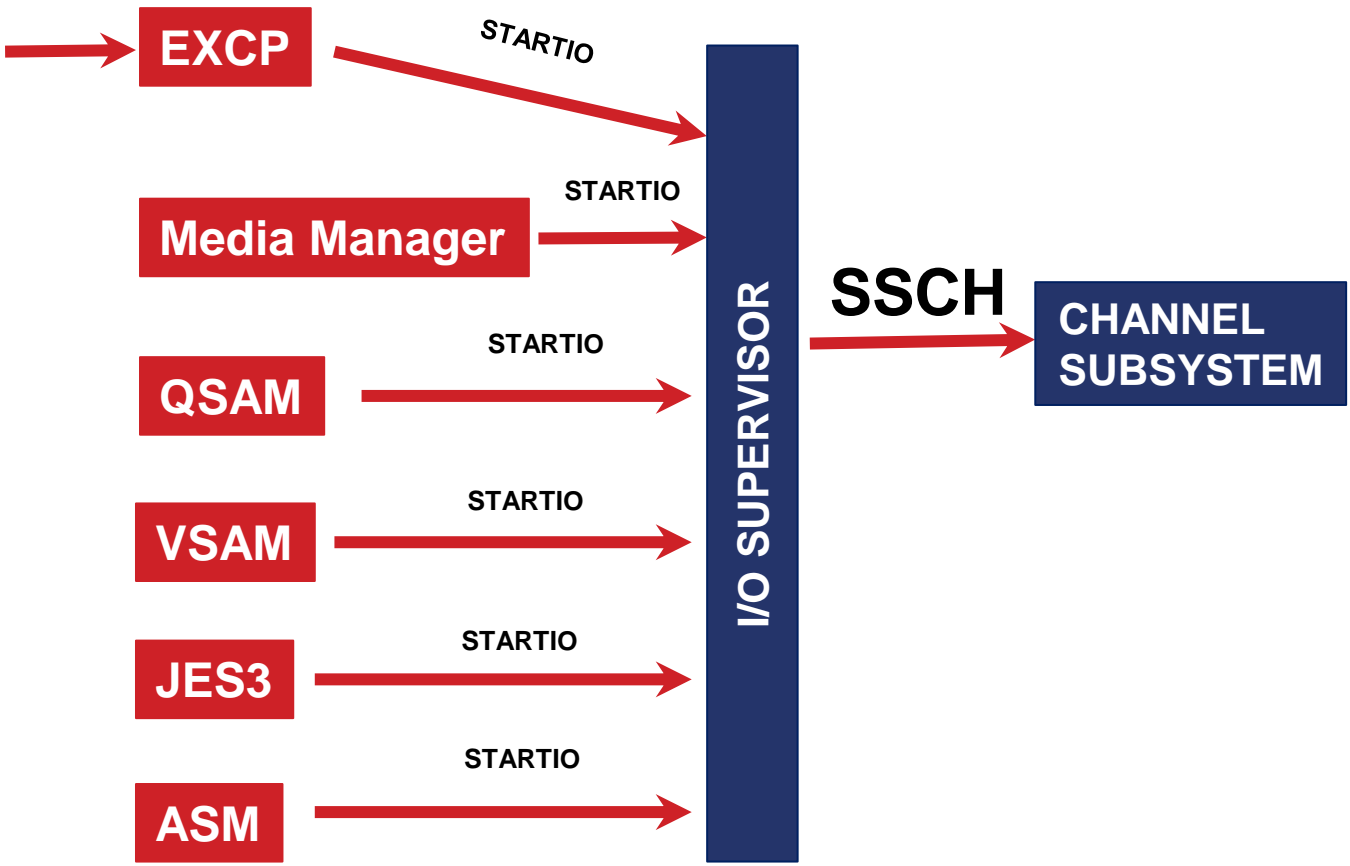
SMF42 Subtypes

- Subtype 1 – Storage Class Related Information-BufferManagement Facility
- Subtype 2 – Cache Control unit
- Subtype 3 – SMS Configuration Changes
- Subtype 4 – SDM Statistics /Extented Seq Dataset Concurrent Copy
- Subtype 5 – Storage class VTOC and VVDS I/O statistics.
- Subtype 6 – records DASD data set level I/O statistics.
- Subtype 7/8/26 – NFS.
- Subtype 9 – is written each time a B37/D37/E37 abend
- Subtype 10 – is written at the time of volume selection failure because of insufficient space when allocating a data set.
- Subtype 11 – is written for extended remote copy (XRC) session statistics whenever the SMF timer interval ends.
- Subtype 14 – (ADSM)
- Subtype 15/16/17/18/19 – VSAM-RLS
- Subtype 20 who/what STOW INITIALIZE to delete all the members from a PDSE
- Subtype 21 who/what when a member is deleted from a PDS or a PDSE
- Subtype 22/23 DFSMSrmm for audit/security records.
- Subtype 24 is written when a member is added or replaced from a PDS or a PDSE
- Subtype 25 who/what when a member is renamed from a PDS or a PDSE

SMF42 Subtype 6

DASD DATASET LEVEL I/O STATISTICS

There are <u>two events</u> that cause subtype 6 to be generated:
1- Close, or
2- Immediately after the recording of the type 30 interval record. There is one type 42 subtype 6 record for each type 30 interval record.

