Installer Zero Downtime Database Setup & Operational Guide
Oracle Banking Trade Finance
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FINANCIAL SERVICES

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1. Installer Zero Downtime Database Setup

1.1 Introduction

Patch set Installation with Zero downtime (ZDT) requires Installer to use Editions in a Database Schema.

Installer is enhanced to use Database Schema Editions and apply the Patch set DB compilation in patch set edition and then Base edition in a staggered manner to achieve Zero Downtime.

Installer support establishing JDBC connections through Application, Gateway, ATM etc. To be pointing to a specific edition.

The approach is discussed in detail under the following heads.

1.2 Pre-Requisite

Below Privilege must be provided to the Database Schema from SYS Database User.

1. ALTER USER <SCHEMA NAME> ENABLE EDITIONS [FORCE];

2. GRANT CREATE ANY EDITION TO <SCHEMA NAME>;

3. GRANT DROP ANY EDITION TO <SCHEMA NAME>;

4. GRANT ALTER SESSION TO <SCHEMA NAME>;

5. GRANT EXECUTE on DBMS_SESSION TO <SCHEMA NAME>;

Note: Refer to section 1.7 Operational Issues and Troubleshooting.

Pre-Installation Configuration:

- ZDT_PATCHING is a property in the file **env.properties**. Set this property to 'Y' if ZDT patching is required and 'N' if application should be taken offline when patching is done.

- BASE_EDITION is a property in the file **env.properties**. This property is used to indicate the Base Edition. For example 'ORA$BASE'.

- PATCHSET_EDITION is a property in the file **env.properties.** This property is used to specify the Edition that would be used as the alternate Edition during ZDT Patch-set Installation. For example, 'E1'.

- PATCHSET_INSTALLATION is an existing property in the file **env.properties**. It will have value 'Y' for Patch set installation process.

Sample Entries in **env.properties** as given below.

```
1    #Wed Aug 04 12:56:23 IST 2021
2    GW_PROPERTIES_PATH=C:/exec/FCU
3    PATCHSET_INSTALLATION=Y
4    ZDT_PATCHING=Y
5    BASE_EDITION=ORA$BASE
6    PATCHSET_EDITION=E1
```

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Refer "Property File Creation" User Manual section of User manual for detailed procedure to create Property file.

Application Domain - Prerequisite:

- o Two application domains – <Domain1>, <Domain2> required. These Domains will be integrated and controlled with Oracle Traffic Director to support Zero downtime Patching.

- o By default, <Domain2> will remain inactive (Standby mode) and all JDBC connections to Database (Schema) routed to <Domain1>.

- Any Bulk upload processing, Batch processing (including End of Day operations) to be planned either to complete before the start or after completion of the Patch Set Compilation / Deployment.

