

$\text{fact}(int n)$

$\text{int } x = \text{fact}(n-1)$

$x \times n$

smaller input  
use

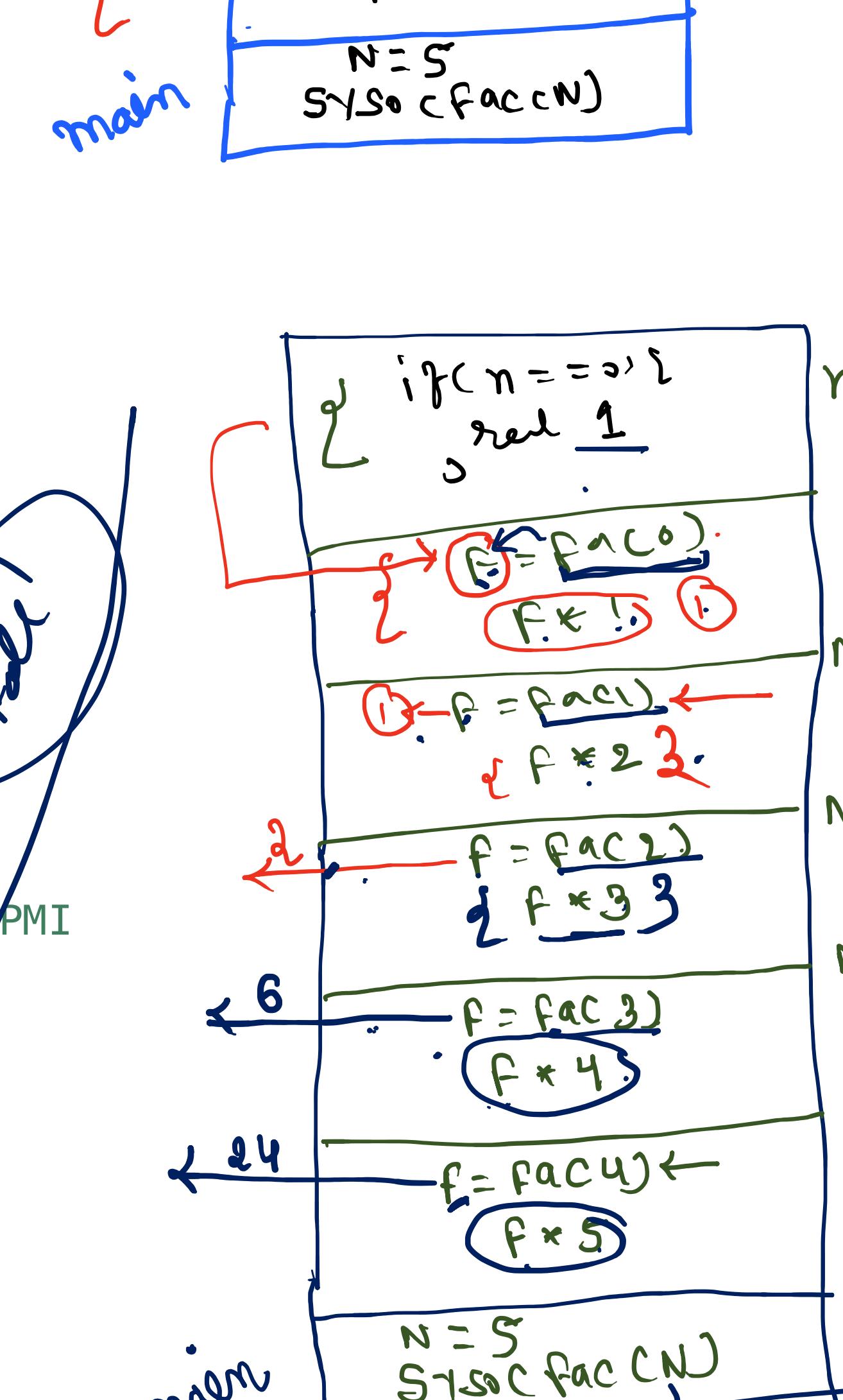
$$\begin{aligned} 4! &= 4 \times 3! \\ 5! &= 5 \times 4! \\ 6! &= 6 \times 5! \\ 2 &= 2! \times 1 \\ 1 &= 1! \times 0 \\ 0! &= 1 \end{aligned}$$

as  $n! = 1 \times n!$

```
public static void main(String[] args) {
    // TODO Auto-generated method stub
    int n = 5;
    System.out.println(Fac(n));
}

public static int Fac(int n) {
    int f = Fac(n - 1); // SP 2nd Steps of PMI
    return f * n;
}
```

