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# Safe Harbor Statement

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# Blockchain Technology

## Oracle FSGBU Approach and Solution

Financial Services Global Business Unit
August, 2017

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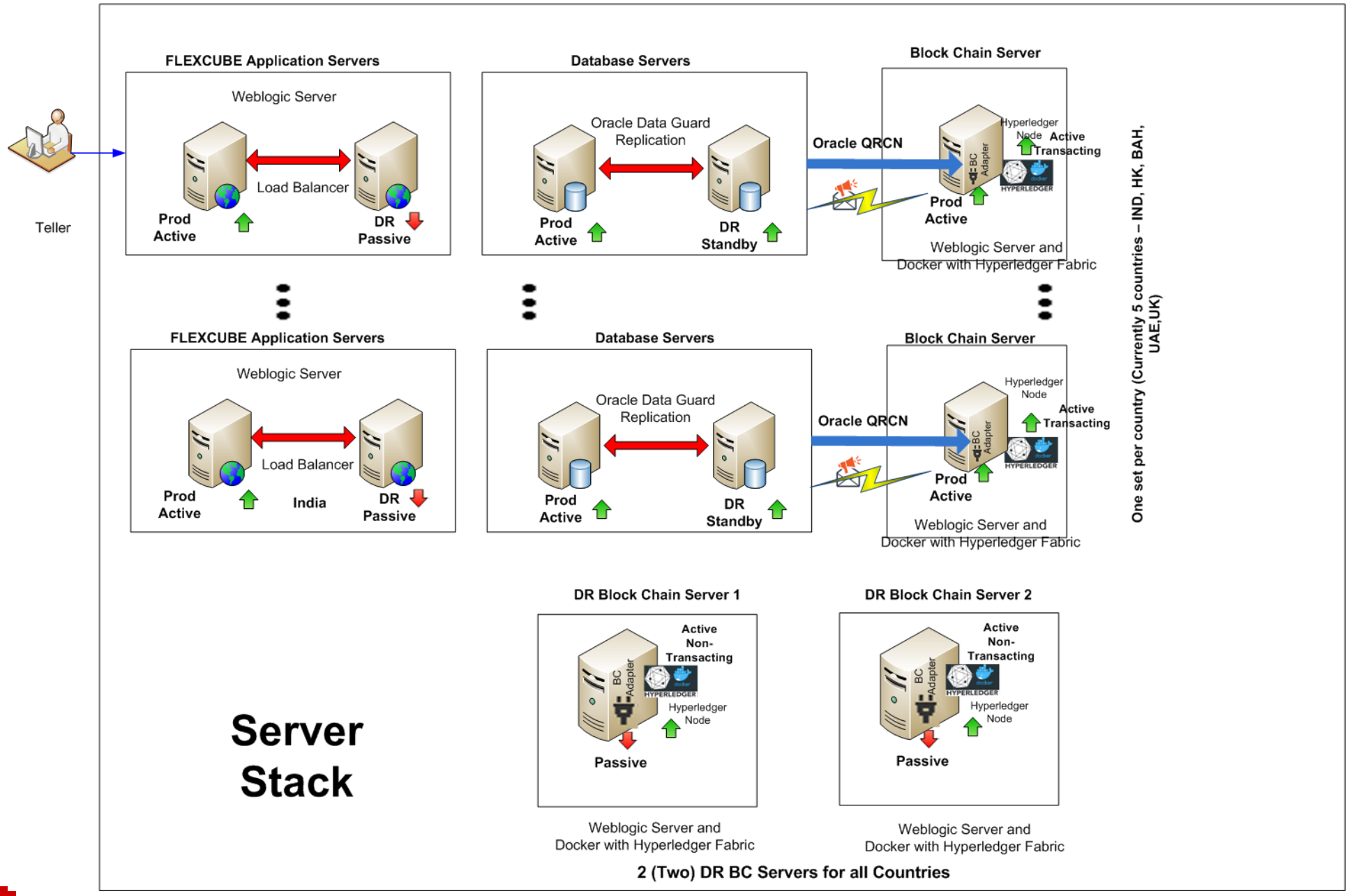
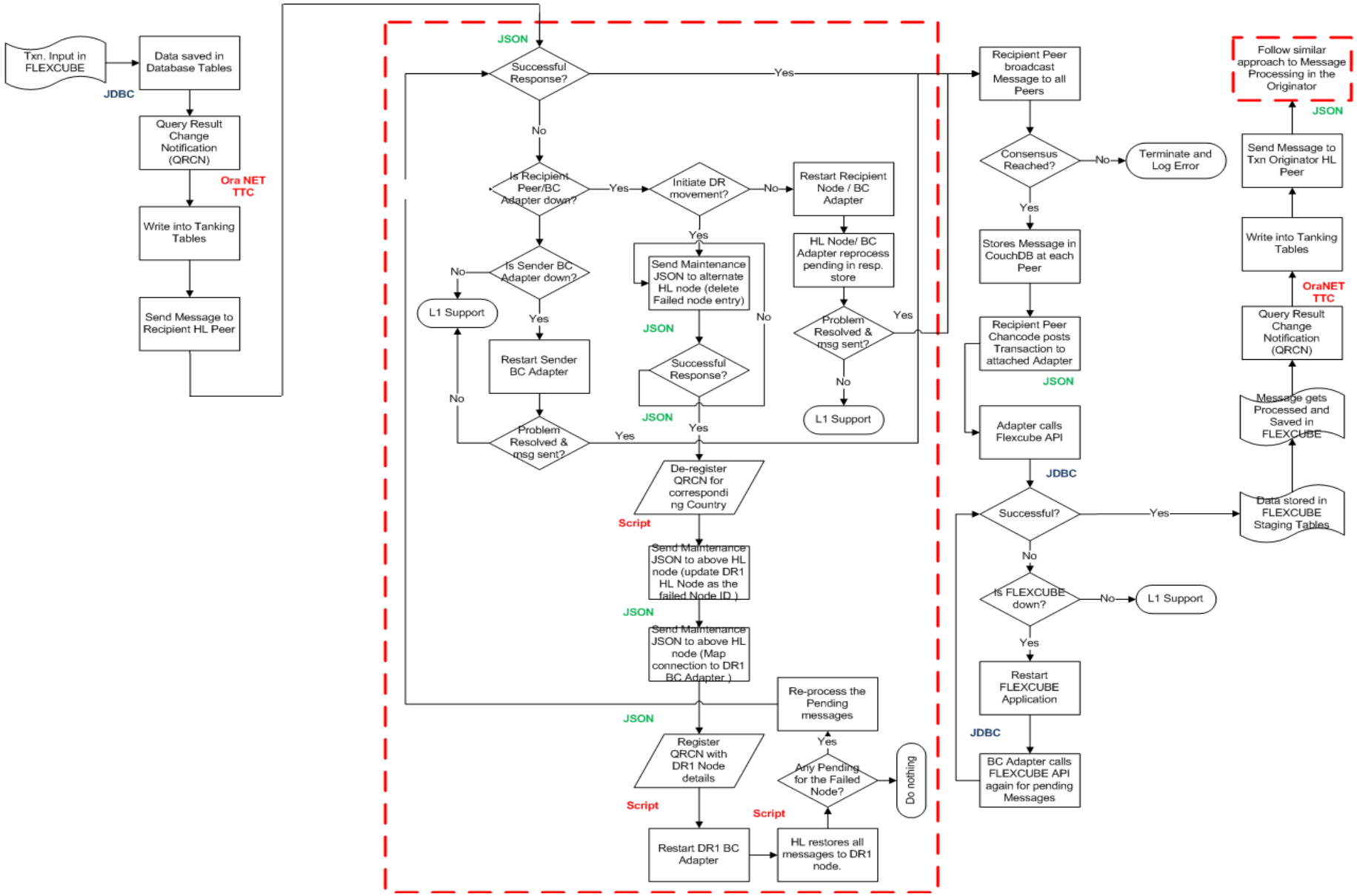
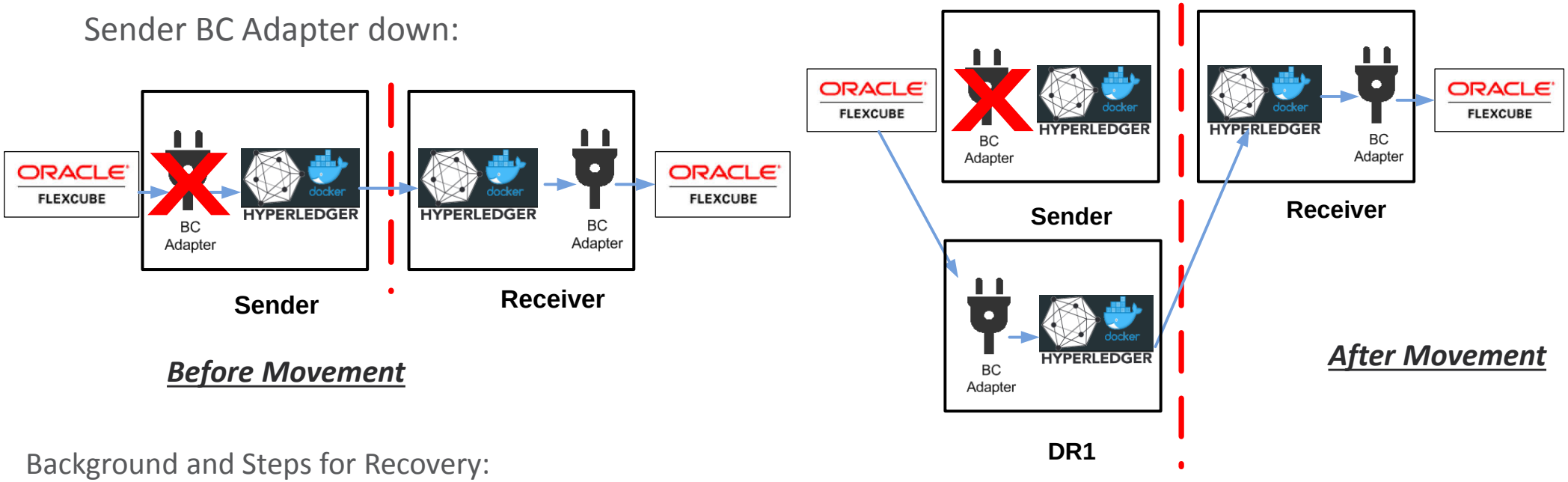


