PHYSICAL DATABASE DESIGN
FOR THE
INTERPRETING SERVICES BOOKING SYSTEM
FOR
ITRW 311

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Submitted in pursuit of the degree

BSc (Information Technology)

North West University Potchefstroom Campus

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Potchefstroom

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It all starts here

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Table of Contents

List of Figures

1 ENTITY RELATIONSHIP DIAGRAM

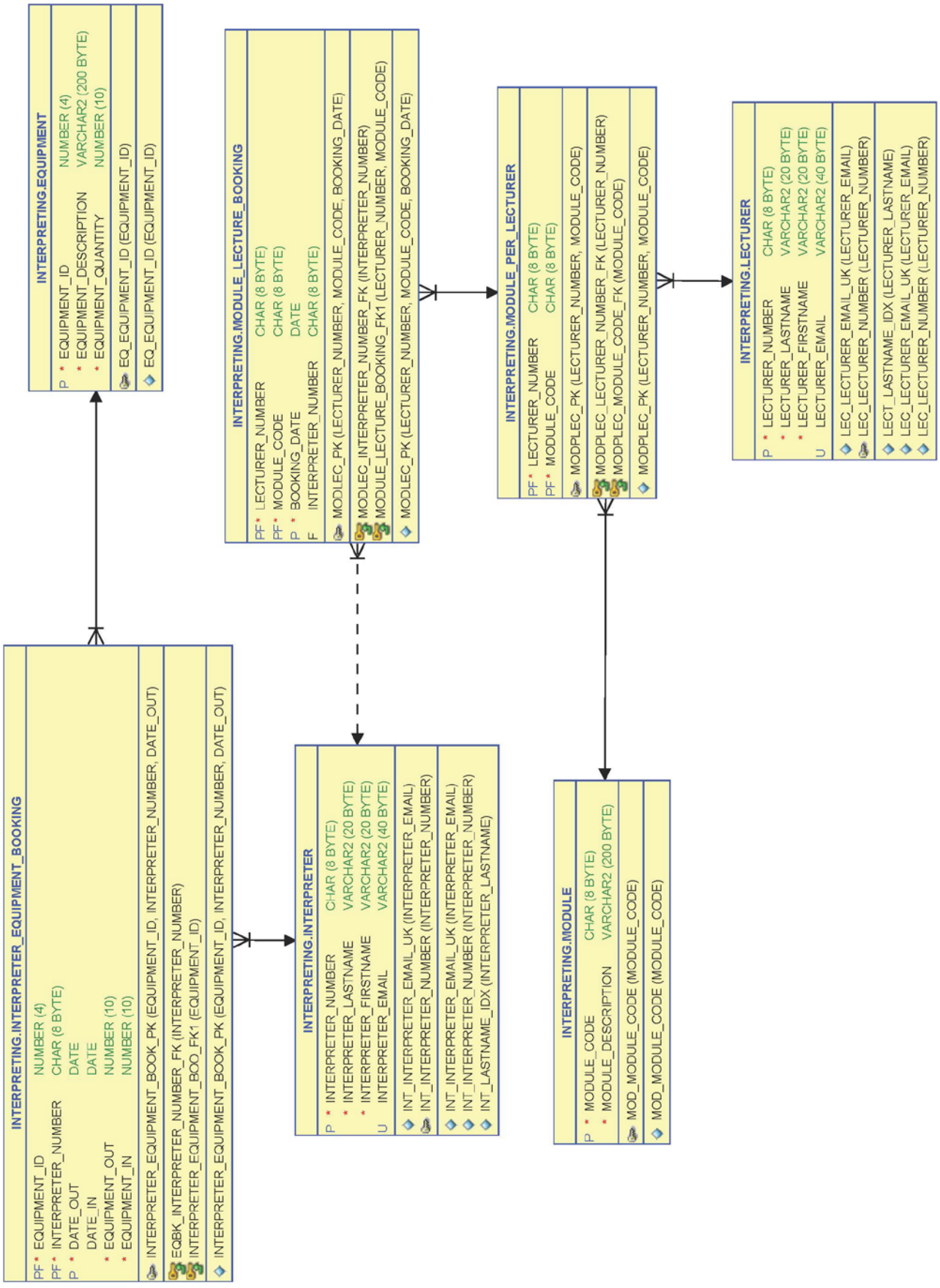


Figure 1: Entity Relationship diagram

2 DATABASE OBJECTS

2.1 TABLES

```
CREATE TABLE LECTURER
    ( lecturer_number CHAR(8)
        CONSTRAINT lec_lecturer_number PRIMARY KEY
    , lecturer_lastname VARCHAR(20)
         CONSTRAINT lec_lecturer_lastname_nn NOT NULL
    , lecturer_firstname VARCHAR(20)
    , lecturer_email VARCHAR(40)
        CONSTRAINT lec_lecturer_email_uk UNIQUE
    )
```

```
CREATE TABLE INTERPRETER
    ( interpreter_number CHAR(8)
        CONSTRAINT int_interpreter_number PRIMARY KEY
    , interpreter_lastname VARCHAR(20)
         CONSTRAINT int_interpreter_lastname_nn NOT NULL
    , interpreter_firstname VARCHAR(20)
         CONSTRAINT int_interpreter_firstname_nn NOT NULL
    , interpreter_email VARCHAR(40)
        CONSTRAINT int_interpreter_email_uk UNIQUE
    )
```

```
CREATE TABLE MODULE
    ( module_code CHAR(8)
