SIGNING FREE AGENTS BASEBALL PLAYERS

WE CAN SPEND UPTO
$X

Problem:

We have N positions and at each position.
We have P free agents, we have to select one agent.

..P   ..P   ..P   ..N

Each player has Position, Cost and VORP. We are looking for players with high VORP and low Cost, spending no more then X on total cost.

- ● Position
- $ Cost
- ★ VORP

Explaination:

Let L={p1,p2,…,pk} be a set of players, possibly empty, with maximum VORP for the subproblem (i,x)

If i=N then L has at most one player. If all players in position N have cost more than x, then L has no players. Otherwise, L={p1}, where p1 has the maximum VORP among players for position N with cost at most x

If i<N
and L includes player p for position i, then L '=L-{p} is an optimal set for the subproblem (i+1,x-p.cost)

If i<N and L does not include a player for position i, then L is an optimal set for the subproblem (i+1,x).

Solution:

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FREE-AGENT-VROP(p, N, P, X)
    let v[1..N][0..X] and who[1..N][0..X] be new tables
    for x = 0 to X
        v[N, x] = -∞
        who[N, x] = 0
        for k = 1 to P
            if p_{Nk}.cost ≤ x and p_{Nk}.vrop > v[N, x]
                v[N, x] = pNk.vrop
                who[N, x] = k
    for i = N - 1 downto 1
        for x = 0 to X
            v[i, x] = v[i + 1, x]
            who[i, x] = 0
            for k = 1 to P
                if p_{ik}.cost ≤ x and v[i + 1, x - p_{ik}.cost] + p_{ik}.vrop > v[i, x]
                    v[i, x] = v[i + 1, x - p_{ik}.cost] + p_{ik}.vrop
                    who[i, x] = k
    print "The maximum value of VORP is " v[1, X]
    amt = X
    for i = 1 to N
        k = who[i, amt]
        if k != 0
            print "sign player " p_{ik}
            amt = amt - p_{ik}.cost
    print "The total money spent is " X - amt
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