

Database Management Systems

Lab 5 Exercise: Simple SQL DDL, DML and Constraint Statements

WHAT TO DO

1. 下载 **Lab5** 课程材料，**Lab3Exercise** 文件夹中包含三个 SQL 脚本文件，**Lab5DB.sql**, **Lab5AddConstraints.sql** and **Lab5TestConstraints.sql**.
2. **Place** your **InsertMyself.sql** script file inside the **Lab5Exercise** folder. 在该文件中增加插入下列 5 个纪录的语句。

studentId	courseId	grade
<your student id>	COMP3311	97.6
<your student id>	COMP4021	88.3
<your student id>	ELEC3100	95.1
<your student id>	HUMA1020	89.4
<your student id>	MATH2421	92.5

3. **Execute** the **Lab5DB.sql** script file in **SQL Developer**.
4. **Edit** the **Lab5AddConstraints.sql** script file by editing the **alter table** statements to do the following.
 - a. For the **Student**, **Course**, **Facility** and **EnrollsIn** tables, add foreign key referential integrity constraints.
 - b. For the **Department** table, add a constraint to check that **departmentId** has only a value in the set {BUS, COMP, ELEC, HUMA, MATH}.
 - c. For the **Student** table, add constraints to
 - i. enforce the uniqueness of **email** values;
 - ii. check that **studentId** and **phoneNo** have exactly 8 digits only;
 - iii. check that **cga** has a value between 0 and 4; and
 - iv. check that **admissionYear** begins with a 2 and has exactly 4 digits only.
 - d. For the **Course** table, add a constraint to check that **courseId** follows the pattern of exactly four uppercase letters followed by exactly four digits.
 - e. For the **EnrollsIn** table, add a constraint to check that **grade** has a value between 0 and 100.

Note: 你可以逐条实现和测试上述约束。在实现第 *i* 个约束后，你可以在 **Lab5AddConstraint.sql** 上把光标挪到改行，然后点击 **Run** 按钮仅运行该行。随后，执行 **Lab5TestConstraints.sql** 上测试第 *i* 个约束的语句。但要注意，假如你的约束没有正确实现，**Lab5TestConstraints** 就会插入不合法的纪录，修改了你的数据库。所以在每次测试后，重新运行 **Lab5DB.sql**，让数据库恢复原来的状态。

5. When all your constraints are correctly specified, **execute** the **Lab5TestConstraints.sql** script file in **SQL Developer**. 把输出结果复制粘贴到一个文本文件中，命名为 **Lab5TestConstraintsResults.txt**.

WHAT TO SUBMIT

1. Your modified **Lab5AddConstraints.sql** script file containing the completed **alter table** statements.
2. A text file named **Lab5TestConstraintsResults.txt** containing the result of executing the **Lab5TestConstraints.sql** script file. The **Lab5TestConstraintsResults.txt** file can be created by saving the **SQL Developer Script Output tab** to a file with this name. The expected result of executing the **Lab5TestConstraints.sql** script file is shown in Figure 1 and Figure 2.

HOW TO SUBMIT

在下次实验课之前（周二下午 10 点前），将上述文件打包（以为名字+学号命名）发给学委，学委再打包邮件发给我（zhenglb6@mail.sysu.edu.cn）。

Lab 5 Exercise: Simple SQL DDL, DML and Constraint Statements

```
<<<<----- STUDENTS WHOSE AVERAGE GRADE IS >90 ----->>>>
STUDENTI FIRSTNAME      LASTNAME      AVG(GRADE)
-----
11111111 Typical        Student       92.58
28918856 Alan           Turing        91.1
<<<<----- TESTS FOR REFERENTIAL INTEGRITY CONSTRAINTS ----->>>>

*** 1. REFERENTIAL INTEGRITY on Facility table: No matching department id in Department table.

Error starting at line : 26 in command -
insert into Facility values ('CHEM', 2, 5)
Error report -
ORA-02291: integrity constraint (COMP3311STU000.SYS_C0069568) violated - parent key not found

*** 2. REFERENTIAL INTEGRITY on Student table: No matching departmentId in Department table.

Error starting at line : 31 in command -
insert into Student values ('22222222', '*** Student ***', 'RI: No matching dept id', 'afong', '22223334', 0.00, 'PHYS', '2016')
Error report -
ORA-02291: integrity constraint (COMP3311STU000.SYS_C0069569) violated - parent key not found

*** 3. REFERENTIAL INTEGRITY on Student table: Should delete 1 row and select 0 rows.

1 row deleted.

0 rows selected.

*** 4. REFERENTIAL INTEGRITY on Course table: No matching department id in Department table.

Error starting at line : 41 in command -
insert into Course values ('PHYS4311', '*** ', '*** Course ***', 'RI: No matching dept id')
Error report -
ORA-02291: integrity constraint (COMP3311STU000.SYS_C0069570) violated - parent key not found

*** 5. REFERENTIAL INTEGRITY on EnrollsIn table: No matching course id in Course table.

Error starting at line : 46 in command -
insert into EnrollsIn values ('13456789', 'PHYS4311', 80.6)
Error report -
ORA-02291: integrity constraint (COMP3311STU000.SYS_C0069572) violated - parent key not found

*** 6. REFERENTIAL INTEGRITY on EnrollsIn table: No matching student id in Student table.

Error starting at line : 50 in command -
insert into EnrollsIn values ('12345678', 'COMP3311', 75.6)
Error report -
ORA-02291: integrity constraint (COMP3311STU000.SYS_C0069571) violated - parent key not found
```