        CONSTRAINT mod_module_code PRIMARY KEY
    , module_description VARCHAR(100)
        CONSTRAINT mod_module_desc_nn NOT NULL
    )
```

```
CREATE TABLE EQUIPMENT
    ( equipment_id NUMBER(4)
     CONSTRAINT eq_equipment_id PRIMARY KEY
    , equipment_description VARCHAR(20)
         CONSTRAINT eq_equipment_description_nn NOT NULL
    , equipment_quantity NUMBER(10)
    , CONSTRAINT eq_equipment_quantity_uk UNIQUE(equipment_quantity)
    )
```

```
CREATE TABLE MODULE_LECTURE_BOOKING
    ( lecturer_number CHAR(8)
    , module_code CHAR(8)
    , booking_date DATE
    , interpreter_number CHAR(8)
    , CONSTRAINT modlec_module_code_fk FOREIGN KEY (module_code)
      REFERENCES MODULE(module_code)
    , CONSTRAINT modlec_interpreter_number_fk FOREIGN KEY (interpreter_number)
      REFERENCES INTERPRETER(interpreter_number)
    , CONSTRAINT modlec_pk PRIMARY KEY (lecturer_number, module_code,booking_date)
    , CONSTRAINT modlec_lecturer_number_fk FOREIGN KEY(lecturer_number)
      REFERENCES LECTURER(lecturer_number)
    )
```

```
CREATE TABLE MODULE_PER_LECTURER
    ( lecturer_number CHAR(8)
    , module_code CHAR(8)
    , CONSTRAINT modplec_module_code_fk FOREIGN KEY (module_code)
      REFERENCES MODULE(module_code)
    , CONSTRAINT modplec_pk PRIMARY KEY (lecturer_number, module_code)
    , CONSTRAINT modplec_lecturer_number_fk FOREIGN KEY(lecturer_number)
      REFERENCES LECTURER(lecturer_number)
    )
```

