**Lab Project**

**Voice Over IP (VoIP) Phone Server**

**Calls Database**

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**Statement of Work (SOW)**

**Overview:**

I will create a database to track incoming call history for a VoIP (Voice over internet protocol) phone server powered by FreePBX, an open source phone server software.

**Purpose and Objective:**

The database will allow a phone server to connect and create records pertaining to incoming/outgoing calls including date, time, phone number, and call duration. This will provide the foundation for a separate application to connect and manage these records so that an office employee can easily view past call history. The information stored in the database will be available for other purposes including linking with a CRM (Customer Relationship Management) solution which will allow office employees to view client data as a call is commenced, based upon a link between phone number and stored client data.

**Diagram Tool:**

Oracle SQL Data Modeler

**Database:**

Oracle Server Hosted on UMUC Amazon DaaS

**Hardware and Software:**

Microsoft Windows Virtual Machine, Oracle SQL Server

**DDL and DML:**

Structured Query Language will be used for the DDL and DML. SQL schema definition will be generated via an ER diagram using Oracle SQL Data Modeler. DML scripts will utilize INSERT queries to generate rows of phone data into the database.

**Application Requirements**

**Stakeholders:**

1. **Client** - Makes calls to the business phone server. Receives calls from the business phone server via the Customer Service Representative.
2. **Customer Service Representative (Office Employee/CSR)** - Makes calls to the client using the business phone server. Receives calls from the client from the business phone server. Tracks client call activity via the phone server database.

**Requirements:**

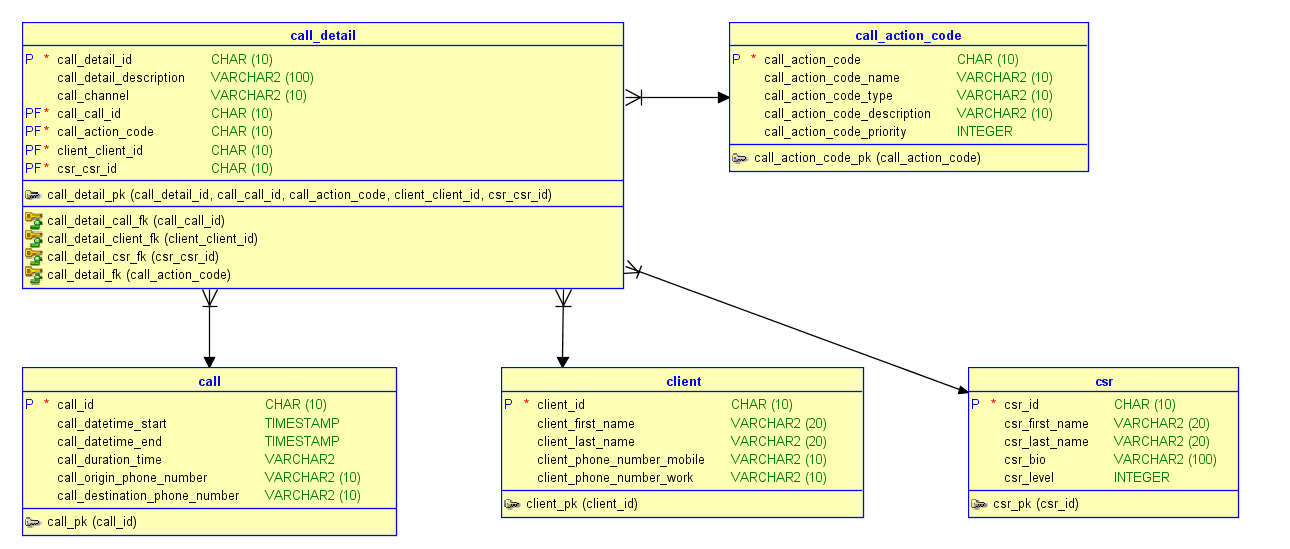
1. Incoming calls from the Client to the CSR should be recorded in the database with the following information: Start Datetime (at beginning of call), End Datetime (at time of call end), Duration of Call (at time of call end), Origin Phone Number (at beginning of call), Destination Phone Number (at beginning of call), Call Action Code (as they occur).
2. Outbound calls to the Client from the CSR should be recorded in the database with the following information: Start Datetime (at beginning of call), End Datetime (at time of call end), Duration of Call (at time of call end), Origin Phone Number (at beginning of call), Destination Phone Number (at beginning of call), Call Action Code records (as they occur).
3. An associated Client Relationship Management (CRM) application should be able to connect and utilize Incoming Call and Client data via a Join relationship query to determine Client First Name and Client Last Name upon call initiation.
   1. Incoming calls will utilize the Origin Phone Number to compare with Client Records to determine if a client is known or unknown.
   2. Outbound calls will utilize the Destination Phone Number to compare with Client Records to determine if a client is known or unknown as well as to record a record which the CRM could use to track client contact occurrences.

