IBM IMS Performance Analyzer for z/OS

Product overview

IBM

IMS Tools

for z/OS

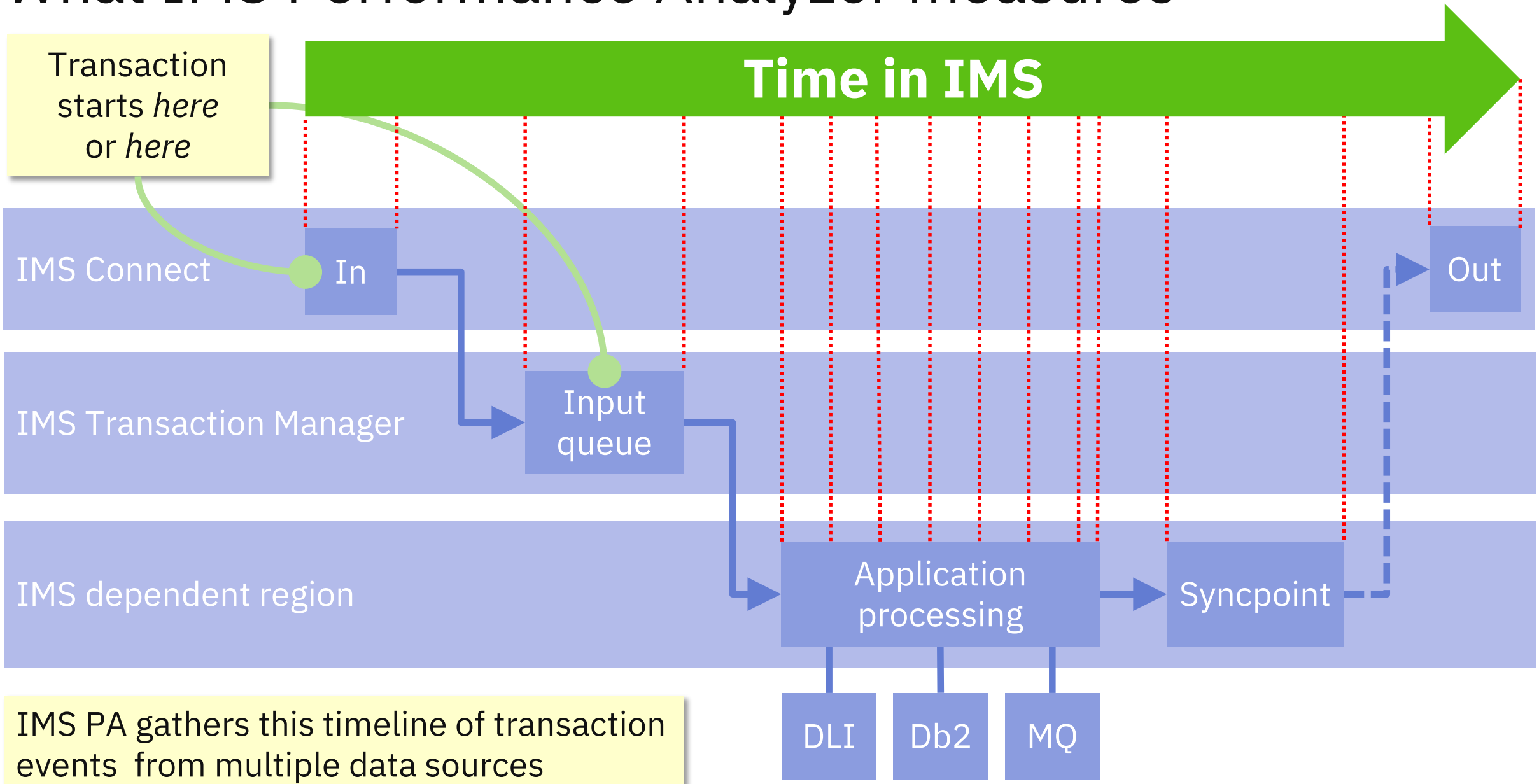
Mission statement

IMS Performance Analyzer is a reporting tool for IMS system programmers, administrators, application developers, and business managers who need to analyze the performance of IMS transactions and resources

IMS Performance Analyzer overview

- Comprehensive batch reporting of the IMS log, monitor, and traces
- Official historical reporter for OMEGAMON for IMS (ATF) and IMS Connect
- Signature feature—form-based reporting to design your own reports—provides the most flexible way of analyzing transaction performance
- Typical customer use:
  - Daily transaction performance and system health check reporting
  - Performance benchmarking for release migration and application changes
  - Ad-hoc problem determination
  - Long-term historical performance data collection
  - Forward transaction performance data to charting, analytics platforms