# FLEXCUBE Blockchain Transaction Flow and Disaster Recovery



# Disaster Recovery Procedure (Details) (1/9)

Sender BC Adapter down:

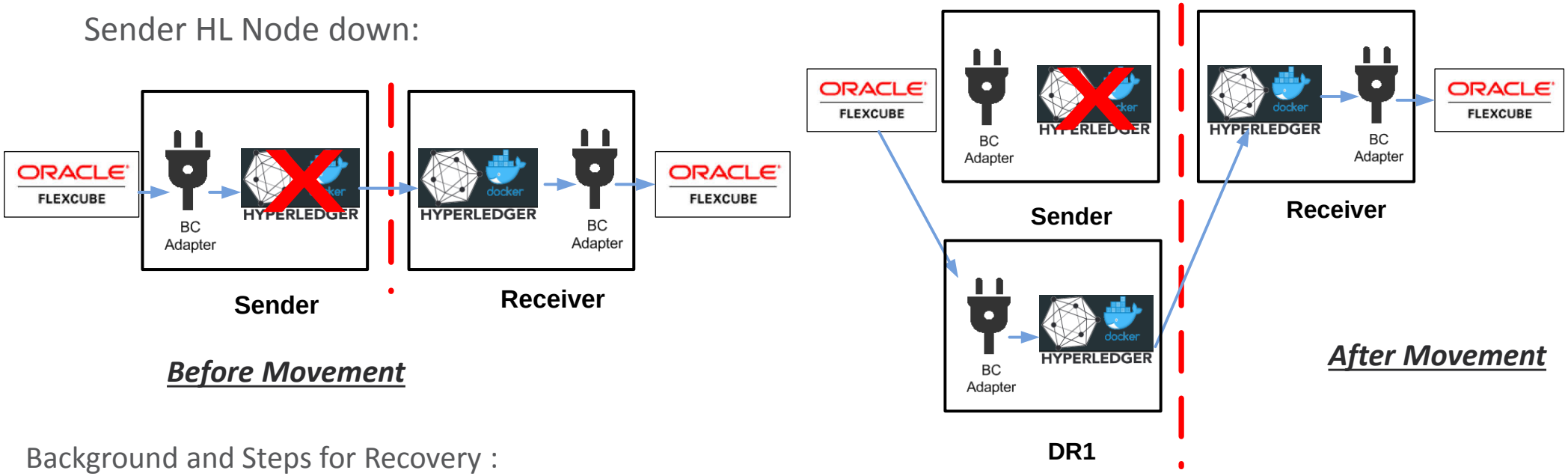



Background and Steps for Recovery:

- Flexcube goes on accepting Transactions and store in Persistence Tables.
- Run Script to send Maintenance JSON to any Active HL node to delete HL node of Failed BC Adapter.
- Run Script to De-register QRCN in FC for Sender Country
- Run Script to send Maintenance JSON to Active HL node to add DR1 HL Node entry.
- Run Script to send Maintenance JSON to Active HL node to Map new entry to DR1 BC Adapter and Port.
- Run Script to Register QRCN in FC with DR1 Node details
- Run Script to Restart DR1 BC Adapter
- HL restores all messages to DR1 node.
- BC Adapter Re-process the Pending messages in the Flexcube Persistence Table.

# Disaster Recovery Procedure (Details) (2/9)

Sender HL Node down:

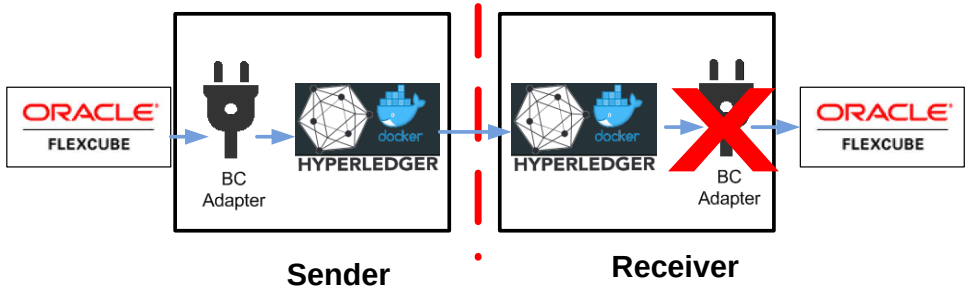



Background and Steps for Recovery :

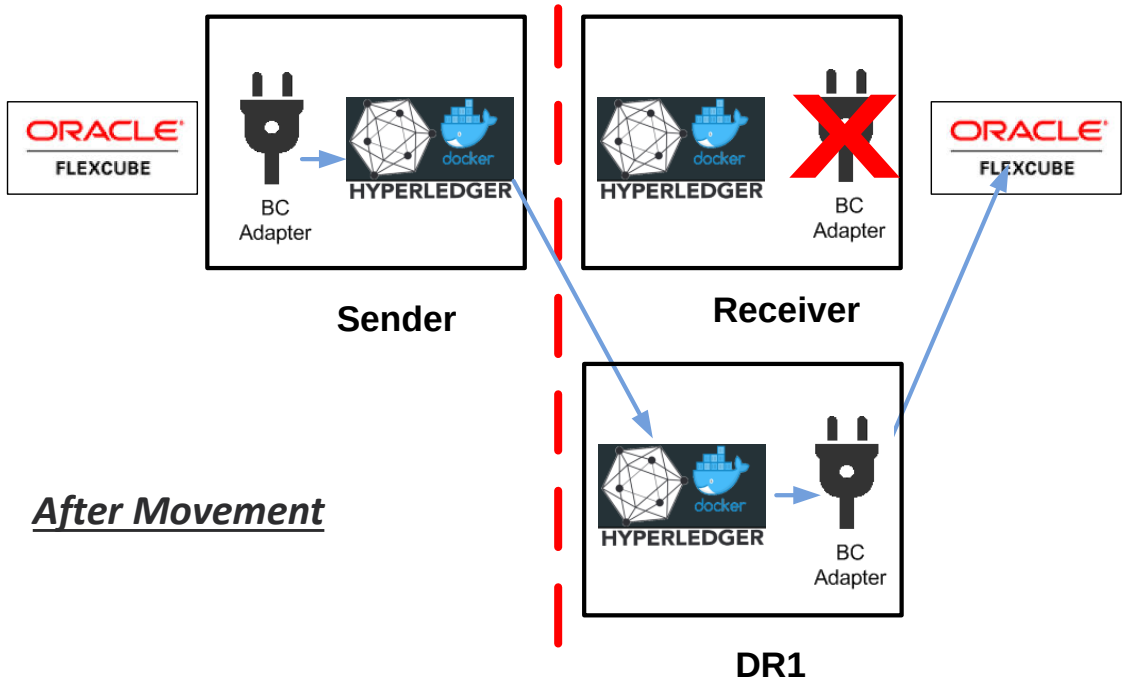
- Flexcube goes on accepting Transactions and store in Persistence Tables.
- BC Adapter even though up cannot process message as HL Node is down so message remains pending.
- Run Script to send Maintenance JSON to any Active HL node to delete Failed node entry
- Run Script to De-register QRCN in FC for Sender Country
- Run Script to send Maintenance JSON to Active HL node to add DR1 HL Node entry.
- Run Script to send Maintenance JSON to Active HL node to Map new entry to DR1 BC Adapter and Port.
- Run Script to Register QRCN in FC with DR1 Node details
- Run Script to Restart DR1 BC Adapter
- HL restores all messages to DR1 node.
- BC Adapter Re-process the Pending messages in the Flexcube Persistence Table.

