

*Algebra:* The algebraic solution is trickier than SQL's. Let `PROFCR-  
SAUX(ProfId, CrsCode)` be defined as follows:

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$$\pi_{\text{ProfId,CrsCode}}(\text{PROFESSOR} \bowtie_{\text{DeptId} \neq \text{DeptId}} \text{COURSE})$$

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A tuple,  $(p, c)$  here means that  $c$  is a course that is offered by a department *other than* the one where  $p$  works. Next, consider `PROFCRS(ProfId, CrsCode)`, which is defined as follows:

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$$\text{PROFCRSAUX} \cup \pi_{\text{ProfId,CrsCode}}(\text{TEACHING})$$

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A tuple,  $(p, c)$  in this relation means that  $c$  is a course that was either taught by  $p$  or it is offered by a department *other than* the one where  $p$  works.

Finally, the expression for the requisite query can be constructed as follows:

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$$\text{PROFCRS} / \pi_{\text{CrsCode}}(\text{COURSE})$$

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Note that constructing `PROFCRSAUX` was essential. The expression

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$$\pi_{\text{ProfId,CrsCode}}(\text{TEACHING}) / \pi_{\text{CrsCode}}(\text{COURSE})$$

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is *not* correct, because it finds every professor who have taught every course in every department rather than the courses that are offered by the department where that professor works.