System Performance Challenges at NSDL

AGENDA

- Overview of Depository Systems

- Performance challenges

- Techniques Deployed

Depository System

Facilitate securities holding and transaction in electronic book entry form

Key Legislative and regulatory requirement
– Service only through Participants

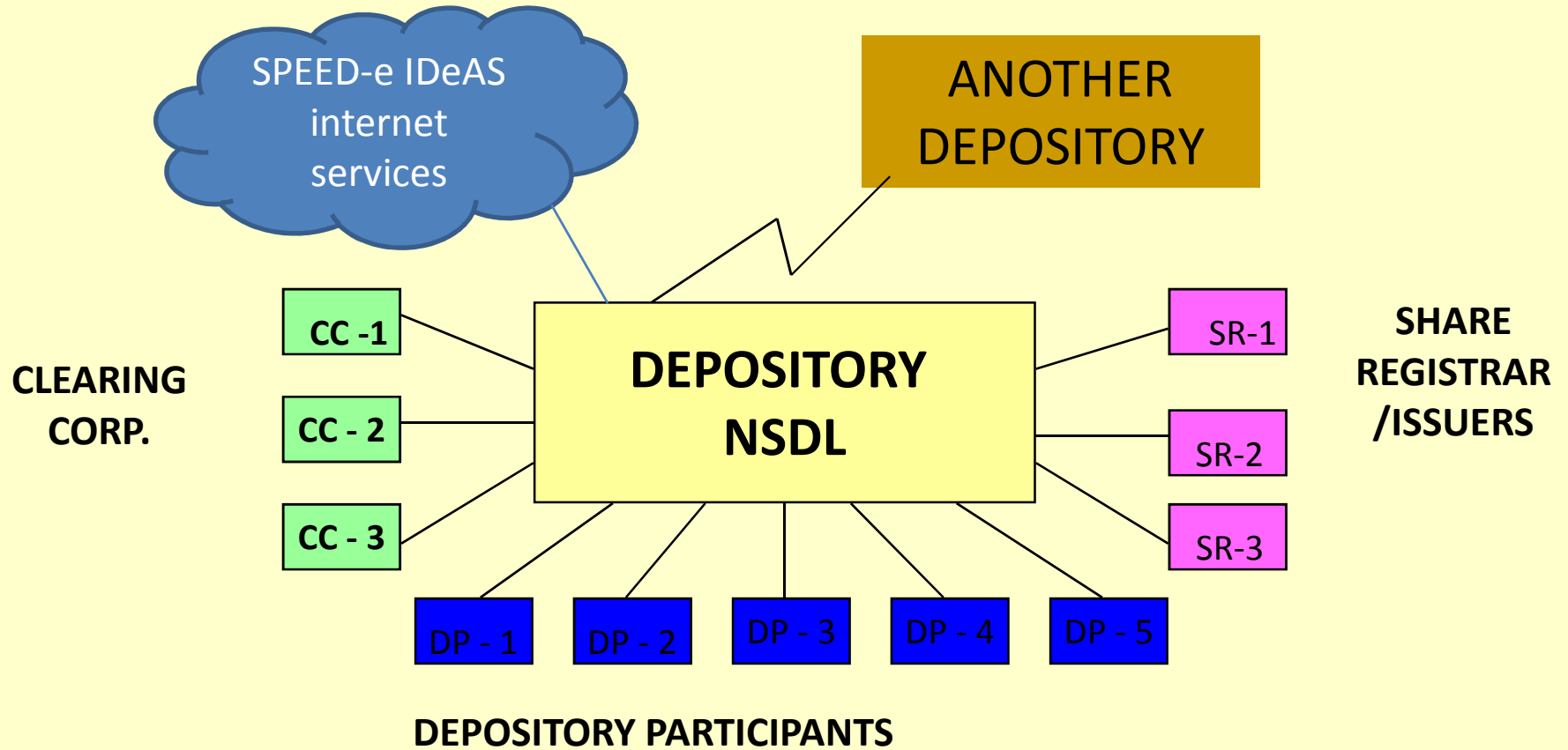– Depository to maintain client level data