# Disaster Recovery Procedure (Details) (3/9)

Receiver BC Adapter down:




***Before Movement***



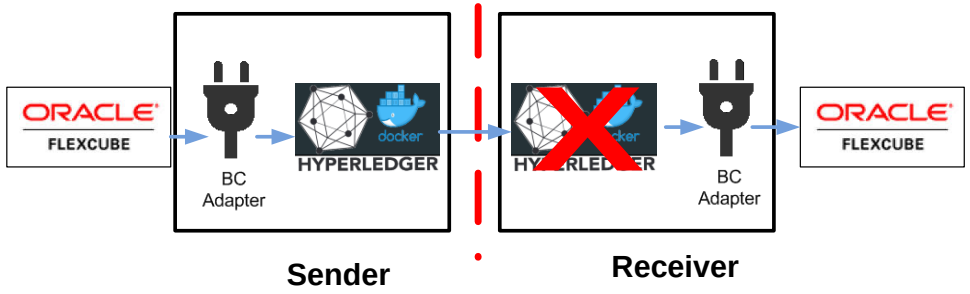

***After Movement***

Background and Steps for Recovery :

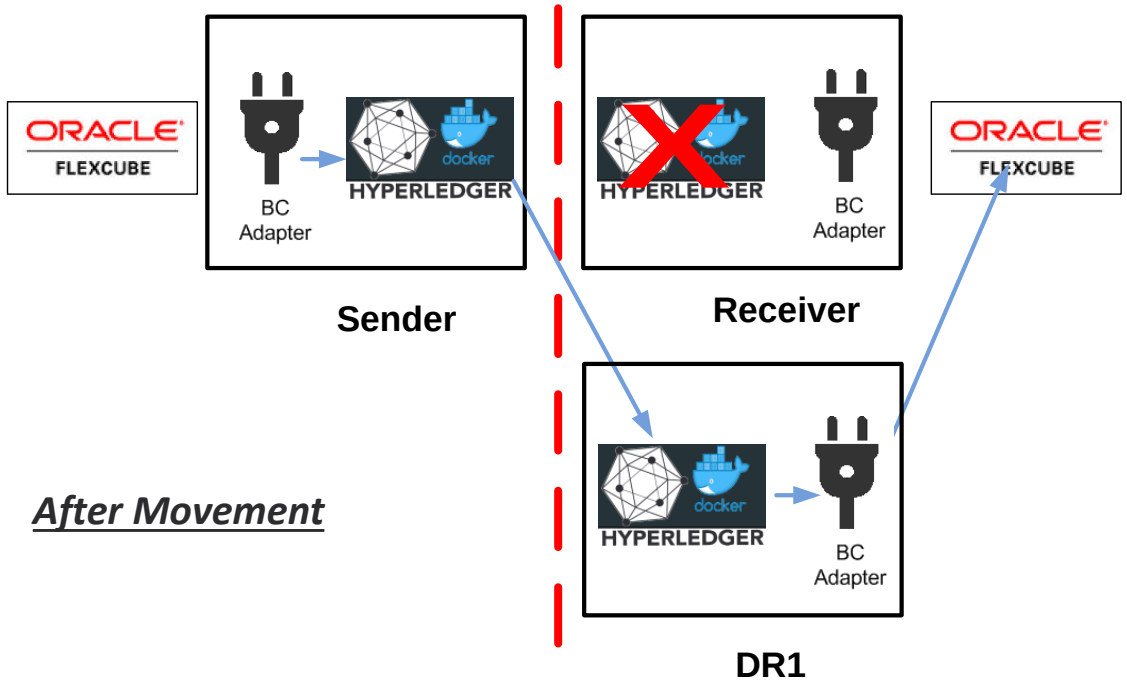
- Sender Flexcube goes on accepting Transactions and sends to Receiver Hyperledger through Sender HL node.
- Receiver HL Node tanks the Transaction as BC Adapter is down.
- Run Script to send Maintenance JSON to any Active HL node to delete HL node of Failed BC Adapter.
- Run Script to De-register QRCN in FC for Receiver Country
- Run Script to send Maintenance JSON to Active HL node to add DR1 HL Node entry.
- Run Script to send Maintenance JSON to Active HL node to Map new entry to DR1 BC Adapter and Port.
- Run Script to Register QRCN in FC with DR1 Node details
- Run Script to Restart DR1 BC Adapter
- HL restores all messages to DR1 node.
- HL sends any tanked Transaction for receiver to DR1 BC Adapter.

