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IMS Tools Performance Studies—Sep06

Cedric Chen
Toshikazu Takahashi
IBM Information Management Tools

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Performance Studies

- **IMS Parallel Reorganization (IPR) V3.1**
- **IMS High Performance Fast Path Utilities (HPFPU) V2.2**
- **Unload/Load API versus Application Programs**
- **High Performance Image Copy (HPIC) V4.1**
- **High Performance Change Accumulation (HPCA) V1.3**
- **Online Reorg Facility (ORF) V1.1 versus IMS V9 OnLine Reorg (OLR)**
- **Database Recovery Facility (DRF) V3.1**

Disclaimer

- **IMS Tools Performance Studies results contained in this document were obtained in a controlled lab environment, therefore, the results that can be obtained in other operating environment might vary significantly. Users of this document should verify the applicability of data for their specific environment .**

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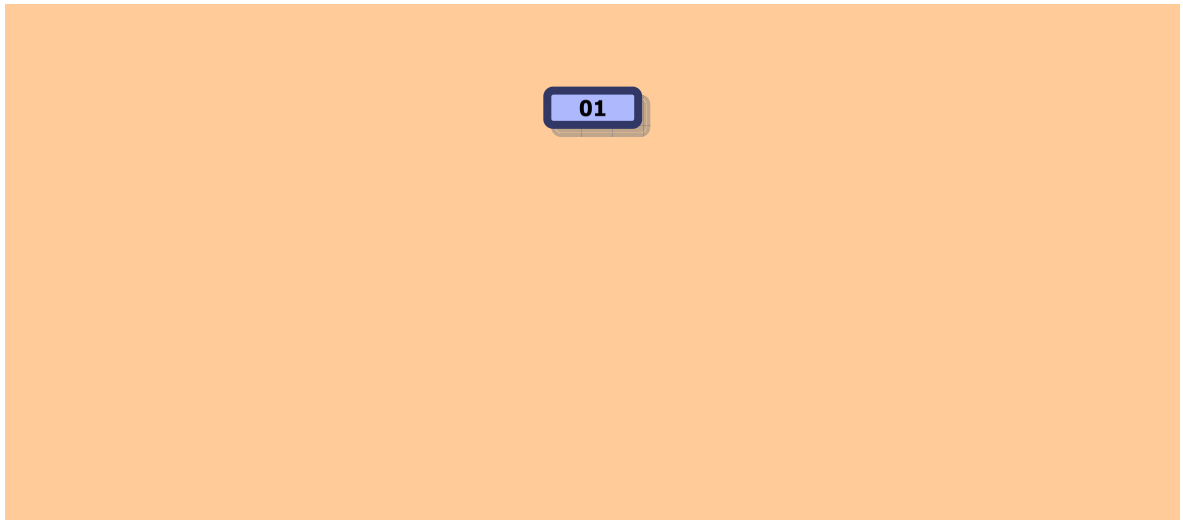
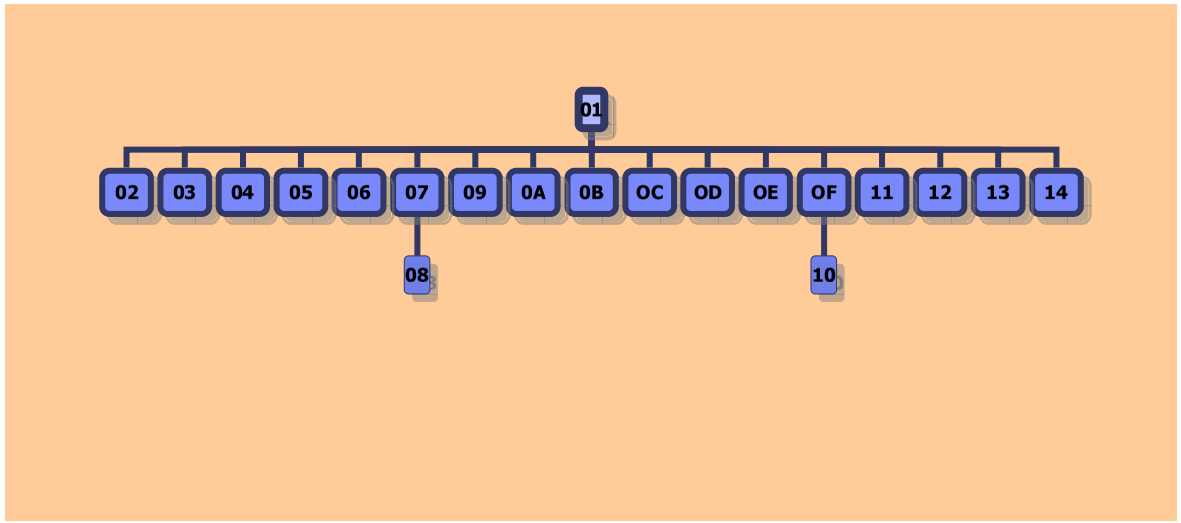
IMS Parallel Reorganization V3.1

