SHARE Anaheim, CA
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IMS Disaster Recovery Tools Solutions
IMS Recovery Expert

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IBM Disaster Recovery Solutions

- IMS *Recovery* Solutions
  - IMS databases are recovered using image copies and/or logs
    - IMS Full Database recovery or IMS Timestamp recovery
- IMS *Restart* Solutions
  - IMS system and databases are mirrored to remote site
    - IMS Recovery Expert System Level Backup
    - GDPS and Storage Mirroring
- IMS *Restart & Recovery* Solution
  - IMS system and databases are mirrored to remote site
  - Additional transmitted data allows for forward recovery
    - IMS Recovery Expert (5655-S98) System Level Backup with IMS Logs, Change Accums, Backup Recon
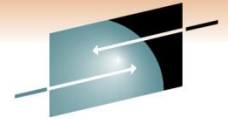
RTO vs. RPO

- Recovery Time Objective (RTO)
  - Time allowed to recover the applications
  - All critical operations are up and running again
  - Considerations include:
    - Recovery of databases
    - Restarting the network
- Recovery Point Objective (RPO)
  - Amount of data lost in the disaster
  - Last point-in-time when all data was consistent
  - Considerations include:
    - Frequency of creating recovery points
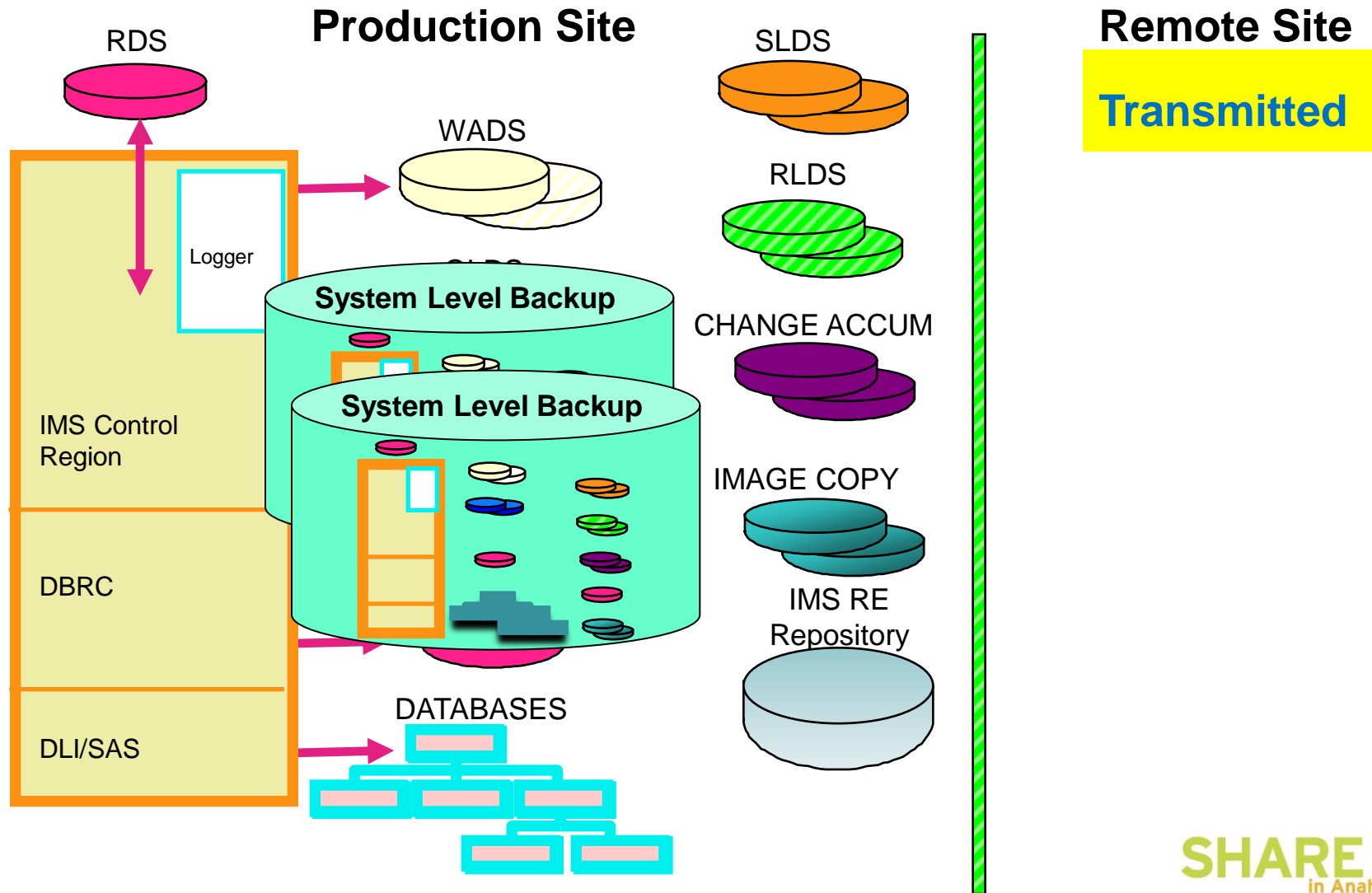   - Frequency of transfer of data to remote site
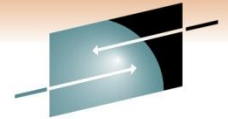
Recovery vs. Restart: Comparison

- IMS Disaster *Recovery* Solutions
    - RPO and RTO are highest
        - Recovery of databases required
    - Operational complexity is higher
    - Cost is generally low
- IMS Disaster *Restart* Solutions
    - RPO and RTO based on remote replication capabilities
        - Synchronous vs. Asynchronous
        - Frequency of data transmission and bandwidth
    - Operational complexity based on failover automation
    - Cost is generally high