**Database Definition**

**Data Dictionary:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table** | | | | |
| **P/F** | **Field Name** | **Data Type** | **Field Size** | **Notes/Constraints** |
| CALL | | | | |
| PK | call\_id | UID | 10 | Auto Increment (AI) |
|  | call\_datetime\_start | Timestamp | 10 | With Time Zone |
|  | call\_datetime\_end | Timestamp | 10 | With Time Zone |
|  | call\_duration\_time | Varchar | 4 | Simple Time in Length |
|  | call\_origin\_phone\_number | Varchar | 10 | Originating Phone |
|  | call\_destination\_phone\_number | Varchar | 10 | Final destination Phone |
| CALL\_DETAIL | | | | |
| PK | call\_detail\_id | UID | 10 | AI Call Detail Primary Key |
|  | call\_detail\_description | Varchar | 100 | CSR Generated Description of Call |
|  | call\_channel | Varchar | 10 | System generated info |
| FK | call\_id | UID | 10 | call\_id FK |
| FK | call\_action\_code | UID | 10 | call\_action\_code FK |
| FK | call\_csr\_id | UID | 10 | csr\_id PK |
| FK | call\_client\_id | UID | 10 | client\_id PK |
| CALL\_ACTION\_CODE | | | | |
| PK | call\_action\_code | UID | 10 | AI NN |
|  | call\_action\_code\_name | Varchar | 10 |  |
|  | call\_action\_code\_type | Varchar | 10 |  |
|  | call\_action\_code\_description | Varchar | 100 |  |
|  | call\_action\_code\_priority | Integer | 10 |  |
| CLIENT | | | | |
| PK | client\_id | UID | 10 | AI |
|  | client\_first\_name | Varchar | 20 |  |
|  | client\_last\_name | Varchar | 20 |  |
|  | client\_phone\_number\_mobile | Varchar | 10 |  |
|  | client\_phone\_number\_work | Varchar | 10 |  |
| CSR (Customer Service Representative) | | | | |
| PK | csr\_id | UID | 10 | AI |
|  | csr\_first\_name | Varchar | 20 |  |
|  | csr\_last\_name | Varchar | 20 |  |
|  | csr\_bio | Varchar | 100 |  |
|  | csr\_level | Integer | 10 |  |

**ERD (Entity Relationship Diagram)**



**Data Definition Language (DDL)**

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Drop Statements

CASCADE CONSTRAINTS drops references between tables.

\*/

DROP VIEW CALLS CASCADE CONSTRAINTS ;

DROP VIEW CSR CASCADE CONSTRAINTS ;

DROP TABLE call CASCADE CONSTRAINTS;

DROP TABLE call\_action\_code CASCADE CONSTRAINTS;

DROP TABLE call\_detail CASCADE CONSTRAINTS;

DROP TABLE client CASCADE CONSTRAINTS;

DROP TABLE csr CASCADE CONSTRAINTS;

DROP SEQUENCE call\_id;

DROP SEQUENCE client\_id;

DROP SEQUENCE csr\_id;

DROP SEQUENCE call\_detail\_id;

DROP SEQUENCE call\_action\_code;

/\*

I spent a lot of time trying on my own to get the Triggers to work,

they have been commented out in the script so that this script can work properly.

DROP TRIGGER TRIGGER1;

DROP TRIGGER TRIGGER2;

\*/

/\*

Create Tables call, call\_action\_code, call\_detail, client, & csr

Alter tables to add constraints including primary and foreign key relationships.

\*/

CREATE TABLE call (

call\_id CHAR(10) NOT NULL,

call\_datetime\_start TIMESTAMP,

call\_datetime\_end TIMESTAMP,

call\_duration\_time VARCHAR2(10),

call\_origin\_phone\_number VARCHAR2(10),

call\_destination\_phone\_number VARCHAR2(10) );

ALTER TABLE call ADD CONSTRAINT call\_pk PRIMARY KEY ( call\_id );

CREATE TABLE call\_action\_code (

call\_action\_code CHAR(10) NOT NULL,

call\_action\_code\_name VARCHAR2(10),

call\_action\_code\_type VARCHAR2(10),

call\_action\_code\_description VARCHAR2(10),

call\_action\_code\_priority INTEGER );

