

The SMurF's are EXCEling

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Session **IG**



Agenda

- Introduction and Disclaimer
- SMF and Db2 Overview
- Tools and Data
- Using the Data
- The End Game



Introduction and Disclaimer

- Primarily Db2 orientated
 - More DBA than sysprog
 - Same principles apply though to any data source
- Not an in depth session on performance tuning
- Not a session on advanced EXCEL features
- So, what is it?
- It's for people who wish they had this...



Introduction and Disclaimer (contn)

- ...but only have this!
- Those two old clubs being
 - Db2 Performance Database
 - MS EXCEL
- And to stretch the allegory to limit
 - The bag is SMF!

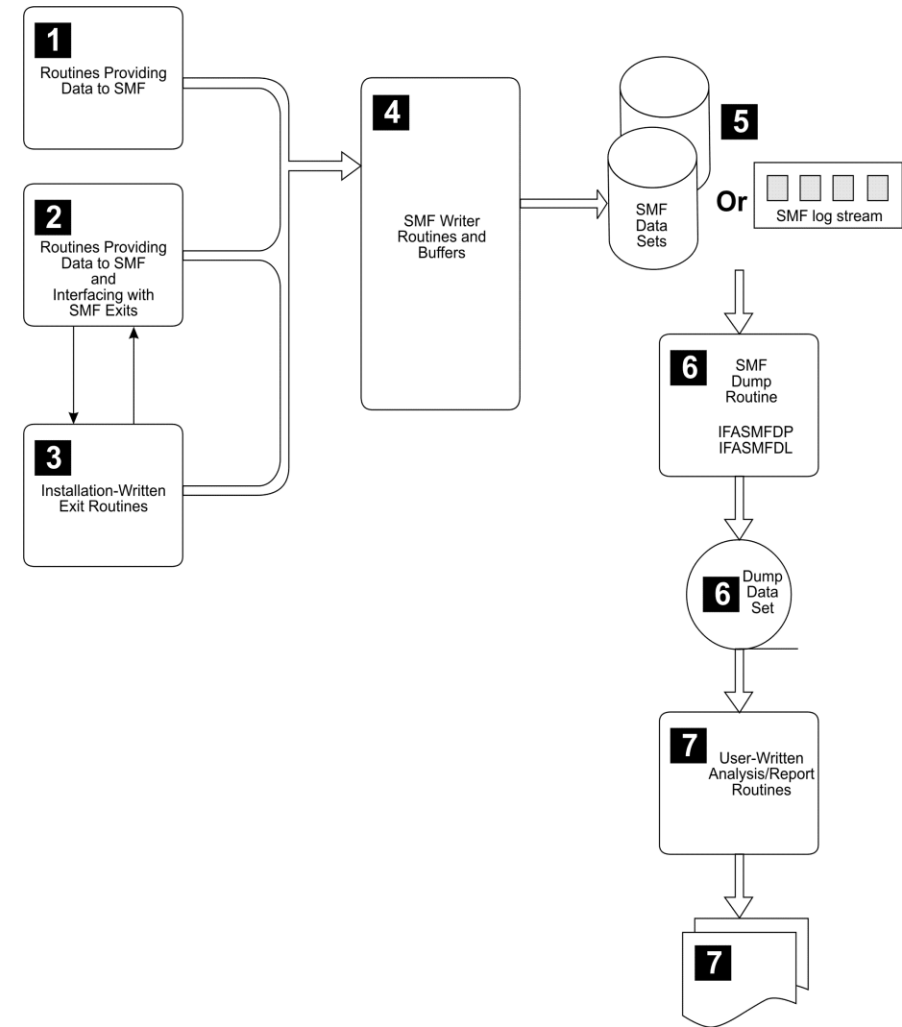


Introduction and Disclaimer (Cont)

- Royal Bank of Scotland
 - 5 Production Db2 Data Sharing Groups
 - Main DSG has 10 active members on 10 LPARs
 - 680M CICS transactions per day (17000 txns per second at peak)
 - 20M distributed transactions per day
 - 15M RRS transactions per day
 - 200K Utility executions per day
 - 300GB of Db2 SMF data per day alone
 - Problem? What to do with it all!

SMF and Db2 Overview

- What is SMF?
 - Systems Management Facility
 - Gathers measurement data from multiple sources
 - CICS, Db2, MQ, Websphere
 - Used for (amongst others)
 - System usage reports
 - Historical analysis
 - Capacity Planning, Performance Analysis
 - Reporting on SLA's



SMF and Db2 Overview

- Each SMF Record assigned a type
 - Types 0-127 reserved for IBM products
 - Types 128-255 available for user records
- Most commonly used types are
 - Job statistics – type 30
 - RMF – type 70 thru 79
 - CICS – 110
 - MQ – 115 and 116
 - DB2
 - Statistics – 100
 - Accounting – 101
 - Performance - 102

SMF and Db2 Overview

- Db2 Traces
 - Instrumentation Facility Component (IFC) allows 6 trace types
 - Statistics
 - Accounting
 - Audit
 - Performance
 - Monitor
 - Global
 - Trace types use trace classes (and can have subtypes)
 - Trace classes consist of one or more IFCIDs
 - IFCID = Instrumentation Facility Component ID

SMF and Db2 Overview

- Sample SMF Type/Db2 Trace/IFCID relationships

IFCID	TRACE	CLASS	SMF TYPE	SMF SUBTYPE	DESCRIPTION
001	STATISTICS	1	100	0	SYSTEM SERVICES STATISTICS
002	STATISTICS	1	100	1	DATABASE STATISTICS
202	STATISTICS	1	100	2	BUFFER POOL PARAMETERS
230	STATISTICS	5	100	3	DATA SHARING GLOBAL STATISTICS
225	STATISTICS	1	100	4	STORAGE STATISTICS
172 196 105	STATISTICS	3	102		DEADLOCK AND TIMEOUT STATISTICS DB TS MAPPING
003	ACCOUNTING	1	101	0	PLAN ACCOUNTING
003	ACCOUNTING	2	101	0	PLAN IN DB2 TIME
003	ACCOUNTING	3	101	0	PLAN WAIT TIME
239	ACCOUNTING	7	101	1	PACKAGE ACCOUNTING
239	ACCOUNTING	8	101	1	PACKAGE WAIT TIME
239	ACCOUNTING	10	101	1	PACKAGE ACCOUNTING DETAILS

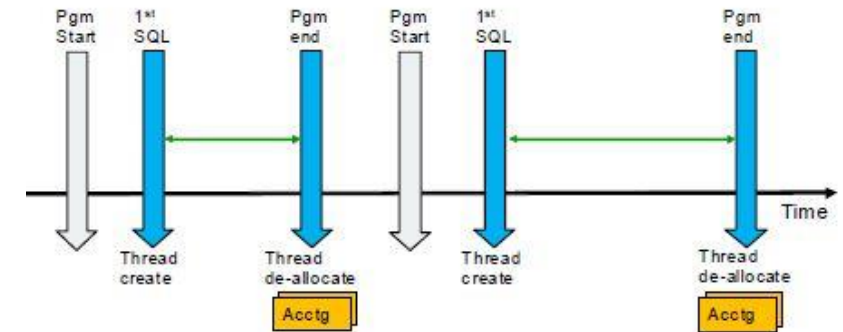
SMF and Db2 Overview

- Db2 Accounting Data
 - Primarily used for looking at thread/application level issues
 - Contains Package level information
 - Contains information on
 - Identification of thread
 - Elapsed, CPU, and wait times
 - SQL statements counters
 - RID list processing
 - Query parallelism
 - Group buffer pool and buffer pool activity
 - Data-sharing locking
 - Stored Procedures
 - Locking activity
 - Resource limit facility (RLF)
 - Distributed data facility (DDF)
 - Packages & DBRMs executed

SMF and Db2 Overview

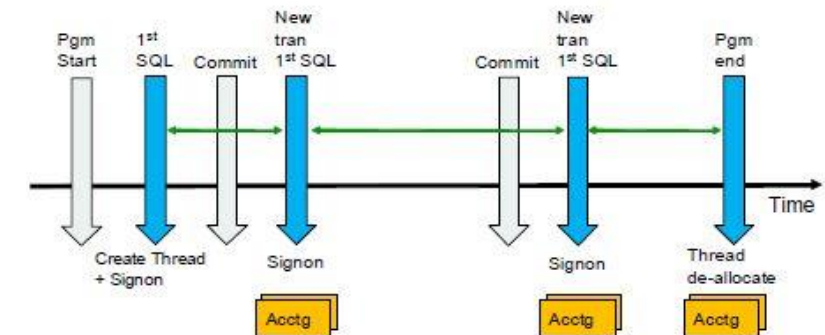
- Db2 Accounting Data
 - Produced when
 - Thread ends (deallocates or abends)
 - Thread is reused
 - Watch out for Class 1 elapsed gotcha
 - Class 1 elapsed will include wait time between protected thread re-use
 - New CICS txn may not cut record if:
 - Protected entry thread
 - Txns on DB2ENTRY use same authid
 - ACCOUNTREC=NONE or TASK

• When the thread de-allocates - normal case



• When a thread is reused

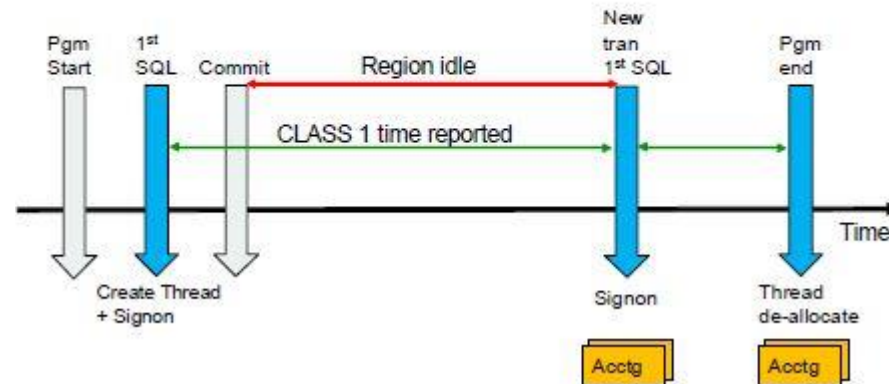
- Applies to IMS and CICS
- (There are additional options in CICS - see CICS Transaction Server - DB2 Guide)



SMF and Db2 Overview

- Db2 Accounting Data

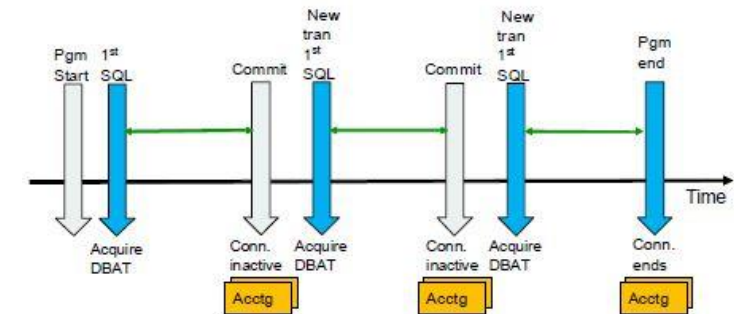
- When a thread is reused but there is a long time between transaction end and the next transaction doing signon



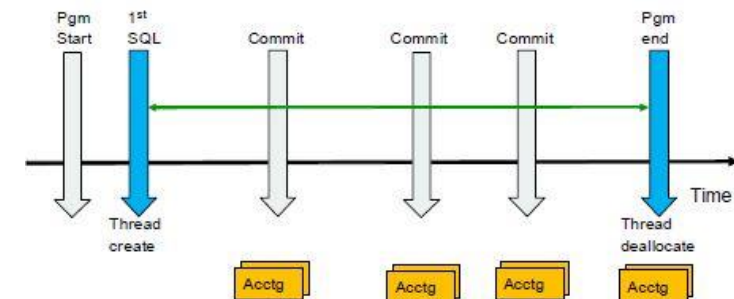
SMF and Db2 Overview

- Db2 Accounting Data
 - DDF cuts records at commit time
 - With CMTSTAT=INACTIVE
 - RRS can cut at commit time
 - Using accounting-interval commit
 - No open held cursors
 - When using rollup Accounting (DDF/RRS)
 - ACCUMAC>1
 - Record cut at ACCUMAC=x for whichever aggregation type chosen (ACCUMUID)

- When the connection goes inactive
 - Distributed thread
 - CMTSTAT=INACTIVE



- RRS using accounting-interval commit (and no open held cursors) writes accounting records at commit time



SMF and Db2 Overview

- Db2 Statistics
 - Interval driven
 - STATIME=1 (default since Db2 V10)
 - Recommend starting when Db2 starts – SMFSTAT zparm
 - Start classes 1,3,4,5,6 (7,8 also very useful)
 - Class 1 = Db2 statistics
 - Class 3 = exceptions like deadlock, timeout, take extent
 - Class 4 = exceptions related to distributed activity
 - Class 5 = data sharing stats
 - Class 6 = storage stats
 - Class 7 = DDF location stats
 - Class 8 = Dataset I/O stats

