



# MTS CERTIFICATION

## TELECOM DATABASE QUALIFICATIONS



Approved by USAID/ADM II, Washington DC,  
@ George Washington University, Marvin  
Center, USA  
6/22/2012



# **MTS CERTIFICATION**

PROJECT OF BTC, USAID/ADM II COMPANY

**ICT CAPACITY BUILDING**

## **TELECOM DATABASE QUALIFICATIONS**

**2013-2017**

Version 1.00

P. O. Box 652, New York, NY, 100027, USA

US: +1 91 68 66 72 85 / +1 64 68 41 7878 - Africa: +233-2626 80 865

Website: <http://www.mtscertification.com> Email: [mtscert@gmail.com](mailto:mtscert@gmail.com)



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# ORACLE TELECOM DATABASE ADMINISTRATION I (Oracle TBO, 11g,12c)



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# TELECOM DATABASE ADMINISTRATION I

## a)AIMS

The aims of this syllabus are:

- a) to develop the basic use of Oracle SQL and its application to Telecom Database and CDR Analysis
- b) to lay a good foundation in Oracle PL/SQL for higher learning in Telecom database
- c) to generate Management Information Systems Reports for Telecom Companies
- d) to equip candidates with technical knowledge in Telecom database to perform functions, solve TBO problems and achieve

## b)TARGET POPULATION

- This syllabus is designed for candidates who have passed the Higher National Diploma certificate examination or university degrees or equivalent diplomas in Telecom, Marketing, Management, Accounting, Human Resource Management, Information Technology, Project Management, and Business Studies.
- Mature employees with or without any of the qualifications specified in (2.a) above but who need to acquire qualification in Telecom Database Administration to enhance their promotion
- Candidates with HND or degrees but not in the discipline specified in (2.a) may also apply

## 3. DURATION OF STUDY

A minimum period of 12 hours will be sufficient to cover the syllabus fully

## 4. COURSE OUTLINES

- **PART 1 - Introduction to Telecommunications Services**
  - Telecom Basic Services
  - Telecom Valued-Added Services
  - Tele Service Codes, Traffic Cases and Routine Numbers
  - The Short Service Message
  - SMS Records and Call Types
  - GPRS / Data Calls
  - Mobile Money / Zap Service
  - Mobile Number Portability
- **PART 2 - Telecom Database and CDR Analysis**



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### Chapter 1: Introduction to Oracle PLSQL Developer

- Lesson 1: Getting Started with Oracle PLSQL Developer
- Lesson 2: Creating Users and Building Subscribers Database

### Chapter 2: Oracle PLSQL Functions for Telecom Business Operations

- Lesson 3: Using String Functions for Telecom Database Analysis
- Lesson 4: Using Numeric and Date Functions for TBO Reports

### Chapter 3: SQL Components and Operators

- Lesson 5: Designing Call Details Records (CDR) Database - DDL
- Lesson 6: CDR Oracle Data Capture and Manipulation - DML
- Lesson 7: Controlling Oracle Telecom Database - DCL
- Lesson 8: TBO Data Retrieval and Analysis -SELECT
- Lesson 9: Using SQL Operators

### Chapter 4: Designing TBO Reports

- Lesson 10: Telecom Business Operations Basic Reports
- Lesson 11: Telecom Business Operations Aggregate Reports
- Lesson 12: Telecom Business Operations Marketing Reports
- Lesson 13: Telecom Business Operations Financial Reports
- Lesson 14: Telecom Business Operations Statutory Reports

### Chapter 5: TBO Billing and Invoicing

- Lesson 15: Billing and Invoicing Postpaid subscribers (Join/Union)
- Lesson 16: Postpaid and Prepaid Subscribers Reports

### Chapter 5: TBO Procedures and Jobs

- Lesson 17: Designing and Testing TBO Procedures
- Lesson 18: Jobs Scheduling and Management

## • PART 3 - Oracle Telecom Database Administration

### Chapter 6: Oracle Instance and User Administration

- Lesson 19: Administering Oracle User Security
- Lesson 20: Managing the Oracle Instance



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## Chapter 7: Oracle Storage and Schema Objects

- Lesson 21: Managing Oracle Database Storage Structure
- Lesson 22: Managing Oracle Schema Objects
- Lesson 23: Schema Objects Exp/Imp Backup and Restore

