Relacijska algebra - vježba

Relacijska algebra - vježba 1

student

studentID	lastName	firstName	seminarTeacherId	projectTeacherId
101	Turk	Ivan	1001	1002
102	Anić	Josip	1001	1003
103	Ban	Ana	1003	1002
104	Bašić	Tea	1001	1003

teacher

teacherID	firstName	lastName
1001	Matko	Ribić
1002	Alen	Anić
1003	Iva	Oreb

course

courseID	courseName	ECTS	totWorkHours
10	Chemistry	6.0	60
11	Mechanics	4.0	30
12	Physics	5.0	45

exam

studentID	courseId	examDate	writtenTeacherId	oralTeacherId	writtenGrade	grade
101	10	15.1.2021	1003	1001	1	1
101	10	15.1.2022	1002	1002	4	5
102	10	15.1.2022	1001	1003	3	4
102	11	12.1.2022	1002	1003	5	5
104	12	07.1.2022		1003		3

Napisati izraz relacijske algebre čiji je rezultat relacija **teacherBP**({ teacherFname}). Relacija **teacherBP** sadrži različita imena nastavnika koji su držali usmeni ispit iz predmeta naziva „Databases".

$$\rho_{\text{teacherDB(teacherFName)}}\left(\pi_{\text{firstName}}\left(\sigma_{\text{courseName= 'Databases'}}\ (\text{teacher} \underset{\text{oralTeacherId=teacherId}}{\bowtie} \text{exam} \bowtie \text{course})\right)\right)$$

Relacijska algebra - vježba 2

student

studentID	lastName	firstName	seminarTeacherId	projectTeacherId
101	Turk	Ivan	1001	1002
102	Anić	Josip	1001	1003
103	Ban	Ana	1003	1002
104	Bašić	Tea	1001	1003

teacher

teacherID	firstName	lastName
1001	Matko	Ribić
1002	Alen	Anić
1003	Iva	Oreb

course

courseID	courseName	ECTS	totWorkHours
10	Chemistry	6.0	60
11	Mechanics	4.0	30
12	Physics	5.0	45

exam

studentID	courseId	examDate	writtenTeacherId	oralTeacherId	writtenGrade	grade
101	10	15.1.2021	1003	1001	1	1
101	10	15.1.2022	1002	1002	4	5
102	10	15.1.2022	1001	1003	3	4
102	11	12.1.2022	1002	1003	5	5
104	12	07.1.2022		1003		3

Napisati izraz relacijske algebre čiji je rezultat relacija **passed10Not11** ({ studentId, lastName, firstName}). Relacija sadrži matične brojeve, prezimena i imena studenata koji su položili predmet sa šifrom 10, ali nisu položili predmet sa šifrom 11. Podaci za istog studenta se ne smiju ponavljati.

Rješenje:

studentID	lastName	firstName
101	Turk	Ivan

$$\rho_{\text{passed10Not11(studentId, lastname, firstname)}}\left(\pi_{\text{studentId, lastname, firstname}}\left(\text{student} \triangleright\!\triangleleft \left(\pi_{\text{studentId}}(\sigma_{\text{courseId=10} \wedge \text{grade>1}}(\text{exam})) \setminus \pi_{\text{studentId}}(\sigma_{\text{courseId = 11} \wedge \text{grade>1}}(\text{exam}))\right)\right)\right)$$

Relacijska algebra - vježba 2

Je li ovo točno rješenje?

$$\rho_{\text{passed10Not11(studentId, lastName, firstName)}}\Big(\pi_{\text{studentId, lastName, firstName}}\big((\sigma_{\text{courseId=10} \wedge \text{grade>1}}(\text{student} \triangleright\!\triangleleft \text{exam})) \setminus (\sigma_{\text{courseId=11} \wedge \text{grade>1}}(\text{student} \triangleright\!\triangleleft \text{exam}))\big)\Big)$$

$$(\sigma_{\text{courseId=10} \wedge \text{grade>1}}(\text{student} \triangleright\!\triangleleft \text{exam})) \setminus (\sigma_{\text{courseId=11} \wedge \text{grade>1}}(\text{student} \triangleright\!\triangleleft \text{exam}))$$

studentID	lastName	firstName	seminar TeacherId	project TeacherId	courseID	examDate	written TeacherId	oral TeacherId	written Grade	grade
101	Turk	Ivan	1001	1002	10	15.01.2022	1002	1002	4	5
102	Anić	Josip	1001	1003	10	15.01.2022	1001	1003	3	4