For the SMSPDSE and SMSPDSE1 address spaces, type 42 subtype 6 records are recorded at the BMFTIME interval immediately after the type 42 subtype 1 records

Complete your sessions evaluation online at SHARE.org/SFEval

Dataset Level I/O Statistics

S42DSIOR - Average Responsetime

S42DSIOC - Average Connecttime

S42DSIOP - Average Pendtime

S42DSIOD - Average Disconnecttime

S42DSIOQ - Average ControlUnitQtime

S42DSMXR – Maximum I/O Responsetime

S42DSMXS – Maximum Dataset Servicetime

Average IOSQtime in MXG variables

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Dataset Level I/O Statistics- Related To IO Count

Total IO Count

Sequential IO Count

Sequential Blocks Read/Write

Random Blocks Read/Write

DASD Rate And Several MXG fields

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Dataset Level I/O Statistics- Related To Cache

Read Cache Hit %

Write Cache Hit %

Record Level Caching

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Dataset Level I/O Statistics- Related To AS

Jobname

System

Service Class

Workload Name

Complete your sessions evaluation online at SHARE.org/SFEval

- **Using more Buffers**
- **Compression – I/O vs CPU**
- **LBI support**
- **Responsetime specific checkings**
- **Blocksize**
- **ENQs**
- **Striping**
- **Access Methods –Dataset types**

Dataset I/O Statistics Section

Offsets		Name	Length	Format	Description
0	0	S42DSIOR	4	binary	Average response time.
4	4	S42DSIOC	4	binary	Average I/O connect time. There is one SMF subtype 6 record per data set, and each record has its own S42DSIOC field.
8	8	S42DSIOP	4	binary	Average I/O pending time.
12	C	S42DSIOD	4	binary	Average I/O disconnect time.
16	10	S42DSIOQ	4	binary	Average control unit queue time.
20	14	S42DSION	4	binary	Total number of I/Qs. There is one SMF subtype 6 record per data set, and each record has its own S42DSION field.
24	18	S42DSCND	4	binary	Number of cache candidates.
28	1C	S42DSSHTS	4	binary	Number of cache hits.
32	20	S42DSWCN	4	binary	Number of write candidates.
36	24	S42DSWHI	4	binary	Number of write hits.
40	28	S42DSSEQ	4	binary	Number of sequential I/O operations. Operations counted here are not accumulated in S42DSCND and S42DSWCN.
44	2C	S42DSRLC	4	binary	Number of record level cache I/O operations.
48	30	S42DSICL	4	binary	Number of inhibit cache load I/O operations.
52	34	S42DSDA0	4	binary	Average I/O device-active-only time.
56	38	S42DSMXR	4	binary	Maximum data set I/O response time.
60	3C	S42DSMXS	4	binary	Maximum data set service time.
64	40	S42DSRDD	4	binary	Average disconnect time for reads.
68	44	S42DSRDT	4	binary	Total number of read operations.

Access Method Statistics Section

Offsets		Name	Length	Format	Description
0	0	S42AMSRB	4	binary	Sequential read: number of blocks.
4	4	S42AMSRR	4	binary	Sequential read: input/output delay.
8	8	S42AMSWB	4	binary	Sequential write: number of blocks.
12	0C	S42AMSWR	4	binary	Sequential write: input/output delay.
16	10	S42AMDRB	4	binary	Direct read: number of blocks.
20	14	S42AMDRR	4	binary	Direct read: total input/output delay.
24	18	S42AMDWB	4	binary	Direct write: number of blocks.
28	1C	S42AMDWR	4	binary	Direct write: total input/output delay.
32	20	S42AMZRB	4	binary	Number of directory reads.
36	24	S42AMZRR	4	binary	Directory read: input/output delay.
40	28	S42AMZWB	4	binary	Number of directory writes.
44	2C	S42AMZWR	4	binary	Directory write: input/output delay.

Dataset Header Section

49	31	S42DSCOD S42FIRST *	1	binary	Entry descriptor flag **Bit** **Meaning** 1... .... First data set entry since Open. .xxx xxxx Reserved.
50	32	S42DSFL1 S42DSGSR S42DSLSR S42DSRLS S42DSNSR S42DSEXC S42DSFXD S42DSPL S42DSEF S42DSEFC	1	binary	Data set descriptor flags **Bit** **Meaning** 11xx xxxx VSAM buffer flags 11.. .... GSR 10.. .... LSR 01.. .... RLS 00.. .... NSR ..x. .... Reserved ....1 .... Open for EXCP processing ..... 1... Non-VSAM fixed length records ..... .1.. Program library ....1. Extended format ....1 Compressed format
51	33	*	1	EBCDIC	Reserved.
52	34	S42DSIOO	4	binary	Offset to data set I/O statistics section.
56	38	S42DSAMO	4	binary	Offset to access method statistics section.
60	3C	S42DSVOL	6	EBCDIC	Volume serial number.
66	42	S42DSDEV	2	binary	Device number.
68	44	S42DSSC	8	EBCDIC	Storage class name.
76	4C	S42DSBSZ	4	binary	Block size. For concatenated data sets, this data is taken from the first data set.
80	50	S42DSTRP	2	binary	Number of stripes
82	52	*	6	EBCDIC	Reserved.

