

CS206

Programming Assignment 1

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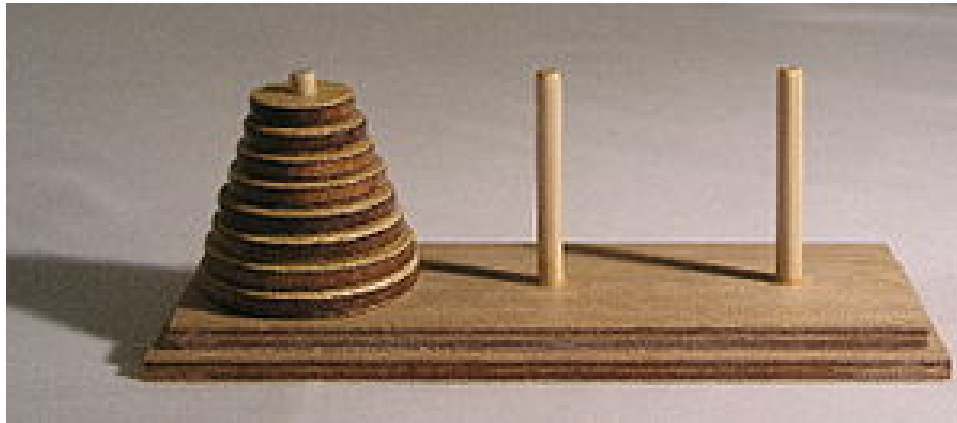
9. 29. 2014

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Hanoi tower

- Mathematical puzzle
- The objective of the puzzle is to move the entire stack to another rod (e.g. 1 to 3)



Hanoi tower

- Obeying the following simple rules
 1. Only one disk can be moved at a time.
 2. A disk can only be moved if it is the uppermost disk on a stack.
 3. No disk may be placed on top of a smaller disk.



Hanoi tower

- The minimum number of moves required to solve a Tower of Hanoi puzzle is $2^n - 1$,
- where n is the number of disks.

Recursion

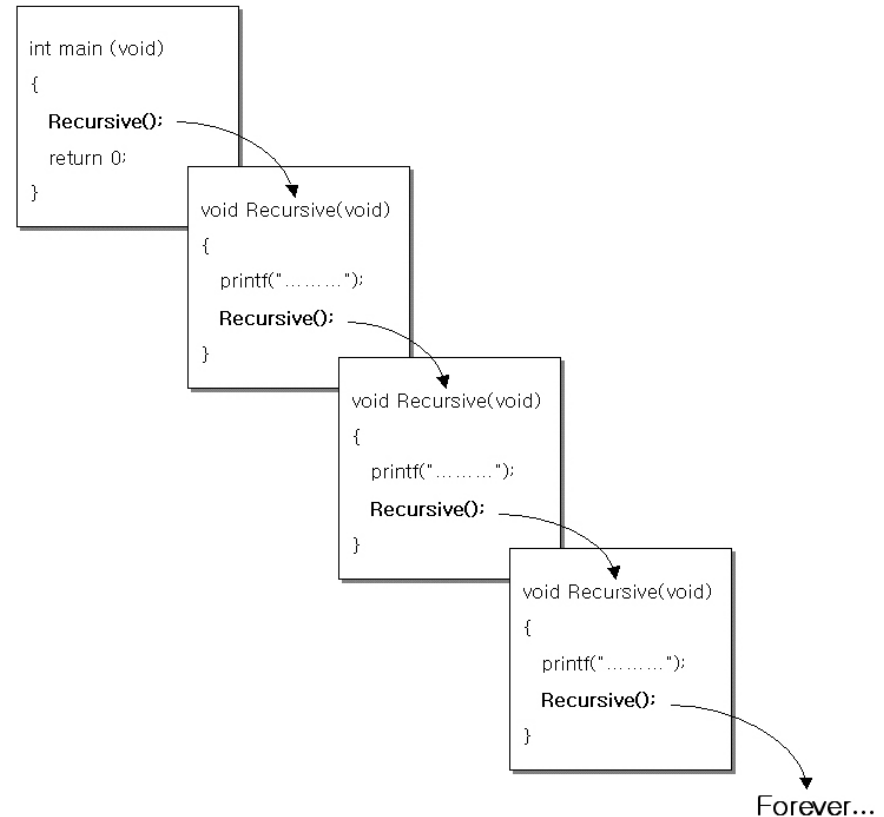
- Recursion
 - Technique of defining a process in terms of itself

$$n! = n * (n-1) * (n-2) * \dots * 1$$

$$n! = \begin{array}{ll} n * (n-1)! & \text{if } n > 0 \\ 1 & \text{otherwise} \end{array}$$