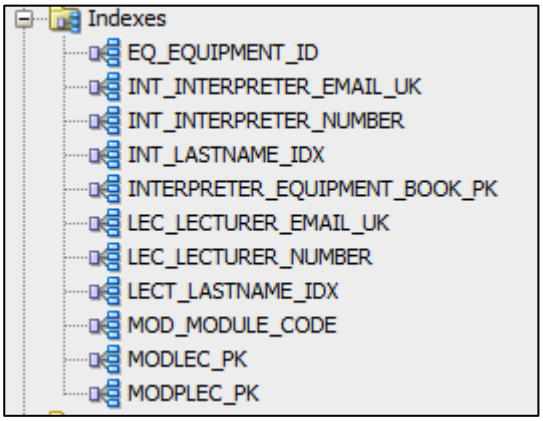
```
CREATE TABLE INTERPRETER_EQUIPMENT_BOOKING
    ( equipment_id NUMBER(4)
    , interpreter_number CHAR(8)
    , date_out DATE
    , date_in DATE
    , equipment_out NUMBER(10)
        CONSTRAINT eqbk_equip_out_nn NOT NULL
    , equipment_in NUMBER(10)
        CONSTRAINT eqbk_equip_in_nn NOT NULL
    , equipment_quantity NUMBER(10)
    , CONSTRAINT eqbk_equipment_id_fk FOREIGN KEY (equipment_id)
      REFERENCES MODULE_PER_LECTURER(equipment_id)
    , CONSTRAINT eqbk_interpreter_number_fk FOREIGN KEY (interpreter_number)
      REFERENCES INTERPRETER(interpreter_number)
    , CONSTRAINT eqbk_pk PRIMARY KEY (equipment_id, interpreter_number,date_out)

    )
```

2.2 INDEXES

```
CREATE INDEX int_lastname_idx
ON           interpreter(interpreter_lastname);
```

```
CREATE INDEX lect_lastname_idx
ON           lecturer(lecturer_lastname);
```



2.3 VIEWS

```
CREATE OR REPLACE VIEW bookings
    AS SELECT l.lecturer_lastname AS " LECTURER NAME",
              m.module_code AS "MODULE CODE",m.booking_date AS "BOOKING DATE",
              i.interpreter_lastname AS "INTERPRETER NAME"
       FROM   module_lecture_booking m
       JOIN  lecturer l  ON    m.lecturer_number =  l.lecturer_number
       JOIN interpreter i  ON  m.interpreter_number = i.interpreter_number
       WITH READ ONLY;
```

```
CREATE OR REPLACE VIEW equipment_not_returned
    AS SELECT i.interpreter_lastname AS "INTERPRETER NAME",
              eq.equipment_description AS "EQUIPMENT NOT YET RETURNED",
              (e.equipment_in - e.equipment_out) AS "QUANTITY NOT RETURNED"
       FROM   interpreter_equipment_booking e
       JOIN  equipment eq  ON    e.equipment_id =  eq.equipment_id
       JOIN interpreter i  ON   e.interpreter_number = i.interpreter_number
       WITH READ ONLY;
```

```
CREATE OR REPLACE VIEW lecturer_modules
    AS SELECT l.lecturer_number AS "STAFF NUMBER",
              (l.lecturer_firstname || ' ' || l.lecturer_lastname)  AS " LECTURER NAME",
              (m.module_code || ' ' || mo.module_description) AS "MODULE INFO"
       FROM   module_lecture_booking m
       JOIN  lecturer l  ON    m.lecturer_number =  l.lecturer_number
       JOIN  module mo ON m.module_code = mo.module_code
       WITH READ ONLY;
```

```
CREATE OR REPLACE VIEW lecturer_info
    AS SELECT l.lecturer_number AS "STAFF NUMBER",
              (l.lecturer_firstname || ' ' || l.lecturer_lastname)  AS " LECTURER NAME",
              l.lecturer_email AS "EMAIL ADDRESS"
       FROM   lecturer l
       WITH READ ONLY;
```

