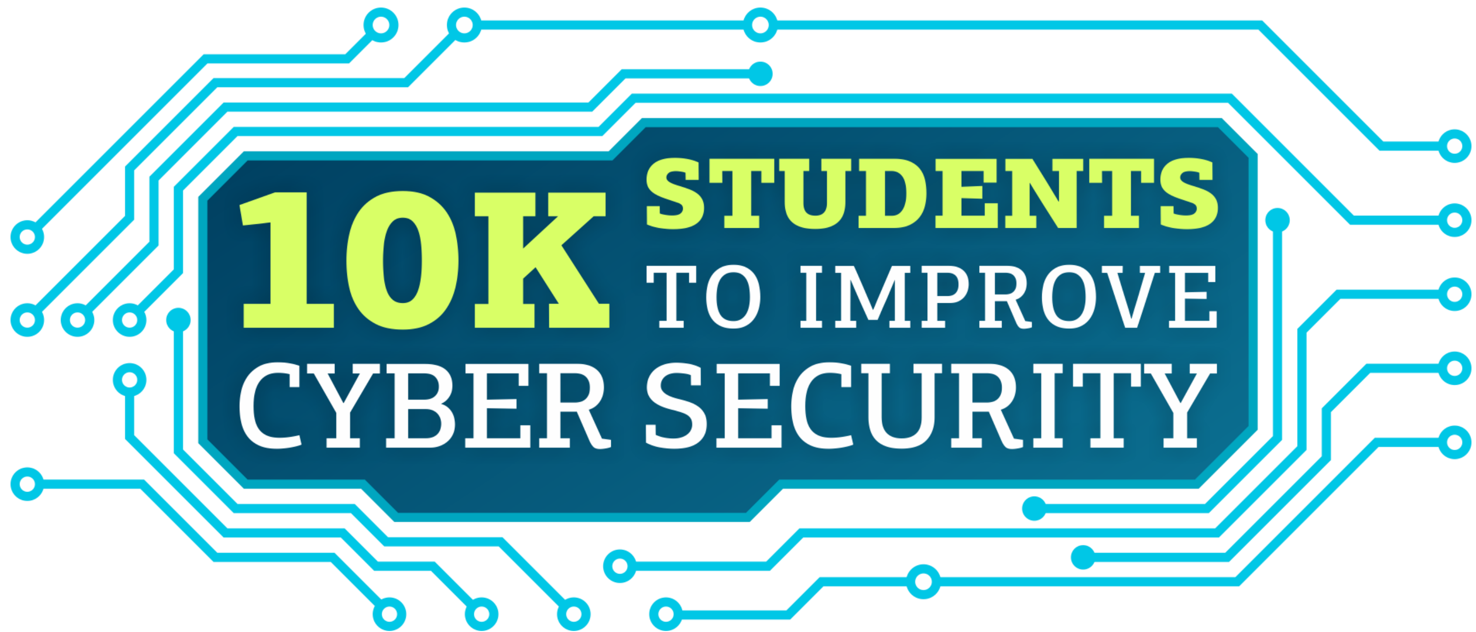
10K STUDENTS
TO IMPROVE
CYBER SECURITY

syssec

# Part I
# The Basic Idea

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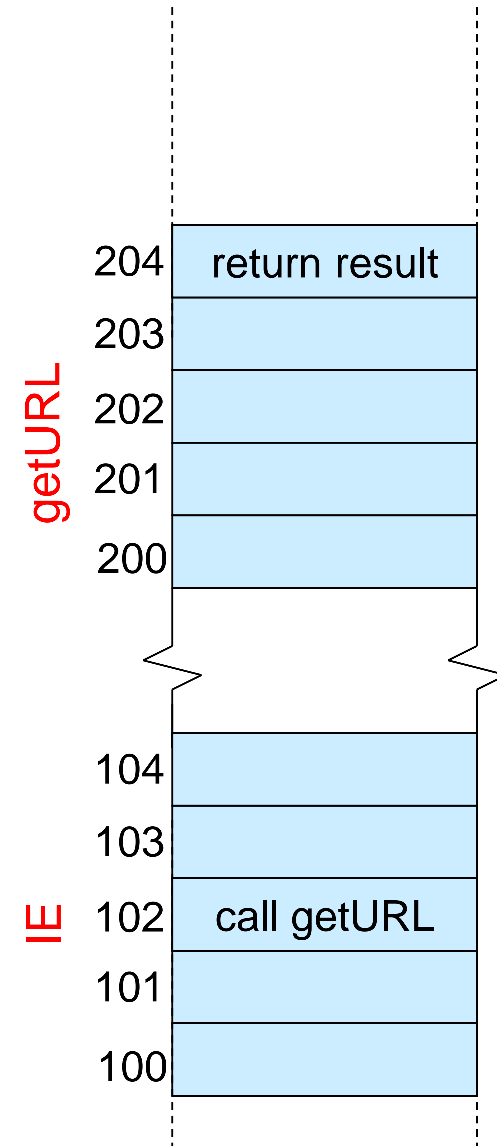
# software

- sequence of instructions in memory
- logically divided in functions that call each other