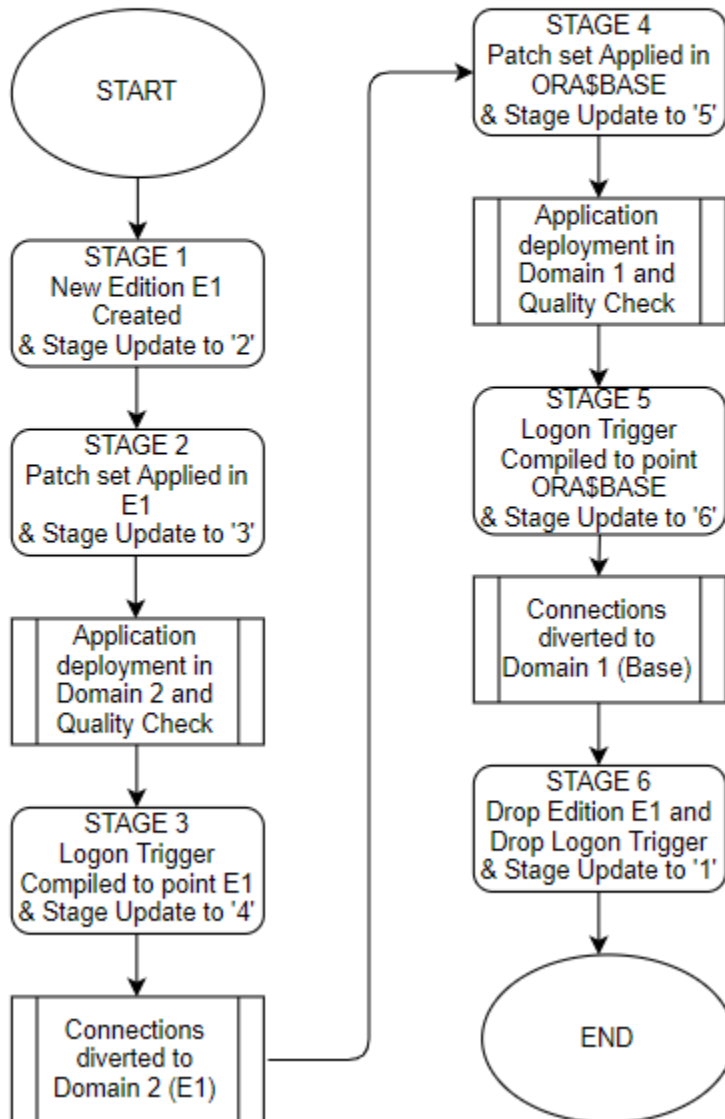## 1.3 Zero Downtime Database Setup

This section details about the Installer commands and Operational steps required to be done in the same order as specified to achieve Zero Downtime Patch Database Compilation and Application management.

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1.3.1   Patch set Database Compilation Process Flow

BASE_EDITION = ORA$BASE
PATCHSET_EDITION = E1

Installer Process

	Operational Steps	

Zero Downtime Patch set Deployment Process flow

```
                                                    ┌──────────────────────┐
                                                    │      STAGE 4         │
                                                    │ Patch set Applied in │
                    START                           │      ORA$BASE        │
                                                    │ & Stage Update to '5'│
                       │                            └──────────────────────┘
                       ▼                                       │
         ┌──────────────────────┐                             ▼
         │      STAGE 1         │                   ┌──────────────────────┐
         │   New Edition E1     │                   │     Application      │
         │      Created         │                   │   deployment in      │
         │ & Stage Update to '2'│                   │    Domain 1 and      │
         └──────────────────────┘                   │    Quality Check     │
                       │                            └──────────────────────┘
                       ▼                                       │
         ┌──────────────────────┐                             ▼
         │      STAGE 2         │                   ┌──────────────────────┐
         │ Patch set Applied in │                   │      STAGE 5         │
         │         E1           │                   │    Logon Trigger     │
         │ & Stage Update to '3'│                   │  Compiled to point   │
         └──────────────────────┘                   │      ORA$BASE        │
                       │                            │ & Stage Update to '6'│
                       ▼                            └──────────────────────┘
         ┌──────────────────────┐                             │
         │     Application      │                             ▼
         │   deployment in      │                   ┌──────────────────────┐
         │    Domain 2 and      │                   │    Connections       │
         │    Quality Check     │                   │    diverted to       │
         └──────────────────────┘                   │   Domain 1 (Base)    │
                       │                            └──────────────────────┘
                       ▼                                       │
         ┌──────────────────────┐                             ▼
         │      STAGE 3         │                   ┌──────────────────────┐
         │    Logon Trigger     │                   │      STAGE 6         │
         │  Compiled to point E1│                   │  Drop Edition E1 and │
         │ & Stage Update to '4'│                   │  Drop Logon Trigger  │
         └──────────────────────┘                   │ & Stage Update to '1'│
                       │                            └──────────────────────┘
                       ▼                                       │
         ┌──────────────────────┐                             ▼
         │    Connections       │                          END
         │    diverted to       │
         │   Domain 2 (E1)      │
         └──────────────────────┘
```

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1.3.2   ZDT Installer Stage Sequence Flow