ALTER TABLE call\_action\_code ADD CONSTRAINT call\_action\_code\_pk PRIMARY KEY ( call\_action\_code );

CREATE TABLE call\_detail (

call\_detail\_id CHAR(10) NOT NULL,

call\_detail\_description VARCHAR2(100),

call\_channel VARCHAR2(10),

call\_call\_id CHAR(10) NOT NULL,

call\_action\_code CHAR(10) NOT NULL,

client\_client\_id CHAR(10) NOT NULL,

csr\_csr\_id CHAR(10) NOT NULL );

ALTER TABLE call\_detail

ADD CONSTRAINT call\_detail\_pk PRIMARY KEY ( call\_detail\_id,

call\_call\_id,

call\_action\_code,

client\_client\_id,

csr\_csr\_id );

CREATE TABLE client (

client\_id CHAR(10) NOT NULL,

client\_first\_name VARCHAR2(20),

client\_last\_name VARCHAR2(20),

client\_phone\_number\_mobile VARCHAR2(10),

client\_phone\_number\_work VARCHAR2(10) );

ALTER TABLE client ADD CONSTRAINT client\_pk PRIMARY KEY ( client\_id );

CREATE TABLE csr (

csr\_id CHAR(10) NOT NULL,

csr\_first\_name VARCHAR2(20),

csr\_last\_name VARCHAR2(20),

csr\_bio VARCHAR2(100),

csr\_level INTEGER);

ALTER TABLE csr ADD CONSTRAINT csr\_pk PRIMARY KEY ( csr\_id );

ALTER TABLE call\_detail

ADD CONSTRAINT call\_detail\_fk FOREIGN KEY ( call\_action\_code )

REFERENCES call\_action\_code ( call\_action\_code );

ALTER TABLE call\_detail

ADD CONSTRAINT call\_detail\_call\_fk FOREIGN KEY ( call\_call\_id )

REFERENCES call ( call\_id );

ALTER TABLE call\_detail

ADD CONSTRAINT call\_detail\_client\_fk FOREIGN KEY ( client\_client\_id )

REFERENCES client ( client\_id );

ALTER TABLE call\_detail

ADD CONSTRAINT call\_detail\_csr\_fk FOREIGN KEY ( csr\_csr\_id )

REFERENCES csr ( csr\_id );

Table CALL created.

Table CALL altered.

Table CALL\_ACTION\_CODE created.

Table CALL\_ACTION\_CODE altered.

Table CALL\_DETAIL created.

Table CALL\_DETAIL altered.

Table CLIENT created.

Table CLIENT altered.

Table CSR created.

Table CSR altered.

Table CALL\_DETAIL altered.

Table CALL\_DETAIL altered.

Table CALL\_DETAIL altered.

Table CALL\_DETAIL altered.

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Create Views “Calls” and “CSR”:

“Calls” View displays recent call activity for an I.T. consultant who deploys the phone server.

“CSR” View displays client information with dates and times of phone calls for a customer service representative log/dashboard.

\*/

CREATE OR REPLACE VIEW CALLS AS

SELECT

call.call\_datetime\_start,

call.call\_datetime\_end,

call.call\_duration\_time,

call.call\_destination\_phone\_number,

call.call\_origin\_phone\_number

FROM

call ;

CREATE OR REPLACE VIEW CSRS AS

SELECT

client.client\_first\_name,

client.client\_last\_name,

client.client\_phone\_number\_mobile,

client.client\_phone\_number\_work,

call.call\_datetime\_start,

call.call\_datetime\_end,

call.call\_duration\_time,

call.call\_origin\_phone\_number,

call.call\_destination\_phone\_number,

FROM

call,

client ;

View CALLS created.

View CLIENTS created.

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Create Sequences

\*/

CREATE SEQUENCE call\_id

START WITH 1

INCREMENT BY 1

NOORDER ;

CREATE SEQUENCE client\_id

START WITH 10

INCREMENT BY 1 ;

CREATE SEQUENCE csr\_id

START WITH 1

INCREMENT BY 1 ;

CREATE SEQUENCE call\_detail\_id

START WITH 1

INCREMENT BY 1 ;

Sequence CALL\_ID created.

Sequence CLIENT\_ID created.

Sequence CSR\_ID created.

Sequence CALL\_DETAIL\_ID created.

/\*

Create Triggers

Trig. 1: On insert of call, populate call.call\_datetime\_start with sysdatetime.

Trig. 2: On update of call, populate call.call\_datetime\_end with sysdatetime.