  - function 'IE' calls function 'getURL' to read the corresponding page
- in CPU, the program counter contains the address in memory of the next instruction to execute
  - normally this is the next address (instruction 100 is followed by instruction 101, etc)
  - ***not so with function call***

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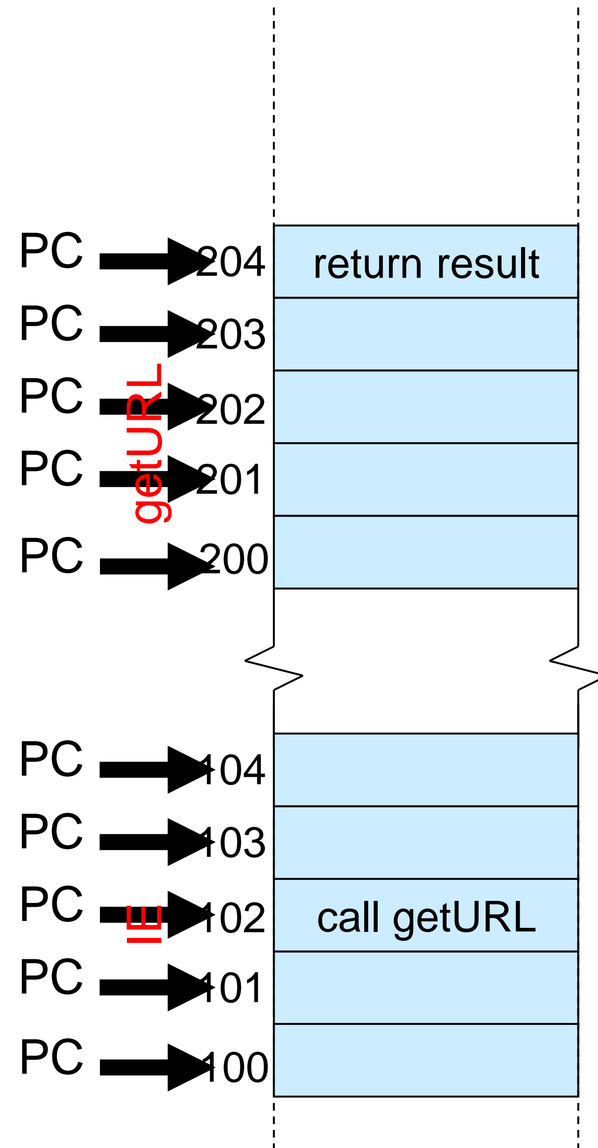


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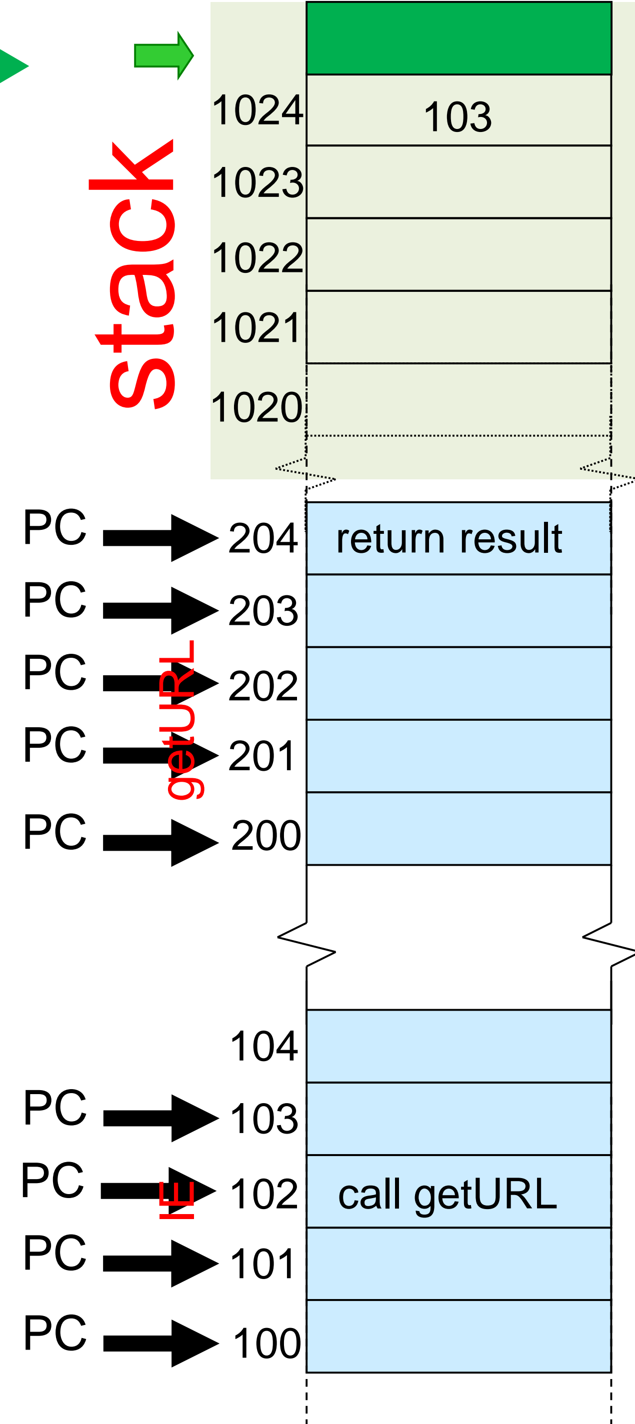
# software

- so how does our CPU know where to return?
  - it keeps administration
  - on a 'stack'

