

# IMS V7 High Volume Transaction Processing Benchmark on the Sysplex

## E26

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Anaheim, California

October 23 - 27, 2000



# Agenda

- ESS Evaluation
- IMS 7.1 + ESS



# IMS Runs the World...



## ■ Most Corporate Data is Managed by IMS

- Over 90% of Fortune 1000 Companies use IMS
- IMS Manages over 15 Billion GBs of Production Data
- \$2 Trillion/day transferred thru IMS by one customer

## ■ Over 50 Billion Transactions a Day run through IMS

- IMS Serves Close to 200 Million Users a Day
- Over 79 Million IMS Trans/Day Handled by One Customer on a Single Production Sysplex, 30 Million Trans/Day on a single CEC
- 120M IMS Trans/day, 7M per hour handled by one customer
- 4000 Trans/sec across TCP/IP to a single IMS
- 11,200 Trans/sec (Nearly 1 Billion/day) with IMS Data/Queued sharing on a 2-CEC Sysplex
- 3000 days without an outage at one large customer

## ■ Ninth Largest Revenue Producing "Software Company"

**"A still large and loyal IMS installed base due to the rock solid reputation of a transactional power horse for very large workloads. IMS is already successfully proven in large, web-based applications."**

- Gartner Group report

# IMS Performance goes fishing...



**...and catches a Shark!**

# IMS Performance ESS Configuration

- ◆ 2105 Model E20
- ◆ 9.1 GB drives (Ultra-high performance)
- ◆ 7 PAVs
- ◆ Multiple Allegiance
- ◆ 6 GB cache
  - ▶ 3 GB per cluster
  - ▶ not shared between clusters



# IMS ESS DASD Evaluation

- OLDS Logging bandwidth
  - ▶ high volume writing
- BMP
  - ▶ sequential I/O
- Database Utility runs
  - ▶ random I/O

# OLDS Logging Bandwidth

	RAMAC-2	RVA-X82	ESS-E20
Trans/sec	103	311	550
Dev Act rate	13.8	38	71.8
Resp. time*	68	24	14
Log data/sec	2.8 MB	8.2 MB	14.2 MB
% increase	-	193	407

\* response time shown in milliseconds

# BMP

RAMAC-2                      RVA-X82                      ESS-E20

Elapsed time\*  
Delta (vs RAMAC)  
Delta (vs RVA)

1,534	537	334
-	-65%	-82%
-	-	-38%

\*time shown in seconds



# Database Utilities

	RAMAC-2	RVA-X82	ESS-E20
Unload (FABCUR1+SORT)*	342	147	102
Reload(FABCUR3)*	947	290	185
Total REORG*	1289	437	287