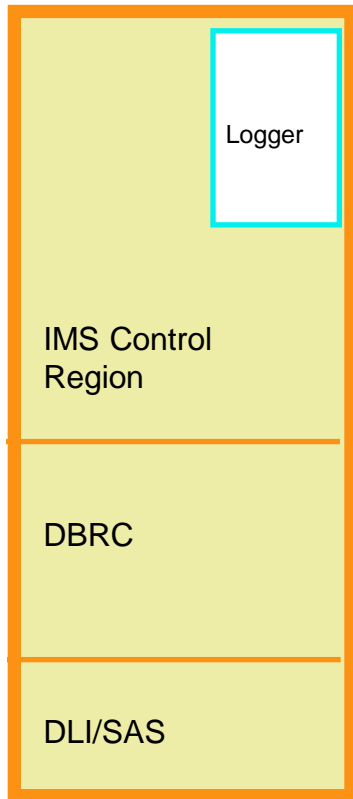# IMS Recovery Expert: Disaster Restart Solutions

Production Site

Remote Site

Transmitted

RDS

WADS

SLDS

RLDS

Logger

System Level Backup

System Level Backup

CHANGE ACCUM

IMAGE COPY

IMS RE Repository

IMS Control Region

DBRC

DLI/SAS

DATABASES

IMS Recovery Expert: Disaster *Restart* Solutions

Remote Site

/ERE IMS

Logger

IMS Control Region

DBRC

DLI/SAS

Restore SLB

WADS

SLDS

OLDS

RLDS

RDS

CHANGE ACCUM

RECON

IMAGE COPY

DATABASES

IMS RE Repository

Transmitted

System Level Backup

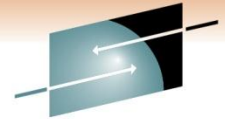System Level Backup
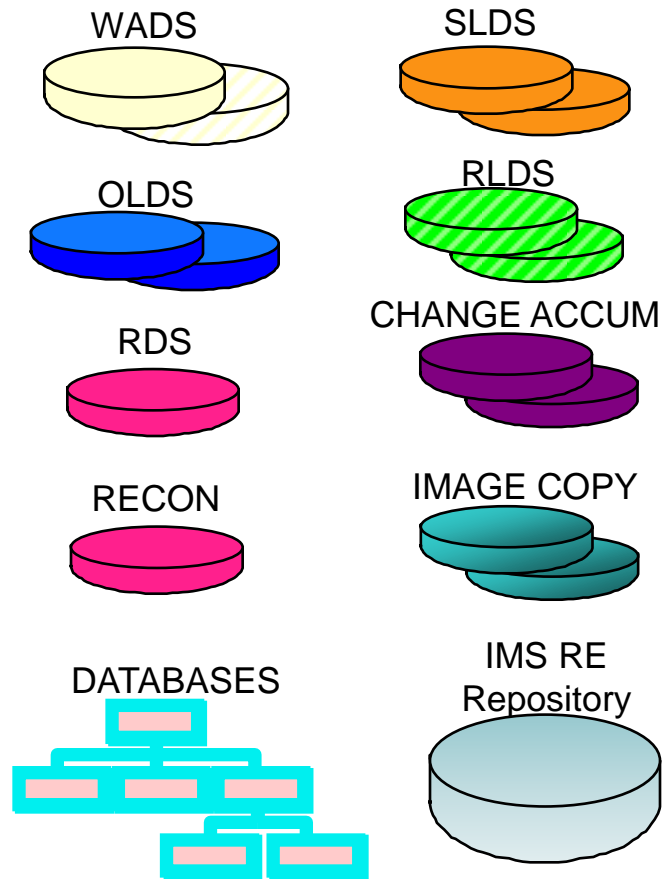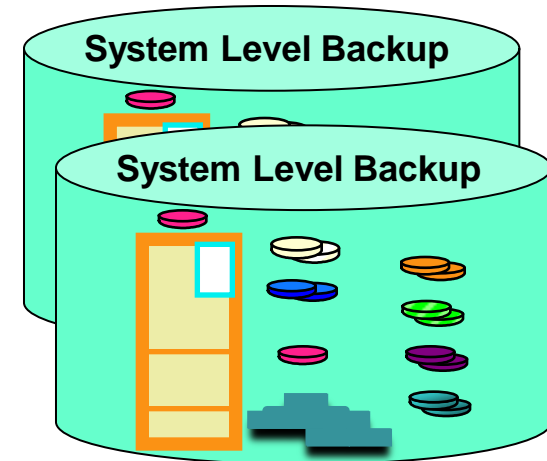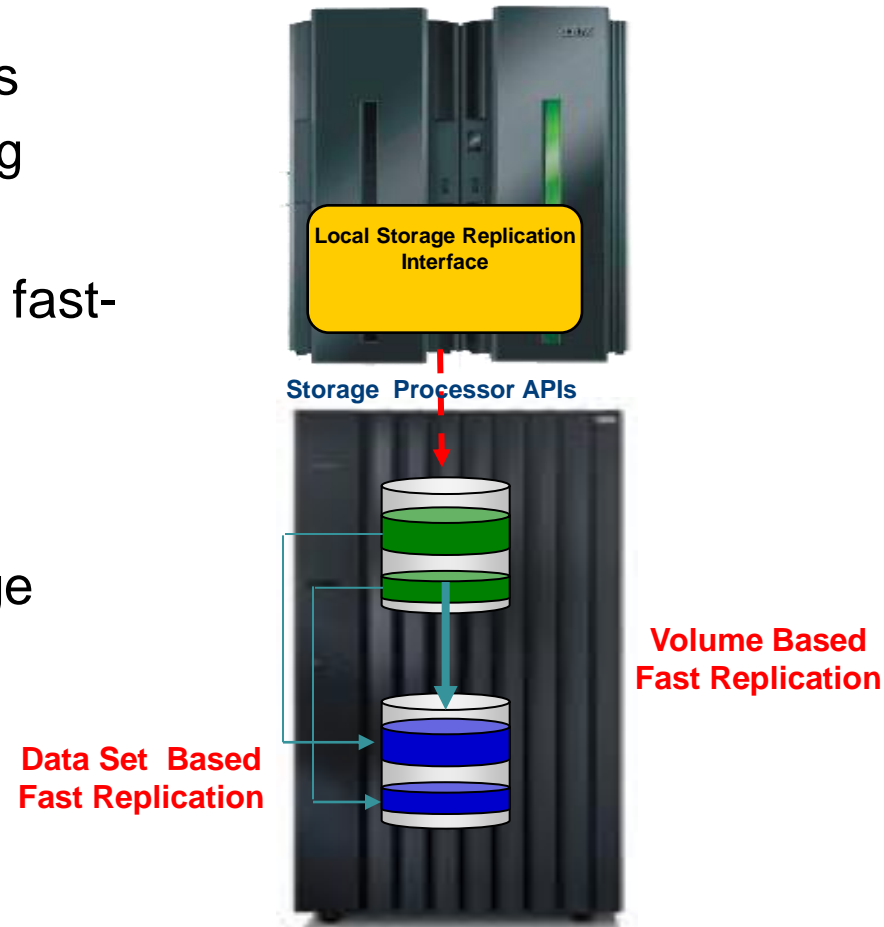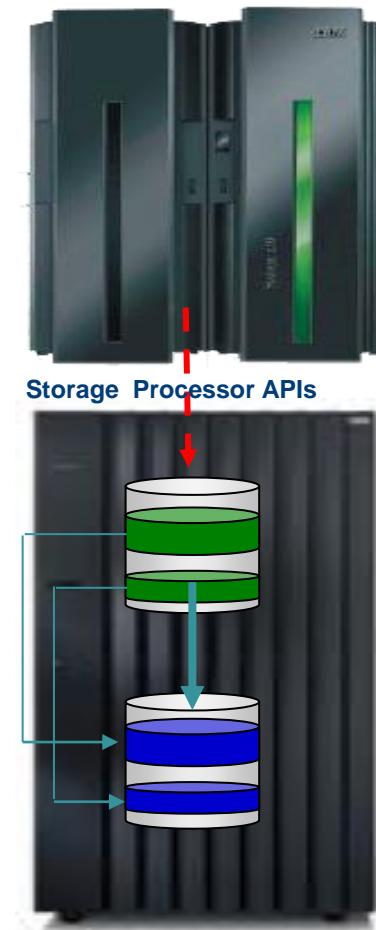
Local Storage-based Fast Replication