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# real functions
# ➔ variables

```
getURL ()
{
  char buf[10];
  read(keyboard,buf,64);
  get_webpage (buf);
}
IE ()
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  getURL ();
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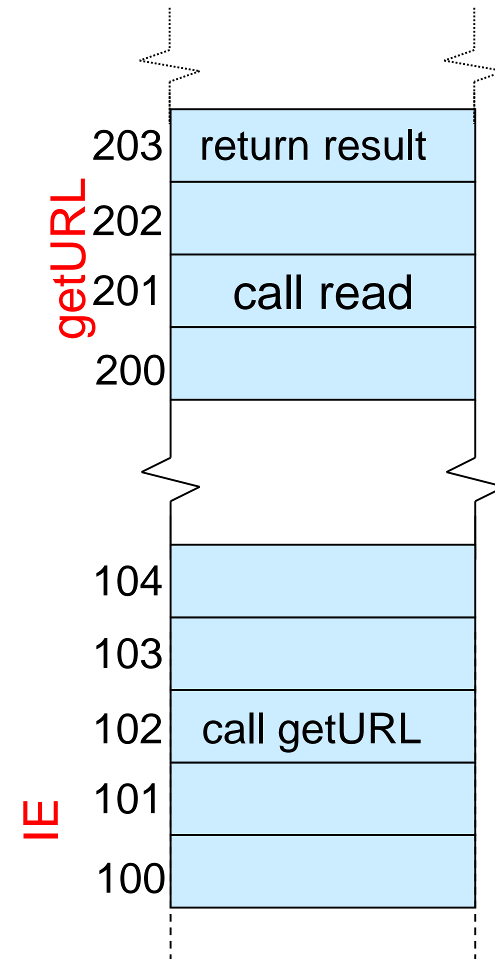