Recursion

- Recursion
 - It need to escape condition
 - To prevent infinite recursive function call



Recursion

- Example of recursion
 - Adding numbers from 1 to n

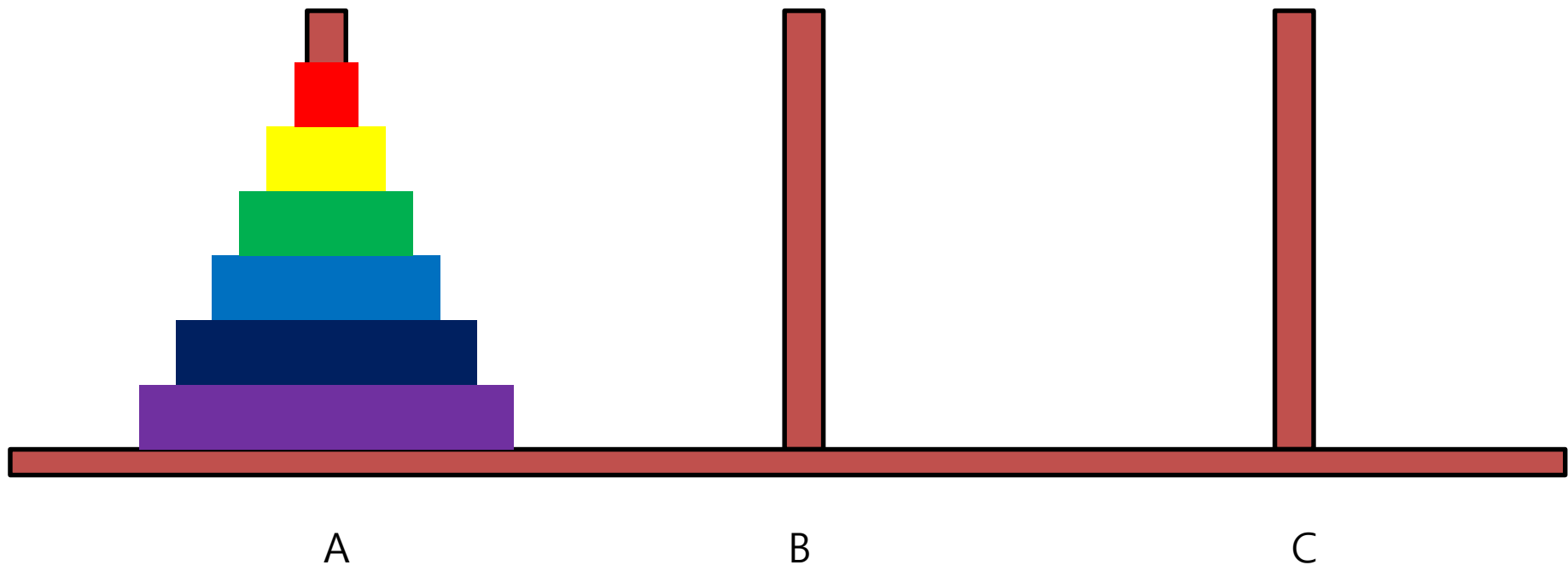
```
int sum( int n )
{
    if( n > 0 ) return n + sum( n-1 ) ;
    return 0 ;
}
```

- Calculate factorial

```
int f(int n)
{
    if (n == 0)
        return 1;
    else
        return n * f(n-1);
}
```