\*times shown in seconds

# IMS ESS APARs

- OSAM non-serialization support
  - ▶ IMS 6.1 - PQ37020
  - ▶ IMS 7.1 - PQ37003

# IMS 7.1 with ESS in the Parallel Sysplex

- Hardware -

- ▶ 21/2 9672-ZZ7 processors
- ▶ 157 volumes ESS 2105-E20

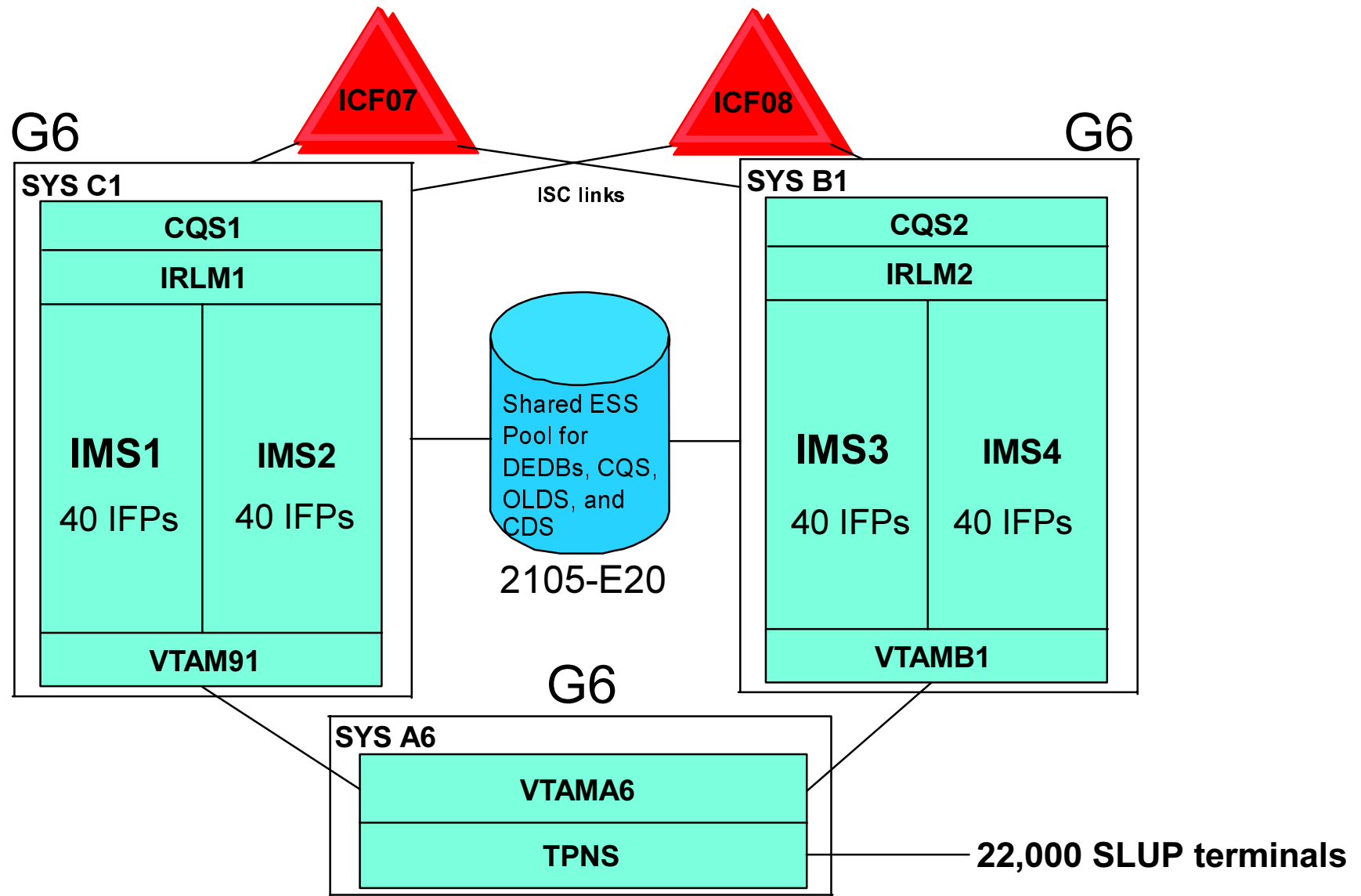
- Software -

- ▶ OS/390 2.8
- ▶ IMS 7.1
- ▶ IRLM 2.1
- ▶ TPNS 3.4

- Result -

- ▶ **11,246 transactions per second !**

# Parallel Sysplex Environment



# IMS Performance ESS Connectivity

- 32 chpids per 2105 from each ZZ7
  - ▶ 2 chpids per path
- 9032 Mod5 ESCON director
- ESS-1
  - ▶ 8 LSSs
  - ▶ 12 paths
  - ▶ 123 volumes
  - ▶ 7 PAVs per volume
- ESS-2 & 3
  - ▶ 4 LSSs each
  - ▶ 4 paths each
  - ▶ 64 volumes
  - ▶ 3 PAVs per volume