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real functions
→ variables

frame pointer (FP)
→ Points to start of this function's stack frame

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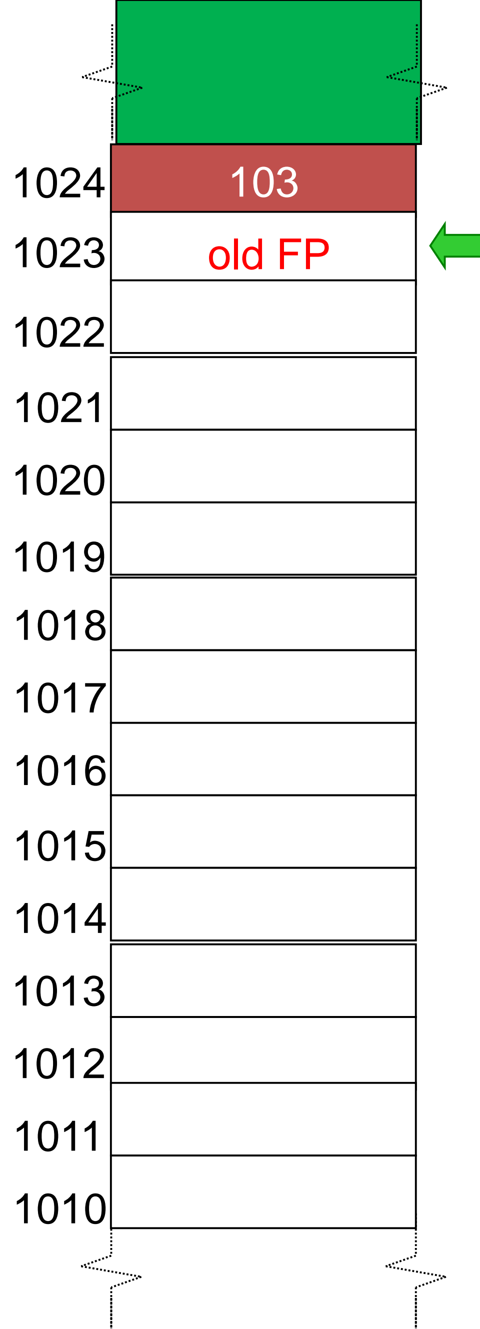


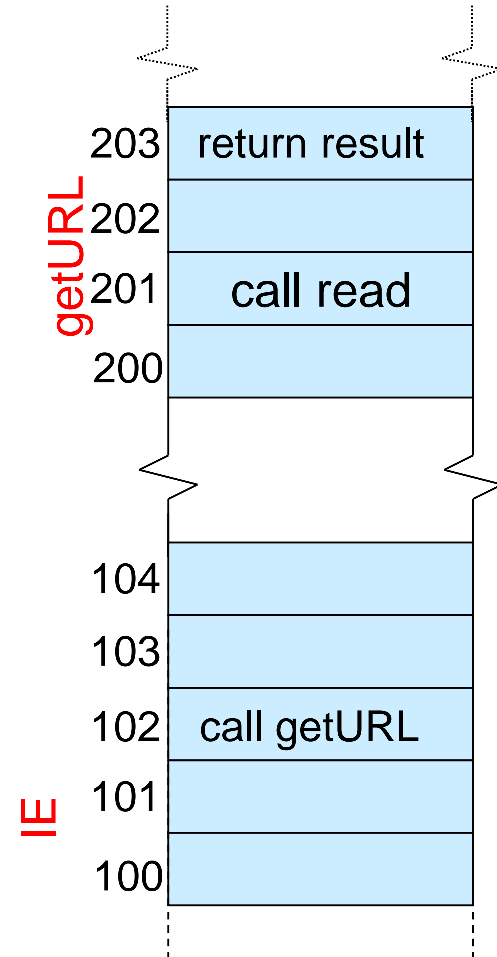