What IMS Performance Analyzer measures



IMS PA gathers this timeline of transaction events from multiple data sources

Example reports

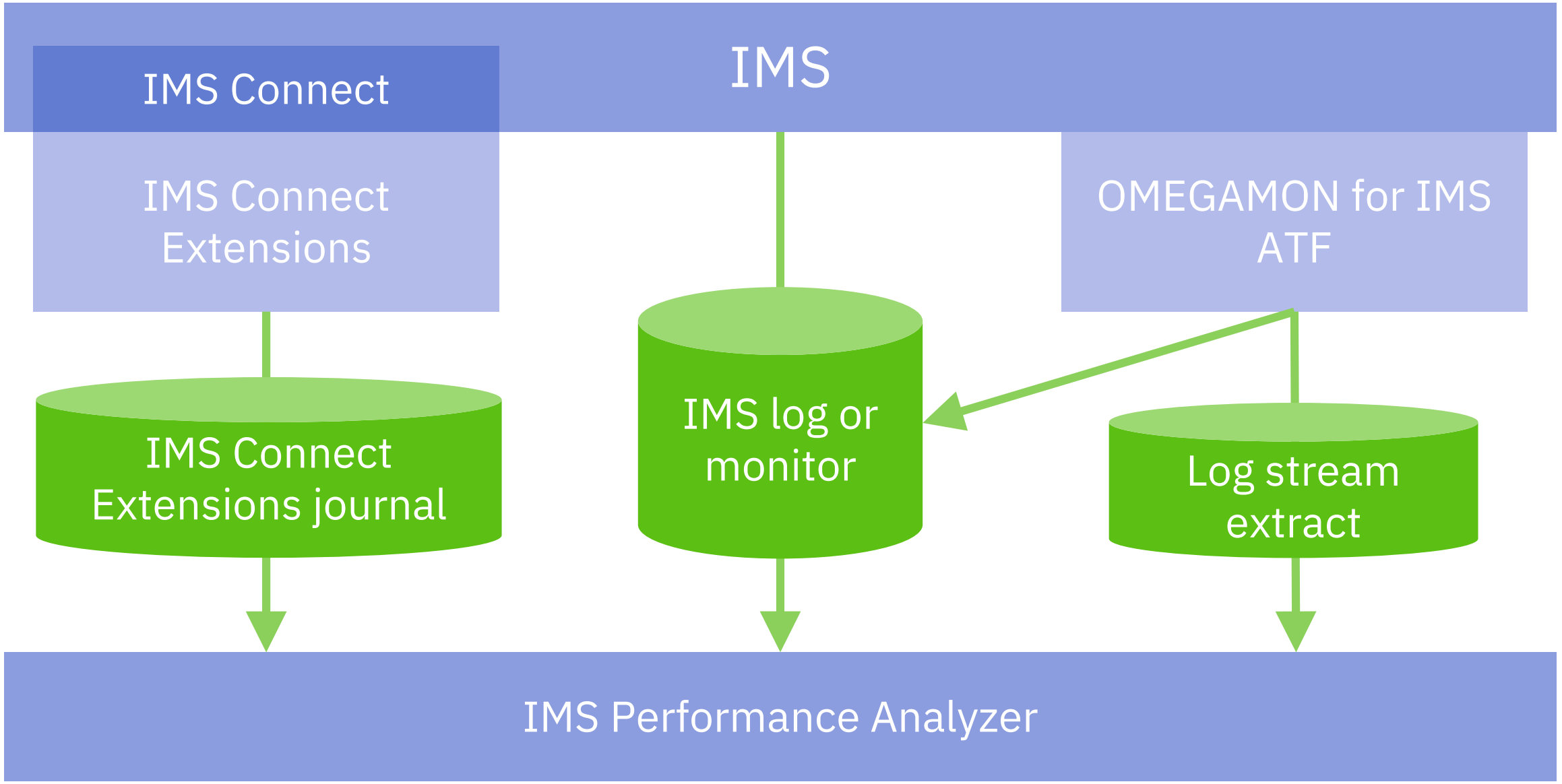
List: Chronological list of transactions with performance details