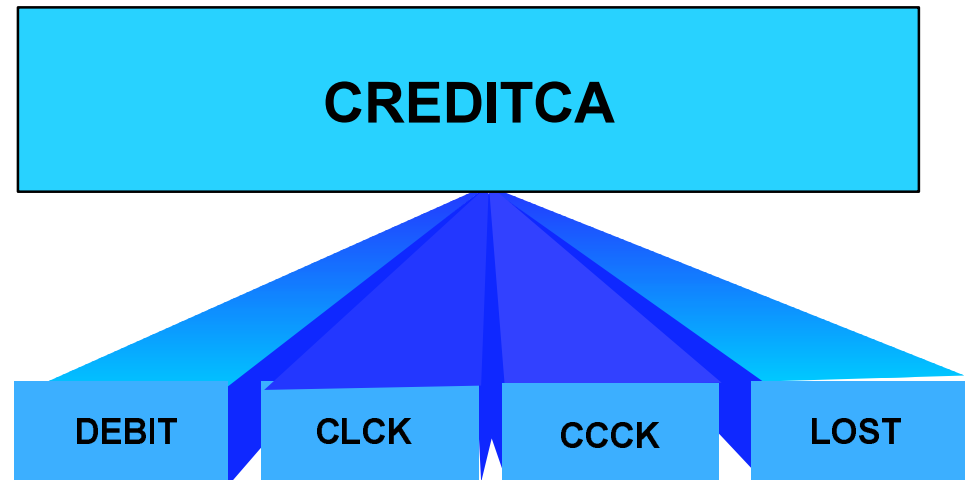
# IMS ESS usage

VOL	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
S00 @	A01	A17	A33	A49	A65	A81	IMS2 WAD	CQS 3	CQS 9							CDS 1
S01 @	A02	A18	A34	A50	A66	A82	IMS3 WAD	CQS 4	CQS 10							CDS 2
S02 @	A03	A19	A35	A51	A67	A83	IMS4 WAD	CQS 5	CQS 11							CDS 3
S03 @	A04	A20	A36	A52	A68	A84	CDS 10	CQS 6	CQS 12	IMS2 OL3	IMS4 OL6					CDS 4
S04 @	A05	A21	A37	A53	A69	A85	CQS 1	CQS 7	IMS2 OL6	IMS2 OL4	IMS3 OL9					CDS 5
S05 @	A06	A22	A38	A54	A70	A86	CQS 2	CQS 8	IMS2 OL7	IMS2 OL5	CDS 9					CDS 6
S06 @	A07	A23	A39	A55	A71	IMS1 OL0	IMS1 OL1	IMS1 OL2	IMS1 OL3	IMS1 OL4	IMS1 OL5	IMS1 OL6	IMS1 OL7	IMS1 OL8	IMS1 OL9	CDS 7
S07 @	A08	A24	A40	A56	A72	IMS2 OL0	IMS2 OL1	IMS2 OL2						IMS2 OL8	IMS2 OL9	CDS 8
S90 @	A09	A25	A41	A57	A73	IMS3 OL0	IMS3 OL1	IMS3 OL2								
S90 @									A10	A26	A42	A58	A74	IMS3 OL3	IMS3 OL4	STO A01
S91 @	A11	A27	A43	A59	A75	IMS3 OL6	IMS3 OL7	IMS1 WAD								
S91 @									A12	A28	A44	A60	A76	EXC ADD	IMS4 OL0	IMS4 OL1
S92 @	A13	A29	A45	A61	A77	IMS4 OL2	IMS4 OL3	IMS4 OL4								
S92 @									A14	A30	A46	A62	A78	IMS4 OL5	EXC A01	IMS4 OL7
S93 @	A15	A31	A47	A63	A79	IMS4 OL8	IMS4 OL9	RCN 1								
S93 @									A16	A32	A48	A64	A80	IMS3 OL8	RCN 2	IMS3 OL5

