西北工业大学 | Northwestern Polytechnical University

数据库系统原理 | Database System

第十章 查询处理与查询优化作业

第4题

4. 对于数据库模式：

Teacher (Tno, Tname, Tsex, Title, Tbirthdate, Dno)

Department (Dno, Dname, Dcontact, Dtel, Director, SHno);

Work(Tno, Dno, Year, Salary)

以上模式的语义参考本书附录。假设Teacher的Tno属性、Department的Dno属性以及Work的Year属性上有B+树索引。请说明下列查询语句的一种较优的处理方法。

(1) SELECT * FROM Teacher WHERE Tsex=='女'

(2) SELECT * FROM Department WHERE Dno<301

(3) SELECT * FROM Work WHERE Year <>2000

(4) SELECT * FROM Work WHERE Year>2000 AND Salary<5000

(5) SELECT * FROM Work WHERE Year<2000 OR Salary<5000

第4题

(1) SELECT * FROM Teacher WHERE Tsex=='女'
对teacher表进行全表扫描，查看元组是否满足性别为女。

(2) SELECT * FROM Department WHERE Dno<301
- ✓ 如果满足dno<301的元组数目较少,可以通过索引找到dno=301的索引项,然后顺着B+树的顺序得到dno<301的索引项，通过这些指针找到Department 中的元组。
- ✓ 如果dno<301的元组数目较多，可以采用对department全表扫描方式进行。

(3) SELECT * FROM Work WHERE Year<>2000
对work表进行全表扫描，查看元组是否满足Year<>2000

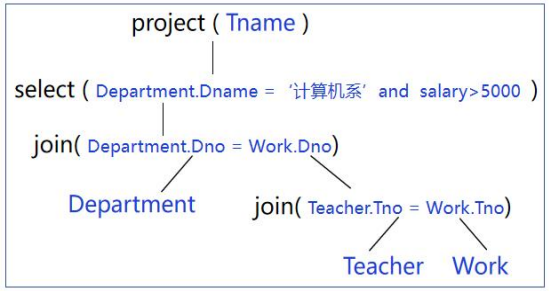
(4) SELECT * FROM Work WHERE Year>2000 AND Salary<5000
通过year的索引找到满足Year>2000的元组，检查元组是否满足Salary<5000。

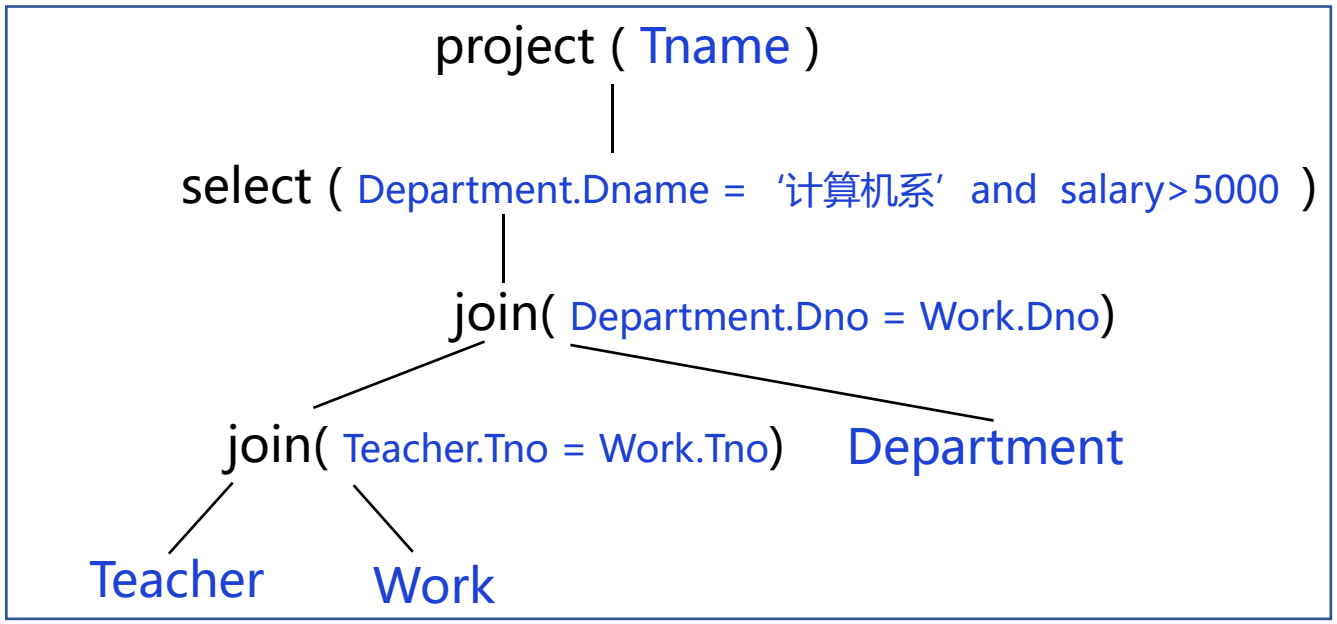
(5) SELECT * FROM Work WHERE Year<2000 OR Salary<5000
对work进行全表扫描，查看元组是否满足Year<2000 或者 Salary<5000。