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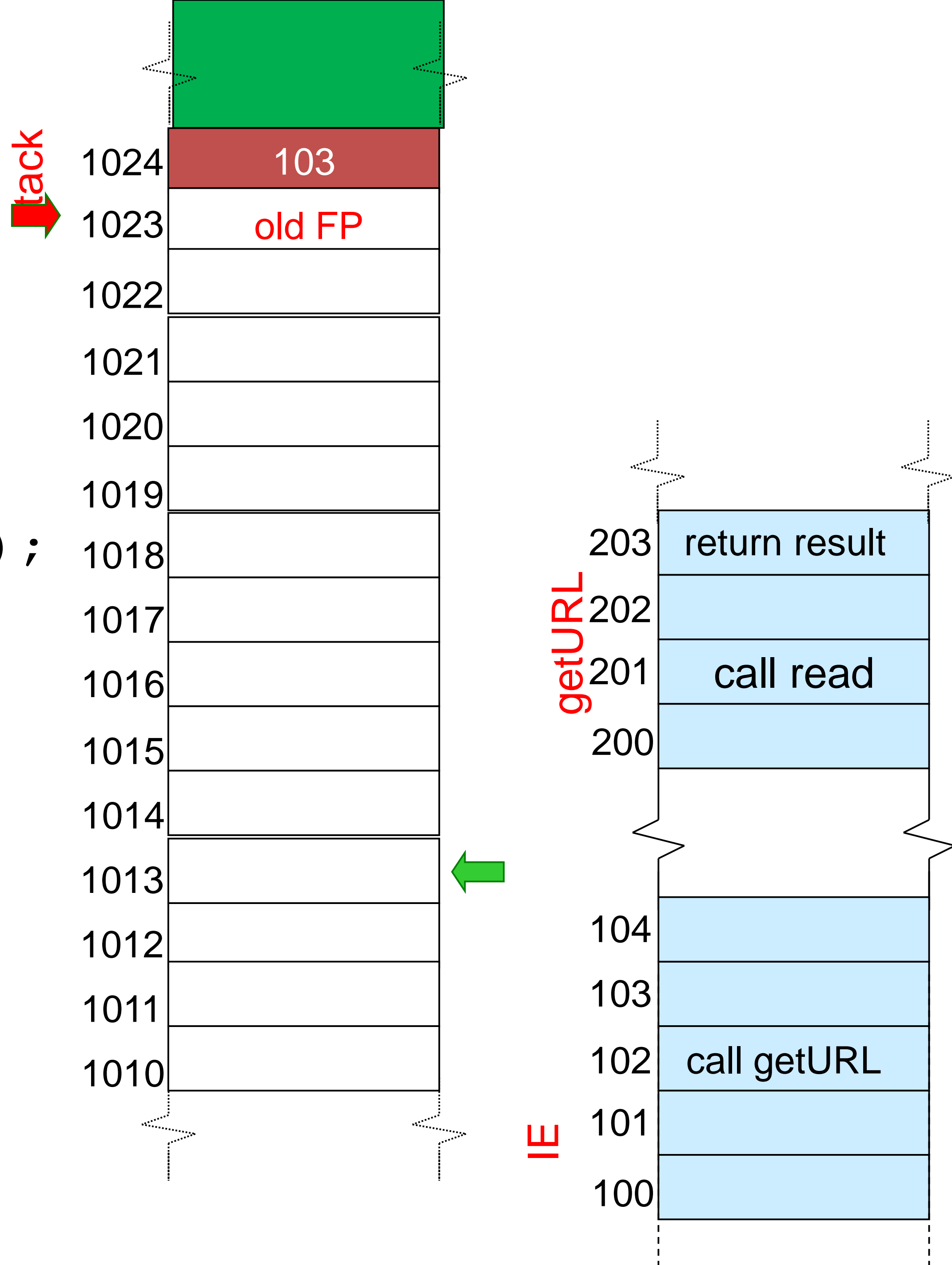


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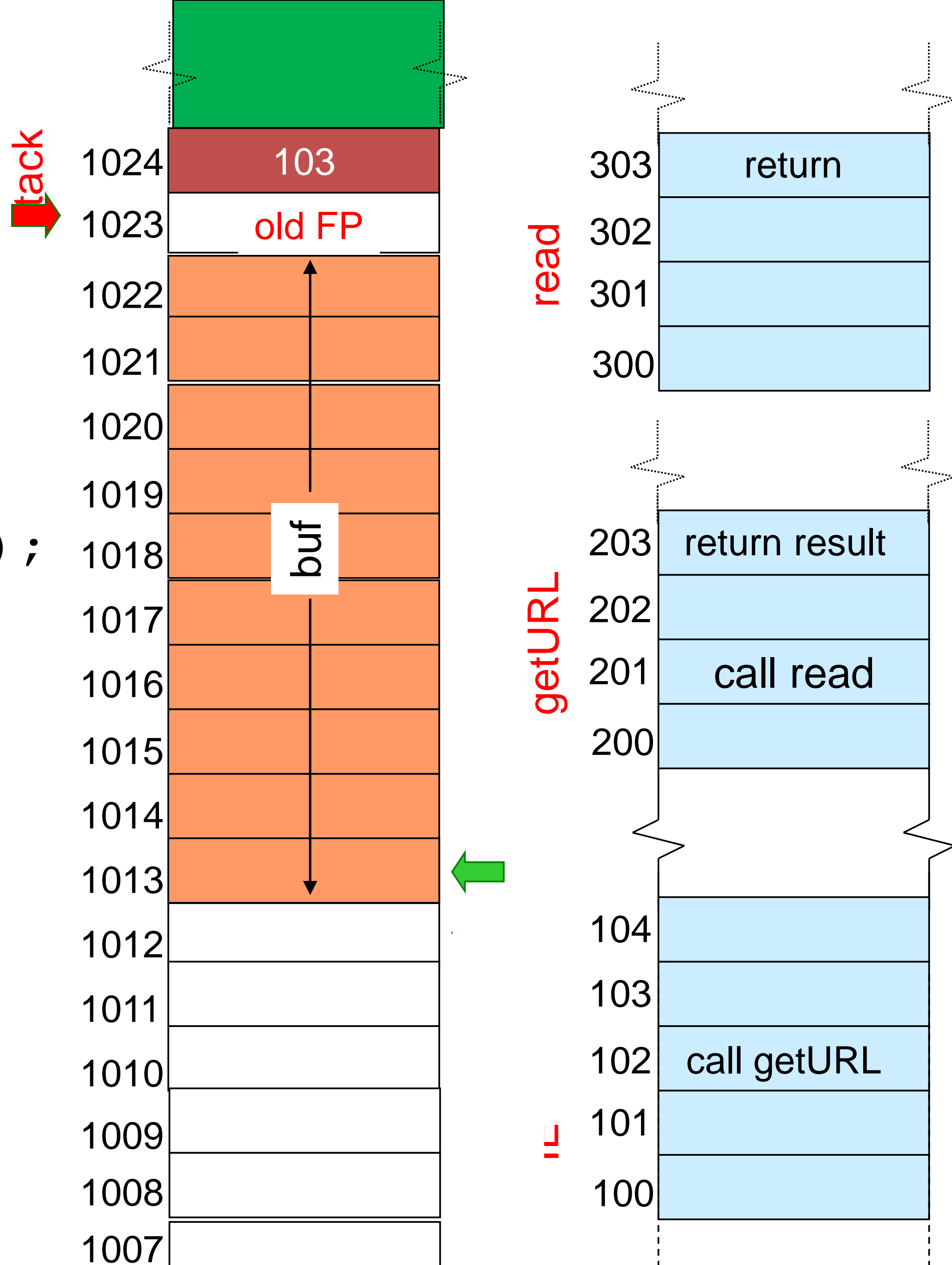


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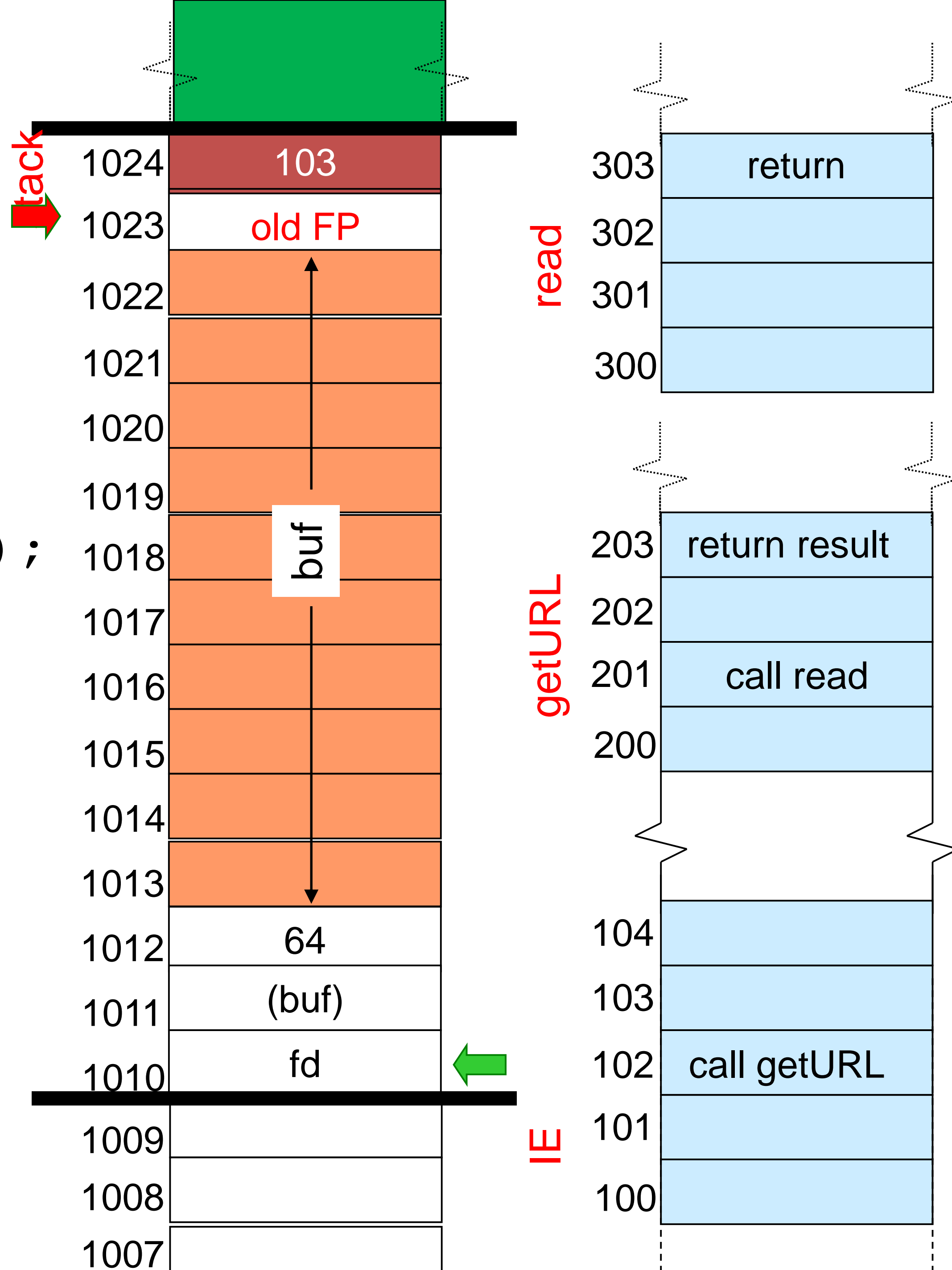


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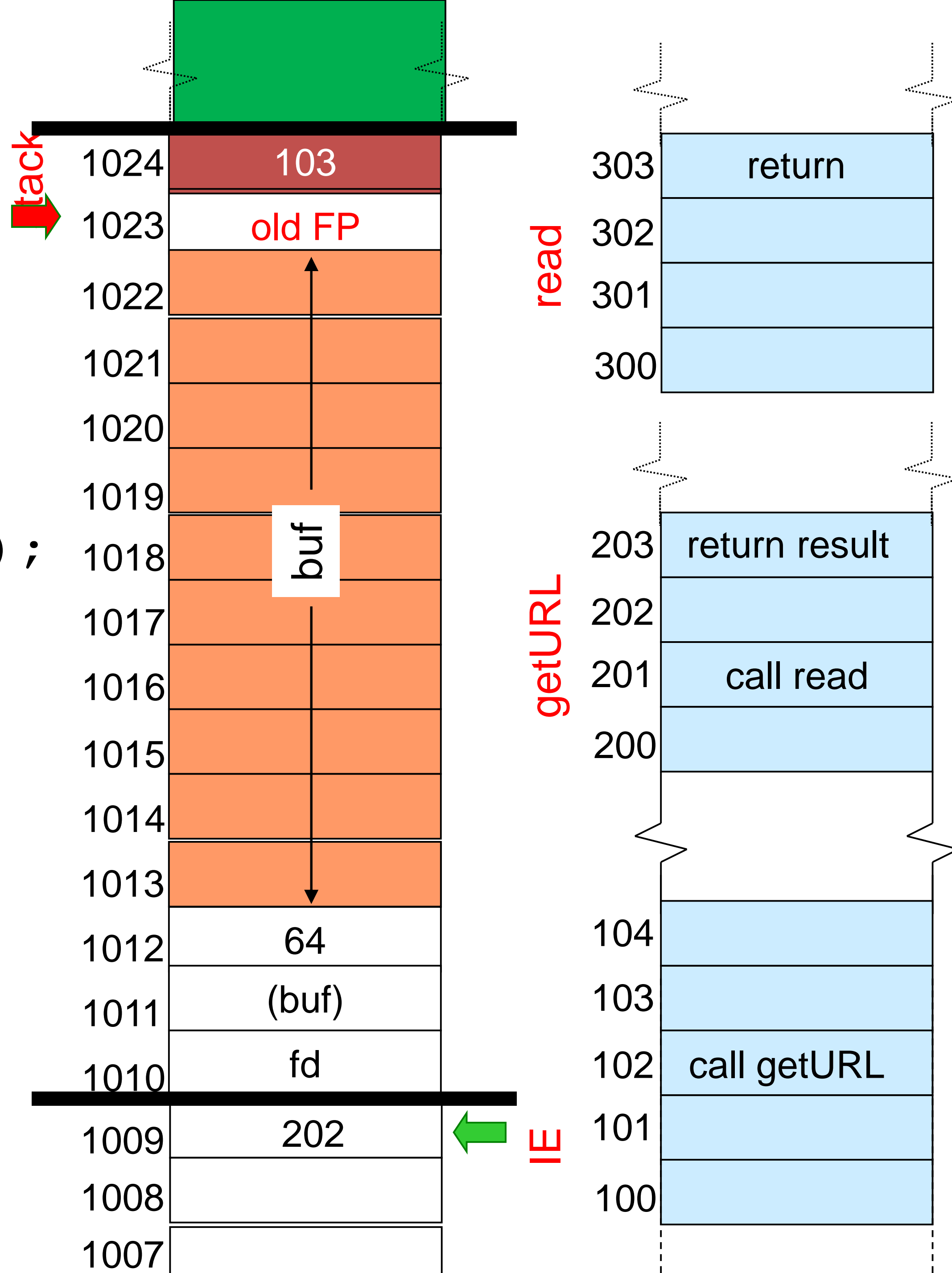