$\setminus$

studentID	lastName	firstName	seminar TeacherId	project TeacherId	courseID	examDate	written TeacherId	oral TeacherId	written Grade	grade
102	Anić	Josip	1001	1003	11	12.01.2022	1002	1003	5	5

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studentID	lastName	firstName	seminar TeacherId	project TeacherId	courseID	examDate	written TeacherId	oral TeacherId	written Grade	grade
101	Turk	Ivan	1001	1002	10	15.01.2022	1002	1002	4	5
102	Anić	Josip	1001	1003	10	15.01.2022	1001	1003	3	4

Relacijska algebra - vježba 2

studentID	lastName	firstName	seminar TeacherId	project TeacherId	courseID	examDate	written TeacherId	oral TeacherId	written Grade	grade
101	Turk	Ivan	1001	1002	10	15.01.2022	1002	1002	4	5
102	Anić	Josip	1001	1003	10	15.01.2022	1001	1003	3	4

$$\pi_{\text{studentId, lastname, firstName}}\Big((\sigma_{\text{courseId}=10 \wedge \text{grade}>1}(\text{student} \triangleright\!\triangleleft \text{exam})) \setminus (\sigma_{\text{courseId}=11 \wedge \text{grade}>1}(\text{student} \triangleright\!\triangleleft \text{exam}))\Big)$$

Rješenje nije točno!

studentID	lastName	firstName
101	Turk	Ivan
102	Anić	Josip

Relacijska algebra - vježba 3

student

studentID	lastName	firstName	seminarTeacherId	projectTeacherId
101	Turk	Ivan	1001	1002
102	Anić	Josip	1001	1003
103	Ban	Ana	1003	1002
104	Bašić	Tea	1001	1003

teacher

teacherID	firstName	lastName
1001	Matko	Ribić
1002	Alen	Anić
1003	Iva	Oreb

course

courseID	courseName	ECTS	totWorkHours
10	Chemistry	6.0	60
11	Mechanics	4.0	30
12	Physics	5.0	45

exam

studentID	courseId	examDate	writtenTeacherId	oralTeacherId	writtenGrade	grade
101	10	15.1.2021	1003	1001	1	1
101	10	15.1.2022	1002	1002	4	5
102	10	15.1.2022	1001	1003	3	4
102	11	12.1.2022	1002	1003	5	5
104	12	07.1.2022		1003		3

Napisati izraz relacijske algebre čiji je rezultat relacija **course1**({ courseId, cName, noOfStud}). N-torka relacije **course1** sadrži šifru i naziv predmeta te broj ispita iz tog predmeta.

$$\rho_{\text{course1(courseId, cName, noOfStud)}}\left({}_{\text{courseId, courseName}}\mathcal{G}_{\text{COUNT(examDate)}}\left(\text{course} \triangleright\!\triangleleft \text{exam}\right)\right)$$

Argument COUNT funkcije može biti bilo koji atribut relacije **exam** čija je vrijednost sigurno poznata za svaku ntorku - npr. studentIdStud, courseId ili gradeU ili *, ali ne i atribut koji može imati nepoznatu vrijednost za neke ntorke - npr. sifNastPism ili writtenGrade.

Relacijska algebra - vježba 4

student

studentID	lastName	firstName	seminarTeacherId	projectTeacherId
101	Turk	Ivan	1001	1002
102	Anić	Josip	1001	1003
103	Ban	Ana	1003	1002
104	Bašić	Tea	1001	1003

teacher

teacherID	firstName	lastName
1001	Matko	Ribić
1002	Alen	Anić
1003	Iva	Oreb

course

courseID	courseName	ECTS	totWorkHours
10	Chemistry	6.0	60
11	Mechanics	4.0	30
12	Physics	5.0	45

exam

studentID	courseId	examDate	writtenTeacherId	oralTeacherId	writtenGrade	grade
101	10	15.1.2021	1003	1001	1	1
101	10	15.1.2022	1002	1002	4	5
102	10	15.1.2022	1001	1003	3	4
102	11	12.1.2022	1002	1003	5	5
104	12	07.1.2022		1003		3

