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# Flash Forward Application Performance in Mainframe Environments

# Service & Infrastructure Management

Service & Infrastructure Management has the SEB Group's IT Governance responsibility for Infrastructure Services

- Steering of Infrastructure Maintenance Management teams
- Infrastructure lifecycle management plans (roadmaps, steering and control)
- Design support to divisional projects
- Handle business relations with divisions in cooperation with IT Development
- Service Development (what to develop)
- Service Provisioning (what to deliver)
- Service Monitoring (control and follow up of provisioning)
- Financial steering and control (e.g. cost efficiency)
- External Vendor Management (selection, contract handling, control, follow up and service level definition)
- Internal Provider Management (agreements including service level definition, control and follow up)

# Agenda

- Company overview
- Background
- New storage environment
- Storage project overview
- Results
- Summary

# SEB – the key to North-European markets **SEB**

## SEB Group

- Local presence in ten countries + strategic locations globally

- Half of the revenue generated outside of Sweden



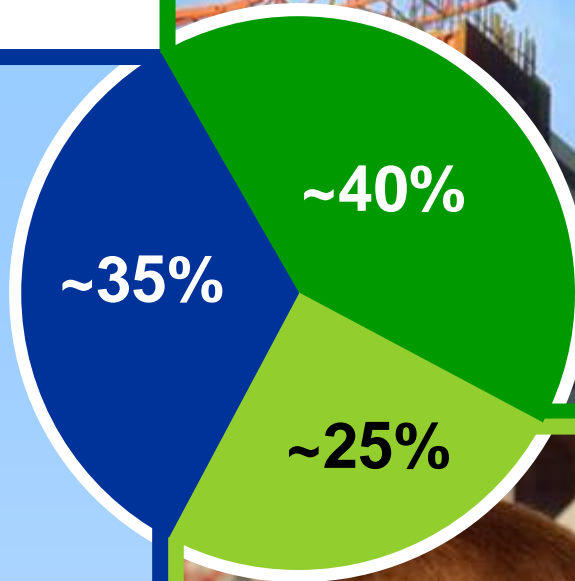
- About 20,000 employees
- 600 branch offices
- Global top rankings within several areas

# A strong customer base

Share of total income

2,500 large companies and financial institutions

5 million private customers



400,000 small & medium sized companies



# Background – Storage LCM

- Why did we purchase new mainframe storage.
  - Current mainframe storage solution was more than 3 years old
  - Maintenance expensive
  - Architecture lacking in new industry functions
- Life Cycle Management process started with RFI followed by an RFP in Q4 2009 where 3 vendors were evaluated
- The most important judgment used in the evaluation was:
  - To reduce the operation cost for our existing Mainframe Storage configuration
  - Requirements for high availability and the flexibility in the configuration in terms of capacity and performance

# z/OS infrastructure

- 2 x z10, IBM 2097 - 2 x z196, IBM 2817
- Total 6773 MIPS - Total 8998 MIPS
- Operation system: z/OS 1.10 - z/OS 1.12
- GDPS V 3.6
- 18 LPARs supporting three countries, Sweden, Germany and Denmark.





# New storage environment

- IBM branded Brocade 48000 with FICON connectivity
- 2 x EMC VMAX storage arrays each equipped with:
  - 4 engines, 196 GB cache
  - Tier 0: 3,8TB Enterprise Flash Drives (EFD)
  - Tier 1: 24TB 146GB 15K
  - Tier 2: 16TB 600GB 10K
  - FICON/FC
  - SRDF/S, COMPAV/Hyperpav, Dynamic Cache partitioning
  - Flashcopy and zHPF not in production yet
  - z/OS migrator (dataset & volume-migration)



