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**Platinum
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GoldenGate for Auditing

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GoldenGate

Agenda

- GoldenGate History
- High-Level GoldenGate Architecture
- Traditional Use Cases
- GoldenGate Auditing Use Case
- Configuring an Audit Schema
- Putting it all together- Examples
- Managing your Audit Schema
- Conclusion

Oracle GoldenGate: Real-Time Data Integration

Gold Standard- High Performance, Reliable, and Proven

RAYMOND JAMES™

CHASE 
Paymentech

Sabre Holdings™

Adventist
HEALTH SYSTEM

MEMORIAL
HERMANN

TravelCLICK

ISO NEW YORK
INDEPENDENT
SYSTEM OPERATOR

BlackBerry

Overstock.com™
Your Online Outlet™

DIRECTV

Jefferson™
University Hospitals

usbank
Five Star Service Guaranteed

pulse

Häagen-Dazs

Federated

Red
retail decisions

1-800-flowers.com

Bank of America

JANACE
Communications
Anil Dhirubhai Ambani Group

VOCALINK

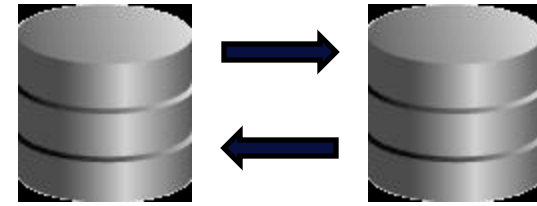
4,000+ implementations

- Top 3 of 3 busiest ATM networks
- Top 3 of 5 largest commercial banks
- Top 7 of 10 financial data services companies
- Top 4 of 5 telecommunications providers
- Top 3 of 5 largest food & drug stores

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What is Oracle GoldenGate?



Oracle GoldenGate provides low-impact capture, routing, transformation, and delivery of transactional data across heterogeneous environments in real time

Key Differentiators:

Performance

Non-intrusive, low-impact, sub-second latency

Flexible and Extensible

Open, modular architecture - Supports heterogeneous sources and targets

Reliable

Maintains transactional integrity - Resilient against interruptions and failures

How Oracle GoldenGate Works

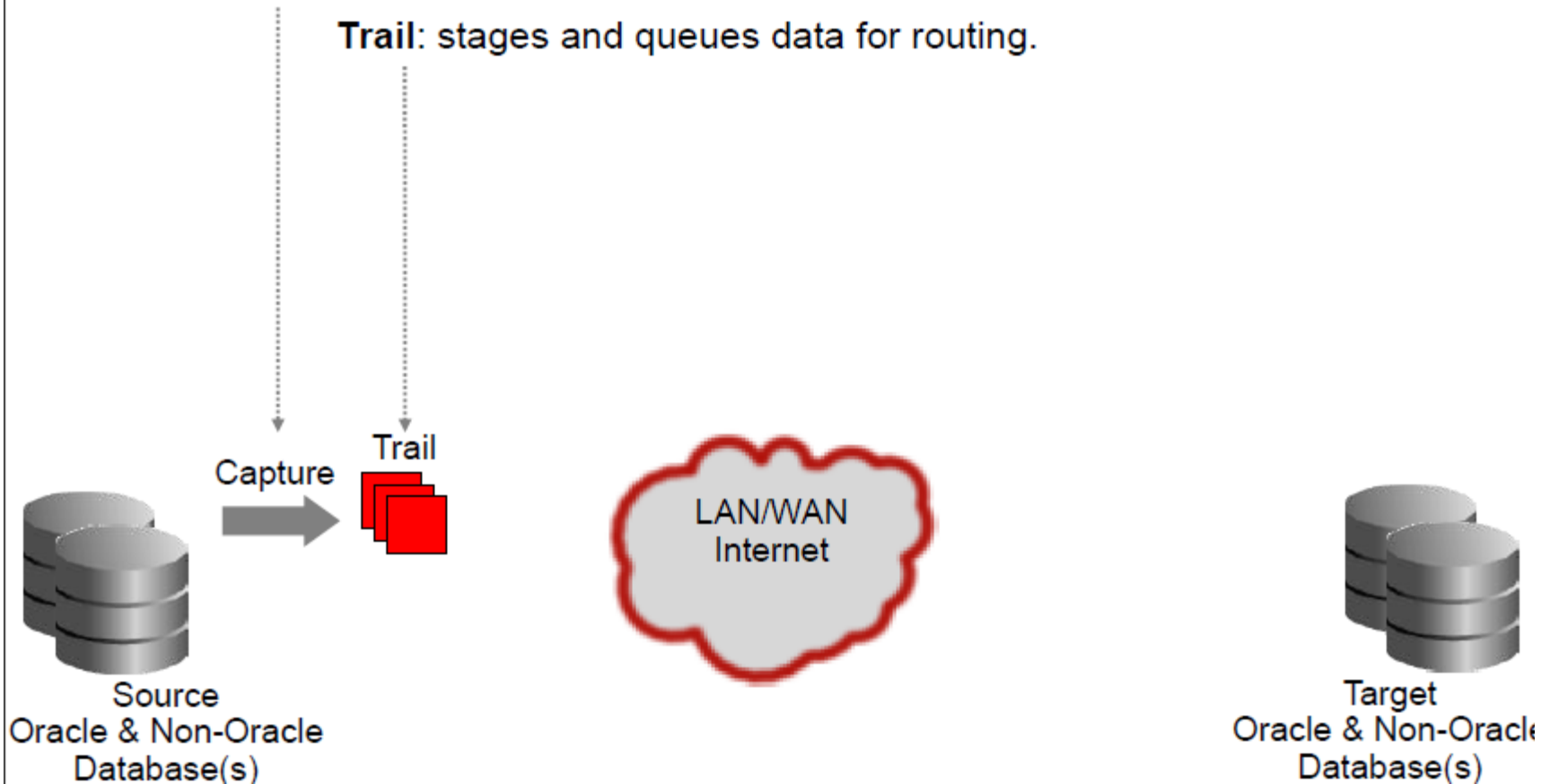
Capture: committed transactions are captured (and can be filtered) as they occur by reading the transaction logs.