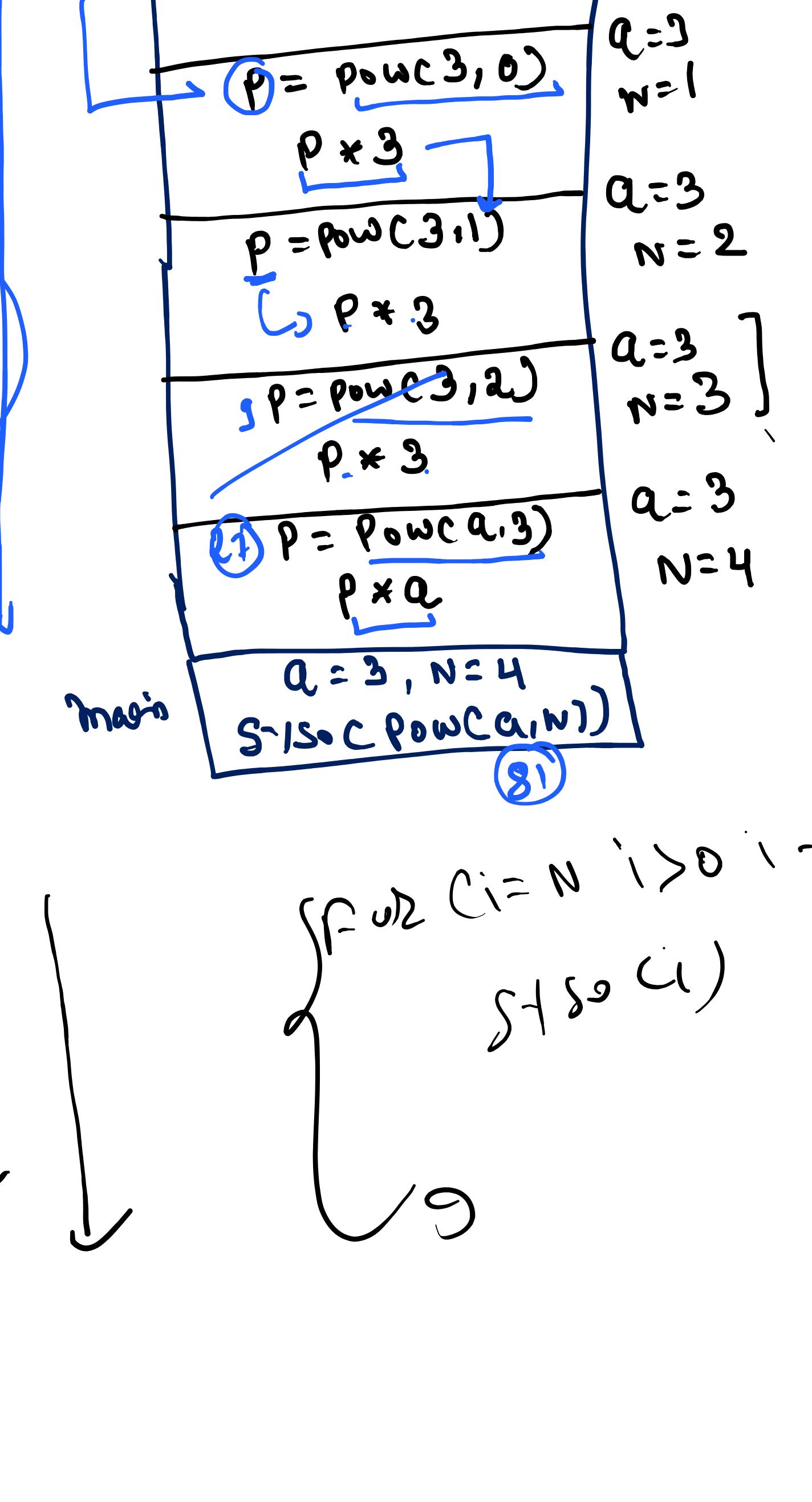
Stack  
method



```
public static void main(String[] args) {
    // TODO Auto-generated method stub
    int n = 5;
    System.out.println(Fac(n));
}
```

