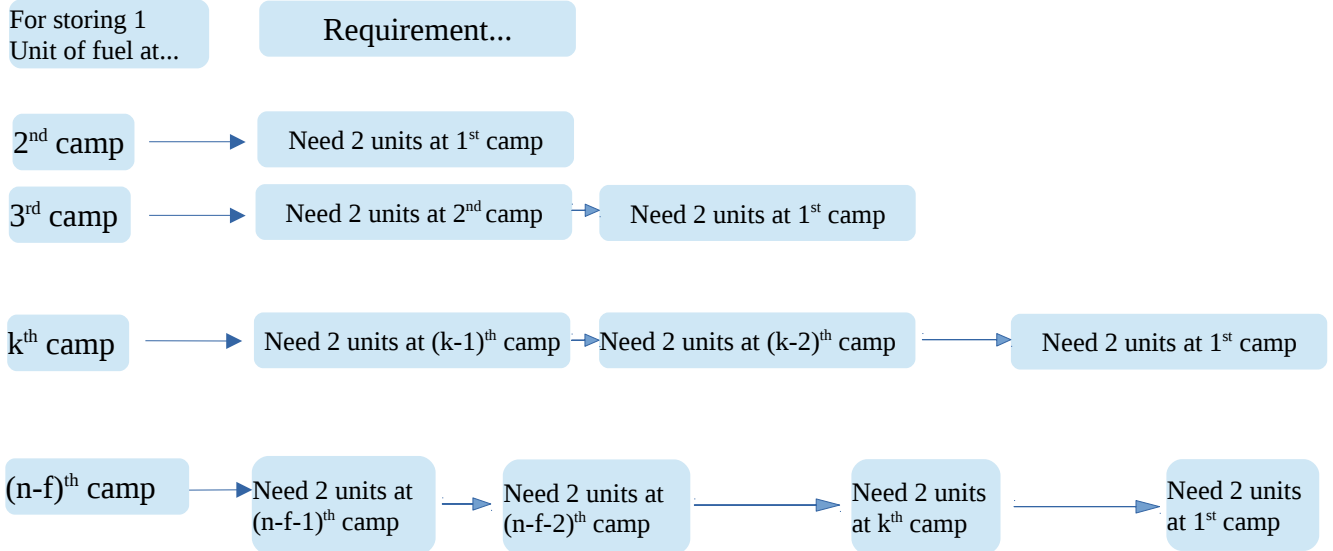


Truck Problem Solution

Since the target camp is n fields away and the fuel capacity of the truck is $f=3$, if the truck reaches the $(n-f)^{\text{th}}$ field with f units of fuel, it could use the f units to reach the target camp n . Out of f units of fuel, 2 units of fuel is used to reach a field and return from the field, and remaining $(f-2)$ (which equals 1 in our case) can be stored at the camp. For being able to store 1 unit of fuel at the second camp, we need 2 units of fuel at the first camp – 1 unit used while going towards the second camp and 1 unit for returning back to the base camp. Similarly, for being able to store 1 unit of fuel at k^{th} camp, we need 2 units of fuel at $(k-1)^{\text{th}}$ camp. Our aim is to store 1 unit of fuel at $(n-f)^{\text{th}}$ camp, so that the truck could use that 1 unit of fuel to refill it's tank and head towards the final journey with f units of fuel from $(n-f)^{\text{th}}$ camp to n^{th} camp. The following chart illustrates the scenario explained above:



Consequently, 2 units of fuel need to be stored at 1st camp, initially. After this, the truck goes ahead to store a unit of fuel at 2nd camp. Meanwhile, the 2 units stored at the 1st camp get used up in the process. Thus, a continuous (recursive) check has to be run, to refill the used up units in the subsequent iterations. Following table shows an example of iterations for 6 intermediate camps:

Trips	Camp 1	Camp 2	Camp 3	Camp 4	Camp 5	Camp 6
1,2	2 units	0	0	0	0	0
3	0	1 unit	0	0	0	0
4,5	2 units	0	0	0	0	0
6	0	2 units	0	0	0	0
7,8	2 units	2 units	0	0	0	0
9	0	0	1 unit	0	0	0
10, 11	2 units	0	1 unit	0	0	0
12	0	1 unit	1 unit	0	0	0
13	1 unit	1 unit	1 unit	0	0	0
14	0(used for refill)	0(used for refill)	0(used for refill)	0	0	0 (truck reached 6)

In the above example, As the fuel at Camp 1 gets used up at the end of the 3rd trip, it needs to be refilled in the 4th and 5th trip. Also, at 9th trip, 1 unit of fuel has been stored at Camp 3 (which is $6-3$ or $n-f$). After this the strategy changes. Now, the target is to maintain 1 unit at Camp 2 (which is $3-1$). Once this is done, the

target is to maintain 1 unit at Camp 1 (which is 3-1). Final trip is the trip 14th. Total fuel used is 42 (14x3units).