\*/

CREATE OR REPLACE TRIGGER trigger1

BEFORE INSERT ON call

FOR EACH ROW BEGIN

IF call.call\_datetime\_start IS NULL

THEN call.call\_datetime\_start := SYSDATE;

END IF;

END;

CREATE OR REPLACE TRIGGER trigger2

AFTER UPDATE ON call

FOR EACH ROW BEGIN

IF call.call\_datetime\_end IS NULL

THEN call.call\_datetime\_end := SYSDATE;

END IF;

END;

Trigger TRIGGER1 compiled

Trigger TRIGGER2 compiled

Errors in compiler log:

Error(1,13): PLS-00357: Table,View Or Sequence reference 'CALL.CALL\_DATETIME\_START' not allowed in this context

I attempted to wrap these field definitions in parentheses bdut this produced the same result.

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Check Database

\*/

SELECT \* FROM CALL;

SELECT \* FROM CALL\_DETAIL;

SELECT \* FROM CALL\_ACTION\_CODE;

SELECT \* FROM CSR;

SELECT \* FROM CLIENT;

**Data Manipulation Language (DML) - Deliverable 04**

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Insert Data

TRUNCATE - DDL CARES ABOUT REFERENTIAL INTEGRITY

DELETE - DML DOES NOT CARE ABOUT REFERENTIAL INTEGRITY

\*/

TRUNCATE TABLE CALL\_DETAIL;

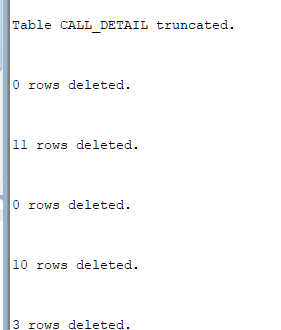
DELETE FROM CALL;

DELETE FROM CALL\_ACTION\_CODE;

DELETE FROM CALL\_DETAIL;

DELETE FROM CLIENT;

DELETE FROM CSR;



/\*

CALL DATA

\*/

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('1', TO\_TIMESTAMP('2017-11-25 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-29 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3019996666', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('2', TO\_TIMESTAMP('2017-11-28 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-28 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3015556666', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('3', TO\_TIMESTAMP('2017-11-28 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-28 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3014446666', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('4', TO\_TIMESTAMP('2017-11-27 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-27 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3013336666', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('5', TO\_TIMESTAMP('2017-11-27 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-27 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3012226666', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('6', TO\_TIMESTAMP('2017-11-27 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-27 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3011116666', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('7', TO\_TIMESTAMP('2017-11-22 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-22 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3019995555', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('8', TO\_TIMESTAMP('2017-11-22 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-22 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3019994444', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('9', TO\_TIMESTAMP('2017-11-22 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-22 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3019993333', '3014905968');

INSERT INTO "SYSTEM"."CALL" (CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER, CALL\_DESTINATION\_PHONE\_NUMBER)

VALUES ('10', TO\_TIMESTAMP('2017-11-26 00:17:13.194000000', 'YYYY-MM-DD HH24:MI:SS.FF'), TO\_TIMESTAMP('2017-11-26 01:17:25.139000000', 'YYYY-MM-DD HH24:MI:SS.FF'), '01:01:00', '3019921111', '3014905968');

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CLIENT DATA

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INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('10', 'Joe', 'Schmo', '3019996666');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('11', 'Mary', 'Blidge', '3015556666');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('12', 'Ellen', 'Mazerstonson', '3014446666');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('13', 'Steve', 'Rollerderby', '3013336666');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('14', 'Fred', 'Fredmerkson', '3012226666');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('15', 'Mark', 'Markerson', '3011116666');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('16', 'William', 'Williamson', '3019995555');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('17', 'Bobert', 'Smith', '3019994444');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('18', 'Jack', 'Bauer', '3019993333');

INSERT INTO "SYSTEM"."CLIENT" (CLIENT\_ID, CLIENT\_FIRST\_NAME, CLIENT\_LAST\_NAME, CLIENT\_PHONE\_NUMBER\_MOBILE) VALUES ('19', 'Kelly', 'Kapinski', '3019921111');

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CSR DATA

Only 3 customer service representatives work for the company.