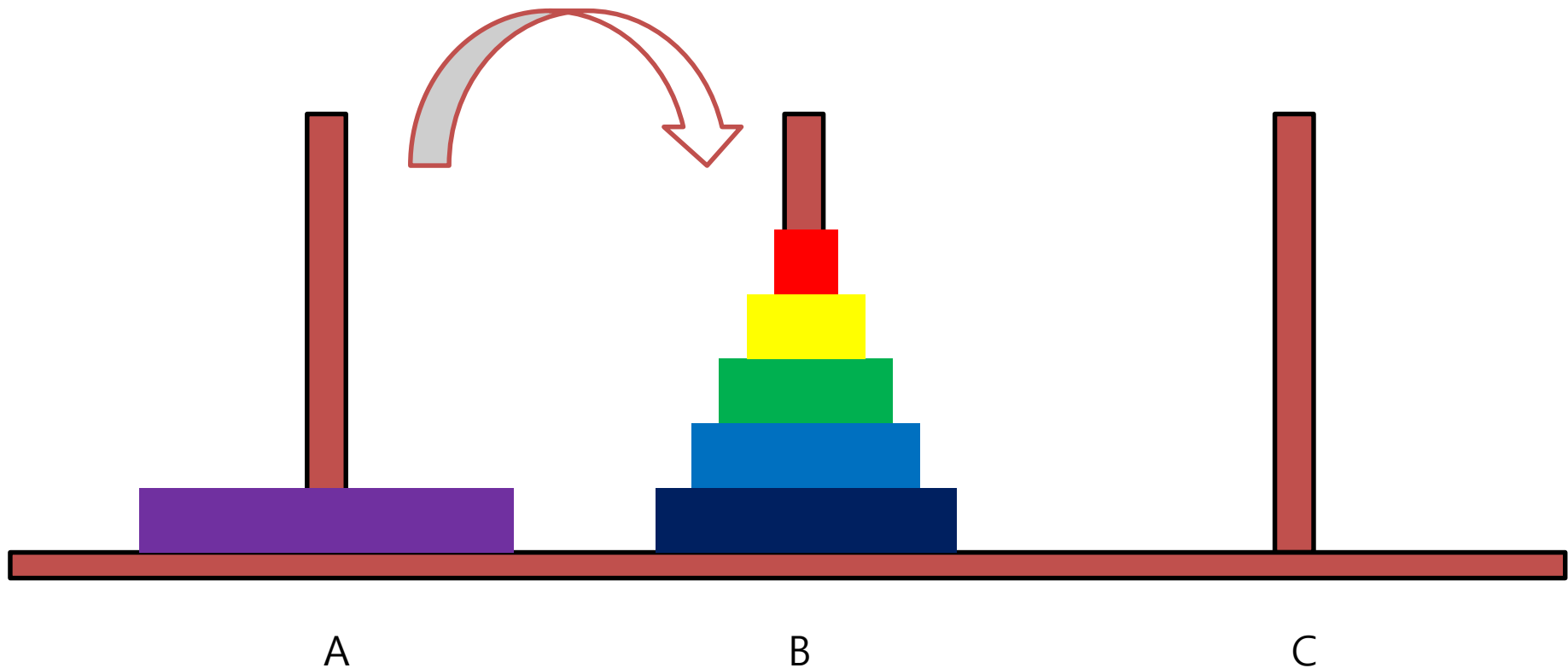

Why Hanoi problem is recursion?

- At the top level, we will want to move the entire tower, so we want to move disks N and smaller from A to C.