Dataset Header Section

Offsets		Name	Length	Format	Description
0	0	S42DSNXT	4	binary	Offset to the next data set header section (0 if the last data set).
4	4	S42DSN	44	EBCDIC	Data set name.
48	30	S42DSTYP	1	binary	Data set type.

Value | Meaning
0 | Other
1 | Physical sequential
2 | PDS
3 | PDSE
4 | Direct access
5 | ISAM
6 | EXCP
7 | Extended physical sequential data set
10 | HFS
16 | KSDS data component
17 | KSDS index component
18 | Variable RRDS data component
19 | Variable RRDS index component
20 | Fixed length RRDS
21 | Linear data set
22 | ESDS

Sample One Dataset

SYSTEM	SMFTIME	ZDATE	AVGCONMS	AVGCUQMS	AVGDAOMS	AVGDISMS	AVGIOQMS	AVGPNDMS	BLKSIZE	CACHCAND	CACHHITS	CACHRATE	CHITPCT	CIOPCT	DASDMPL
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	1.664	0.128	0	4096	145	95	0.105555556	65.51724138	100	0.000288711
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	1.92	0.256	0	4096	119	74	0.082222222	62.18487395	100	0.000287716
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	1.664	0.512	0	4096	10	9	0.01	90	100	2.41778E-05
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	3.328	0.128	0	4096	3	2	0.002222222	66.66666667	100	0.00001152
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	0	0.128	0	4096	6	6	0.006666667	100	100	8.53E-07
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	0.256	0.256	0	4096	33	31	0.034444444	93.93939394	100	1.87733E-05
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	1.92	0.128	0	4096	17	15	0.016666667	88.23529412	100	3.86844E-05
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	0	0.128	0	4096	23	23	0.025555556	100	100	3.27E-06
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	0.768	0.256	0	4096	126	110	0.122222222	87.3015873	100	0.00014336
PRDA	16JAN2013:00:00:00.03	21-Jan-13	0	0	0	0	0.128	0	4096	115	115	0.127777778	100	100	1.63556E-05
PRDA	16JAN2013:00:15:00.04	21-Jan-13	0	0	0	2.048	0.256	0	4096	169	106	0.117777778	62.72189349	100	0.00043264

Sample One Dataset

DASDRATE	DCMEPCT	DEVNR	DSEFIRST	DSNAME	DSTYPE	DURATM	ENDTIME	HITPCT	ICLS	INTVCLOS	IOCOUNT	JOB
0.161111111	0	2206	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	65.51724138	0	1:INTERVAL	145	PDA2DBM1
0.132222222	0	260F	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	62.18487395	0	1:INTERVAL	119	PDA2DBM1
0.011111111	0	A001	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	90	0	1:INTERVAL	10	PDA2DBM1
0.003333333	0	A309	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	66.66666667	0	1:INTERVAL	3	PDA2DBM1
0.006666667	0	A407	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	100	0	1:INTERVAL	6	PDA2DBM1
0.036666667	0	A600	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	93.93939394	0	1:INTERVAL	33	PDA2DBM1
0.018888889	0	A700	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	88.23529412	0	1:INTERVAL	17	PDA2DBM1
0.025555556	0	B10D	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	100	0	1:INTERVAL	23	PDA2DBM1
0.14	0	B20D	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	87.3015873	0	1:INTERVAL	126	PDA2DBM1
0.127777778	0	B30D	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	15JAN2013:23:59:59.00	100	0	1:INTERVAL	115	PDA2DBM1
0.187777778	0	2206	N	PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A001	21:LINEAR DATA SET	15:00.0	16JAN2013:00:14:59.00	62.72189349	0	1:INTERVAL	169	PDA2DBM1

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Sample One Dataset

MAXRSPTM	MAXSRVTM	PERFGRP	RCIPCT	RDHITPCT	READTIME	RESPTIME	RLCS	S42AMDRB	S42AMDRR	S42AMDWB	S42AMDWR	S42AMSRB	S42AMSRR	S42AMSWB	S42AMSWR	S42AMZRB
10.368	10.368	0	0	65.5	05JAN2013:02:31:47.62	1.792	0	144	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
12.928	12.928	0	0	62.2	05JAN2013:02:31:47.62	2.176	0	118	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
18.048	17.792	0	0	90	05JAN2013:02:31:47.62	2.176	0	10	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
10.24	10.112	0	0	66.7	05JAN2013:02:31:47.62	3.456	0	3	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
0.128	0	0	0	100	05JAN2013:02:31:47.62	0.128	0	6	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
6.784	6.528	0	0	93.9	05JAN2013:02:31:47.62	0.512	0	33	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
25.344	25.088	0	0	88.2	05JAN2013:02:31:47.62	2.048	0	17	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
0.64	0	0	0	100	05JAN2013:02:31:47.62	0.128	0	23	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
12.416	12.16	0	0	87.3	05JAN2013:02:31:47.62	1.024	0	125	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
1.536	0.256	0	0	100	05JAN2013:02:31:47.62	0.128	0	122	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0
43.52	43.52	0	0	62.7	05JAN2013:02:31:47.62	2.304	0	181	00:00.0	0	00:00.0	0	00:00.0	0	00:00.0	0