2.4 DATA ON TABLES

```
CREATE SEQUENCE equipment_equipid_seq
                INCREMENT BY 1
                START WITH 1
                MAXVALUE 999999
                NOCACHE
                NOCYCLE;
```

```
CREATE OR REPLACE TRIGGER equipment_update
AFTER  DELETE OR INSERT OR UPDATE OF EQUIPMENT_IN,EQUIPMENT_OUT ON INTERPRETER_EQUIPMENT_BOOKING
FOR EACH ROW
BEGIN

    UPDATE equipment
    SET     equipment_quantity = (equipment_quantity -:new.equipment_out +:new.equipment_in)
    WHERE equipment_id = :new.equipment_id;
END;
```

```
INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020210','Boshoff','Tiaan','11020210@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020211','Boshoff','Phillip','11020211@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020212','van Wyk','Xander','11020212@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020213','van Wyk','Christelle','11020213@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020214','van Rensburg','Henri','Henri.vanRensburg@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020215','van der Walt','Johan','11020215@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020216','Zuma','Jacob','11020216@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020217','Mphemfe','Sipho','11020217@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020218','Maree','Nicolaas','11020218@nwu.ac.za');

INSERT INTO LECTURER(lecturer_number,lecturer_lastname,lecturer_firstname,lecturer_email)
VALUES   ('11020219','Barnard','Jacques','Jacques.Barnard@nwu.ac.za');
```

```
INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('23918748','Boshoff','Etienne','etienne4241@hotmail.com');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('27300749','Marx','Paul','27300749@hotmail.com');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('28684826','Brough','Ansie','28684826@hotmail.com');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('29158710','Fritze','Savannah','29158710@hotmail.com');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('27225860','Du Preez','Edrich','27225860@hotmail.com');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('28522125','Mitton','Jeandre','28522125@hotmail.com');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('11020211','Goldberg','Roland','Roland.Goldberg@nwu.ac.za');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('11020212','Mattheysen','Andries','11020212@student.g.nwu.ac.za');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('11020213','Madden','Victor','11020213@student.g.nwu.ac.za');

INSERT INTO INTERPRETER(interpreter_number,interpreter_lastname,interpreter_firstname,interpreter_email)
VALUES   ('11020214','Pompies','Piet','11020214@student.g.nwu.ac.za');
```

```
INSERT INTO EQUIPMENT(equipment_id,equipment_description,equipment_quantity)
VALUES   (equipment_equipid_seq.NEXTVAL,'headphones',500);

INSERT INTO EQUIPMENT(equipment_id,equipment_description,equipment_quantity)
VALUES   (equipment_equipid_seq.NEXTVAL,'microphones',300);

INSERT INTO EQUIPMENT(equipment_id,equipment_description,equipment_quantity)
VALUES   (equipment_equipid_seq.NEXTVAL,'tablets',300);

INSERT INTO EQUIPMENT(equipment_id,equipment_description,equipment_quantity)
VALUES   (equipment_equipid_seq.NEXTVAL,'clothes',500);

INSERT INTO EQUIPMENT(equipment_id,equipment_description,equipment_quantity)
VALUES   (equipment_equipid_seq.NEXTVAL,'rechargable batteries',500);

INSERT INTO EQUIPMENT(equipment_id,equipment_description,equipment_quantity)
VALUES   (equipment_equipid_seq.NEXTVAL,'toolbox',500);
```

```
INSERT INTO MODULE(module_code,module_description)
VALUES ('BMAN111','INTRODUCTION TO THE BUSINESS ENVIRONMENT');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG111','INTRODUCTION TO PROGRAMMING');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG121','INTRODUCTION TO PROGRAMMING 2');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG211','JAVA PROGRAMMING');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG212','C# PROGRAMMING');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG213','SYSTEMS DESIGN');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG311','DATABASE 1');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG321','DATABASE 2');

INSERT INTO MODULE(module_code,module_description)
VALUES ('CMPG221','JAVA PROGRAMMING 2');

INSERT INTO MODULE(module_code,module_description)
VALUES ('BMAN222','ADVANCED KNOWLEDGE IN THE BUSINESS ENVIRONMENT');

INSERT INTO MODULE(module_code,module_description)
VALUES ('ACCS111','INTRODUCTION TO ACCOUNTING');
```

```
INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020210','BMAN111');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020211','ACCS111');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020212','CMPG111');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020213','CMPG121');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020214','CMPG311');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020215','CMPG213');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020216','CMPG321');
```


```
INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020216','CMPG321');
```


```
INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020217','CMPG211');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020218','CMPG212');

INSERT INTO MODULE_PER_LECTURER(lecturer_number,module_code)
VALUES   ('11020219','CMPG221');
```

```
INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020210','BMAN111','15-MAY-19 15:00:00','23918748');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020211','ACCS111','21-MAY-19 11:00:00','27300749');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020212','CMPG111','15-JUN-19 13:00:00','28684826');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020210','BMAN111','20-MAY-19 15:00:00','27300749');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020213','CMPG121','17-MAY-19 08:00:00','28522125');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020214','CMPG311','10-MAY-19 15:00:00','27225860');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020215','CMPG213','30-MAY-19 15:00:00','29158710');
INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020210','BMAN111','10-MAY-19 13:00:00','23918748');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020216','CMPG321','13-MAY-19 17:00:00','28522125');

INSERT INTO MODULE_LECTURE_BOOKING(lecturer_number,module_code,booking_date,interpreter_number)
VALUES   ('11020217','CMPG211','15-AUG-19 15:00:00','29158710');
```

```
INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                date_out,date_in,equipment_out,equipment_in)
VALUES    (1,23918748,SYSDATE,NULL,30,0);

INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                date_out,date_in,equipment_out,equipment_in)
VALUES    (1,27300749,'30-MAY-19 15:00:00',NULL,30,0);

INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                date_out,date_in,equipment_out,equipment_in)
VALUES    (1,23918748,SYSDATE,NULL,30,0);

INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                date_out,date_in,equipment_out,equipment_in)
VALUES    (1,23918748,SYSDATE,SYSDATE,0,30);

INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                date_out,date_in,equipment_out,equipment_in)
VALUES    (2,28522125,SYSDATE,null,1,0);
```

```
INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                 date_out,date_in,equipment_out,equipment_in)
VALUES    (2,28522125,SYSDATE,null,1,0);

INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                 date_out,date_in,equipment_out,equipment_in)
VALUES    (3,28684826,SYSDATE,null,1,0);

INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                 date_out,date_in,equipment_out,equipment_in)
VALUES    (2,28684826,SYSDATE,null,1,0);

INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                 date_out,date_in,equipment_out,equipment_in)
VALUES    (1,28684826,SYSDATE,null,50,0);
```

```
INSERT INTO INTERPRETER_EQUIPMENT_BOOKING(equipment_id,interpreter_number,
                                date_out,date_in,equipment_out,equipment_in)
VALUES    (2,28522125,SYSDATE,SYSDATE,0,1);
```