– Daily Reconciliation

Key Requirements and Decisions

- Quick Launch

- Adapt operational TCS SEGA system
  - Mainframe CICS DB2
  - Proprietary COMS with SWIFT messaging

- BPs - Windows SQL server systems

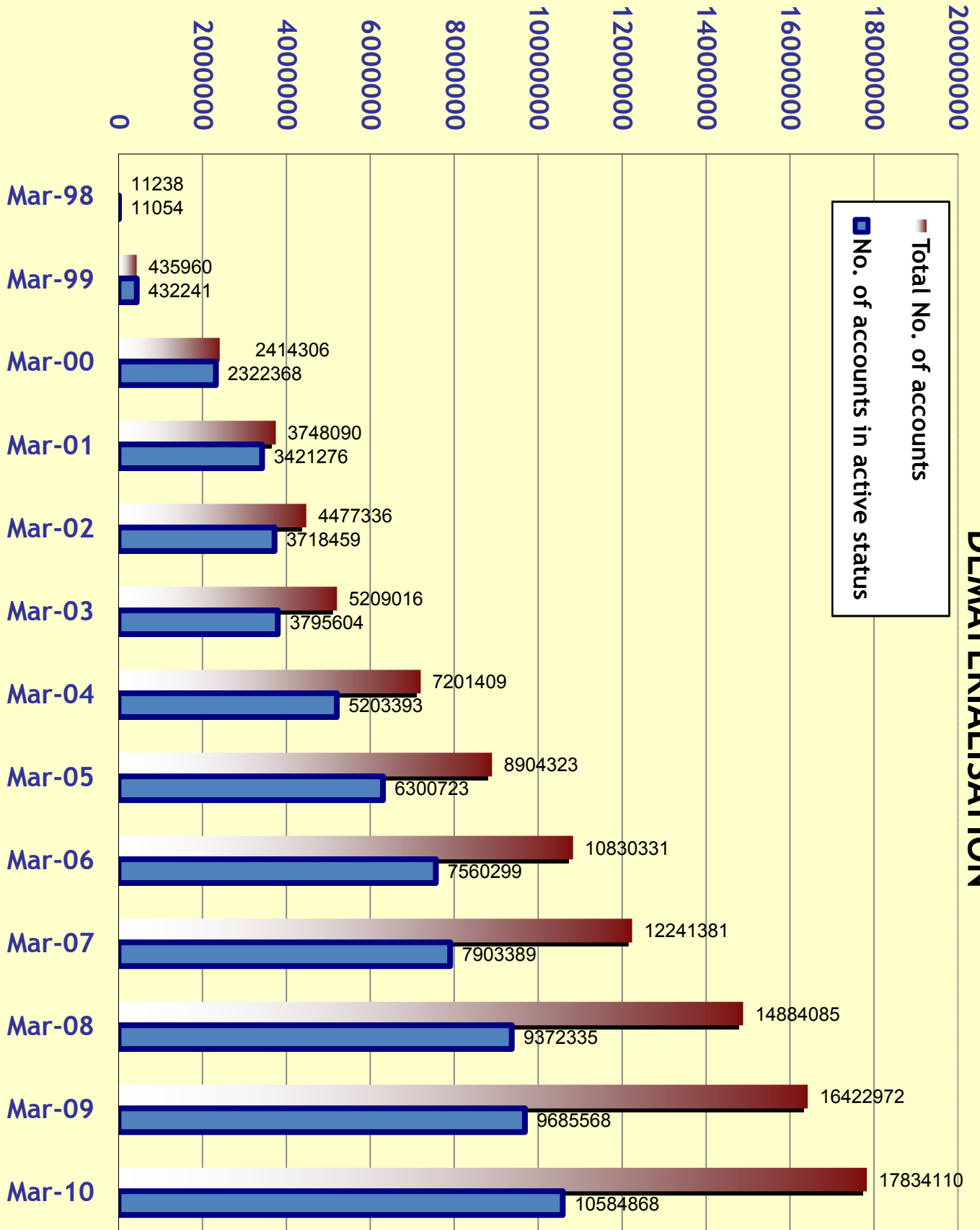- Internet based inquiry and transaction submission system for end users