# Disaster Recovery Procedure (Details) (4/9)

Receiver HL Node down :




***Before Movement***



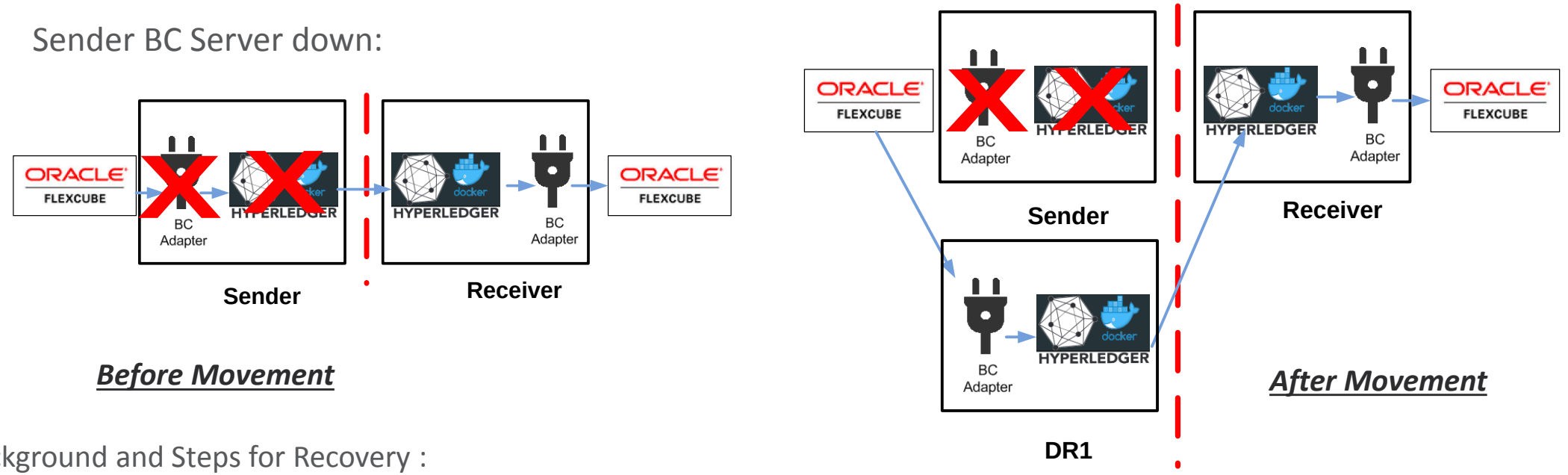

***After Movement***

Background and Steps for Recovery :

- Sender Flexcube goes on accepting Transactions and sends to Sender Hyperledger.
- Messages are tanked in Hyperledger as receiver HL node is down.
- Run Script to send Maintenance JSON to any Active HL node to delete Failed receiver HL node entry
- Run Script to De-register QRCN in FC for Receiver Country
- Run Script to send Maintenance JSON to Active HL node to add DR1 HL Node entry.
- Run Script to send Maintenance JSON to Active HL node to Map new entry to DR1 BC Adapter and Port.
- Run Script to Register receiver QRCN in FC with DR1 Node details
- Run Script to Restart DR1 BC Adapter
- HL restores all messages to DR1 node.
- HL sends any tanked Transaction for receiver to DR1 BC Adapter.

# Disaster Recovery Procedure (Details) (5/9)

Sender BC Server down:

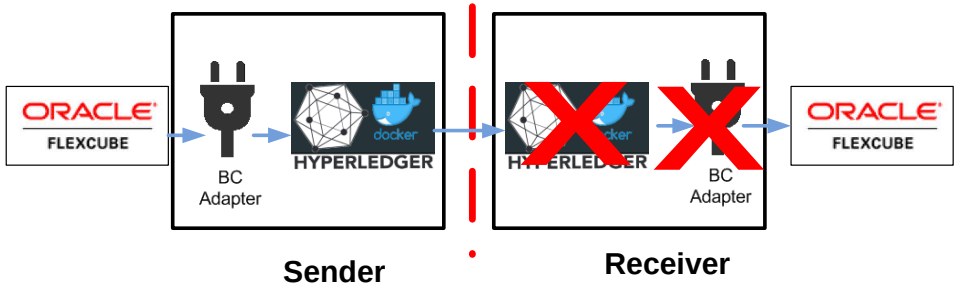



Background and Steps for Recovery :