Napisati izraz relacijske algebre kojim će se dobiti relacija koja sadrži identifikator, ime i prezime studenta te prosječnu ocjenu položenih ispita (ukupna ocjena je veća od 1). Relacija treba sadržavati podatke samo za studente koji se zovu Ivan.

$$\text{studentId, firstName, lastName}\,\mathcal{G}_{\text{AVG(grade)}}\left(\sigma_{\text{firstName='Ivan'}}\,(\text{student}) \triangleright\!\triangleleft \sigma_{\text{grade}>1}(\text{exam})\right)$$

Relacijska algebra - vježba 5

skill

skillID	skillName
1	English
2	Driving licence B2
3	Advanced programming in c#
4	MS Office

candidate

candidateID	lastName	firstName
101	Ribić	Matko
102	Anić	Alen
103	Oreb	Iva

candidateSkill

candidateID	skillId
101	1
101	2
101	4
102	1
103	1
103	4

position

positionID	positionName
1	Administrator
2	Programmer

positionSkill

positionID	skillId
1	1
1	4
2	1
2	3

Napisati izraz relacijske algebre čiji je rezultat relacija **hasSkillsForPos** ({ lastName, firstName}).
Relacija sadrži ime i prezime kandidata koji posjeduju vještine potrebne za radno mjesto sa šifrom 1.

Result:

hasSkillsForPosition

lastName	firstName
Ribić	Matko
Oreb	Iva

$$\rho_{hasSkillsForPos(lastName,firstName)}\left(\pi_{lastName,firstName}\left(candidateSkill \div \left(\pi_{skillId}\left(\sigma_{positionId=1}(positionSkill)\right)\right) \rhd\lhd candidate\right)\right)$$

Relacijska algebra - vježba 6

student

studentID	lastName	firstName	seminarTeacherId	projectTeacherId
101	Turk	Ivan	1001	1002
102	Anić	Josip	1001	1003
103	Ban	Ana	1003	1002
104	Bašić	Tea	1001	1003

teacher

teacherID	firstName	lastName
1001	Matko	Ribić
1002	Alen	Anić
1003	Iva	Oreb

course

courseID	courseName	ECTS	totWorkHours
10	Chemistry	6.0	60
11	Mechanics	4.0	30
12	Physics	5.0	45

exam

studentID	courseId	examDate	writtenTeacherId	oralTeacherId	writtenGrade	grade
101	10	15.1.2021	1003	1001	1	1
101	10	15.1.2022	1002	1002	4	5
102	10	15.1.2022	1001	1003	3	4
102	11	12.1.2022	1002	1003	5	5
104	12	07.1.2022		1003		3

Napisati izraz relacijske algebre čiji je rezultat relacija **course1**({ courseId, name, noOfStud}). N-torka relacije **course1** sadrži šifru i naziv predmeta te broj ispita iz tog predmeta. U relaciji se trebaju nalaziti i predmeti koje nije polagao niti jedan student. Za takve predmete kao broj studenata treba ispisati vrijednost 0.

$$\rho_{\text{course1(courseId, name, noOfStud)}}\left(_{\text{courseId, courseName}}\mathcal{G}_{\text{COUNT(examDate)}}\left(\text{course} \;{}^{*}\!\triangleright\!\triangleleft\; \text{exam}\right)\right)$$

Relacijska algebra - vježba 6

$$\rho_{\text{predmet1(courseId, naziv, brStud)}}\left(_{\text{courseId, nazPred}}\mathcal{G}_{\text{COUNT(examDate)}}\left(\text{pred} *\triangleright\triangleleft \text{exam}\right)\right)$$

Pored atributa examDate, argument funkcije COUNT može biti neki od atributa: studentId, oralTeacherId ili grade tj. neki od atributa relacije **exam** čija je vrijednost sigurno poznata za svaku ntorku.
Atribut writtenTeacherId npr. ne može jer ponekad ima vrijednost NULL.

COUNT(*) broji ntorke bez obzira na vrijednosti atributa pa će za predmete iz kojih nije bilo ispita dati rezultat 1. Zbog toga ni COUNT(*) neće dati točan rezultat.