Fall 2023 B561 Assignment 1
Tuple Relational Calculus (TRC) Solutions

Pavan Kalyan Thota

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$Problem14$
$\{p.pid, p.pname \mid Person(p) p.city =$ 'Bloomington' $\wedge$
$\exists w(worksFor(w) \wedge w.pid = p.pid \wedge (w.salary >= 30000 \vee w.salary <= 50000)) \wedge$
$\exists hm(hasManager(hm) \wedge hm.eid = p.pid)\}$

$Problem15$
$\{p1.pid, p1.pname \mid Person(p1) \wedge \nexists hm1(hasManager(hm1) \wedge hm1.eid = p1.pid)$
$\vee \exists hm2(hasManager(hm2) \wedge person(p2) \wedge hm2.eid = p1.pid \wedge hm2.mid = p2.pid \wedge p1.city! = p2.city)\}$

$Problem16$
$\{p.pid, p.pname, w.salary \mid Person(p) \wedge worksFor(w) \wedge w.pid = p.pid \wedge$
$\exists hm1, hm2(hasManager(hm1), hasManager(hm2), personSkill(ps1), personSkill(ps2)$
$\wedge hm1.eid = p.pid \wedge hm2.eid = p.pid \wedge hm1.mid! = hm2.mid \wedge ps1.pid = hm1.mid \wedge ps2.pid = hm2.mid$
$\wedge ps1.skill = ps2.skill \wedge ps1.skill! =$ 'Programming' $)\}$

$Problem17$
$\{c.cname, w1.salary \mid Company(c) \wedge worksFor(w1) \wedge w1.cname = c.cname$
$\wedge \nexists w2(worksFor(w2) \wedge w2.cname = c.cname \wedge w2.salary > w1.salary)\}$

$Problem18$
$\forall hm1\ hasManager(hm1) \rightarrow \exists hm2(hasManager(hm2) \wedge hm1.eid! = hm2.eid \wedge hm1.mid = hm2.mid)$

$Problem19$
$\exists p(Person(p) \wedge worksFor(w1) \wedge p.pid = w1.pid$
$\wedge \forall hm\ (hasManager(hm) \wedge worksFor(w2) \wedge hm.eid = p.pid \wedge w2.pid = hm.mid) \rightarrow w1.salary < w2.salary))$

$Problem20$
$\nexists hm\ (hasManager(hm) \wedge worksFor(w1) \wedge worksFor(w2)$
$\wedge hm.eid = w1.pid \wedge hm.mid = w2.pid \wedge w1.cname! = w2.cname)$