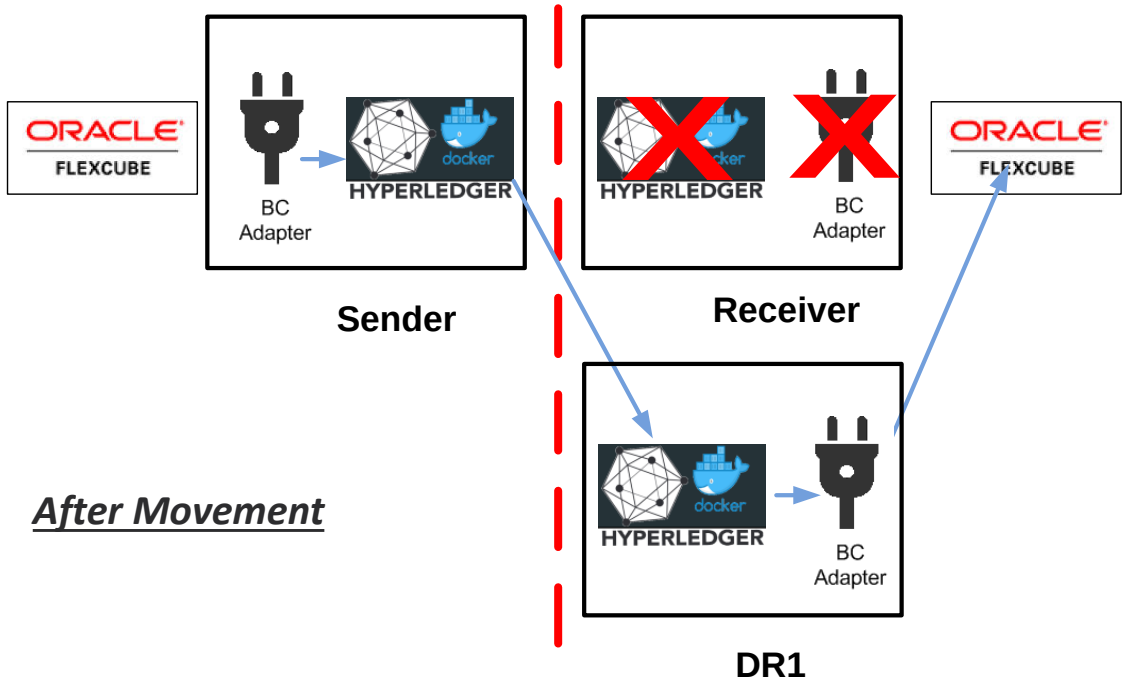
- Flexcube goes on accepting Transactions and store in Persistence Tables.
- Run Script to send Maintenance JSON to any Active HL node to delete Failed node entry
- Run Script to De-register QRCN in FC for Sender Country
- Run Script to send Maintenance JSON to Active HL node to add DR1 HL Node entry.
- Run Script to send Maintenance JSON to Active HL node to Map new entry to DR1 BC Adapter and Port.
- Run Script to Register QRCN in FC with DR1 Node details
- Run Script to Restart DR1 BC Adapter
- HL restores all messages to DR1 node.
- BC Adapter Re-process the Pending messages in the Flexcube Persistence Table.

# Disaster Recovery Procedure (Details) (6/9)

Receiver BC Server down:




***Before Movement***



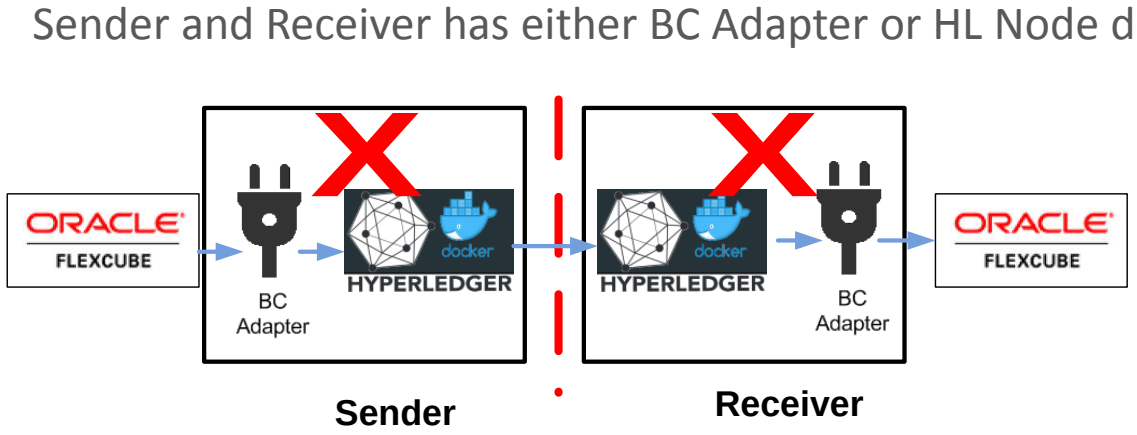

***After Movement***

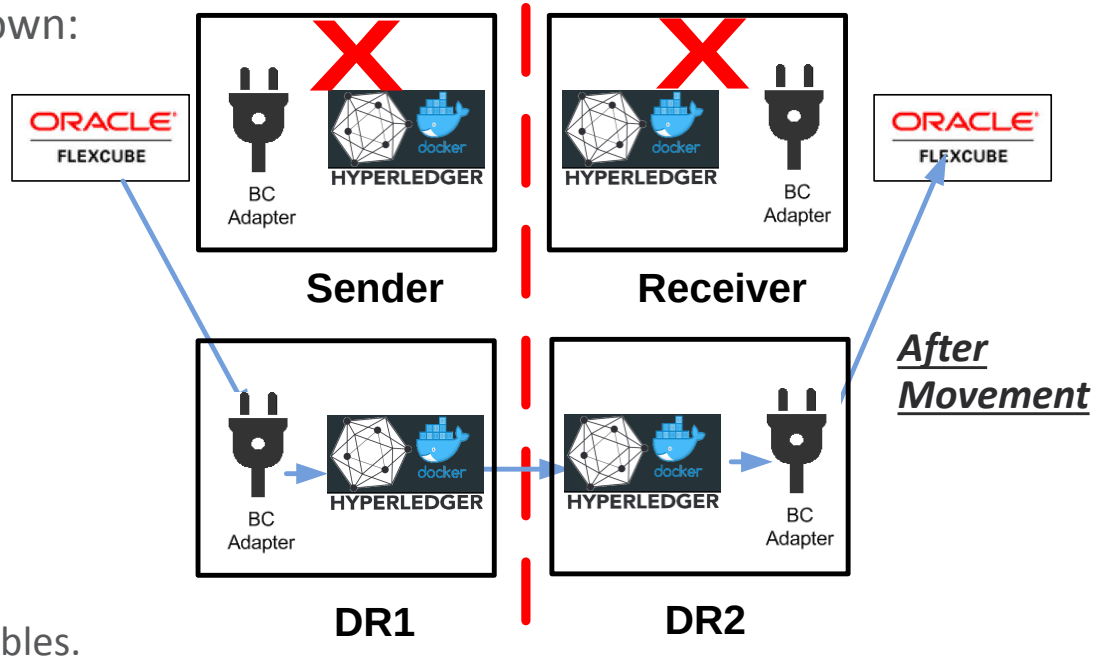
Background and Steps for Recovery :