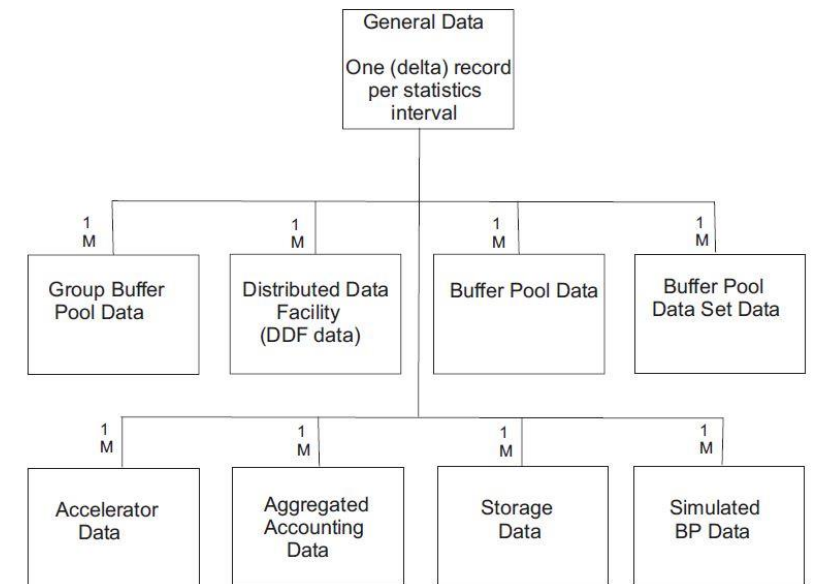
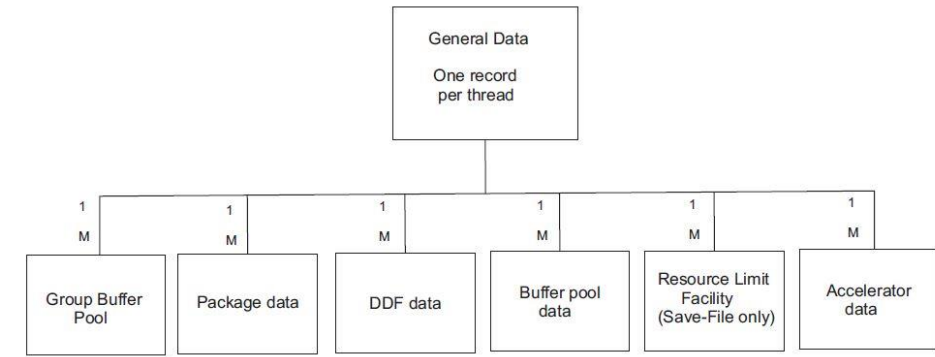
SMF and Db2 Overview

- Db2 Statistics
 - Used for looking at Db2 Subsystem level data
 - Gathers a lot of data on (amongst others) -
 - SQL usage
 - Stored proc, triggers, UDFs
 - EDM pool
 - Subsystem services
 - Open/Close activity
 - Log activity
 - Plan/package processing
 - DB2 commands
 - RID list processing, Dynamic statement cache
 - Authorization management
 - Locking activity / Data-sharing locking
 - Query parallelism
 - CPU times
 - DB2 IFI requests
 - DB2 latch counters
 - Buffer pool and Group buffer pool activity
 - DDF activity
 - Storage statistics

Tools and Data

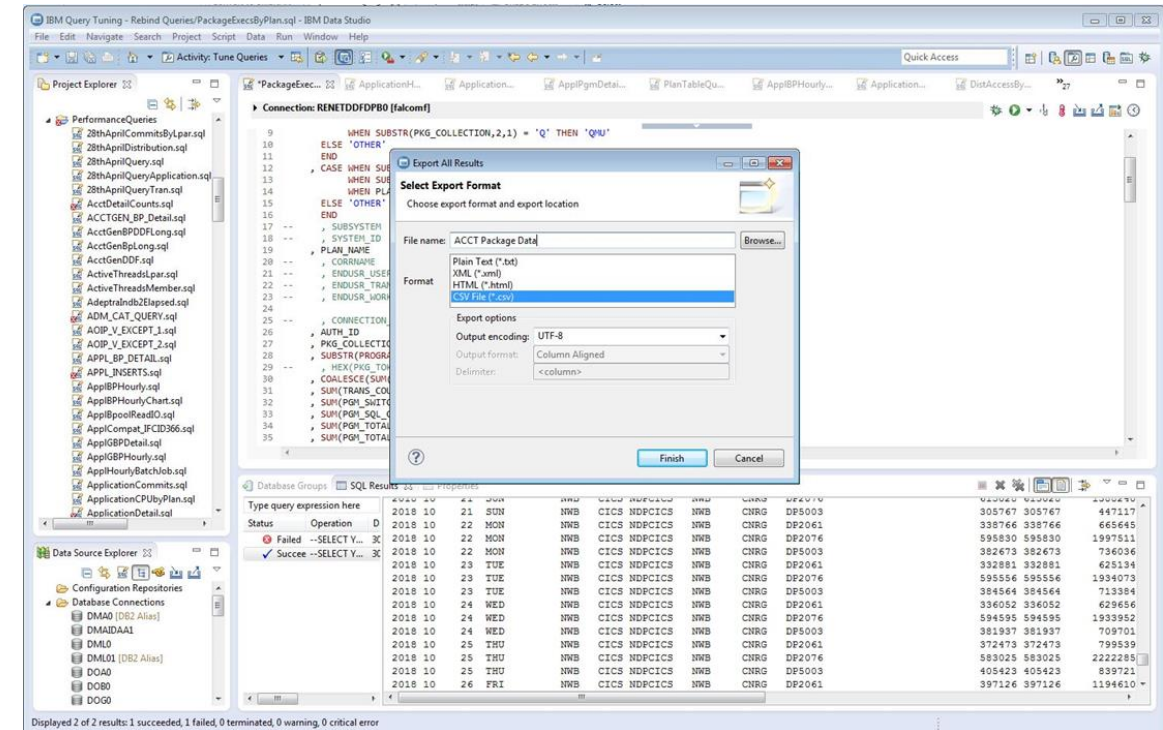
- Performance Database

- Multiple Vendors supply their own versions
 - Can be challenge mapping their columns to the IBM field names
- Flexible in implementation
 - Can be every accounting record (great if you have the space and time!)
 - Can be aggregated by Interval (if you don't)
 - Can retain as much historical data as you can cope with
- Recommend custom indexing
 - Majority of searches would use PLAN, CORRNAME, AUTHID, CONNID and DATE/TIME



Tools and Data

- Tool to Query the Performance Database
 - IBM Data Studio, DBVisualizer etc
 - Basically anything that lets you export to CSV file
 - Or use unload utility on mainframe
- Have standard set of SQLs
 - General accounting data
 - Package level accounting data
 - Bufferpool level accounting data
 - Bufferpool level statistics data
 - Group bufferpool level statistics



Tools and Data

The screenshot displays the IBM Data Studio environment. The main window shows a SQL query being executed against a database. An 'Export All Results' dialog box is open, allowing the user to select an export format and location. The dialog shows 'File name: ACCT Package Data' and 'Format: CSV File (*.csv)'. The 'Export options' section shows 'Output encoding: UTF-8', 'Output format: Column Aligned', and 'Delimiter: <column>'. Below the dialog, a table of query results is visible, showing columns for date, time, status, operation, and various performance metrics.

Export All Results Dialog:

- Select Export Format:** Choose export format and export location
- File name:** ACCT Package Data
- Format:** CSV File (*.csv)
- Export options:**
 - Output encoding: UTF-8
 - Output format: Column Aligned
 - Delimiter: <column>

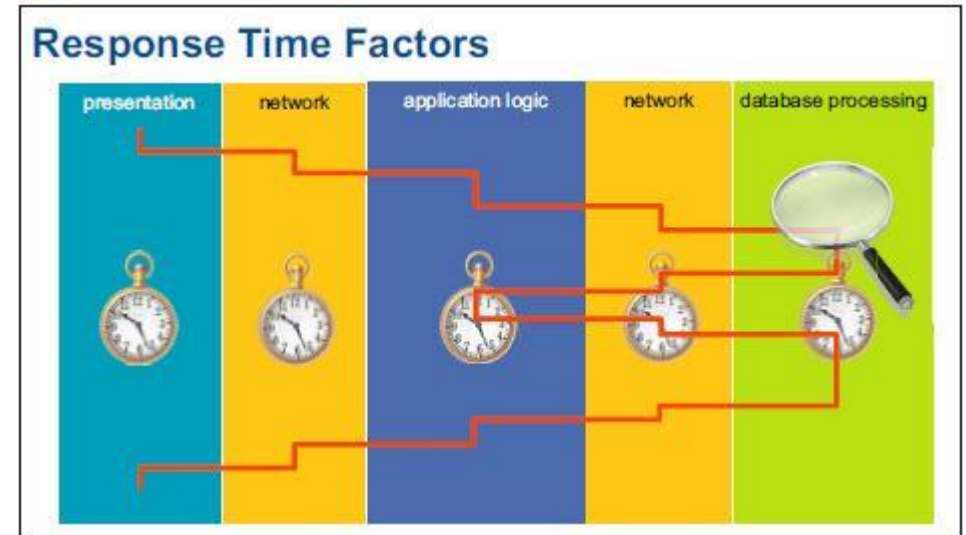
Query Results Table:

Type	Status	Operation	Date	Time	Day	Week	Package	Package ID	Package Name	Package Type	Package Status	Package Count	Package Size	Package Duration	Package Error	Package Warning	Package Critical
Failed	--SELECT Y...	30	2018	10	21	SUN	NWB	CICS	NDPCICS	NWB	CNRG	DP5003	305767	305767	447117		
Succeed	--SELECT Y...	30	2018	10	22	MON	NWB	CICS	NDPCICS	NWB	CNRG	DP2061	338766	338766	665645		
Succeed	--SELECT Y...	30	2018	10	22	MON	NWB	CICS	NDPCICS	NWB	CNRG	DP2076	595830	595830	1997511		
Succeed	--SELECT Y...	30	2018	10	22	MON	NWB	CICS	NDPCICS	NWB	CNRG	DP5003	382673	382673	736036		
Succeed	--SELECT Y...	30	2018	10	23	TUE	NWB	CICS	NDPCICS	NWB	CNRG	DP2061	332881	332881	625134		
Succeed	--SELECT Y...	30	2018	10	23	TUE	NWB	CICS	NDPCICS	NWB	CNRG	DP2076	595556	595556	1934073		
Succeed	--SELECT Y...	30	2018	10	23	TUE	NWB	CICS	NDPCICS	NWB	CNRG	DP5003	384564	384564	713384		
Succeed	--SELECT Y...	30	2018	10	24	WED	NWB	CICS	NDPCICS	NWB	CNRG	DP2061	336052	336052	629656		
Succeed	--SELECT Y...	30	2018	10	24	WED	NWB	CICS	NDPCICS	NWB	CNRG	DP2076	594595	594595	1933952		
Succeed	--SELECT Y...	30	2018	10	24	WED	NWB	CICS	NDPCICS	NWB	CNRG	DP5003	381937	381937	709701		
Succeed	--SELECT Y...	30	2018	10	25	THU	NWB	CICS	NDPCICS	NWB	CNRG	DP2061	372473	372473	799539		
Succeed	--SELECT Y...	30	2018	10	25	THU	NWB	CICS	NDPCICS	NWB	CNRG	DP2076	583025	583025	2222285		
Succeed	--SELECT Y...	30	2018	10	25	THU	NWB	CICS	NDPCICS	NWB	CNRG	DP5003	405423	405423	839721		
Succeed	--SELECT Y...	30	2018	10	26	FRI	NWB	CICS	NDPCICS	NWB	CNRG	DP2061	397126	397126	1194610		

Displayed 2 of 2 results: 1 succeeded, 1 failed, 0 terminated, 0 warning, 0 critical error

Using the Data

- Top down approach
 - Many application layers in the mix
 - Usually you'll just be proving the issue is not Db2
 - Start looking at the high level stats then drill down
 - For application type issues start with Accounting Class 1,2,3 level data



Using the Data

- Accounting Class Terminology

- Class 1

- Application time connect (thread create) to disconnect (thread terminate)
 - Reporting Class 1 elapsed and Class 1 cpu time

- Class 2

- Time spent in Db2
 - Reporting Class 2 Elapsed and Class 2 cpu time

- Class 3

- Suspensions (I/O wait, locking, service task switch)

- Class 7

- Same as Class 2, but at package level
 - Reporting Class 7 Elapsed and Class 7 cpu time

- Class 8

- Same as Class 3, but at package level

TIMES/EVENTS	APPL (CL.1)	DB2 (CL.2)	CLASS 3 SUSPENSIONS	ELAPSED TIME
ELAPSED TIME	32.419443	1.752436	LOCK/LATCH (DB2+IRLM)	1.716285
NONNESTED	32.419443	1.752436	IRLM LOCK+LATCH	0.000000
STORED PROC	0.000000	0.000000	DB2 LATCH	1.716285
UDF	0.000000	0.000000	SYNCHRON. I/O	0.015137
TRIGGER	0.000000	0.000000	DATABASE I/O	0.011434
			LOG WRITE I/O	0.003703
CP CPU TIME	0.003043	0.001556	OTHER READ I/O	0.000000
AGENT	0.003043	0.001556	OTHER WRTE I/O	0.000000
NONNESTED	0.003043	0.001556	SER.TASK SWITCH	0.004382
STORED PROC	0.000000	0.000000	UPDATE COMMIT	0.004382
UDF	0.000000	0.000000	OPEN/CLOSE	0.000000
TRIGGER	0.000000	0.000000	SYSLGRNG REC	0.000000
PAR.TASKS	0.000000	0.000000	EXT/DEL/DEF	0.000000
			OTHER SERVICE	0.000000
SE CPU TIME	0.000000	0.000000	ARC.LOG (QUIES)	0.000000
NONNESTED	0.000000	0.000000	LOG READ	0.000000
STORED PROC	0.000000	0.000000	DRAIN LOCK	0.000000
UDF	0.000000	0.000000	CLAIM RELEASE	0.000000
TRIGGER	0.000000	0.000000	PAGE LATCH	0.011564
			NOTIFY MSGS	0.000000
PAR.TASKS	0.000000	0.000000	GLOBAL CONTENTION	0.000000
			COMMIT PH1 WRITE I/O	0.000000
SUSPEND TIME	0.000000	1.748431	ASYNCH CF REQUESTS	0.001063
AGENT	N/A	1.748431	TCP/IP LOB XML	0.000000
PAR.TASKS	N/A	0.000000	ACCELERATOR	0.000000
STORED PROC	0.000000	N/A	AUTONOMOUS PROCEDURE	0.000000
UDF	0.000000	N/A	PQ SYNCHRONIZATION	0.000000
			TOTAL CLASS 3	1.748431
NOT ACCOUNT.	N/A	0.002448		