- First product availability - late nineties
  - Used to streamline batch processing
  - Speed backup processing
- Data copied using storage processor fast-replication facilities
  - Volume based
  - Dataset based
- No application or database knowledge
- Examples
  - EMC TimeFinder
  - IBM FlashCopy
  - HDS Shadow Image
- Typically used by storage administrators

Local Storage Replication Interface

Storage Processor APIs

Volume Based Fast Replication
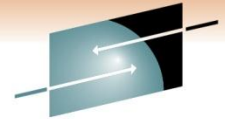
Data Set Based Fast Replication

Fast Replication: Many Hardware Options

- Volume Based Fast Replication
  - FlashCopy (IBM,EMC,HDS)
  - SnapShot (IBM,STK)
  - TimeFinder/Clone Volume Snap (EMC)
  - TimeFinder/Snap (EMC)
  - Mirror processes
    - PPRC (IBM,EMC,HDS)
    - TimeFinder/Mirror, SRDF (EMC)
    - ShadowImage HUR (HDS)

- Data Set Based Fast Replication
  - Data Set FlashCopy (IBM,EMC,HDS)
  - Data set SnapShot (IBM,STK)
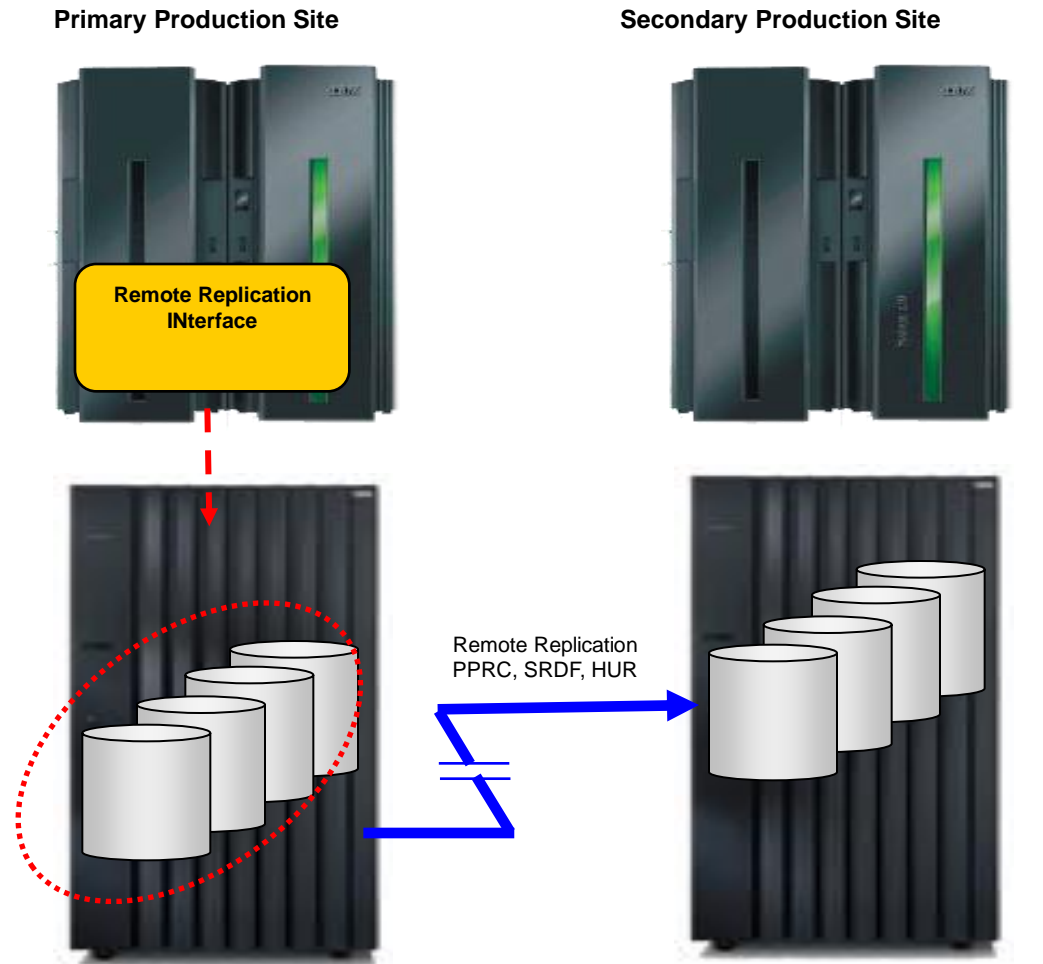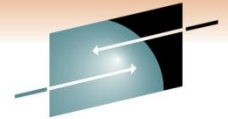 - TimeFinder/Clone Data set Snap (EMC)

