

## CS 348 Assignment 1

The student number and name of second year students who have obtained a grade lower than 65 in atleast 2 courses in a department with the name "computer science"

D)

$\{ (snum, sname) \mid \text{STUDENT}(snum, sname, 2) \wedge$

$\exists \text{deptcode} \cdot \text{DEPARTMENT}(\text{deptcode}, \text{"computer science"})$

$\wedge \exists c_1, c_2, t_1, t_2, s_1, s_2 \cdot \text{ENROLLMENT}(snum, \text{deptcode}, c_1, t_1, s_1) \wedge$

$\wedge \text{ENROLLMENT}(snum, \text{deptcode}, c_2, t_2, s_2) \wedge$

$\wedge \exists g_1 \cdot \text{MARK}(snum, \text{deptcode}, c_1, t_1, s_1, g_1) \wedge g_1 < 65$

$\wedge \exists g_2 \cdot \text{MARK}(snum, \text{deptcode}, c_2, t_2, s_2, g_2) \wedge g_2 < 65$

$\wedge \neg (c_1 = c_2 \wedge t_1 = t_2 \wedge s_1 = s_2)$



2)  $\{(pnum, pname) \mid \exists d . \text{Professor}(pnum, pname, o, d)$

$\wedge d = \text{CS}^6$

$\wedge \exists (cnum, term, section) . \text{Class}(d, cnum, term, section, pnum)$

$\wedge (cnum = 240 \vee cnum = 245)) \}$

Review

The number and name of professors who have taught a CS 245 class in which a student obtained a grade that is among the highest recorded for CS 245.

3)  $\{ \{ \text{profnum}, \text{phoname} \} \mid \exists \text{prof. PROFESSOR}(\text{rnum}, \text{phoname}, \text{prof})$

$\wedge \exists \text{dc, cnrm} \cdot \text{dc} = "CS" \wedge \text{rnum} = 245$

$\wedge \exists \text{term, section} \cdot \text{CLASS}(\text{dc}, \text{cnrm}, \text{term}, \text{section}, \text{phoname})$

$\wedge \exists \text{snum} \cdot \text{ENROLLMENT}(\text{snum}, \text{dc}, \text{cnrm}, \text{term}, \text{section})$

$\wedge \exists \text{grade} \cdot \text{MARK}(\text{snum}, \text{dc}, \text{cnrm}, \text{term}, \text{section}, \text{grade})$

$\wedge \exists (\exists \text{snum2}, \text{t2}, \text{s2}, \text{g2} \cdot \text{ENROLLMENT}(\text{snum2}, \text{dc}, \text{cnrm}, \text{t2}, \text{s2}))$

$\wedge \text{MARK}(\text{snum2}, \text{dc}, \text{cnrm}, \text{t2}, \text{s2}, \text{g2})$

$\wedge \text{g2} > \text{grade}$ )

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4.

{(snum, sname) | STUDENT(snum, sname, 4)}

Δ (snum, deptcode, unum, term, section) ENROLMENT(snum,  
deptcode,  
unum,  
term,  
section)

Δ grade MARK(snum, deptcode, unum, term, section, grade)  
Δ grade ≥ 5 ∧ (deptcode = "C" ∨ deptcode = "CS")

(RED)

5) The number, name, office, and department of each professor who is currently teaching on Mondays before noon and on Fridays after noon.

$\exists(pnum, pname, o, pd) \mid \text{PROFESSOR}(pnum, pname, o, pd)$

$\wedge \exists cnum, term, section, dc \cdot \text{CLASS}(dc, cnum, term, section, pnum)$   
 $\wedge \exists snum, grade \cdot \text{MARK}(snum, dc, cnum, term, section, grade)$   
 $\wedge \exists d, t, r \cdot \text{SCHEDULE}(dc, cnum, term, section, d, t, r),$

$\wedge d = \text{"MONDAY"} \wedge t < 12$

$\wedge \exists cnum2, term2, section2, dc2 \cdot \text{CLASS}(dc2, cnum2, term2, section2, pnum)$

$\wedge \exists snum2, grade2 \cdot \text{MARK}(snum2, dc2, cnum2, term2, section2, grade2)$

$\wedge \exists d2, t2, r2 \cdot \text{SCHEDULE}(dc2, cnum2, term2, section2, d2, t2, r2)$

$\wedge d2 = \text{"FRIDAY"} \wedge t2 \geq 12$

The minimum and maximum final grade of each class  
for a third year CS course, together with the number, name,  
and department of the professor who taught the class.

6)  $\{(\min, \max, \text{prof}, \text{name}, \text{pd}) |$

$\exists o \cdot \text{PROFESSOR}(\text{pnum}, \text{pname}, o, \text{pd}) \wedge$

$\exists d, \text{cnum}, t, s \cdot \text{CLASS}(d, \text{cnum}, t, s, \text{pnum}) \wedge$

$\text{cnum} \geq 300 \wedge \text{cnum} \leq 399 \wedge$

$\exists s \text{ min, sMax } \text{ENROLLMENT}(s\text{Min}, d, \text{cnum}, t, s) \wedge \text{ENROLLMENT}(s\text{Max}, d,$   
 $\text{cnum}, t, s)$

$\wedge \text{MARK}(s\text{Min}, d, \text{cnum}, t, s, \text{min}) \wedge \text{MARK}(s\text{Max}, d, \text{cnum}, t, s, \text{max})$

$\wedge \neg (\exists \text{ sother } \cdot \text{ENROLLMENT}(\text{sother}, d, \text{cnum}, t, s))$