第5题

对如下查询进行代数优化

```
SELECT Tname
FROM Teacher, Department, Work
WHERE Teacher.Tno = Work.Tno AND
      Department.Dno = Work.Dno AND
      Department.Dname =’计算机系’ AND salary>5000
```



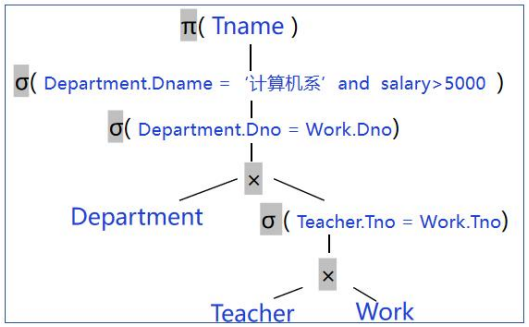


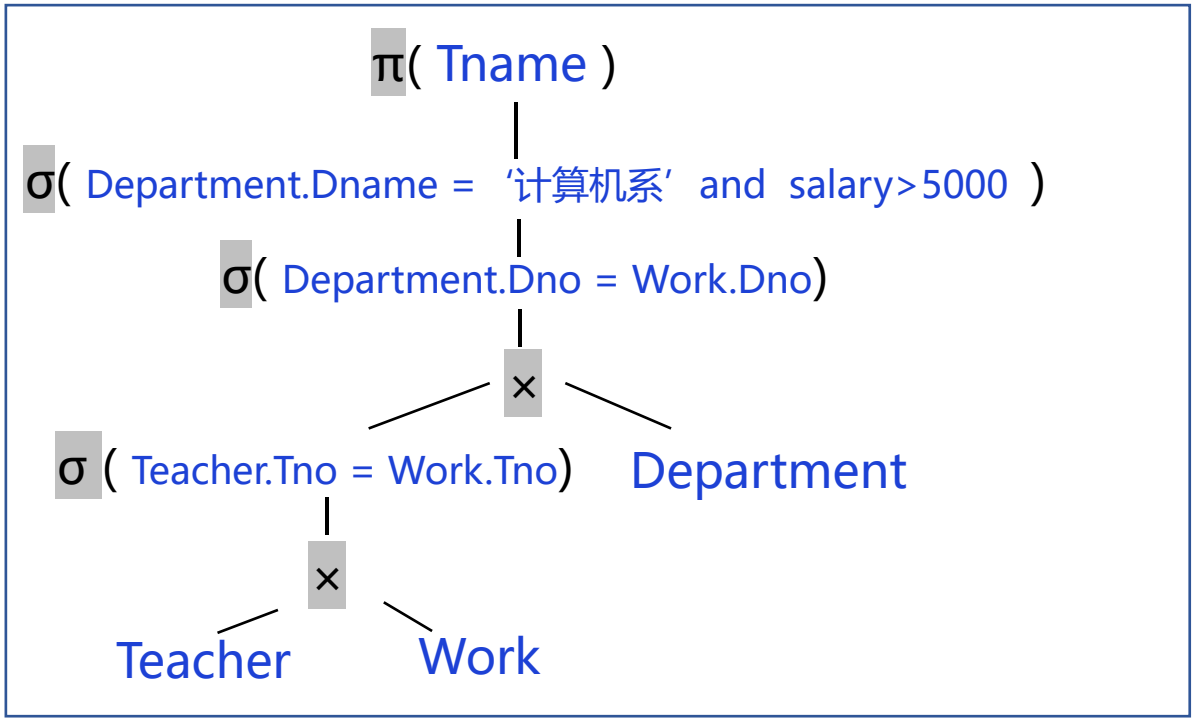
SQL查询树

第5题

对如下查询进行代数优化

```
SELECT Tname
FROM Teacher, Department, Work
WHERE Teacher.Tno = Work.Tno AND
      Department.Dno = Work.Dno AND
      Department.Dname =’计算机系’ AND salary>5000
```