Test DB descriptions

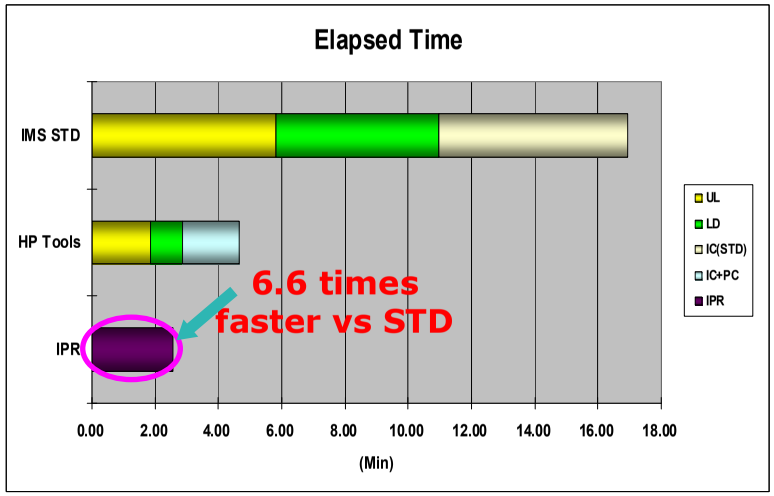


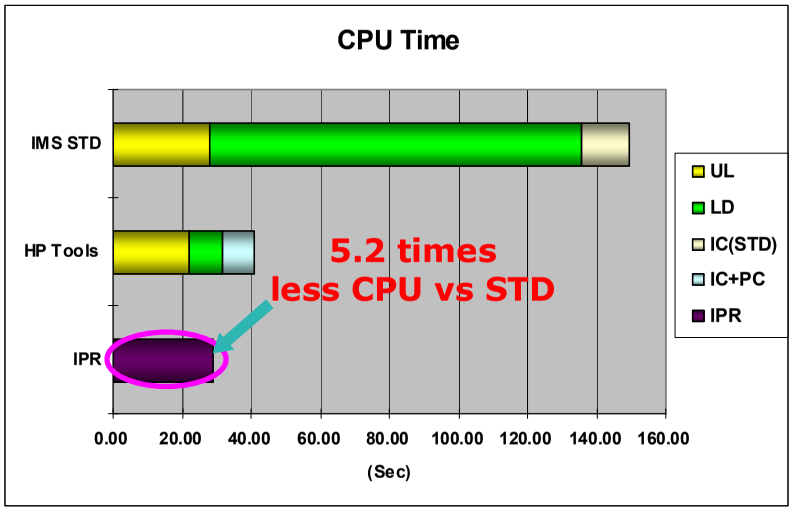
- **Root Only DB**
  - 11 million occurrences
  - 1100 cylinders (0.8GB)
  - HIDAM/VSAM
  - No secondary indexes



- **20 Segment types DB**
  - 49 million occurrences
  - 1700 cylinders (1.3GB)
  - HIDAM/OSAM
  - 2 secondary indexes

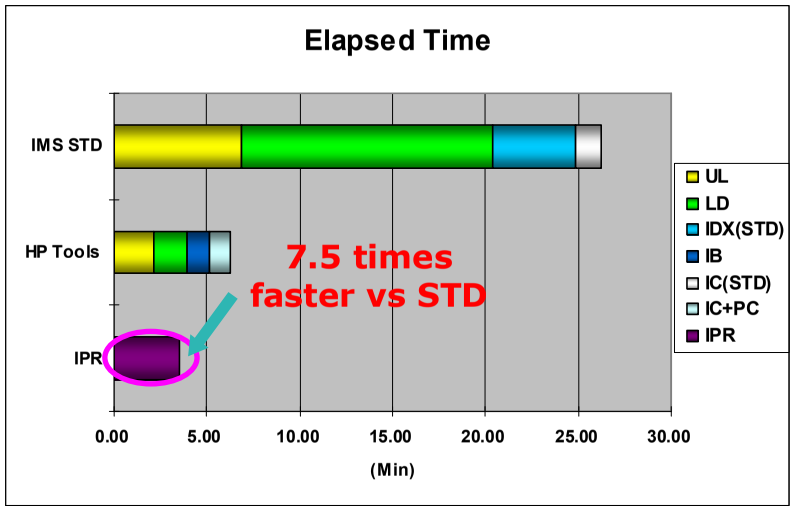
Test Result (HIDAM/VSAM Root only)

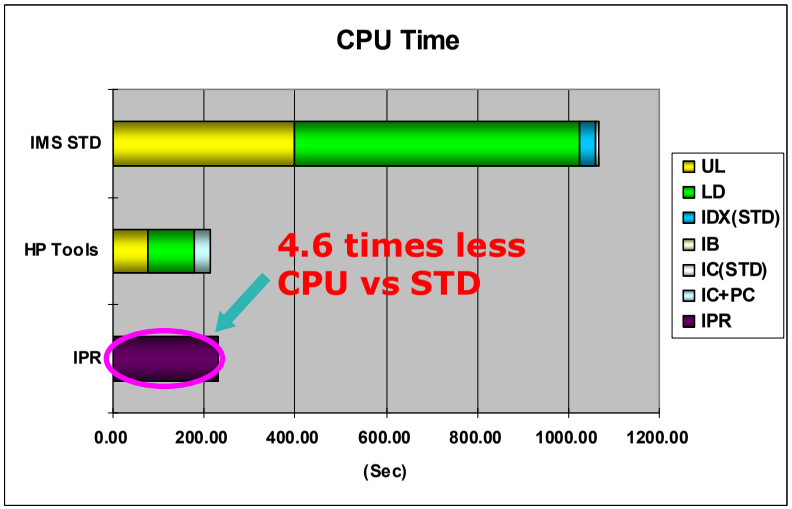




- **Comparison:**
  - Standard IMS Utilities
    - HD Unload
    - HD Reload
    - Image Copy
    - (No Pointer Checking)
  - High Performance Tools
    - HP Unload
    - HP Load
    - HP Image Copy
    - HP Pointer Checker
  - IPR
    - Unload+Reload+ImageCopy+ Pointer Checker
- **Faster & less CPU (IPR vs STD)**
  - Elapsed Time: **6.6 times faster**
  - CPU Time: **5.2 times less CPU time**

Test Result (HIDAM/OSAM 20 segment types)





- **Comparison**
  - Standard IMS Utilities
    - HD Unload (with OSAM SB)
    - HD Reload
    - HISAM Unload/Reload (For Secondary Indexes)
    - Image Copy (No Pointer Checking)
  - High Performance Tools
    - HP Unload
    - HP Load
    - Index Builder
    - HP Image Copy
    - HP Pointer Checker
  - IPR
    - Unload+Reload+IndexBuilder+ Image Copy+Pointer Checker
- **Faster & less CPU (IPR vs STD)**
  - Elapsed Time: **7.5 times faster**
    CPU Time: **4.6 times less CPU time**