- Sender Flexcube goes on accepting Transactions and sends to Sender Hyperledger.
- Messages are tanked in Hyperledger as receiver HL node is down.
- Run Script to send Maintenance JSON to any Active HL node to delete Failed receiver HL node entry
- Run Script to De-register QRCN in FC for Receiver Country
- Run Script to send Maintenance JSON to Active HL node to add DR1 HL Node entry.
- Run Script to send Maintenance JSON to Active HL node to Map new entry to DR1 BC Adapter and Port.
- Run Script to Register receiver QRCN in FC with DR1 Node details
- Run Script to Restart DR1 BC Adapter
- HL restores all messages to DR1 node.
- HL sends any tanked Transaction for receiver to DR1 BC Adapter.

# Disaster Recovery Procedure (Details) (7/9)

Sender and Receiver has either BC Adapter or HL Node down:



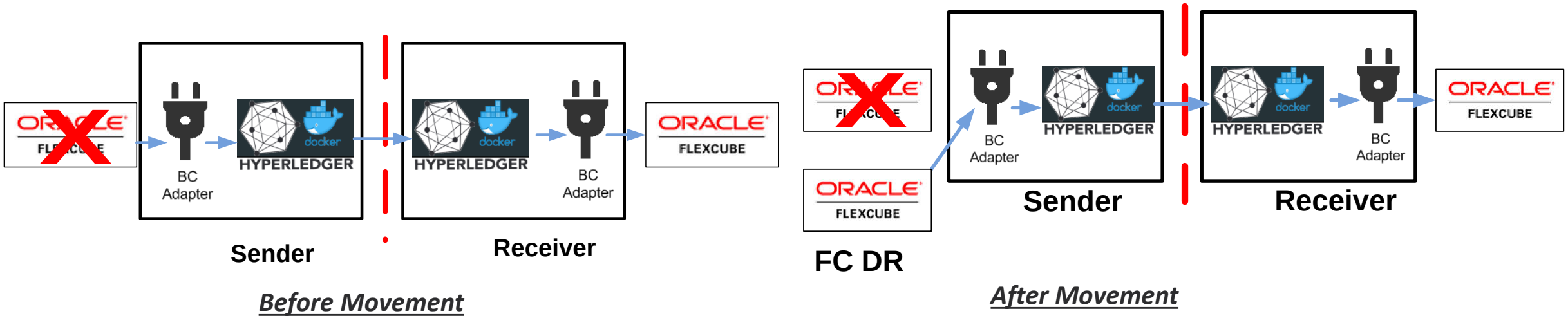




Background and Steps for Recovery :

- Flexcube goes on accepting Transactions and store in Persistence Tables.
- Run Script to send Maintenance JSON to any Active HL node to delete Both Failed node entries
- Run Script to De-register QRCN in FC for Receiver and Sender Country
- Run Script to send Maintenance JSON to Active HL node to add DR1 and DR2 HL Node entry.
- Run Script to send Maintenance JSON to Active HL node to Map DR1 entry to DR1 BC Adapter and DR12 entry to DR2 BC Adapter.
- Run Script to Register sender QRCN with DR1 and receiver QRCN with DR2 Node details
- Run Script to Restart DR1 BC Adapter
- Run Script to Restart DR2 BC Adapter
- HL restores all messages to DR1 and DR2 node.
- BC Adapter in DR1 and DR2 Re-process the Pending messages in the Flexcube Persistence Tables.

# Disaster Recovery Procedure (Details) (8/9)

Sender CBS (Flexcube) down:

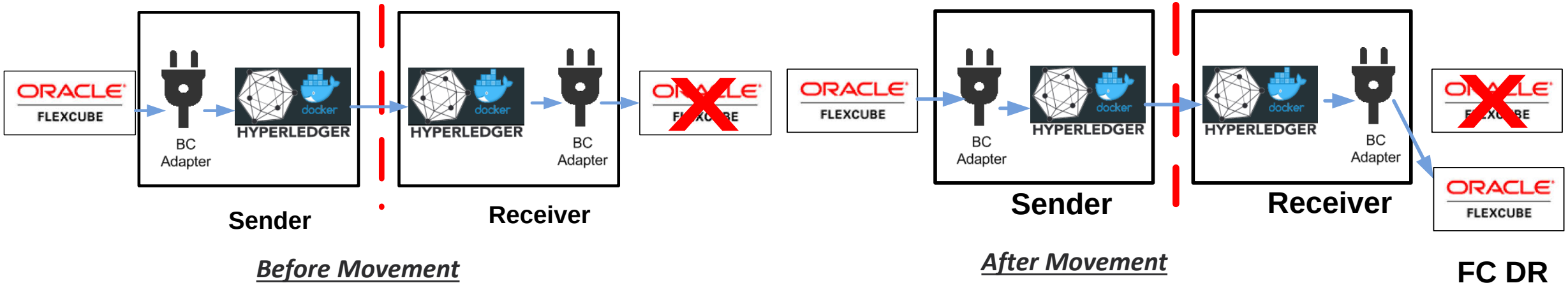



Background and Steps for Recovery :