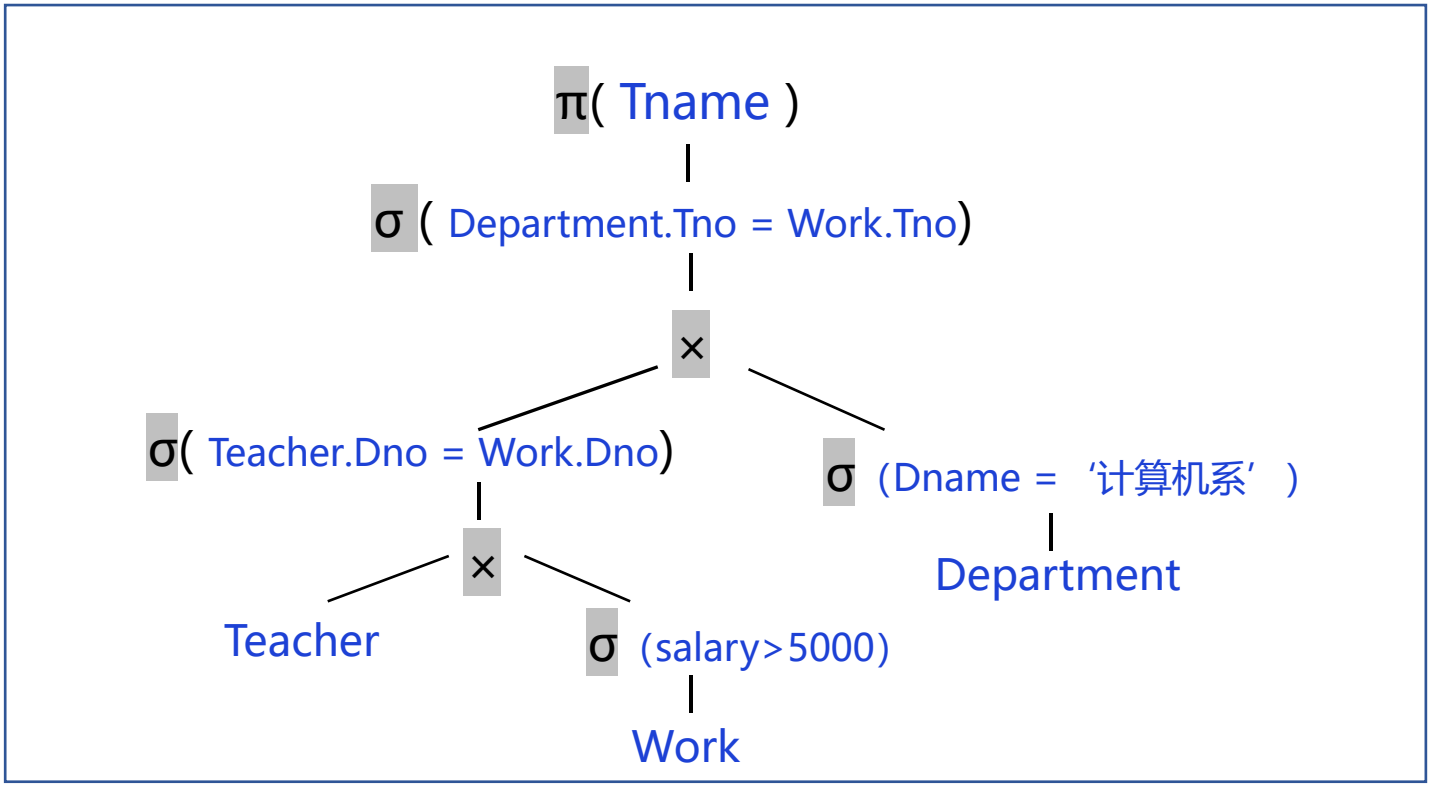




关系代数树

第5题

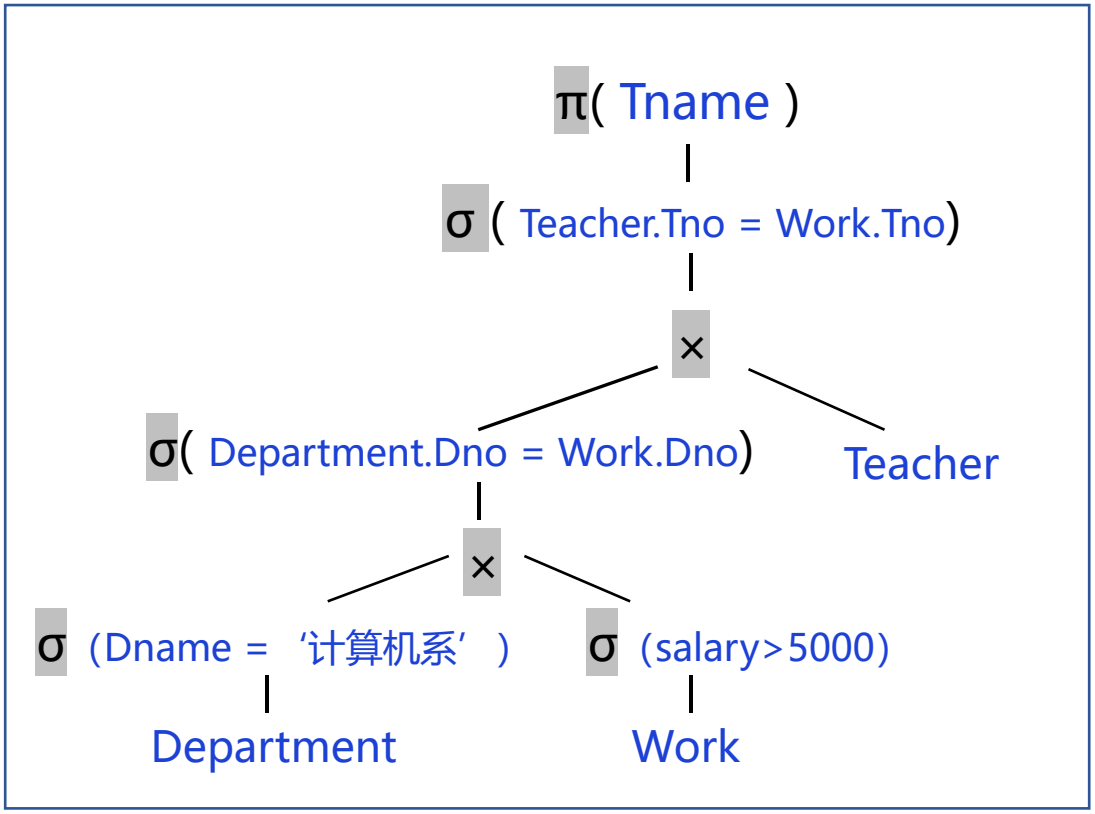
对如下查询进行代数优化



逻辑优化后的关系代数树（1）

第5题

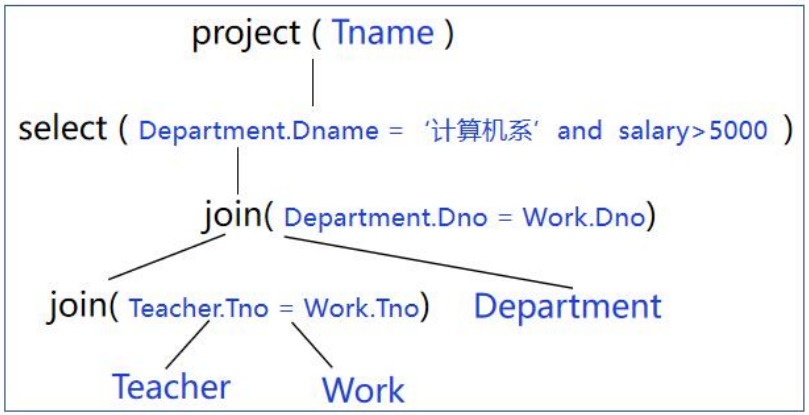
对如下查询进行代数优化



