# FCUBS Switch Interface Gateway High Availability Configuration

Oracle FLEXCUBE Universal Banking

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ORACLE

FINANCIAL SERVICES

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# 1. Purpose

FLEXCUBE Switch Interface Gateway /ATM gateway High Availability (HA) is becoming a must-have requirement for Banks that cannot afford system down time. Since Banks must always be prepared to serve their customers, either a planned or an unplanned loss of service makes it costly when the system is not available.

FLEXCUBE Switch Interface Gateway is subjected to a series of tests to ascertain its ability to be highly available and resilient to failure of all critical components of the deployment. The tests indicated that the system is highly available and a blue print of its deployment for HA is evolved as a result of these tests.

## 1.1 Introduction

Availability is the degree to which an application or service is available when, and with the functionality, users expect. Availability is measured by the perception of an application's end user. End users experience frustration when their data is unavailable, and they do not understand or care to differentiate between the complex components of an overall solution.

- Reliability: Reliable hardware is one component of an HA solution. Reliable software, including the database and application, is as critical to implementing a highly available solution.

The FLEXCUBE Switch Interface Gateway (referred as POJO SWIG in this doc) comprises of the database server and integration server(where SWIG is deployed). A brief overview of these components is discussed first. In order to provide a truly fault tolerant system, each of these components must be capable of handling failures to render a highly available application system. The magnitude of failures can range from a loss of a single component on one hand to a total loss of the data center.

Key aspects that go into developing, testing and maintaining a business continuity plan are discussed.

## 1.2 Softwares and Versions

1. Oracle Database 12C
2. JDK 11
3. Apache HAProxy 1.6.X

## 1.3 Scope

The test scope covers

1. Key delivery channel like ATM and POS

All the online simulations took place with the help of ATM native simulator was used.

## 1.4 Test Scope

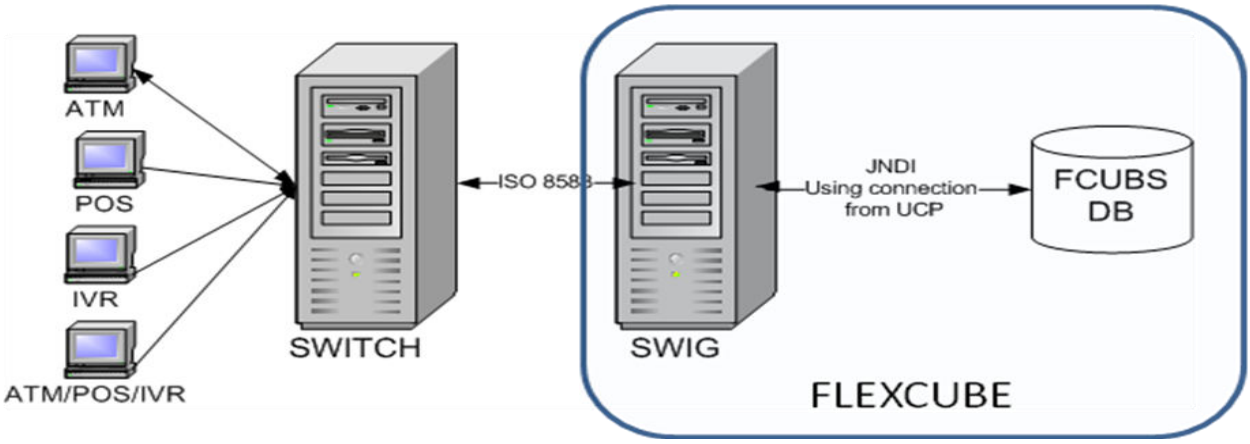
The primary scope of test cases is to validate FLEXCUBE SWIG availability during its online processing. Test cases

1. ATM high availability due to Integration server failure

2. ATM high availability due to Database failure

## 1.5 Architectural Components

This section provides a brief overview of the crucial application components that must have HA built into their deployment.




### 1.5.1 HOST Database Server

The HOST database server houses the complete business logic and the data of the application. The business logic comprises of PL/SQL stored procedures and functions. These are standard Oracle PL/SQL components. The data is organized into application related tables and Indexes.