Origin LTERM	Trancode	Program	Start Time	CPU Time	Userid	InputQ Time	Process Time	OutputQ Time	Total IMS Time	DB Call Count	ESAFcall Count	ABEND
NYC1	WEBONLIN	PROGRAM1	14.51.39.7360	0.0511	JOHN	0.0216	0.6168	-	0.6384	86	19	
	BUYSHOES	PROGRAM2	14.51.40.3744	0.0046	SALLY	0.0105	0.0109	-	0.0202	5	19	
	ADD2CART	PROGRAM3	14.51.40.3920	0.0032	JACK	0.0112	0.0177	0.0000	0.0280	5	19	
NYC2	WEBONLIN	PROGRAM1	14.51.40.7500	0.0476	JILL	0.0057	0.3147	-	0.3204	86	19	
	BUYSHOES	PROGRAM2	14.51.41.0703	0.0030	STEVE	0.0164	0.0184	-	0.0337	5	19	
	ADD2CART	PROGRAM3	14.51.41.0933	0.0031	JAMES	0.0102	0.0218	0.0000	0.0312	5	19	U0777

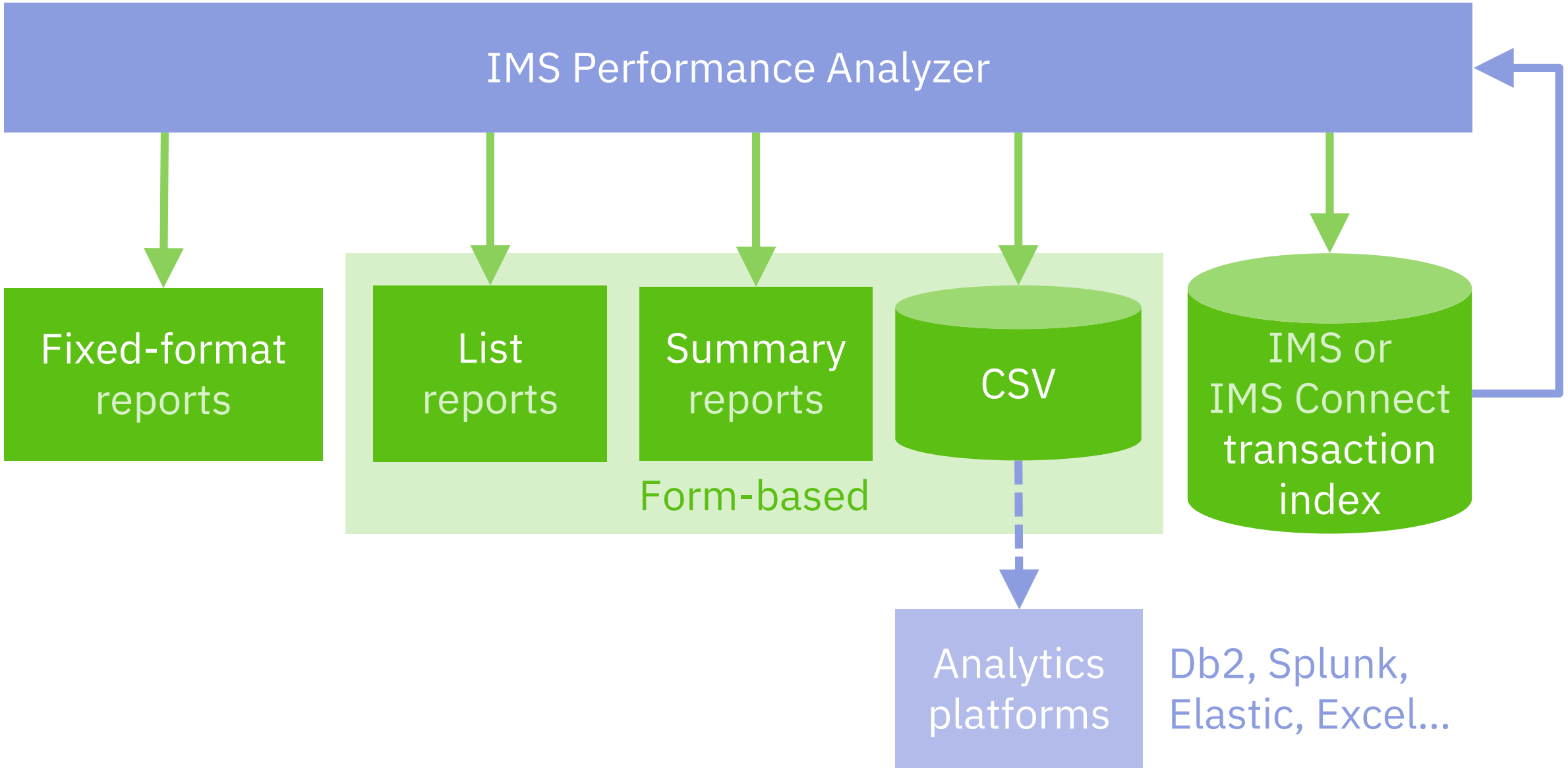
Summary: Statistical analysis based on any key field combination (e.g. by trancode or region type)