Using the Data

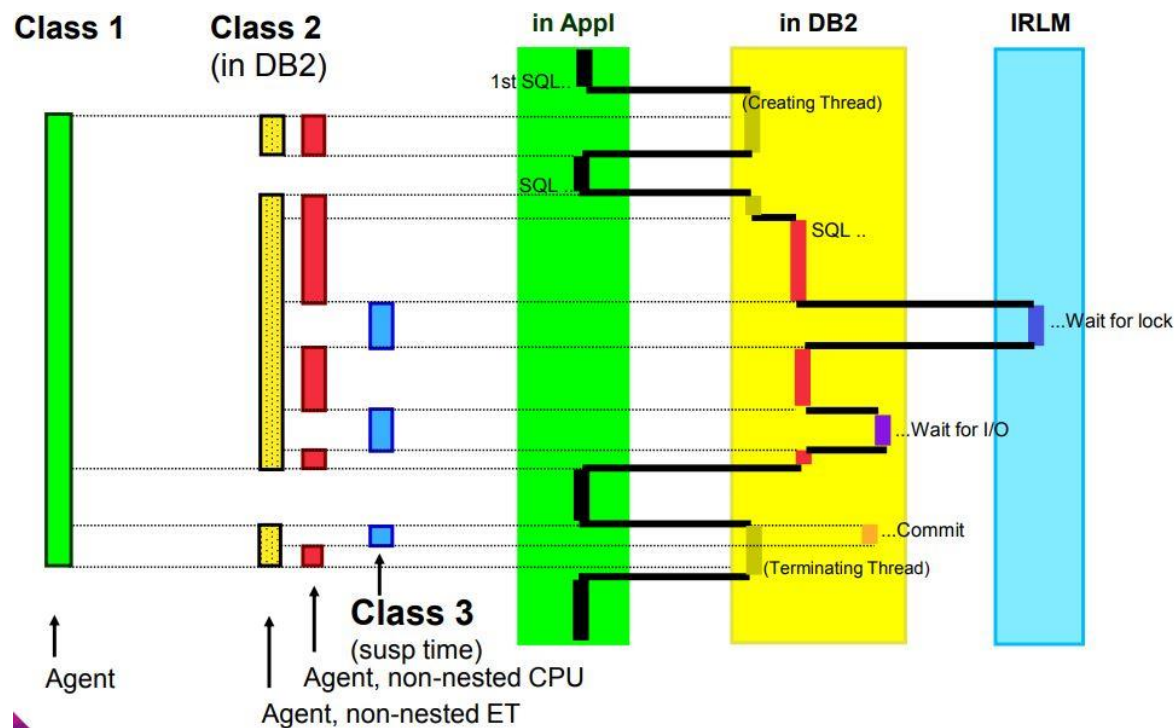
- Accounting Class Terminology



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PAR.TASKS	N/A	0.000000	ACCELERATOR	0.000000
STORED PROC	0.000000	N/A	AUTONOMOUS PROCEDURE	0.000000
UDF	0.000000	N/A	PQ SYNCHRONIZATION	0.000000
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Using the Data

- Accounting Class Terminology



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Using the Data

- Accounting Report Limitations
 - Verbose
 - A LOT of data per transaction, especially if in high volume production situation
 - Difficult to see the big picture in detailed trace reports
 - Summary reports can be too high level
 - Enter EXCEL...
 - Object is to plot out the information in accounting report in visual form
 - Which is all in your performance database, so here we go...

Using the Data

- Take methodical approach
 - Start at a high(ish) level then work down
 - 95% of issues can be diagnosed from data patterns
 - If you have aggregated accounting tables then start there
 - If not, then aggregate results by second, minute or hour in your SQL queries
 - In SQL queries, start by taking the Class 1,2,3 fields
 - Refer to your vendors documentation
 - Have adhoc SMF dump jobs and File extracts ready to run
 - Some sites only externalise the SMF data into their performance databases once a day, usually overnight

Using the Data

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..			..	
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DATE	TIME	CORR	EXECS	COMMIT	APPL_ELAPSED	APPL_TCB	C2NN_ELAP	C2ELAP	TOT_CPU	C3SYNC	C3LOCK	C3LATCH	C3DRNWT	C3ASYNCR	C3LOG	C3ASYNCW	C3SERV	C3ARCLW	C3GLOB	C3PGLTCH	NOT_ACC
02.08.2018	12.38.13	UIN2	6	23	1.989299	0.047251	0.120147	0.120147	0.038275	0.013936	0.031492	0.000029	0	0	168	0	0.031834	0	0.001471	0	0.002991
02.08.2018	12.38.14	UIN2	10	110	3.727015	0.183839	0.40856	0.40856	0.154184	0.067919	0.000011	0	0	0.006035	1052	0	0.169364	0	0	0.000012	0.010362
02.08.2018	12.38.15	UIN2	20	56	7.249691	0.462559	0.587115	0.587115	0.427453	0.034347	0.037014	0.000061	0	0.001553	348	0	0.058649	0	0	0.000049	0.027582
02.08.2018	12.38.16	UIN2	27	62	5.430338	0.389528	0.544152	0.544152	0.355633	0.054534	0.031565	0.00002	0	0.0046	409	0	0.068149	0	0	0.000131	0.028948
02.08.2018	12.38.17	UIN2	19	43	5.392612	0.152976	0.233747	0.233747	0.13039	0.043691	0	0.000029	0	0.00045	419	0	0.046835	0	0.002274	0.000006	0.009808
02.08.2018	12.38.18	UIN2	20	63	34.534644	0.292739	0.427189	0.427189	0.262512	0.046419	0.002863	0.002345	0	0.00067	744	0	0.089411	0	0.002496	0.000038	0.019966
02.08.2018	12.38.19	UIN2	7	111	4.249092	0.095317	0.390115	0.390115	0.071386	0.158361	0.00016	0.000155	0	0.006777	864	0	0.146281	0	0.001209	0.00002	0.002316
02.08.2018	12.38.20	UIN2	14	47	6.286933	0.20877	0.32568	0.32568	0.189183	0.062967	0.000112	0.000028	0	0.00256	378	0	0.0596	0	0	0.000013	0.011057
02.08.2018	12.38.21	UIN2	14	97	6.520175	0.332119	0.541609	0.541609	0.301177	0.077187	0	0.000067	0	0.002933	1018	0	0.140241	0	0	0.000017	0.019469

Using the Data

- Create Pivot chart

Create PivotTable with PivotChart

Choose the data that you want to analyze

☒ Select a table or range

Table/Range: UIN2 2nd August 2018 T1300 T153!\$A\$1:\$B\$6

☐ Use an external data source

Choose where you want the PivotTable and PivotChart to be placed

☒ New Worksheet

☐ Existing Worksheet

Location:

OK Cancel

	A	B	C	D	E	F
1	DATE	TIME	CORR	EXECS	COMMIT	APPL_ELAP
2	02.08.2018	12.38.13	UIN2	6	23	1.989
3	02.08.2018	12.38.14	UIN2	10	110	3.727
4	02.08.2018	12.38.15	UIN2	20	56	7.249
5	02.08.2018	12.38.16	UIN2	27	62	5.430
6	02.08.2018	12.38.17	UIN2	19	43	5.392
7	02.08.2018	12.38.18	UIN2	20	63	34.534
8	02.08.2018	12.38.19	UIN2	7	111	4.249
9	02.08.2018	12.38.20	UIN2	14	47	6.286
10	02.08.2018	12.38.21	UIN2	14	97	6.520
11	02.08.2018	12.38.22	UIN2	29	85	28.349
12	02.08.2018	12.38.23	UIN2	22	56	30.412
13	02.08.2018	12.38.24	UIN2	10	38	4.298
14	02.08.2018	12.38.25	UIN2	9	54	4.717
15	02.08.2018	12.38.26	UIN2	15	65	7.384
16	02.08.2018	12.38.27	UIN2	8	26	9.958
17	02.08.2018	12.38.28	UIN2	8	29	1.936
18	02.08.2018	12.38.29	UIN2	10	36	12.877409
19	02.08.2018	12.38.30	UIN2	10	66	8.869628
20	02.08.2018	12.38.31	UIN2	19	50	52.880008

PivotTable Field List

Choose fields to add to report:

- ☐ DATE
- ☒ TIME
- ☒ CORR
- ☐ EXECS
- ☐ COMMIT
- ☐ APPL_ELAPSED
- ☐ APPL_TCB
- ☐ C2NN_ELAP
- ☒ C2ELAP
- ☐ TOT_CPU
- ☐ C3SYNC
- ☐ C3LOCK
- ☐ C3LATCH
- ☐ C3DRNWT
- ☐ C3ASYNCR
- ☐ C3LOG
- ☐ C3ASYNCW
- ☐ C3SERV

Drag fields between areas below:

Report Filter

CORR

Legend Fields (Series)

Axis Fields (Categories)

TIME

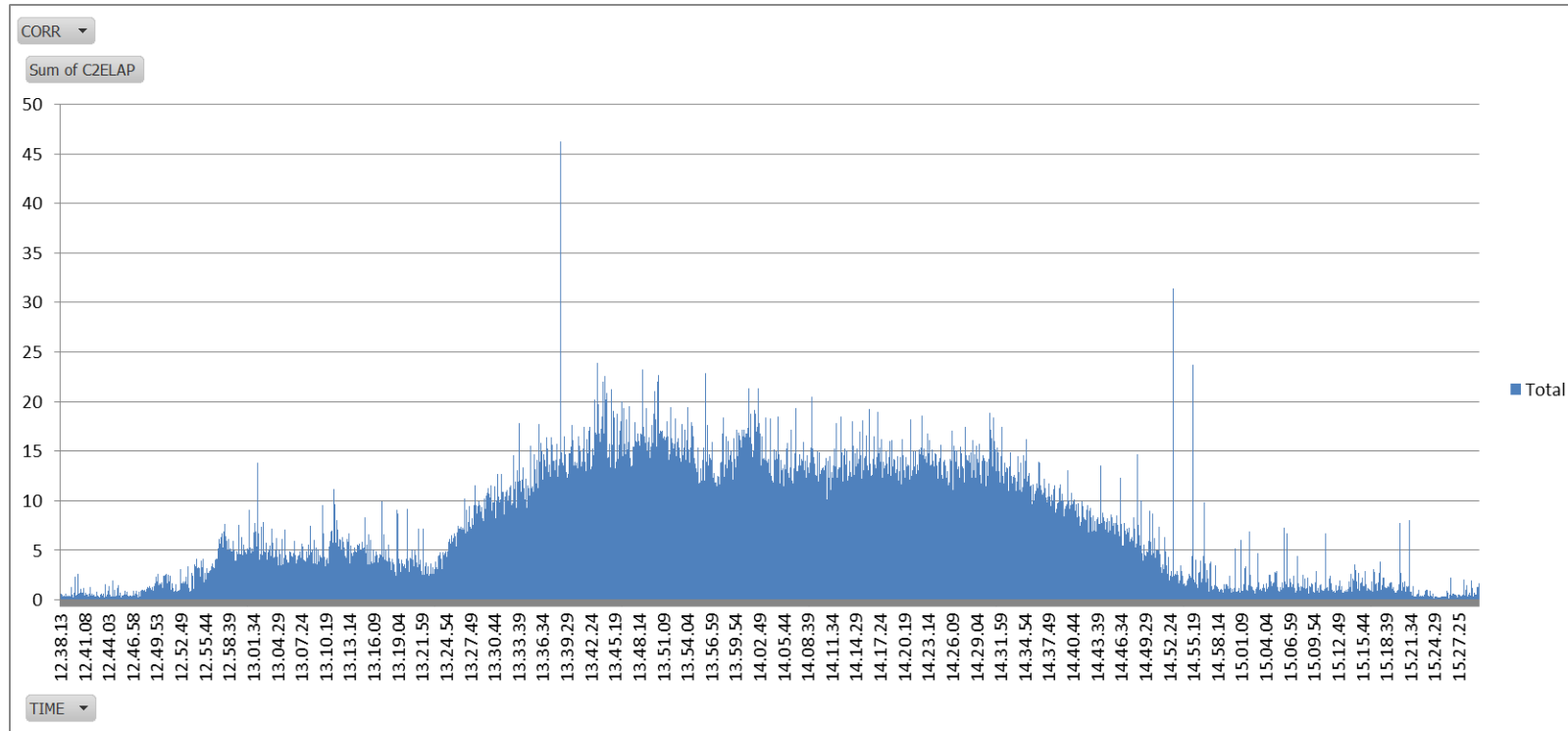
Σ Values

Sum of C2ELAP

☐ Defer Layout Update

Update

Using the Data



Shows Class 2 Elapsed time only, but we can see what this is made up of...

