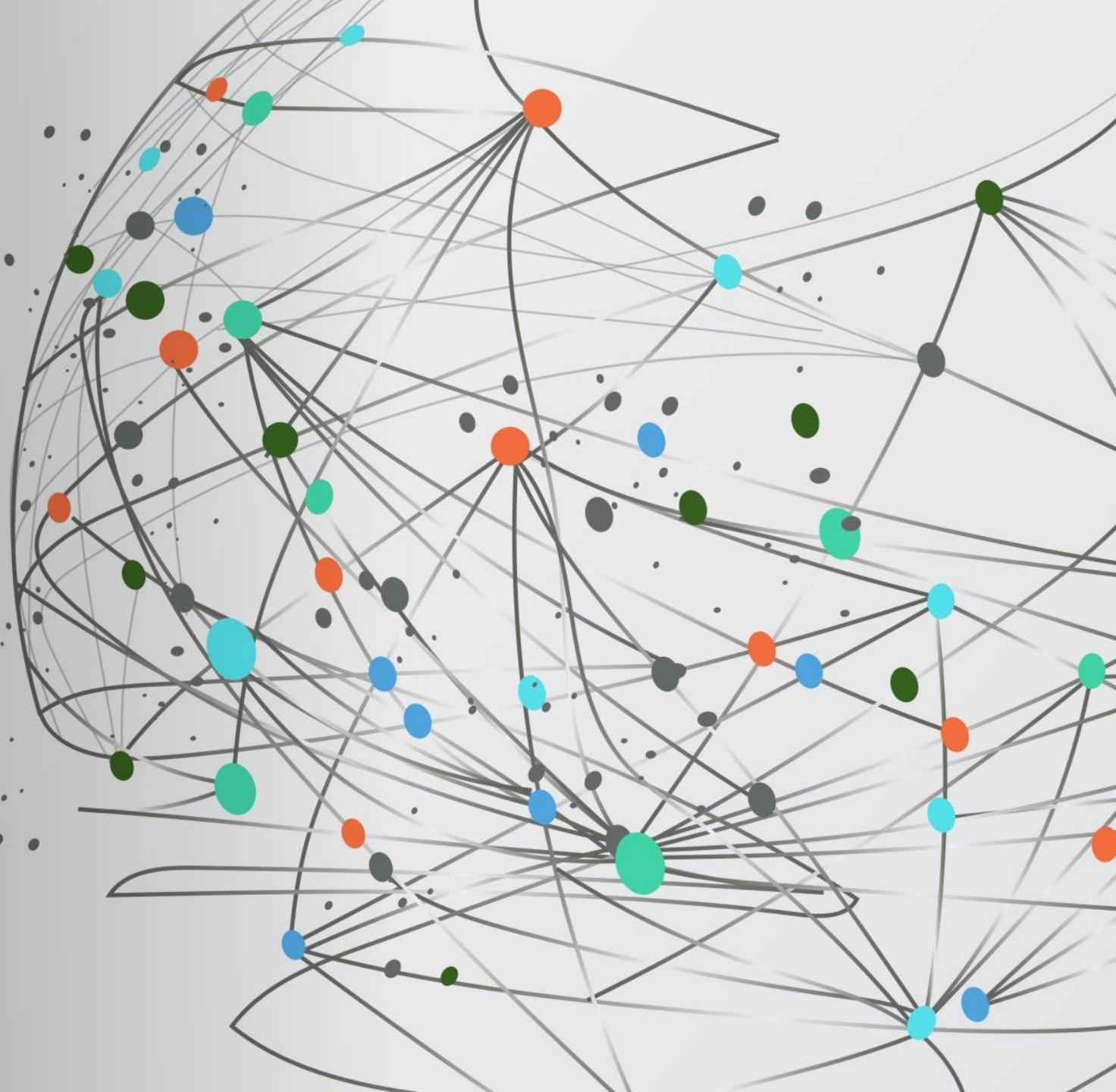
Relational Algebra

Databases 2022



Relational algebra notation (recap)

Operation	Notation	Example
Union	U	**R1** U **R2**
Difference	- or /	**R1** - **R2**
Cartesian product	x	**S1** x **R1**
Select	$\sigma_p(r)$	$\sigma_{\mathbf{Age>20}}$**(Student)**
Project	$\prod_p(r)$	$\prod_{\mathbf{Lastname,\ age}}$**(Students)**
Rename	ρOldName → NewName(r)	ρFather → Parent(Parternity)
Join	⋈	**R** ⋈ **S**
Division	÷	**R1** ÷ **R2**

Exercise I

- Consider following schema:

Suppliers (sid: integer, sname: string, address: string)

Parts (pid: integer, pname: string, color: string)

Catalog (sid: integer, pid: integer, cost: real)

- Convert the following statements to relation algebra

Find the names of suppliers who supply some red part.

Find the sids of suppliers who supply some red or green part.

Find the sids of suppliers who supply some red part or are at 221 Packer Street.

Find the sids of suppliers who supply some red part and some green part.

Find the sids of suppliers who supply every part.

Find the sids of suppliers who supply every red part.

Find the sids of suppliers who supply every red or green part.

Find the sids of suppliers who supply every red part or supply every green part.

Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid.

Find the pids of parts supplied by at least two different suppliers.

For reference

SID	PID	Cost
1	1	$10.00
1	2	$20.00
1	3	$30.00
1	4	$40.00
1	5	$50.00
2	1	$9.00
2	3	$34.00
2	5	$48.00

Catalog

PID	Pname	Color
1	Red1	Red
2	Red2	Red
3	Green1	Green
4	Blue1	Blue
5	Red3	Red

Parts

SID	Sname	Address
1	Yosemite Sham	Devil's canyon, AZ
2	Wiley E. Coyote	RR Asylum, NV
3	Elmer Fudd	Carrot Patch, MN

Suppliers

Exercise II

For the previous schema, state what the following queries compute:

+ $\Pi_{sname}\ (\Pi_{sid}((\sigma_{color=red}Parts) \bowtie (\sigma_{cost<100}Catalog)) \bowtie Suppliers)$
+ $(\Pi_{sname}\ ((\sigma_{color=red}Parts) \bowtie (\sigma_{cost<100}Catalog)) \bowtie Suppliers))\ \cap$
  $(\Pi_{sname}\ ((\sigma_{color=green}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))$
+ $(\Pi_{sid}((\sigma_{color=red}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers)) \cap (\Pi_{sid}\ ((\sigma_{color=green}Parts) \bowtie$
  $(\sigma_{cost<100}Catalog) \bowtie Suppliers))$
+ $\Pi_{sname}\ (((\Pi_{sid,sname}((\sigma_{color=red}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers)) \cap$
  $(\Pi_{sid,sname}\ ((\sigma_{color=green}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))))$

See you next week ☺