Storage Processor APIs

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Remote Storage-based Fast Replication

Primary Production Site
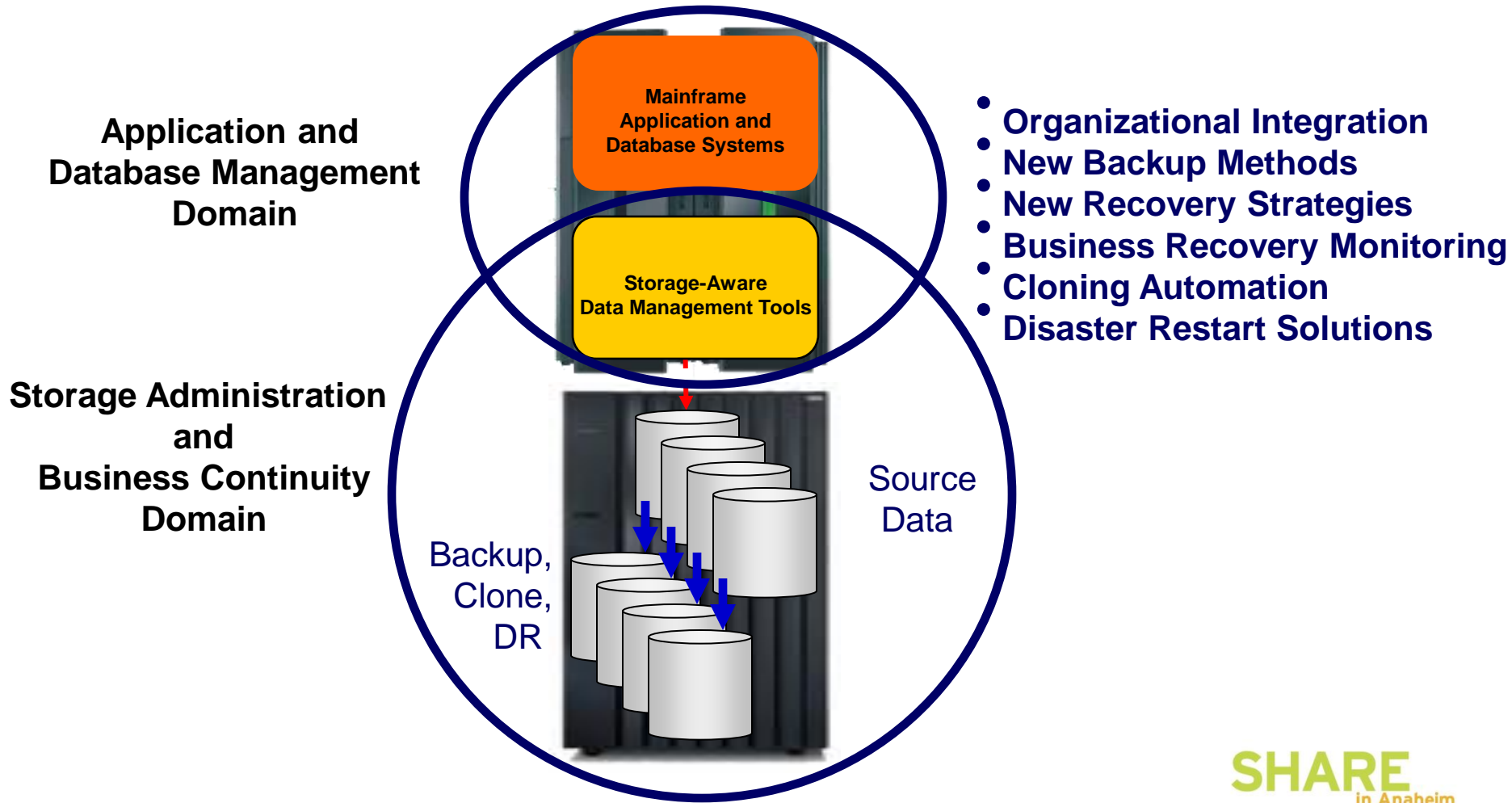
Secondary Production Site

- Volume based remote storage replication
- Used for business continuity and/or high availability
- Synchronous or asynchronous
- Consistency technology required
- No application or database knowledge
- Examples
  - EMC SRDF
  - IBM PPRC, XRC
  - HDS HUR
- Typically used by storage administrators

Remote Replication
INterface

Remote Replication
PPRC, SRDF, HUR

Application and Database Storage Integration

Application and Database Management Domain

Storage Administration and Business Continuity Domain

Mainframe Application and Database Systems

Storage-Aware Data Management Tools

Source Data

Backup, Clone, DR

- **Organizational Integration**
- **New Backup Methods**
- **New Recovery Strategies**
- **Business Recovery Monitoring**
- **Cloning Automation**
- **Disaster Restart Solutions**

# IMS Recovery Expert (5655-S98)

- IMS Recovery Expert features:
  - Environment discovery and configuration management
    - IMS System Level Backup includes:
      - *Active and archive logs*
      - *RECONs*
      - *All IMS database data sets*
      - *IMS system data sets (ex. ACBLIBs, DBDLIBs, PGMLIBs, etc.)*
      - *All associated ICF User catalogs*
  - System backup and recovery operations
  - Instantaneous backups using storage-based fast replication
  - System backup validation
  - IMS data consistency using IMS Log Suspend process
  - Automated and encrypted tape offload management
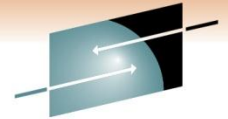
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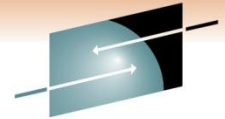
IMS System Level Backup (SLB)

