

Chap2-practice

University database

classroom(building, room_number, capacity)

department(dept_name, building, budget)

course(course_id, title, dept_name, credits)

instructor(ID, name, dept_name, salary)

section(course_id, sec_id, semester, year, building, room_number, time_slot_id)

teaches(ID, course_id, sec_id, semester, year)

student(ID, name, dept_name, tot_cred)

takes(ID, course_id, sec_id, semester, year, grade)

advisor(s_ID, i_ID)

time_slot(time_slot_id, day, start_time, end_time)

prereq(course_id, prereq_id)

• ID و name اساتید دانشکده “Comp. Sci.”

• ID و name اساتید دانشکده “Comp. Sci.”

$\Pi_{id, name} (\sigma_{dept_name = \text{“Comp. sci”}} (instructor))$

- نام اساتید دانشکده “Comp. sci.” که حقوقی بیشتر از ۱۰۰۰۰ دلار می گیرند.

- نام اساتید دانشکده “Comp. sci.” که حقوقی بیشتر از ۱۰۰۰۰ دلار می گیرند.

- $\Pi_{\text{name}} (\sigma_{\text{dept_name} = \text{“Comp. sci.”} \wedge \text{salary} > 10000} (\text{instructor}))$

• Id و name اساتیدی که در دانشکده ای در ساختمان “Watson” هستند

• Id و name اساتیدی که در دانشکده ای در ساختمان “Watson” هستند

• $\Pi_{id, name} (\sigma_{building = "Watson"} (instructor \bowtie_{i.dept_name = d.dept_name} department))$

name و Id دانشجویانی که حداقل یک درس در دانشکده "Comp. Sci." برداشته اند.

name و Id دانشجویانی که حداقل یک درس در دانشکده "Comp. Sci." برداشته اند.

$\Pi_{id, name} (\sigma_{dept_name = "Comp. Sci."} (student \bowtie_{s.id=t.id} takes \bowtie_{t.course_id = c.course_id} course))$

• Name و id دانشجویانی که حداقل یک گروه درسی در سال ۲۰۱۸ گرفته اند.

• Name و id دانشجویانی که حداقل یک گروه درسی در سال ۲۰۱۸ گرفته اند.

• $\Pi_{id, name} (\sigma_{year = "2018"} (student \bowtie_{s.id=t.id} takes))$

• Name و id دانشجویانی که گروه درسی ای در سال 2018 نگرفته اند

• Name و id دانشجویانی که گروه درسی ای در سال 2018 نگرفته اند

• $St2018 \leftarrow \Pi_{id, name} (\sigma_{year = "2018"} (student \bowtie_{s.id=t.id} takes))$

• $\Pi_{id, name} (student) - St2018$

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teaches(ID, course_id, sec_id, semester, year)
student(ID, name, dept_name, tot_cred)
takes(ID, course_id, sec_id, semester, year, grade)
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time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

• Id دانشجویان دانشکده علوم کامپیوتر که معدل بالای 17 دارند.

classroom(building, room_number, capacity)
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student(ID, name, dept_name, tot_cred)
takes(ID, course_id, sec_id, semester, year, grade)
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prereq(course_id, prereq_id)

• id انشجویان دانشکده “Comp. sci” که معدل بالای 17 دارند.

• $\Pi_{id} (\sigma_{dept_name = \text{“Comp. sci”} \wedge tot_cred > 17} (student))$

id	name	dept_name	tot_cred
123	Alavi	Physics	12.5
124	Hoseini	Comp sci.	17.5
125	Mansoori	Physics	18
126	Rahgozar	Comp sci.	16

• id انشجویان دانشکده “Comp. sci” که معدل بالای 17 دارند.

• $\Pi_{id} (\sigma_{dept_name = \text{“Comp. sci”} \wedge tot_cred > 17} (student))$

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prereq(course_id, prereq_id)

• Id دروسی که پیشنیاز ندارند.

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takes(ID, course_id, sec_id, semester, year, grade)
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prereq(course_id, prereq_id)

• Id دروسی که پیشنیاز ندارند.