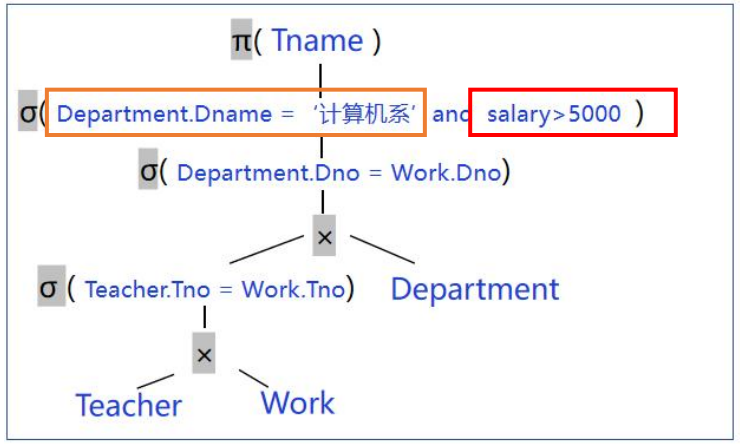
优化后的关系代数树（2）
考虑数据量依据小表做驱动表，笛卡尔积交换律

SQL关系代数优化过程

```
SELECT Tname
FROM Teacher, Department, Work
WHERE Teacher.Tno = Work.Tno AND
      Department.Dno = Work.Dno AND