**Your information
should be shown in the
result of this query.**

Figure 1: Example Script Output tab showing the result of executing the referential integrity constraints.

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```
<<<<----- TESTS FOR CHECK CONSTRAINTS ----->>>>

*** 7. CHECK CONSTRAINT on Department table: departmentId must be one of BUS, COMP, ELEC, HUMA or MATH.

Error starting at line : 57 in command -
insert into Department values ('DEPT','*** Department table: CHK: deptId','0000')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_DEPARTMENTID) violated

*** 8. CHECK CONSTRAINT on Student table: studentId must be all digits.

Error starting at line : 62 in command -
insert into Student values ('234567*9','*** Student table:', 'CHK: studentId', 'afong', '22223334', 0.00, 'COMP', '2016')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_STUDENTID) violated

*** 9. CHECK CONSTRAINT on Student table: studentId must be exactly 8 digits.

Error starting at line : 67 in command -
insert into Student values ('234567', '*** Student table:', 'CHK: studentId', 'bfong', '22223334', 0.00, 'COMP', '2016')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_STUDENTID) violated

*** 10. CHECK CONSTRAINT on Student table: phoneNo must be all digits.

Error starting at line : 72 in command -
insert into Student values ('33333333', '*** Student table:', 'CHK: studentId', 'cfong', '222a3334', 0.00, 'COMP', '2016')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_PHONENO) violated

*** 11. CHECK CONSTRAINT on Student table: phoneNo must be exactly 8 digits.

Error starting at line : 77 in command -
insert into Student values ('44444444', '*** Student table:', 'CHK: studentId', 'dfong', '2222', 0.00, 'COMP', '2016')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_PHONENO) violated

*** 12. CHECK CONSTRAINT on Student table: cga must be between 0 and 4.

Error starting at line : 82 in command -
insert into Student values ('55555555', '*** Student table:', 'CHK: cga', 'ali', '25524334', 4.50, 'COMP', '2016')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_CGA) violated

*** 13. CHECK CONSTRAINT on Student table: admissionYear must be all digits.

Error starting at line : 87 in command -
insert into Student values ('77777777', '*** Student table:', 'CHK: admissionYear', 'bli', '25524334', 4.50, 'COMP', '200a')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_ADMISSIONYEAR) violated

*** 14. CHECK CONSTRAINT on Student table: admissionYear has exactly 4 digits.

Error starting at line : 92 in command -
insert into Student values ('88888888', '*** Student table:', 'CHK: admissionYear', 'cli', '25524334', 4.50, 'COMP', '200')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_ADMISSIONYEAR) violated

*** 15. CHECK CONSTRAINT on Student table: admissionYear begins with a 2.

Error starting at line : 97 in command -
insert into Student values ('99999999', '*** Student table:', 'CHK: admissionYear', 'dli', '25524334', 4.50, 'COMP', '1999')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_ADMISSIONYEAR) violated

*** 16. CHECK CONSTRAINT on Course table: course id must be exactly four uppercase letters followed by exactly four digits.

Error starting at line : 102 in command -
insert into course values ('comp3311','COMP','** Course Table: CHK: courseId','Test Man')
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_COURSEID) violated

*** 17. CHECK CONSTRAINT on EnrollsIn table: grade must be between 0 and 100.

Error starting at line : 107 in command -
insert into EnrollsIn values ('99987654', 'COMP3311', 100.1)
Error report -
ORA-02290: check constraint (COMP3311STU000.CHK_GRADE) violated

<<<<----- TEST FOR UNIQUE CONSTRAINT ----->>>>

*** 18. CHECK CONSTRAINT on Student table: email must be unique.

Error starting at line : 114 in command -
insert into Student values ('10101010', '*** Student table:', 'CHK: eEmail', 'csgrande', '22223334', 0.00, 'COMP', '2018')
Error report -
ORA-00001: unique constraint (COMP3311STU000.UNIQUE_EMAIL) violated
```

Figure 2: Example Script Output tab showing the result of executing the check constraints.