PivotTable Field List

Choose fields to add to report:

- ☐ DATE
- ☒ **TIME**
- ☒ **CORR**
- ☐ EXEC
- ☐ COMMIT
- ☐ APPL_ELAPSED
- ☐ APPL_TCB
- ☐ C2NN_ELAP
- ☒ **C2ELAP**
- ☐ TOT_CPU
- ☐ C3SYNC
- ☐ C3LOCK
- ☐ C3LATCH
- ☐ C3DRNWT
- ☐ C3ASYNCR
- ☐ C3LOG
- ☐ C3ASYNCW
- ☐ C3SERV
- ☐ C3ASYNW

Drag fields between areas below:

Report Filter

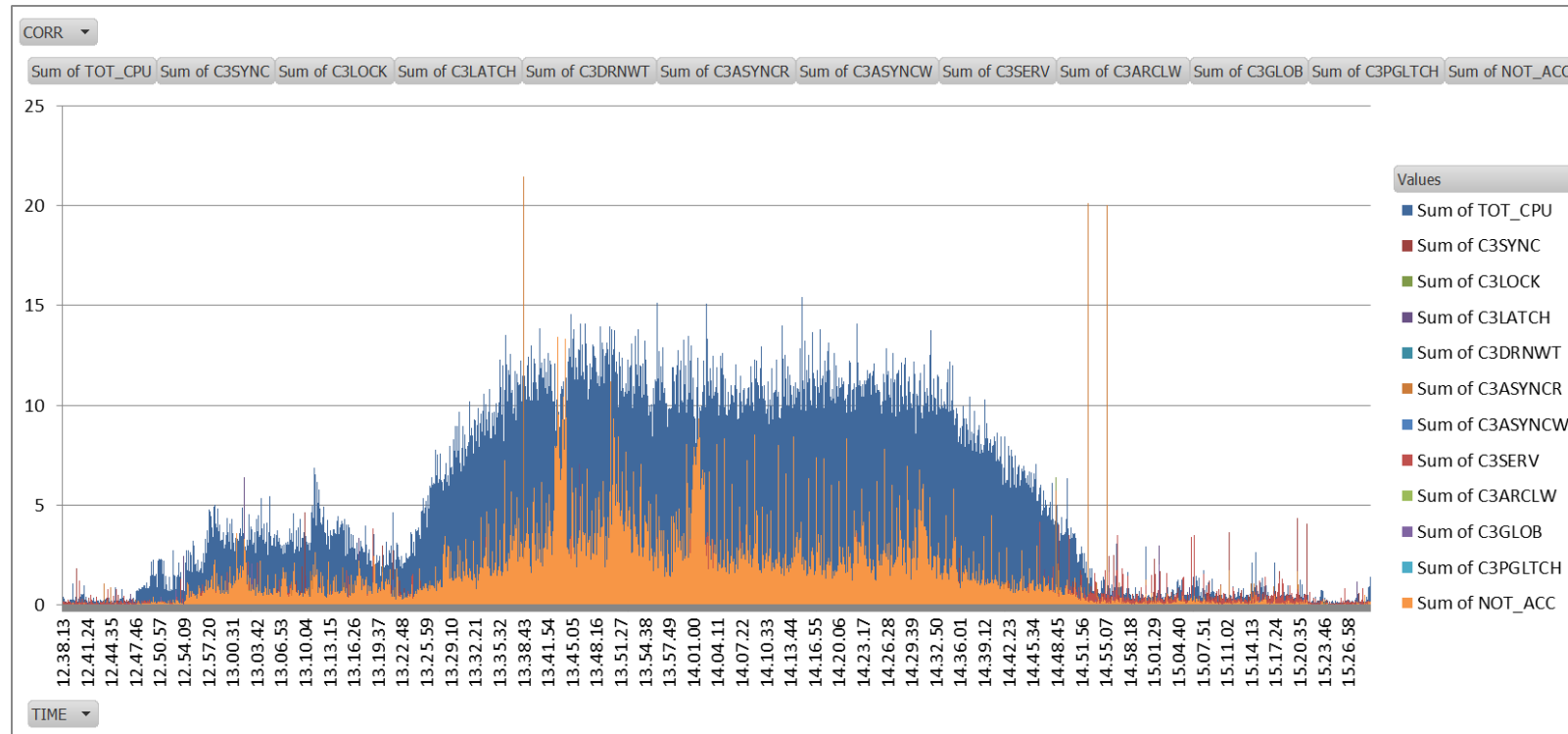
Legend Fields (Series)

Axis Fields (Categories)

Σ Values

Defer Layout Update **Update**

Using the Data



Axis values don't match Class 2 Elapsed, need to change chart type to stacked...

PivotTable Field List

Choose fields to add to report:

- ☐ COMMIT
- ☐ APPL_ELAPSED
- ☐ APPL_TCB
- ☐ C2NN_ELAP
- ☐ C2ELAP
- ☒ TOT_CPU
- ☒ C3SYNC
- ☒ C3LOCK
- ☒ C3LATCH
- ☒ C3DRNWT
- ☒ C3ASYNCR
- ☐ C3LOG
- ☒ C3ASYNCW
- ☒ C3SERV
- ☒ C3ARCLW
- ☒ C3GLOB
- ☒ C3PGLTCH
- ☒ NOT_ACC

Drag fields between areas below:

Report Filter: CORR

Legend Fields (Series): Σ Values

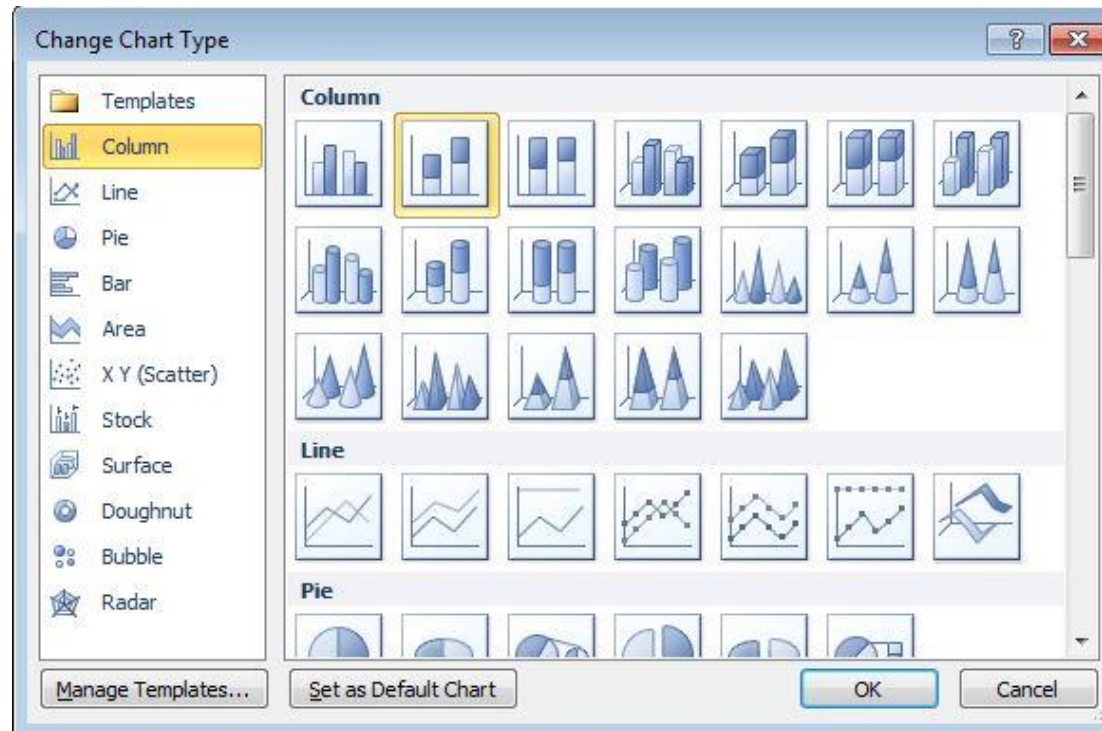
Axis Fields (Categories): TIME

Σ Values:

- Sum of TOT_CPU
- Sum of C3SYNC
- Sum of C3LOCK
- Sum of C3LATCH
- Sum of C3DRNWT
- Sum of C3ASYNCR
- Sum of C3ASYNCW

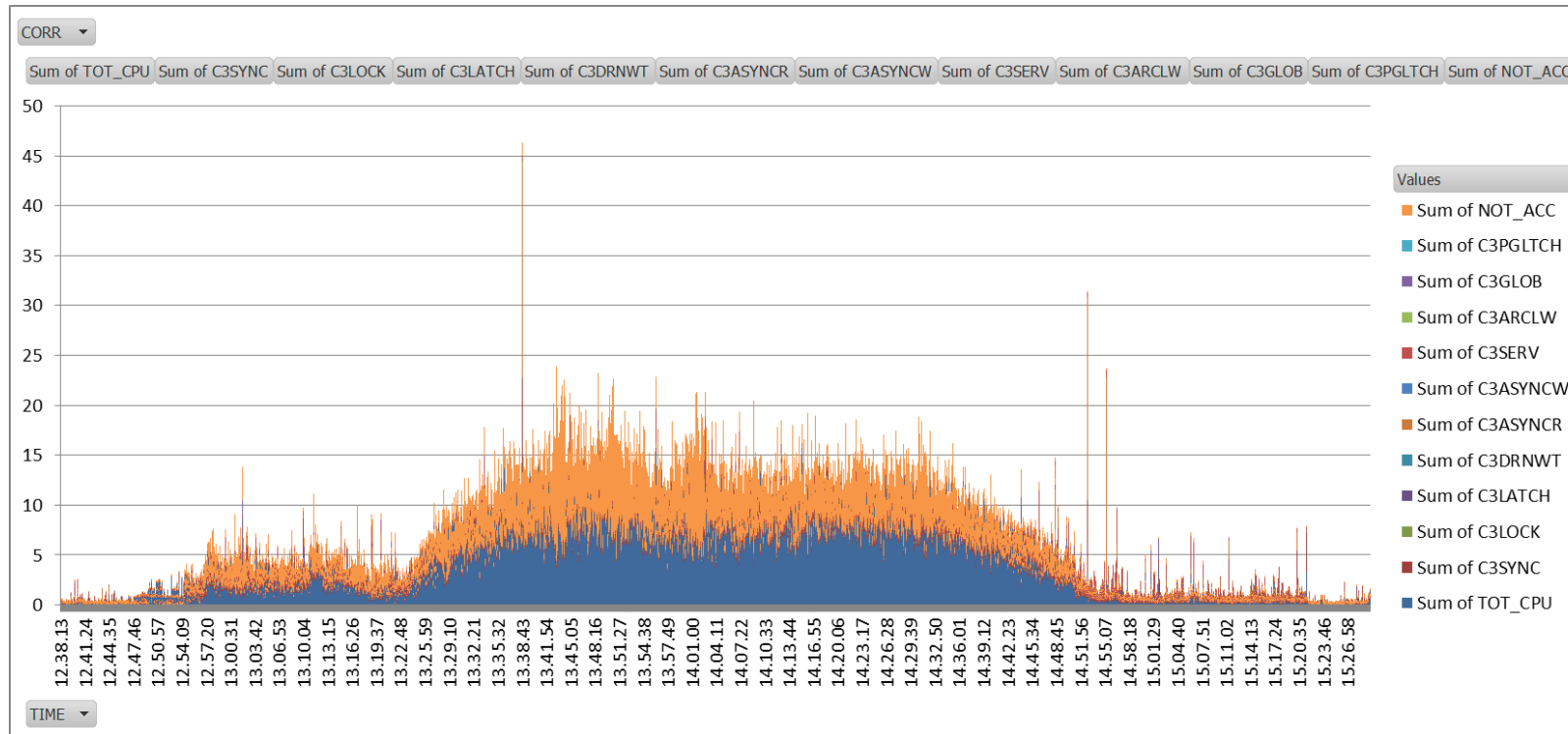
☐ Defer Layout Update Update

Using the Data



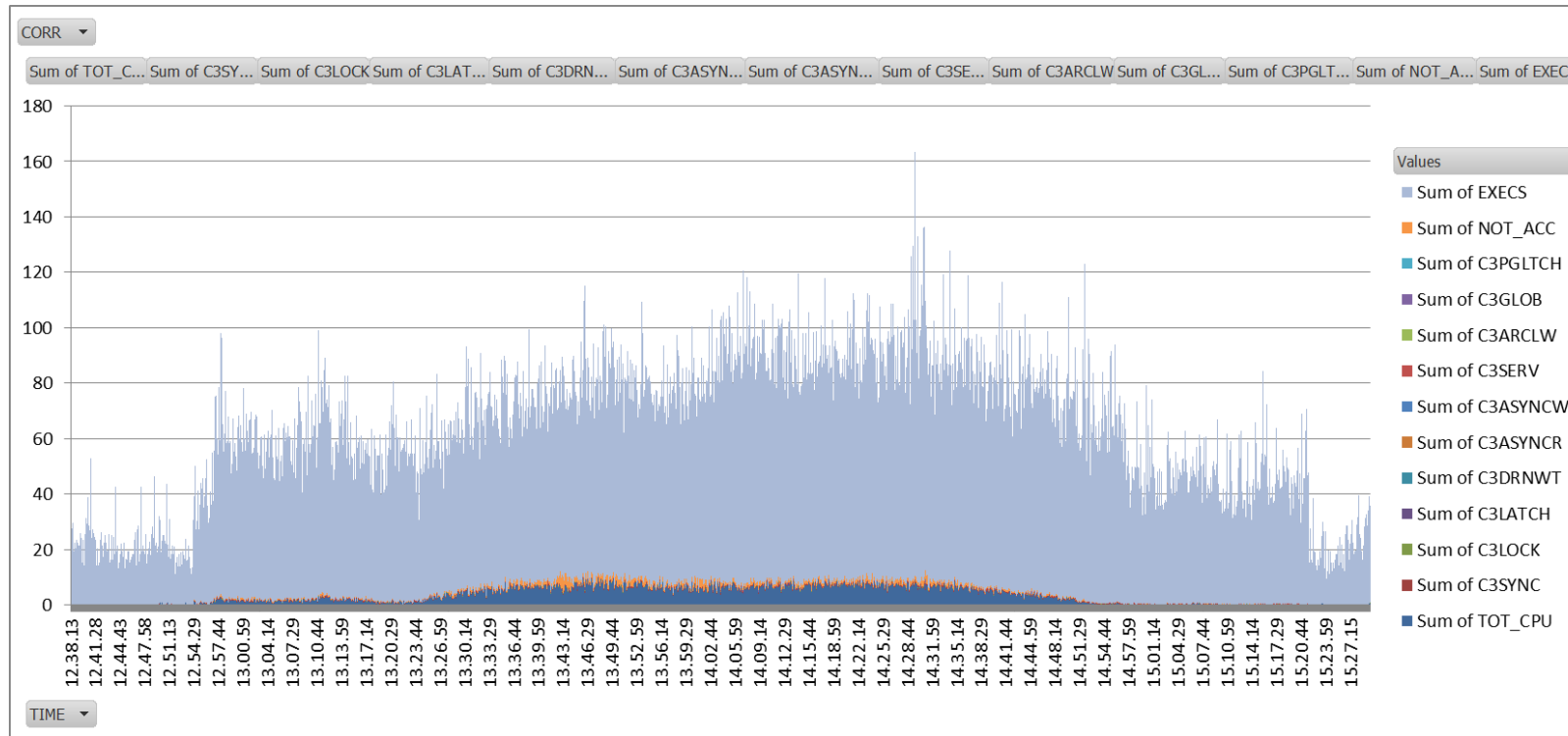
Switch to stacked view

Using the Data

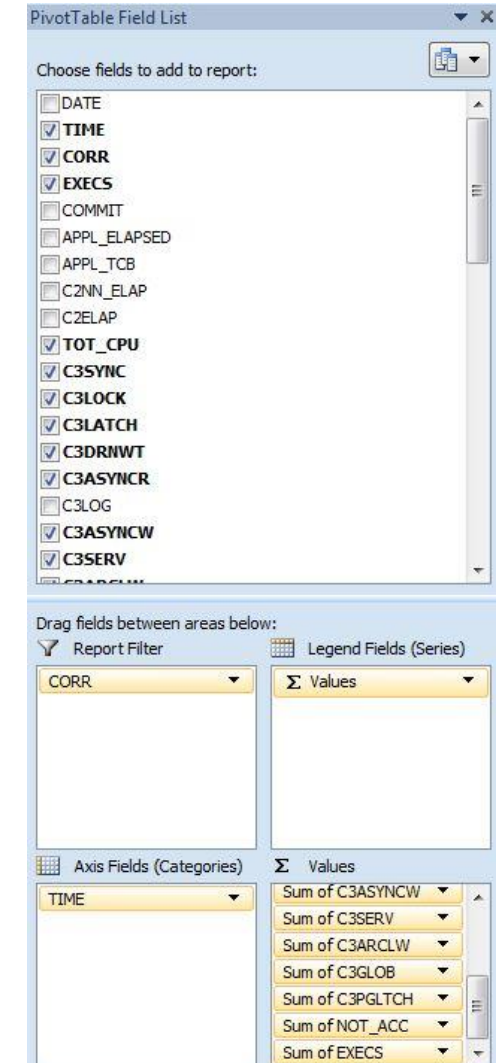


Now have nice view of what application was doing In-Db2 at one second interval. Can now enhance further and add in the transaction volumes...