# IMS Data-sharing Workload

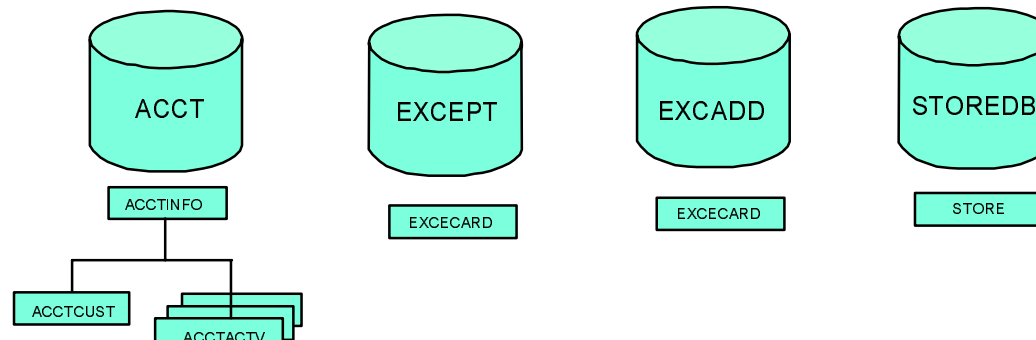
1 COBOL application program -

4 Fast Path exclusive transactions



4 DEDB databases -

89 Area datasets



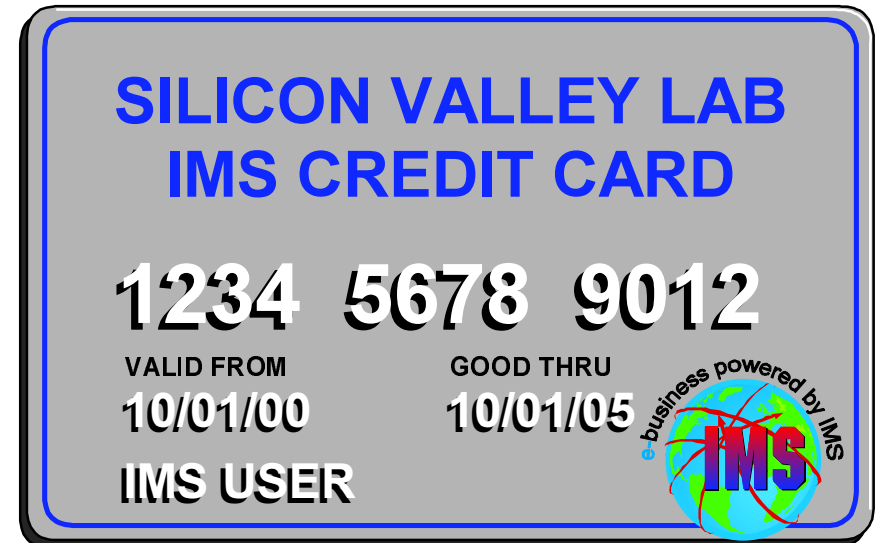
# Transaction Codes

CCCK - Credit check

CLCK - Credit limit check

DEBIT - Account debit/credit

LOST - report lost or stolen card



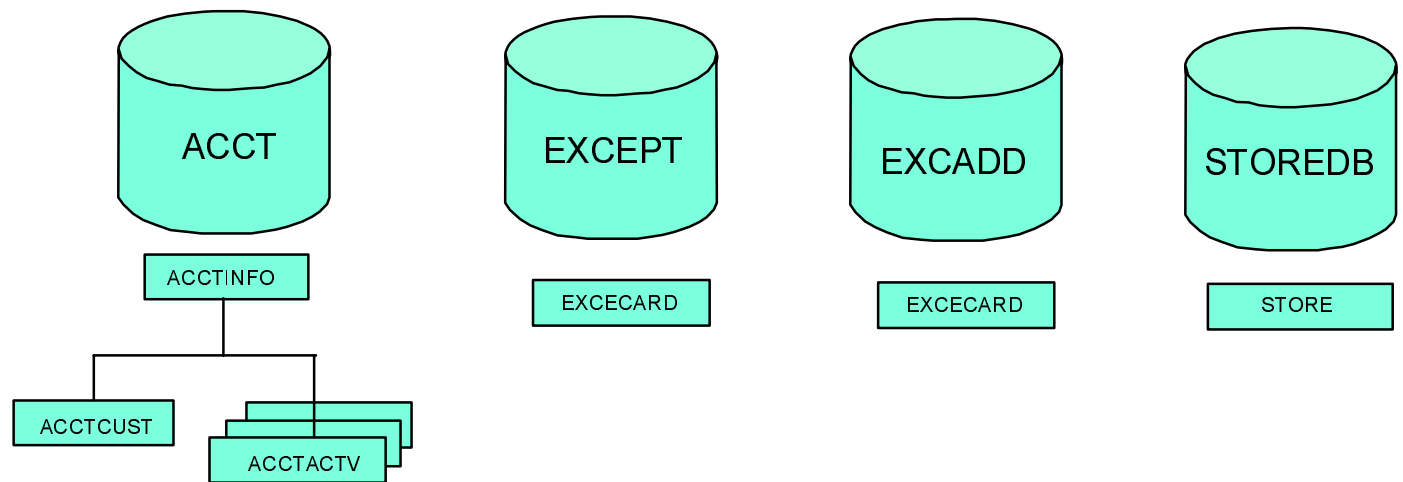


# Transaction DL/I call profiles

- Tran code	DB	ACCT (shared)	EXCEPT (SVSO)	EXCADD (shared)	STORE (SVSO)	I/O PCB
LOST		GHU REPL	GHU REPL	ISRT		GU  ISRT
CCK - case 1			GHU			GU ISRT
CCK - case 2			GHU	GHU		GU ISRT
CCK - case 3			GHU REPL			GU ISRT
CCK - case 4			GHU	GHU REPL		GU ISRT
CLCK		GU				GU ISRT
DEBIT		GHU REPL ISRT			FLD	GU  ISRT

