

Linguagens de Modelagem

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Sumário

- AMPL (LP, MIP)
- GAMS
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- CPLEX (LP, MIP, BAR, MIQP)
- XPRESS (LP, MIP, BAR, MIQP)
- GUROBI (LP, MIP)
- OSL (LP, MIP, BAR, MIQP)
- Lindo (LP, MIP, BAR, NLP, MIQP, MINLP)
- MOPS(LP, MIP, BAR)



AMPL - <http://www.ampl.com/>

- AMPL é uma linguagem de alto nível para especificação de problemas de otimização.
- AMPL permite que o modelo seja especificado separadamente dos dados
- É muito semelhante a forma que expressamos problemas
- O usuário fica livre da manipulação de dados

AMPL – Dieta (dieta.mod)

```
set NUTR ordered;
set FOOD ordered;

param cost {FOOD} >= 0;
param f_min {FOOD} >= 0, default 0;
param f_max {j in FOOD} >= f_min[j], default Infinity;

param n_min {NUTR} >= 0, default 0;
param n_max {i in NUTR} >= n_min[i], default Infinity;

param amt {NUTR,FOOD} >= 0;

# -----

var Buy {j in FOOD} integer >= f_min[j], <= f_max[j];

# -----

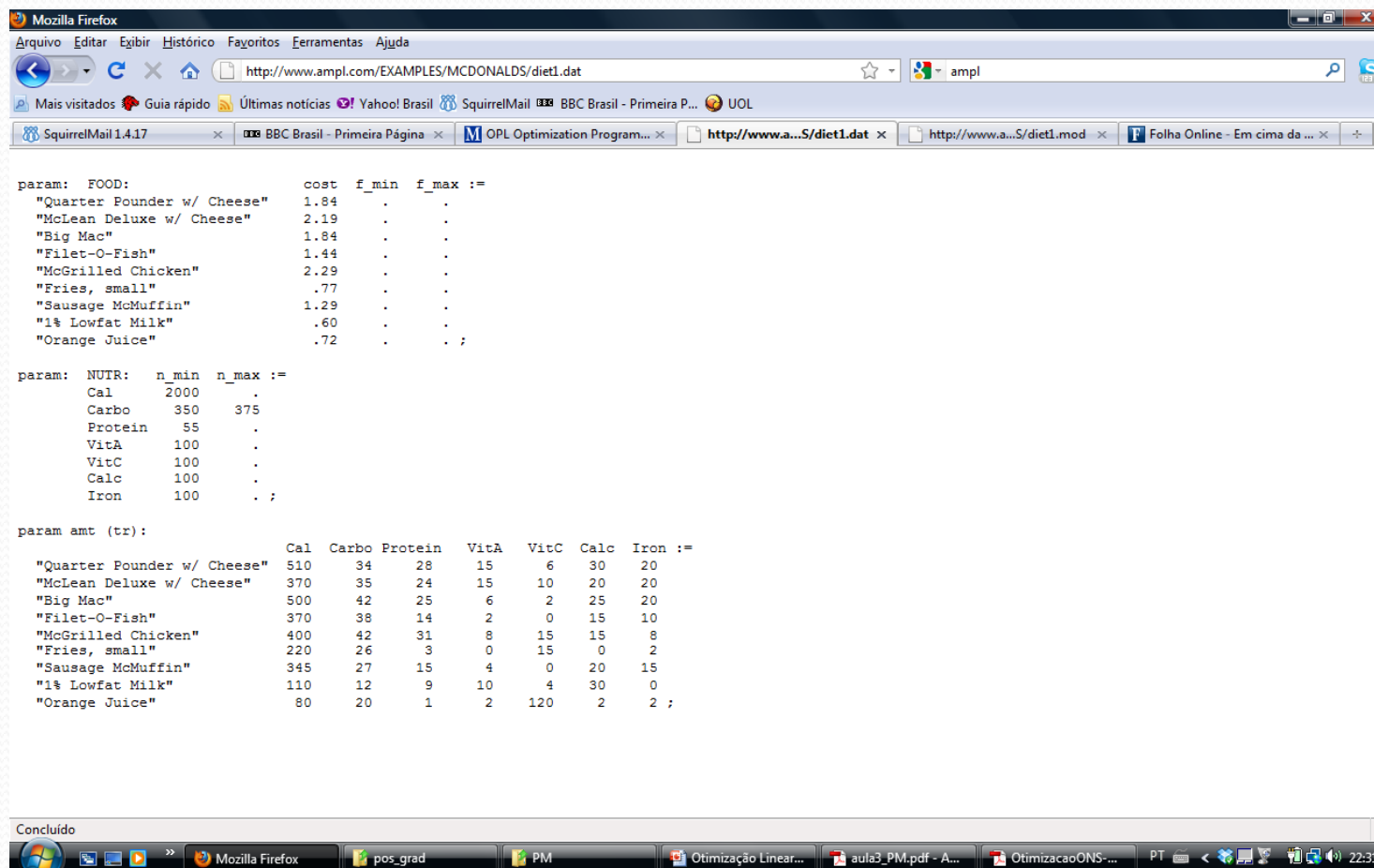
minimize Total_Cost: sum {j in FOOD} cost[j] * Buy[j];

minimize Nutr_Amt {i in NUTR}: sum {j in FOOD} amt[i,j] * Buy[j];

# -----

subject to Diet {i in NUTR}:
    n_min[i] <= sum {j in FOOD} amt[i,j] * Buy[j] <= n_max[i];
```