How Oracle GoldenGate Works

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Trail: stages and queues data for routing.

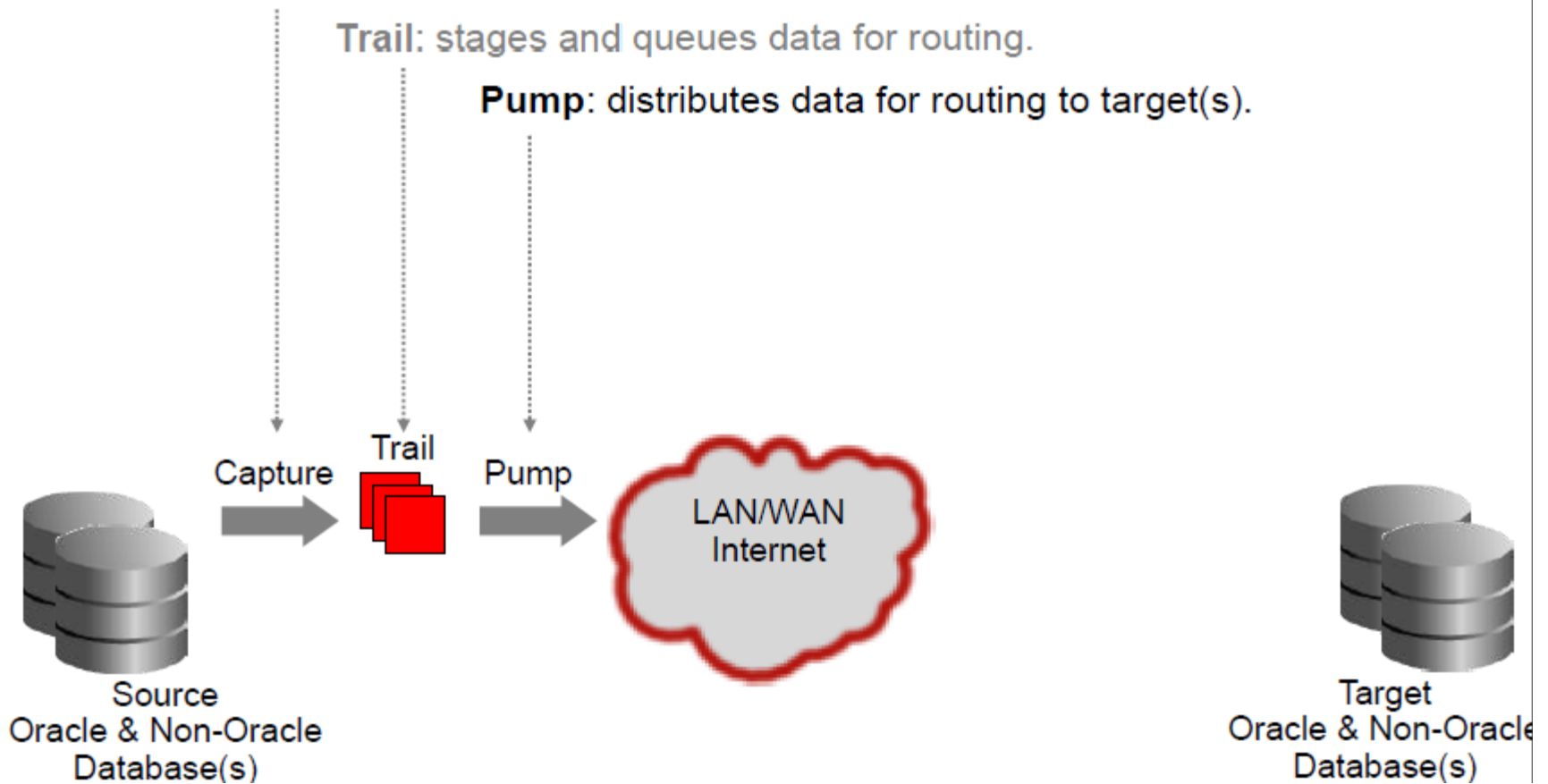


How Oracle GoldenGate Works

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