

Re: Anyone interested in being paid to find a solution to a commercial problem?

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Source: <http://coding.derkeiler.com/Archive/General/comp.programming/2006-03/msg00015.html>

- *From:* "robertwessel2@xxxxxxxx" <robertwessel2@xxxxxxxx>
 - *Date:* 28 Feb 2006 23:58:55 -0800
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josh@xxxxxxxxxxxxxxxx wrote:

We are software developers for the vacation rental business. We need to code an availability search (in Microsoft SQL Server) to find the cheapest combination of properties that will accommodate a given capacity. Testing all possible combinations is not an option as forty properties will yield roughly a trillion combinations. We have got to the point where we take each property in turn, starting with the cheapest in terms of cost per head, and then adding the next cheapest and so on, until greater than or equal to the required capacity is reached. If that capacity is reached EXACTLY, we then have a solution. So far so good. But if we have gone over the required capacity, there is a possibility that a different mix with a lower capacity will be cheaper, even if the cost per head of capacity is higher, as a result of the spare capacity in going over what is required rather than matching it exactly.

On the surface this sounds like it's related to the knapsack problem. Only instead of trying to maximize the value where the total size of the collection of objects is less than some limit, you're coming from the other side and trying to minimize the value of a collection of objects whose size is at least some limit. For the traditional knapsack problem, (which is NP-complete in terms of a general solution), there is a reasonable dynamic programming solution when all of the object sizes are small integers (which is obviously the case in your problem).

It is also similar in some respects to the bin packing problem.

In both cases there is considerable literature, perhaps some research in those directions might help.

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