AMPL – Dieta (dados.dat)



```
param: FOOD:          cost  f_min  f_max :=
"Quarter Pounder w/ Cheese"  1.84   .    .
"McLean Deluxe w/ Cheese"    2.19   .    .
"Big Mac"                    1.84   .    .
"Filet-O-Fish"               1.44   .    .
"McGrilled Chicken"          2.29   .    .
"Fries, small"               .77   .    .
"Sausage McMuffin"           1.29   .    .
"1% Lowfat Milk"             .60   .    .
"Orange Juice"               .72   .    . ;

param: NUTR:  n_min  n_max :=
  Cal      2000   .
  Carbo    350    375
  Protein   55    .
  VitA     100    .
  VitC     100    .
  Calc     100    .
  Iron     100    . ;

param amt (tr):
      Cal  Carbo  Protein  VitA  VitC  Calc  Iron :=
"Quarter Pounder w/ Cheese"  510   34   28   15   6   30   20
"McLean Deluxe w/ Cheese"    370   35   24   15   10  20   20
"Big Mac"                   500   42   25   6    2   25   20
"Filet-O-Fish"              370   38   14   2    0   15   10
"McGrilled Chicken"         400   42   31   8    15  15   8
"Fries, small"              220   26   3    0    15   0   2
"Sausage McMuffin"          345   27   15   4    0   20  15
"1% Lowfat Milk"            110   12   9   10   4   30   0
"Orange Juice"              80    20   1   2   120   2   2 ;
```



GAMS - <http://www.gams.com/>

- GAMS é uma linguagem de alto nível para especificação de problemas de otimização.
- Este *software tem uma versão free para*
- estudante na internet
- É muito semelhante a forma que expressamos problemas

- The design of OPL was motivated by the successful implementation of mathematical modeling languages like AMPL and GAMS
- Like AMPL and GAMS, OPL provides full support for linear programming and integer programming, including access to linear programming algorithms.
- The main difference between OPL and other modeling languages is that OPL also provides support for both the modeling and search aspects of constraint programming.
- In other words, OPL allows the user to specify not only the problem but also the search procedure tailored to the problem.

CPLEX – Arquivo no formato: 'lp', 'mps', 'bas', 'min', 'net', 'sav', 'vec', 'mst', 'ord', 'sos', 'tre'.

- Escrevendo o comando “help” aparece a seguinte informação:
- Add add constraints to the problem
- Baropt solve using barrier algorithm
- Change change the problem
- Display display problem, solution, or parameter settings
- Enter enter a new problem
- Help provide information on CPLEX commands
- Mipopt olve a mixed integer program
- Netopt solve the problem using network method
- Optimize solve the problem
- Primopt solve using the primal method
- Quit leave CPLEX
- Read read problem or basis information from a file
- Set set parameters
- Tranopt solve using the dual method
- Write write problem or solution info. to a file
- Execute execute a command from the operating system



CPLEX

- ILOG CPLEX offers C, C++, Java, and C#.NET libraries that solve linear programming (LP) and related problems.
- ILOG Concert Technology (C++, Java, and C#.NET)
- ILOG CPLEX Callable Library (C)