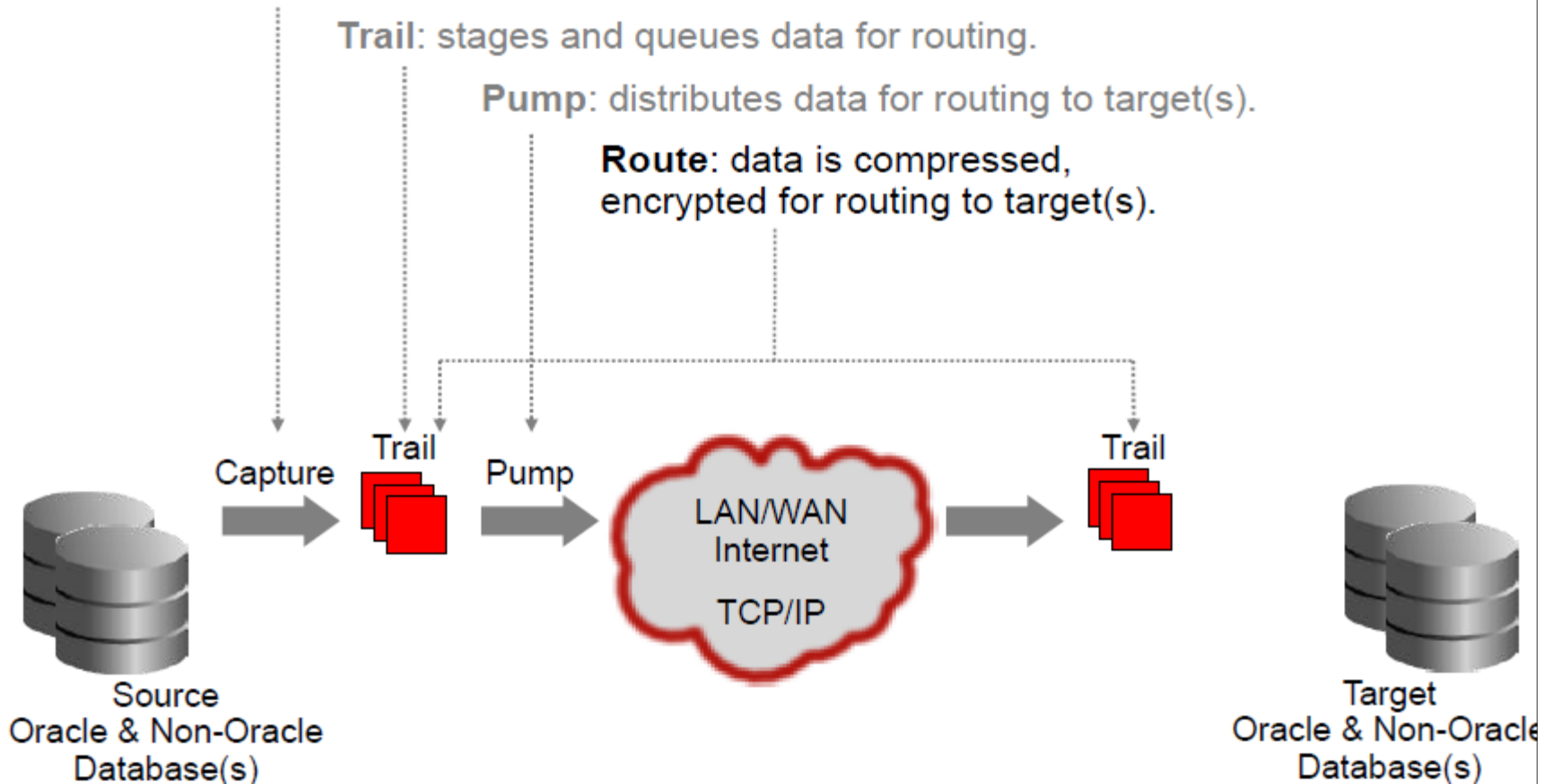
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How Oracle GoldenGate Works

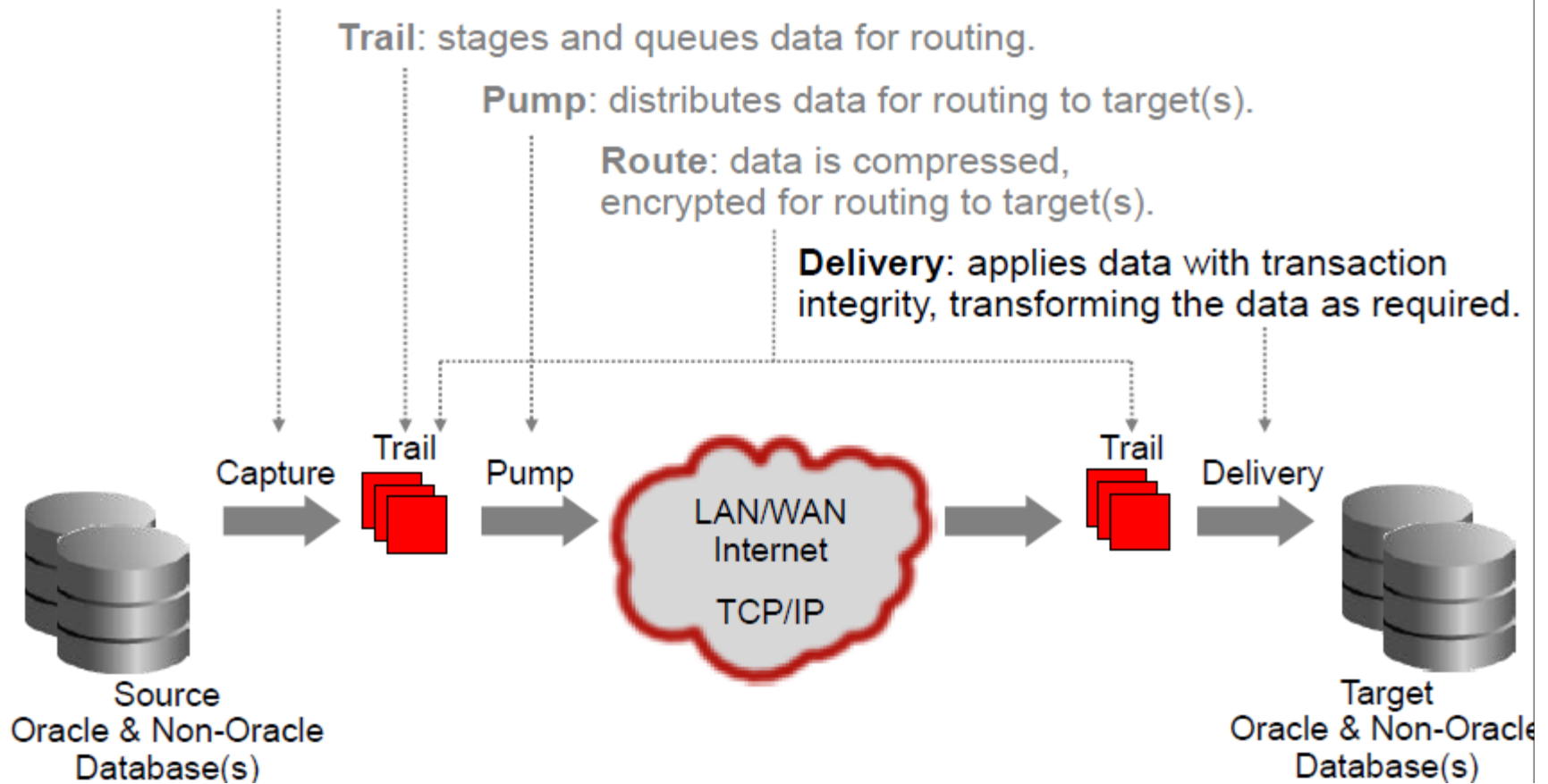
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How Oracle GoldenGate Works