- Create IMS System Level Backup (SLB)
  - Backs up entire DBMS production environment
    - Records SLB in IMS Recovery Expert Repository
  - Leverages Storage-Based Volume Fast Replication
  - Multiple SLBs can be offloaded to tape for remote site
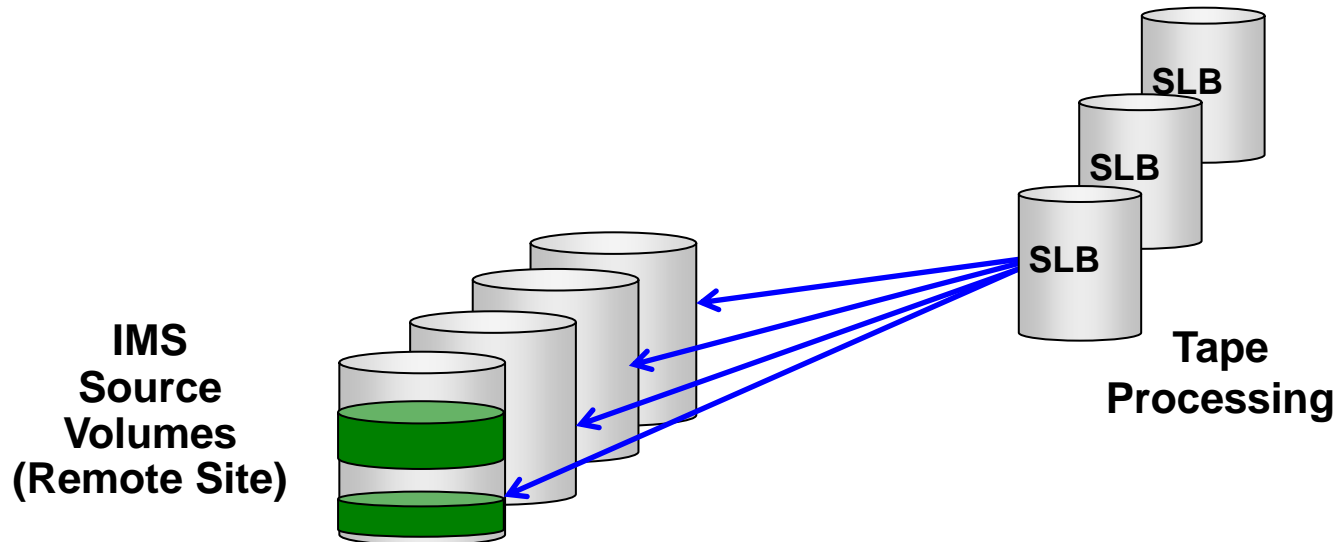 - Data is dependent-write consistent

IMS Source Volumes

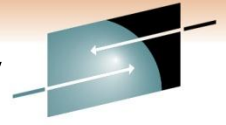**IMS Target Volumes**

SLB

SLB

SLB

Tape Processing
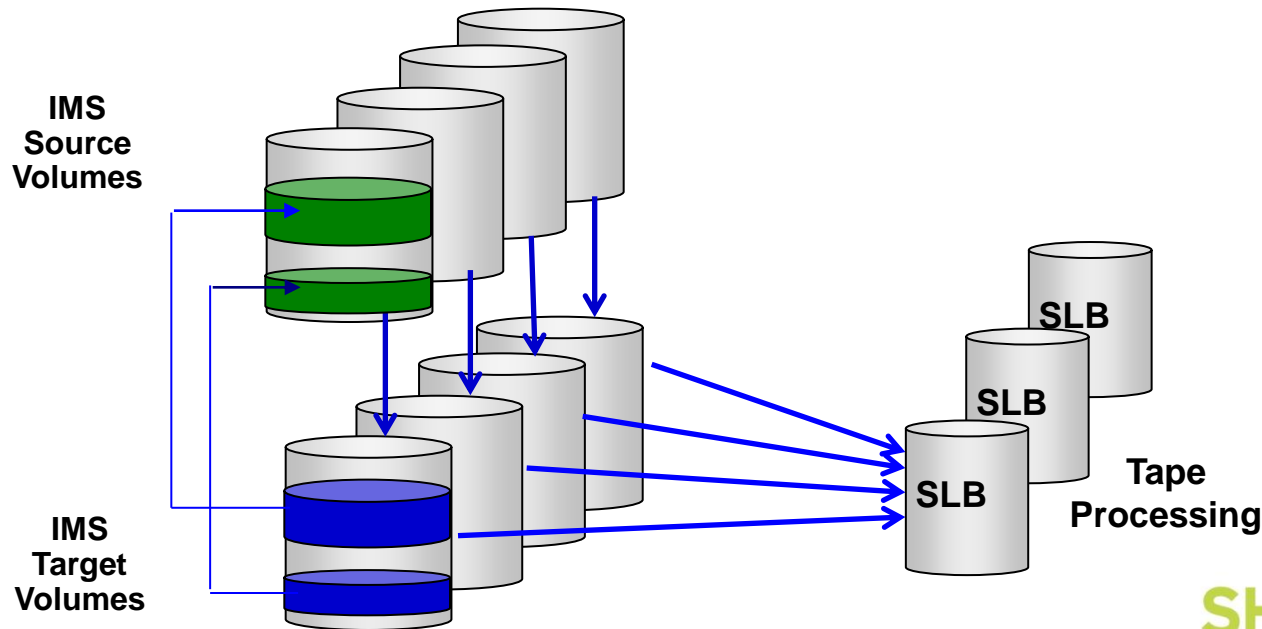
IMS SLB Restore at Remote Site