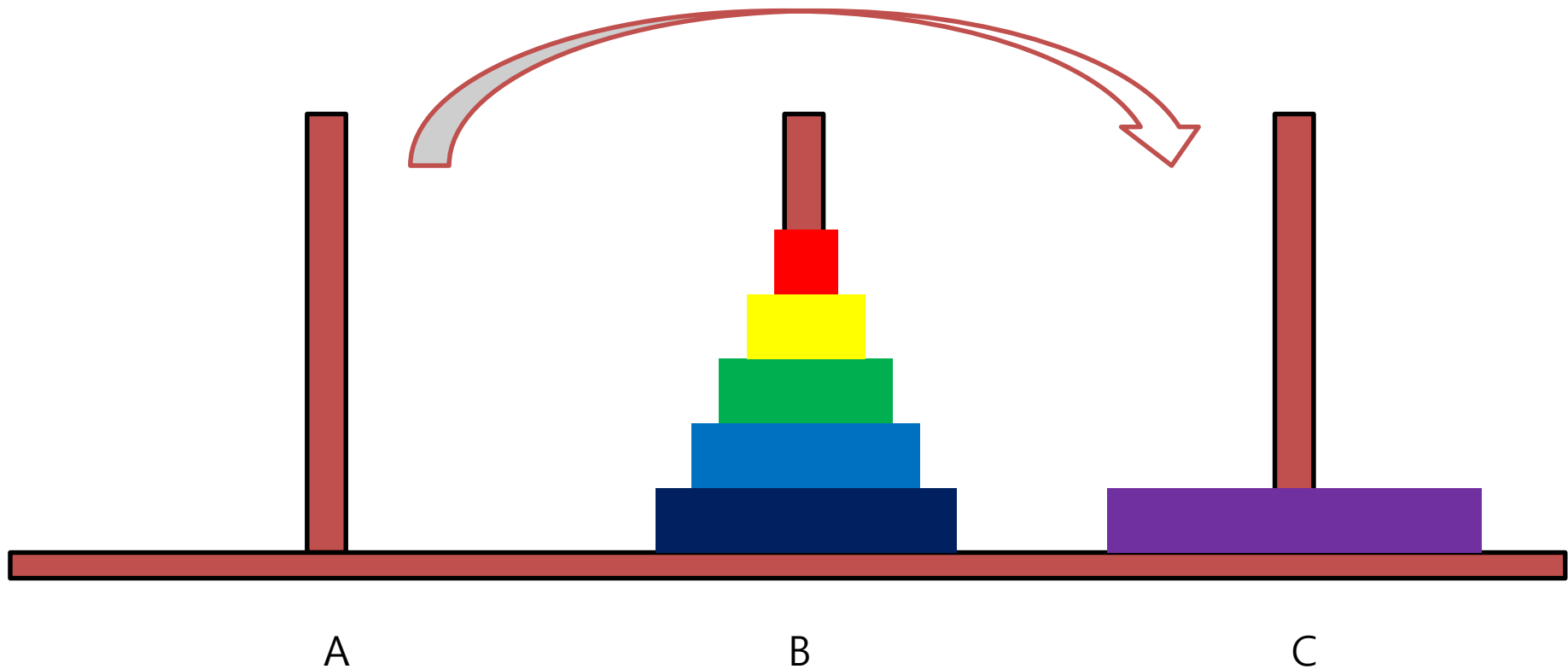
Why Hanoi problem is recursion?