ZDT Installer Stage Sequence
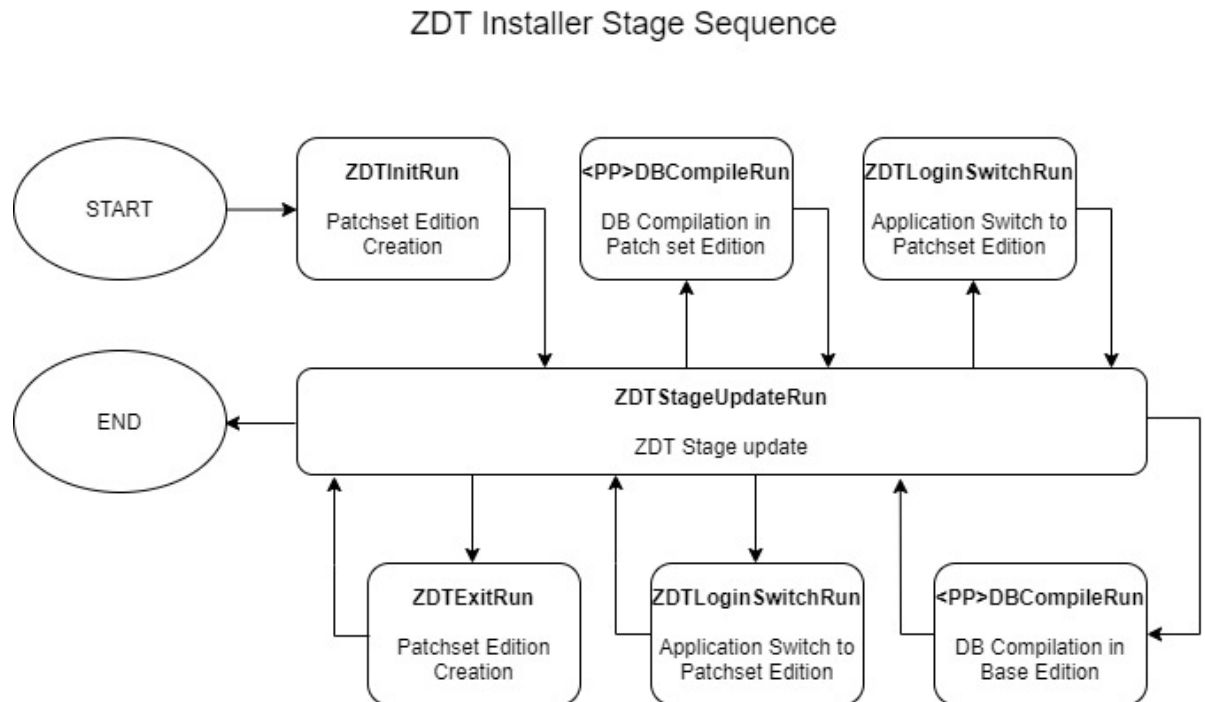
1.3.3   Creating Patch set Edition

Patch set Edition creation done using Silent Installer.

At the start of Zero downtime Database Setup process, Run **ZDTInitRun.bat** in Windows (**ZDTInitRun.sh** for Linux)

This will ensure that a new Edition is created with the name configured in **env.properties** file for the property 'PATCHSET_EDITION'

Run **ZDTStageUpdateRun.bat** in Windows (**ZDTStageUpdateRun.sh** for Linux) to move to process the next stage operation.

1.3.4   Database Setup in Patch set Edition

Backend Setup done using Silent Installer.

DDL Compilation, Object Compilation and Static Data Loading are part of Backend Setup.

Run the **SMSDBCompileRun.bat** in windows (**SMSDBCompileRun.sh** in Linux) for SMS schema (DB) compilation.

Run the **<Product Processor>DBCompileRun.bat** to complete DDL Compilation, Object Compilation and Static Data load.

For Example: FCUBS INSTALLATION-

a.   Run **ROFCDBCompileRun.bat** in windows (ROFCDBCompileRun.sh in linux)

Check for the Invalid Count and make sure that the Invalid count is zero.

This step will ensure the Database Backend Setup done in Patch set Edition of the Schema.

Run `ZDTStageUpdateRun.bat` in Windows (`ZDTStageUpdateRun.sh` for Linux) to move to process the next stage operation.

1.3.5 Application Deployment in Patchset Edition

This section briefs on the Application setup in <Domain 2>

- Generate Application / Gateway Ears and deploy in <Domain2> Application.
- <Domain 2> to be in inactive state (Standby mode).