Depository Set-Up

SPEED-e IDeAS internet services
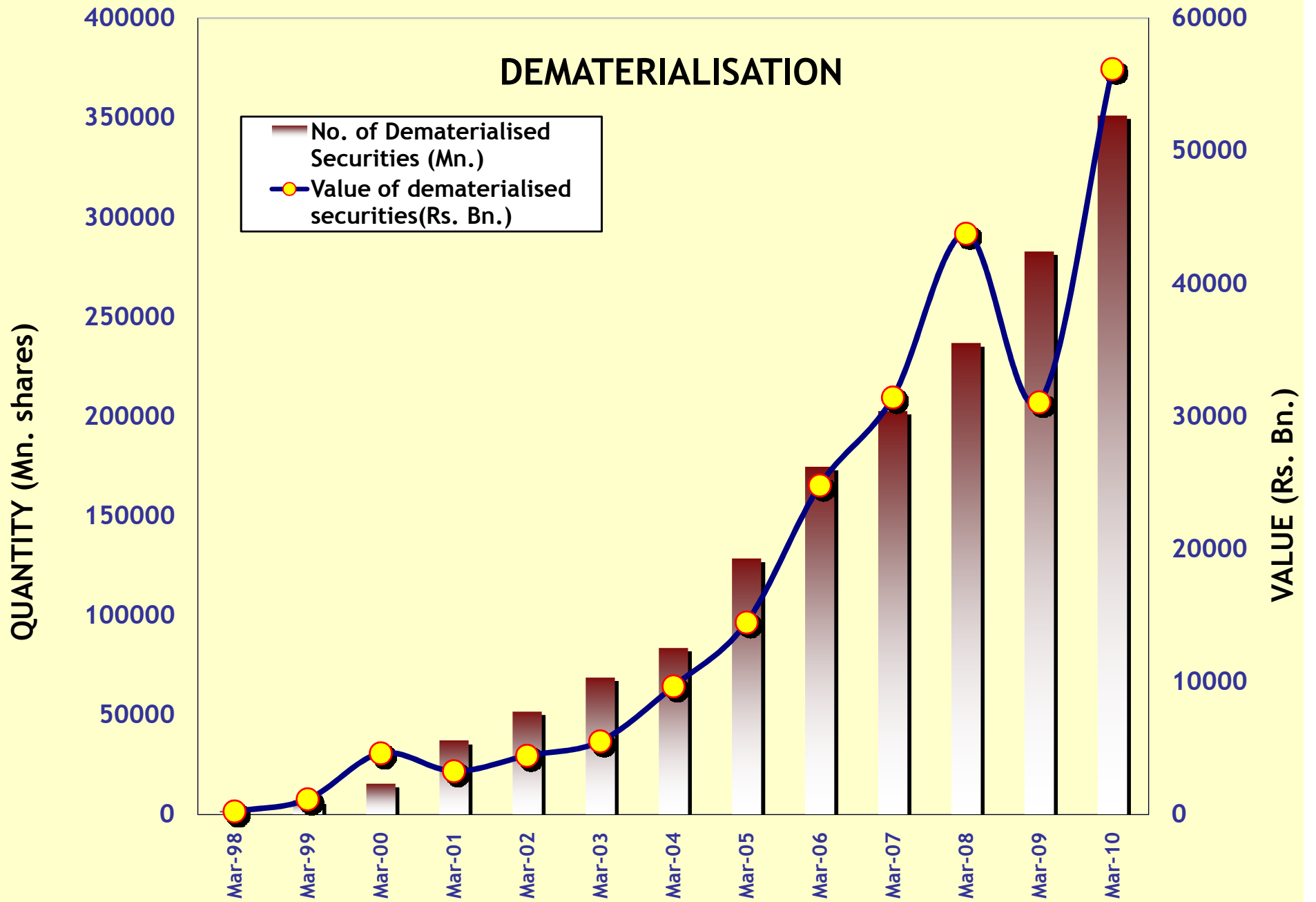
ANOTHER DEPOSITORY

CLEARING CORP.