\*/

INSERT INTO "SYSTEM"."CSR" (CSR\_ID, CSR\_FIRST\_NAME, CSR\_LAST\_NAME, CSR\_BIO, CSR\_LEVEL) VALUES ('1', 'Jim', 'President', 'Jim President started Company many years ago.', '1');

INSERT INTO "SYSTEM"."CSR" (CSR\_ID, CSR\_FIRST\_NAME, CSR\_LAST\_NAME, CSR\_BIO, CSR\_LEVEL) VALUES ('2', 'Joe', 'Sales', 'Joe Sales is the Sales Manager.', '1');

INSERT INTO "SYSTEM"."CSR" (CSR\_ID, CSR\_FIRST\_NAME, CSR\_LAST\_NAME, CSR\_BIO, CSR\_LEVEL) VALUES ('3', 'Christie', 'Newemployee', 'Chritie Newemployee just recently started working at Company.', '2');

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CALL ACTION CODE DATA

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INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('11', 'QUEUED', 'START', 'START', '1');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('22', 'INITIATED', 'START', 'START', '1');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('33', 'RINGING', 'START', 'START', '1');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('44', 'ANSWERED', 'INPROGRESS', 'INPROGRESS', '2');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('55', 'HOLDING', 'INPROGRESS', 'INPROGRESS', '2');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('66', 'TRANSFER', 'INPROGRESS', 'INPROGRESS', '2');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('77', 'COMPLETED', 'END', 'END', '5');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('88', 'BUSY', 'INPROGRESS', 'INPROGRESS', '4');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('99', 'VOICEMAIL', 'END', 'END', '4');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('00', 'TERMINATED', 'END', 'END', '5');

INSERT INTO "SYSTEM"."CALL\_ACTION\_CODE" (CALL\_ACTION\_CODE, CALL\_ACTION\_CODE\_NAME, CALL\_ACTION\_CODE\_TYPE, CALL\_ACTION\_CODE\_DESCRIPTION, CALL\_ACTION\_CODE\_PRIORITY) VALUES ('01', 'FAILED', 'END', 'END', '5');

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CALL DETAIL DATA

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INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('1', 'Client called', 'CHAN\_SIP', '1', '22', '10', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('2', 'Client called', 'CHAN\_SIP', '2', '22', '11', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('3', 'Client called', 'CHAN\_SIP', '3', '22', '12', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('4', 'Client called', 'CHAN\_SIP', '4', '22', '13', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('6', 'Client called', 'CHAN\_SIP', '6', '22', '15', '2');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('7', 'Client called', 'CHAN\_SIP', '7', '22', '16', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('8', 'Client called', 'CHAN\_SIP', '8', '22', '17', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('9', 'Client called', 'CHAN\_SIP', '9', '22', '18', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('10', 'Client called', 'CHAN\_SIP', '10', '22', '19', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('11', 'Client called', 'CHAN\_SIP', '1', '77', '10', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('12', 'Client called', 'CHAN\_SIP', '2', '77', '11', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('13', 'Client called', 'CHAN\_SIP', '3', '77', '12', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('14', 'Client called', 'CHAN\_SIP', '4', '77', '13', '3');

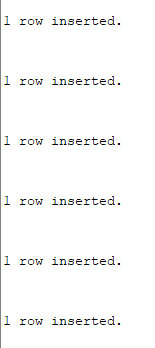
INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('15', 'Client called', 'CHAN\_SIP', '5', '99', '14', '1');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('16', 'Client called', 'CHAN\_SIP', '6', '99', '15', '2');

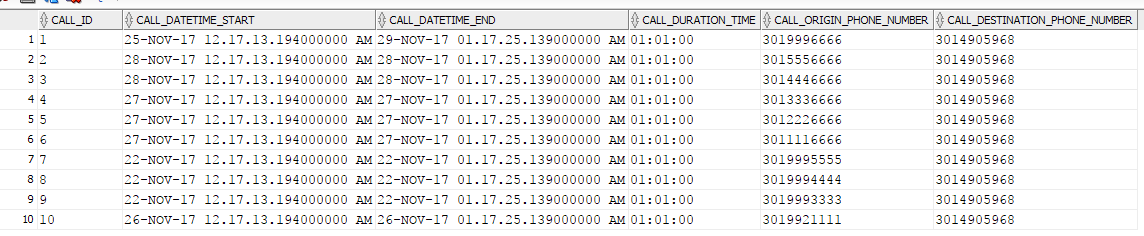
INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('17', 'Client called', 'CHAN\_SIP', '7', '77', '16', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('18', 'Client called', 'CHAN\_SIP', '8', '77', '17', '3');