Refer "EAR Building" User Manual section for EAR building steps.

1.3.6 Edition Switch in Patchset Edition

Run `ZDTLoginSwitchRun.bat` (`ZDTLoginSwitchRun.sh` for Linux Operating System).

This BAT file execution will ensure all new JDBC connections from application points to the new Edition created (as maintained by the property PATCHSET_EDITION).

Run `ZDTStageUpdateRun.bat` in Windows (`ZDTStageUpdateRun.sh` for Linux) to move to process the next stage operation.

1.3.7 Application Management in Patchset Edition

This section briefs on the <Domain 2> application Sanity and to activate for live transaction traffic.

a. Operational Recommendation briefed in section 1.6 Operational recommendations on Other Application Components to be adhered.

b. Start the <Domain 2> Application.

c. Sanity Check of Patch set in <Domain 2> Application

d. All incoming transactions traffic routed to <Domain 2> using Oracle Traffic Director and,

e. <Domain 1> to be made inactive status (Standby mode), once all the existing transactions in process in <Domain 1> completes its process.

1.3.8 Database Setup in Base Edition

Backend Setup done using Silent Installer.

DDL Compilation, Object Compilation and Static Data Load will be taken care as part of Backend Setup.

Run the `SMSDBCompileRun.bat` in windows (`SMSDBCompileRun.sh` in Linux) for SMS schema (DB) compilation.

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Run the **`<Product Processor>DBCompileRun.bat`** to complete Object Compilation.

For Example: In case of FCUBS INSTALLATION

a. Run **`ROFCDBCompileRun.bat`** in windows (**`ROFCDBCompileRun.sh`** in Linux)

Check for the Invalid Count and make sure that the Invalid count is zero.

This step will ensure the Database Backend Setup is done in Base Edition of the Schema.

Run **`ZDTStageUpdateRun.bat`** in Windows (**`ZDTStageUpdateRun.sh`** for Linux) to move to process the next stage operation.

1.3.9   Application Deployment in Base Edition

This section briefs on the Application setup in <Domain 1>

- Generate Application / Gateway Ears and deploy in Domain1 Application.
- <Domain 1> to be in inactive status (Standby mode).

Refer "EAR Building" User Manual section for EAR building steps.

1.3.10   Edition Switch in Base Edition

Run **`ZDTLoginSwitchRun.bat`** (**`ZDTLoginSwitchRun.sh`** for Linux)

This BAT file execution will ensure all new JDBC connections from application points to the Base Edition (as maintained by the property BASE_EDITION)

Run **`ZDTStageUpdateRun.bat`** in Windows (**`ZDTStageUpdateRun.sh`** for Linux) to move to process the next stage operation.

1.3.11   Application Management in Base Edition

This section briefs on the <Domain 1> application Sanity and to activate for live transaction traffic.

a. Operational Recommendation briefed in section 1.6 Operational recommendations on Other Application Components to be adhered.

b. Start the <Domain 1> Application.

c. Sanity Check of Patch set in <Domain 1> Application

d. All incoming transactions traffic routed to <Domain 1> using Oracle Traffic Director and,

e. <Domain 2> to be made inactive status (Standby mode), once all the existing transactions in process in <Domain 2> completes its process.

1.3.12   Drop Patch Set Edition

At the end of the f Zero downtime Database Setup process, Run **`ZDTExitRun.bat`** in Windows (**`ZDTExitRun.sh`** for Linux).

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This will ensure that the Patch Set Edition (as maintained by the property PATCHSET_EDITION) dropped.

Run `ZDTStageUpdateRun.bat` in Windows (`ZDTStageUpdateRun.sh` for Linux) to move to process the next stage operation.