- Sender Flexcube stops accepting transactions thus no impact to HL node or BC Adapter.
- Run Script to De-register QRCN in FC for Sender Country
- In case physical IP is updated in JDBC connection then the IP address for FC DR DB server to be updated in *jndi*.
- Run Script to Register sender QRCN with Sender BC Adapter details
- Run Script to Restart Sender BC Adapter
- DR Flexcube starts sending messages to Sender BC adapter.

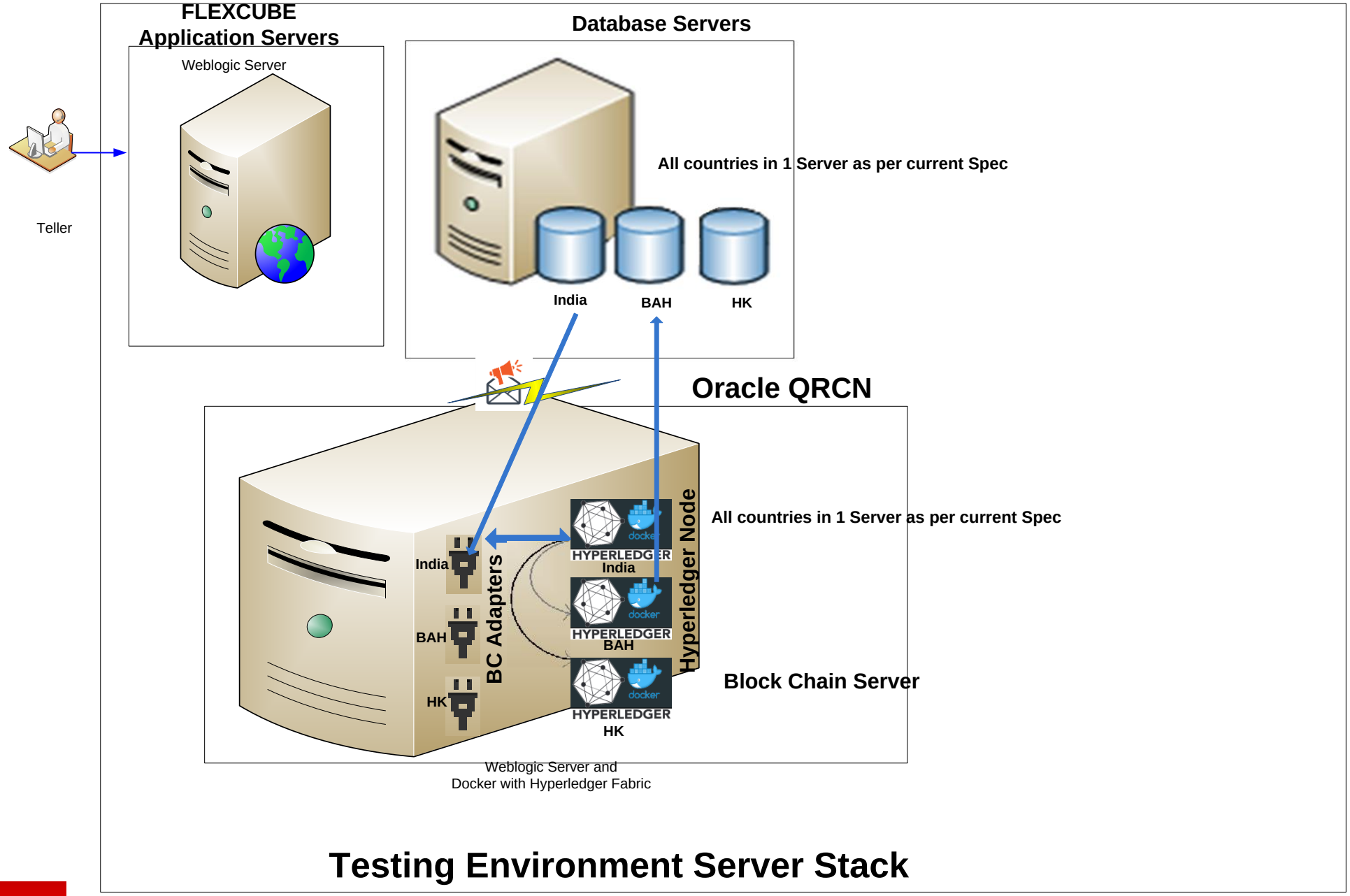
# Disaster Recovery Procedure (Details) (9/9)

Receiver CBS (Flexcube) down:




Background and Steps for Recovery :

- Sender Flexcube goes on accepting Transactions and sends to Sender Hyperledger.
- Receiver Adapter picks up but cannot process as the receiver FC is down so the messages stays in HL as tanked.
- Run Script to De-register QRCN in FC for Receiver Country
- In case physical IP is updated in JDBC connection then the IP address for FC DR DB server to be updated in *jndi*.
- Run Script to Register receiver QRCN with Receiver BC Adapter details
- Run Script to Restart Receiver BC Adapter
- HL starts sending messages to Receiver BC Adapter.
- Receiver BC adapter send messages to FC DR to process and save the same.




# Testing Environment Server Stack

# Integrated Cloud

## Applications & Platform Services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