1. Move disks $N-1$ and smaller from A (*source*) to B



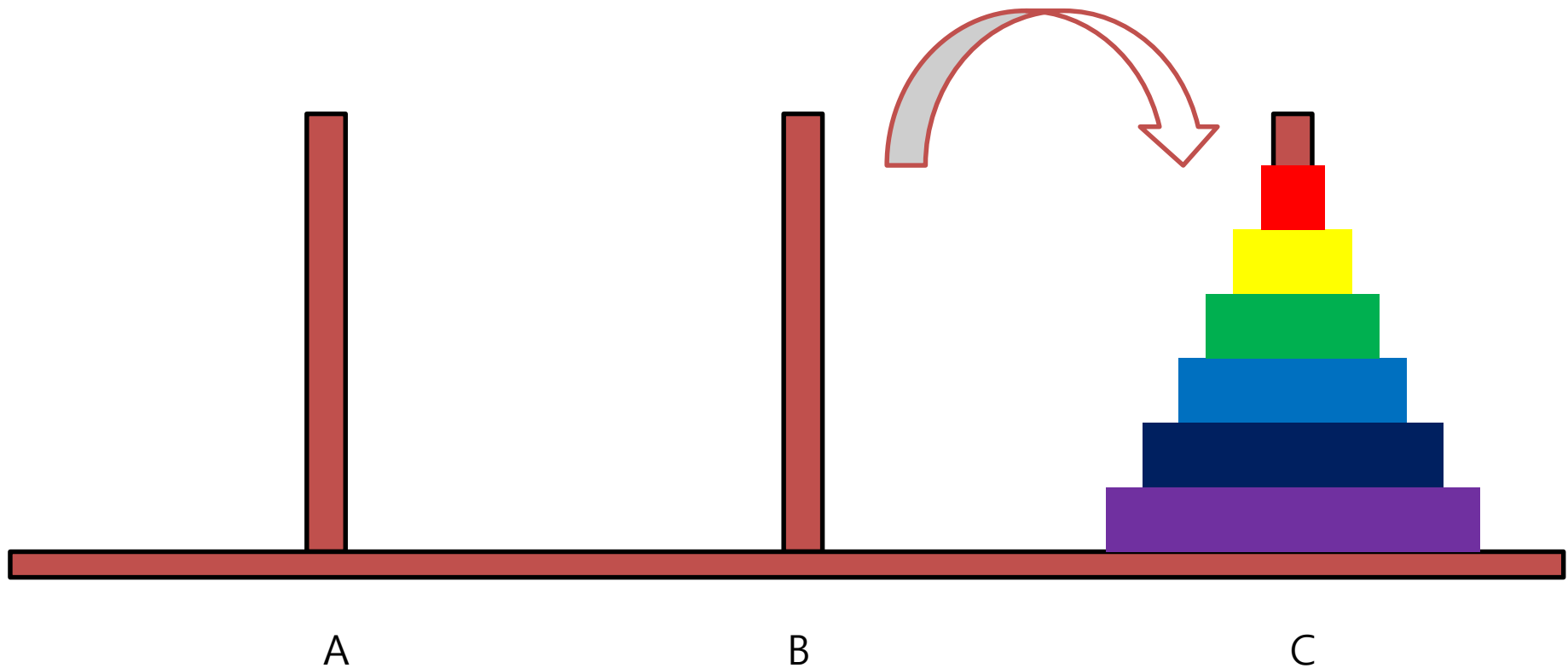
Why Hanoi problem is recursion?

2. we can move disk N from *A* (*source*) to *C* (*dest*).



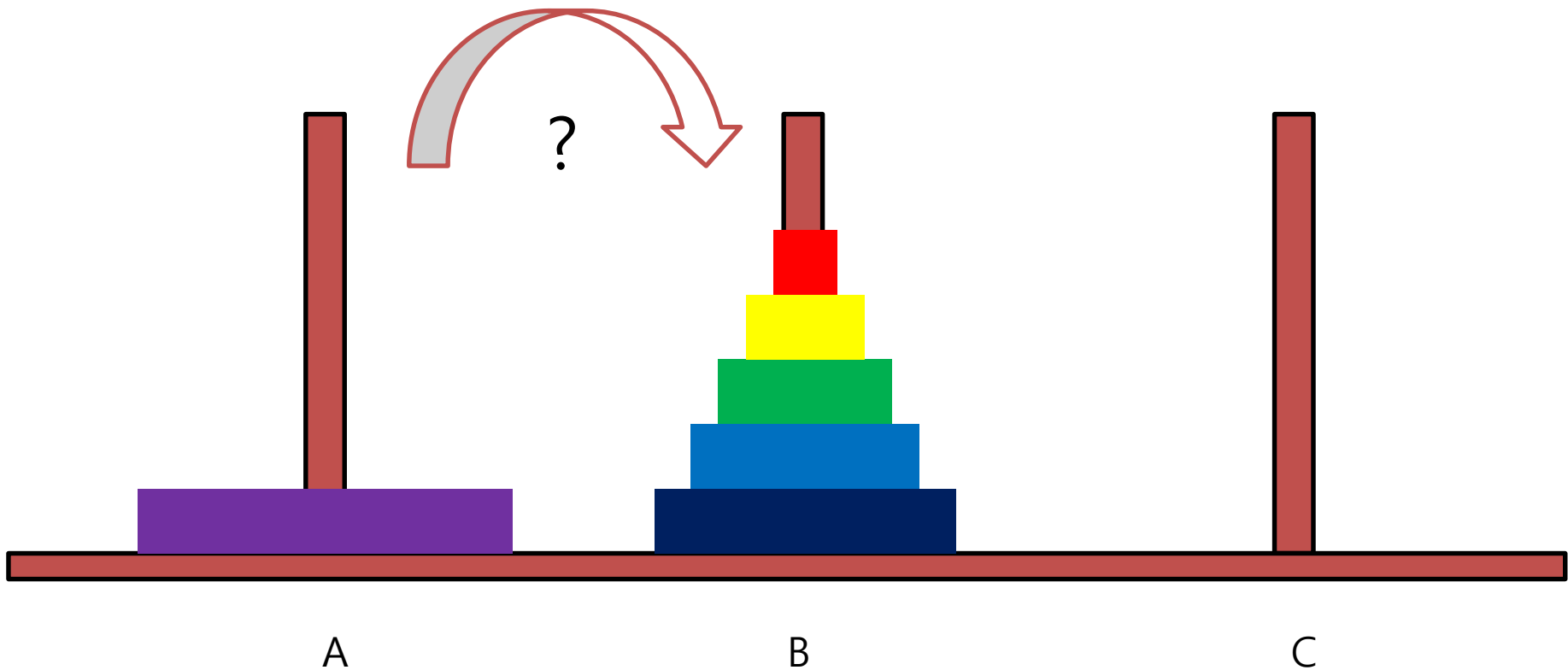
Why Hanoi problem is recursion?

