1. Hanoi Tower when 5 discs are used.

ABC

let the rods be rodA, B, C and discs be a, a, a, a, a, a, a.

Problem: move 5 discs a, a2, a3, a4, a5 from A to C

Sub Problems: 1 Move 4 diecs from A to B

> Move Qo from A to C

@Move 4 discs from B to C

Ly Sub problems: (1) - 1 Move 3 discs from A to C of (1) > Move Q4 from A to B

O-2 Move 3 discs from C toB

*Same manner for 2							
Process							
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
->	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
<b>→</b>	$\frac{a_5}{A} \xrightarrow{a_4} \frac{a_3}{a_3} \rightarrow \frac{a_5}{A} \xrightarrow{a_5} \frac{a_4}{a_3} \xrightarrow{a_5} \frac{a_2}{A} \xrightarrow{a_4} \frac{a_3}{A} \rightarrow \frac{a_5}{A} \xrightarrow{a_5} \frac{a_4}{A} \xrightarrow{a_3} \frac{a_5}{A} \xrightarrow{a_5} \frac{a_4}{A} \xrightarrow{a_5} \frac{a_5}{A} $						
7	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
<b>→</b>	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
<b>→</b>	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$						

1	1. 1/4/4					
비고		Hano	i ( n	, A,	B. C)	
	1	powe	enn [	[n];		
-	2	disc	Move	ement	E[n]	l; int disci
APPENDING	3	for	え=	0 to	n-1	\$ 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
	4		79	i ==	0	(discMovement[i]=0;
	5				r[i]	
	6		else			
	7			Powe	rti]	= power[i-1] *2 }
	8	for	k=1	•		[n-1]
	9	The second second second	COST CHEST STREET	Parketing of the parket of	to V	CONTROL OF THE STREET, AND ADDRESS OF THE STREET
	10					ower[j-1]/2)/power[j]==0
	11			1	disc	= 5; break; } }
	12		7.5		isc %	
	13			STATE OF THE PARTY	PARISON BURNS	isc Movement [disc] % 3
	14			Swi		
	15				A STATE OF THE PARTY OF THE PAR	o: move A > B; break;
	16		and of the			91: move B>C; break;
	17		else		Las	e2: move c → A; break;
4	18		EIDE	01.51	ما ما	
To a transfer	19	CONTRACT OF		SWIT	CNU	isc Movement [disc] % 3
Marin San	20			a wide		0: move A = C; break;
	21	l description of the second	Andrew Co.		case	1: move C+B; break;
	22		n - u vo vakazot	4.1	Case	2: move B > A; break; [disc]++;
			diec	Move	ment	Ldisc1++;
	23		3			
Juntalian	24					
	25					
	26			postan la compagnio		
	27					
and the second	28	at dayle by tener	CARLES AND AND AND AND			
	29	231.000				
	30					

MEMO



2. Technical Report

- for Hanoi (n. A, B, C)

Time Complexity:  $T(n) = c_1 n + c_2 n \cdot n$ =  $O(n \cdot 2^n)$ 

Thput: n number of discs.

A rod where discs start from

B temporary rod.

C rod where discs should end

variable: power[n]=array with 22thstored

disc Movement[n] = number of movements made on ith disc

int disc = disc number that should be moved on the step.

code explanation: <u>line</u># Description 3 - 7 initialize power[] with 22+1 and discMovement[] with 0 9-11 find & Assign the disc# that should be moved on the step. ex) kth disc should be moved on step 2kx-2k-1 (xeIN) 12 - 21 find where from and to move the disc occording to the pattern! ex) if n-disc % 2 == 0, disc moves in order of A > C > B > A > ... else, (n-disco/02==1) disc moves in order of A>B>C>A>... count up the movement of the disc.

Principle: I analyzed which disc moves on specific step, and found out that kth disc is moved on the step  $2^k x - 2^{k-1}$  ( $x \in \mathbb{N}$ ) when this problem is solved recursively. Then, I found out that kth disc start with movement  $A \to C$  when n-k is even, and  $A \to C$  when n-k is odd.

Lastly, the disc that started with  $A \to C$  moves in order of  $A \to C \to B \to A \to C \to B$ , and the other  $A \to B \to C \to A \to B \to C$ ...

3. 
$$T(n) = T(\frac{n}{2}) + C$$

let's gay  $N = 2^k$  then.

 $T(n) = T(\frac{n}{2}) + C$ 
 $= T(\frac{n}{2}) + C + C$ 
 $\vdots$ 
 $= T(1) + C \cdot k$ 
 $k$  can be written as logar.

Therefore.

 $T(n) = C \cdot \log_2 n + C_1$ 
 $= O(\log_2 n)$ 
 $Time\ Complexity\ of\ T(n) = O(\log_2 n)$ .

 $T(n) = 2T(\frac{n}{2}) + C$ 

let's say  $n = 2^k$  then.

 $T(n) = 2T(\frac{n}{2}) + C$ 
 $= 2(2T(\frac{n}{2} \cdot \frac{1}{2}) + C) + C = 2 \cdot 2T(\frac{n}{2} \cdot \frac{1}{2}) + 2c + C$ 
 $= 2^k T(1) + c \int_{i=1}^k 2^{i-1} = 2^k T(i) + C \cdot 2^k$ 
 $= (T(i) + c) 2^k$ 
 $k$  can be written as  $\log_2 n$ .

Therefore,

 $T(n) = (T(i) + c) 2^{\log_2 n} = (T(i) + c) \cdot n$ 
 $= O(n)$ 

: Time complexity of T(n) = O(n).

CamScanner로 스캔하기