      Department.Dname =' 计算机系' AND salary>5000
```

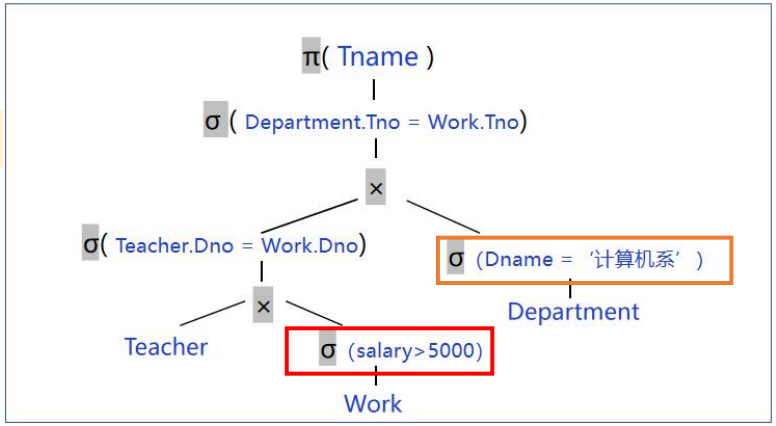



SQL查询树



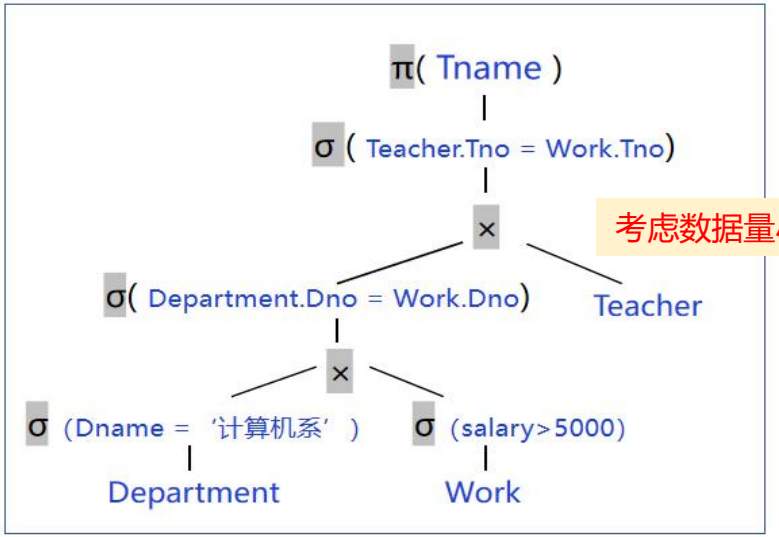
关系代数树

选择运算移动到叶节点



初步优化后关系代数查询树

考虑数据量小表驱动



最终优化后关系代数查询树