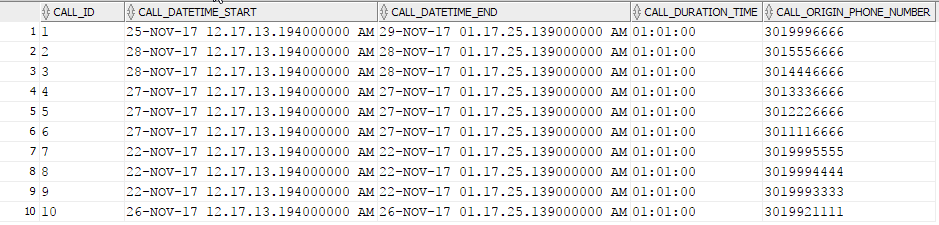
INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('19', 'Client called', 'CHAN\_SIP', '9', '77', '18', '3');

INSERT INTO "SYSTEM"."CALL\_DETAIL" (CALL\_DETAIL\_ID, CALL\_DETAIL\_DESCRIPTION, CALL\_CHANNEL, CALL\_CALL\_ID, CALL\_ACTION\_CODE, CLIENT\_CLIENT\_ID, CSR\_CSR\_ID) VALUES ('20', 'Client called', 'CHAN\_SIP', '10', '77', '19', '3');

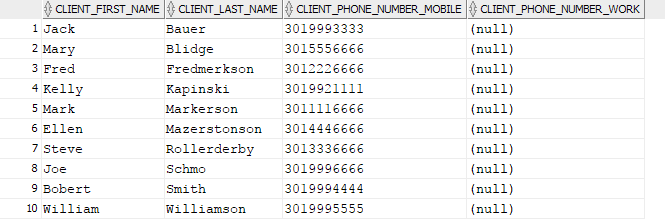
--Select all columns and all rows from one table.

SELECT \* FROM CALL;

--Select 5 columns and all rows from one table.

SELECT CALL\_ID, CALL\_DATETIME\_START, CALL\_DATETIME\_END, CALL\_DURATION\_TIME, CALL\_ORIGIN\_PHONE\_NUMBER FROM CALL;

--Select all columns and all rows from one view.

SELECT \* FROM CLIENTS;

--Using a join on 2 tables, select all columns and all rows from the tables without the use of a Cartesian product.

SELECT

CALL.\*,

CLIENT.\*

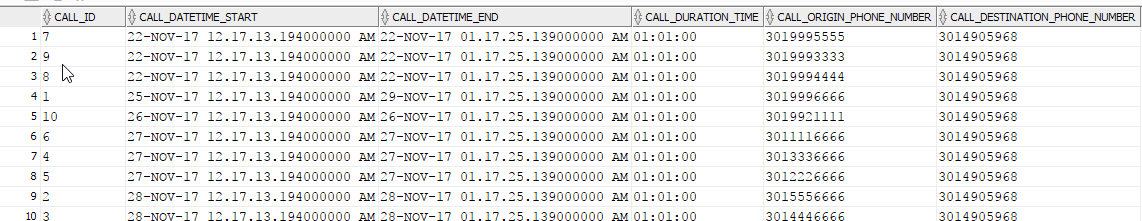
FROM CALL

JOIN CLIENT ON CALL.CALL\_ORIGIN\_PHONE\_NUMBER = CLIENT.CLIENT\_PHONE\_NUMBER\_MOBILE

WHERE CLIENT\_ID = 10;

--Select and order data retrieved from one table.

SELECT \* FROM CALL

ORDER BY CALL\_DATETIME\_START;

--Using a join on 3 tables, select 5 columns from the 3 tables. Use syntax that would limit the output to 10 rows.

SELECT \* FROM

(

SELECT

CALL.CALL\_ID,

CALL.CALL\_DURATION\_TIME,

CALL\_DETAIL.CALL\_DETAIL\_DESCRIPTION,

CLIENT.CLIENT\_LAST\_NAME,

CALL\_ACTION\_CODE.CALL\_ACTION\_CODE\_NAME

FROM CALL

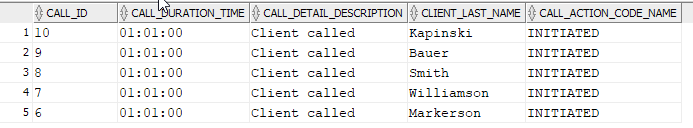
JOIN CALL\_DETAIL ON CALL.CALL\_ID = CALL\_DETAIL.CALL\_CALL\_ID

JOIN CLIENT ON CALL.CALL\_ORIGIN\_PHONE\_NUMBER = CLIENT.CLIENT\_PHONE\_NUMBER\_MOBILE

JOIN CALL\_ACTION\_CODE ON CALL\_ACTION\_CODE.CALL\_ACTION\_CODE = CALL\_DETAIL.CALL\_ACTION\_CODE

ORDER BY CALL\_DURATION\_TIME

)

WHERE ROWNUM <= 5;

--Select distinct rows using joins on 3 tables.

