language=SQL,

morekeywords=WITH,to$_{c}har, to_{d}ate, WHILE, LOOP, FOR, IF, ELSIF, DEC$

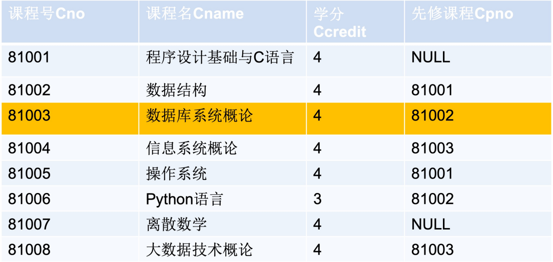
$left, stepnumber = 1, linewidth = 0.8xleftmargin = 0.1$

8

2023 Fall

1 |

- ▶ 1 “ ”

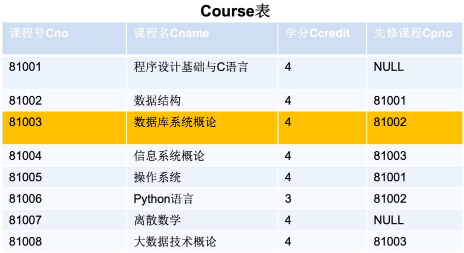


课程号Cno	课程名Cname	学分Ccredit	先修课程Cpno
81001	程序设计基础与C语言	4	NULL
81002	数据结构	4	81001
81003	数据库系统概论	4	81002
81004	信息系统概论	4	81003
81005	操作系统	4	81001
81006	Python语言	3	81002
81007	离散数学	4	NULL
81008	大数据技术概论	4	81003

Course表

1 ||

- ▶ 1 “ ”



Course表

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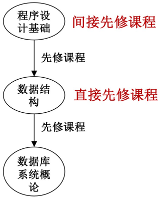
81004	信息系统概论	4	81003
81005	操作系统	4	81001
81006	Python语言	3	81002
81007	离散数学	4	NULL
81008	大数据技术概论	4	81003



1 III

- SQL
  -
  -
  -

SQL I

-
  1. 1 “ ” L[1] L[1]

SELECT B.Cname FROM Course A, Course B WHERE A.Cname = ’ ’ AND A.Cpno=B.Cno;

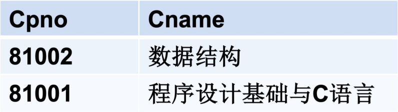
SQL I

-

  2. i (i>=2) L[i-1] L[i]
  3. i, L[i] $L[1] \bigcup \cdots \bigcup L[i]$

SELECT B.Cname FROM Course A, Course B WHERE A.Cname = ' ' AND A.Cpno=B.Cno;
SELECT B.Cname FROM Course A, Course B WHERE A.Cname = ' C ' AND A.Cpno=B.Cno;

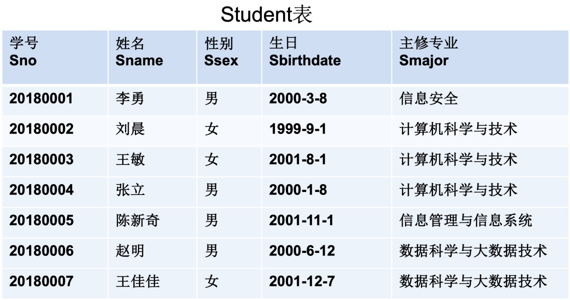
- 2 2.1 Course 1 “ ” “ ” L[1]
- 2 “ ” “ C ” L[2]
- 3 “ C ” L[3]
- L[3] $L[1] \bigcup L[2]$ 1