3. we can move disks $N-1$ and smaller from B to C (*dest*).



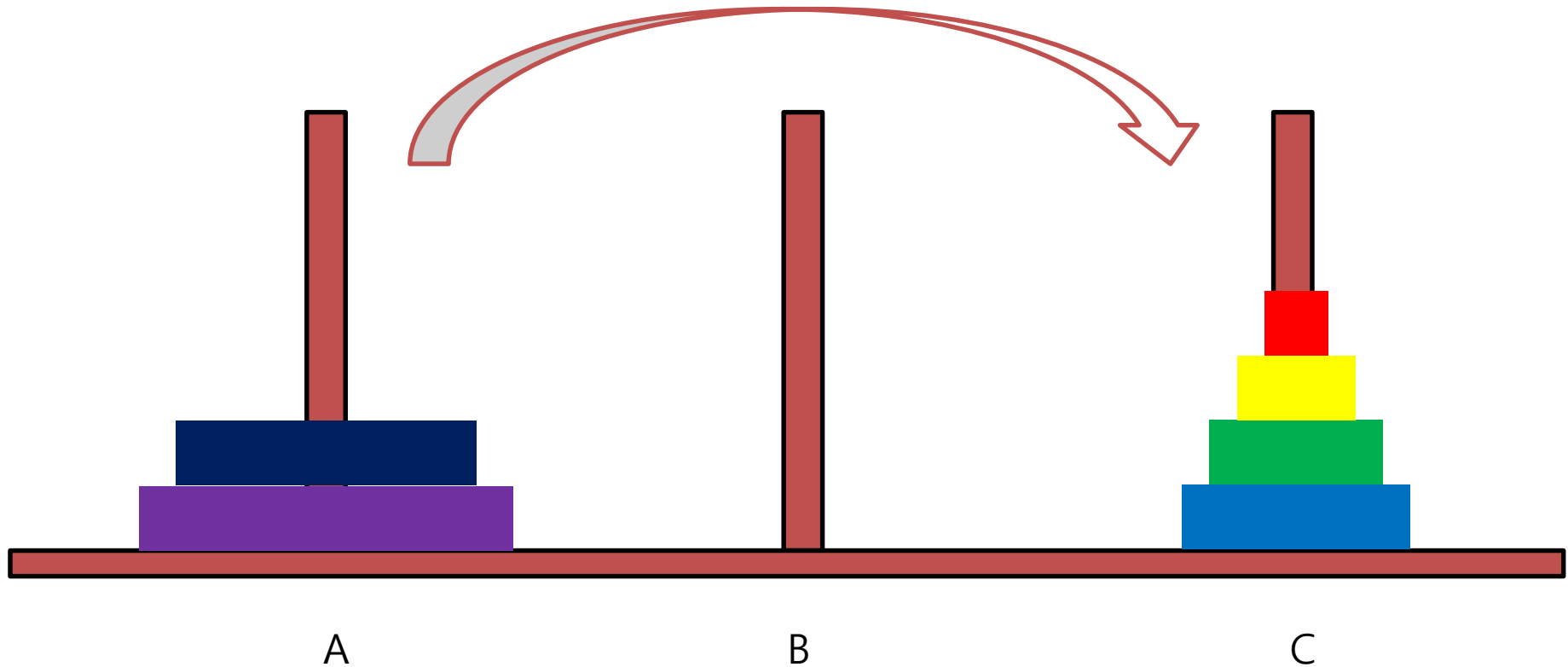
Why Hanoi problem is recursion?