Trancode	Tran Count	Ave InputQ Time	Max InputQ Time	Ave CPU Time	Max CPU Time	>0.05 CPU Time	Ave Process Time	Max Process Time	>1.0sec Process Time	Ave Total IMS Time	Max Total IMS Time	Ave DB Call Count	Ave ESAFcall Count
WEBONLIN	2	0.0137	0.0216	0.0493	0.0511	50.00%	0.4657	0.6168	0.00%	0.4794	0.6384	86.00	19.00
BUYSHOES	2	0.0134	0.0164	0.0038	0.0046	0.00%	0.0147	0.0184	0.00%	0.0269	0.0337	5.00	19.00
ADD2CART	2	0.0107	0.0112	0.0031	0.0032	0.00%	0.0197	0.0218	0.00%	0.0296	0.0312	5.00	19.00
INVENTRY	10	0.0061	0.0123	0.0368	0.0474	0.00%	0.5202	2.0075	10.00%	0.5273	2.0103	68.80	15.20
PAYMENTS	10	0.0041	0.0088	0.0020	0.0035	0.00%	0.1077	1.0045	10.00%	0.1115	1.0095	4.00	15.20
Total	26	0.0069	0.0216	0.0193	0.0511	3.85%	0.2800	2.0075	7.69%	0.2869	2.0103	35.38	16.08

Data sources



Outputs


IMS Performance Analyzer
Fixed-format reports
List reports
Summary reports
CSV
IMS or IMS Connect transaction index
Form-based
Analytics platforms
Db2, Splunk, Elastic, Excel...

Transaction performance reporting

CPU heavy hitters summary report

- Create new forms, or create modified copies of supplied forms, to answer your site-specific IMS performance questions
- Example: this “CPU heavy hitters” report summarizes IMS transaction CPU and process times in *ranges appropriate to your environment* (step-by-step how-to video on YouTube)

Program	Tran Count	Tot CPU Time	Avg CPU Time	>0.2 CPU Time	>0.5 CPU Time	>2.0 CPU Time	Max CPU Time	Avg Process Time	>1.0 Process Time	>2.0 Process Time	Max Process Time
BANKING	143	66.22499	0.476439	43.88%	20.14%	0.00%	1.758429	6.405757	32.17%	27.97%	187.6067
FINANCE	19	54.28877	2.857303	73.68%	63.16%	42.11%	11.19808	10.10058	100.00%	94.74%	59.88424
MOBILE	16,132	35.17463	0.002180	0.00%	0.00%	0.00%	0.014006	0.023198	0.00%	0.00%	0.519829
ONLINE	12	28.91666	2.628787	100.00%	100.00%	100.00%	5.865392	25.13817	100.00%	100.00%	104.9229
ORDERS	77	21.79370	0.283035	90.91%	0.00%	0.00%	0.313683	0.791294	22.08%	10.39%	5.615369
INVENTRY	70	17.12364	0.244623	7.14%	5.71%	2.86%	7.029314	1.332807	35.71%	7.14%	20.97937
CUSTOMER	2,219	15.33635	0.006911	0.00%	0.00%	0.00%	0.022029	0.063811	0.00%	0.00%	0.749206
STOCK	68	13.95261	0.205185	50.00%	1.47%	1.47%	2.677944	2.321356	55.88%	30.88%	49.71441
…											
Total	44,290	438.5006	0.010333	0.59%	0.19%	0.08%	12.05804	0.819255	5.92%	0.50%	3673.108

- Understanding transaction CPU times helps identify candidate programs for optimization; together with Tailored Fit Pricing, this can help you to reduce overall running costs

Program switch list report

- Program switches: an initial transaction can call one or more other transactions, which can call other transactions, and so on
- Understanding the program switch sequence can help identify specific bottlenecks...