Sample One Dataset

S42AMZWR	S42DSBUF	S42DSEF	S42DSEFC	S42DSEXC	S42DSFL1	S42DSFXD	S42DSPL	S42DSRDD	S42DSRDT	S42DSTRP	S42JDDSO	S42JDGMO	S42VIO	SEQIOS	SRVCLASS	STARTIME	STORCLAS	VOLSER
00:00.0	0:NSR	Y			**			1.664	145	0	11169	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGXF6
00:00.0	0:NSR	Y			**			1.92	119	0	10753	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGXU6
00:00.0	0:NSR	Y			**			1.664	10	0	10961	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGX37
00:00.0	0:NSR	Y			**			3.328	3	0	10337	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDG185
00:00.0	0:NSR	Y			**			0	6	0	10545	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	APL000
00:00.0	0:NSR	Y			**			0.256	33	0	11377	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	DBP267
00:00.0	0:NSR	Y			**			1.92	17	0	10129	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	DBP246
00:00.0	0:NSR	Y			**			0	23	0	11793	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGXL0
00:00.0	0:NSR	Y			**			0.768	126	0	11585	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDRX03
00:00.0	0:NSR	Y			**			0	115	0	12001	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDG046
00:00.0	0:NSR	Y			**			2.048	169	0	10129	59:59.0		0	SYSSTC	15JAN2013:23:59:59.00	SCSTR4	PDGXF6

Complete your sessions evaluation online at SHARE.org/SFEval

Sample One Dataset

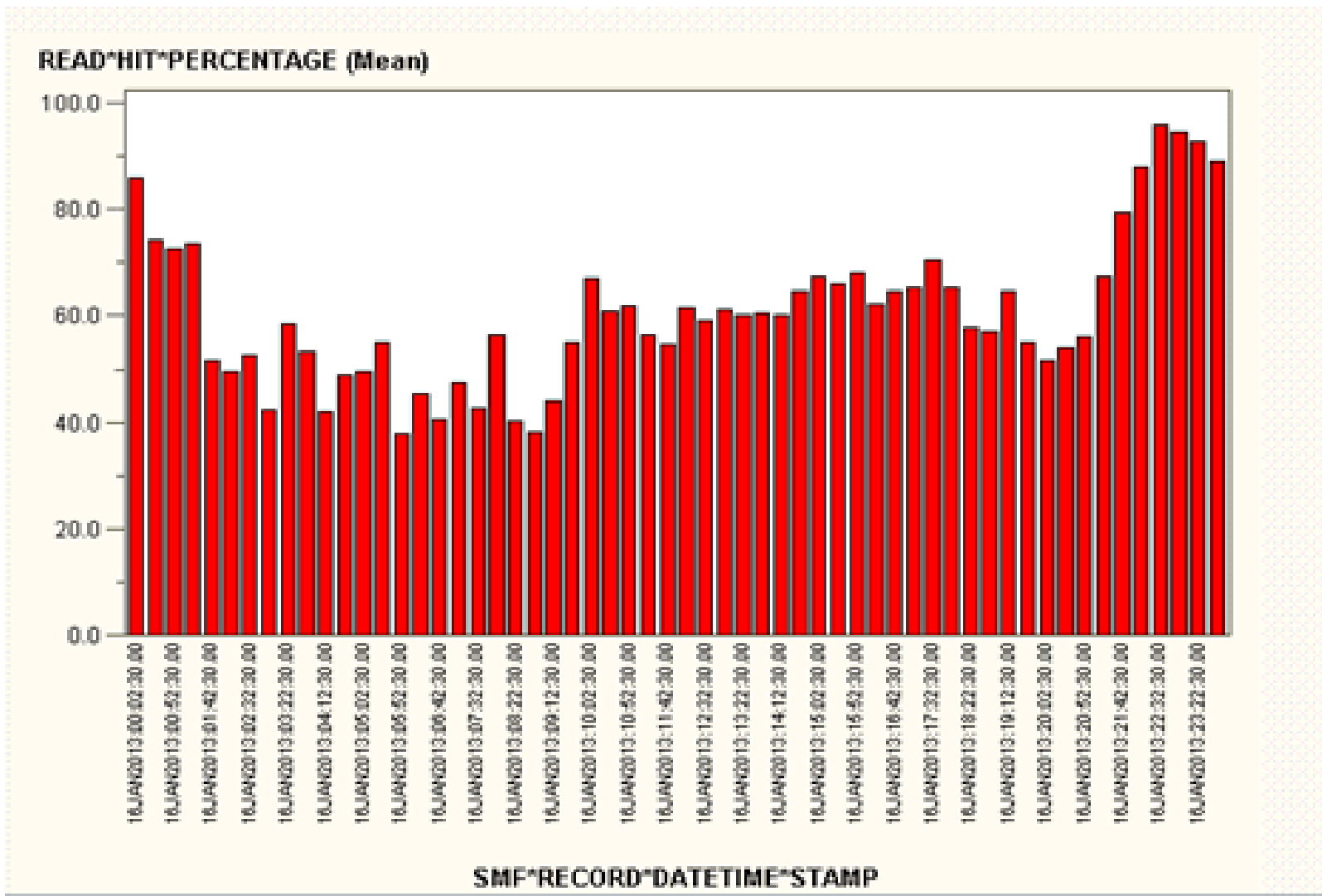| S42DSRDD	S42DSRDT	S42DSTRP	S42JDDSO	S42JDGMO	S42VIO	SEQIOS	SRVCLASS	STARTIME	STORCLAS	VOLSER	WLMNAME	WRHITPCT	WRITCAND	WRITHITS
1.664	145	0	11169	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGXF6	SYSTEM	.	0	0
1.92	119	0	10753	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGXU6	SYSTEM	.	0	0
1.664	10	0	10961	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGX37	SYSTEM	.	0	0
3.328	3	0	10337	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDG185	SYSTEM	.	0	0
0	6	0	10545	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	APL000	SYSTEM	.	0	0
0.256	33	0	11377	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	DBP267	SYSTEM	.	0	0
1.92	17	0	10129	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	DBP246	SYSTEM	.	0	0
0	23	0	11793	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDGXL0	SYSTEM	.	0	0
0.768	126	0	11585	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDRX03	SYSTEM	.	0	0
0	115	0	12001	59:59.0		0	SYSSTC	15JAN2013:23:44:59.00	SCSTR4	PDG046	SYSTEM	.	0	0
2.048	169	0	10129	59:59.0		0	SYSSTC	15JAN2013:23:59:59.00	SCSTR4	PDGXF6	SYSTEM	.	0	0