- Restore the SLB
  - System Level Backup is restored from disk or tape
  - Coordinated parallel restore operations
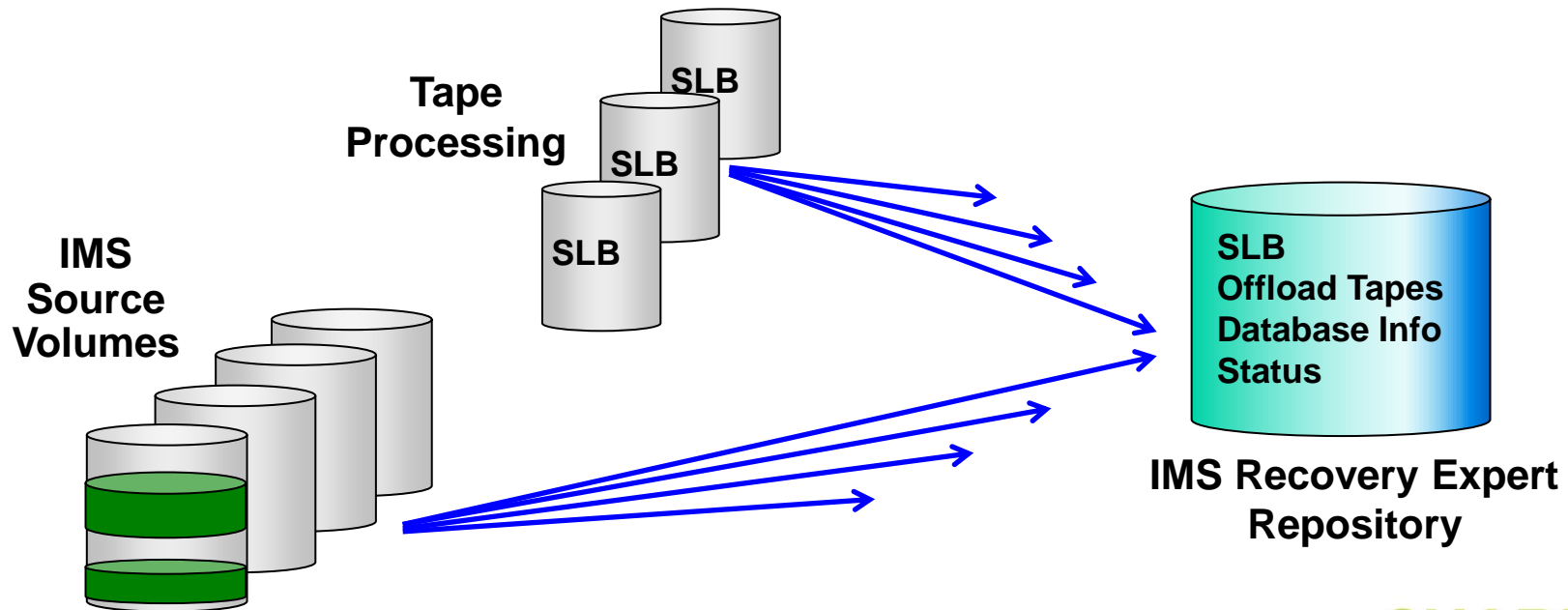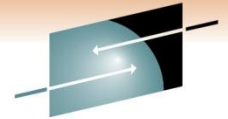 - IMS Emergency Restart from System Level Backup

IMS
Source
Volumes
(Remote Site)

SLB

SLB

SLB

Tape
Processing

IMS Recovery Expert (5655-S98) Repository

- IMS Recovery Expert Repository
  - Store information on SLBs created
  - Track database characteristics and status
    - HALDB, Fast Path EEQEs, Volume, Recovery Needed Status
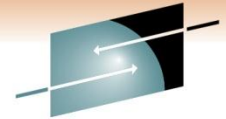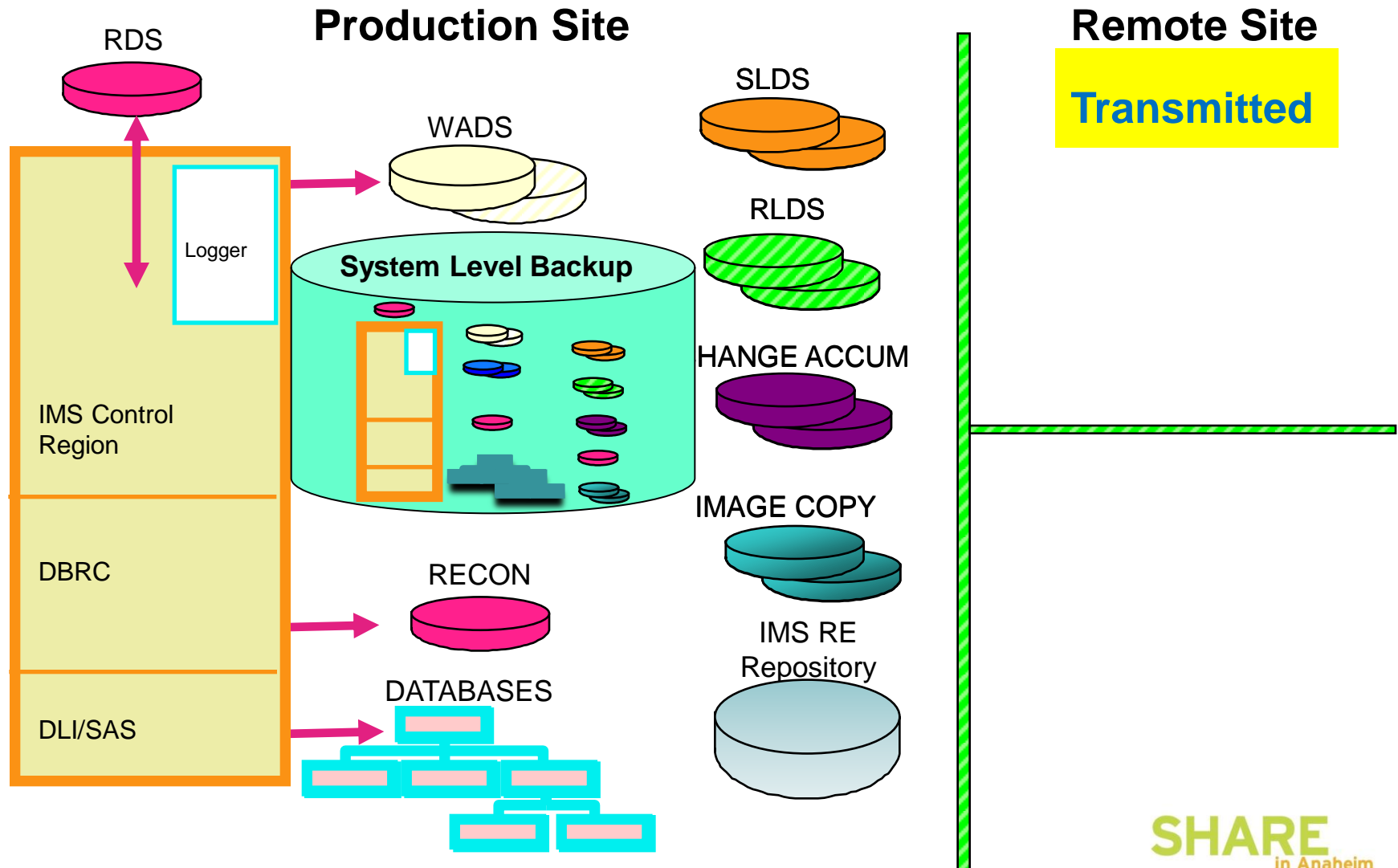 - SLB and Offloading Tape information