Org LTERM	IMS Tran Start	Parent Trancode	Trancode	Prog Swit#	InputQ Time	PgmSwtch Time	Process Time	OutputQ Time	Total IMS Time	IMS Resp Time	CPU Time
NEWYORK	14.58.02.023922		BANK0001	0	0.004688	-	0.009277	-	0.013965	4.467306	0.000737
	14.58.02.037859	BANK0001	BANK0010	1	0.000150	0.000137	1.065917	-	1.066054	-	0.014046
	14.58.03.102187	BANK0010	BANK0011	2	0.001114	0.001093	0.762127	-	0.763220	-	0.015807
	14.58.03.861171	BANK0011	BANK0012	3	0.004557	0.004535	0.586579	-	0.591114	-	0.015897
	14.58.04.449915	BANK0012	BANK0013	4	0.003350	0.003330	0.458266	-	0.461596	-	0.014347
	14.58.04.909175	BANK0013	BANK0014	5	0.101360	0.101341	0.428108	-	0.529449	-	0.013495
	14.58.05.435875	BANK0014	BANK0015	6	0.312120	0.312099	0.754851	0.000000	1.066950	-	0.028735

Notice the long switch times for the last 2 transactions:
this contributed to almost 0.5 seconds of the response time

Program switch summary report

Program switch reports can reveal performance issues that might not be apparent just by looking at the overall transaction response or CPU times.

The switch time for trancode BANK0150 stands out as a potential bottleneck

Org Trancode	Trancode	Tran Count	Avg InputQ Time	Avg PgmSwtch Time	Max PgmSwtch Time	Avg Process Time	Max Process Time	Avg OutputQ Time	Avg Total IMS Time	Avg Resp Time	Avg CPU Time
BANK0101	BANK0101	932	0.011484	-	-	0.044661	3.590554	0.000000	0.056145	0.498563	0.004940
...											
BANK0101	BANK0150	126	0.188746	0.188721	7.246319	0.507465	5.454976	0.000000	0.696186	-	0.014304
BANK0101	BANK0153	309	0.006004	0.005973	0.549195	0.396116	4.169538	0.000000	0.402089	-	0.020677
BANK0101	BANK0154	607	0.002426	0.002396	0.337522	0.313873	1.866285	0.000000	0.316269	-	0.019530

Before/after comparison summary report

You can create summary forms that compare differences in performance between time periods: for example, before and after changes to an application.

Performance for ADD2CART has slightly improved

Trancode	Time	Tran Count	Ave InputQ Time	Max InputQ Time	Ave CPU Time	Max CPU Time	Ave Process Time	Max Process Time	Ave Total Time	Max Total Time	Ave DB Call Count	Ave ESAFcall Count
ADD2CART	Before	7283	0.0137	0.0216	0.0493	0.0511	0.4657	0.6168	0.4794	0.6384	86	19
	After	7315	0.0135	0.0208	0.0479	0.0499	0.4582	0.5996	0.4717	0.6204	86	19
PAYMENTS	Before	5463	0.0041	0.0088	0.0020	0.0035	0.1077	1.0045	0.1115	1.0095	4	15
	After	5495	0.0073	0.0101	0.0032	0.0051	0.1492	1.6728	0.1565	1.6829	11	27

Such reports are useful to see whether changes will affect your running costs; especially useful for Tailored Fit Pricing.

Performance for PAYMENTS has got worse: on average, 7 more DB DLI calls and 12 more Db2 calls are being issued

Form-based reporting concepts

- A form is a report template where you select the field to be reported.
- Two form types:
  - List forms define reports that shows per-transaction data.
  - Summary forms use statistical functions to summarize multiple transactions.
- Fields available for reporting:
  - 160+ IMS transaction index fields.
  - 40 IMS Connect transaction index fields.
- Sample forms help you get started with many common tasks...

IMS Performance Analyzer sample report forms

Name	Type	Description
ALLLIST	LIST	Transaction List Report/Extract
ALLSUMM	SUMMARY	Transaction Summary Report
ALLSUMMX	SUMMARY	Transaction Summary Extract
BADRESP	SUMMARY	Bad Transaction Response Time
COMBLIST	LIST	Combined IMS and Connect List
COMBSUMM	SUMMARY	Combined IMS and Connect Summary
COMPLVL	SUMMARY	Transaction Completion Summary
CONNACK	SUMMARY	Connect ACK/NAK Summary
CONNLIST	LIST	Connect Transit Log
CONNPLEX	SUMMARY	Connect PLEX Usage Summary
CONNTCOD	SUMMARY	Connect Analysis by Trancode
CPUHIGH	SUMMARY	High CPU Usage Transactions
DASH	SUMMARY	Transaction Dashboard
DBCTLIST	LIST	List of DBCTL Transactions
DBCTSUMM	SUMMARY	Summary of DBCTL Transactions
FPANAL	SUMMARY	FP Transit Analysis by Trancode
FPBUFUSE	SUMMARY	FP Buffer Usage
FPDBCALL	SUMMARY	FP Database Calls
FPLOG	LIST	FP Transaction Transit Log
FPMSG	SUMMARY	FP Message Statistics
FPRESUSE	SUMMARY	FP Resource Usage
FPTRANX	LIST	FP Transact Exception - Basic
FPTRANXD	LIST	FP Transact Exception - Detailed