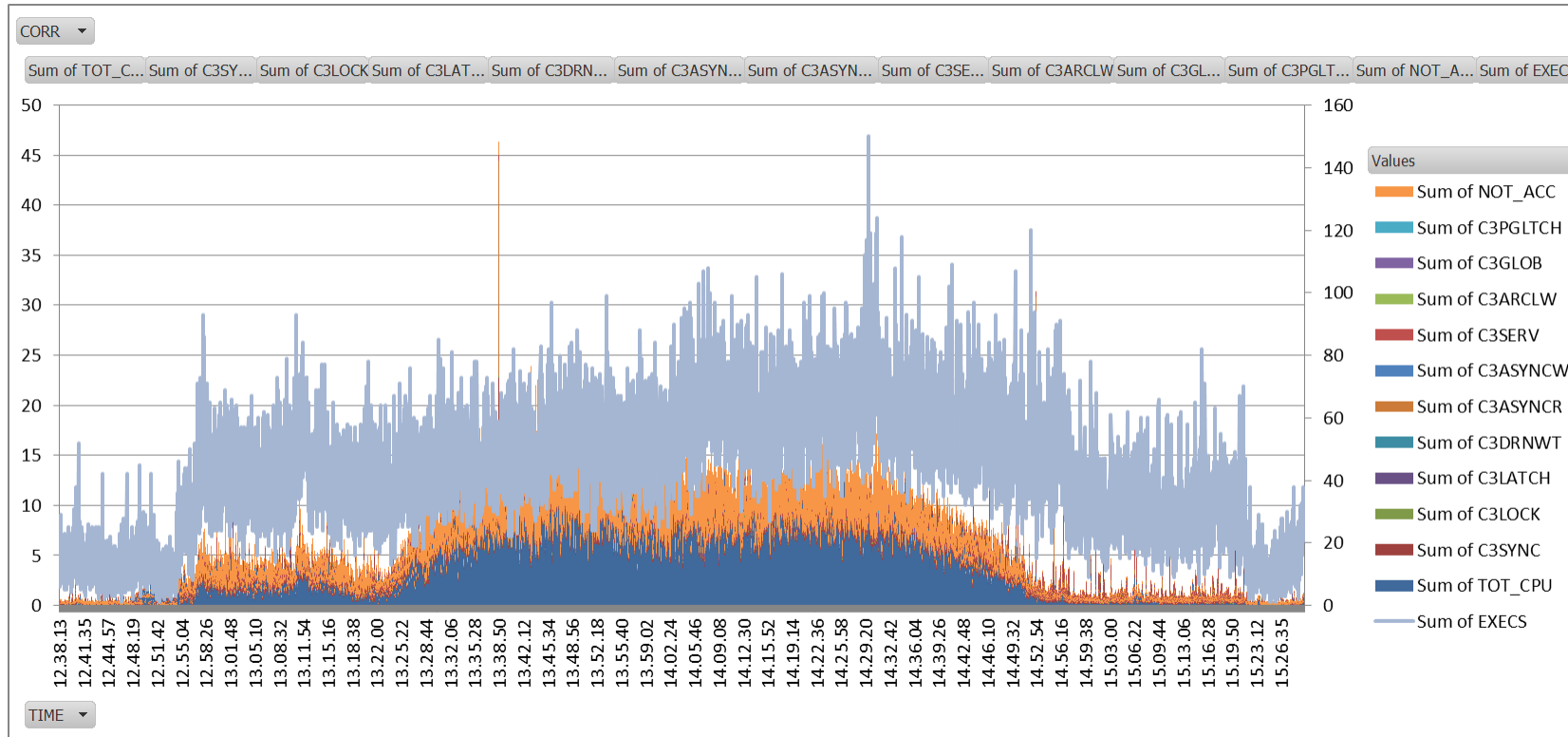
Using the Data



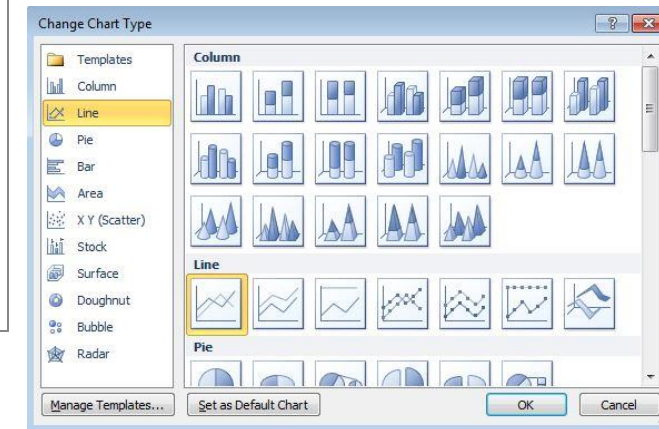
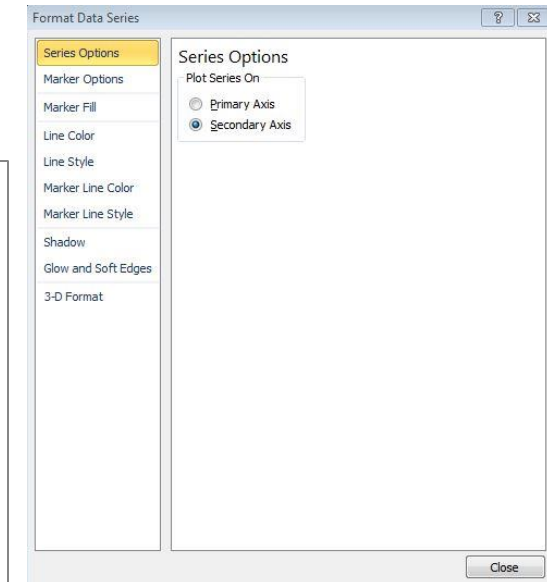
Adding #Execs to chart has obscured the In-Db2 elapsed time, so move #Execs to secondary axis...



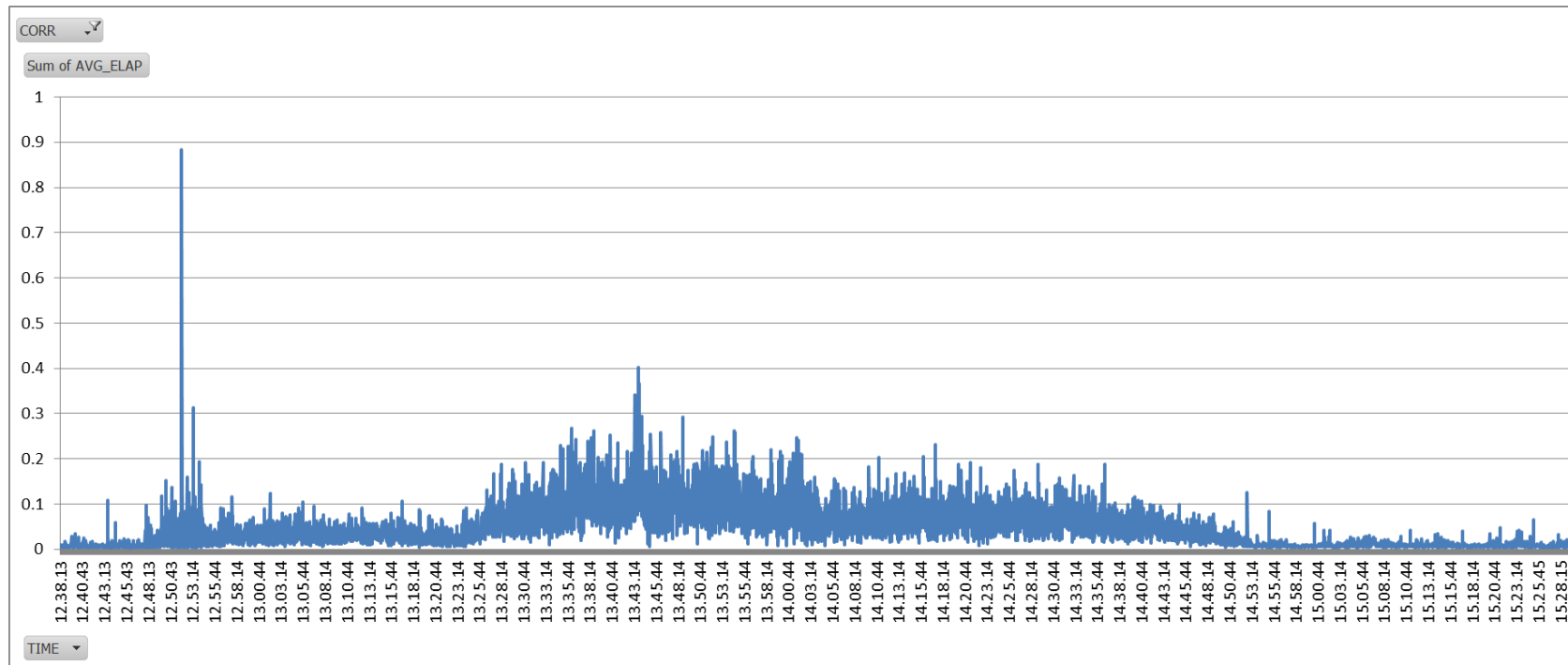
Using the Data



Now have In-Db2 time plotted against transaction throughput



Using the Data



Perhaps you just want to see the average response times for the transaction...

PivotTable Field List

Choose fields to add to report:

- ☐ C3SERV
- ☐ C3ARCLW
- ☐ C3GLOB
- ☐ C3PGLTCH
- ☐ NOT_ACC
- ☐ BP_GETP
- ☐ DB2_TCB
- ☐ DB2_SRB
- ☒ **AVG_ELAP**
- ☐ AVG_CPU
- ☐ AVG_GETP
- ☐ MIN_ELAP
- ☐ MAX_ELAP
- ☐ DRAIN_LOCK_TIME
- ☐ CLAIM_RELEASE_TIME
- ☐ ARCHIVE_READ_TIME
- ☐ DS_MSG_TIME
- ☐ SELECT
- ☐ INSERT

Drag fields between areas below:

Report Filter

CORR

Legend Fields (Series)