- How we can move $N-1$ and smaller A to B ?



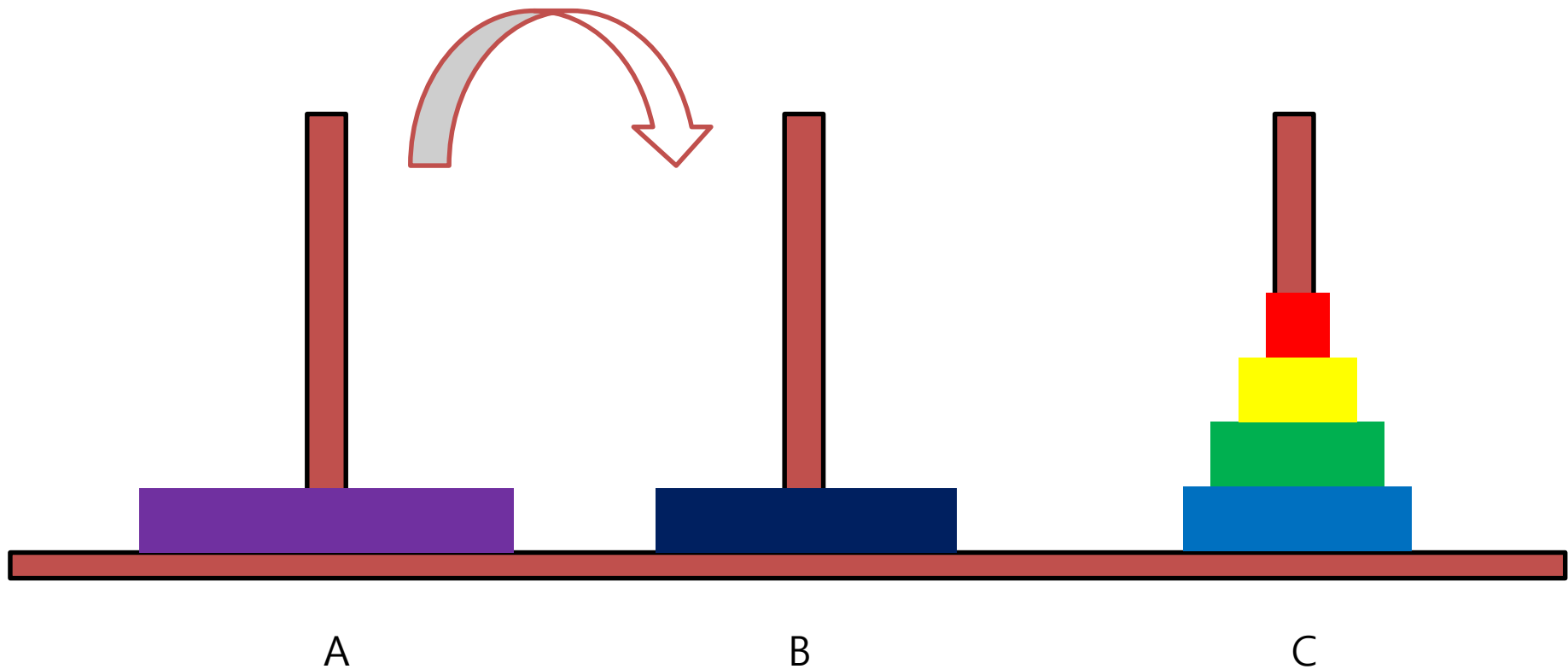
Why Hanoi problem is recursion?