## GUIDANCE NOTES

### TOPIC 1 SQL COMPONENTS

- a. Candidates should have good understanding of creating tables, data types, adding or dropping columns from a table, dropping tables. Emphasis should be laid on subscribers table, Incoming\_Payments table by the postpaid subscribers.
- b. Creating Unique Index, Advantages and disadvantages of Index, Primary key and foreign key (Subscribers as a primary table and Incoming\_Payments as a foreign table). Difference between Primary Key and Unique Index : (Primary Key = Unique Index + Not Null)
- c. Candidates should master data entry using Insert, Insert All, Update especially incrementing Unit price of a product by 10%, 12%...etc and Delete. They must also know that DML are referred as transactions and must always be committed
- d. Emphasis should be laid on create user, drop user, grant and revoke
- e. Select statement must include WHERE with Date field Criteria, Numeric field criteria and character field criteria. Order By must also be used with ASC and DESC. Simple WHERE to display a particular subscriber or prepaid or postpaid subscribers. Group By should be used with SUM. Other aggregate functions will be introduced later in Query Boosters.

### TOPIC 2 QUERIES AND VIEWS

- f. Candidates should have good understanding of Union queries, different between Union and Union All. They should be able to use Union Query to create Standard and Classic Subscribers Report.
- g. They should understand the difference between INNER JOIN, LEFT JOIN and RIGHT JOIN. Disadvantages of JOIN Queries especially in duplicating numeric values.
- h. Understand the Sub Queries and its importance, especially with NOT IN and IN.
- i. Subscribers and Incoming\_Payments tables can be used to illustrate



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### TOPIC 3 SUBSCRIBERS ACCOUNTS

- j. Candidates should be able to understand the basic and valued-added services of t
- k. Telecom companies; both prepaid and postpaid business operations that generate revenues to a Telecom companies
- l. Emphasis should be laid on postpaid subscribers and their payments, and how to generate their accounts.
- m. Candidates should understand the difference building postpaid subscribers accounts with JOIN queries and UNION queries. Emphasis should be laid on UNION Queries Postpaid Accounts Building for correct and accurate records.

### TOPIC 4 SUBSCRIBERS ACTIVITIES REPORTS

- n. A telecom company with both Fix Line and Mobile Line should be used in this topic. Each report should consist of Reportdate, ISDN, MinutesOfUse (MOU), Revenue and CountOfCalls for a given date per subscriber.
- o. There are six reports: Onnet, Offnet and International; Peak (0600 to 2159), OffPeak (2200 to 2359) and latenight (0000 to 0559)
- p. Candidates should have correct understanding of the Teleservicecodes in order to create the network and time reports for each category (Voice, SMS and Data) for both Prepaid and Postpaid Subscribers.

### TOPIC 5 FREQUENTLY USED FUNCTIONS

- q. Emphasis should be laid on the application of TO\_CHAR, TO\_NUMBER, TO\_DATE, TRUNC; LENGTH, TRIM, UPPER, LOWER, INITCAP, SUBSTR; SUM, MAX, MIN, AVG, COUNT
- r. Candidates should be able to use them to boost the performance of queries

### TOPIC 6 CDR PERIODIC REPORTS

- s. Candidates should be able to use TO\_CHAR to extract week, month, and year and apply them to generate periodic reports using **Voucher\_CDR, IN\_CDR and Adjustment\_CDR.**
- t. Reports should be weekly, monthly and yearly

### TOPIC 7 PL/SQL PROCEDURES

- u. Candidates should be able to create procedures with views (Customers Accounts, Suppliers Accounts and Inventory Reports procedures)



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- v. They should be able to create procedures using INSERT and with variable. Create table from existing SQL Statements and use in the procedure.
- w. They should also be able to test their procedure and debug.

## TOPIC 8 BACKUP AND RECOVERY

- x. Candidates should know how to export and import tables, objects and data
- y. They should have correct understanding of the Data Control Language to administer database

## ABOUT MTS

- z. Candidates should understand that MTS is a project of BTC, a US based company and BTC project was endorsed by ADM II, 22<sup>nd</sup> June 2012, George Washington University, Marvin Center, Washington DC, USA
- aa. Understand ADM and its Partners: (USAID and Western Union)
- bb. MTS Application fields (Telecom, Banking, Oil and Gas, Manufacturing, Agric ERP, Mining, Health IT)
- cc. MIS Engineers Position: (MIS Engineers or MIS Administrator, Data Warehouse Administrator, Database Administrator, Data Mining Engineers or Data Mining Operators, Explorative Database Administrator (Oil and Gas)
- dd. MTS Mission and Vision, its Key Words: **Telecom** and **ERP Database**. Correct understanding of these three (3) keywords
- ee. Understand how to create user and grant privilege using Oracle PL/SQL Developer





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# ORACLE TELECOM DATABASE ADMINISTRATION II (Oracle TBO, PLSQL, 11g, 12c)



# TELECOM DATABASE ADMINISTRATION II

## 1. AIMS

The aims of this syllabus are:

- to equip candidates with higher technical knowledge to function as TELECOM MIS Engineer to perform TELECOM Data Mining
- to empower candidates with good command in Oracle PL/SQL Programming to manage TELECOM Business Operations

## 2. TARGET POPULATION

- This syllabus is designed for candidates who have passed the **TELECOM DATABASE ADMINISTRATION I**
- Mature employees without the qualification specified in (2.a) above but has equivalent certificate from recognized institution acceptable to MTS will be considered for outright exemption.