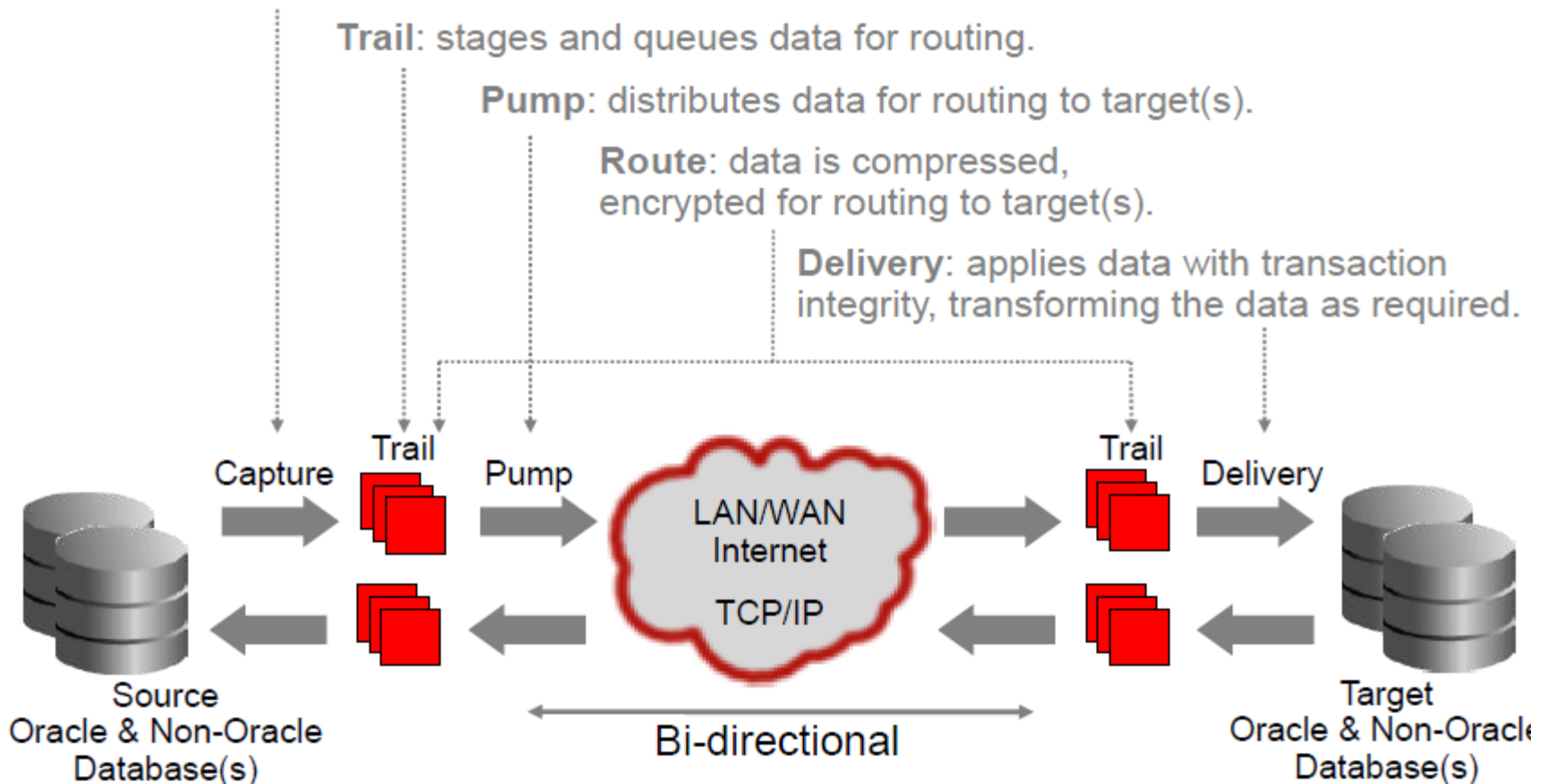
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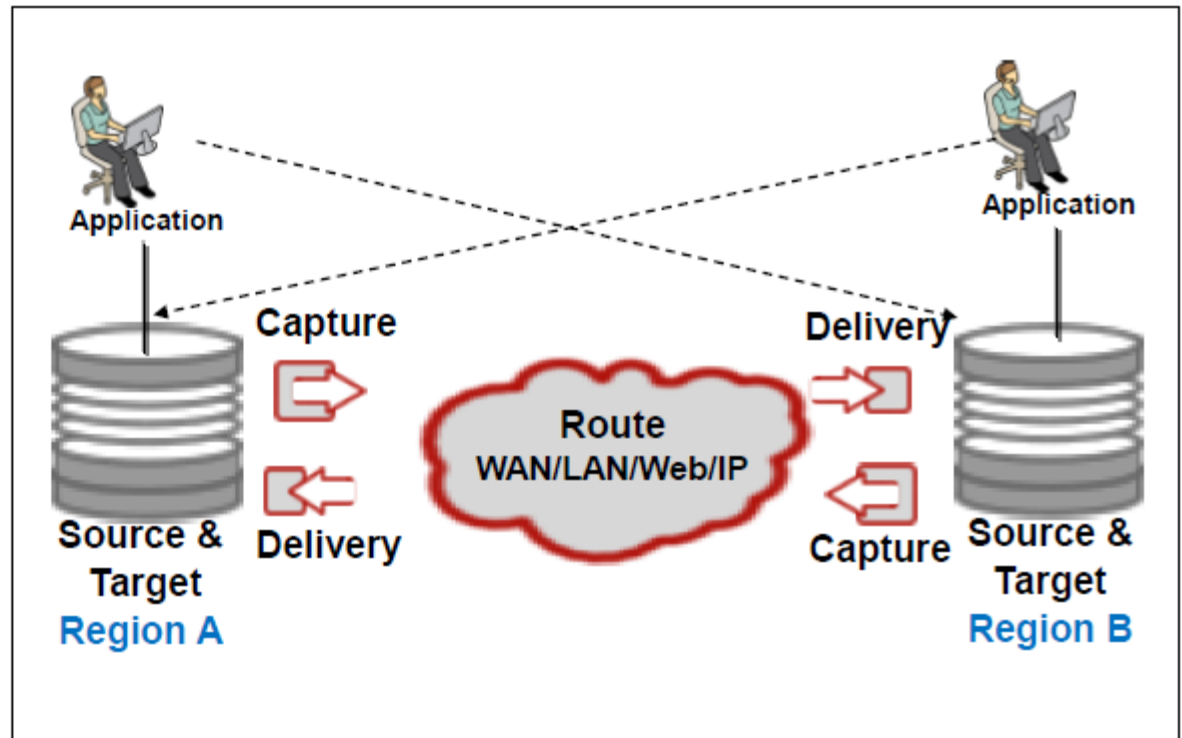
