

The simplex algorithm for the data-flow architecture

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August 25, 2015

Motivation

- Linear programming used for modeling a rich set of problems
- Simplex is one of the most important algorithms in history
- Practical - easy to implement and fast
- Can we make it even faster?

Applications I. - scheduling

- crew scheduling in airlines
- job assignments to machines
- load management in supercomputing



Applications II. - financial applications

- risk assesment
- option pricing
- portfolio selection



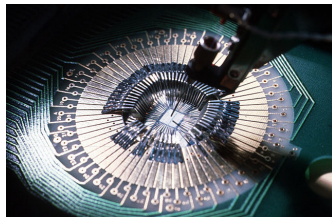
Applications III. - telecommunications

- call routing
- network design
- internet traffic optimization



Applications IV. - traveling salesman

- VLSI chip manufacturing
- vehicle routing
- warehouse picking



Problem statement

n variables

$$x = [x_1, x_2, \dots, x_n]$$

These variables are bounded by a set of m constraints, given in matrix form as:

$$Ax \leq b.$$

Out of these feasible solutions, the ultimate goal is to find a vector x , which maximizes a linear goal function

$$c^T x.$$

Conclusions

- Linear programming requires a lot of computing effort
- Since real linear programs are large, solving them is also very data-intensive
- The data-flow architecture is very suitable for such tasks