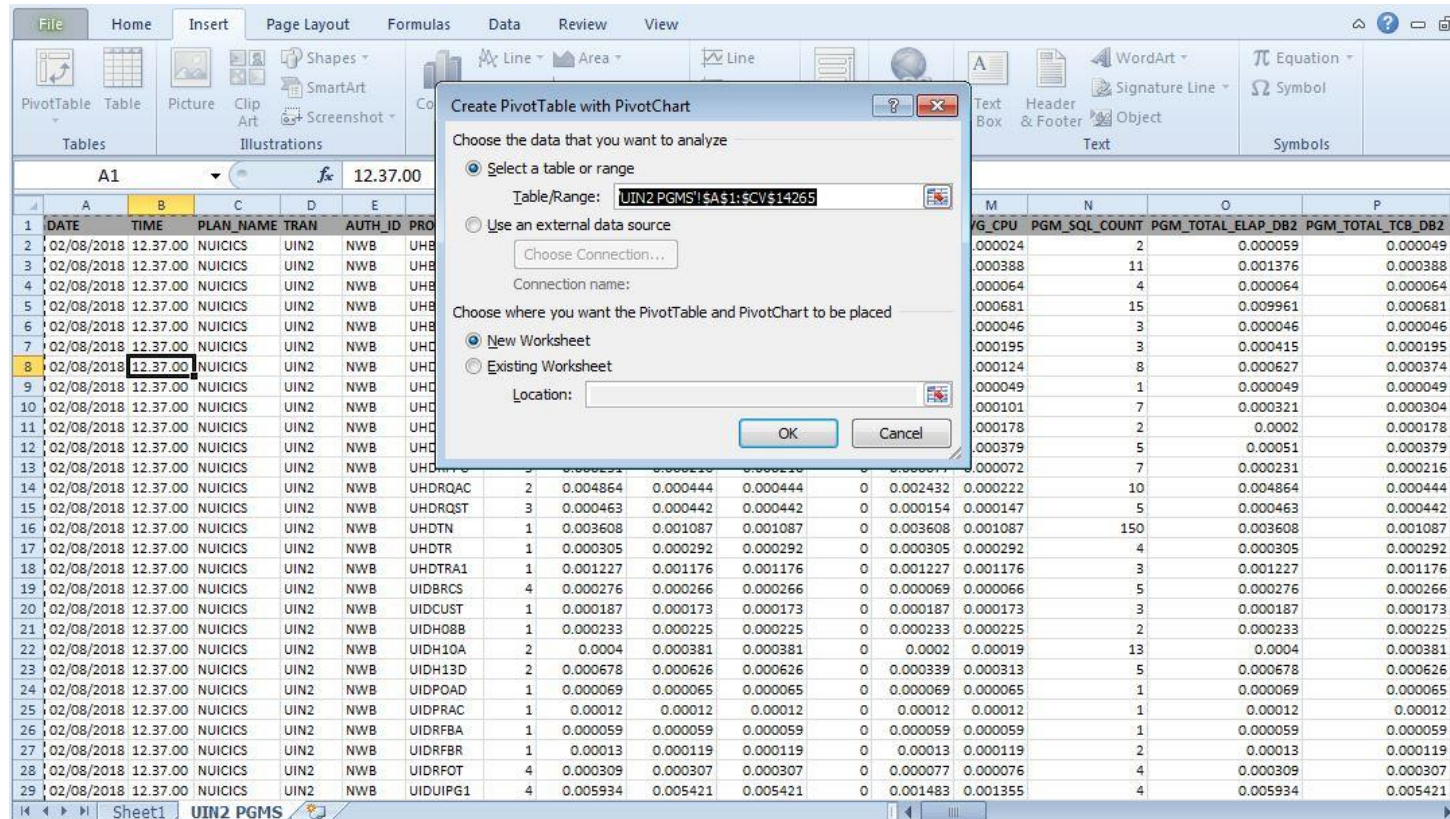
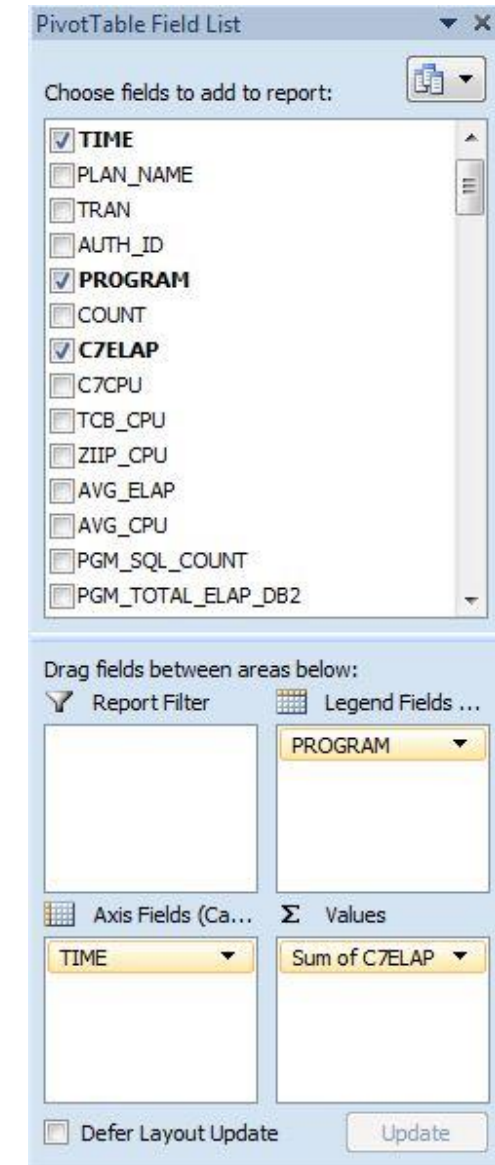
Axis Fields (Categories)

TIME

Σ Values

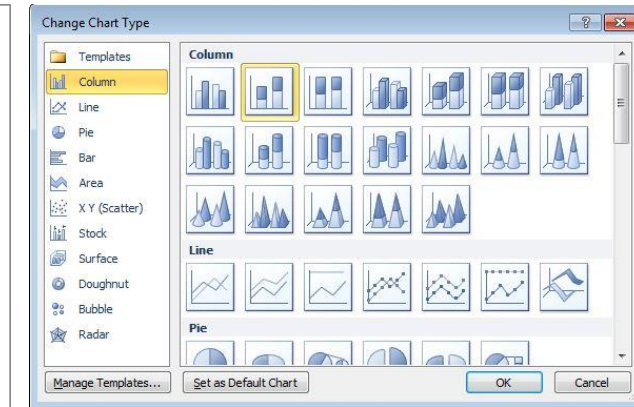
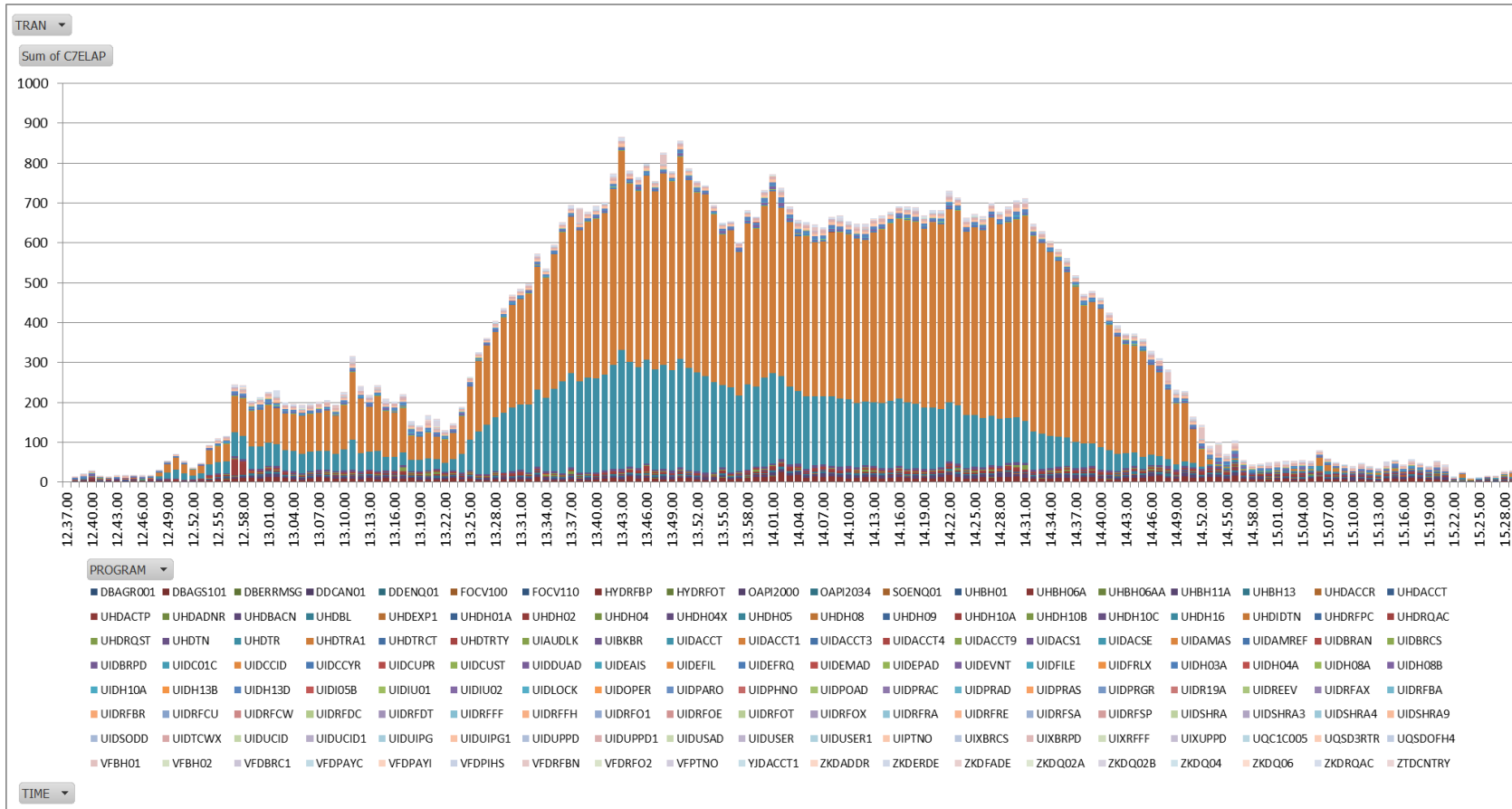
Sum of AVG_ELAP

Using the Data

- Say you want to go deeper and look at the Class7 data – Package level
- Create Pivot table with Program now going into Legend Field and Class 7 Elapsed in Values

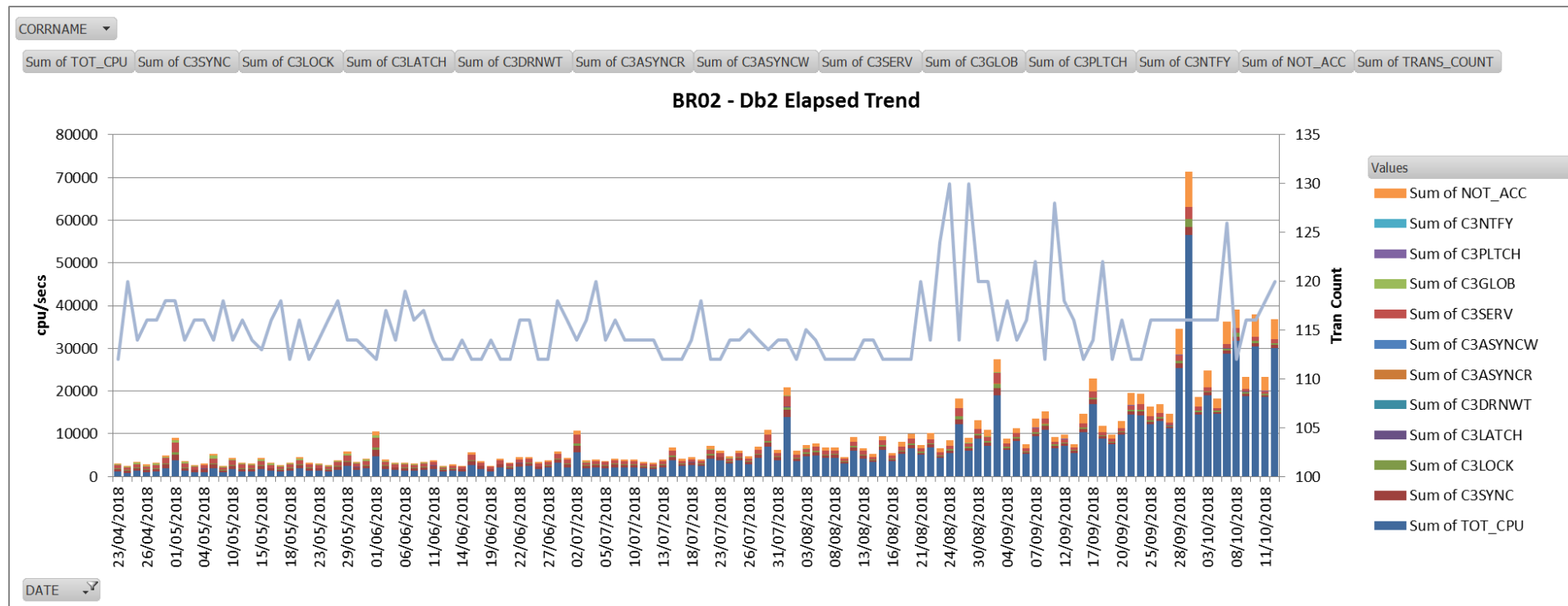
Using the Data



- Use Stacked Option on chart type
- Can use drop down boxes to focus on individual packages or txns

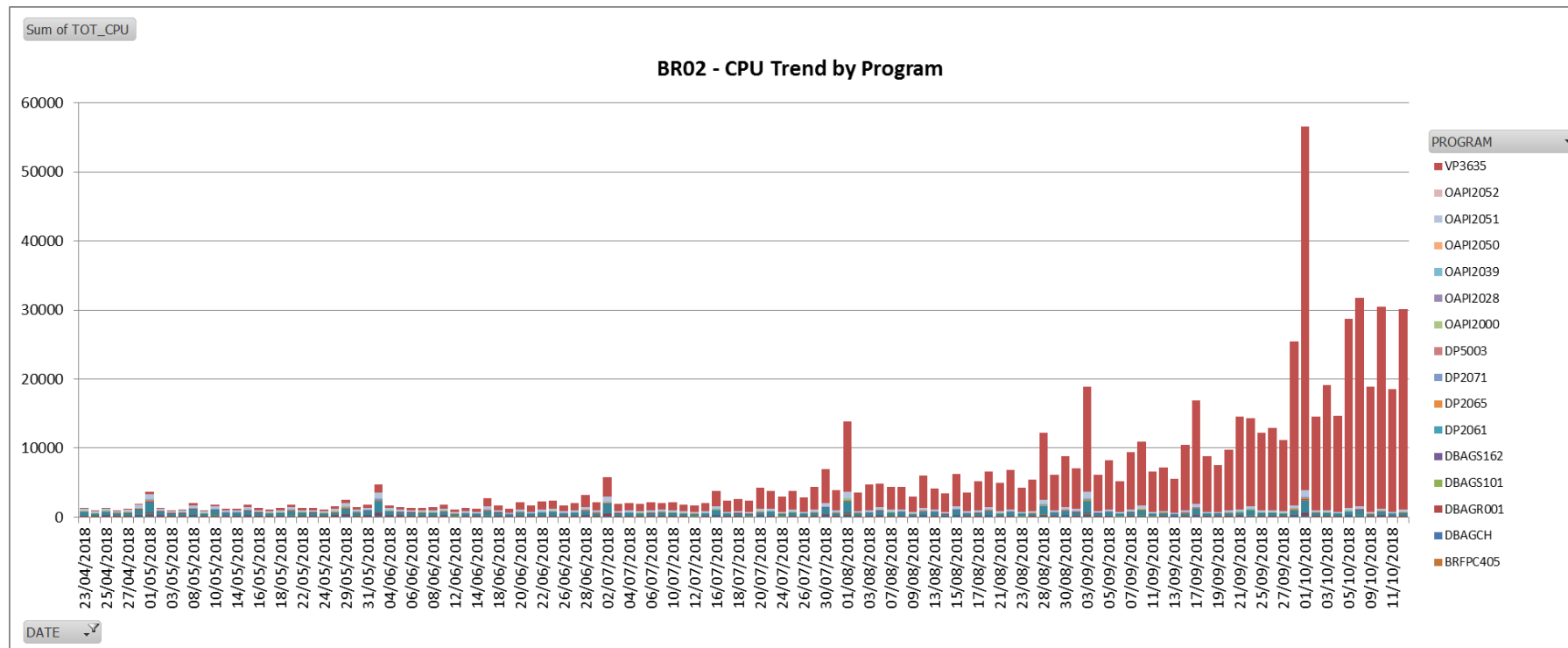
Using the Data

- Case Study 1 – Capacity team spot high CPU usage from CICS region running BR02 transaction
 - Plot accounting class 2,3 times going back to start of historical data
 - Very clear CPU burn started to rise sometime in July, but no increase in txn counts