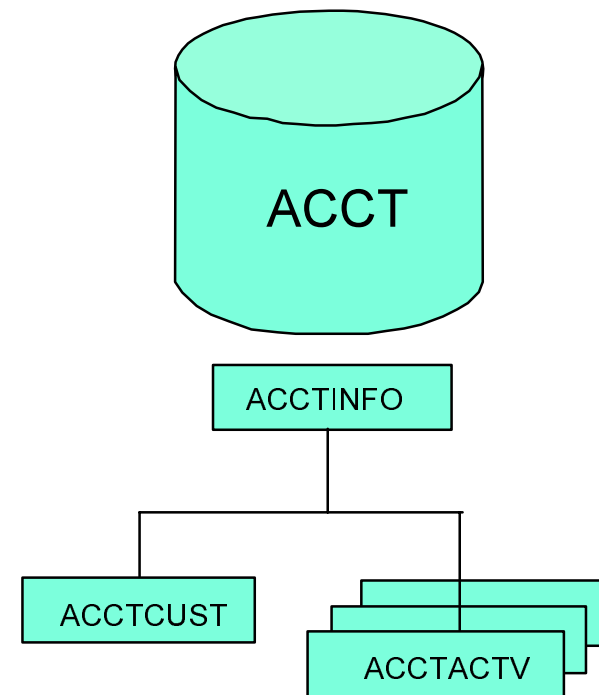
# Workload Databases

- DEDBs
  - ▶ VSAM Clusters
  - ▶ 2 native databases
  - ▶ 2 CF structures



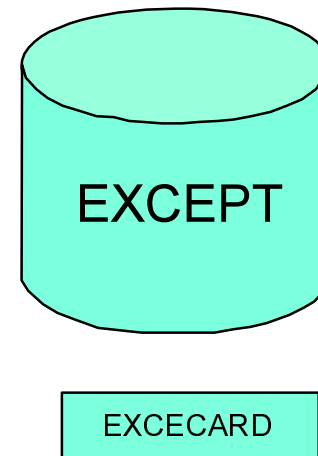
# Account Database

- Single database
  - ▶ 86 area datasets
  - ▶ 2200 cylinders per area
- 2 level hierarchy
- 13 million root segments
- ACCESS=UPDATE



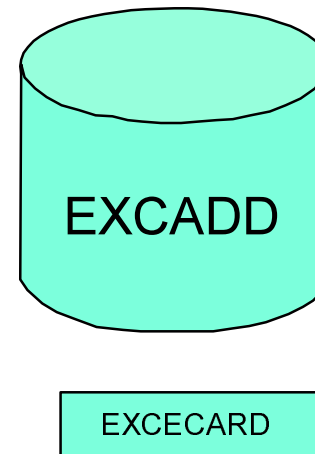
# Exception Database

- Single area
  - ▶ 500 cylinder dataset
- Root-only
  - ▶ 268,000 records
- Shared VSO
- ACCESS=UPDATE



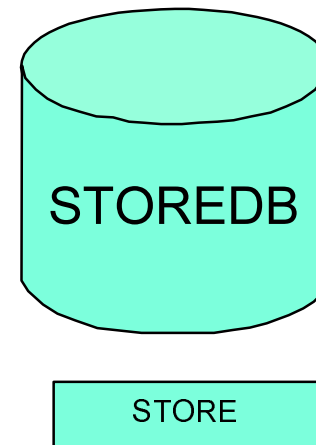
# Exception Add Database

- Single area
  - ▶ 2200 cylinder dataset
- Root-only
  - ▶ 500 records at start
- ACCESS=UPDATE



# Store Database

- Single area
  - ▶ 5 cylinder dataset
- Shared VSO
- Root-only
  - ▶ 2000 records
- ACCESS=UPDATE



# Measurement results

- Storage usage
- CF activity
  - ▶ IRLM
  - ▶ EMHQ
  - ▶ SVSO areas
- DASD monitoring
  - ▶ Account Areas
  - ▶ OLDS

# RMF Virtual Storage Summary

R M F S U M M A R Y R E P O R T

V I R T U A L S T O R A G E A C T I V I T Y

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OS/390  
REL. 02.08.00

SYSTEM ID 961  
RPT VERSION 2.7.0

DATE 05/22/2000  
TIME 22.02.00

INTERVAL 00.59.999  
CYCLE 1.000 SECONDS

## COMMON STORAGE SUMMARY

NUMBER OF SAMPLES 6

### STATIC STORAGE MAP

AREA	ADDRESS	SIZE	BELOW 16M			EXTENDED (ABOVE 16M)							
			MIN	MAX	AVG	MIN	MAX	AVG					
EPVT	2FE00000	1282M											
ECSA	A562000	601M	SQA 1568K	22.02.00	1568K	22.02.00	1568K	103M	22.02.00	103M	22.02.00	103M	
EMLPA	A561000	4K	CSA 1128K	22.02.00	1128K	22.02.00	1128K	199M	22.02.50	199M	22.02.00	199M	
EFLPA	0	0K											
EPLPA	81F3000	35.4M											
ESQA	25A9000	92.3M	0	300K	22.02.00	300K	22.02.00	300K	7104K	22.02.00	7104K	22.02.00	7104K
ENUC	1000000	21.7M	1	40K	22.02.00	40K	22.02.00	40K	844K	22.02.00	844K	22.02.00	844K
----- 16 MEG BOUNDARY -----			2	0K	22.02.00	0K	22.02.00	0K	4K	22.02.00	4K	22.02.00	4K
NUCLEUS	FCA000	216K	3	0K	22.02.00	0K	22.02.00	0K	0K	22.02.00	0K	22.02.00	0K
SQA	DF8000	1864K	4	0K	22.02.00	0K	22.02.00	0K	4K	22.02.00	4K	22.02.00	4K
PLPA	C83000	1492K	5	4K	22.02.00	4K	22.02.00	4K	2956K	22.02.00	2956K	22.02.00	2956K
FLPA	C82000	4K	6	72K	22.02.00	72K	22.02.00	72K	25.4M	22.02.00	25.4M	22.02.00	25.4M
MLPA	C7F000	12K	7	712K	22.02.00	712K	22.02.00	712K	163M	22.02.50	163M	22.02.00	163M
CSA	600000	6652K	8-F	0K	22.02.00	0K	22.02.00	0K	0K	22.02.00	0K	22.02.00	0K
PRIVATE	1000	6140K											
PSA	0	4K											