Name	Type	Description
MSGLEN	SUMMARY	Message Length Analysis
QTYPE	SUMMARY	Queue-type Summary
RESPDIST	SUMMARY	Response Time Distribution %
SMQLIST	LIST	SMQ Transaction Transit Log
SMQTCOD	SUMMARY	SMQ Transaction Analysis
SYNCCOUT	LIST	Synchronous Callout List
TRANCLAS	SUMMARY	Transit Analysis by Class
TRANINTV	SUMMARY	Interval Transaction Analysis
TRANPRTY	SUMMARY	Transit Analysis by Priority
TRANRESU	SUMMARY	Transaction Resource Usage
TRANTCOD	SUMMARY	Transit Analysis by Trancode
SWITLIST	LIST	Program-Switch List
SWITSUMM	SUMMARY	Program-Switch Summary
TRANRES1	SUMMARY	Transaction Resource Usage
TRANRESD	SUMMARY	Tran Resource Usage DLICall Summary
OLRLIST	LIST	HALDB Online Reorg List
OLRSUMM	SUMMARY	HALDB Online Reorg Summary

Resource usage reports

Database update activity fixed-format report

This report extract shows programs that updated database CUSTOMER.

Programs CUST02 and STOK31 accounted for most of the activity.

Database	Program	Proc	5050 Total		Updates	ISRT	DLET	REPL	ROLx	New Block	Free Space	5052 Insert	5051 Problem	20 24	Open/ Error
CUSTOMER	CUST02	APPL	240	DLI	240	177	52	11	0			0	0		0
				I/O	155	59	0	96		0	85				0
	CUST14	APPL	2	DLI	2	0	0	2	0			0	0		0
				I/O	2	0	0	2		0	0				0
	CUST15	APPL	58	DLI	58	0	0	58	0			0	0		0
				I/O	58	0	0	58		0	0				0
	CUST30	APPL	3	DLI	3	3	0	0	0			0	0		0
				I/O	2	1	0	1		0	1				0
	CUST38	APPL	0	DLI	0	0	0	0	0			0	0		1
				I/O	0	0	0	0		0	0				0
	STOK16	APPL	11	DLI	11	0	0	11	0			0	0		0
				I/O	11	0	0	11		0	0				0
	STOK17	APPL	4	DLI	4	0	0	4	0			0	0		0
				I/O	4	0	0	4		0	0				0
	STOK24	APPL	6	DLI	6	4	0	2	0			0	0		0
				I/O	4	1	0	3		1	1				0
	STOK31	APPL	252	DLI	252	186	8	58	0			0	0		0
				I/O	158	48	0	110		42	52				0
	STOK60	APPL	1	DLI	1	0	0	1	0			0	0		0
				I/O	1	0	0	1		0	0				0
	Total	APPL	577	DLI	577	370	60	147	0			0	0		1
				I/O	395	109	0	286		43	139				0

These programs are candidates for optimization.

OSAM Buffer Pool Statistics fixed-format report

One of the 20+ Internal Resource Usage reports.

96% of OSAM reads used the buffer pool and did not require database I/O. ✓

For optimal performance, you want to maximize this percentage.

		Count	/Tran	/Second	
Subpool ID:	None				
Fix options: Prefix/Buffers	Y/Y				
Buffer Size		4,096			
Buffer count		10			
Locate-type calls		18,638	7.64	.68	
Requests to create new Blocks		0	.00	.00	
Buffer Alter calls		526	.22	.02	
Purge calls		155	.06	.01	
Locate-type calls, Data already in Pool		17,956	7.36	.65	96.34% of Locate calls
Buffers searched by all Locate-type calls		22,931	9.39	.83	
Read I/O requests		668	.27	.02	74.22% of OSAM I/O operations
Single Block Writes by Buffer Steal routine		0	.00	.00	0.00% of OSAM I/O operations
Blocks Written by Purge		232	.10	.01	25.78% of OSAM I/O operations

VSAM Buffer Pool Statistics fixed-format report

Another of the 20+ Internal Resource Usage reports.