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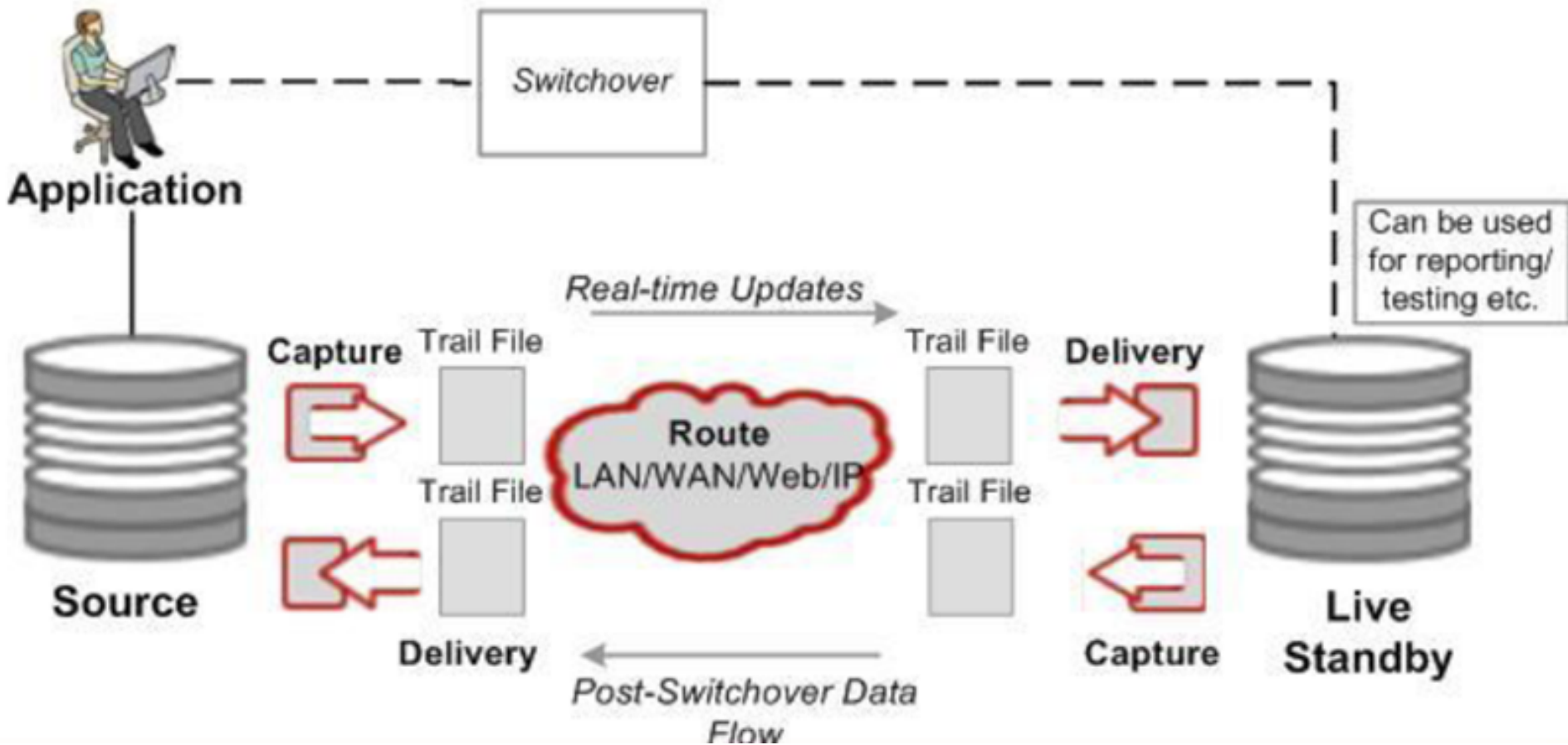
Oracle GoldenGate Active-Active / Multi-Master Replication