• $\Pi_{id}(course) - \Pi_{course_id}(prereq)$

<i>course_id</i>	<i>title</i>	<i>dept_name</i>	<i>credits</i>
BIO-101	Intro. to Biology	Biology	4
BIO-301	Genetics	Biology	4
BIO-399	Computational Biology	Biology	3
CS-101	Intro. to Computer Science	Comp. Sci.	4
CS-190	Game Design	Comp. Sci.	4
CS-315	Robotics	Comp. Sci.	3
CS-319	Image Processing	Comp. Sci.	3
CS-347	Database System Concepts	Comp. Sci.	3
EE-181	Intro. to Digital Systems	Elec. Eng.	3
FIN-201	Investment Banking	Finance	3
HIS-351	World History	History	3
MU-199	Music Video Production	Music	3
PHY-101	Physical Principles	Physics	4

Course_id	Prereq_id
BiO-301	BIO-101
CS-190	CS-101
CS-315	CS-190
CS-347	CS-101

• Id دروسی که پیشنهاد ندارند.

- $\Pi_{\text{course_id}}(\text{course}) - \Pi_{\text{course_id}}(\text{prereq})$
- $\Pi_{\text{course_id}}(\text{course-prereq})$ wrong!

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prereq(course_id, prereq_id)

- نام و id دانشجویانی که استاد راهنمای آنها در دانشکده علوم کامپیوتر است.

classroom(building, room_number, capacity)
department(dept_name, building, budget)
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time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

• نام و id دانشجویانی که استاد راهنمای آنها در دانشکده علوم کامپیوتر است.

• $\Pi_{id,name} (\sigma_{dept_name="Comp. Sci"} (student \bowtie_{s.ID=a.s_ID} advisor \bowtie_{a.i_ID=i.ID} instructor))$

st.id	St.name	St.dept_name	St.tot_cred	a.S_id	a.i_ID	i.id	i.name	i.dept_name	i.salary
123	Alavi	music	12.5	123	76766	15151	mozart	music	40000
123	Alavi	music	12.5	123	76766	76766	Crick	Comp. Sci.	72000
123	Alavi	music	12.5	123	15151	15151	mozart	music	40000
123	Alavi	music	12.5	123	15151	76766	Crick	Comp. Sci.	72000
123	Alavi	music	12.5	124	15151	15151	mozart	music	40000
123	Alavi	music	12.5	124	15151	76766	Crick	Comp. Sci.	72000
124	Hoseini	Comp sci.	17.5	123	76766	15151	mozart	music	40000
124	Hoseini	Comp sci.	17.5	123	76766	76766	Crick	Comp. Sci.	72000
124	Hoseini	Comp sci.	17.5	123	15151	15151	mozart	music	40000
124	Hoseini	Comp sci.	17.5	123	15151	76766	Crick	Comp. Sci.	72000
124	Hoseini	Comp sci.	17.5	124	15151	15151	mozart	music	40000
124	Hoseini	Comp sci.	17.5	124	15151	76766	Crick	Comp. Sci.	72000

st.id	St.name	St.dept_name	St.tot_cred	a.S_id	a.i_ID	i.id	i.name	i.dept_name	i.salary
123	Alavi	music	12.5	123	76766	15151	mozart	music	40000
124	Hoseini	Comp sci.	17.5	123	15151	76766	Crick	Comp. Sci.	72000
				124	15151				

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student(ID, name, dept_name, tot_cred)
takes(ID, course_id, sec_id, semester, year, grade)
advisor(s_ID, i_ID)
time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

- نام دانشجویانی که هم در ترم اول سال ۲۰۲۰ درس “adv. Prog.” را برداشته اند و هم در ترم دوم

classroom(building, room_number, capacity)
department(dept_name, building, budget)
course(course_id, title, dept_name, credits)
instructor(ID, name, dept_name, salary)
section(course_id, sec_id, semester, year, building, room_number, time_slot_id)
teaches(ID, course_id, sec_id, semester, year)
student(ID, name, dept_name, tot_cred)
takes(ID, course_id, sec_id, semester, year, grade)
advisor(s_ID, i_ID)
time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

• نام دانشجویانی که هم در ترم اول سال ۲۰۲۰ درس “adv. Prog.” را برداشته اند و هم در ترم دوم