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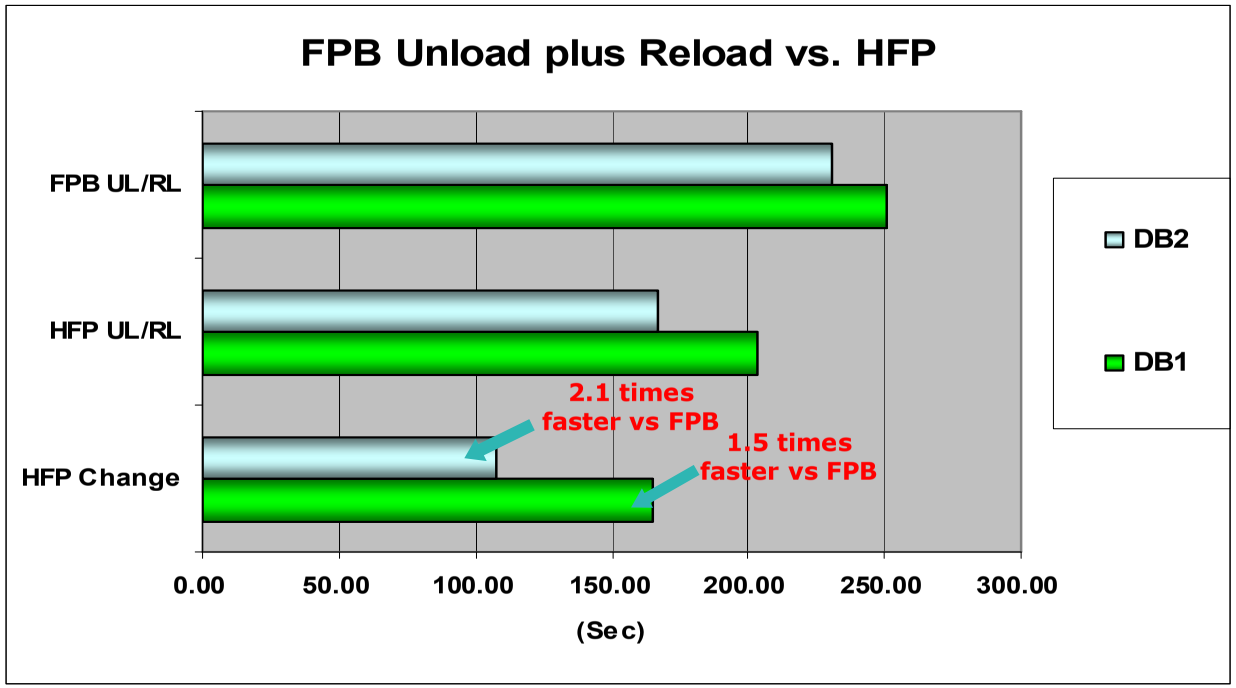
IMS High Performance Fast Path Utilities V2.2

Unload/Reload/Change: Performance

- **Environment**
  - z990 (2084-332) LPAR with 3 CPUs and 4GB CS (dedicated)
  - ESS (2105-800)

- **Databases**
  - DB1
    - *CI-SIZE: 4096 UOW=(20,6) ROOT=(11000,1000)*
    - *Segment Information*
      - The total number of the segments: 2,750,000
        - ROOT segments: 250,000
        - DDEP segments: 2,000,000
        - SDEP segments: 500,000
  - DB2
    - *CI-SIZE: 4096 UOW=(360,20) ROOT=(700,400)*
    - *Segment information*
      - The total number of the segments: 3,006,840
        - ROOT segments: 501,140
        - DDEP segments: 2,505,700
        - SDEP segments: 0

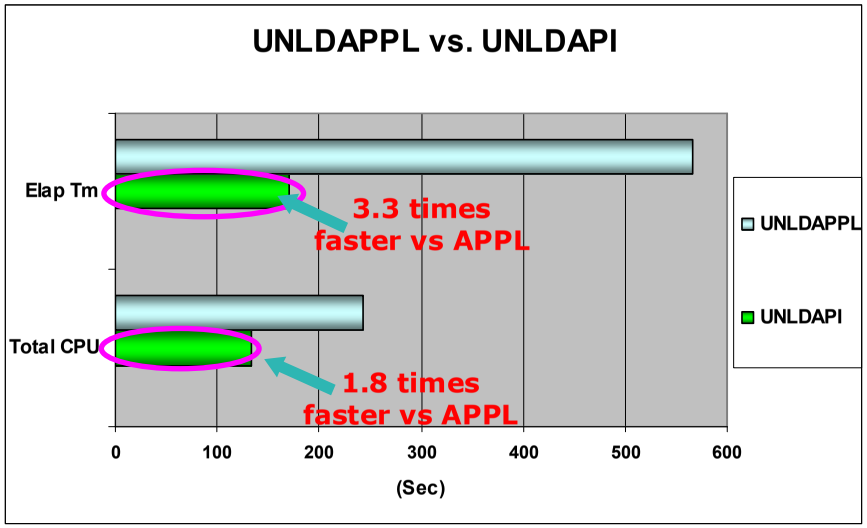
FPB Unload plus Reload vs. HFP

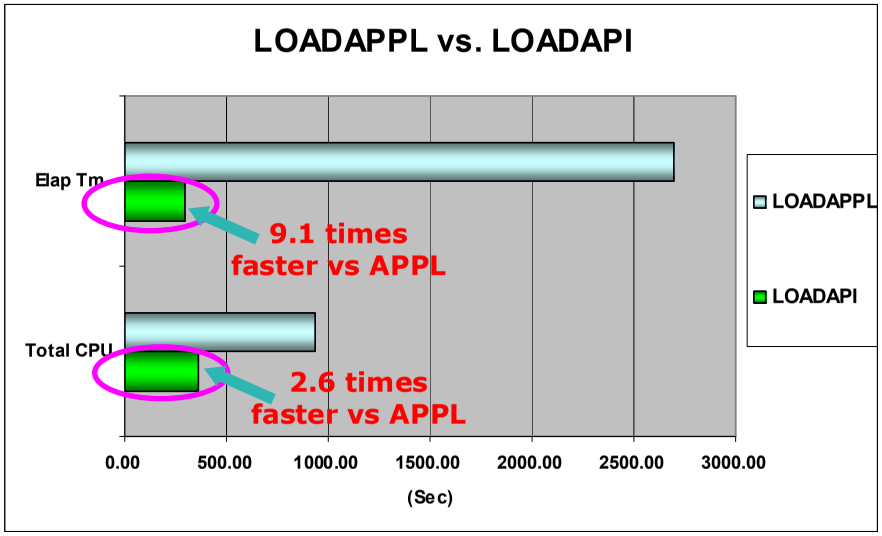


- **Comparison**
  - DB1, Elapsed Time
    - FPB UL/RL: 0:04:11
    - HFP UL/RL: 0:03:23
    - HFP Change: 0:02:45
      (1.5 times faster vs FPB)
  - DB2, Elapsed Time
    - FPB UL/RL: 0:03:51
    - HFP UL/RL: 0:02:47
    - HFP Change: 0:01:48
      (2.1 times faster vs FPB)

Unload/Load API versus Application Programs

Unload/Load API versus Application Measurements





- **Unload Comparison**
  - UNLDAPPL
    - Elapsed Time (sec): 567
    - Total CPU: 242.84
  - UNLDAPI
    - Elapsed Time (sec): 171
    - Total CPU: 132.97
- **Load Comparison**
  - LOADAPPL
    - Elapsed Time (sec): 2,696
    - Total CPU: 931.61
  - LOADAPI
    - Elapsed Time (sec): 296
    - Total CPU: 360.67
- **Faster & less CPU**
  - UNLDAPPL vs. UNLDAPI
    - Elapsed Time: **3.3 times faster**
    - Total CPU: **1.8 times less CPU time**
  - LOADAPPL vs. LOADAPI
    - Elapsed Time (sec): **9.1 times faster**
    - Total CPU: **2.6 times less CPU time**

