Database Assignment1

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Problem 1

1. Data redundancy and inconsistency: multiple file formats, duplication of information in different files

2. Difficulty in accessing data: need to write a new program to carry out each new task

3. Data isolation 一multiple files and formats

4. Integrity problems

Problem 2

1. Cost of Hardware and Software

2. Cost of Data Conversion

3. Cost of Staff Training

4. Appointing Technical Staff

5. Database Damage

Problem 3

	and unknown	*or* unknown	*not*
true	unknown	true	false
false	false	unknown	true
unknown	unknown	unknown	unknown

Problem 4

a. minimum: $\max(r, s)$. $R \subset S$ or $S \subset R$
maximum: $r + s$. $R \cap S = \emptyset$

b. minimum: 0. $R.B \cap S.B = \emptyset$
maximum: $r \times s$. All elements in $R.A$ and $S.C$ are distinct and All elements in $R.B$ and $S.B$ are the same.

c. minimum: 0. $R.B \cap S.B = \emptyset$
maximum: $min(r, s)$. All elements in $R.B$ are distinct and one relation's B attribute is a subset of another

d. That relation equals to R
minimum: r
maximum: r

e. minimum: 0. All tuples have $A = B$
maximum: r. All tuples have $A \neq B$

Problem 5

a. $\pi_{employee\_name,city}\left(employee \bowtie \sigma_{company\_name=\text{"First Bank Corporation"}}(works)\right)$

b. $\pi_{employee\_name,street,city}\left(employee \bowtie \sigma_{company\_name=\text{"First Bank Corporation"} \wedge salary>10000}(works)\right)$

c. $\pi_{name}\left(\sigma_{number=\mathcal{G}_{max(number)}(c)}\left(\rho_{c(name,number)}\left(_{company\_name}\mathcal{G}_{count(employee\_name)}(works)\right)\right)\right)$

d. $\sigma_{avg\_sly>\pi_{avg\_sly}(\sigma_{name=\text{"First Bank Corporation"}}(c))}\left(\rho_{c(name,avg\_sly)}\left(\left(_{company\_name}\mathcal{G}_{avg(salary)}(works)\right)\right)\right)$

Problem 6

a. $\pi_{name}\left(\sigma_{publisher=\text{"McGraw-Hill"}}(employee \bowtie loan \bowtie books)\right)$

b. $\pi_{name}\left((employee \bowtie loan) \div \pi_{isbn}\left(\sigma_{publisher=\text{"McGraw-Hill"}}(books)\right)\right)$

c. $\pi_{name}\left(employee \bowtie \sigma_{n>5}\left(\rho_{l(empno,n)}\left(_{empno}\mathcal{G}_{count(isbn)}\left(loan \bowtie \sigma_{publisher=\text{"McGraw-Hill"}}(books)\right)\right)\right)\right)$

d. $\pi_{name,pub}\left(employee \bowtie \sigma_{n>5}\left(\rho_{l(empno,pub,n)}\left(_{empno,publisher}\mathcal{G}_{count(isbn)}(loan \bowtie books)\right)\right)\right)$