• $\Pi_{\text{name}} (\sigma_{\text{semester}=1 \wedge \text{year}= "2020" \wedge \text{title}= "adv. prog"} (\text{student} \bowtie_{\text{s.id=t.id}} \text{takes} \bowtie_{\text{t.course_id=c.course_id}} \text{course}) \cap$
 $\Pi_{\text{name}} (\sigma_{\text{semester}=2 \wedge \text{year}= "2020" \wedge \text{title}= "adv. prog"} (\text{student} \bowtie_{\text{s.id=t.id}} \text{takes} \bowtie_{\text{t.course_id=c.course_id}} \text{course}))$

$\sigma_{\text{semester}=2} (\sigma_{\text{semester}=1 \wedge \text{year}= "2020" \wedge \text{title}= "adv. prog"} (\text{student} \bowtie_{\text{s.id=t.id}} \text{takes} \bowtie_{\text{t.course_id=c.course_id}} \text{course}))$

Wrong!!

classroom(building, room_number, capacity)
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teaches(ID, course_id, sec_id, semester, year)
student(ID, name, dept_name, tot_cred)
takes(ID, course_id, sec_id, semester, year, grade)
advisor(s_ID, i_ID)
time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

• نام دانشجویانی که هم در ترم اول سال ۲۰۲۰ درس “adv. Prog.” را برداشته اند و هم در ترم دوم

• $\Pi_{\text{name}} (\sigma_{\text{semester}=1 \wedge \text{year} = \text{"2020"} \wedge \text{title} = \text{"adv.prog"}} (\text{student} \bowtie_{\text{s.id=t.id}} \text{takes} \bowtie_{\text{t.course_id=c.course_id}} \text{course}) \cap$

$\Pi_{\text{name}} (\sigma_{\text{semester}=2 \wedge \text{year} = \text{"2020"} \wedge \text{title} = \text{"adv.prog"}} (\text{student} \bowtie_{\text{s.id=t.id}} \text{takes} \bowtie_{\text{t.course_id=c.course_id}} \text{course})$

• $\Pi_{\text{name}} (\sigma_{\text{semester}=1 \wedge \text{year} = \text{"2020"}} (\text{student} \bowtie_{\text{s.id=t.id}} \text{takes} \bowtie_{\text{t.course_id=A.course_id}} \rho_A(\Pi_{\text{course_id}} (\sigma_{\text{title} = \text{"adv.prog"}} (\text{course})) \cap$

$\Pi_{\text{name}} (\sigma_{\text{semester}=2 \wedge \text{year} = \text{"2020"}} (\text{student} \bowtie_{\text{s.id=t.id}} \text{takes} \bowtie_{\text{t.course_id=c.course_id}} (\sigma_{\text{title} = \text{"adv.prog"}} (\text{course})))$

course_id	title	dept_name	credits
BIO-101	Intro. to Biology	Biology	4
CS-101	Intro. To Computer Science	Comp. Sci.	4
CS-190	Adv. Prog.	Comp. Sci.	4
EE-181	Intro. to Digital Systems	Elec. Eng.	3



course_id	title	dept_name	credits
CS-190	Adv. Prog.	Comp. Sci.	4



course_id
CS-190

st.id	St.name	St.dept_name	St.tot_cred	ID	course_id	sec_id	semester	year	grade	course_id
123	Alavi	music	12.5	125	CS-190	1	1	2020	9.5	CS-190
123	Alavi	music	12.5	125	CS-101	2	1	2020	12	CS-190
123	Alavi	music	12.5	125	CS-190	2	2	2020	10	CS-190
123	Alavi	music	12.5	124	CS-190	1	1	2020	18	CS-190
123	Alavi	music	12.5	124	CS-101	1	1	2020	17	CS-190
124	Hoseini	Comp sci.	17.5	125	CS-190	1	1	2020	9.5	CS-190
124	Hoseini	Comp sci.	17.5	125	CS-101	2	1	2020	12	CS-190
124	Hoseini	Comp sci.	17.5	125	CS-190	2	2	2020	10	CS-190
124	Hoseini	Comp sci.	17.5	124	CS-190	1	1	2020	18	CS-190
124	Hoseini	Comp sci.	17.5	124	CS-101	1	1	2020	17	CS-190
125	sadeghi	Comp sci.	12	125	CS-190	1	1	2020	9.5	CS-190
125	sadeghi	Comp sci.	12	125	CS-101	2	1	2020	12	CS-190
125	sadeghi	Comp sci.	12	125	CS-190	2	2	2020	10	CS-190
125	sadeghi	Comp sci.	12	124	CS-190	1	1	2020	18	CS-190
125	sadeghi	Comp sci.	12	124	CS-101	1	1	2020	17	CS-190