# Primary

# Secondary **S|E|B**

IBM z10 EC E26  
2097-706

IBM z10 EC E12  
2097-506

4443 MIPS

2330 MIPS

Coupling Links

z/OS SAN

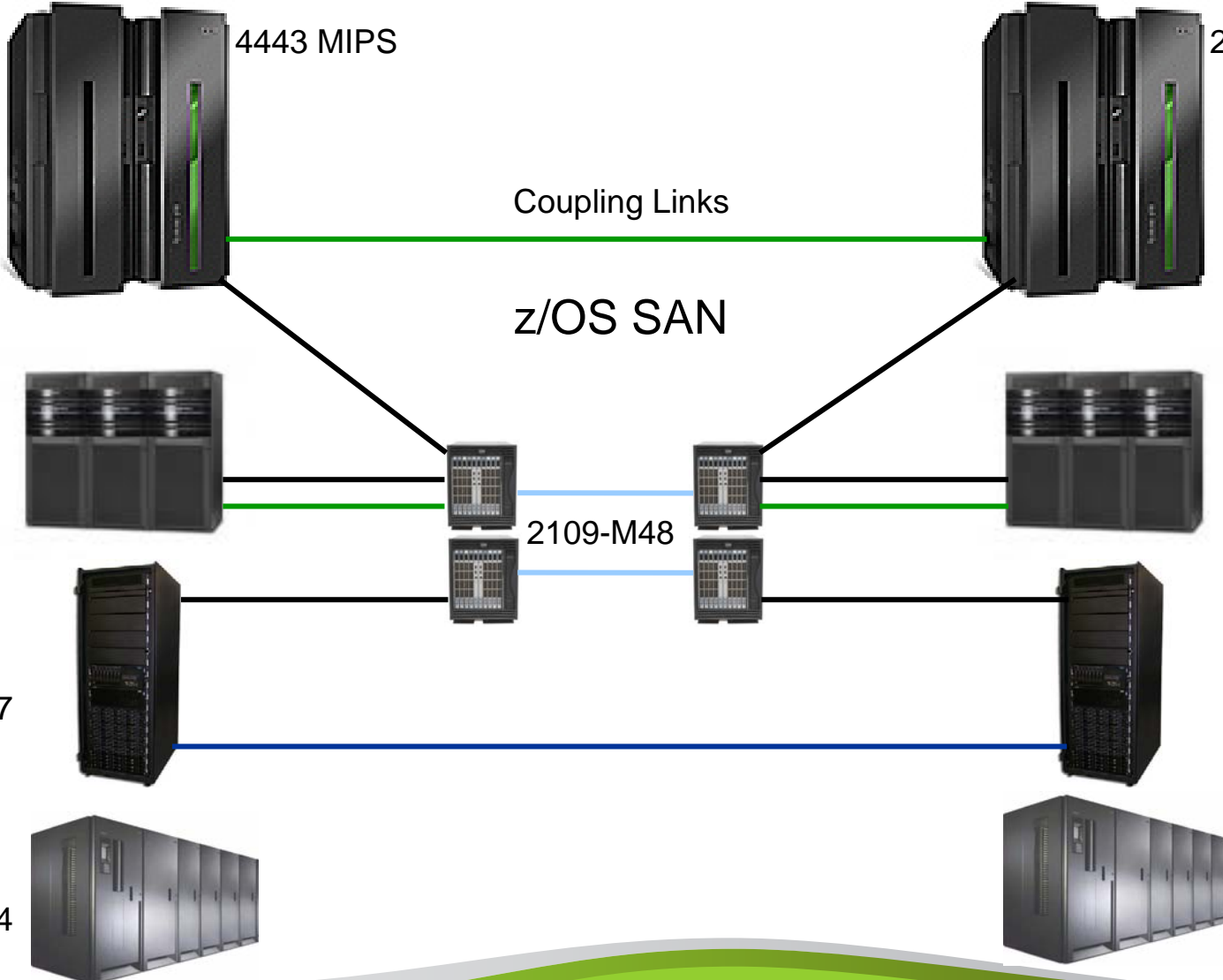
EMC  
V-MAX

TS7740  
IBM 3957

TS3500  
IBM 3584

2109-M48

- Dark fiber
- Ficon
- Fiberchannel
- Ethernet



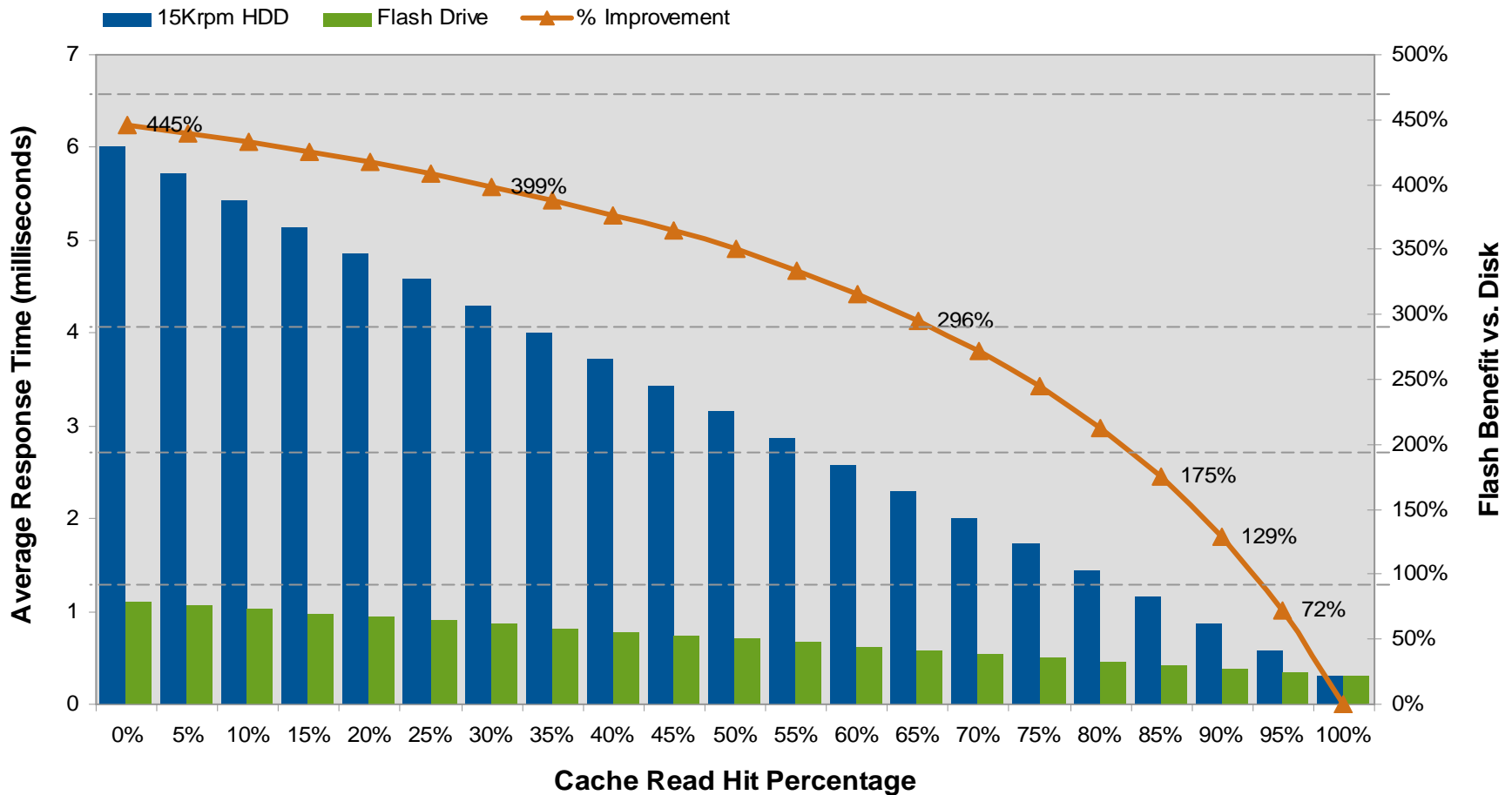
# Use of new tier technology

- Tier 0
  - Initially all DB2, IMS and KTO databases placed on EFD – random read/low cache read hit application behavior
  - Depending on behavior migration to lower tier will be done
- Tier 1
  - Raid 1: DB2 and IMS logs – write intensive data
  - Raid 5: All storage pools e.g. batch etc. except (tier2 pools)
- Tier 2
  - Archiving pools (HSM, TSM etc.)