SELECT DISTINCT

CALL.CALL\_DURATION\_TIME

FROM CALL

JOIN CALL\_DETAIL ON CALL.CALL\_ID = CALL\_DETAIL.CALL\_CALL\_ID

JOIN CLIENT ON CALL.CALL\_ORIGIN\_PHONE\_NUMBER = CLIENT.CLIENT\_PHONE\_NUMBER\_MOBILE

JOIN CALL\_ACTION\_CODE ON CALL\_ACTION\_CODE.CALL\_ACTION\_CODE = CALL\_DETAIL.CALL\_ACTION\_CODE;

--Use GROUP BY & HAVING in a select statement using one or more tables.

SELECT CSR\_LEVEL AS "Max Assigned CSR Level"

FROM CSR

GROUP BY CSR\_LEVEL

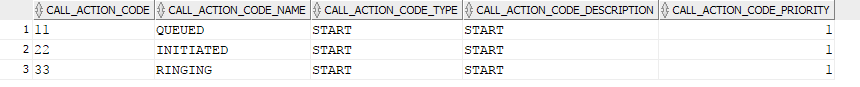
HAVING MAX(CSR\_LEVEL) = 1;



--Use IN clause to select data from one or more tables.

SELECT \* FROM CALL\_ACTION\_CODE

WHERE CALL\_ACTION\_CODE\_TYPE

IN ('START');

--Select length of one column from one table (use LENGTH function).

SELECT DISTINCT LENGTH(CALL\_DETAIL\_DESCRIPTION) FROM CALL\_DETAIL;

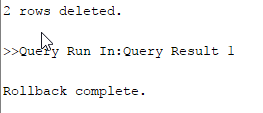
--Use the SQL DELETE statement to delete one record from one table. Add select statements to demonstrate the table contents before and after the DELETE statement. Make sure to use ROLLBACK afterwards so that the data will not be physically removed.

SELECT \* FROM CALL\_DETAIL;

DELETE FROM CALL\_DETAIL WHERE CALL\_CALL\_ID = 1;

SELECT \* FROM CALL\_DETAIL;

ROLLBACK;



--Use the SQL UPDATE statement to change some data. Add select statements to demonstrate the table contents before and after the UPDATE statement. You can either COMMIT or ROLLBACK afterwards.

SELECT \* FROM CALL\_DETAIL WHERE CALL\_DETAIL\_ID = 1;

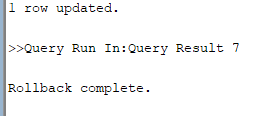
UPDATE CALL\_DETAIL

SET CALL\_DETAIL\_DESCRIPTION = 'No description'

WHERE CALL\_DETAIL\_ID = 1;

SELECT \* FROM CALL\_DETAIL WHERE CALL\_DETAIL\_ID = 1;

ROLLBACK;



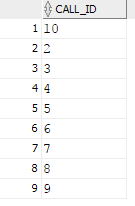
--Using Coronel, Morris and Rob’s definition of Advanced SQL (Chapter 8), perform 8 additional advanced (multiple table joins, sub-queries, aggregate, etc.) SQL statements.

--1 USE A UNION TO GET CALL IDS

SELECT CALL.CALL\_ID FROM CALL

UNION

SELECT CALL\_DETAIL.CALL\_CALL\_ID FROM CALL\_DETAIL;

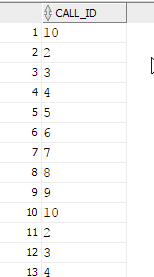


--2 USE A UNION ALL TO GET CALL IDS

SELECT CALL.CALL\_ID FROM CALL

UNION ALL

SELECT CALL\_DETAIL.CALL\_CALL\_ID FROM CALL\_DETAIL;