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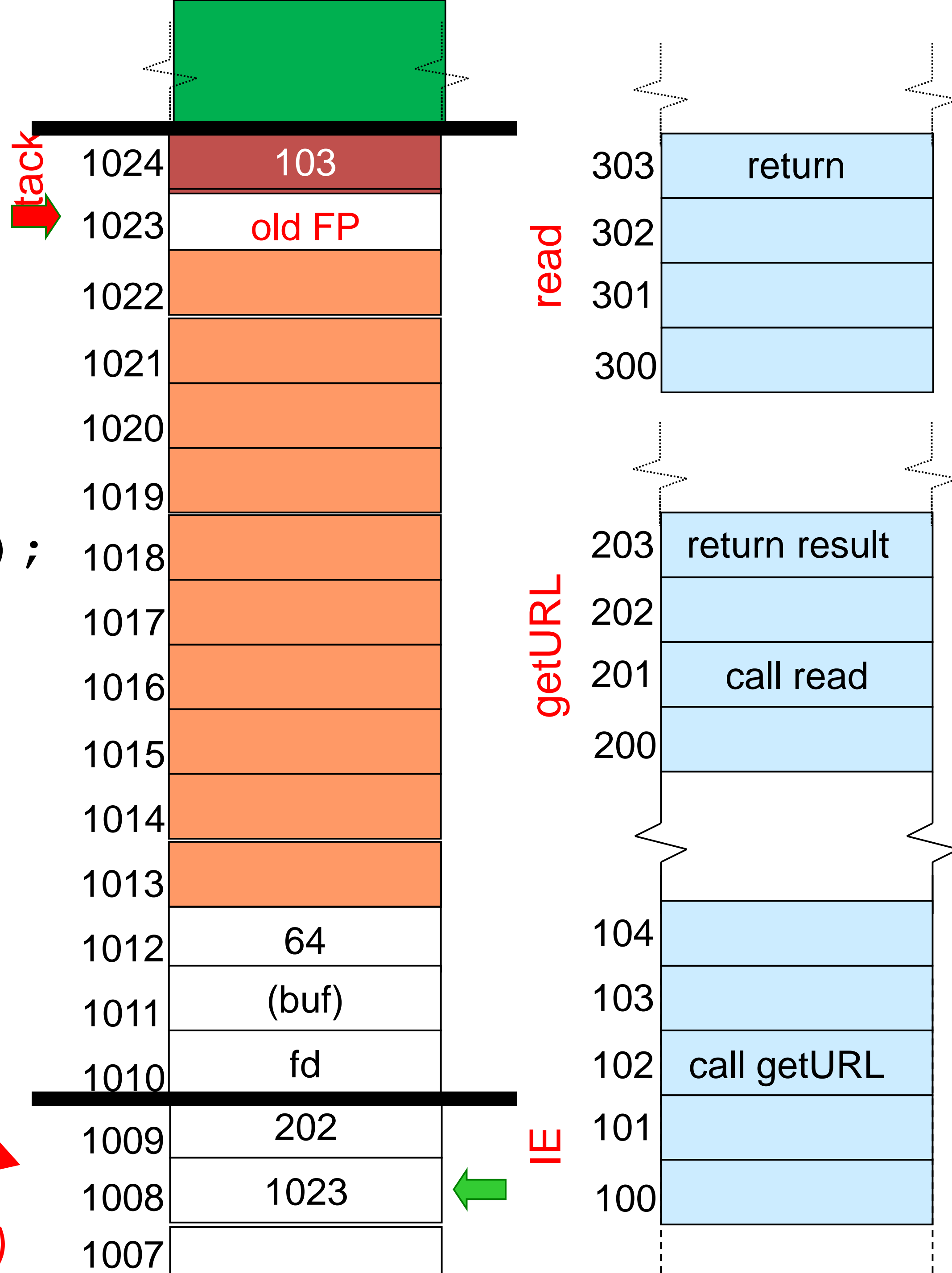


frame pointer (FP)

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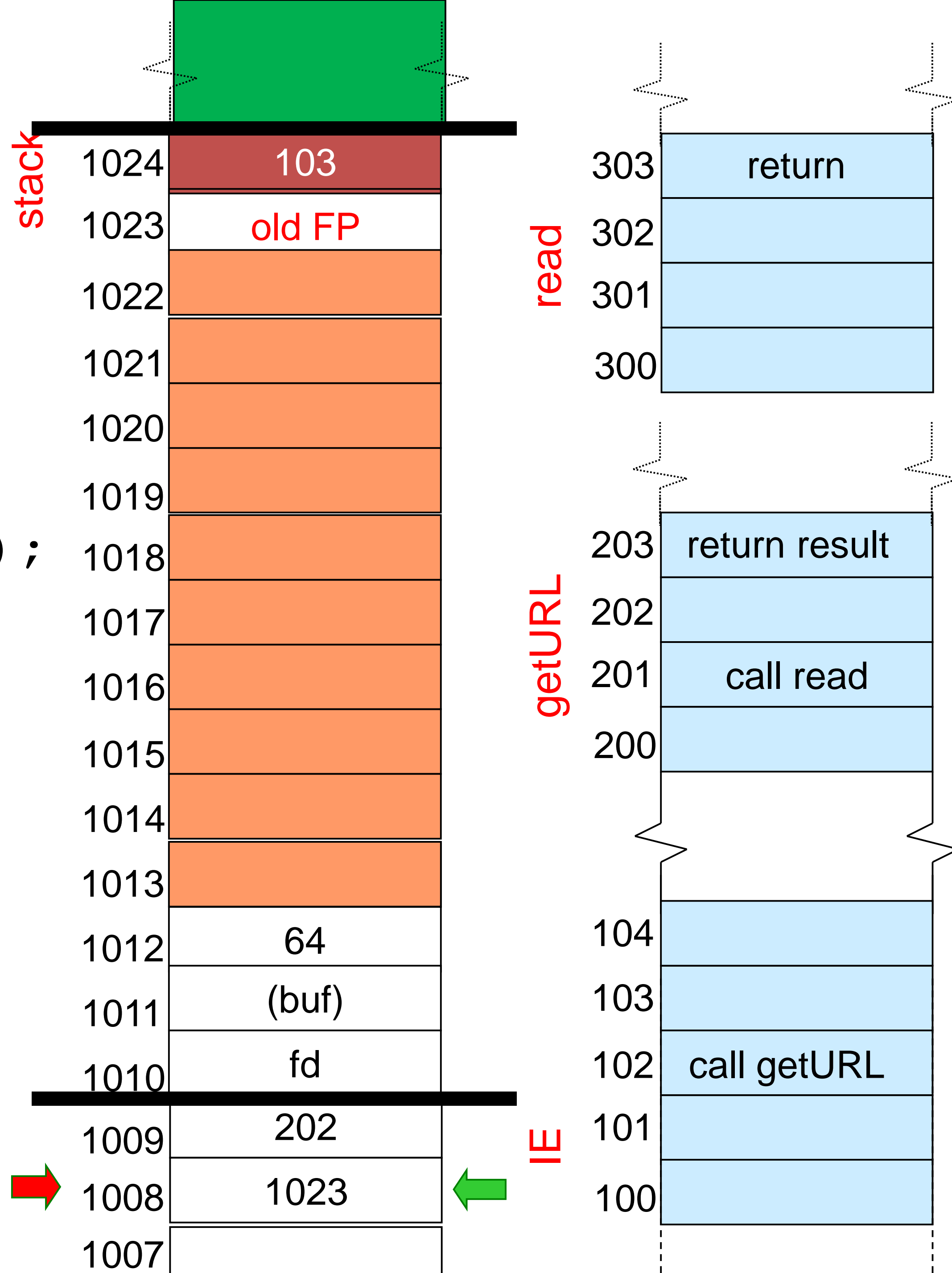
on "return from read"