89% of VSAM reads used the buffer pool and did not require database I/O. ✓

For optimal performance, you want to maximize this percentage.

Summary Totals	Count	/Tran	/Second	
Virtual Pool Size	8,816,640			
Buffers in all Subpools	2,280			
Write Errors	0			
Retrieve by RBA calls	14,080	5.77	.51	78.85% of Retrieve calls
Retrieve by Key calls	3,777	1.55	.14	21.15% of Retrieve calls
Retrieve calls	17,857	7.32	.65	
Logical records Inserted into ESDS	0	.00	.00	0.00% of Update requests
Logical records Inserted into KSDS	15	.01	.00	3.05% of Update requests
Logical records Altered in this Subpool	476	.20	.02	96.95% of Update requests
Updates	491	.20	.02	
Background Write requests	0	.00	.00	0.00% of calls to VSAM
Synch calls	83	.03	.00	0.62% of calls to VSAM
VSAM Get calls	13,148	5.39	.48	98.83% of calls to VSAM
VSAM Search Buffer calls	72	.03	.00	0.54% of calls to VSAM
VSAM calls	13,303	5.45	.48	
VSAM found CI in Pool	18,705	7.66	.68	89.63% of VSAM buffer requests
VSAM Read CI from DASD	2,165	.89	.08	94.71% of VSAM I/O operation
Writes initiated by IMS	121	.05	.00	5.29% of VSAM I/O operation
Writes initiated by VSAM	0	.00	.00	0.00% of VSAM I/O operation

Dozens of fixed-format reports for common issues

IMS Log

Transaction Transit
- Analysis
- Statistics
- Log
- Extract by Interval
- Transaction Exception

Resource Usage & Availability
- Dashboard
- Management Exception
- Transaction Resource Usage
- Resource Availability
- CPU Usage
- Internal Resource Usage
  (over 20 different reports)
- MSC Link Statistics
- Message Queue Utilization
- Database Update Activity
- Region Histogram
- OSAM Sequential Buffering
- Deadlock
- System Checkpoint
- BMP Checkpoint
- Gap Analysis
- Cold Start Analysis

Fast Path Transit
- Analysis
- Log
- Extract By Interval
- Transaction Exception

Fast Path Resource Usage
- Resource Usage & Contention
- Database Call Statistics
- IFP Region Occupancy
- EMH Message Statistics
- DEDB Update Activity
- VSO Statistics

ATF Enhanced Summary
- Transaction Analysis
- DLI Call Analysis
- Db2 Call Analysis
- MQ Call Analysis

Trace
- DC Queue Manager Trace
- Database Trace (Full Function)
- DEDB Update Trace
- ESAF Trace

IMS Monitor

Region Activity Summary
- Schedule Transaction
- Region
- Program (PSB)
- Database IWAIT

Region Activity Analysis
- Region Analysis
- Application Detail
- Database IWAIT Analysis
- Performance Exceptions
- Enqueue/Dequeue Trace
- Region Histogram

System Analysis
- Total System IWAIT

Program Analysis
- Program Activity Detail
- Program Trace
- Batch VSAM Statistics

Resource Usage
- Buffer Pool & Latch Statistics
- Communication
- MSC
- ESAF
- Synchronous Callout

Fast Path Analysis
- DEDB Resource Contention
- Fast Path Buffer Statistics
- BALG/Shared EMHQ Analysis
- OTHREAD Analysis
- VSO Summary

Monitor Data Analysis
- Monitor Record Trace

IMS Connect

Transaction Transit
- Analysis
- Log
- Extract

Resource Usage
- Port Usage
- Resume Tpipe
- ACK/NAK
- Exception Events
- Gap Analysis

Trace
- Transit Event Trace

OMEGAMON ATF

Transaction Transit
- List
- Summary

Trace
- Record Trace

Extracts
- Exception Transaction

Automated log file selection

Automated log file selection

- When requesting reports, you specify:
  - IMS subsystem names to report
  - Date/time range
- IMS PA selects the corresponding IMS log files or IMS Connect Extensions journals
- No need to know which input data set names to specify
- One-time-only setup task: **register your IMS and IMS Connect subsystems** in the IMS PA ISPF dialog
- Selects and merges logs across the sysplex

Related IMS performance tools

IMS Performance Solution Pack (PSP)

IMS Connect Extensions

- Brings powerful routing capabilities to IMS Connect
- Use for failover; higher availability
- Drain (suspend routing to datastore)
- Enhance security
- Brings instrumentation and monitoring to IMS Connect