CC -1

CC - 2

CC - 3

DEPOSITORY NSDL

SR-1

SR-2

SR-3

SHARE REGISTRAR /ISSUERS

DP - 1   DP - 2   DP - 3   DP - 4   DP - 5

DEPOSITORY PARTICIPANTS

STAR NETWORK

SWIFT MESSAGING CONVENTION

DEMATERIALISATION

Date	Total No. of accounts	No. of accounts in active status
Mar-98	11238	11054
Mar-99	435960	432241
Mar-00	2414306	2322368
Mar-01	3748090	3421276
Mar-02	4477336	3718459
Mar-03	5209016	3795604
Mar-04	7201409	5203393
Mar-05	8904323	6300723
Mar-06	10830331	7560299
Mar-07	12241381	7903389
Mar-08	14884085	9372335
Mar-09	16422972	9685568
Mar-10	17834110	10584868

DEMATERIALISATION

Performance Challenges

- Transaction concentration
- Inability of CICS to exploit multi CPU
- Disproportionate usage of MF for COMS
- Batch settlement in on-line window
- ADHOC query load in on-line window
- Managing EOD window with growth
- Information latency in IDeAs

Measures adopted OLTP system

- Multi threading and range partitioning
- Increase commit frequency
- Housekeeping, archival of data
- Daily transactions table
- Separate reporting database
- Re-engineer application
  - Reduce redundant bookings/ledger entries
  - Multi channel messaging for IDeAS

- Multi region CICS to separate COMS and APP
- Extend CICS Multi Region for APP through MQ

Measures Adopted for COMS

- Message blocking
- Lookup table based compression
- File upload/download for batches
- Offline distribution of signature information
- Offload COMS to UNIX Front end systems
- Dedicated Receiver /transmitter for select DPs

Measures adopted for EOD window

- Incremental external reconciliation

- Parallel processing and drive CPU to 100%

- High commit frequency with re-start logic.

- Use Flash copy for full backup

Redevelopment of Application

- 13 year old system based on SEGA code base
- Not Architectured for linear scalability
- Lock-in to Mainframe platform
- Settlement risk for DP if local system is down
- Unit level messaging protocol
- Lack of Branch Connectivity & STP

Re-development by TCS under IIT (B) Guidance

Key Requirements

- Linear incremental N fold scalability
- Portability across platforms and databases

- 1 hour EOD window
- Reduce Pay-in (batch settlement) time
- Zero latency for IDeAS SOT/SOH
- Direct Instructions submission by DP

Key Design Strategies

- Increase in memory processing (object cache)

- Common validation for batch of transactions

- Pass full transaction data through MQ

- Use of non persistent queues with rebuild

- Separate tables for processed and pre-processed transactions

Key design strategies(cont'd)

- Performance oriented database design
  - Store different types of positions for account in single row as columns
  - To be processed transactions in temp table with multiple indices
- Advance processing to reduce point load for settlement
- On-line reconciliation

Key design strategies(cont'd)

- Offload reporting to separate database
- NSDL hosted eDPM for instruction submission
- Local DPM for reporting
- STP enablement
- SOT/SOH from main database for IDeAs

- 100% JAVA code , JMS based interface for messaging Hibernate ORM for DB independent code

Achievement

- **Target**

  - **Current System** : 3 lacs instructions /hour
  - **Current Requirement** : 5 lacs instructions /hour
  - **10th year volume** : 40 lacs instructions/hour

- **Achievement**
  - **zOS DB2** 14.50 lacs/hr
  - **Aix – Oracle** 24.09 lacs/hr
  - **HP – Oracle** 12.51 lacs/hr

- **Very significant reduction in MIPS requirement.**

Thank You