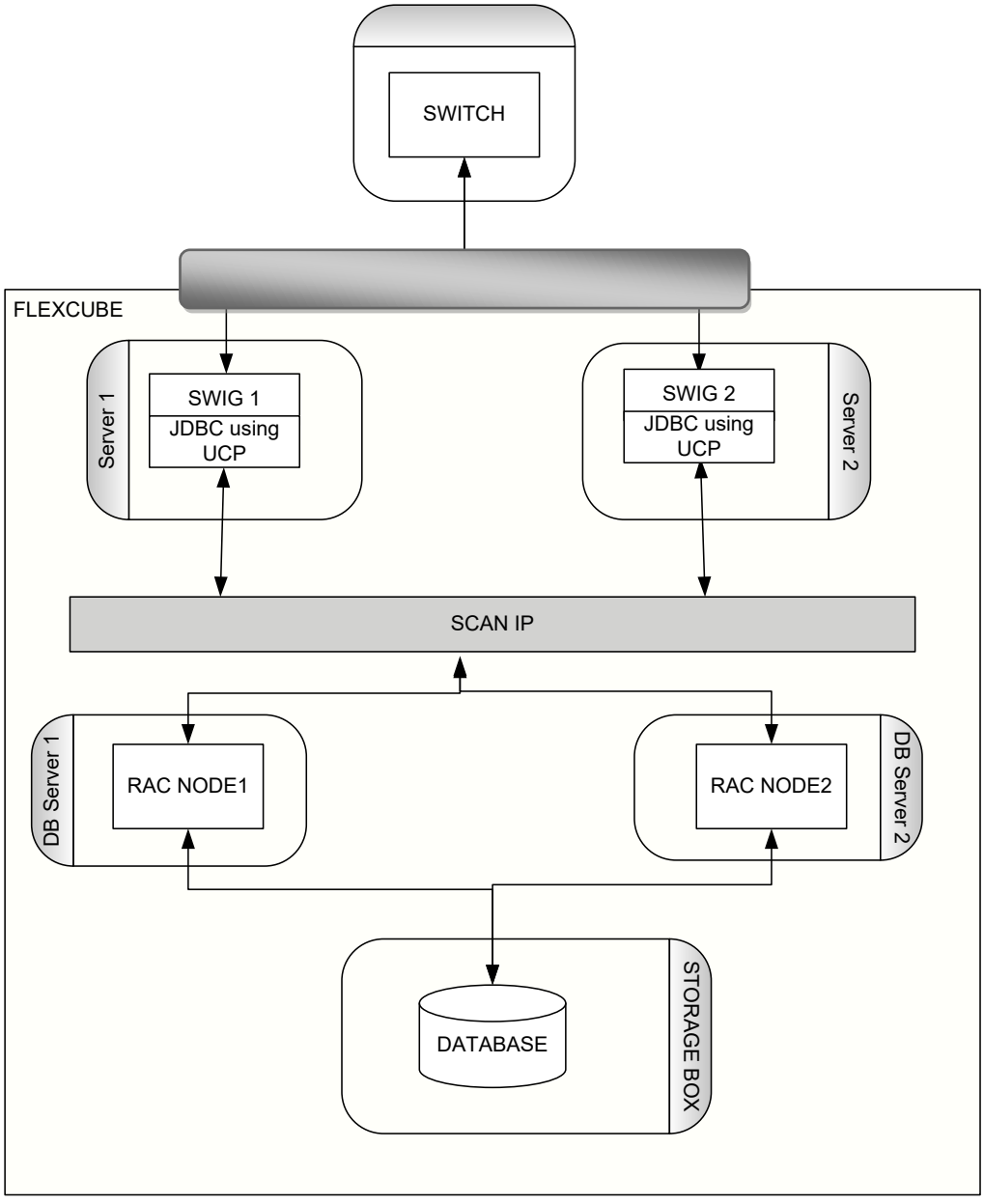
The database server can be deployed as either a standalone system or as a Cluster database deploying Oracle RAC (Real Application Cluster). Oracle features such as standby databases can also be leveraged upon for database deployment.

### 1.5.2 Integration Server

The Integration server is used to host the FLEXCUBE SWIG application. It is deployed as a plain Java component serves as the interface layer between ATM/POS Switch and FLEXCUBE.