Datasets That Are Needed Special Care

- DB2 Log Copy Datasets
- DB2 Work Datasets
- System Page Datasets
- DB2 Table Spaces Loved Onces
- A Critical Batch Job's Datasets
- Critical AS's (System AS,CICS,etc) Datasets
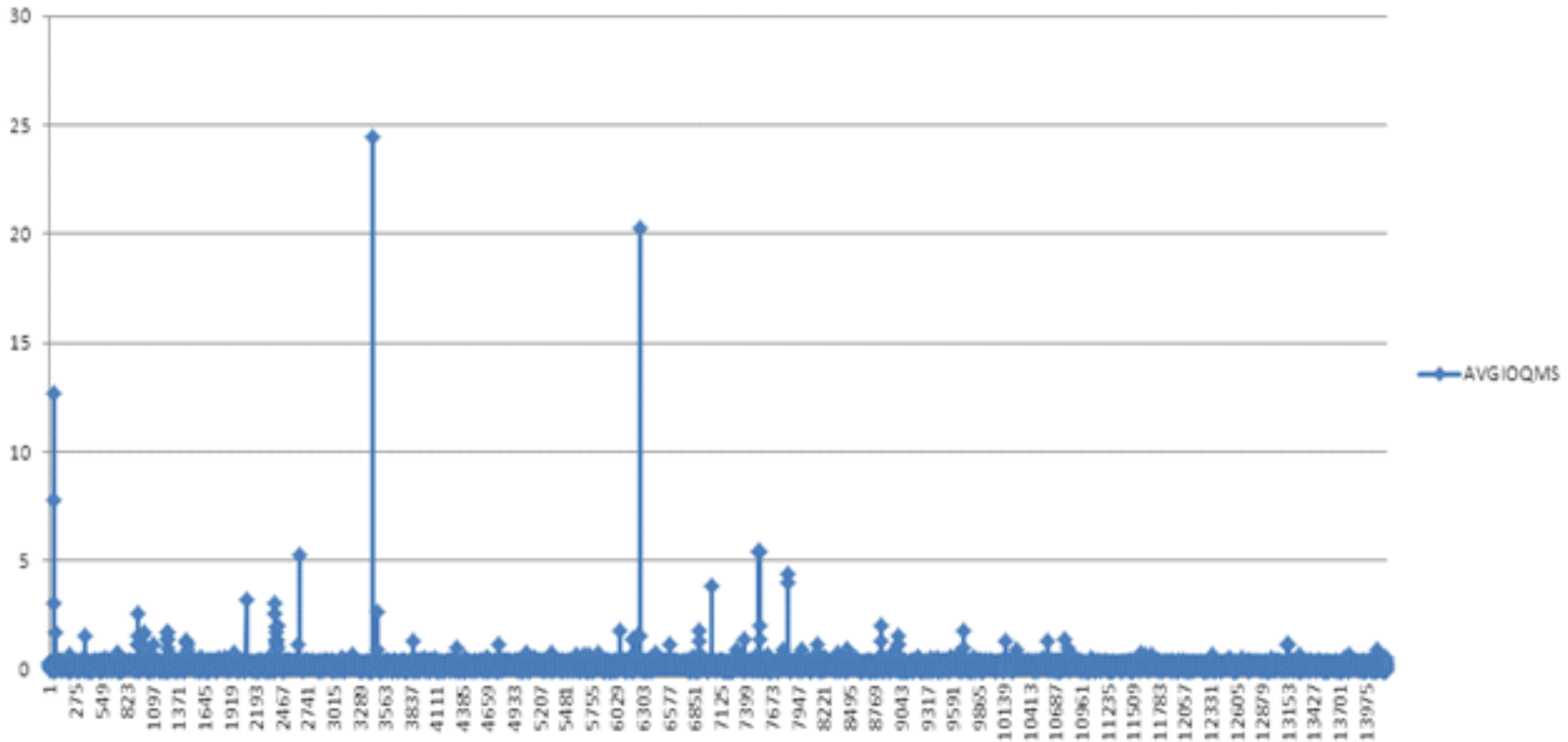
SrvClass Based IO Count – Seq + Total