IMS Performance Analyzer

- Comprehensive reporting on transaction performance and system resource usage
- Use to monitor, maintain, tune
- Impact of IMS Connect on transaction performance

IMS Problem Investigator

- Investigative tool
- Determine the cause of problems
- Trace the flow of events
- Identify and resolve problems
- Transaction times
- Latency
- Multiple reporting options

Transaction Analysis Workbench

- Analyze problems of z/OS-based transactions
  - IMS
  - CICS
  - Db2
  - MQ
- Consolidate and investigate logs
- Forward logs to analytics platforms

Summary of IMS Performance Analyzer features

- Comprehensive reporting solution out-of-the-box for IMS transaction performance: over 70 fixed-format reports, 40 report forms
- Optimized processing: multiple inputs and outputs, single pass of the data
- IMS Connect and OMEGAMON ATF reporting
- Design your own reports using forms
- Extract IMS performance data for use in analytics platforms
- Define multiple report sets for different reporting tasks: scheduled daily, weekly, monthly reporting, or on-demand
- Complements other IMS tools for comprehensive IMS performance analysis solution

For more information

- YouTube video “IMS Performance Analyzer - Form-based Reporting - CPU heavy hitters” https://youtu.be/go3ABDGeUdw
- IMS Performance Analyzer for z/OS Marketplace Resources https://www.ibm.com/us-en/marketplace/ims-performance-analyzer-for-zos/resources
- IMS Performance Solution Pack Marketplace Resources https://www.ibm.com/us-en/marketplace/ims-performance-solution-pack-z-systems/resources
- IMS Tools YouTube Playlist www.youtube.com/playlist?list=PLezLS0Tuqb-5DSdF1Locnq5IhTgcX02vf
- Sign up to the IBM zITSM newsletter! http://ibm.biz/zITSMNewsletterSubscribe
- IMS Tools website www.ibm.com/it-infrastructure/z/ims/tools
- IMS Tools new functions www.ibm.com/support/docview.wss?uid=swg22015506
- IMS Tools Product Documentation www.ibm.com/support/docview.wss?uid=swg27020942
- IMS new functions www.ibm.com/support/knowledgecenter/en/SSEPH2_15.1.0/com.ibm.ims15.doc.rpg/ims_cd_functions.htm
- IMS Tools support for IMS V15 www.ibm.com/support/docview.wss?uid=swg22009341

धन्यवाद
Hindi

多謝
Traditional

감사합니다
Korean

Спасибо
Russian

Ndzi khense ngopfu
Tsonga

Gracias
Spanish

Thank You
English

شكراً
Arabic

Obrigado
Brazilian
Portuguese

Grazie
Italian

Danke
German

Ke a leboha
Tswana

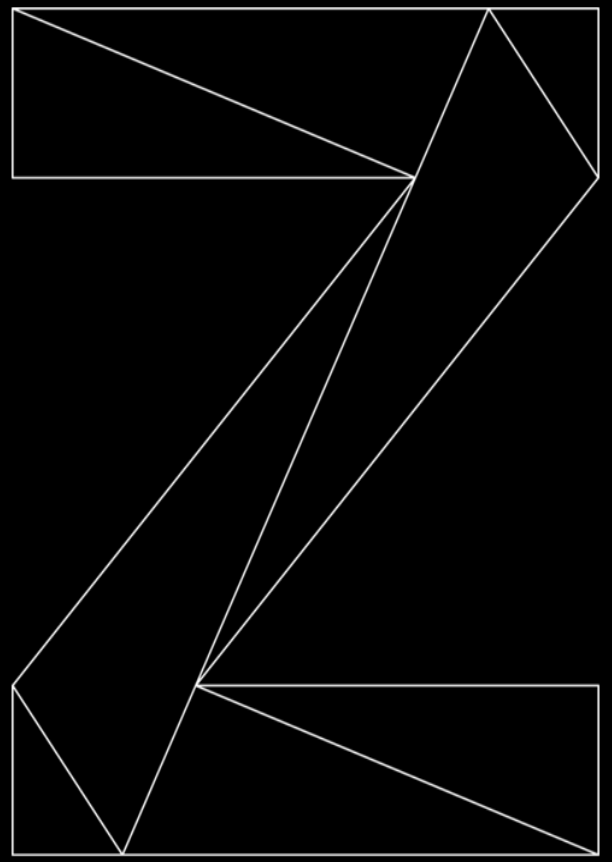
多谢
Simplified
Chinese

Merci
French

நன்றி
Tamil

ありがとうございました
Japanese

ขอบคุณ
Thai



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