Increase ROI on Existing Servers and Synchronize Data Across the Globe

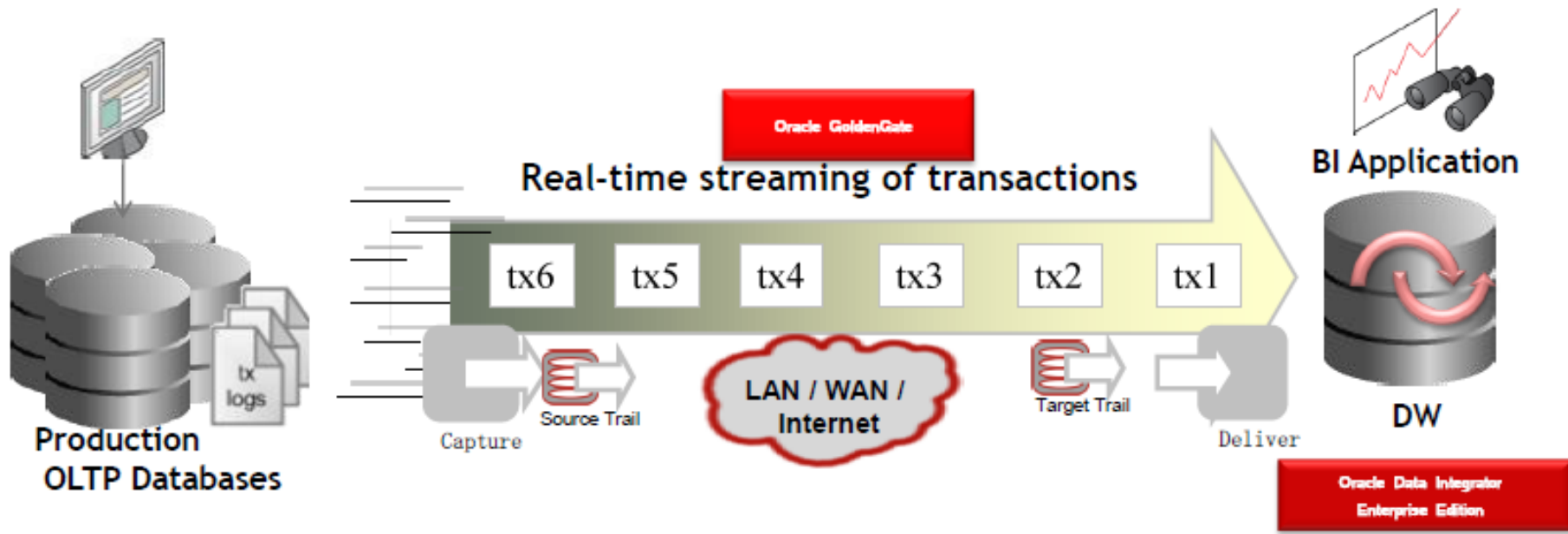
- Utilize multiple systems for transactions
- Enable continuous availability during unplanned and planned outages
- Synchronize data across data centers around the globe



