Say $n$ boxes arrive in the order $b_1, \ldots, b_n$. Say each box $b_i$ has a positive weight $w_i$, and the maximum weight each truck can carry is $W$. To pack the boxes into $N$ trucks preserving the order is to assign each box to one of the trucks $1, \ldots, N$ so that:

- No truck is overloaded: the total weight of all boxes in each truck is less or equal to $W$.

- The order of arrivals is preserved: if the box $b_i$ is sent before the box $b_j$ (i.e. box $b_i$ is assigned to truck $x$, box $b_j$ is assigned to truck $y$, and $x < y$) then it must be the case that $b_i$ has arrived to the company earlier than $b_j$ (i.e. $i < j$).

We prove that the greedy algorithm uses the fewest possible trucks by showing that it “stays ahead” of any other solution. Specifically, we consider any other solution and show the following. If the greedy algorithm fits boxes $b_1, b_2, \ldots, b_j$ into the first $k$ trucks, and the other solution fits $b_1, \ldots, b_i$ into the first $k$ trucks, then $i \leq j$. Note that this implies the optimality of the greedy algorithm, by setting $k$ to be the number of trucks used by the greedy algorithm.

We will prove this claim by induction on $k$. The case $k - 1$ is clear; the greedy algorithm fits as many boxes as possible into the first truck. Now, assuming it holds for $k - 1$: the greedy algorithm fits $j'$ boxes into the first $k - 1$, and the other solution fits $i' \leq j'$. Now, for the $k^{th}$ truck, the alternate solution packs in $b_{i'+1}, \ldots, b_i$. Thus, since $j' \geq i'$, the greedy algorithm is able at least to fit all the boxes $b_{i'+1}, \ldots, b_i$ into the $k^{th}$ truck, and it can potentially fit more. This completes the induction step, the proof of the claim, and hence the proof of optimality of the greedy algorithm.