IMS Disaster *Restart & Recovery* Solutions

✓ **IMS Recovery Expert (5655-S98)**

✓ **System Level Backup + Logs + RECON**
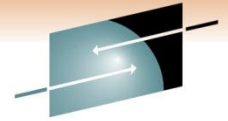
IMS Disaster Restart & Recovery Solutions

IMS Disaster Restart & Recovery Solutions

Remote Site

SHARE
Technology · Connections · Results

Cold Start IMS

Logger

IMS Control Region

DBRC

DLI/SAS

Recover DB

SLDS

RLDS

CHANGE ACCUM

CONDITIONED RECON

IMAGE COPY

DATABASES

Restore SLB

WADS   SLDS

OLDS   RLDS

RDS   CHANGE ACCUM

RECON   IMAGE COPY

DATABASES   IMS RE Repository

Transmitted

System Level Backup

SLDS

RLDS

CHANGE ACCUM

IMAGE COPY

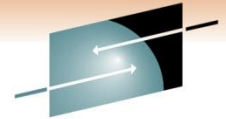IMS RE Repository

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16
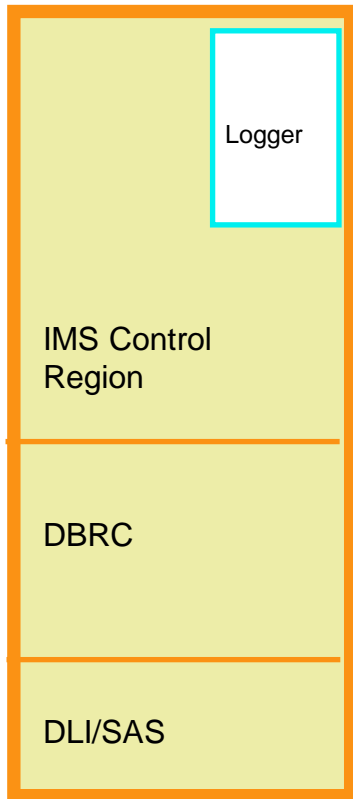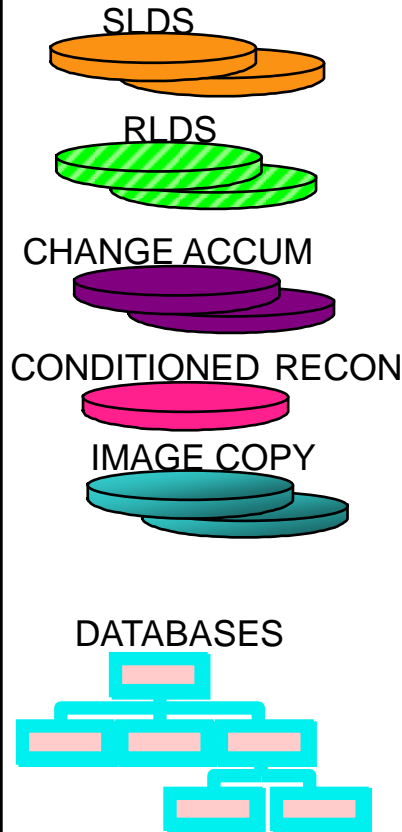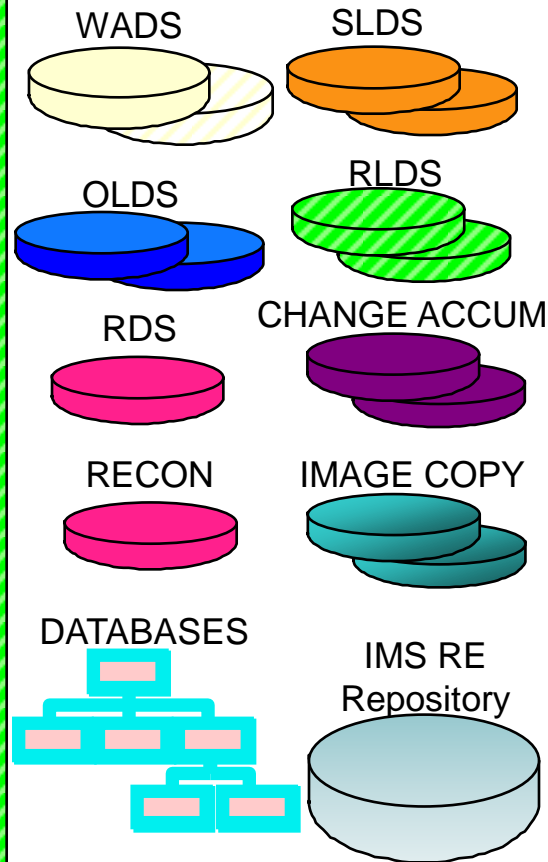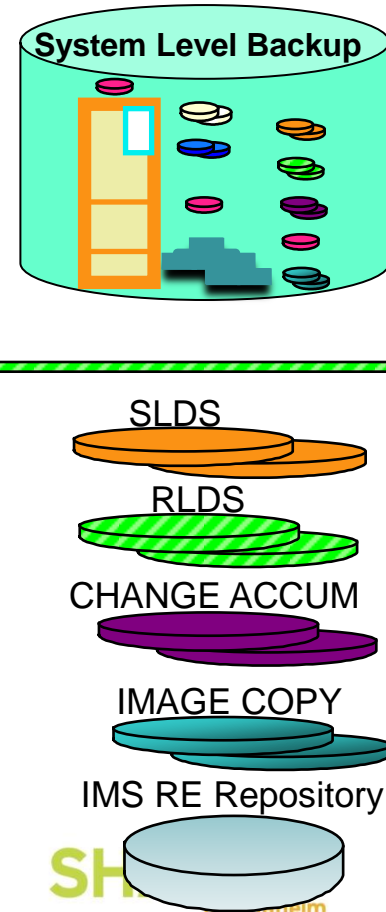
IMS Recovery Expert System Restore & Recovery

