**The DIVISION Operation**

The DIVISION operation, denoted by ÷, is useful for a special kind of query that sometimes occurs in database applications.

An example is Retrieve the names of employees who work on all the projects that ‘John Smith’ works on. To express this query using the DIVISION operation, proceed as follows.

First, retrieve the list of project numbers that ‘John Smith’ works on in the intermediate relation

SMITH\_PNOS:

SMITH ← σ Fname=‘John’ AND Lname=‘Smith’(EMPLOYEE)

SMITH\_PNOS ← π Pno(WORKS\_ON Essn=Ssn SMITH)

Next, create a relation that includes a tuple <Pno, Essn> whenever the employee whose Ssn is Essn works on the project whose number is Pno in the intermediate relation SSN\_PNOS:

SSN\_PNOS ← π Essn, Pno(WORKS\_ON)

Finally, apply the DIVISION operation to the two relations, which gives the desired employees’ Social Security numbers:

SSNS(Ssn) ← SSN\_PNOS ÷ SMITH\_PNOS

RESULT ← πFname, Lname(SSNS \* EMPLOYEE)

The preceding operations are shown in Figure 8.8(a).

In general, the DIVISION operation is applied to two relations R(Z) ÷ S(X), where the attributes of S are a subset of the attributes of R; that is, X ⊆ Z.