Oracle GoldenGate for Disaster Recovery, Data Protection and Reporting

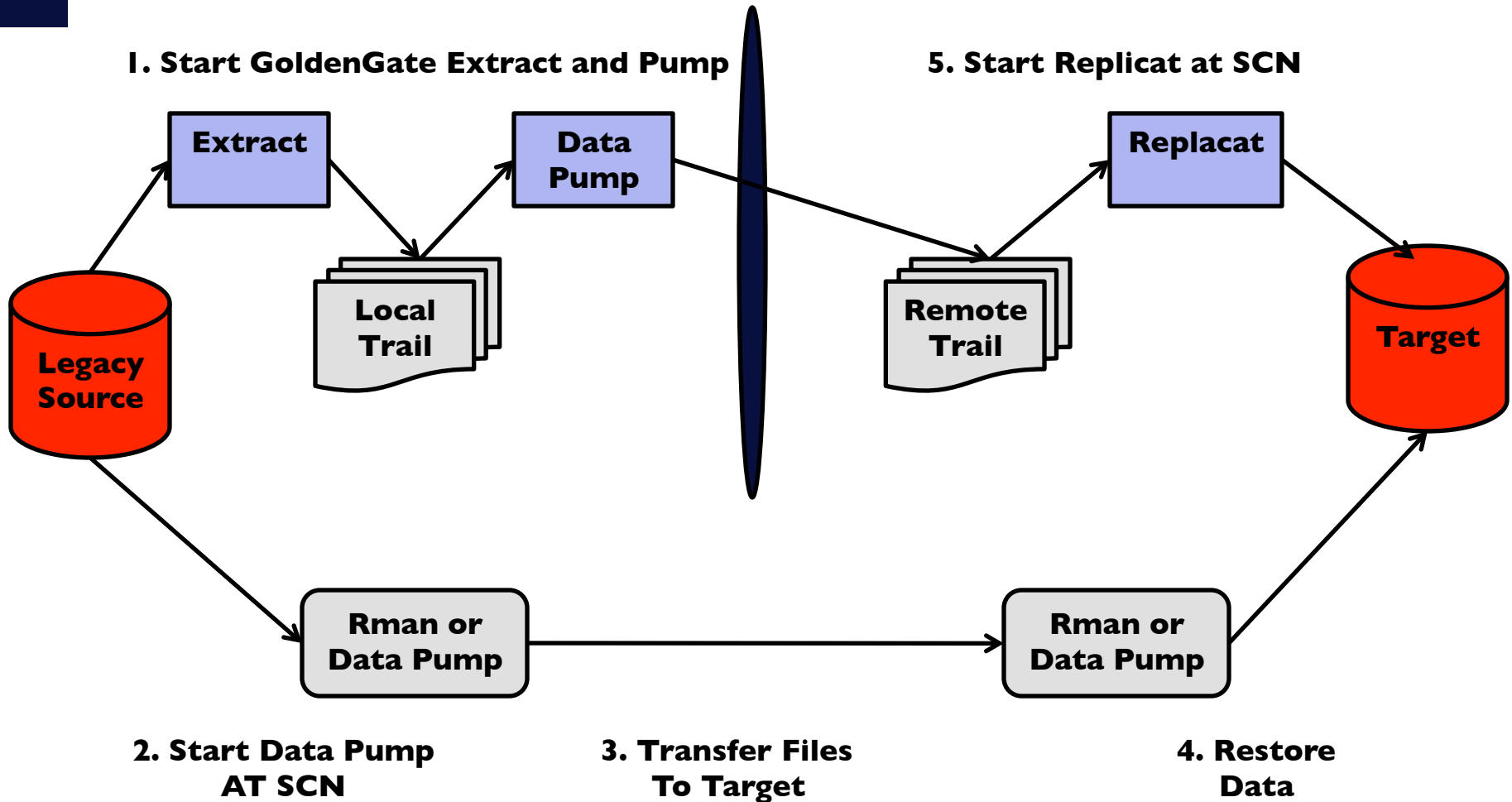


Oracle GoldenGate for Real-Time Data Warehousing



- Sub-second data latency
- Minimal overhead and no batch windows
- High-performance, in-database transformations
- Read-consistent changed data with referential integrity
- Complete data recoverability via Trail files

Leveraging Oracle GoldenGate for Zero-Downtime Migrations and Instantiations.

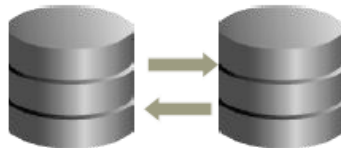


GoldenGate Traditional Configurations

Unidirectional
Query Offloading



Bi-Directional
Live Standby or
Active-Active for HA



Peer-to-Peer
Load Balancing,
Multi-Master



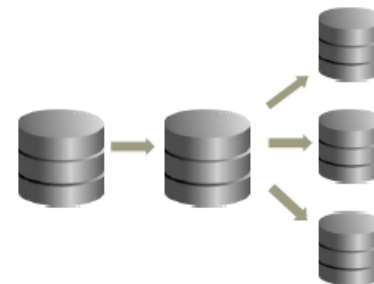
Broadcast
Data Distribution



Integration/Consolidation
Data Warehouse



Cascading
Data Marts



GoldenGate Auditing Use Cases



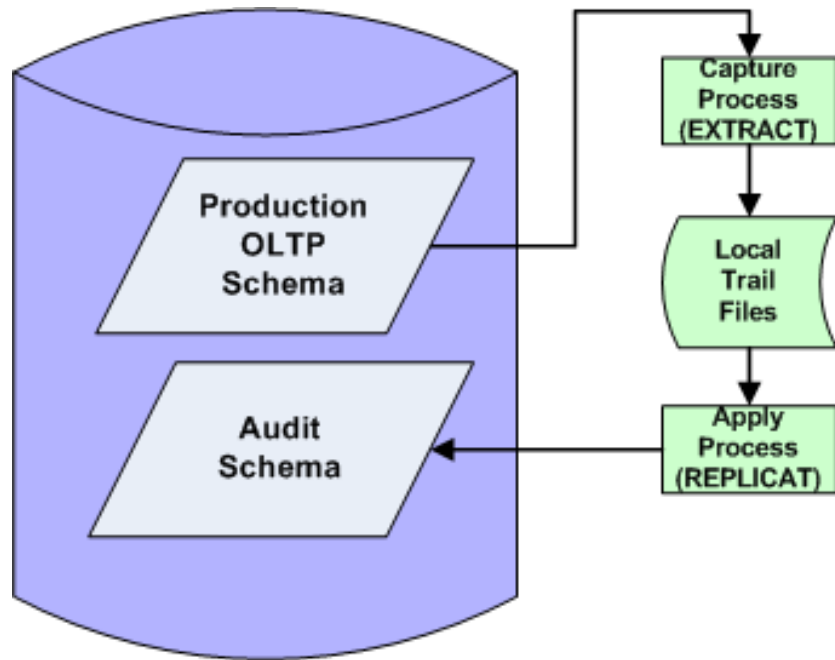
As increasing regulation and compliance demands have been placed on the financial services and healthcare industries, there has been an influx of demand for GoldenGate's unique capabilities to provide fine grain auditing functionality across homogeneous database platforms, hardware, and operating systems.