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High Performance Image Copy V4.1

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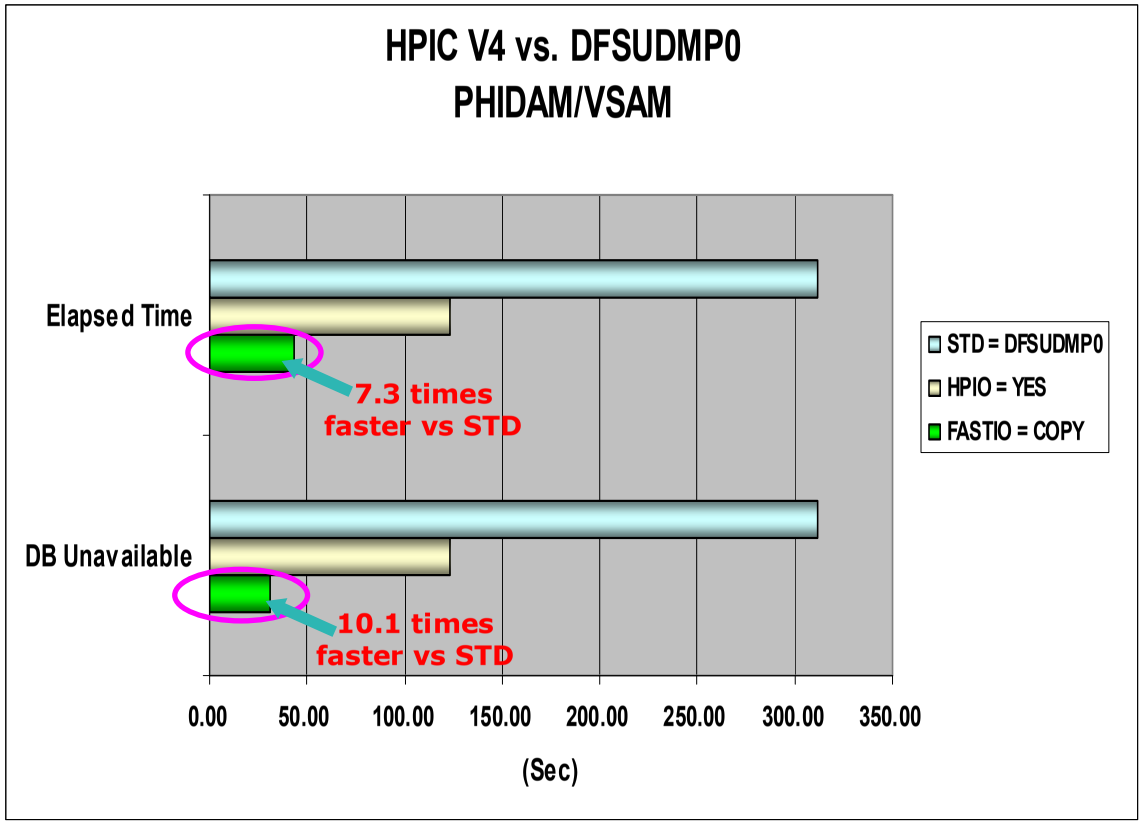
HPIC V4 versus Standard DFSUDMP0

Environment

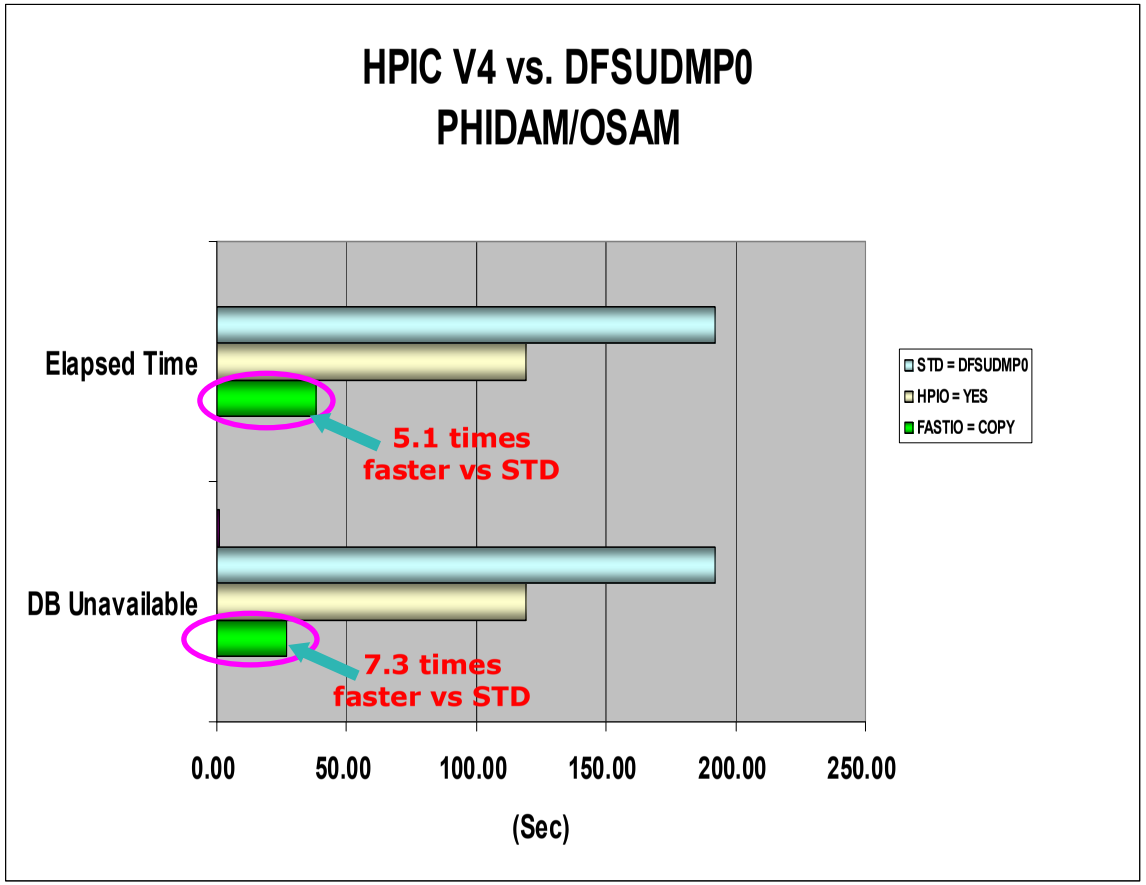
Hardware	Software	Database
▪ CPU -- 2-cp 2084 ▪ DASD -- ESS-F20	▪ z/OS 1.6 ▪ IMS V8 ▪ HP IC V4.1 and V3.2	▪ PHIDAM/VSAM ▪ 3,893,360 segments ▪ 561,440 roots ▪ Size: 2,620 CYLs

