Cotta&Cush

## Software Engineering Internship Challenge

# FIRST PROGRESS REPORT

By

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**(a). Problem Analysis and Mathematical Basis**

Given that:

no. of bananas = x  where x >= 3000;
no. of camels = z  where 1 <= z <=10;
dist. To market = y  where 1000 <= y <= 10,000; and
no. of bananas 1 camel eats per 1km = k  where 1 <= k <= 10

Assuming that:

z = 1 camel, x = 3000 bananas, y = 1000km

Now if the camel carries 1000 bananas to markey y (1000km), it will have finish the whole banana and will not be able to go back.

But if the camel stop at an intermediate distance, then if the camel stops at a distance 500km, then it will have consume the whole 3000 bananas. But if the camel carries 1000 bananas and drop it at 1km, then it will eat 1 banana and when coming back it will eat 1 banana too. So, it will drop 998 bananas at 1km. For the second 1000 bananas, it will drop 998 bananas as well, but on the third 1000 bananas the camel will only eat one banana and drop 999 bananas. Hence the total bananas carried to 1km is 2995 bananas and the camel only consume 5 bananas for the 5 trips.

Now, if were to calculate the distance **d1 km**(intermediate distance) it would have covered when the camel would have consume 1000 bananas and remaining 2000 bananas, then we have that

5 bananas $\longrightarrow$ 1 km

then,

$$3000 - 5d = (3000 - 1000)$$
$$d1 = 200\text{km}$$

At this point, we have only covered 200km and 2000 bananas remaining, then if the camel is to travel d2 km dropping 1000 bananas and consuming 1000 bananas, then the camel will only consume 3 bananas per 1 km to and fro, then we have that

3 bananas $\longrightarrow$ 1 km

then,

$$2000 - 3d = (2000 - 1000)$$
$$d = 333.33 \text{ km}$$

Hence, d1 + d2 = 200 + 333.33 = 533.33 km

Now, the trip to y(1000km) market is now remaining (1000 – 533.33) km, hence the camel carries the remaining 1000 bananas and consumes 466.66 → 467 bananas to complete the 1000 km to the market and the farmer will be able to sell the remaining 533 bananas.

I have been able to analyze the problem and understand that problem has a sequential pattern, and which was used to develop the mathematical model.

Therefore given x = 3000, z = 1, k=1 y = 1000 the farmer sells maximum of 533 bananas.

Now let's assume we have 3500 instead of 3000 we need an additional move.

The extra value 500 that can be gotten by 3500 mod 1000 divided by an+1

Assuming the farmer has one camel to transport the bananas, then the **maximum number of camels** is given by:

$$\left\{ \frac{1}{k} \left[ \left( \sum_{b=1}^{a} \frac{1000}{2b-1} \right) + \frac{x\,mod\,1000}{2(a)+1} \right] - y \right\}$$

where

a = $\frac{x}{1000}$

1000 = capacity of the camel

x = number of bananas

k = number of bananas a camel eats for each km travelled

y = distance to the market

c = range of number of camels from 1 to Z

**(b). Maximum number of camels.**

The following formula is used in determining the maximum number of camels if more than one camel is available:

$$max^{c} = 1 - z \left[ \left\{ \frac{1}{k} \left[ \left( \sum_{b=1}^{\frac{a}{c}} \frac{1000}{2b-1} \right) + \frac{xmod\,1000}{2(a)+1} \right] - Y \right\} c \right]$$

When x = 1000, z = 1, k=1 y = 1000 the number of camel for maximum output is 1,
x = 2000, max Camel = 1
x = 3000, max Camel = 1
x = 4000, max Camel = 1
x = 5000, max Camel = 2
x = 6000, max Camel = 2
x = 7000, max Camel = 2
x = 8000, max Camel = 2
x = 9000, max Camel = 3
x = 10000, max Camel = 3
x = 11000, max Camel = 3
x = 12000, max Camel = 3