# Enterprise Flash Drives Deliver Response Time Benefits

Measurable improvements even in high read hit scenarios



# Project overview

- Common project with SEB, EMC and TSS – Total Storage Solutions Local EMC Partner with focus on Mainframe solutions
- Project leader from TSS
- Weekly project meetings
- Total duration of project was May to September



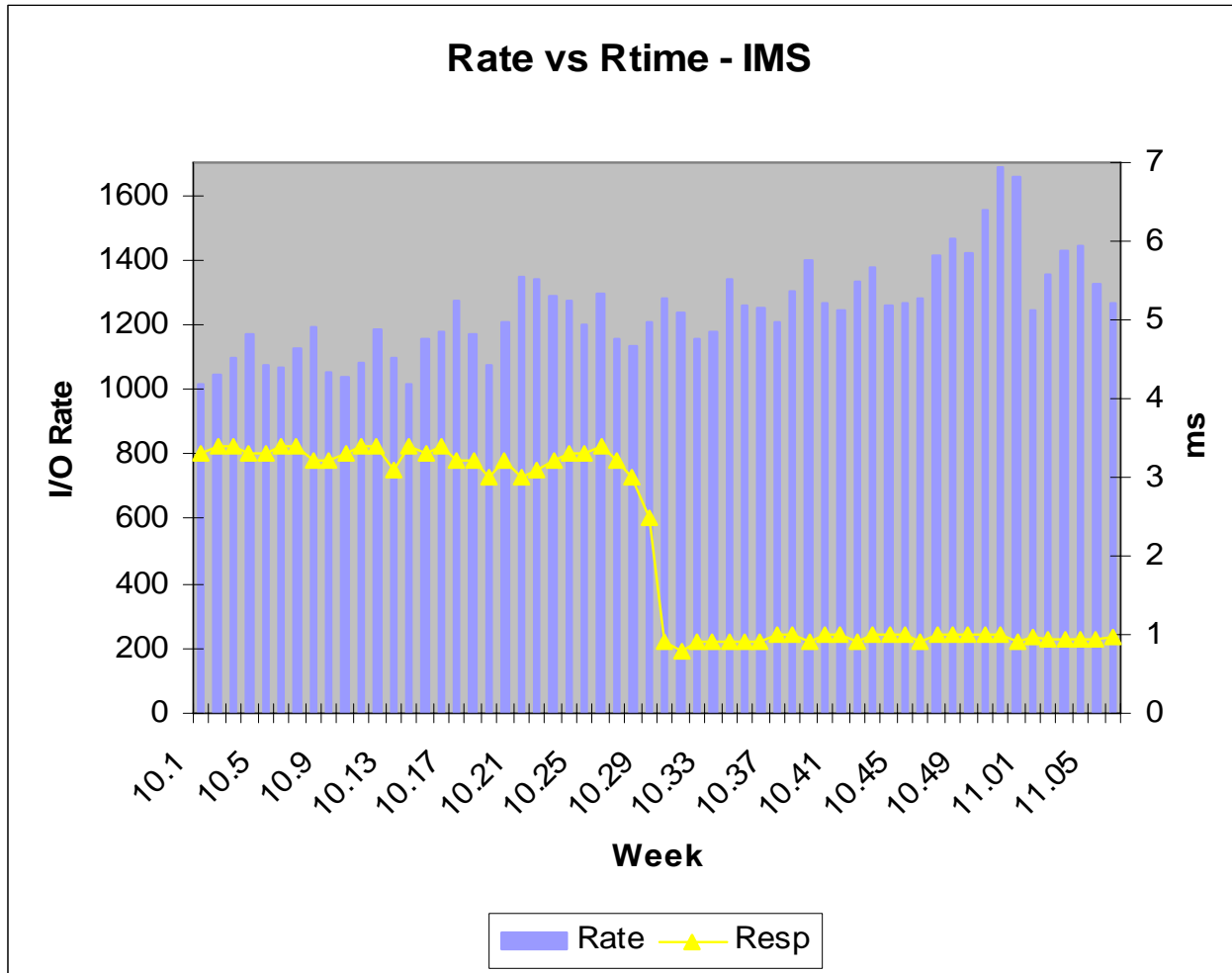
# Conclusions from project

- Initial planning of strategy was very time consuming
  - Tier and migration strategy
- Careful planning of migration was important
  - Placement of dataset and volume
  - Volume sizes (M54, M27, M9, M3)
  - Migration methods (dataset, volume)
  - Migration timeframe (service-windows)
- Majority of data moved online during office-hours using z/OS migrator software from EMC
- Total planned downtime: 60 minutes
  - Only a few critical datasets and spool-volumes had to be moved during this service-window
  - Only one service-window required in total