	SRVCLASS	SUM_of_SEQIOS	SUM_of_IOCOUNT
1		4	407
2	SBATHIG	149896309	156851330
3	SBATIMP	15993355	19206888
4	SBATLOW	328034011	358641638
5	SBATMED	56844105	61516121
6	SCICHIGA	0	186856
7	SCICHIGB	4298	270880
8	SCICHIGC	0	3124555
9	SCICHIGD	0	110004
10	SCICHIGE	278	166036
11	SCICHIGG	0	195111
12	SCICHIGW	0	302
13	SCICMED	0	1865
14	SHIGH	9423285	28941996
15	SLOW	9991	12320
16	SMED	719971	10511042
17	SMON	47842	42806213
18	SMQHIG	155941759	156143678
19	SOEMVS	30760	1055809
20	STSO	1247386	1703129
21	SYSSTC	131105406	4968213368
22	SYSTEM	2568578	49065084

Sample Report- Read Hit %

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DB2 Work Datasets Study – Report 1

AVGIOQMS

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DB2 Work Datasets Study – Report 2

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DB2 Work Datasets Study – Report 3
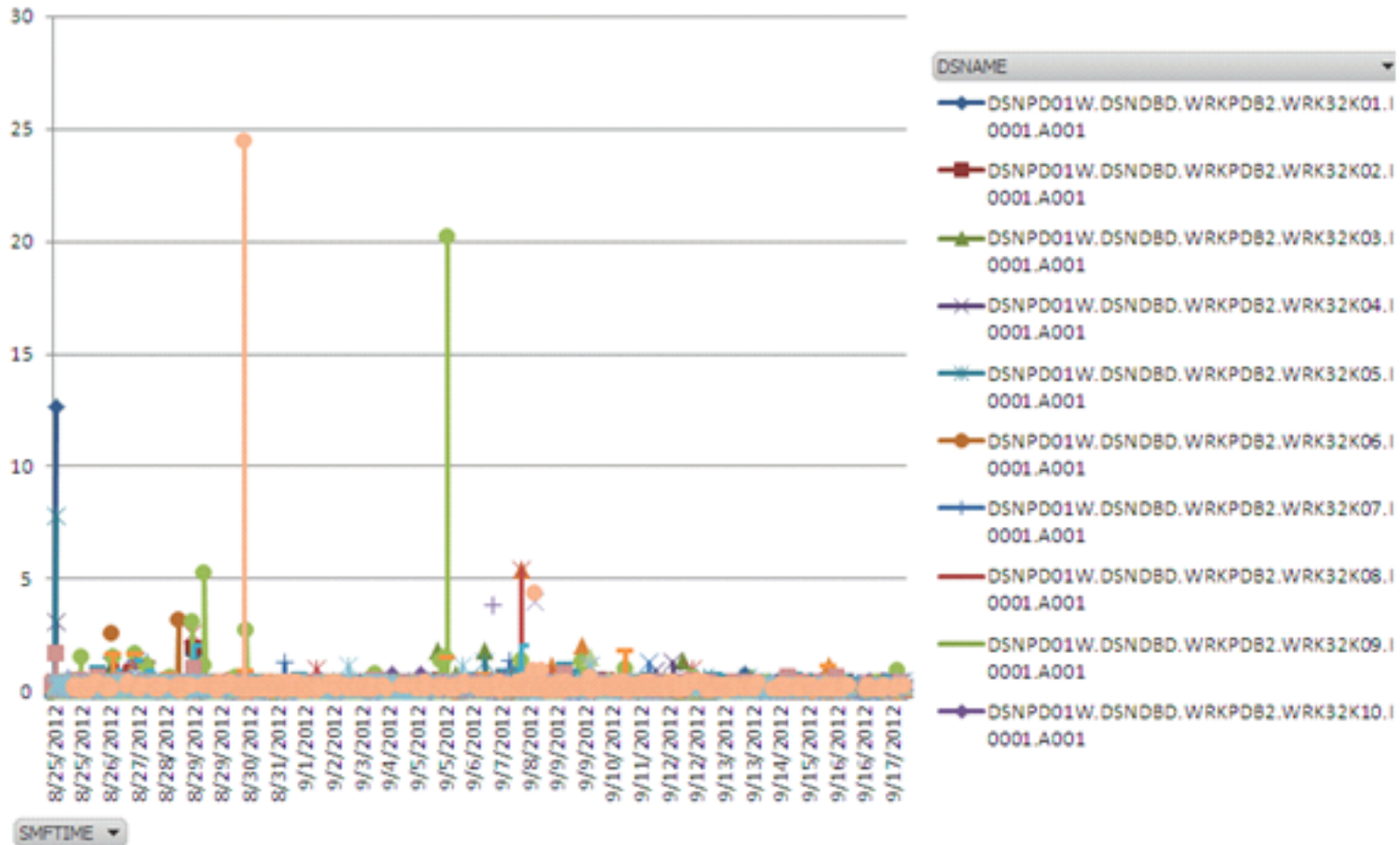
Complete your sessions evaluation online at SHARE.org/SFEval
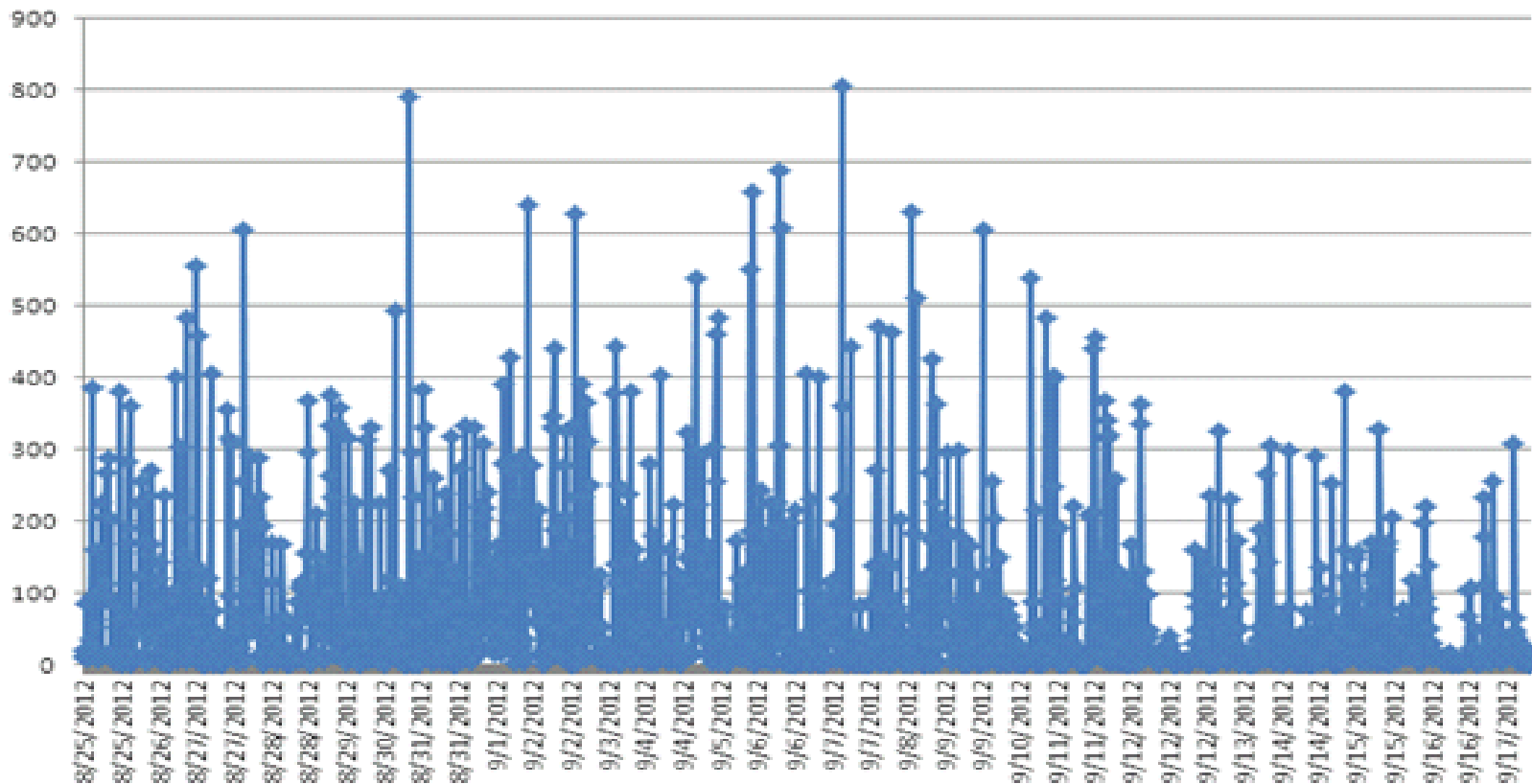
SSD Eligible Datasets Analysis Using Flashda

