Additional Example Problems (we will discuss the Rel Calc answers soon)

Consider this schema:

Student(ST#, classif, name, major)

Enrollment(ST#, C#, midterm, final)

Course(C#, title, dept, creditHours)

Solve each of the following with Relational Calculus ∀p ∃h:

1. Get the ST# and name of senior (classif = 'SR') students who had a final exam >= 90 in CS department courses. No Universal needed

RANGE Student s

RANGE Enrollment e

RANGE Course c

Get W (s.ST#, s.name ): s.classif = ‘SR’ ^ ∃e∃c (e.final >= 90 ^ c.dept = ‘CS’ ^ c.C# = e.C# ^ e.ST# = s.ST#)

Order of expressions do NOT matter

1. Get the ST# of students enrolled in **at least one class** that student #222 is enrolled. Do not include 222 in your result. Universal not needed

RANGE Enrollment e

RANGE Enrollment e222

Get W(e.ST# ): ∃e222 (e222.ST# = 222 ^ e222.C# = e.C#) – has student 222 in the result, we don’t want

Get W(e.ST# ): e.ST# <> 222 ^ ∃e222(e222.ST# = 222^e222.C# = e.C#)

1. Get the ST# and classif of students who are enrolled in **all** of the CS department 5 hour courses. State whether you included students who were not enrolled in any courses in your result. Universal needed

(-> indicates all of a subset)

RANGE Student s

RANGE Enrollment e

GET W (s.ST#, s.classif ): ∀c ( (c.dept = ‘CS’ ^ c.creditHours = 5) ->

∃e (c.C# = e.C# ^ s.ST# = e.ST# ) )

1. Get the ST# of students who are **only** enrolled in MAT department courses. State whether you included students who were not enrolled in any courses in your result.

RANGE Enrollment e

RANGE Range Student s

RANGE Course c

Get W (s.ST#): ∀e(e.ST# = s.ST# - > ∃c (c.C# = e.C# ^ c.dept = ‘MAT’))

Includes students with no enrollment!

Get W (s.ST#): ∀e(e.ST# = s.ST# - > ∃c (c.C# = e.C# ^ c.dept = ‘MAT’)) (Scope of univ e ends)

^ ∃e (e.ST# = s.ST#)

1. Get the ST# of students who **did not pass any** final exams. State whether you included students who were not enrolled in any courses in your result.

RANGE Enrolllment e

RANGE Range Student s

Get W (s.ST# ): ∀e(e.ST# = s.ST# -> e.final < 60)

Includes students with no enrollment tho !

How to remove these students?

Get W (s.ST# ): ∀e(e.ST# = s.ST# -> e.final < 60)

^ ∃e(e.ST# = s.ST#)

Additional problem for relational calculus:

1. Get the ST# and name of students who are in all the courses with student "I M Cheater". State whether you included I M Cheater in your answer.

RANGE Student simc – to get I M Cheater’s ST#

RANGE Student s – the one to return

RANGE Enrollment eimc – to get the C# for IMC

RANGE Enrollment e - for s’s enrollment

Get W (s.ST#, s.name): ∃simc (simc.name = “I M Cheater”) let’s start with getting IMC ST# ^∀eimc(eimc.ST# = simc.ST# -> ∃e (e.ST# = s.ST# ^ e.C# = eIMC.C# ) ) )