

Lab 3: Relational Algebra

Part 1 - Joins

$T1 \bowtie_{T1.A=T2.A} T2$

A	Q	R	B	C
20	a	5	b	6
20	a	5	b	5

$T1 \bowtie_{T1.Q=T2.B} T2$

Empty set (no results)

$T1 \bowtie T2$

A	Q	R	B	C
20	a	5	b	6
20	a	5	b	5

$T1 \bowtie_{T1.A=T2.A \wedge T1.R=T2.C} T2$

A	Q	R	B	C
20	a	5	b	5

Part 2 - Chess Queries

Find the names of any player with an Elo rating of 2850 or higher.

$\Pi_{\text{Name}}(\sigma_{\text{Elo} \geq 2850}(\text{Players}))$

Find the names of any player who has ever played a game as white.

$\rho(\text{WhitePlayerID}, (\Pi_{\text{wpID}}(\text{Games})))$

$\Pi_{\text{Name}}(\text{Players} \bowtie_{\text{Players.pID} = \text{WhitePlayerID.wpID}} (\text{WhitePlayerID}))$

Find the names of any player who has ever won a game as white.

$\Pi_{\text{Name}}(\text{Players} \bowtie_{(\text{Players.pID} = \text{Games.wpID}) \wedge (\text{Games.Result} = \text{'1-0'})} (\text{Games}))$

Find the names of any player who played any games in 2018.

$\Pi_{\text{Name}}(\text{Players} \bowtie_{((\text{Players.pID} = \text{wpID}) \vee (\text{Players.pID} = \text{bpID})) \wedge (\text{Games.Year} = 2018)} (\text{Games}))$

Find the names and dates of any event in which Magnus Carlsen lost a game.

$\rho(\text{MCPlayerID}, (\Pi_{\text{pID}}(\sigma_{\text{Name}='Magnus Carlsen'}(\text{Players}))))$
 $\rho(\text{MCLostAsBP}, \Pi_{(\text{Event.Name}, \text{Event.Year})}((\text{Games} \bowtie_{(\text{Games.Result} = '1-0' \wedge \text{Games.bpID} = \text{MCPlayerID.pID})} \text{MCPlayerID}) \bowtie_{\text{Event.eID} = \text{Games.eID}} (\text{Event})))$
 $\rho(\text{MCLostAsWP}, \Pi_{(\text{Event.Name}, \text{Event.Year})}((\text{Games} \bowtie_{(\text{Games.Result} = '0-1' \wedge \text{Games.wpID} = \text{MCPlayerID.pID})} \text{MCPlayerID}) \bowtie_{\text{Event.eID} = \text{Games.eID}} (\text{Event})))$
 $\text{MCLostAsBP} \cup \text{MCLostAsWP}$

Find the names of all opponents of Magnus Carlsen. An opponent is someone who he has played a game against.

$\rho(\text{MCPlayerID}, (\Pi_{\text{pID}}(\sigma_{\text{Name}='Magnus Carlsen'}(\text{Players}))))$
 $\rho(\text{MCAsBP}, (\text{Games} \bowtie_{\text{Games.bpID} = \text{MCPlayerID.pID}} \text{MCPlayerID}))$
 $\rho(\text{MCAsWP}, (\text{Games} \bowtie_{\text{Games.wpID} = \text{MCPlayerID.pID}} \text{MCPlayerID}))$
 $\Pi_{\text{Name}}((\text{Players} \bowtie_{\text{Players.pID} = \text{MCAsBP.wpID}} \text{MCAsBP}) \cup (\text{Players} \bowtie_{\text{Players.pID} = \text{MCAsWP.bpID}} \text{MCAsWP}))$

Part 3 - LMS Queries

Part 3.1

Name (varchar(255))
Hermione
Harry

To find the names of students who never had a “C” grade.

Part 3.2

Name (varchar(255))
Hermione

To find the names of all students who were born in the same year as Ron, excluding Ron himself.

Part 3.3

Empty set (no results)

To find the names of the courses in which every student is enrolled.

Part 4
$$\rho(\text{CoursesStartWithThree}, (\Pi_{\text{cID}}(\sigma_{(\text{cID} \geq 3000) \wedge (\text{cID} < 4000)}(\text{Courses}))))$$
$$\rho(\text{StudentsIDs}, (\Pi_{\text{sID}}(\text{Enrolled}/\text{CoursesStartWithThree})))$$
$$\Pi_{\text{Name}}(\text{Students} \bowtie_{\text{Students.sID}=\text{StudentsIDs.sID}} (\text{StudentsIDs}))$$