### SQA EXPANSION INTO CSA

0K 22.02.00 0K 0K 79.3M 22.02.00 79.3M 22.02.00 79.3M

PLPA INTERMODULE SPACE - 4K IN PLPA AND 75K IN EPLPA

PLPA SPACE REDUNDANT WITH MLPA/FLPA - 1K IN PLPA AND 0K IN EPLPA





# CF results

- Total CF utilization - 61.3% of 4 cps

Structure name	requests/second	Sync service time*	Async serv time*
IRLMLOCKTBL	<b>44,584</b>	<b>47.3</b>	no async requests
EMHQ	9,336	49.6	204.8
EXCEPTA (SVSO)	1,439	46.2	199.3
STOREDB (SVSO)	<b>10,026</b>	<b>45.2</b>	217.2

\*service time shown in microseconds

# CF07

R M F S U M M A R Y R E P O R T  
C O U P L I N G F A C I L I T Y A C T I V I T Y

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OS/390  
REL. 02.08.00

SYSPLEX PLEX1  
RPT VERSION 2.7.0

DATE 05/22/2000  
TIME 22.02.00

INTERVAL 001.00.000  
CYCLE 01.000 SECONDS

COUPLING FACILITY NAME = CF07

TOTAL SAMPLES (AVG) = 59 (MAX) = 59 (MIN) = 59

COUPLING FACILITY USAGE SUMMARY

STRUCTURE SUMMARY

TYPE	STRUCTURE NAME	STATUS CHG	ALLOC SIZE	% OF CF STORAGE	# REQ	% OF ALL REQ	AVG REQ/ SEC	LST/DIR ENTRIES TOT/CUR	DATA ELEMENTS TOT/CUR	LOCK ENTRIES TOT/CUR	DIR REC XI'S
LIST	IXCSTRUC	ACTIVE	6M	0.1%	1024K	26.7%	17058	1365	1359	N/A	N/A
								3	29	N/A	N/A
	M52LOGEMHQ01	ACTIVE	750M	18.4%	139897	3.6%	2331.6	1056K	2113K	N/A	N/A
								467K	672K	N/A	N/A
	M52LOGMSGQ01	ACTIVE	250M	6.1%	0	0.0%	0.00	169K	843K	N/A	N/A
								633	2040	N/A	N/A
LOCK	IRLMLOCKTBL1	ACTIVE	500M	12.3%	2675K	69.7%	44584	1487K	0	134M	N/A
								2095	0	1365	N/A
CACHE	VSAMSESXI1	ACTIVE	64M	1.6%	0	0.0%	0.00	321K	0	N/A	0
								0	0	N/A	0
STRUCTURE TOTALS			2G	38.5%	3838K	100%	63974				

COUPLING FACILITY USAGE SUMMARY

PROCESSOR SUMMARY

COUPLING FACILITY 9672 MODEL ZZ7 CFLEVEL 9  
 AVERAGE CF UTILIZATION (% BUSY) 74.6 LOGICAL PROCESSORS: DEFINED 2 EFFECTIVE 2.0