Cpno	Cname
81002	数据结构
81001	程序设计基础与C语言

2 |

- 2



Student表

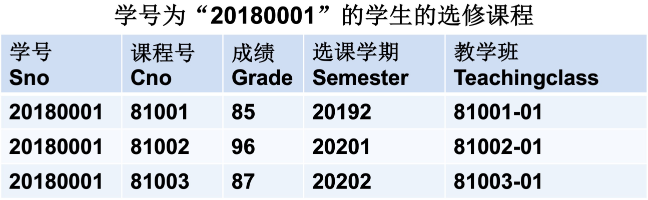
学号 Sno	姓名 Sname	性别 Ssex	生日 Sbirthdate	主修专业 Smajor
20180001	李勇	男	2000-3-8	信息安全
20180002	刘晨	女	1999-9-1	计算机科学与技术
20180003	王敏	女	2001-8-1	计算机科学与技术
20180004	张立	男	2000-1-8	计算机科学与技术
20180005	陈新奇	男	2001-11-1	信息管理与信息系统
20180006	赵明	男	2000-6-12	数据科学与大数据技术
20180007	王佳佳	女	2001-12-7	数据科学与大数据技术

2 II

- SQL
  - 2 ( ) : 2000-6-12
    1. (2021) 2021-6-12
    2. 2021-6-9
    3. [2021-6-9 2021-6-16]
    4.

3 GPA I

- 3 GPA



学号为“20180001”的学生的选修课程

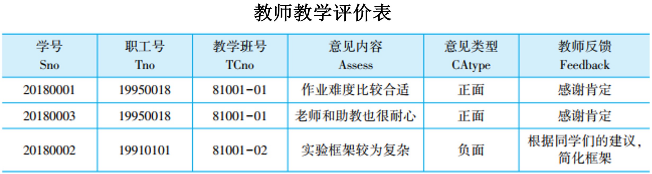
学号 Sno	课程号 Cno	成绩 Grade	选课学期 Semester	教学班 Teachingclass
20180001	81001	85	20192	81001-01
20180001	81002	96	20201	81002-01
20180001	81003	87	20202	81003-01

3 GPA II

- SQL
  -
  -
  - “ ”

4 |

- 4

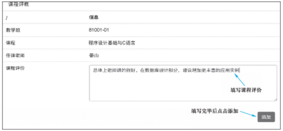


教师教学评价表

学号 Sno	职工号 Tno	教学班号 TCno	意见内容 Assess	意见类型 CAtype	教师反馈 Feedback
20180001	19950018	81001-01	作业难度比较合适	正面	感谢肯定
20180003	19950018	81001-01	老师和助教也很耐心	正面	感谢肯定
20180002	19910101	81001-02	实验框架较为复杂	负面	根据同学们的建议，简化框架

4 II

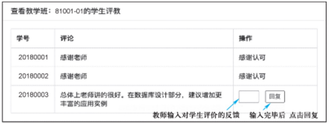
- SQL



课程评教

/	信息
教学班	81001-01
课程	程序设计基础与C语言
任课老师	姜山
课程评价	总体上老师讲的很好，在数据库设计部分，建议增加更丰富的应用实例

图 学生输入并提交课程评价



查看教学班：81001-01的学生评教

学号	评论	操作
20180001	感谢老师	感谢认可
20180002	感谢老师	感谢认可
20180003	总体上老师讲的很好。在数据库设计部分，建议增加更丰富的应用实例	回复

图: 教师提交对学生评价的反馈

I

- SQL
  - –
  - –
  - ——
  - –

SQL I

- 1. SQL
- 2.
- 3. PL/SQL /

SQL I

- 1 SQL WITH RECURSIVE
- WITH RECURSIVE SQL SQL
- WITH RECURSIVE WITH

WITH I

- WITH :

WITH RS1 (< >,< >) AS /* RS1 */ SELECT 1 [, /*
RS1 SELECT */ /*SELECT 1 RS1 */
RS2 (< >,< >) AS /* RS2 */ SELECT 2 ,...] /*
RS2 SELECT */ /*SELECT 2 RS2 */ SQL /*
RS1 RS2,..., */

WITH I

- 81001-01 81001-02

```
WITH RS1(Grade) AS (SELECT AVG(Grade) FROM SC WHERE
Teachingclass = '81001-01'), RS2(Grade) AS (SELECT
AVG(Grade) FROM SC WHERE Teachingclass = '81001-02')
SELECT RS1.Grade-RS2.Grade FROM RS1,RS2;
```

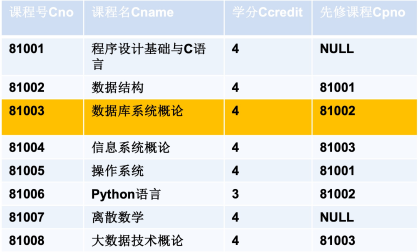
WITH RECURSIVE I

- WITH RECURSIVE :