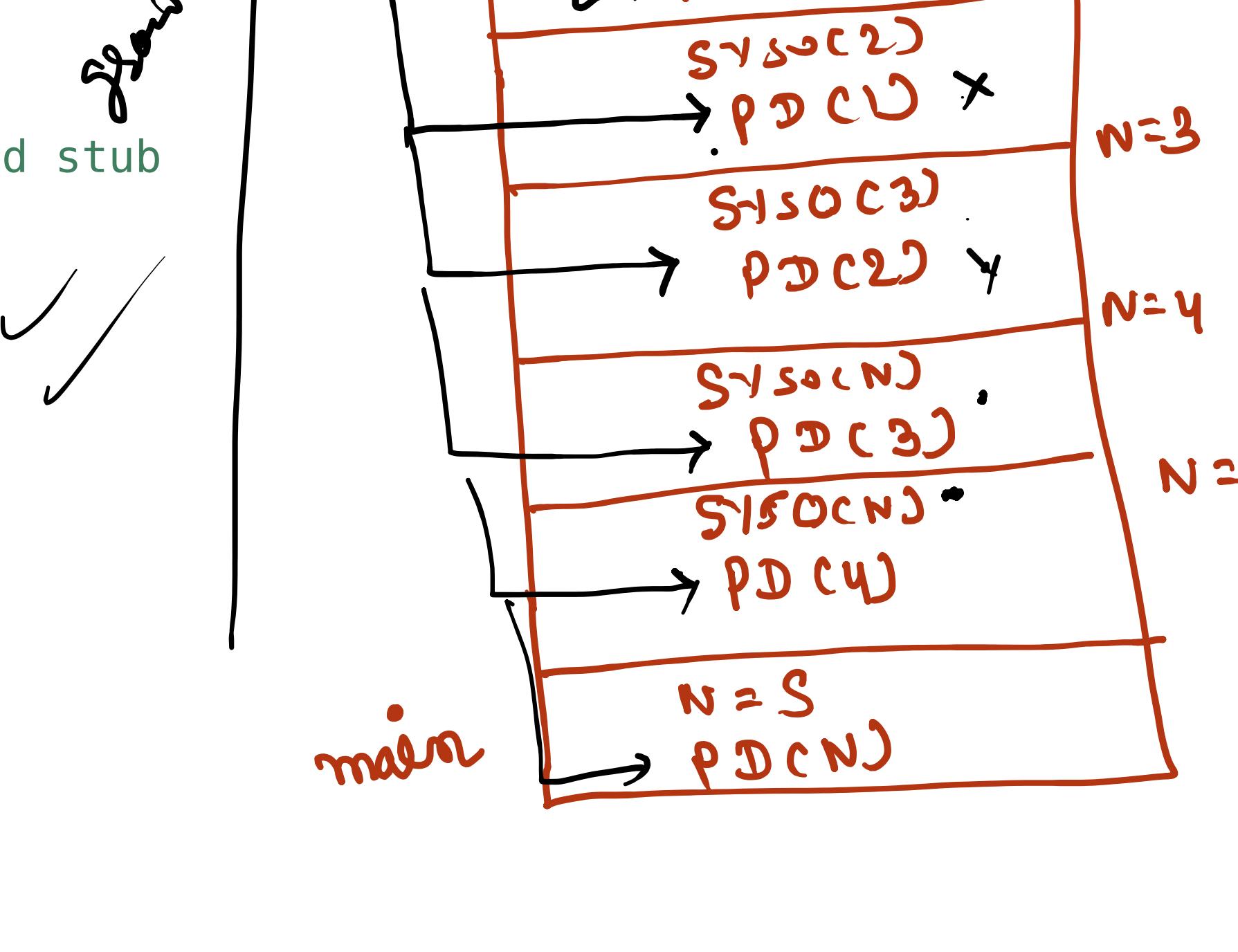
```
public static int Fac(int n) {
    if (n == 0) {
        return 1;
    }
    int f = Fac(n - 1); // SP 2nd Steps of PMI
    return f * n;
}
```

depth first



```
public static void main(String[] args) {
    // TODO Auto-generated method stub
    int a = 3;
    int n = 4;
    System.out.println(pow(a, n));
}
```

```
public static int pow(int a, int n) {
    if (n == 0) {
        return 1;
    }
    int p = pow(a, n - 1); // a^n-1
    return p * a;
}
```



$N = 5$

$f_{\text{out}}(i = N - 1 \geq 0) \rightarrow S + S_0(i)$

$S_1$

$S_2$

$S_3$

$S_4$

$S_5$

$S_6$

$S_7$

$S_8$

$S_9$

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