Chinese N Linked Rings Puzzle

The prototype of this question is designed based on the Chinese antique toy "Chinese Nine Linked Rings Puzzle". It is also known as the the Chinese rings puzzle - perhaps the largest mechanical puzzle in China. The puzzle consists of a long ring with a handle at one end, which is interlocked with nine rings.

Figure 1: Chinese 9 rings puzzle

The beauty of many great puzzles is that their rules can be expressed very simply, yet the challenge of solving them requires much thought and patience. The nine linked rings is such a puzzle. The goal is to remove all nine rings that are trapped on the handle, and this can be accomplished in 256 steps by following two simple rules.

Before reading further, find a linked rings puzzle and see if you can solve it for yourself. Then analyze your solution and try to find an easy way to express it. Can you discover the two rules? A procedure for solving the nine linked rings puzzle is based on the fact that at any given moment there are exactly two rings that can be taken off or put on the handle.

- **Rule A.** Ring 1 can always be taken off or put on the handle.
- **Rule B.** The only other ring that can be taken off or put on the handle is the ring immediately after the lead ring, where the lead ring is defined as the first ring that is on the handle.
- **Rule C.** Ring 1 and Ring 2 can be taken off or put on the handle simultaneously in just 1 instruction if possible.

Problem

Please design a **Recursive** program to solve Chinese N Linked Rings Puzzle take off problem. First, enter an integer N, which represents N rings. In the initial state, each ring is hung on the handle. You must follow **Rule A.B.C.** and continue the recursive operation until all the rings are put down. You need to print each operation and its number on the screen in detail. The program cannot stop the output until all rings are down.

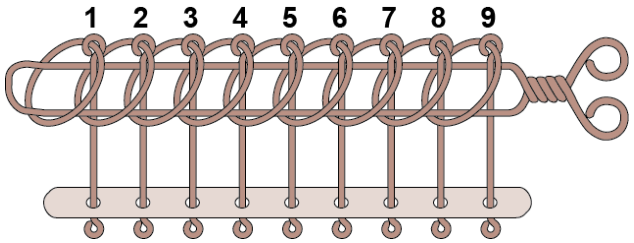

Figure 2: N-ring sample

Input

The input consists one positive integer N. N follows the restriction of C/C++ integer.

Output

For the input value N, you have to solve the problem told step by step. You need to output multi-line text in a specific format. Only when the problem is solved completely can the output terminated.
The format is the text "Step"+ the number of the step + ongoing operations + the text "Ring"+ the ring number on which the operation is being performed, respectively. Note that the ongoing operations are selected from "Take off" and "Put on". Give a reasonable output line:
Step 10: Take off Ring 5

Sample Input

3

Sample Output

Step 1: Take off Ring 1
Step 2: Take off Ring 3
Step 3: Put on Ring 1
Step 4: Take off Ring 1 and 2

Reference:

*(Highly recommended to read)
https://chinesepuzzles.org/nine-linked-rings-puzzle/

http://simonsays-tw.com/web/NineLinkedRings/game/nineLinkedRings.html
https://zh.wikipedia.org/zh-tw/
https://www.linux-magazine.com/Issues/2018/213/Programming-Snapshot-Python-Scripts