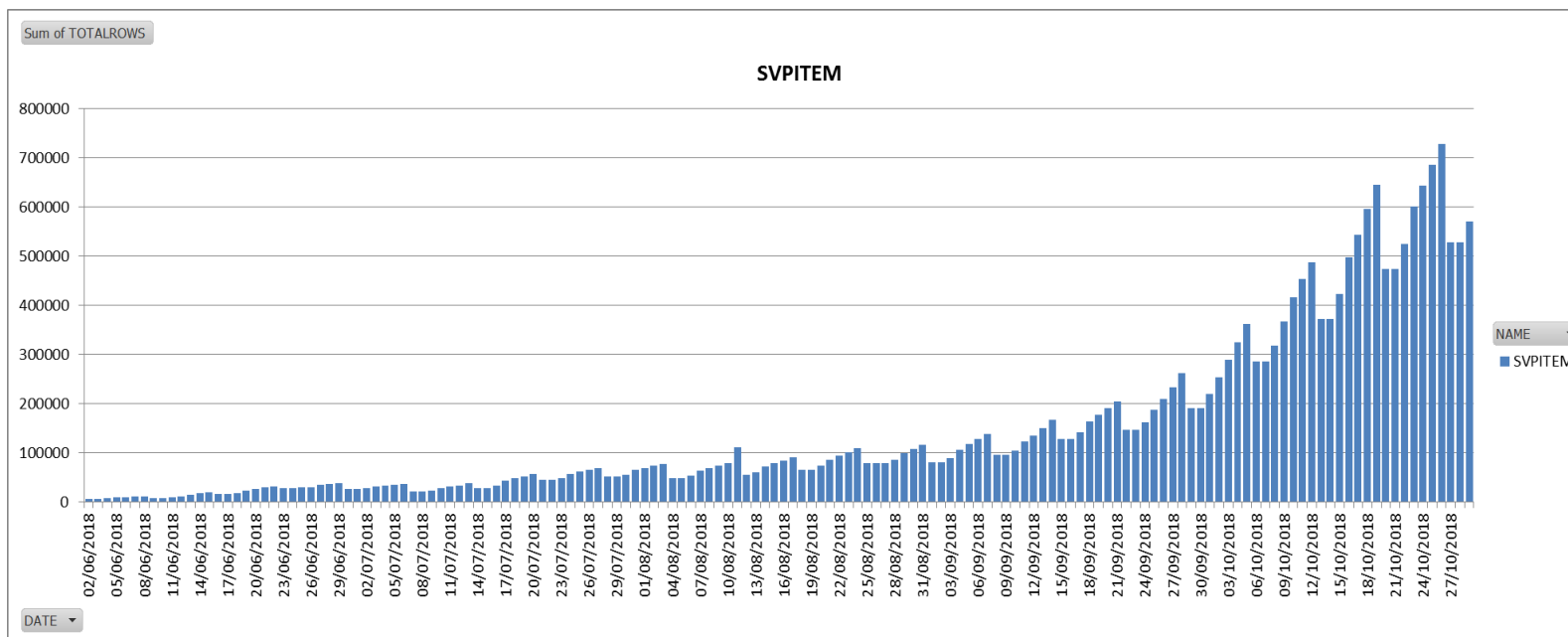
Using the Data

- Case Study 1 (Cont)
 - Plot accounting class 7 time by package going back to start of historical data
 - Very clear CPU burn started to rise sometime in July in package VP3635



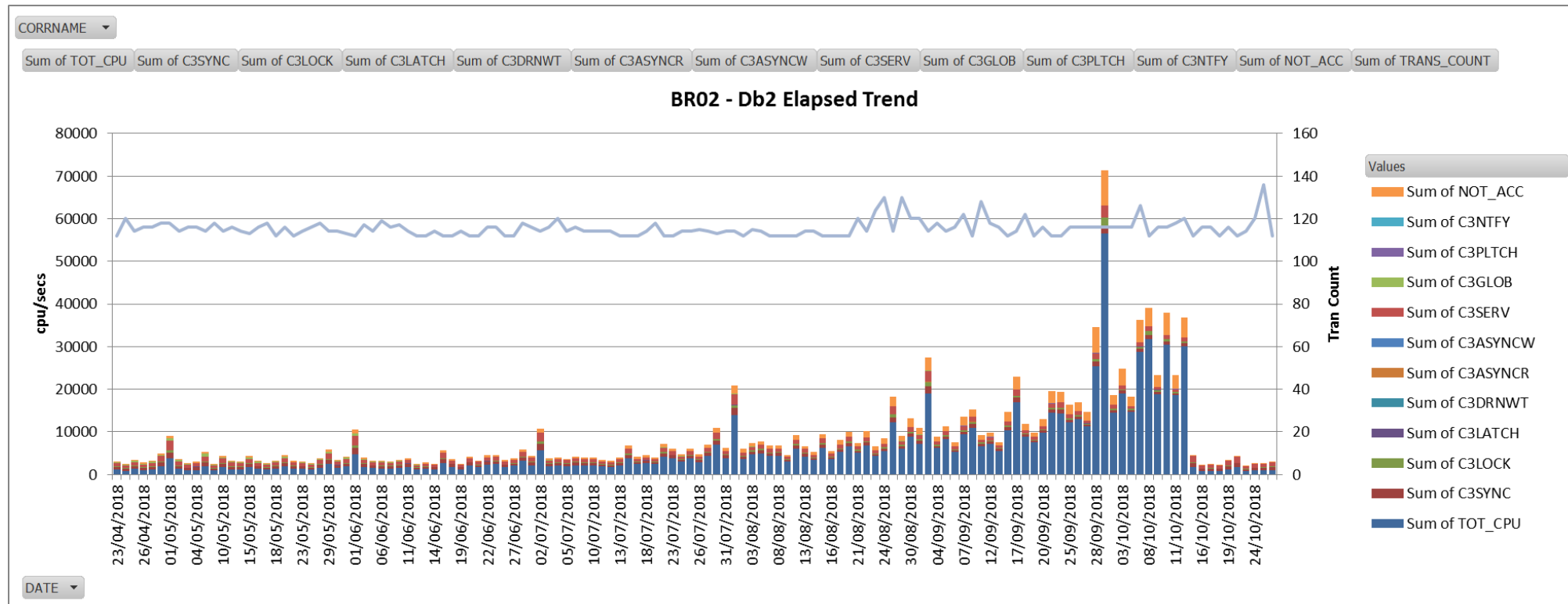
Using the Data

- Case Study 1 (Cont)
 - Package had not been rebound recently, so no access path changes
 - Then checking RTS showed that tables being accessed had corollary in table volume increases
 - Access path was inefficient, with a number of TS scans against these tables



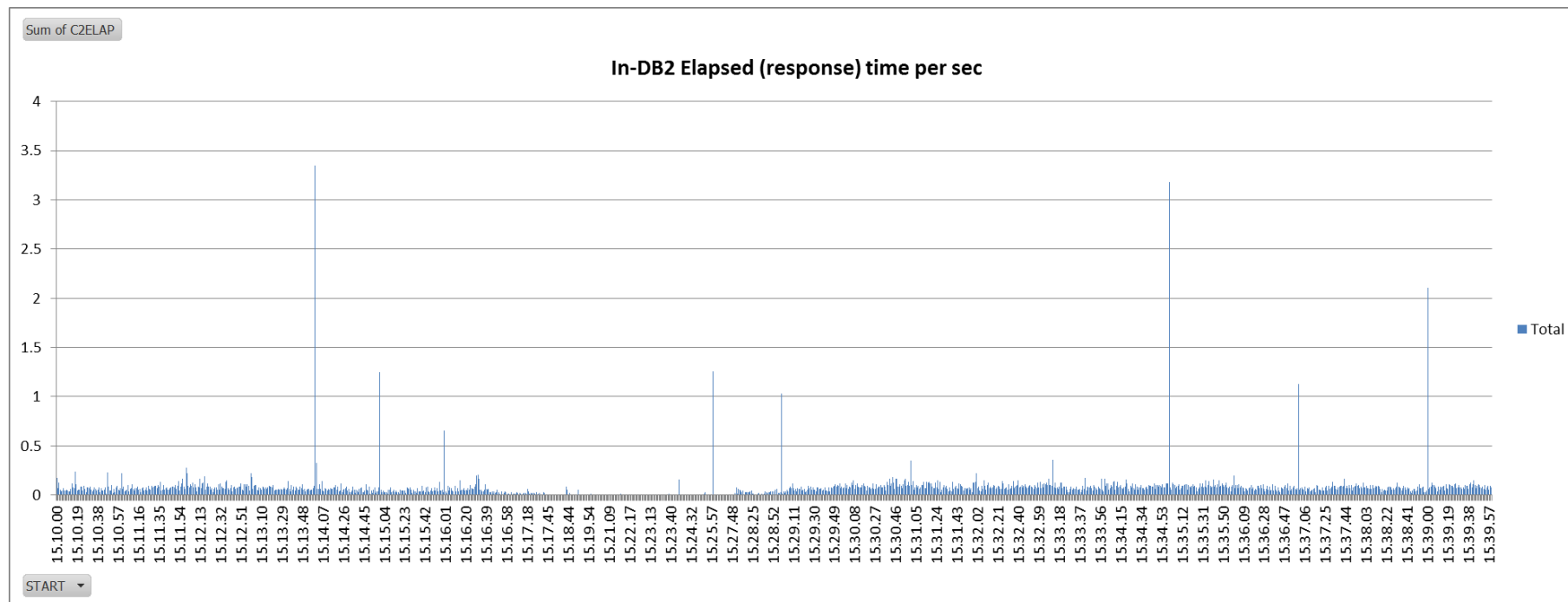
Using the Data

- Case Study 1 (Cont)
 - New Index added to fix access path problem



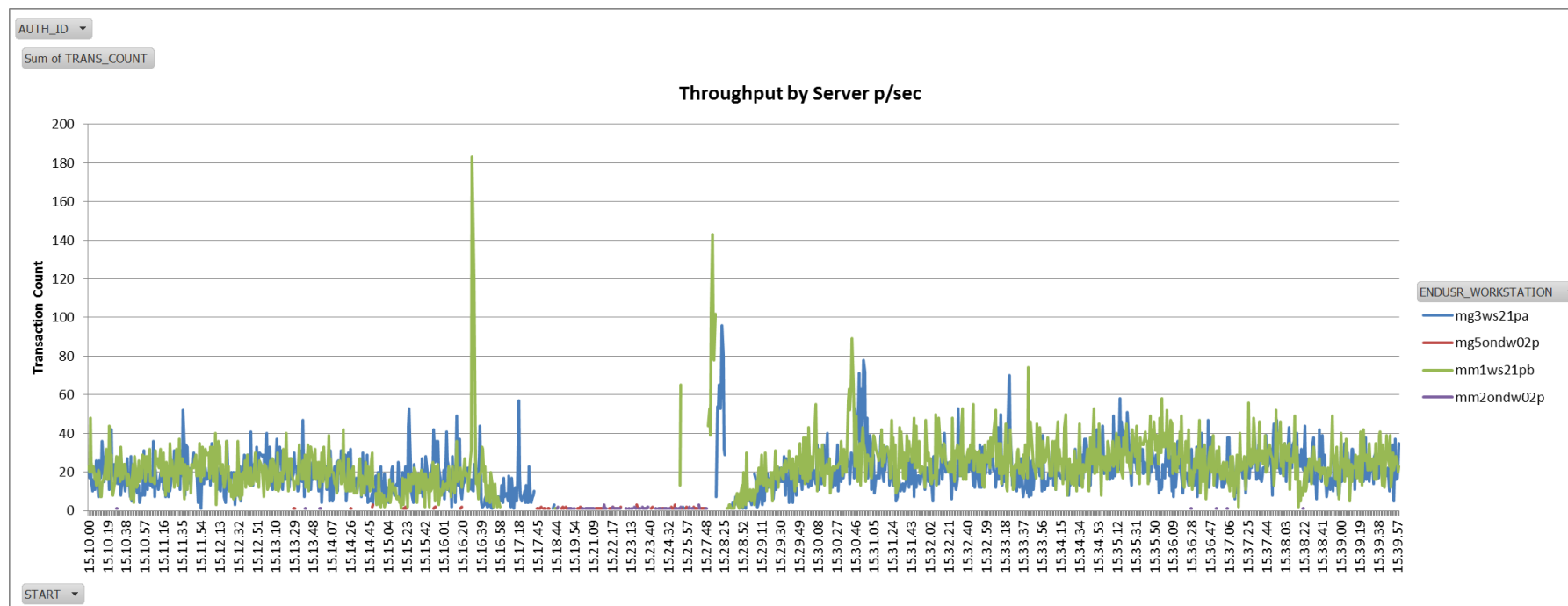
Using the Data

- Case Study 2
 - Issue with offhost Branch diary application, JVM thread pools filling up and monitoring tools point at long response times (60 sec+) from Db2 on mainframe
 - Initial look at response times in Db2 do not support this