# IRLM (lock)

STRUCTURE NAME = IRLMLOCKTBL1      TYPE = LOCK														
SYSTEM NAME	# REQ	REQUESTS					DELAYED REQUESTS					EXTERNAL REQUEST CONTENTIONS		
	TOTAL AVG/SEC	# REQ	% OF ALL	-SERV TIME (MIC)- AVG    STD_DEV		REASON	# REQ	% OF REQ	---- AVG TIME (MIC) ---- /DEL    STD_DEV    /ALL					
STLABB1	1302K	SYNC	1302K	48.7%	65.8	55.8						REQ TOTAL	1256K	
	21692	ASync	0	0.0%	0.0	0.0	NO SCH	0	0.0%	0.0	0.0	0.0	REQ DEFERRED	93K
		CHNGD	0	0.0%	INCLUDED IN ASync								-CONT	92K
												-FALSE CONT	28K	
STLABC1	1374K	SYNC	1374K	51.3%	29.8	38.1						REQ TOTAL	1336K	
	22892	ASync	0	0.0%	0.0	0.0	NO SCH	0	0.0%	0.0	0.0	0.0	REQ DEFERRED	105K
		CHNGD	0	0.0%	INCLUDED IN ASync								-CONT	104K
												-FALSE CONT	38K	
<hr/>														
TOTAL	2675K	SYNC	2675K	100%	47.3	50.8						REQ TOTAL	2591K	
	44584	ASync	0	0.0%	0.0	0.0	NO SCH	0	0.0%	0.0	0.0	0.0	REQ DEFERRED	197K
		CHNGD	0	0.0%									-CONT	197K
													-FALSE CONT	66K

# EMHQ (list)

STRUCTURE NAME = I71EMHQ01		TYPE = LIST												
SYSTEM NAME	# REQ	REQUESTS					DELAYED REQUESTS					EXTERNAL REQUEST		
	TOTAL	#	% OF	-SERV TIME (MIC) -	REASON	#	% OF	AVG TIME (MIC)	STD_DEV	/ALL	CONTENTIONS			
NAME	AVG/SEC	REQ	ALL	AVG	STD_DEV	REQ	REQ	/DEL	STD_DEV	/ALL				
STLABB1	353K	SYNC	350K	62.5%	38.7	53.7						REQ TOTAL	351K	
	5876	ASYNC	1108	0.2%	181.5	150.6	NO SCH	1084	48.8%	214.9	254.1	104.8	REQ DEFERRED	0
		CHNGD	1114	0.2%	INCLUDED IN ASYNC		DUMP	0	0.0%	0.0	0.0			
STLABC1	208K	SYNC	187K	33.3%	70.1	65.1							REQ TOTAL	197K
	3460	ASYNC	10K	1.8%	207.3	142.5	NO SCH	9990	48.0%	128.7	138.3	61.8	REQ DEFERRED	0
		CHNGD	10K	1.9%	INCLUDED IN ASYNC		DUMP	0	0.0%	0.0	0.0			
-----														
TOTAL	560K	SYNC	537K	95.9%	49.6	59.8							REQ TOTAL	548K
	9336	ASYNC	11K	2.0%	204.8	143.5	NO SCH	11K	48.1%	137.1	155.7	65.9	REQ DEFERRED	0
		CHNGD	12K	2.1%			DUMP	0	0.0%	0.0	0.0	0.0		

# Store Database (cache)

STRUCTURE NAME = FP2STOREDBA		TYPE = CACHE		----- DELAYED REQUESTS -----										
SYSTEM	# REQ		REQUESTS		-SERV TIME (MIC) -	REASON	#	% OF	AVG	TIME (MIC)				
NAME	AVG/SEC		ALL	% OF	AVG	STD_DEV	REQ	REQ	/DEL	STD_DEV	/ALL			
STLABB1	306K	SYNC	151K	24.4%	27.8	45.6								
	5106	ASYNC	155K	25.1%	199.4	168.8	NO SCH	3743	2.4%	247.0	249.1	5.9		
		CHNGD	504	0.1%	INCLUDED IN ASYNC		DUMP	0	0.0%	0.0	0.0			
STLABC1	311K	SYNC	139K	22.5%	56.0	53.4								
	5187	ASYNC	169K	27.3%	188.2	139.4	NO SCH	39K	22.4%	119.0	140.1	26.7		
		CHNGD	3588	0.6%	INCLUDED IN ASYNC		DUMP	0	0.0%	0.0	0.0			
-----														
TOTAL	618K	SYNC	290K	46.9%	41.3	51.4							-- DATA ACCESS --	
	10293	ASYNC	324K	52.4%	193.6	154.3	NO SCH	42K	12.9%	130.3	157.1	16.9	READS	302485
		CHNGD	4092	0.7%			DUMP	0	0.0%	0.0	0.0	0.0	WRITES	324528
													CASTOUTS	0
													XI'S	321557

# Account DEDB results

- I/O response time
  - ▶ overall average response time: 2.5 millisec
- IOSQ time
  - ▶ none
- DeviceBusy delay
  - ▶ average less than .01 millisec
  - ▶ only 8 of 89 areas reported 0.1 millisec db delay