WITH RECURSIVE RS AS (SEED QUERY /* L[1]*/
UNION [ALL] /* ALL */ RECURSIVE QUERY
/* L[2] ... L[i]*/) SQL /* RS */

WITH RECURSIVE I

- ▶ 1 “ ”



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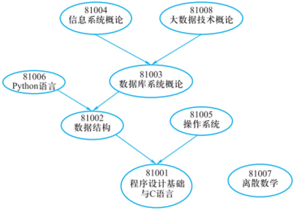


WITH RECURSIVE II

- 1 “ ”

WITH RECURSIVE RS AS (SELECT Cpno FROM Course WHERE Cname = ' ' /* RS L[1] “ ” */ UNION SELECT Course.Cpno FROM Course,RS WHERE RS.Cpno = Course.Cno) /* i (i>=1) i-1 RS*/ SELECT Cno, Cname FROM Course WHERE Cno IN (SELECT Cpno FROM RS); /* RS */

- SQL
  -
  -
  -
  -
  - IP
  -
  -
  -

|

- 2

SELECT Sno, Sname, Ssex, Sbirthdate, Smajor FROM Student WHERE to$_{d}ate(to_{c}har(current_{d}ate,' yyyy')||' -' ||to_{c}har(Sbirthdate,' mm - dd'))BETWEENCURRENT_{D}ATEANDCURRENT_{D}ATE + INTERVAL'7'DAY$;

- WHERE :

||

1. current$_d ate2021 - 6 - 9$

1.
   to$_c har(current_d ata'yyyy')2021; to_c har(Sbirthdate'mm - dd')6-$
   9

1. to$_d ate(to_c har(current_d ate,'yyyy')||' -'$
   $||to_c har(Sbirthdate,'mm - dd'))' -''$

1. to$_d ate()$

1. CURRENT$_D ATE +$
   $INTERVAL'7'DAYinterval(yyyy)(q)(m)(d)(h)CURRENT_D ATE + INT$
   $6 - 16$

- WHERE [2021-6-9 2021-6-16]

PL/SQL /

- PL/SQL

-
    -
- SQL
    - SQL SQL
- ODBC/JDBC
    - API

2.1 SQL I

- SQL
  - SQL
  -
  -
    -
    -
- SQL
  1. : DECLARE
     -
     -
  2.

BEGIN SQL SQL EXCEPTION END;

-
-

2.2 I

1.
   - [[NOT NULL]:=]
   - [[NOT NULL]]
2.
   - CONSTANT :=
   - SQL
3.
   - :=

2.3 l

- SQL

  1. : IF-THEN IF-THEN-ELSE IF
     - IF-THEN
     - IF-THEN-ELSE
     - THEN ELSE IF IF

IF condition THEN Sequence$_{o}f_{s}tatements$; $ENDIF$;
IF condition THEN
Sequence$_{o}f_{s}tatements1$; $ELSESequence_{o}f_{s}tatements2$; $ENDIF$;

2.3 II

2. : LOOP, WHILE-LOOP, FOR-LOOP

LOOP Sequence$_o f_s tatements$; $ENDLOOP$;

- SQL EXIT BREAK LEAVE LOOP

2.3 III

WHILE condition LOOP Sequence$_of_statements; ENDLOOP$;

-
-
-

2.3 IV

FOR count IN [REVERSE] bound1 ... bound2 LOOP
Sequence$_o f_s tatements; ENDLOOP$;

2.3 V

3.

- SQL
- SQL SQL

2.4 I

-
  - SQL SELECT
  - SQL
  - :

    1. 2. 3. 4.

2.4 II

1.

DECLARE [(1 , 2 , …)] CURSOR FOR SELECT ;

- SELECT

2.4 III

2.

OPEN [(1 , 2 , …)];

- SELECT

2.4 IV

3.

FETCH INTO 1[, 2,…];

- SELECT
- FETCH SQL
- FETCH

2.4 V

4.