1. Move disks $N-2$ and smaller from A (*source*) to C



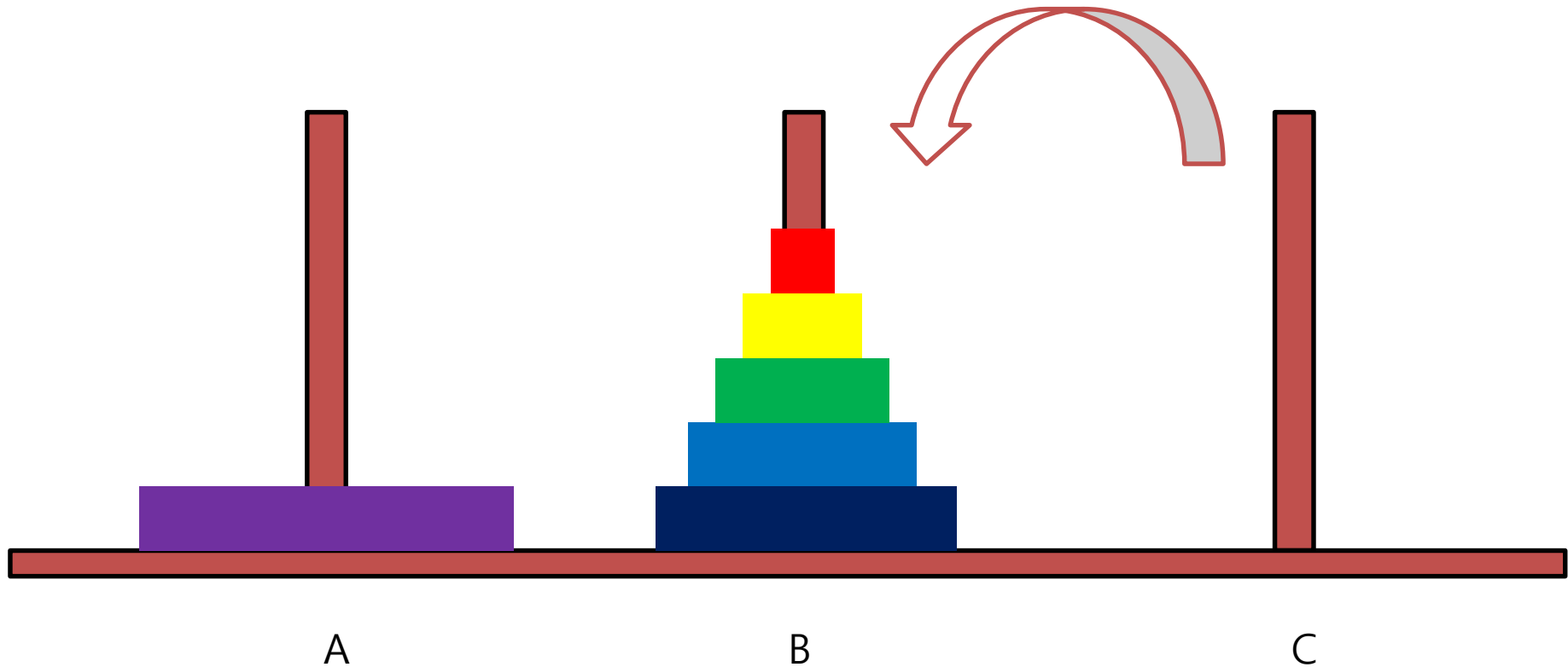
Why Hanoi problem is recursion?

2. we can move disk $N-1$ from A (*source*) to B .



Why Hanoi problem is recursion?

3. we can move disks $N-2$ and smaller from C to B.



Submission

- Same as PA0
 - File – Export – Archive File
 - File name format:
[#ID]_[FIRSTNAME]_[LASTNAME]_lab1.zip
 - Submit at KLMS submission page
- Due : 10/02 Thu. 23:59 PM
- **Late submission will not be accepted**

Grading Policy

- Score range 0~100
- We will test your source code with different configurations
 - The number of disk : 1~5
 - For each case, full score would be 20
 - Full score will be given if procedures of moving disks tower meet the constraints in PA specification
- If your source code contains any compile error, you will get **zero point**.
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