Homework 3

Paul Isaacson

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Our assignment was to minimize the cost of operating a mainframe at Oxbridge University.

Here is the model file:

{string} Workers = ...;

{string} Days = ...;

float wageRates[Workers] = ...;

float minHours[Workers] = ...;

float hoursOpen[Days] = ...;

tuple workerAssignType {

string w;

string d;

float availHrs;

}

{workerAssignType} WorkAssigns = ...;

tuple connection {

string w;

string d;

}

{connection} Connections = { <w,d> | <w,d,availHrs> in WorkAssigns};

float Availability[Connections] = [ <t.w,t.d>:t.availHrs | t in WorkAssigns];

dvar float+ Hours[Connections];

constraint ctSupply[Workers];

constraint ctDemand[Days];

constraint ctAvail[Connections];

minimize

sum(c in Connections)

wageRates[c.w] \* Hours[c];

subject to {

forall(w in Workers)

ctSupply[w]:

sum(<w, d> in Connections)

Hours[<w, d>] >= minHours[w];

forall(d in Days)

ctDemand[d]:

sum(<w, d> in Connections)

Hours[<w, d>] == hoursOpen[d];

forall (c in Connections)

ctAvail[c]:

Hours[c] <= Availability[c];

}

execute{

for( var c in Connections ) {

writeln(c, Hours[c]);

}

}

Here is the data file:

Workers = {

KC,

DH,

HB,

SC,

KS,

NK,

};

Days = {

M,

T,

W,

R,

F,

};

wageRates = #[

KC:25,

DH:26,

HB:24,

SC:23,

KS:28,

NK:30,

]#;

minHours = #[

KC:8,

DH:8,

HB:8,

SC:8,

KS:7,

NK:7,

]#;

hoursOpen = #[

M:14,

T:14,

W:14,

R:14,

F:14

]#;

WorkAssigns = {

<KC,M,6>,

<KC,W,6>,

<KC,F,6>,

<DH,T,6>,

<DH,R,6>,

<HB,M,4>,

<HB,T,8>,

<HB,W,4>,

<HB,F,4>,

<SC,M,5>,

<SC,T,5>,

<SC,W,5>,

<SC,F,5>,

<KS,M,3>,

<KS,W,3>,

<KS,R,8>,

<NK,R,6>,

<NK,F,2>,

};

Here are the results:

<"KC" "M">3

<"KC" "W">2

<"KC" "F">4

<"DH" "T">2

<"DH" "R">6

<"HB" "M">4

<"HB" "T">7

<"HB" "W">4

<"HB" "F">4

<"SC" "M">5

<"SC" "T">5

<"SC" "W">5

<"SC" "F">5

<"KS" "M">2

<"KS" "W">3

<"KS" "R">2

<"NK" "R">6

<"NK" "F">1

The minimum cost is $1,755 per week.