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| **《数据库系统原理》实验报告（六）** | | | | | |
| **题目： 触发器** | | | | | |
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| **实验环境：Redhat5**  **VMware workstation 15 pro**  **Oracle** | | | | | |
| **实验步骤及结果截图：**  先切换用户至oracle  conn oracle  1建立table studentsA  Sno char(9) primary key  Sname char(20) unique  Ssex char(20)  Sage smallint  Sdept char(20)  create table studentsA(  Sno char(9) primary key,  Sname char(20) unique,  Ssex char(20),  Sage smallint,  Sdept char(20)  );  2建立table coursesA  Cno char(4) primary key  Cname char(40)  Cpno char(4)  Ccredit smallint  create table coursesA(  Cno char(4) primary key,  Cname char(40),  Cpno char(4),  Ccredit smallint  );  3建立table SC  Sno char(9)  Cno char(4)  Grade smallint  primary key (Sno,Cno)  foreign key (Sno) references studentsA(Sno)  foreign key (Cno) references coursesA(Cno)  create table SC(  Sno char(9),  Cno char(4),  Grade smallint,  primary key (Sno,Cno),  foreign key(Sno) references studentsA(Sno),  foreign key(Cno) references coursesA(Cno)  );  4插入数据  先清空之前的数据  DELETE FROM SC;  DELETE FROM coursesA;  DELETE FROM studentsA;  然后插入数据  insert into studentsA values ('200215121','Li Yong','male',20,'CS');  insert into studentsA values ('200215122','Liu Chen','female',19,'CS');  insert into studentsA values ('200215123','Wang Min','female',18,'MA');  insert into studentsA values ('200215125','Zhang Li','male',19,'IS');    insert into coursesA(Cno,Cname,Cpno,Ccredit) values ('0001','database','5',4);  insert into coursesA (Cno,Cname,Ccredit) values ('0002','maths',2);  insert into coursesA (Cno,Cname,Cpno,Ccredit) values ('0003','IS','1',4);  insert into coursesA (Cno,Cname,Cpno,Ccredit) values ('0004','OS','6',3);  insert into coursesA (Cno,Cname,Cpno,Ccredit) values ('0005','data struncture','7',4);  insert into coursesA (Cno,Cname,Ccredit) values ('0006','data process',2);  insert into coursesA (Cno,Cname,Cpno,Ccredit) values ('0007','PASCAL','6',4);    insert into SC values ('200215121','0001',92);  insert into SC values ('200215121','0002',85);  insert into SC values ('200215121','0003',88);  insert into SC values ('200215122','0002',90);  insert into SC values ('200215122','0003',80);    6，作业：创建触发器  1）创建一个触发器，使得每当新建一门课程时，判断输入信息的合法性（必须得有主键非空，实现其他有加分），只有合法的信息才能创建。  2）利用系统触发器实现数据库启动和关闭的日志  1）触发器1：限制主键为空的插入  create or replace trigger coursesA\_tri1  before insert or update on coursesA  for each row  begin  if :new.Cno is null then  raise\_application\_error(-20001, 'Can''t Update/Insert when Cno is null');  end if;  end;  /    触发器2：限制学分小于等于0的插入  create or replace trigger coursesA\_tri2  before insert or update on coursesA  for each row  begin  if :new.Ccredit <=0 then  raise\_application\_error(-20001, 'Can''t Update/Insert when Ccredit is less than zero');  end if;  end;  /    两个触发器分别创建是为了更好地管理触发器的开关  触发器1效果  insert into coursesA(Cno,Cname,Cpno,Ccredit) values (NULL,'CVPR','3',4);    触发器2效果  insert into coursesA(Cno,Cname,Cpno,Ccredit) values ('0008','databasea','6',-1);    2）创建日志表  create table Database\_logs(  ts Timestamp not null,  log varchar(500)  );  数据库开启触发器：  create or replace trigger log\_open  after startup  on database  begin  insert into Database\_logs(ts,log) values(sysdate,’database is open’);  end;  /  数据库关闭触发器：  create or replace trigger log\_close  before shutdown  on database  begin  insert into Database\_logs(ts,log) values(sysdate,’database is closed’);  end;  /  触发器效果： | | | | | |
| **出现的问题：**  **1、ORA-04089: cannot create triggers on objects owned by SYS。SYS用户下不允许创建触发器** | | | | | |
| **解决方案：**  **1、切换用户，在其他用户下创建触发器** | | | | | |