

Soft Constraints

additional definitions:

$\text{close}(p1,p2) \equiv \forall p1,p2:\text{person} \bullet (\exists r1,r2:\text{room} \mid \text{assigned-to}(p1,r1) \wedge \text{assigned-to}(p2,r2) \bullet \text{close}(r1,r2))$

	Constraint	Formal Expression	Penalty/ Violation
1	group heads should have a large office	$\forall h:\text{person}, g:\text{group} \mid \text{heads-group}(h,g) \bullet \exists r:\text{room} \bullet \text{assigned-to}(h,r) \rightarrow \text{large-room}(r)$	-40
2	group heads should be close to all members of their group	$\forall h:\text{person}, g:\text{group} \mid \text{heads-group}(h,g) \bullet \forall p:\text{person} \mid \text{group}(p,g) \bullet \text{close}(h,p)$	-2
3	group heads should be located close to at least one secretary in the group	$\forall h:\text{person}, g:\text{group} \mid \text{heads-group}(h,g) \bullet \exists s:\text{person} \mid \text{secretary}(s) \wedge \text{group}(s,g) \bullet \text{close}(h,s)$	-30
4	secretaries should share offices with other secretaries	$\forall s:\text{person}, r:\text{room} \mid \text{secretary}(s) \wedge \text{assigned-to}(s,r) \bullet \exists s2:\text{person} \mid \text{secretary}(s2) \wedge s \neq s2 \bullet \text{assigned-to}(s2,r)$	-5
5	managers should be close to at least one secretary in their group	$\forall m:\text{person}, g:\text{group} \mid \text{manager}(m) \wedge \text{group}(m,g) \bullet \exists s:\text{person} \mid \text{secretary}(s) \wedge \text{group}(s,g) \bullet \text{close}(m,s)$	-20
6	managers should be close to their group's head	$\forall m:\text{person}, h:\text{person}, g:\text{group} \mid \text{manager}(m) \wedge \text{group}(m,g) \wedge \text{heads_group}(h,g) \bullet \text{close}(m,h)$	-20
7	managers should be close to all members of their group	$\forall m:\text{person}, g:\text{group} \mid \text{manager}(m) \wedge \text{group}(m,g) \bullet \forall p:\text{person} \mid \text{group}(p,g) \bullet \text{close}(m,p)$	-2
8	the heads of projects should be close to all members of their project	$\forall hp:\text{person}, pr:\text{project} \mid \text{heads-project}(hp,pr) \bullet \forall p:\text{person} \mid \text{project}(p,pr) \bullet \text{close}(hp,p)$	-5
9	the heads of large projects should be close to at least one secretary in their group	$\forall hp:\text{person}, pr:\text{project}, g:\text{group} \mid \text{heads-project}(hp,pr) \wedge \text{large-project}(pr) \wedge \text{group}(hp,g) \bullet \exists s:\text{person} \mid \text{secretary}(s) \wedge \text{group}(s,g) \bullet \text{close}(hp,s)$	-10
10	the heads of large projects should be close to the head of their group	$\forall hp:\text{person}, h:\text{person}, g:\text{group} \mid \text{heads-project}(hp,pr) \wedge \text{large-project}(pr) \wedge \text{group}(hp,g) \wedge \text{heads_group}(h,g) \bullet \text{close}(hp,h)$	-10
11	a smoker shouldn't share an office with a non-smoker	$\forall ps:\text{person}, r:\text{room} \mid \text{smoker}(ps) \wedge \text{assigned-to}(ps,r) \bullet \sim \exists p:\text{person} \mid \text{assigned-to}(p,r) \bullet \sim \text{smoker}(p)$	-50
12	members of the same project should not share an office (encourages synergy between projects)	$\forall p:\text{person}, \text{proj}:\text{project}, r:\text{room} \mid \text{assigned-to}(p,r) \wedge \text{project}(p,\text{proj}) \bullet \sim \exists p2:\text{person} \mid p \neq p2 \wedge \text{project}(p2,\text{proj}) \bullet \text{assigned-to}(p2,r)$	-7
13	if a non-secretary hacker/non-hacker shares an office, then he/she should share with another hacker/non-hacker	$\forall p,p2:\text{person}, r:\text{room} \mid \sim \text{secretary}(p) \wedge \sim \text{secretary}(p2) \wedge \text{assigned-to}(p,r) \wedge \text{assigned-to}(p2,r) \wedge p \neq p2 \bullet \text{hacker}(p) \leftrightarrow \text{hacker}(p2)$	-2
14	people prefer to have their own offices	$\forall p:\text{person}, r:\text{room} \mid \text{assigned-to}(p,r) \bullet \sim \exists p2:\text{person} \mid p \neq p2 \bullet \text{assigned-to}(p2,r)$	-4

15	if two people share an office, they should work together	$\forall p, p2: \text{person}, r: \text{room} \mid \text{assigned-to}(p, r) \wedge \text{assigned-to}(p2, r) \wedge p \neq p2 \bullet \text{works-with}(p, p2)$	-3
16	two people shouldn't share a small room	$\forall p, q: \text{person} \mid p \neq q \bullet (\text{assigned-to}(p, r) \wedge \text{assigned-to}(q, r)) \rightarrow \sim \text{small-room}(r)$	-25