HPIC V4 vs DFSUDMP0 PHIDAM/VSAM (no IC compression)



- **Comparison**
  - STD DFSUDMP0
    - Elapsed Time (sec): 312
    - DB Unavailable (sec): 312
  - HPIO = YES vs STD DFSUDMP0
    - Elapsed Time (sec): 123
      - 2.5 times faster
    - DB Unavailable (sec): 123
      - 2.5 times less CPU
  - FASTIO = COPY vs STD DFSUDMP0
    - Elapsed Time (sec): 43
      - **7.3 times faster**
    - DB Unavailable (sec): 31
      - **10.1 times less CPU time**

HPIC V4 vs DFSUDMP0 PHIDAM/OSAM (no IC compression)



- **Comparison**
  - STD DFSUDMP0
    - Elapsed Time (sec): 192
    - DB Unavailable (sec): 192
  - HPIO = YES vs STD DFSUDMP0
    - Elapsed Time (sec): 119
      - 1.7 times faster
    - DB Unavailable (sec): 119
      - 1.7 times less CPU
  - FASTIO = COPY vs STD DFSUDMP0
    - Elapsed Time (sec): 38
      - **5.1 times faster**
    - DB Unavailable (sec): 27
      - **7.3 times less CPU time**

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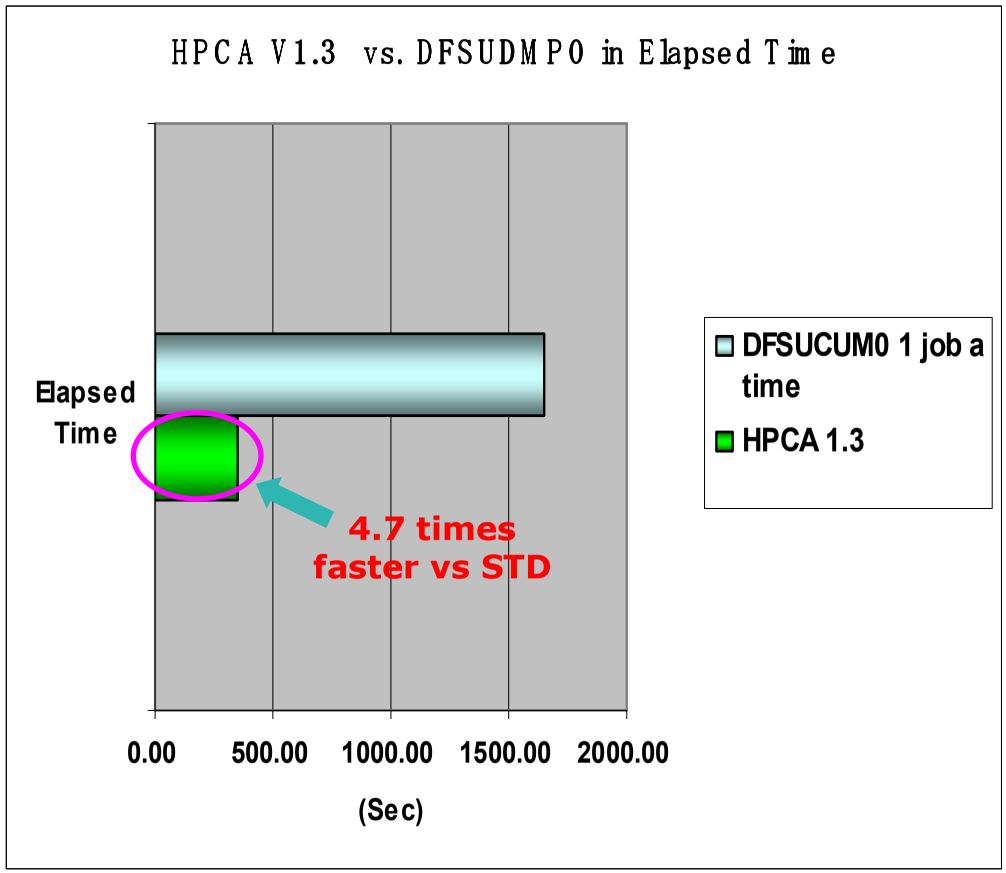
High Performance Change Accumulation V1.3

HPCA V1.3 vs Standard CA

Environment

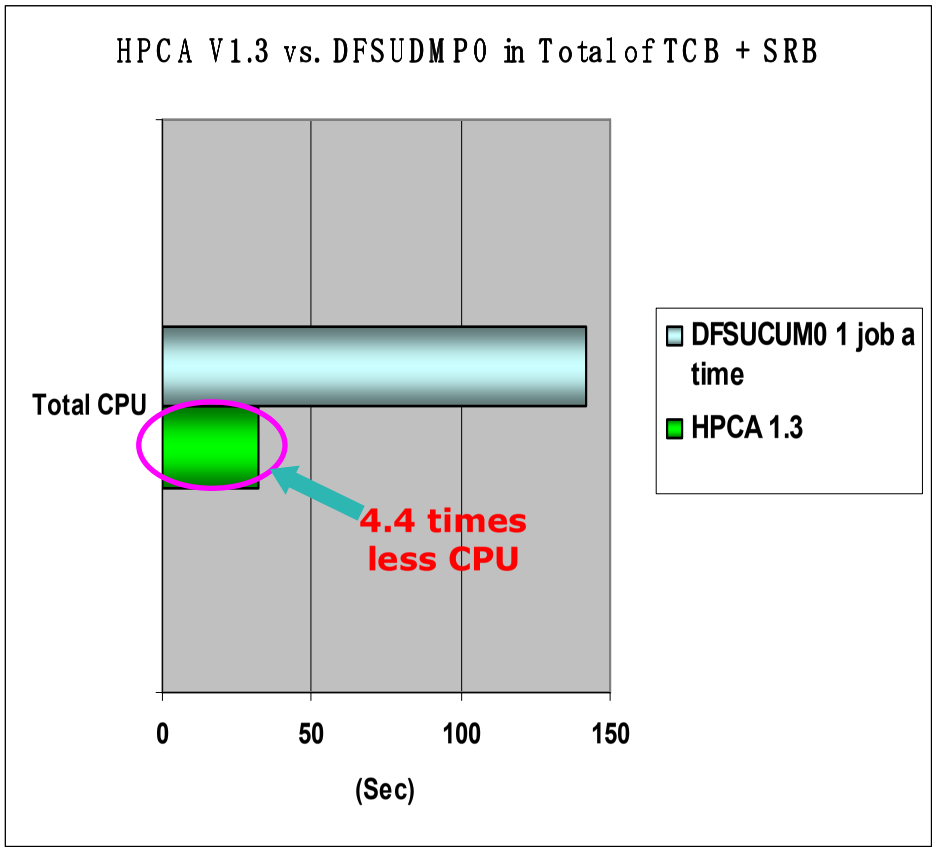
Hardware	Software	Database
▪ CPU -- 4-cp 2064 ▪ DASD -- ESS-F20, DS8000, RVA ▪ 32 SLDS with 200 CYLs each on various DASD	▪ z/OS 1.6 ▪ IMS V8 ▪ HPCA 1.3	▪ 86 DEDB areas ▪ 8 CAGRPs ▪ Area size: 2,200 CYLs