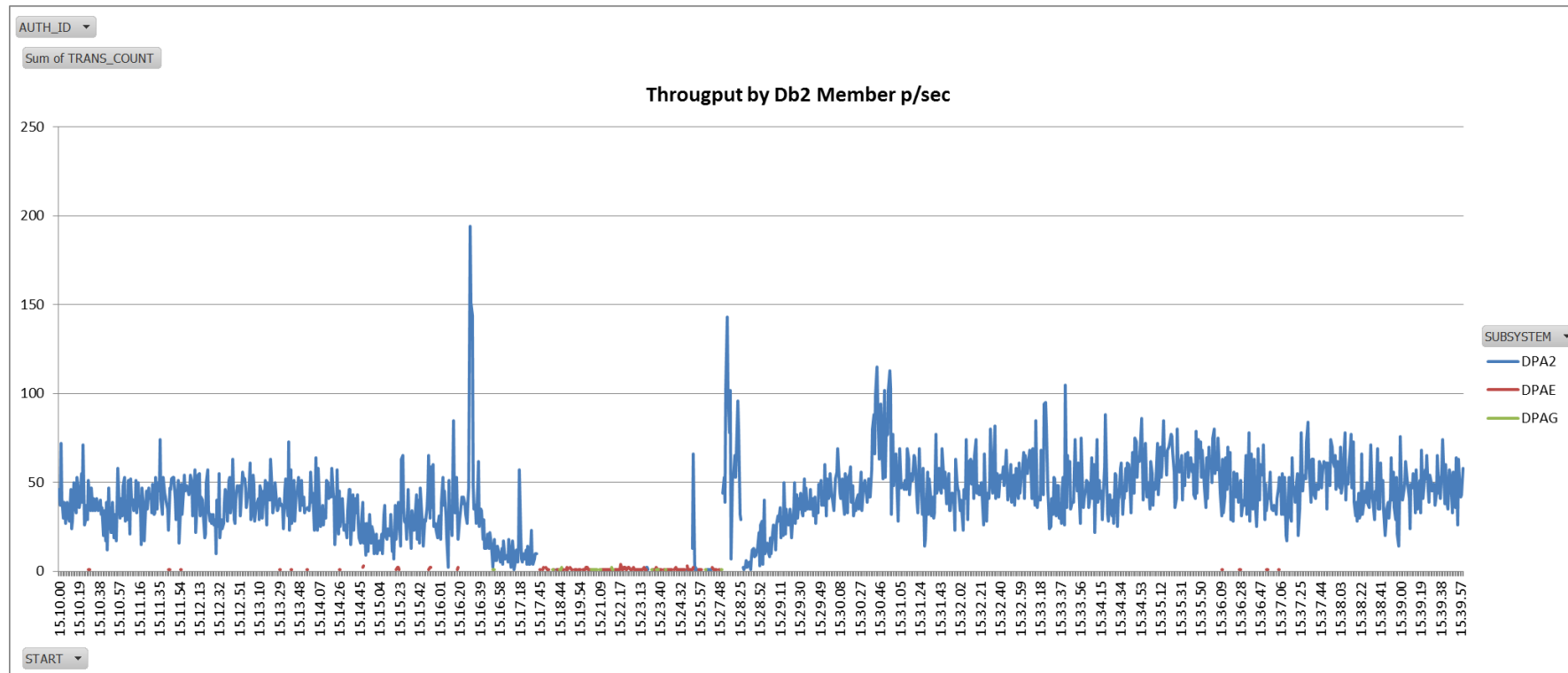
Using the Data

- Case Study 2 (Cont)
 - Time to check what is NOT there, as opposed to what is
 - Instead plotting distributed connection counts by server shows different picture
 - No issues with max DBATs, no error messages in logs, issue still appears to be outside DB2



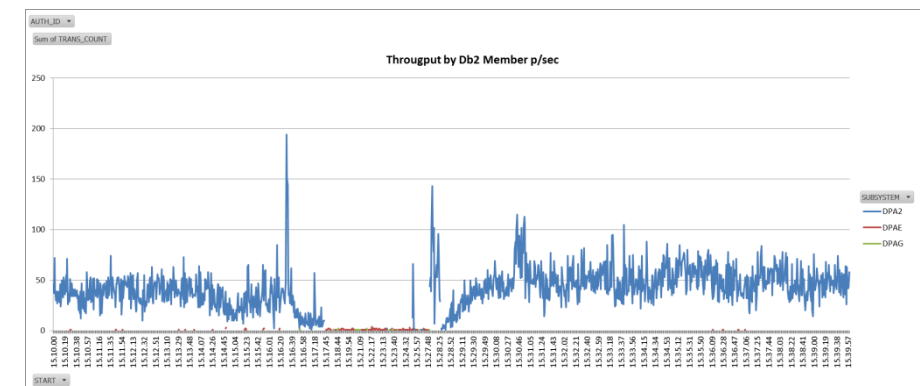
Using the Data

- Case Study 2 (Cont)
 - Time to look at data another way
 - Look at connections by Db2 member instead, which showed a pronounced skew towards DPA2 member, with only a few connections on the other two members



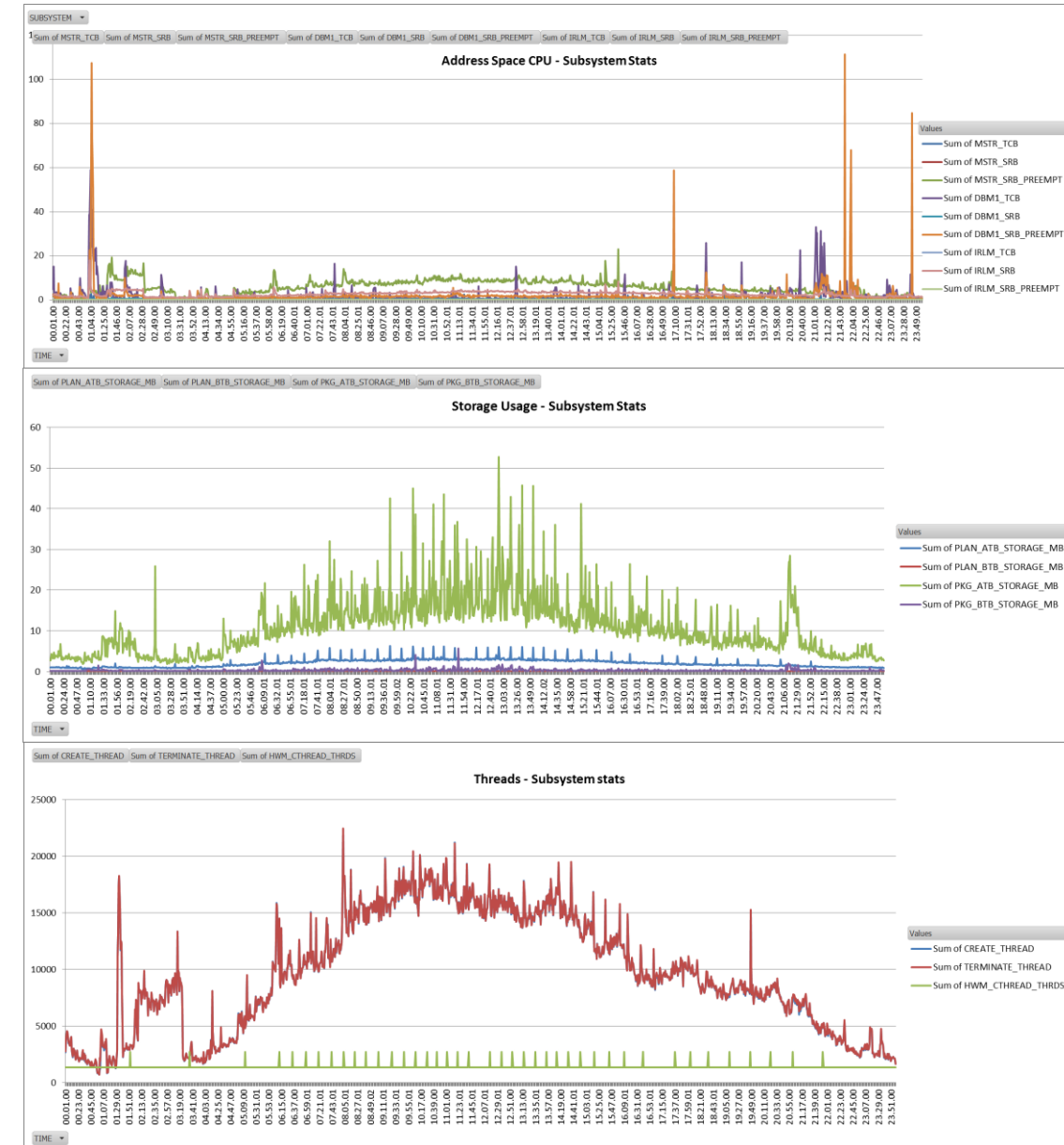
Using the Data

- Case Study 2 (Cont)
 - Sysplex Distributer issue?
 - Firewall?
 - On checking it was discovered that the IP addresses of DPAE and DPAG were not in the firewall rules
 - Application connection via group DVIPA and was directed to DPAE/DPAG on first connection they were successful
 - Subsequent connections direct to the member DVIPA's did not
 - Firewall rule change resolved issue, but resolution would have taken considerably longer had data patterns not pointed that direction



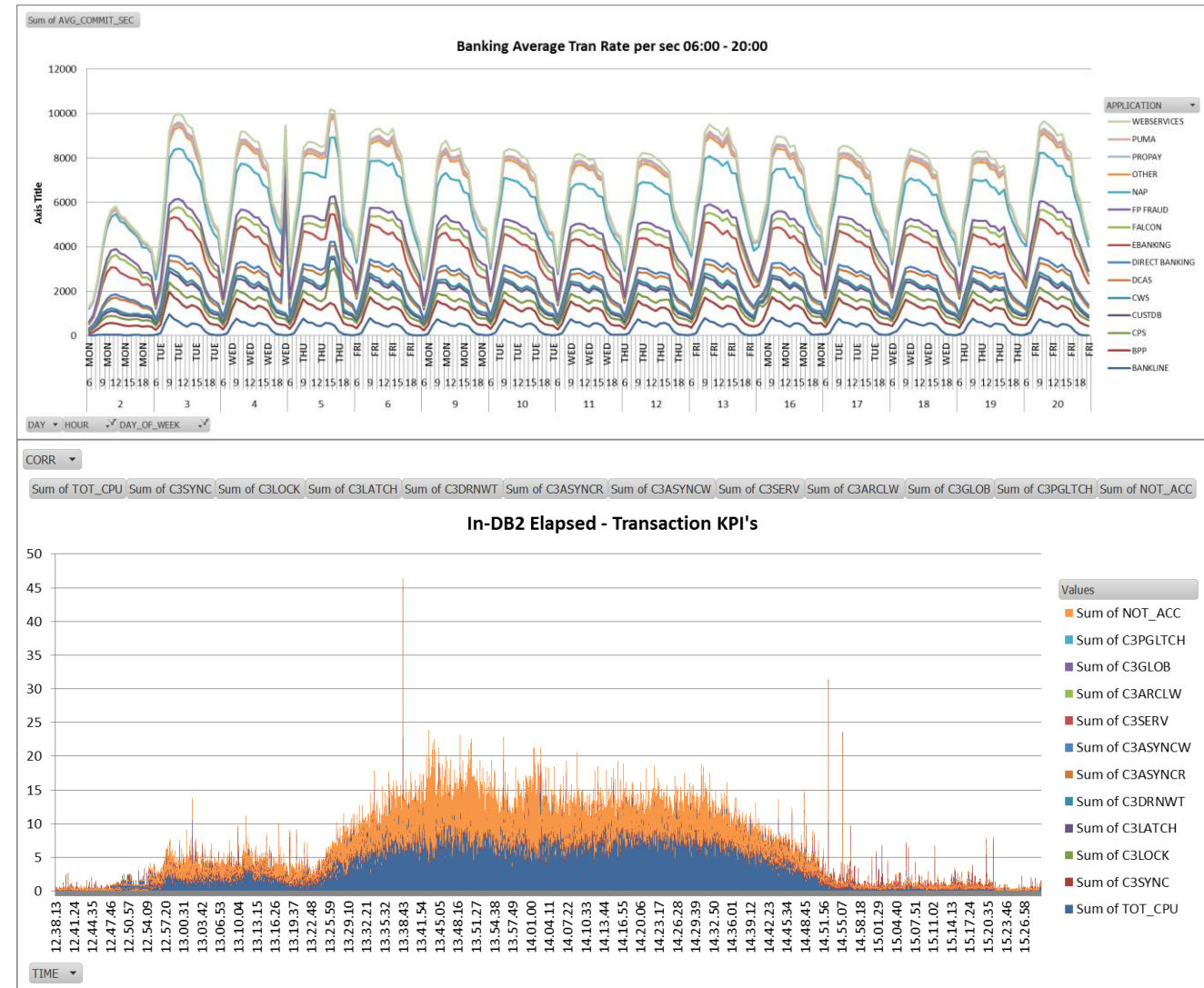
Using the Data

- KPI Examples
 - Subsystem
 - Subsystem Address Space CPU
 - DBM1
 - IRLM
 - MSTR
 - Storage Usage
 - Active/Queued threads
 - Plan/Package above & below bar
 - Dataset open/close activity



Using the Data

- KPI Examples
 - Transaction
 - Throughput rates
 - CL2 Elapsed Total
 - CL2 CPU
 - CL3 Suspensions



The End Game

- Currently reactive
 - Reports produced some time after the fact
- Real time and eventually predictive is the goal!
 - Real time SMF streaming
 - Splunk
 - CDP - Common Data Provider (IBM)
 - Ironstream (Syncsort)
- Machine Learning on Z (MLz)
 - Applying machine learning and data science techniques to SMF data
 - Provide real-time operational insight
 - Near time predictive KPI trends

We want your feedback!

- Please submit your feedback online at
 - <http://conferences.gse.org.uk/2018/feedback/IG>
- Paper feedback forms are also available from the Chair person
- This session is **IG**