				ID	course_id	sec_id	semester	year	grade	course_id
st.id	St.name	St.dept_name	St.tot_cred	125	CS-190	1	1	2020	9.5	
123	Alavi	music	12.5	125	CS-101	2	1	2020	12	
124	Hoseini	Comp sci.	17.5	125	CS-190	2	2	2020	10	
125	sadeghi	Comp sci.	12	124	CS-190	1	1	2020	18	
				124	CS-101	1	1	2020	17	

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time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

• Id و name اساتیدی که حقوق آنها از همه اساتید بیشتر است.

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• Id و name اساتیدی که حقوق آنها از همه اساتید بیشتر است.

- $\Pi_{id, name} (instructor) - \Pi_{A.id, A.name} (\rho_A (instructor) \bowtie_{A.salary < B.salary} \rho_B (instructor))$
-

id	name	dept_name	salary	id	name	dept_name	salary
15151	mozart	music	40000	15151	mozart	music	40000
15151	mozart	music	40000	22222	Enstein	physics	95000
15151	mozart	music	40000	76766	Crick	Biology	72000
15151	mozart	music	40000	75751	Kim	History	62000
22222	Enstein	physics	95000	15151	mozart	music	40000
22222	Enstein	physics	95000	22222	Enstein	physics	95000
22222	Enstein	physics	95000	76766	Crick	Biology	72000
22222	Enstein	physics	95000	75751	Kim	History	62000
76766	Crick	Biology	72000	15151	mozart	music	40000
76766	Crick	Biology	72000	22222	Enstein	physics	95000
76766	Crick	Biology	72000	76766	Crick	Biology	72000
76766	Crick	Biology	72000	75751	Kim	History	62000
75751	Kim	History	62000	75751	mozart	music	40000
75751	Kim	History	62000	22222	Enstein	physics	95000
75751	Kim	History	62000	76766	Crick	Biology	72000
75751	Kim	History	62000	75751	Kim	History	62000

id	name	dept_name	salary
15151	mozart	music	40000
22222	Enstein	physics	95000
76766	Crick	Biology	72000
75751	Kim	History	62000

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advisor(s_ID, i_ID)
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prereq(course_id, prereq_id)

$\Pi_{id, name} (\sigma_{year = "2018" \wedge semester=1 \wedge dept_name="Comp. sci"} (student \bowtie_{s.id=t.id} takes)) \cdot$

classroom(building, room_number, capacity)
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prereq(course_id, prereq_id)

$$\Pi_{\text{course_id,title}}((\text{course}) \bowtie_{\text{c.course_id=A.course_id}} \rho_A(\Pi_{\text{course_id}}(\text{course}) - \Pi_{\text{course_id}}(\text{prereq}))) \cdot$$

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time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

- $\Pi_{s.name} (\sigma_{i.name = \text{"Katz"}} ((\sigma_{dept_name = \text{"Comp. Sci"}} student) \bowtie_{s.ID=a.s_ID} advisor \bowtie_{a.i_ID=i.ID} instructor))$

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prereq(course_id, prereq_id)

- $\Pi_{\text{name}} (\sigma_{\text{name} = \text{"Katz"}} ((\sigma_{\text{dept_name} = \text{"Comp. Sci"}} \text{student}) \bowtie_{\text{s.ID=a.s_ID}} \text{advisor} \bowtie_{\text{a.i_ID=i.ID}} \text{instructor}))$

• نام دانشجویان دانشکده "Comp. Sci." که استاد راهنمای آنها "Katz." است

سوال

- Id و نام دانشجویانی که معدل آنها از همه دانشجویان کمتر است.
- Id و نام دروسی که پیش نیاز آنها درس “adv. Prog.” است.

classroom(building, room_number, capacity)

department(dept_name, building, budget)

course(course_id, title, dept_name, credits)

instructor(ID, name, dept_name, salary)

section(course_id, sec_id, semester, year, building, room_number, time_slot_id)

teaches(ID, course_id, sec_id, semester, year)

student(ID, name, dept_name, tot_cred)

takes(ID, course_id, sec_id, semester, year, grade)

advisor(s_ID, i_ID)

time_slot(time_slot_id, day, start_time, end_time)

prereq(course_id, prereq_id)