HPCA V1.3 vs Standard CA In Elapsed Time



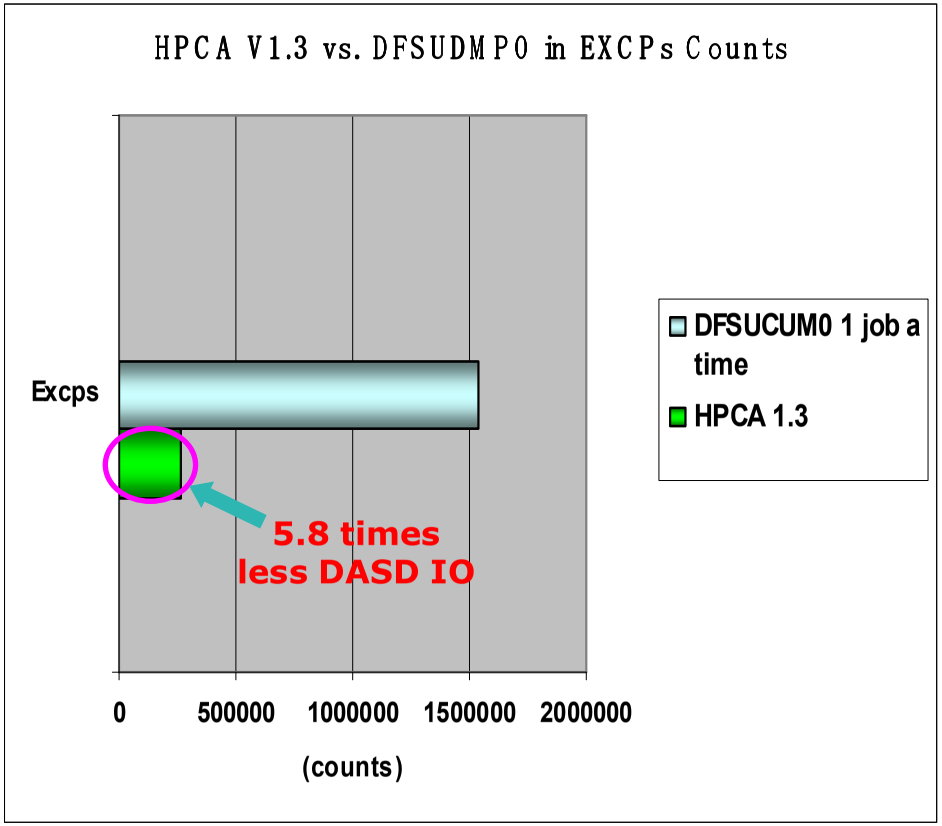
- **STD DFSUCUM0**
  - 1 CA job a time, 8 serial submissions
    - Elapsed Time (sec): 1,648
- **HPCA 1.3 (P.Sorts=8) vs STD DFSUCUM0**
  - 1 CA job on system, 1 Async Batches
    - Elapsed Time (sec): 352
      - **4.7 times faster**

HPCA V1.3 vs Standard CA In CPU



- **STD DFSUCUM0**
  - 1 CA job a time, 8 serial submissions
    - TCB: 16.45x8
    - SRB: 1.26x8
    - Total (TCB+SRB): 141.68
- **HPCA 1.3 (P.Sorts=8)**
  - 1 CA job on system, 1 Async Batches
    - TCB: 29.92
    - SRB: 2.03
    - Total (TCB+SRB): 31.95
      - **4.4 times less CPU time**

HPCA V1.3 vs Standard CA In EXCPs



- **STD DFSUCUM0**
  - 1 CA job a time, 8 serial submissions
    - EXCPs: 1.538M
- **HPCA 1.3 (Parallel Sorts=8)**
  - 1 CA job on system, 1 Async Batches
    - EXCPs: 265,398
    - **5.8 times less DASD IO**

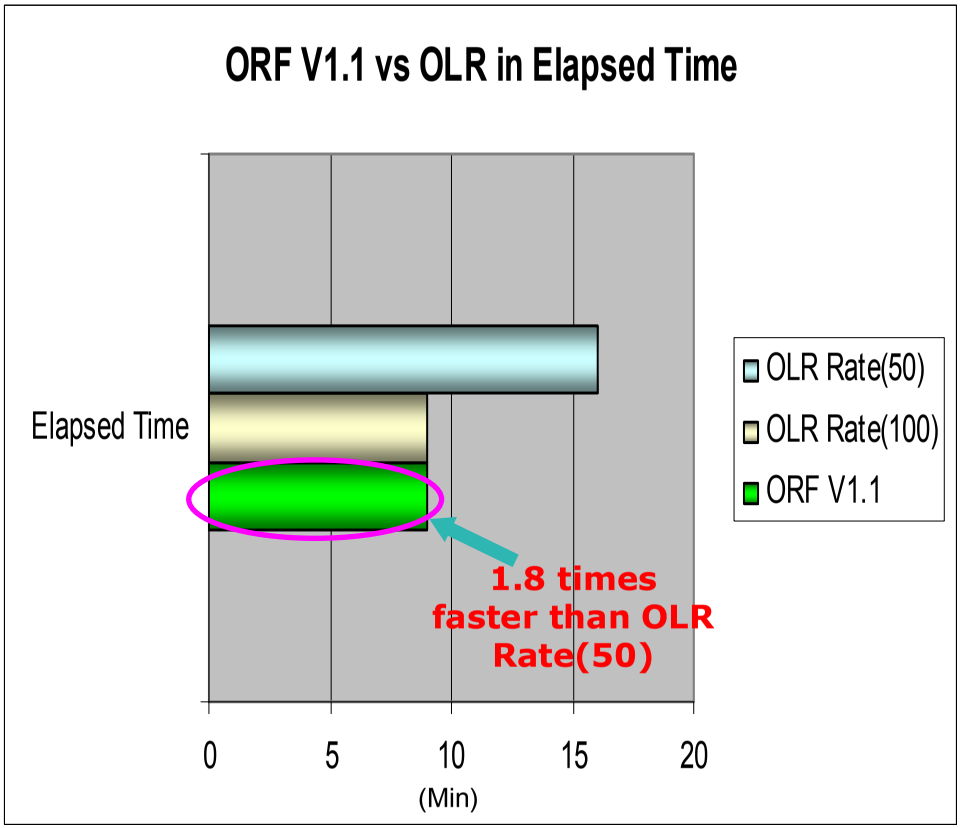
Online Reorg Facility (ORF) V1.1 versus IMS V9 OnLine Reorg (OLR)