# 2. Deployment Architecture

## 2.1 SWIG




## 2.2 Setup & Simulations

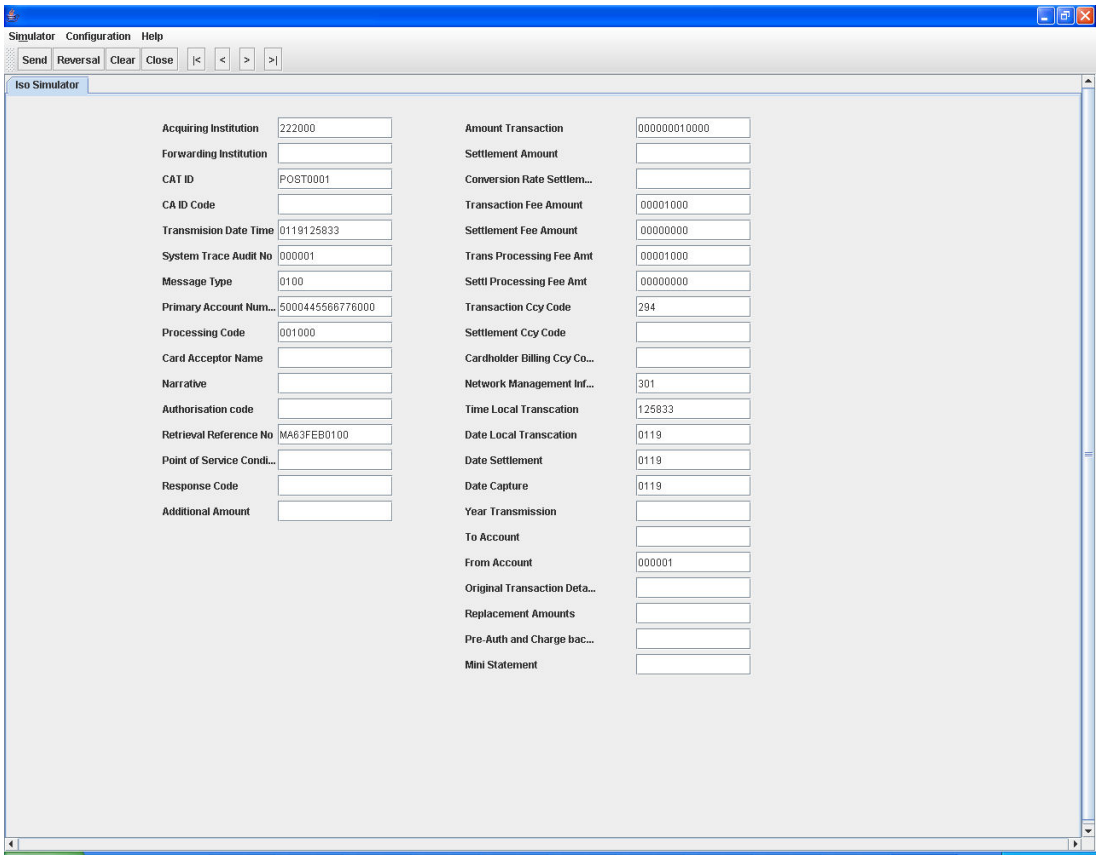
The ATM Switch gateway consists primarily of the ATM service (POJO)..

An in-house developed tool was used for ATM transaction simulation as it has to send request in ISO standard format. This tool played the role of ATM switch and continuously posted requests to the core banking systems switch gateway.

The ATM switch gateway was configured in Active-Active mode as all the switches are not aware / capable of doing load balancing configurations. To bring this Active-Active mode, it is required to have External NLB (Network Load Balancer) which could provide virtual IP as application client access point. For the HA test case, Apache HAProxy Load Balancer has been chosen as solution.

HAProxy is used as a balancer for SWIG service. To make use of this feature, Multiple SWIG services are created and the HAProxy was monitoring the switch gateway listener PORT availability. In the event of PORT unavailability at primary node,HAProxy would start sending transactions to SWIG service on secondary node. SWIG Simulator points to HAProxy installed IP and HAProxy takes care of fault tolerant mechanism.

The following screen shot refers the java based ATM transaction simulator and this launched from Oracle JDeveloper.




## 2.3 Test Cases & Results

The detailed test cases & Results are tabulated as below:

| Test | Failover Component | Input Method | Failure Description | Expected Behaviors | Result | Remark |
|---|---|---|---|---|---|---|
| 1 | DB | Simulator | 1. Simulator would inject ATM Txns<br>2. Either of DB Instance would be stopped abruptly | The transactions get through using other member of RAC. | Request handled successfully by alternate node of RAC | 100 transactions posted.<br><br>No transactions failed [as sequential inserts] |
| 2 | POJO - Listener | Simulator | 1. Simulator would inject ATM Txns<br>2. Primary server ATM/POS service would be stopped abruptly | The HAProxy would failover the ATM/POS service to Secondary server and transactions proceed without failure | HAPRoxy started sending the transactions to the secondary server requests processed successfully. | 100 transactions posted.<br><br>No transactions failed [as sequential inserts] |

## 2.4 System Observations

### 2.4.1 DB Server Failover

The database connections (JDBC) were configured with Multi Datasource [Please refer FCUBS Middleware best Practices document] with Non-XA oracle client.

The database failure had been simulated using abrupt shutdown of the one of the RAC node [i.e. SHUTDOWN ABORT from SYSDBA account].