--USING 3 JOINS DETERMINE THE CALL INFORMATION

SELECT

CALL.\*,

CALL\_DETAIL.\*,

CLIENT.\*,

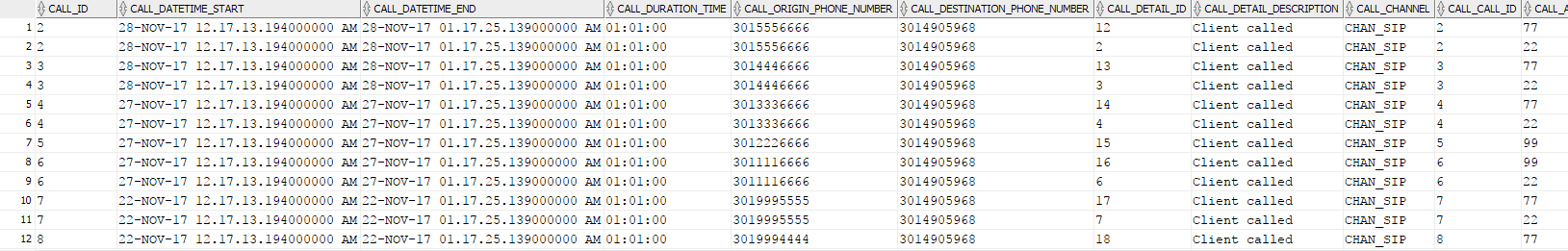
CALL\_ACTION\_CODE.\*

FROM CALL

INNER JOIN CALL\_DETAIL ON CALL.CALL\_ID = CALL\_DETAIL.CALL\_CALL\_ID

INNER JOIN CLIENT ON CALL.CALL\_ORIGIN\_PHONE\_NUMBER = CLIENT.CLIENT\_PHONE\_NUMBER\_MOBILE

INNER JOIN CALL\_ACTION\_CODE ON CALL\_DETAIL.CALL\_ACTION\_CODE = CALL\_ACTION\_CODE.CALL\_ACTION\_CODE;



--4 DETERMINE THE MIN CALL ACTION CODE PRIORITY USING AGGREGATE FUNCTION

SELECT MIN(CALL\_ACTION\_CODE.CALL\_ACTION\_CODE\_PRIORITY)

FROM CALL\_ACTION\_CODE;



--5 DETERMINE WHAT ACTION CODES HAVE BEEN USED

SELECT CALL\_ACTION\_CODE.CALL\_ACTION\_CODE

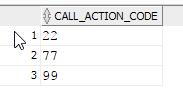
FROM CALL\_ACTION\_CODE

WHERE CALL\_ACTION\_CODE

IN (

SELECT CALL\_DETAIL.CALL\_ACTION\_CODE FROM CALL\_DETAIL

);



--6 DETERMINE THE FIRST AND LAST NAME OF THE CUSTOMER FOR ALL CUSTOMER SUPPORT ISSUES ESCALATED

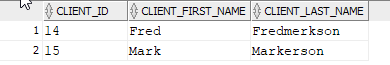
SELECT DISTINCT(C.CLIENT\_ID), C.CLIENT\_FIRST\_NAME, C.CLIENT\_LAST\_NAME

FROM CLIENT C

JOIN CALL\_DETAIL D ON C.CLIENT\_ID = D.CLIENT\_CLIENT\_ID

JOIN CSR S ON S.CSR\_ID = D.CSR\_CSR\_ID

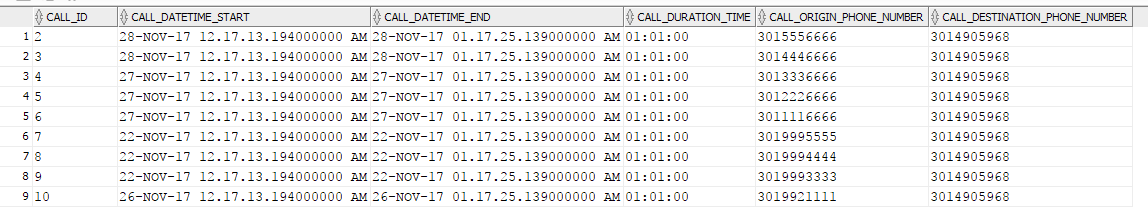
WHERE S.CSR\_LEVEL < 2;



--7 FIND ALL AREA CODE 301 CALLS

SELECT \* FROM CALL

WHERE CALL\_ORIGIN\_PHONE\_NUMBER LIKE '301%%%%%%%';



--8 FIND UNUSUALLY LATE CALLS

SELECT CALL.CALL\_ID, TO\_CHAR(CALL\_DATETIME\_START, 'hh24:mi:ss') AS "CALL START", TO\_CHAR(CALL\_DATETIME\_END, 'hh24:mi:ss') AS "CALL END"

FROM CALL

WHERE TO\_CHAR(CALL\_DATETIME\_START, 'hh24:mi:ss') BETWEEN '00:%%:%%' AND '05:%%:%%'

AND TO\_CHAR(CALL\_DATETIME\_END, 'hh24:mi:ss') BETWEEN '00:%%:%%' AND '05:%%:%%';