## 3. DURATION OF STUDY

A minimum duration of 24 hours hours will be sufficient to cover the syllabus

## 4. CONTENTS

### UNIT 1: PL/SQL Variables

- Candidates should be able to explain variables and constants, assign values to them, assign values to variables directly from a database
- They should use the Adjustments table to get the mobile money transactions of a typical telecom company in their country, to compute previous day summary transactions, previous week transactions, previous month and previous year transactions

### UNIT 2: PL/SQL Control Structures

- **If Condition:** Candidates should be able to load data from employees table to a variable. If salary is greater than x value, then update the employee salary by 10% or if salary is lower than x value then update the salary by 12%.



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- **Simple Loop:** Candidates should be able to use the if condition with Exit to stop the simple loop. They should be able to load voice data from IN\_CDR table from the previous 30 days
- **While Loop:** Candidates should be able to use While Loop to load SMS data from IN\_CDR for the previous 180 days
- **For Loop:** Candidates should be able to understand For Loop and use to load DATA records from the IN\_CDR for the previous 180 days. They should find those who use their modem SIM card to make voice calls together with DATA usage
- **Case:** Use Case to write the scripts in the If Condition to update the employee's salary.

## UNIT 3: PL/SQL Records

- Candidates should know how to use %type to declare variables and constants (employee\_salary employee.salary%type;), using %ROWTYPE to declare record (record\_name table\_name%ROWTYPE;),
- Assign values to record using select statement (SELECT col1, col2 INTO record\_name.col\_name1, record\_name.col\_name2 FROM table\_name [WHERE clause];
- Assign values to ROWTYPE records (SELECT \* INTO record\_name FROM table\_name [WHERE clause];
- Retrieving values from Records (var\_name := record\_name.col\_name;)

## UNIT 4: PL/SQL Cursors

- **Candidates** should be able to use implicit and explicit cursors, use records with cursors, use cursors with For loop. They should know how to use SQL%FOUND, SQL%NOTFOUND, SQL%ROWCOUNT for implicit cursor
- **Implicit Cursor:** You have been employed by a Telecom company which uses Fingerprint machines to register the employees' attendance. You have been given the Employees table and the attendance table which contains employeeid and attendancedate. Use Implicit cursor to write a procedure the employees absent into a table called Absentism. If x number of employees absent on a particular day, then load the remarks into another table called TotalAbsent (Date, Remarks). The remark should be: x employees absent or No employee absent in case no employee is absent.
- **Explicit Cursor:** How to declare record and explicit cursor (emp\_rec emp\_tbl%rowtype; CURSOR emp\_cur IS SELECT \* FROM WHERE salary > 10;) and how to open cursor, fetch cursor and close cursor (OPEN cursor\_name; FETCH cursor\_name INTO record\_name or FETCH cursor\_name INTO variable\_list; and CLOSE cursor\_name;), use explicit cursor attributes such as ISOPEN, cursor\_name%FOUND; cursor\_name%NOTFOUND, cursor\_name%ROWCOUNT



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- **Candidates** should be able to use the loops with Cursor but emphasis should be laid on using For Loop with cursor. The Absenteeism assignment in the implicit cursor paragraph above should be reproduced for the previous 30 days using For Loop explicit cursor.
- **Assignment:** Write a procedure that loads daily the voice inactive subscribers into the table: Voice\_Inactive\_Subs (Startdate, Subno, Subname) with For Loop Explicit Cursor. Use the IN\_CDR and the Subscribers table.
  1. If there are voice inactive subscribers on a particular day, the procedure should load into Inactive\_Subs\_Total(Startdate, TotalSubs, ActivityType), the date of the activity, the total numbers of subscribers inactive on that date, the type of activity which is 'Voice'.
  2. But if there are no inactive subscribers, the procedure loads the date, and zero (0) into the TotalSubs and ActivityType is 'Voice'. Update the procedure to include SMS and DATA

## UNIT 6: CHURNED SUBSCRIBERS REPORT

- Churned Subscribers are those who stop using the network for the past six months. Candidates should be able to produce churned subscribers reports: those who use their number for voice calls only; those who their number for data only, those who their number for voice and data.
- This job should be scheduled so that the report is generated automatically.

