ADC Assignment 1

Harshit Rakesh Shiroiya

September 2021

14. (Problem 2) Find the pid, pname of each person who (a) lives in Bloomington, (b) works for a company where he or she earn a salary that ishigher than 30000, and (c) has at least one manager.

$$\{(p.pid, p.pname) \mid \texttt{Person}(p) \ \wedge \ \texttt{worksFor}(w) \ \wedge \ \texttt{hasManager}(h) \wedge \\ p.city = \ 'Bloomington' \wedge \ w.salary > 30000 \ \wedge \ h.eid = p.pid \\ \wedge \ p.pid = w.pid\}$$

15. (Problem 4) Find the pid and pname of each person who lives in a citythat is different than each city in which his or her managers live. (Persons who have no manager should not be included in the answer.)

$$\{(p.pid, p.pname) \mid \texttt{Person}(p), \wedge \texttt{hasManager}(h), \wedge \\ p.pid = h.eid \ \neg \in \ \{(p1.pid, p1.pname) \mid \texttt{Person}(p1) \\ \wedge \ \texttt{Person}(p2) \wedge \ \texttt{hasManager}(h1) \wedge \ p1.pid = h1.eid \\ \wedge \ p2.pid = h1.mid \wedge \ p1.city = p2.city\}\}$$

16. (Problem 6) Find the pid, pname, and salary of each employee who hasat least two managers such that these managers have a common job skillbut provided that it is not the 'Networks' skill.

$$\{(p.pid, p.pname, w.salary) \mid \texttt{Person}(p) \wedge \ \texttt{worksFor}(w) \\ \wedge \ p.pid = w.pid \wedge \ p.pid \in \{(h1.eid) \mid \texttt{personSkill}(p1) \\ \wedge \ \texttt{personSkill}(p2) \wedge \ \texttt{hasManager}(h1) \wedge \ \texttt{hasManager}(h2) \\ \wedge \ p1.pid = h1.eid \wedge \ p2.pid = h2.pid \wedge \ h1.mid \neq \ h2.mid \\ \wedge \ h1.eid = p.pid \wedge \ h2.eid = p.pid \wedge \ p1.skill = p2.skill \\ \wedge \ p1.skill \neq \ \ 'Networks'\}\}$$

17. (Problem 8) For each company, list its name along with the highest salarymade by employees who work for it.

$$\{(w.cname, w.salary) \mid \texttt{worksFor}(w) \wedge\ \texttt{Company}(c) \wedge\\ c.cname = w.cname \wedge\ w.salary \geq\ \forall\ \{(w1.salary)\\ \mid (\texttt{worksFor}(w1)) \wedge\ w1.cname = w.cname\ \}\}$$

18. Each person works for a company and has at least two job skills.

$$\forall p \in\ \texttt{Person}(p) \rightarrow \exists w\ \{\texttt{worksFor}(w) \wedge\ p.pid = w.pid\\ \wedge\ \exists ps, \exists ps1\ (\texttt{personSkill}(ps1) \wedge\ \texttt{personSkill}(ps2) \wedge\\ \wedge\ p.pid = ps1.pid \wedge\ p.pid = ps2.pid \wedge\ ps1.skill \neq\ ps2.skill)\}$$

alternatively,

$$\neg\exists \in \texttt{Person}(p) \wedge\ \neg\ \exists w\ \{\texttt{worksFor}(w) \wedge\ p.pid = w.pid\\ \wedge\ \exists ps, \exists ps1\ (\texttt{personSkill}(ps1) \wedge\ \texttt{personSkill}(ps2) \wedge\\ \wedge\ p.pid = ps1.pid \wedge\ p.pid = ps2.pid \wedge\ ps1.skill \neq\ ps2.skill)\}$$

19. Some person has a salary that is strictly higher than the salary of each of his or her managers.

$$\{\exists p \in \texttt{Person}, \exists w \in \texttt{worksFor}\ (p.pid = w.pid \wedge\\ \exists w1 \in \texttt{worksFor} \wedge\ \forall h \in \texttt{hasManager}\ (w.salary\\ > w1.salary\ \rightarrow\ w1.pid = h.mid))\}$$

alternatively,

$$\{\exists p \in \texttt{Person}, \exists w \in \texttt{worksFor}\ (p.pid = w.pid \wedge\\ \neg\ (\exists w1 \in \texttt{worksFor} \wedge\ \exists h \in \texttt{hasManager}\ (w.salary\\ > w1.salary\ \wedge\neg\ w1.pid = h.mid)))\}$$

20. Each employee and his or her managers work for the same company.

$$\forall h\ \texttt{hasManager}(h), \forall w\ \texttt{worksFor}(w), \forall w1\ \texttt{worksFor}(w1)\\ \{w.pid = h.eid \wedge\ w1.mid = h.eid \rightarrow\ w.cname = w1.cname\}$$

alternatively,

$$\neg(\exists h\ \texttt{hasManager}(h), \exists w\ \texttt{worksFor}(w), \exists w1\ \texttt{worksFor}(w1)\\ \{w.pid = h.eid \wedge\ w1.mid = h.eid \wedge \neg\ w.cname = w1.cname\})$$