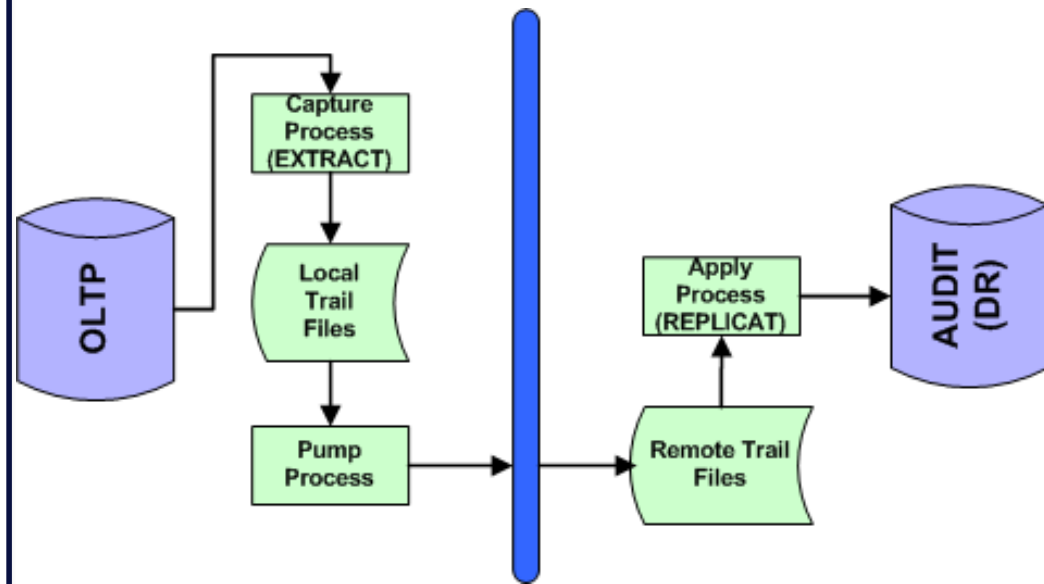
Configuring An Audit Schema

Location- Can be on the same host or located remotely.

Same Host



Remote Host

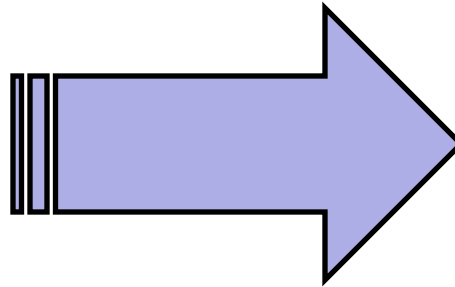


Configuring An Audit Schema

Schema Structure- Tables on The Target are Identical to the Source with Additional Audit Columns

Source

Name
Street Address
City
State
ZIP
Phone 1
Phone 2



Target

Name
Street Address
City
State
ZIP
Phone 1
Phone 2
Audit1
Audit2
Audit3

Configuring An Audit Schema

Configure GoldenGate Capture to Retrieve ALL Before and After Images. Configure the Apply process to Insert all Records

Capture Parameter File:

--Get Before and After Images
GETUPDATEBEFORES

Apply Parameter File:

--Insert all Inserts, Updates, and Deletes
INSERTALLRECORDS



Configuring An Audit Schema

Now in the Case of an Update, Two Records are Inserted, The Before Image and The After Image.

Source Update:

```
SQL> update CUSTOMERS set  
Zip = 30004 where  
Customer_ID = 2322659;
```

Audit Inserts:

	Customer_ID	ZIP
	2322659	30329
	Customer_ID	ZIP
	2322659	30004

Configuring An Audit Schema

Now, Based on the Auditing and Business Rules, We can Capture Additional Auditing Information on The Transactions Through Source Environment Information in conjunction with using GoldenGate Tokens to Transport the Audit Data in the Trail Files. We Can Capture:

User Information	Table Name
Transaction Commit Time	Domain Name (Windows)
Host Information	Process ID
Database Environment Information	Transaction Indicator (B,M,E,W)
Type of Transaction (I, U, D)	Sequence and RBA Location
Before and After Indicator	SCN Number and Transaction ID

Configuring An Audit Schema

Once the Decision has been Made on the Required Audit Fields, The Capture (Extract) and the Apply (Replicat) Process Parameter File Can be Modified to Insert This Additional Data with Every Audit Record. The Original Database Remains Unchanged. Here is an Example Apply Parameter File....

Configuring An Audit Schema

```
MAP MIDDLEWARE.*, TARGET CLARIS_AUDIT.*,
SQLEXEC (query " select claris_audit.seq_audit_id.nextval seqno from dual ", ID lookup2, noparams),
COLMAP (USEDEFAULTS,
        OPERATION$           = @STREXT (@CASE (@GETENU ("GGHEADER","OPTYPE"),
        "INSERT", "I",
        "DELETE", "D",
        "TRUNCATE", "D",
        "UPDATE", @STRCAT ("U",
        @CASE (@GETENU ("GGHEADER", "BEFOREAFTERINDICATOR"),
        "BEFORE", "0",
        "AFTER", "N", "X")),
        "PK UPDATE", @STRCAT ("U",
        @CASE (@GETENU ("GGHEADER", "BEFOREAFTERINDICATOR"),
        "BEFORE", "0",
        "AFTER", "N", "X")),
        "ENSCRIBE COMPUPDATE", @STRCAT ("U",
        @CASE (@GETENU ("GGHEADER", "BEFOREAFTERINDICATOR"),
        "BEFORE", "0",
        "AFTER", "N", "X")),
        "SQL COMPUPDATE", @STRCAT ("U",
        @CASE (@GETENU ("GGHEADER", "BEFOREAFTERINDICATOR"),
        "BEFORE", "0",
        "AFTER", "N", "X")),
        "XX"),1,2),
AUDIT_ID$           = lookup2.seqno,
CSCN$              = @GETENU ("TRANSACTION", "CSN"),
TIMESTAMP$        = @GETENU ("GGHEADER", "COMMITTIMESTAMP"),
RSID$              = @NUMSTR (@STRCAT (@GETENU ("RECORD", "FILESEQNO"), @GETENU ("RECORD", "FILERBA"))),
USERNAME$         = @TOKEN ("TKN-USERNAME"),
COMMIT_TIMESTAMP$ = @DATENOW (),
ROW_ID$           = @STRNUM (@GETENU ("LAG", "SEC"), LEFT)
);
```

Leveraging and Managing Your New Auditing Environment

Now that you have your new Auditing Environment Configured you can:

- Provide a Dedicated Reporting Environment for Auditors without a performance to your OLTP systems.
- Build a Portal on Your new Audit Environment to Provide Real-Time Actionable information.
- Easily Change Data that is Collected based on Business and Audit Rules.
- Leverage your Existing IT Assets.

Q & A

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