The below screen shot represents abrupt shutdown of the DB.

```
codezero@[redacted]:~
[codezero@[redacted] ~]$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.4.0 Production on Thu Mar 31 18:17:20 2016

Copyright (c) 1982, 2013, Oracle.  All rights reserved.


Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.4.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SYS@ZERO11G> shut immediate;
Database closed.
Database dismounted.
ORACLE instance shut down.
SYS@ZERO11G>
```

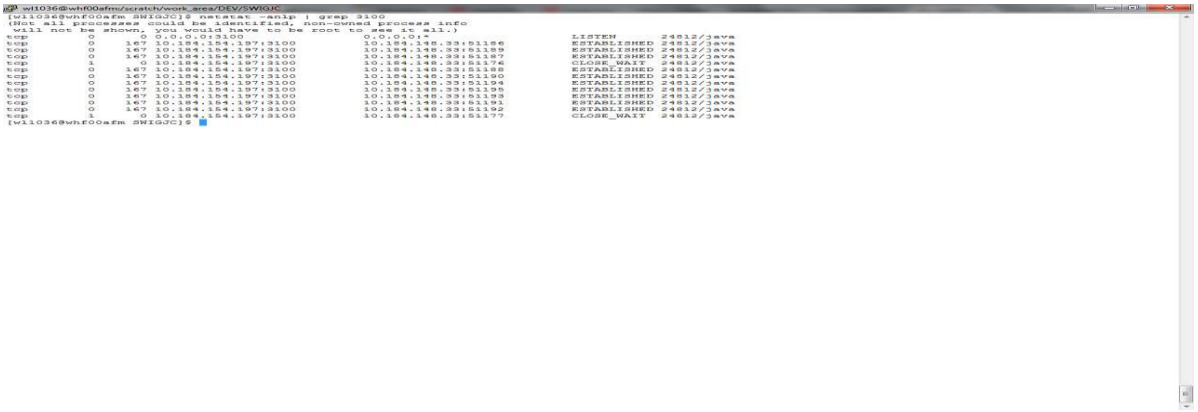
During database failover, connection pool does provide valid connections from available RAC node [Validate Connections option enabled as prescribed in best practices document].

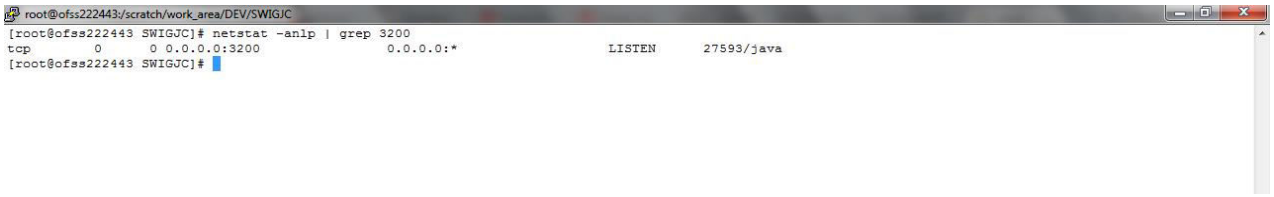
The transaction processed without fail and any intervention from either of the component.

### 2.4.2 POJO Listener

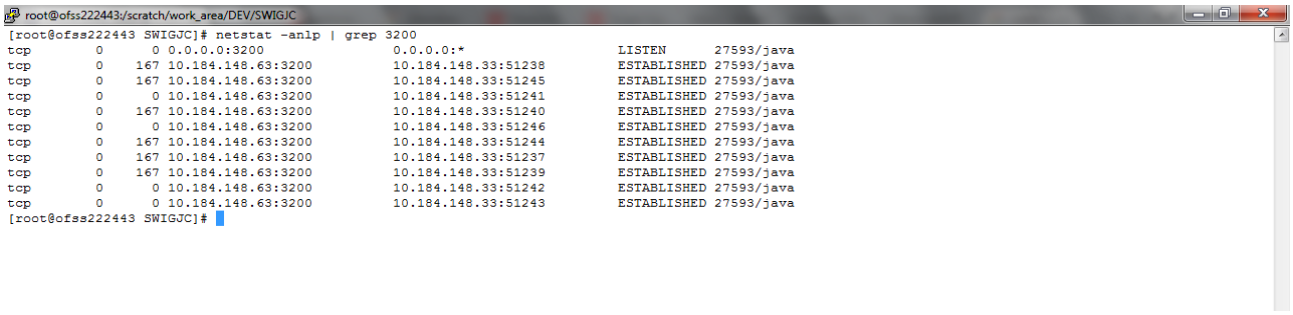
Both POJO sets are up and running

Following screen shot provides information over TCP/IP listener on node whf00afm port 3100 where all connections are established to process transactions.






, HAProxy sends  Transactions to listener on ofss222443  (secondary node) port 3200




Steps on using HAProxy are attached.

HAProxy.doc



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