3 QUERIES

Assignment 3 (Physical Design) Marking Guide

Member Names:		Contribution%:
E BOSHOFF	23918748	100%
P MARX	27300749	100%
A BROUGH	28684826	100%
S FRITZE	29158710	100%
E DU PREEZ	27225860	100%
J MITTON	28522125	100%

Criteria	Total	Mark
Database objects		
• Tables		
o Correct datatypes	**4**	
o 3NF design	**4**	
o Primary keys	**4**	
o Foreign keys	**4**	
o Check constraints	**2**	
• Indexes	**2**	
• Views	**4**	
• Data on tables	**4**	
Queries		
• Based on information requirements of company	**10**	
• Limitation of rows and columns	**4**	
• Sorting	**4**	
• LIKE, AND and OR	**4**	
• Variables and character functions	**4**	
• Round or trunc	**4**	
• Date functions	**4**	
• Aggregate functions	**4**	
• Group by and having	**4**	
• Join	**5**	
• Sub-queries	**5**	
Demonstration	**15**	
• Whole team participates		
• On time for appointment		
• Computer set up correctly to demonstrate the working of ALL SQL statements		
• Hardcopy of SQL available		
• Questions answered correctly		
SQL statements are correct	**10**	
Objects successfully created in Oracle SQL Developer	**10**	
Extra functionality	**10**	
Project completed on time	**10**	
TOTAL	**135**	