Flashda is IBM's free program that is used in SSD analysis

http://www-03.ibm.com/systems/z/os/zos/downloads/flashda.html

Flashda uses SMF42 and SMF74

SAS program – I requested from Barry to write Windows SAS version of this program and we are lucky that he accepted and I used it for our data ,in future it will be available inside MXG code

Sample Output Of Flashda Program

DEVICE NUMBER	VOLSER	DATA SET NAME	TOTAL READ-ONLY DISCON.TIME (MILLISEC)	AVERAGE READ-ONLY DISCON.TIME (MILLISEC)	TOTAL DISCONNECT TIME (MILLISEC)	AVERAGE DISCONNECT TIME (MILLISEC)	AVERAGE RESPONSE TIME (MILLISEC)	AVERAGE I/O CONNECT TIME (MILLISEC)	AVERAGE I/O PENDING TIME (MILLISEC)	AVERAGE CONTROL QUEUE T (MILLIS	STORAG CLASS	BLOCK SIZE	TOTAL READ I/O COUNT	TOTAL WRITE I/O COU
A000	PDGX36	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A004	2205670.70	2.015	2205738.3	2.013	2.268	0.009	0	0	SCSTD	4096	1094706	1112
A000	PDGX36	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A004	2083757.1	1.57	2083775.2	1.57	1.8	0.003	0	0	SCSTD	4096	1326854	812
A201	PDGXJ3	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A003	1985207.80	3.478	1985351.5	3.475	4.302	0.553	0	0.001	SCSTD	4096	570711	611
A201	PDGXJ3	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A003	1956466.1	2.808	1956593.6	2.807	3.472	0.41	0	0	SCSTD	4096	696657	374
4B08	PDGYH8	PISG.DSNDBD.DPGIS01.SISGHSTS.J0001.A002	1815363.8	11.624	1927896.4	9.741	11.973	1.771	0.103	0	SCSTR4	4096	156169	41749
A404	PDG180	PMSH.DSNDBD.DPHMS01.XMSLOGM2.J0001.A002	1771728.90	2.867	1771597.7	2.861	3.282	0.146	0	0	SCSTR4	4096	617994	1143
9612	PDG355	**PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A011**	1627754.1	1.062	1626700.5	1.056	1.263	0.006	0.006	0	SCSTR4	4096	1533387	7288
4306	PDGYD6	PBAG.DSNDBD.DPGBA01.SBAHWFTS.I0001.A001	1625551.8	1.167	1625648.5	1.167	2.787	1.348	0.021	0	SCSTD	4096	1393230	335
9612	PDG355	**PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A011**	1614142.80	1.259	1615639.5	1.254	1.448	0	0	0	SCSTR4	4096	1282163	6042
A201	PDGXJ3	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A003	1587131.1	11.085	2339316.1	3.831	5.02	0.914	0	0	SCSTD	4096	143181	467402
4B08	PDGYH8	PISG.DSNDBD.DPGIS01.SISGHSTS.J0001.A002	1584432.7	11.33	1698215.6	8.573	10.546	1.604	0.071	0	SCSTR4	4096	139849	58238
A201	PDGXJ3	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A003	1582761.9	12.645	2261685.7	4.326	5.531	0.948	0	0.002	SCSTD	4096	125167	397681
9610	PDG350	**PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A010**	1539084.9	2.173	1541059	2.167	2.401	0.014	0.014	0	SCSTR4	4096	708193	2798
B800	PDGXJ6	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A002	1519149.10	2.888	1519358	2.885	3.405	0.274	0	0	SCSTD	4096	525971	618
A201	PDGXJ3	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A003	1513164.2	8.31	2136978.8	2.868	3.604	0.462	0	0	SCSTD	4096	182082	562965
2602	PDG060	**PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A012**	1498022.50	1.128	1501076.2	1.118	1.338	0.01	0.002	0	SCSTR4	4096	1327933	15197
A509	PDG173	PBAG.DSNDBD.DPGBA01.SBAHWFTS.I0001.A002	1495735.1	0.774	1495742.8	0.774	1.49	0.492	0.011	0	SCSTR4	4096	1932933	8
9610	PDG350	**PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A010**	1492409.90	2.141	1492614.6	2.134	2.349	0	0	0	SCSTR4	4096	697203	2252
A201	PDGXJ3	PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A003	1482188.9	9.833	2178173	3.39	4.294	0.637	0	0	SCSTD	4096	150742	491745

Result of 20 Days Data

DatasetName		Occur Count
PBAG.DSNDBD.DPGBA01.SBAHWFTS.I0001.A003	1	70
PBAG.DSNDBD.DPGBA01.SBAHWFTS.I0001.A004	1	48
PLWG.DSNDBD.DPGLW01.SLWLOGFS.J0001.A001	1	38
PBAG.DSNDBD.DPGBA01.SBAHWFTS.I0001.A002	1	31
PFOG.DSNDBD.DPGFO01.SFOMASTS.I0001.A003	1	25
PATG.DSNDBD.DPGAT01.XATKHRB2.I0001.A001	1	23
PBAG.DSNDBD.DPGBA01.SBAHWFTS.I0001.A001	1	22
PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A004	1	22
PLIH.DSNDBD.DPHLI01.SLIRPRDS.J0001.A004	1	22
PARH.DSNDBD.DPHAR01.SARCONTS.I0001.A001	1	20
PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A002	1	20
PFUG.DSNDBD.DPGFU01.XFURXMN4.I0001.A003	1	20
PISG.DSNDBD.DPGIS05.SISACCDP.J0001.A003	1	17
PSMG.DSNDBD.DPGSM01.SSMINCMS.J0001.A001	1	17
PFOG.DSNDBD.DPGFO01.SFOMASTS.I0001.A004	1	16
PLIH.DSNDBD.DPHLI01.SLIRPRDS.J0001.A003	1	15
PBIG.DSNDBD.DPGBI04.XBIODEPE.I0001.A003	1	14
PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A010	1	13
PELG.DSNDBD.DPGEL01.SELSLARS.I0001.A001	1	12
PFOG.DSNDBD.DPGFO01.XFOURUN2.J0001.A001	1	12
PISG.DSNDBD.DPGIS05.SISACCDP.J0001.A004	1	10
PISG.DSNDBD.DPGIS05.SISACCDP.J0001.A001	1	9
PSMG.DSNDBD.DPGSM01.SSMINCMS.J0001.A003	1	9
PLIH.DSNDBD.DPHLI01.SLIRPRDS.J0001.A002	1	8
PANG.DSNDBD.DPGAN01.SANMASTS.J0001.A006	1	7
PBCG.DSNDBD.DPGBC01.SBCORFZS.I0001.A001	1	7
PISG.DSNDBD.DPGIS01.SISSERVS.I0001.A003	1	7
PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A009	1	6
PLIH.DSNDBD.DPHLI01.SLIRPRDS.J0001.A001	1	6
PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A002	1	5
PBAG.DSNDBD.DPGBA10.SBAACTCP.I0001.A003	1	5
PBIG.DSNDBD.DPGBI01.SBITEMDS.J0001.A002	1	5
PATG.DSNDBD.DPGAT01.SATCOFRS.I0001.A001	1	4

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