- IMS System Level Restore
  - Recreates the IMS production environment
  - All data is consistent to specific point in time
- Additional IMS data sets transmitted to remote site
  - IMS SLDS, RLDS, Change Accum, Backup RECON
    - RECON is conditioned using IMS Recovery Expert facilities
  - TSR or PITR applies updates to a RP or any Timestamp
  - IMS is cold started

DATABASES

SLB
SLB
SLB

SLDS
RLDS
CA
RECON

Forward Recovery
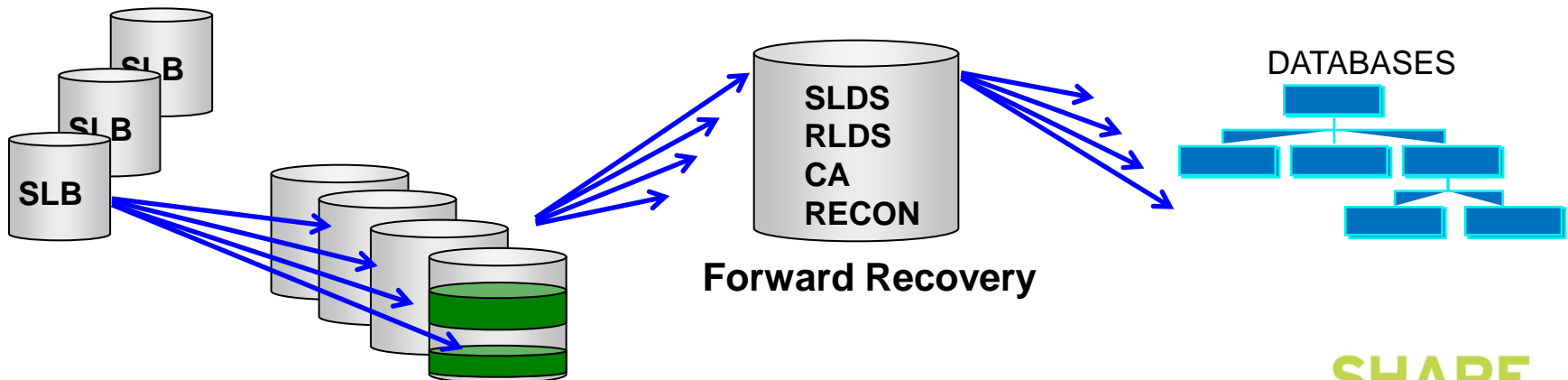
IBM IMS Tools: Onetime Setup

Primary Site

Step 1

IMS Recovery Expert
(Option 0 User Settings)
Register IMS
Include/Exclude Datasets

Step 2

IMS Recovery Expert
(Option 5 Analyze IMS)
Analyze IMS Configuration

Step 3

IMS Recovery Expert
(Option 1 Backup Profiles)
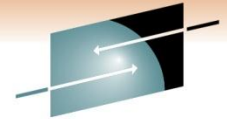Create Backup Profile
Update Target Pool
Update Offload Options

Step 4

IMS Recovery Expert
(Option 3 Application Profile)
Create Profile for Local Site
Build Recovery JCL

Step 5

IMS Recovery Expert
(Option 4 DR Profile)
Create Profile for DR Site
Build Restart JCL
Build Recovery JCL

IMS DR: IMS Recovery Expert (SLB Only)

Primary Site

Cold St... ...
Start BMP
(Wait before Chk...

...ecovery Expert
...Restart JCL)

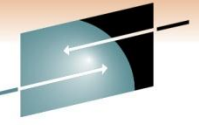Re...

SLB, Remote PDS

IMS Recovery Expert
(Execute Restart JCL)
Restore SLB

Emergency Re...rt IMS
(/ERE Override)
Show Dynamic Backout

IMS HPPC
(Execute Pointer Checker)

IMS DR: IMS Recovery Expert (SLB + TSR)

Primary Site

Cold St~~art IMS~~
Start BMP
(Wait before Ch~~k~~

Archive Logs
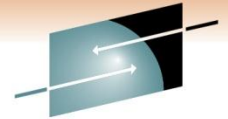
**IMS Recovery Expert
(Execute Recovery JCL)**

Re~~mote~~

SLB, Remote PDS
Logs, CAs, ICs, Recon

**IMS Recovery Expert
(Execute Recovery JCL)
Restore SLB**

**IMS Recovery Expert
(Continue Recovery JCL)
(DRF, HPIC, HPPC)
Forward Recover DBs
Create Image Copies**

Cold Start IMS

Demonstration of IMS DR Recovery
(Onetime Setup)
(SLB Only + IMS Emergency Restart)
(SLB + Forward Recovery + IMS Cold Start)