1.4 Connection routing to Domains using Oracle Traffic Director

In below representation <Domain 1> as denoted as Green and <Domain 2> as Blue.
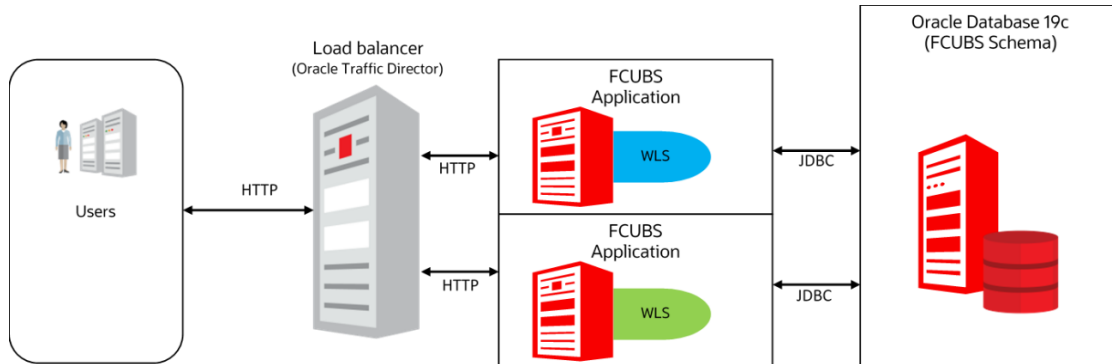
The Blue-Green deployment process uses two identical environments-Blue and Green. Only one environment is active at a time, serving all the traffic with the load balancer and the other environment is in the standby mode.

Example, let us consider that Blue is in standby and Green is active. When the updates are completed in the Blue environment, you can use the load balancer to switch the traffic to the Blue environment.

Once the Traffic is diverted and directed to the Blue environment using the Load balancer. Health checks are performed for all the components of the currently active Blue environment with traffic.

1.5 Additional Integration Source Compilation

This section briefs on any additional Integrations source compilation.

o   If OFSAA Integration exists in the environment, then run the <Product Processor>_OFSAADBCompileRun.bat to complete DDL Compilation, Object Compilation and Static Data load.

o   In both sections 1.3.4 Database Setup in Patch set Edition and 1.3.8 Database Setup in Base Edition the above OFSAA compilation has to be run before the <Product Processor>DBCompileRun.bat

For Example: In case of FCUBS INSTALLATION

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b. Run `ROFC_OFSAADBCompileRun.bat` in Windows (`ROFC_OFSAADBCompileRun.sh` in Linux) then,

c. Run `ROFCDBCompileRun.bat` in windows (`ROFCDBCompileRun.sh` in Linux)

1.6 Operational recommendations on Other Application Components

This section briefs the recommendations on other application components.

- o For Zero Downtime patch set Deployment following operational steps / setup recommended,
  - Remote SOA/BPEL setup is recommended.
  - Standalone Scheduler Application is recommended.
  - As part of Application Management sections 1.3.7 Application Management and 1.3.11 Application Management,
    - ATM instances to be restarted one by one so that it points to respective Application domain (<Domain 2> or <Domain 1>).
    - Scheduler jobs to be paused or stopped as a pre requisite before diverting the transactions traffic from one Domain to another using Oracle Traffic Director.
    - Scheduler jobs has to be started back once the transaction traffic diverted to the specific domain.

1.7 Operational Issues and Troubleshooting

This section briefs on the common issues and its troubleshooting methods.

1. If there are objects with version number other than 1 and While enabling editions for the User <Schema name> in section 1.2 Pre-Requisite will result with the below error
   "ERROR at line 1:
   ORA-38820: user has evolved object type "

   Solution:
   Below query will list the objects with version number other than one.
   Select type_name,owner, version# from dba_type_versions where owner='&SCHEMA_NAME' and VERSION# !='1';

   Below query's result to be executed in SQL command prompt to reset the version to one.
   Select 'ALTER TYPE ' ||TYPE_NAME|| ' RESET;' FROM dba_type_versions where owner='&SCHEMA_NAME' AND VERSION# !='1';

2. Patch set edition will not be dropped in section 1.3.12 Drop Patch Set Edition, if there are active connections to the schema pointing to Patch set Edition.

   "Exception in dropping edition java.sql.SQLException: ORA-38805: edition is in use"

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Clear such sessions and section 1.3.12 Drop Patch Set Edition to process again to get the
Patch set Edition dropped

Below query would help to list all editions in the Schema. At the end of process 1.3.12 Drop
Patch Set Edition, only Base Edition should present.

Select * FROM all_editions

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