## UNIT 7: PROCEDURES AND JOBS

- Candidates should be able to load network (onnet+offnet+international) summary activities report into a single reporting table and time report report also into a single table.
- They should also be to join the two tables into a single table to produce one single Network\_Time reporting table.
- They should further able to get Onnet\_Peak, Onnet\_OffPeak, Onnet\_OffPeak, Offnet\_Peak, Offnet\_OffPeak, Offnet\_Latenight, International\_Peak, International\_OffPeak, International\_Latenight, all into one table and later join that table to the Network\_Time reporting table.
- Candidates should know to schedule procedures as Jobs on the Oracle Enterprise Manager

## UNIT 8: CDR FILES MISSING CHECK

- **Project Description:** The EMM (Ericson Mediation Module) or switch sends files to CDR Analysis, which in turn loads the files into tables. CDR Analysis creates a log for each file. The Log file contains: Filename, Date, and Number of Records amongst others, in each



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file.

- The EMM also creates a dump of all CDR Files that have been pushed to CDR Analysis on a given day. The dump information also contain the filename, date and number of records in each file
  - **Required:**
    1. Assuming the EMM\_Logs are not available, use the CDR logs to produce the CDR Missing Files Report below
    2. Use both the EMM Logs and CDR\_Logs to find out the missing files.
- NB: For more information, check **Project #: TEL224 – CDR Files Missing Report**

## UNIT 9: CDR PROCESSING CHECK

- **Project Description:** Some of the files, which were pushed to CDR Analysis, were partially loaded leading to wrong revenue assurance report
- **Required:** Write a CDR Processing Check Procedure that will detect the files that are partially loaded and submit a report to Switch engineers to reload the files.
- Use **Adloader and Adjustment\_adn** (from both EMM and CDRAS) and produce the CDR Process Check Report displayed below

## UNIT 10:CDR DATA COMPLETION CHECK

- **Project Description:**
  1. Sometimes there are some discrepancy at record level between fully loaded files pushed to CDR Analysis and actual records in the reporting server.
  2. Managers want to know whether records transfer in each file has been successfully completed. It is also known as CDR Data Completion Check which is a record level check that involves two steps: Reporting Server Check and CDR Analysis Check.
  3. In the Reporting Server Level, every table is taken into consideration and check is done on record by record on each table; then check against the source which is CDR Analysis.
- **Required:** Write a procedure that generates daily **CDR Data Completion Report**



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## UNIT 11:CDR JOB LEVEL AND DATA ACCURACY CHECK

- **Project 1:** Job Level Check procedure will check whether the jobs have run successfully as scheduled.
- **Required:** Write Job Level Check procedure that check whether the jobs run successfully
- 
- **Project 2:** Job run produces result. Reporting tables are populated as a result of the job. How accurate is the data is another concern to Revenue Assurance Staff. This project will check the accuracy of the data that is loaded
- **Required:** Write Data Accuracy Check procedure that checks the accuracy of the data

## UNIT 12:ORACLE DATABASE ADMINISTRATION

- Candidates should have thorough understanding of the Oracle Components and architecture, Oracle Networking (TNS, Net Manager, and Client Configuration), Users Management and Administration, Oracle Enterprise Manager



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# ORACLE TELECOM DATABASE ADMINISTRATION III (Oracle RAC/ASM on Linux)



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### 1. AIMS

The aims of this syllabus are:

- to build a core DBA in Oracle Linux and Oracle Real Applications Clusters (Single Node or two nodes)
- To equip the DBA with RMAN and ASM Commands to administer Oracle Database

### 2. TARGET POPULATION

- This syllabus is designed for candidates who have passed the Higher National Diploma certificate examination or university degrees or equivalent diplomas
- 
- Mature employees with or without any of the qualifications specified above but who need to acquire qualification in Oracle Linux Database Administration to manage and reduce expensive downtime in Telecom and business organizations
- 
- Candidates with HND or degrees but not in the discipline specified may also apply.

### 3. DURATION OF STUDY

A minimum period of 20 hours will be sufficient to cover the syllabus fully





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# MAIN CONTENTS

**All Students will practically be connected to the Linux Server with Putty in order to perform the DBA Operations**

- ADMINISTERING ORACLE LINUX
- MANAGING WITH ORACLE WITH ASM COMMANDS
- BACKING, RESTORE AND RECOVERY (RMAN)
- MANAGING ORACLE WITH ENTERPRISE MANAGER
- ADMINISTERING ORACLE REAL APPLICATION CLUSTERS (ORACLE RAC)

For more information about other modules, visit [www.mtscertification.com](http://www.mtscertification.com) or  
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