The Call Stack

David Gries and Scott Wehrwein

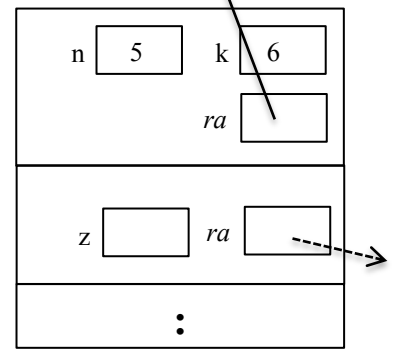
When a Java program is being executed (by you or a computer) a *call stack* is maintained. This call stack contains a frame for each method call that has not been completed.

We show how to execute a method call using function p as an example.

Assume that a method is being executed and it contains the assignment z= p(1+4). A frame for this method is at the top of the call stack —it contains local variable z. The function call p(1+4) is to be carried out or evaluated.

```
public static int p1(int n) {
   int k= n+1;
   return k;
}
```

```
... z= p(1+4); …
```



the call stack, just before step 4 is to be executed

Algorithm

We now state the algorithm for carrying out a general method call, using this method p(1+4) call to illustrate.

1. **Push a frame for the call onto the call stack**.
2. **Evaluate the arguments of the call (from left to right) and store their values in the parameters.** In this case, 1+4 is evaluated and its value, 5, is stored in parameter n.
3. **Execute the method body, using the frame for the call to access parameters and local variables**.
   We execute the assignment k= n+1. The value of the expression is 6, so we store 6 in n.
   Execution of the return statement ends execution of the body.
   The value 6 is to be returned.
4. **Pop the frame for the call from the call stack. If this is a function call** (and it is)**, push the value to be returned onto the call stack.**

(Note that that value will be then be popped from the stack and used as the value of the call.)

That's it! Memorize this 4-step algorithm to execute a method call.