CLOSE ;

-
-

2.4

- 20180001

[xleftmargin=0.1linewidth=] DECLARE CnoOfStudent CHAR(10); GradeOfStudent INT; mycursor CURSOR FOR SELECT Cno,Grade FROM SC WHERE Sno = '20180001'; BEGIN OPEN mycursor; /* */ LOOP /* */ FETCH mycursor INTO CnoOfStudent, GradeOfStudent; /* */ EXIT WHEN mycursor %NOTFOUND; RAISE NOTICE 'Sno:20180001, Cno:%, Grade:%', CnoOfStudent, GradeOfStudent; END LOOP; CLOSE mycursor; /* */ END;

-
  - SQL stored procedure stored function SQL
  -
-
  1.
  2.
  3.
  4.

- |

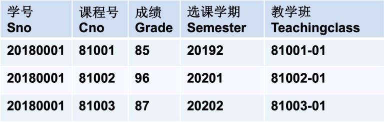
1.

```
[linewidth=] CREATE OR REPLACE PROCEDURE  (
[[IN|OUT|INOUT]  1   , [IN|OUT|INOUT]  2   , ...] ) /*    */
AS <  SQL >; /*          */
```

-
- IN OUT INOUT IN
- < SQL >

–

- GPA
-
    -
    -



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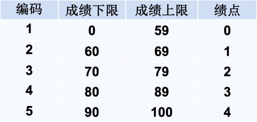
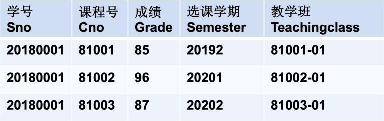


编码	成绩下限	成绩上限	绩点
1	0	59	0
2	60	69	1
3	70	79	2
4	80	89	3
5	90	100	4

- GPA
-
  - “81001” 85 85 [80,89] 3 “81002” 4 “81003” 3
  - 81001-81003 4 GPA $=$ / $=$ * /12 $= (3*4 + 4*4 + 3*4)/12 = 3.33$



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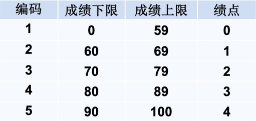

编码	成绩下限	成绩上限	绩点
1	0	59	0
2	60	69	1
3	70	79	2
4	80	89	3
5	90	100	4

- GPA

[linewidth=] CREATE OR REPLACE PROCEDURE compGPA(/* compGPA*/ IN inSno CHAR(10), /* inSno*/ OUT outGPA FLOAT) /* outGPA*/ AS DECLARE courseGPA INT; /* courseGPA */ totalGPA INT; /* totalGPA */ totalCredit INT; /* totalCredit */ grade INT; /* grade */ credit INT; /* credit */ mycursor CURSOR FOR /* mycursor */ SELECT Ccredit, grade FROM SC, Course WHERE Sno = inSno AND SC.Cno = Course.Cno;

- II

[firstnumber=15,linewidth=] BEGIN totalGPA := 0; totalCredit := 0; OPEN mycursor; /* mycursor */ LOOP /* */ FETCH mycursor INTO credit, grade; /* */ EXIT WHEN mycursorIF grade BETWEEN 90 AND 100 THEN courseGPA := 4.0; ELSIF grade BETWEEN 80 AND 89 THEN courseGPA := 3.0; ELSIF grade BETWEEN 70 AND 72 THEN courseGPA := 2.0; ELSIF grade BETWEEN 60 AND 69 THEN courseGPA := 1.0; ELSE courseGPA := 0; END IF; /* 8.2 */ totalGPA := totalGPA + courseGPA * credit; totalCredit := totalCredit + credit; END LOOP; CLOSE mycursor; /* mycursor */ outGPA:= 1.0 * totalGPA / totalCredit; END;

I

2.

CALL/PERFORM [PROCEDURE] ([1, 2,...])

- CALL PERFORM
- SQL

II

- “20180001” GPA
  -

```
DECLARE outGPA FLOAT; BEGIN CALL
compGPA('20180001',outGPA); RAISE NOTICE 'GPA: END;
```

I

3.

- /

ALTER PROCEDURE 1 RENAME TO 2; ALTER PROCEDURE 1 COMPILE;

4.

DROP PROCEDURE

I

-
    1.
    2.
    3.

-
  1. :
  2.