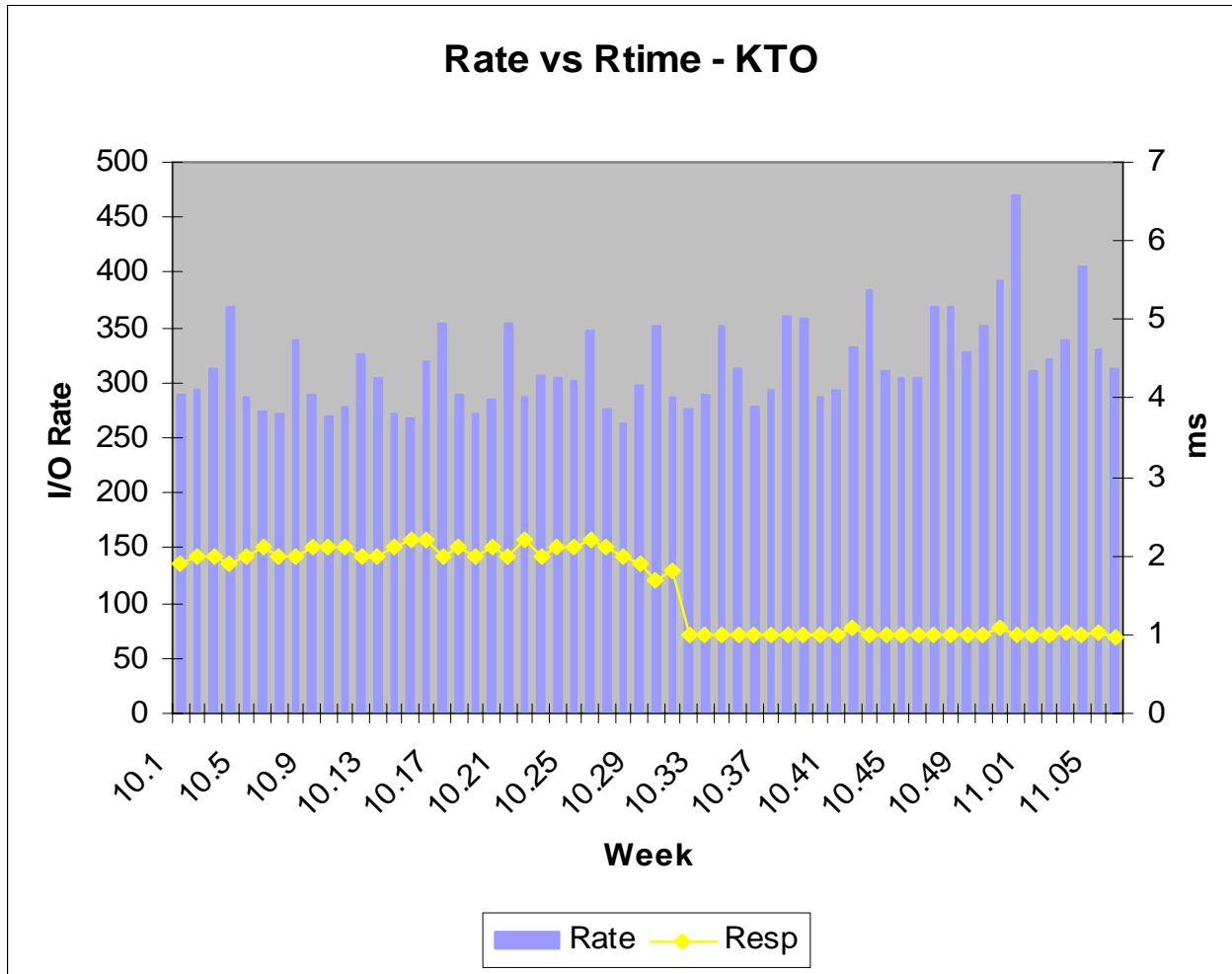


# IMS Databases, rate versus response time/week

- Migration during week 29-30



# KTO (SEB transaction handler), rate versus response time/week

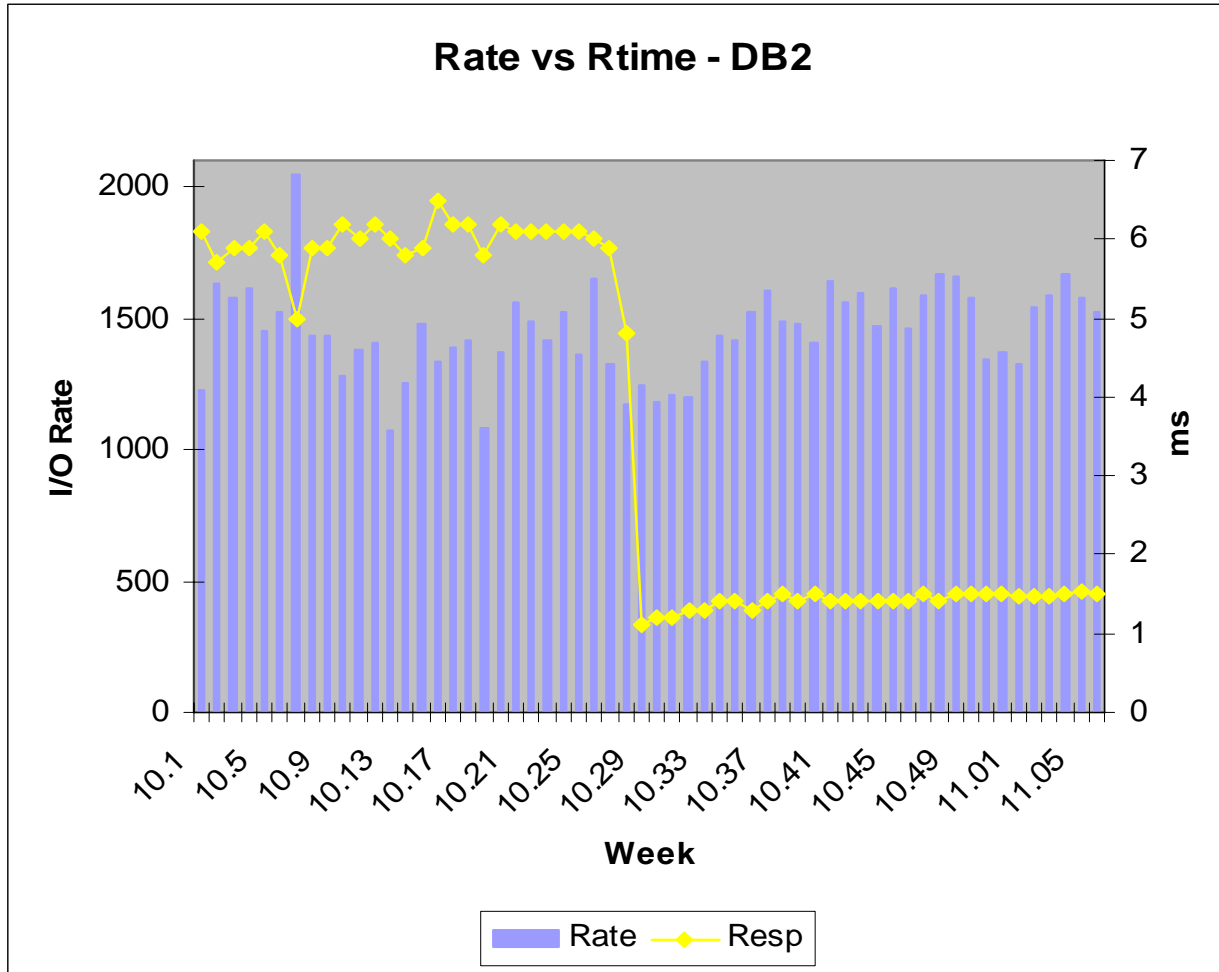


- KTO is one of the most sensitive data at SEB
- Already placed on performance disk
- Migration during week 32



# DB2 databases, rate versus response time/week

- Migration during week 29-30



# Indirect Benefits

- Online workload throughput improved due to elimination of deadlocks and timeouts
  - Avoid unnecessary rollbacks – i.e. non-productive I/O an CPU
- Peak CPU load moved from Online workload to Batch workload
  - Easier to control the batch utilization via scheduling and lower peak 4 hr rolling average
- Batch turnaround times reduced immensely for some specific utilities
  - Parallel reorg went from 4 hours to 10 minutes

# Summary

- More even response time and I/O load
  - Very small variation in response time
- Reduced internal transaction queuing
- Increased number of transactions per second
- Increased storage-capacity
- Implemented storage tiering
- Cost-effective total solution
- Average transaction response time reduced by 40-50%
  - Application sales support from 187 ms per IMS transaction to 0.07 ms



# Contact

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