# RMF DASD Summary Report

RMF SUMMARY REPORT  
DIRECT ACCESS DEVICE ACTIVITY

PAGE 1

OS/390  
REL. 02.08.00

SYSTEM ID 961  
RPT VERSION 2.7.0

DATE 05/22/2000  
TIME 21.55.00

INTERVAL 01.00.000  
CYCLE 1.000 SECONDS

TOTAL SAMPLES = 60 IODF = C1 CR-DATE: 05/11/00 CR-TIME: 12.28.55 ACT: POR

STORAGE GROUP	DEV NUM	DEVICE TYPE	VOLUME SERIAL	MX	LCU	DEVICE ACTIVITY RATE	AVG RESP TIME	AVG IOSQ TIME	AVG DPB DLY	AVG CUB DLY	AVG DB DLY	AVG PEND TIME	AVG DISC TIME	AVG CONN TIME	% DEV CONN	% DEV UTIL	% DEV RESV	AVG NUMBER ALLOC	% ANY ALLOC	% MT PEND
	1D00	33903	S06@00	8	0042	84.433	3	0	0.0	0.0	0.0	0.6	1.4	0.8	0.88	2.38	0.0	2.0	100.0	0.0
	1D01	33903	S06@01	8	0042	81.700	3	0	0.0	0.0	0.0	0.6	1.3	0.8	0.85	2.20	0.0	2.0	100.0	0.0
	1D02	33903	S06@02	8	0042	87.700	3	0	0.0	0.0	0.0	0.6	1.3	0.8	0.91	2.35	0.0	2.0	100.0	0.0
	1D03	33903	S06@03	8	0042	89.267	3	0	0.0	0.0	0.1	0.7	1.6	0.8	0.93	2.71	0.0	2.0	100.0	0.0
	1D04	33903	S06@04	8	0042	93.367	3	0	0.0	0.0	0.0	0.6	1.3	0.8	0.97	2.49	0.0	2.0	100.0	0.0
	1D05	33903	S06@05	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D06	33903	S06@06	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D07	33903	S06@07	8	0042	142.800	3	0	0.0	0.0	0.0	0.4	0.0	2.3	4.18	4.25	0.0	1.0	100.0	0.0
	1D08	33903	S06@08	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D09	33903	S06@09	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D0A	33903	S06@0A	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D0B	33903	S06@0B	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D0C	33903	S06@0C	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D0D	33903	S06@0D	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D0E	33903	S06@0E	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	1.0	100.0	0.0
	1D0F	33903	S06@0F	8	0042	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	2.0	100.0	0.0
			LCU		0042	579.267	3	0	0.0	0.0	0.0	0.6	1.1	1.2	0.54	1.02	0.0	22.0	100.0	0.0
	9000	33903	S90@00	4	0079	91.083	3	0	0.0	0.0	0.0	1.5	0.6	0.8	1.78	3.07	0.0	2.0	100.0	0.0
	9001	33903	S90@01	4	0079	82.967	3	0	0.0	0.0	0.0	1.5	0.5	0.8	1.61	2.75	0.0	2.0	100.0	0.0
	9002	33903	S90@02	4	0079	84.517	3	0	0.0	0.0	0.0	1.5	0.5	0.8	1.64	2.63	0.0	2.0	100.0	0.0
	9003	33903	S90@03	4	0079	90.450	3	0	0.0	0.0	0.0	1.6	0.4	0.8	1.76	2.70	0.0	2.0	100.0	0.0
	9004	33903	S90@04	4	0079	87.400	3	0	0.0	0.0	0.0	1.5	0.5	0.8	1.70	2.70	0.0	2.0	100.0	0.0
	9005	33903	S90@05	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	9006	33903	S90@06	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	9007	33903	S90@07	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	9008	33903	DSN000	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	9009	33903	DSN001	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	900A	33903	DSN002	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	900B	33903	DSN003	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	900C	33903	DSN004	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	900D	33903	DSN005	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	900E	33903	DSN006	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	900F	33903	DSN007	4	0079	0.000	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
			LCU		0079	436.417	3	0	0.0	0.0	0.0	1.5	0.5	0.8	0.53	0.86	0.0	10.0	100.0	0.0





# IMS OLDS results

- 10 OLDS per IMS
- 2500 cylinders per OLDS
- ▶ I/O response time
  - overall average response time: 3 millisec
- ▶ IOSQ time
  - none
- ▶ DeviceBusy delay
  - none

# Results Overall

- Tran rate - 11,246 per second
- Total DASD I/O rate - 13,733 I/Os per sec
  - ▶ average response time - 3 ms
- Total CF utilization - 61.3% of 4 cps
- Total CPU utilization - 93.3%

# In summary...

- ESS
  - ▶ the storage server standard for the new millenium
- IMS V7
  - ▶ the transaction/data server standard for the new millenium
- IMS + ESS
  - ▶ a fast and powerful combination!