$\wedge \exists \text{ gradeOther } \cdot \text{MARK}(\text{sother}, d, \text{cnum}, t, s, \text{gradeOther})$

$\wedge \text{gradeOther} < \text{min} \vee \text{gradeOther} > \text{max}) \}$

"a course for which there are no ongoing classes"

## CS 348 Assignment 1

The dept code and course number of any course  
not currently being taught by either a CS Prof or a Co Prof

1)  $\{ \exists (\text{dept code}, \text{cnum}) | \exists \text{cname} : \text{COURSE}(\text{dept code}, \text{cnum}, \text{cname})$

$\wedge \exists \text{term}, \text{section}, \text{pnum} : \text{CLASS}(\text{dept code}, \text{cnum}, \text{term}, \text{section}, \text{pnum})$

$\wedge \exists \text{pname, office, p dept code} : \text{PROFESSOR}(\text{pnum}, \text{pname}, \text{office}, \text{p dept code})$

$\wedge \neg (\text{p dept code} = "CS") \wedge \neg (\text{p dept code} = "CO")$

$\wedge \exists \text{snum} : \text{ENROLLMENT}(\text{snum}, \text{dept code}, \text{cnum}, \text{term}, \text{section})$

$\wedge \neg \exists \text{g} : \text{MARK}(\text{snum}, \text{dept code}, \text{cnum}, \text{term}, \text{section}, \text{g})$

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within the same term

The number, name and department of any professor who has taught on Monday, and, whenever this has been the case, has always had to teach also on Friday.

1) have taught at least

one term in  
monday

2) every term he  
taught on monday,

he's also taught  
on friday

8)  $\{ \text{(pnum, pname, pdeptcode)} | \exists o \cdot \text{PROFESSOR}(pnum, pname, o, pdeptcode)$

$\wedge \exists dc, cnm, term, section \cdot \text{CLASS}(dc, cnm, term, section, pnum)$

$\wedge \exists day, time, room \cdot \text{SCHEDULE}(dc, cnm, term, section, day, time, room)$

$\wedge day = "MONDAY" \rightarrow \dots, ?, ?, ?$

$(\exists dc2, cnm2, section2, day2, time2, room2 \cdot \text{CLASS}(dc2, cnm2, term, section2, pnum))$

term,  
section2  
pnum)

$\wedge \text{SCHEDULE}(dc2, cnm2, term, section2, day2, time2, room2)$

$\wedge day2 = "FRIDAY" ) \}$

# CS 348 Assignment 1

The number and name of fourth year students who have taken CS 348 and, whenever they did, obtained a lower grade in all other classes taken during the same term.

9.  $\{ (snum, sname) \mid \text{STUDENT}(snum, sname, 4) \wedge$

$\exists dc, cnum \cdot dc = "CS" \wedge cnum = 348$

$\wedge$   $\exists$  term, section, grade  $\in \text{ENROLLMENT}(snum, dc, cnum, term, section)$

$\wedge \text{MARK}(snum, dc, cnum, term, section, grade)$

$\wedge \neg (\text{otherGrade} \wedge \text{otherDC} \wedge \text{otherCnum} \wedge \text{otherSection})$

$\wedge \text{ENROLLMENT}(snum, \text{otherDC}, \text{otherCnum}, \text{term}, \text{otherSection})$

$\wedge \text{MARK}(snum, \text{otherDC}, \text{otherCnum}, \text{term}, \text{otherSection}, \text{otherGrade})$

$\wedge \neg (dc = \text{otherDC} \wedge cnum = \text{otherCnum})$

$\wedge \text{grade} \leq \text{otherGrade} \}$

Check that

12. The number and name of each professor who has taught CS 348 at least 3 times whereas student FB obtained a grade less than 75.

{ (prnm, prnme) |  $\exists$  d1. PROFESSOR(prnm, prnme, d1, d1) }  $\wedge$

$\exists$  dc2, cnm = d2 = "CS"  $\wedge$  cnm = 348

$\exists$  t1, s1, t2, s2, t3, s3 . CLASS(dc2, cnm, t1, s1, prnm)

$\wedge$  CLASS(dc2, cnm, t2, s2, prnm)  $\wedge$  CLASS(dc2, cnm, t3, s3, prnm)

$\wedge \neg (t1 = t2 \wedge s1 = s2 \wedge$   
 $t2 = t3 \wedge s2 = s3 \wedge$   
 $t1 = t3 \wedge s1 = s3)$

$\wedge \neg (\text{snm}^1, \text{grade}^1 \cdot \text{ENROLMENT}(\text{snm}^1, \text{dc}^2, \text{cnm}^1, t1, s1)$

$\wedge \text{MARK}(\text{snm}^1, \text{dc}^2, \text{cnm}^1, t1, s1, \text{grade}^1)$

$\wedge \text{grade}^1 < 75)$

$\wedge \neg (\text{snm}^2, \text{grade}^2 \cdot \text{ENROLMENT}(\text{snm}^2, \text{dc}^2, \text{cnm}^2, t2, s2)$

$\wedge \text{MARK}(\text{snm}^2, \text{dc}^2, \text{cnm}^2, t2, s2, \text{grade}^2)$

$\wedge \text{grade}^2 < 75)$

$\wedge \neg (\text{snm}^3, \text{grade}^3 \cdot \text{ENROLMENT}(\text{snm}^3, \text{dc}^2, \text{cnm}^3, t3, s3)$

$\wedge \text{MARK}(\text{snm}^3, \text{dc}^2, \text{cnm}^3, t3, s3, \text{grade}^3)$

$\wedge \text{grade}^3 < 75) 3$