ORF V1.1 vs V9 OLR

Environment

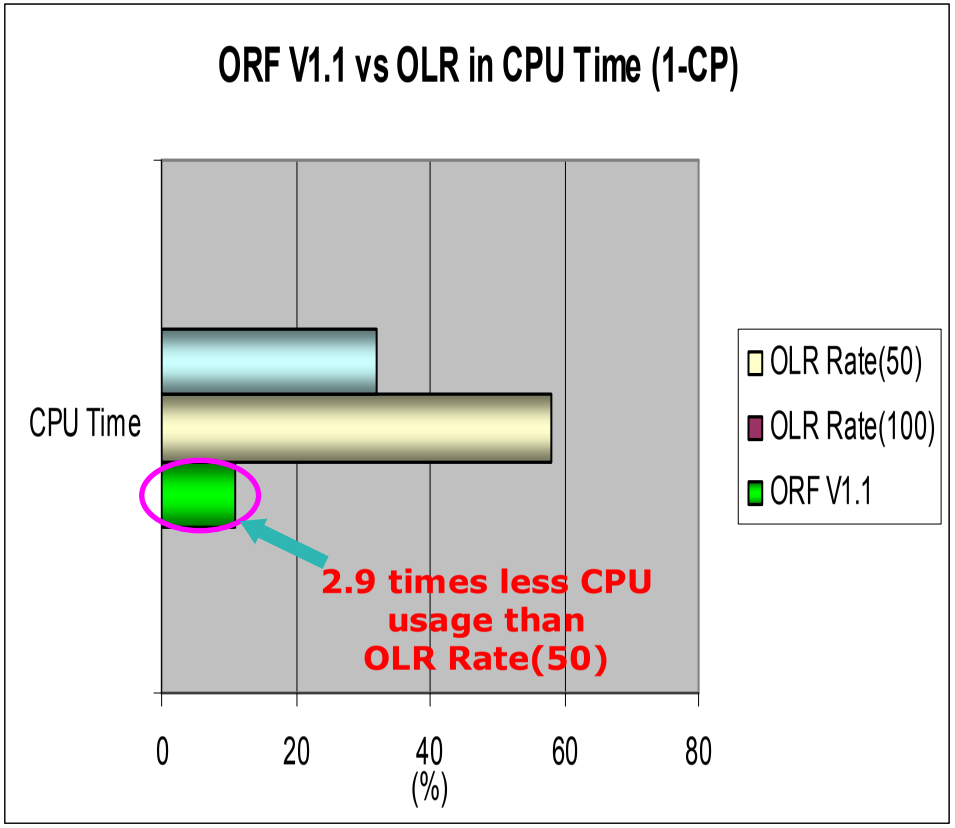
Hardware	Software	Database in online environment
▪ CPU -- 4-cp 2064 ▪ DASD -- ESS-F20, DS8000, RVA	▪ z/OS 1.6 ▪ IMS V9 ▪ ORF V1.1	▪ PHIDAM/OSAM – 1GB being updated online at 3-4 tran/sec

ORF V1.1 vs V9 OLR In Elapsed Time



- **Comparison:**
  - OLR
    - 100% online
    - Significant CPU usage
      - Rate (50): IRLM/OSAM/VSAM structure access 1,151 acc/sec
      - Rate (100): IRLM/OSAM/VSAM structure access 2,091acc/sec
      - XES path-length
    - Significant OLDS logging
      - 1.4 GB (in logging) for a 1GB DB

ORF V1.1 vs V9 OLR In CPU Time



- **Comparison:**
  - ORF
    - Almost 100% online
    - Much less CPU – no CF access & XES path-length
    - No OLDS logging
    - Faster and less CPU
      - **1.8 times faster than OLR Rate(50)**
      - **2.9 times less CPU usage than OLR Rate(50)**
    - Much higher concurrent ORF processing

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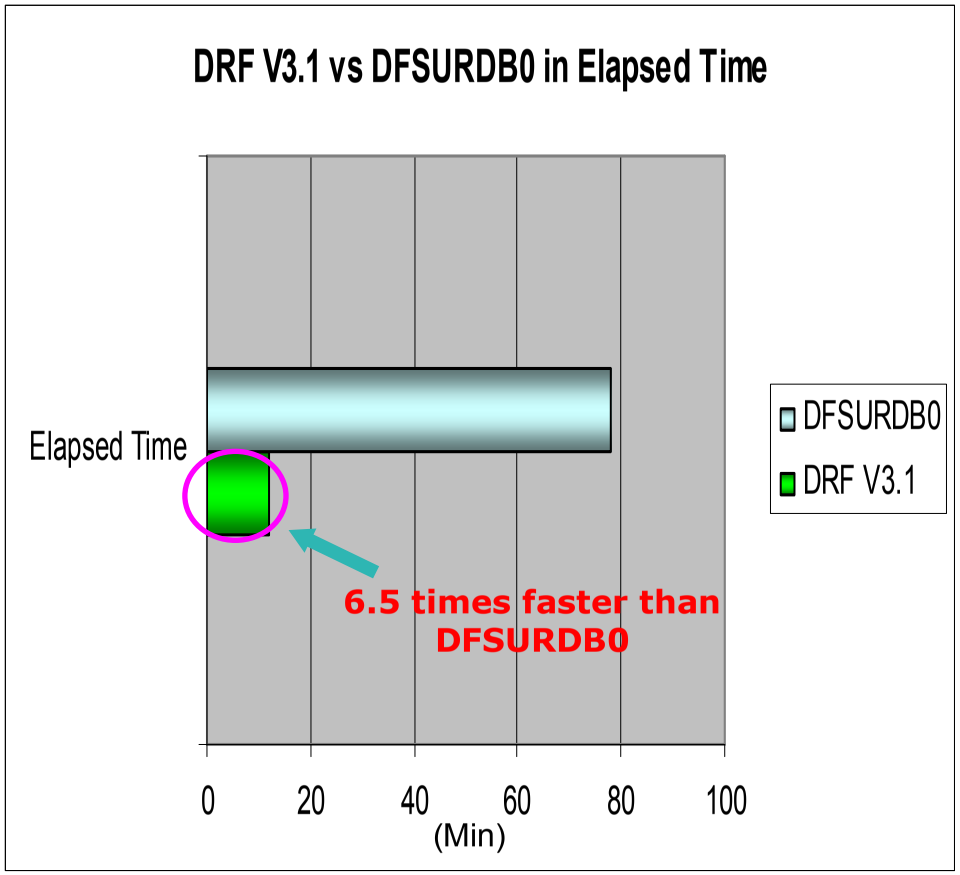
Database Recovery Facility V3.1

DRF V3.1 vs DFSURDB0

Environment

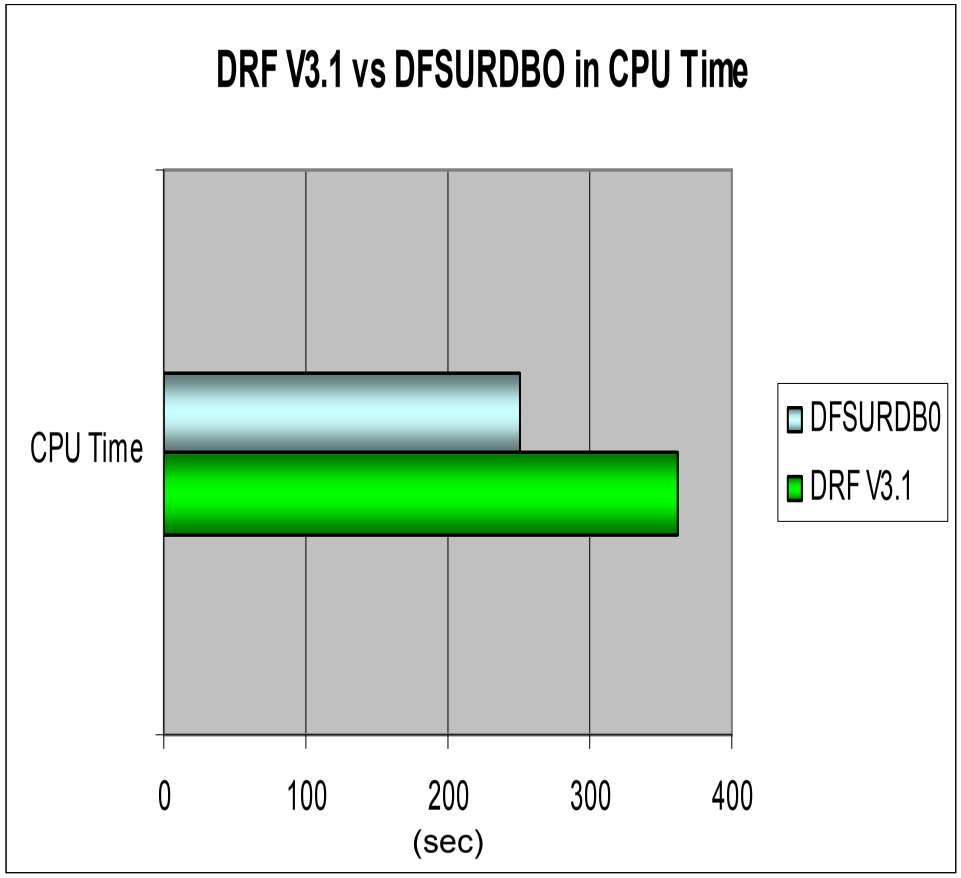
Hardware	Software	Database in online environment
▪ CPU -- 4-cp 2064 ▪ DASD -- ESS-F20, DS8000, RVA	▪ z/OS 1.7 ▪ IMS V9 ▪ DRF V3.1	▪ PHIDAM/OSAM – 4-partition (1 GB each) and 2 secondary indexes

DRF V3.1 vs DFSURDB0 In Elapsed Time



- **Comparison:**
  - DFSURDB0
    - 1 DBDS recovery a time
    - Multiple passes through archived log for recovering HD partitions
    - Secondary indexes need to be recovered
    - ICs needed after recoveries
    - Elapsed time include: 4HD partition and, 2 secondary index recoveries, and 6 ICs

DRF V3.1 vs DFSURDB0 In CPU Time



- **Comparison:**
  - DRF V3.1
    - One step operation HPIC, HPPC, HP DEDBPC, IB and DFSPREC0
    - Incremental image copy
    - Automatic Delete/Define of database & datasets
    - Stacked tape support
    - Submitting IMS commands via TOSI/XCF
    - CPU Time include 12 address spaces: DRFV3, 4 FRXI (HD recovery), 4 FRXP (primary indexes), 1 IB and 2 IB sorts

DRF V3.1 CPU Break down chart

DRFV3						Total		
Elap Tm:	11:18							
CPU	53.52					53.52		
SRB	5.65					5.65		
Subtotal						59.17		59.17
Recovery								
FRXI-1,2,3	1	2	3	DRF V3.1 CPU Break down	4	Total		
Elap Tm:	2:14	2:14	2:05		2:15			
CPU	01:07.5	52.84	20.85		19.83	160.57		
SRB	1.01	0.97	0.62		0.55	3.15		
Subtotal						163.72		163.72
Prime Index Build						Total		
FRXP-1,2,3,4								
Elap Tm:	3:26	3:21	3:14		3:45			
CPU	24.04	23.05	23.11		29.02	99.22		
SRB	1.84	1.81	1.75		2.15	7.55		
Subtotal						106.77		106.77
IB								
FRXB						Total		
Elap Tm:	3:33							
CPU	21.77					21.77		
SRB	1.75					1.75		
Subtotal						23.52		23.52
IB Sorts						Total		
IB Sort	1	2						
Elap Tm:	1:55	1:55						
CPU	4.34	4.31				8.65		
SRB	0.02	0.02				0.04		
Subtotal						8.69		8.69
CPU Grand Total								**361.87**