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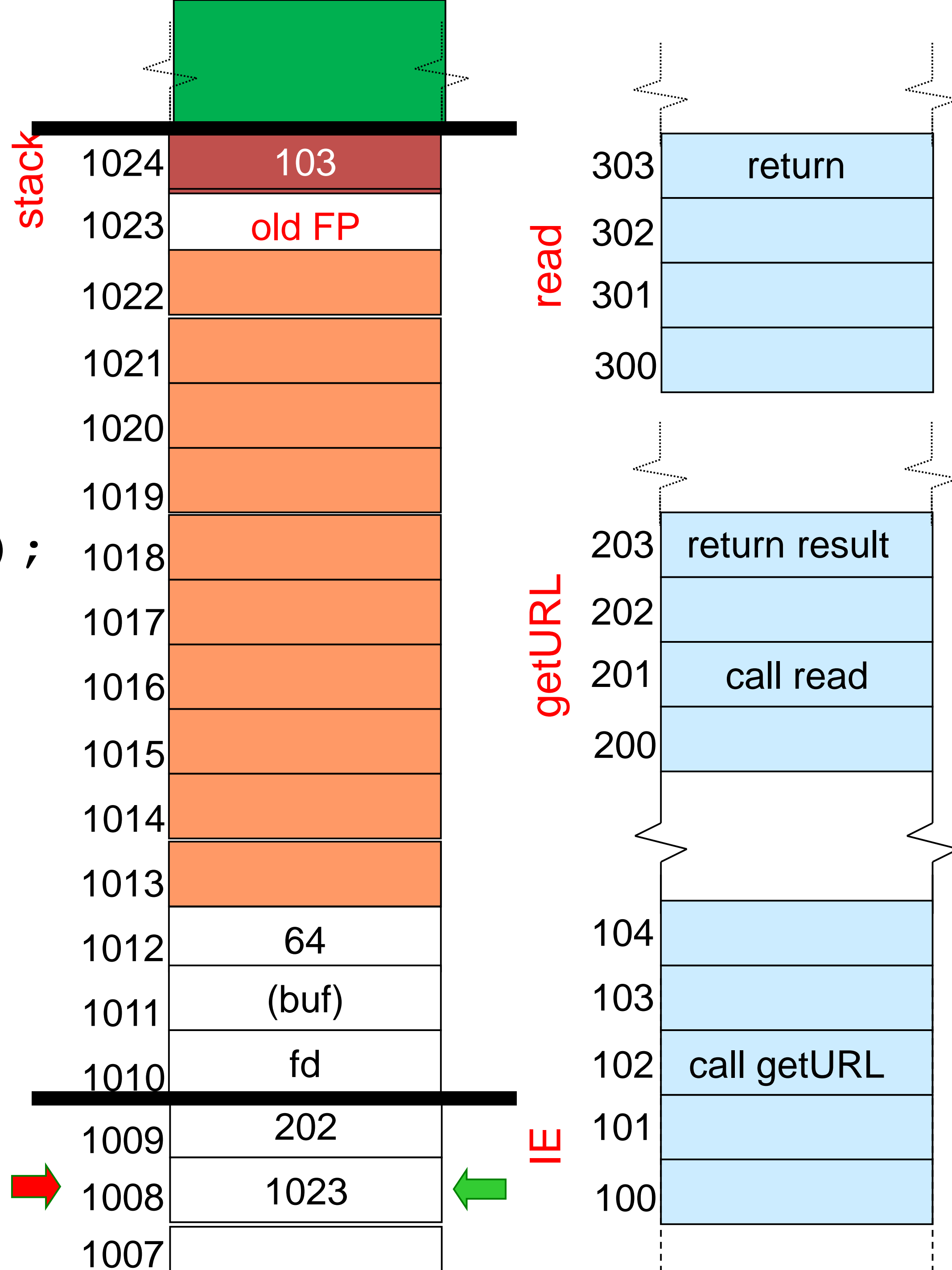
POP

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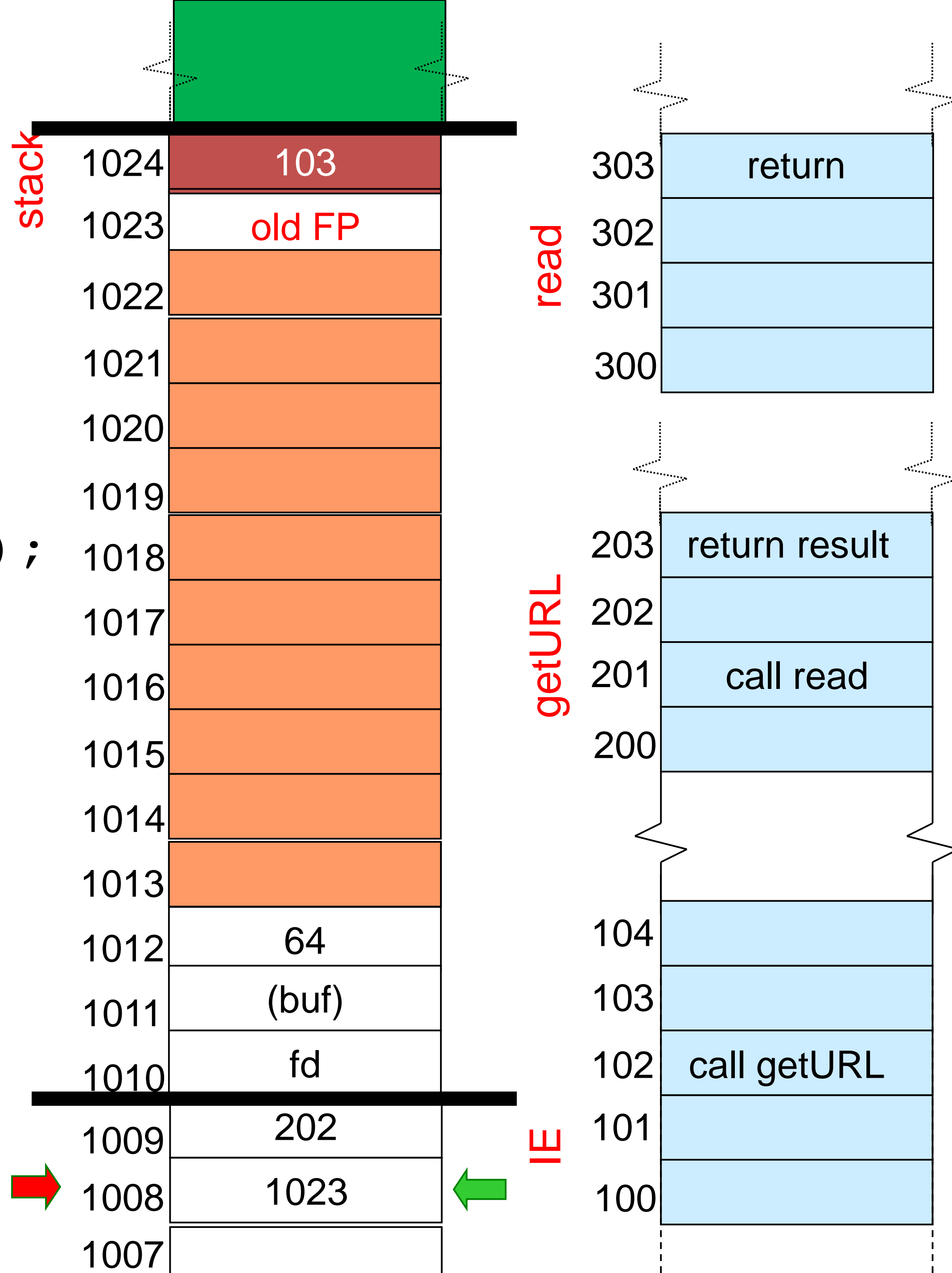


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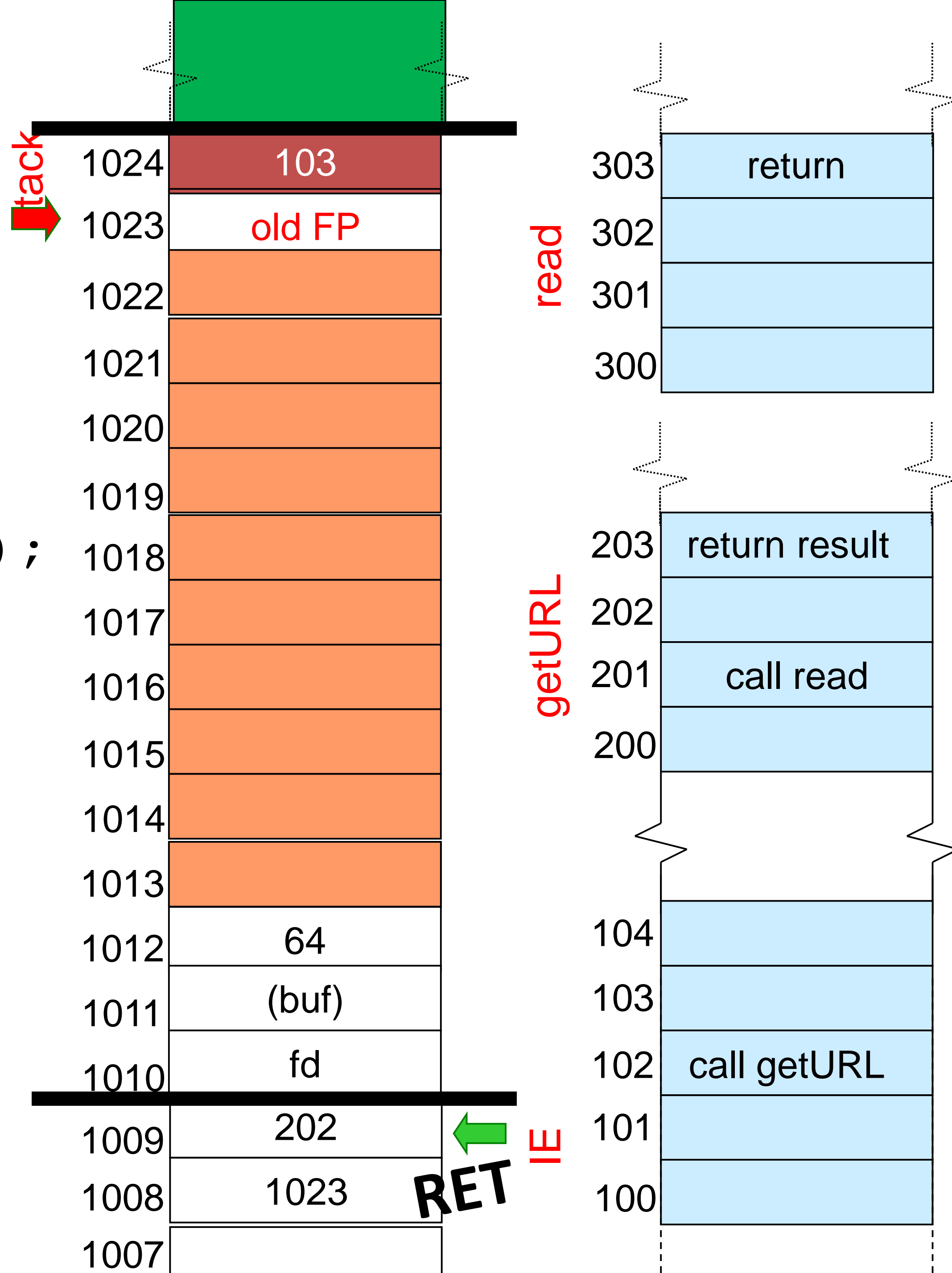


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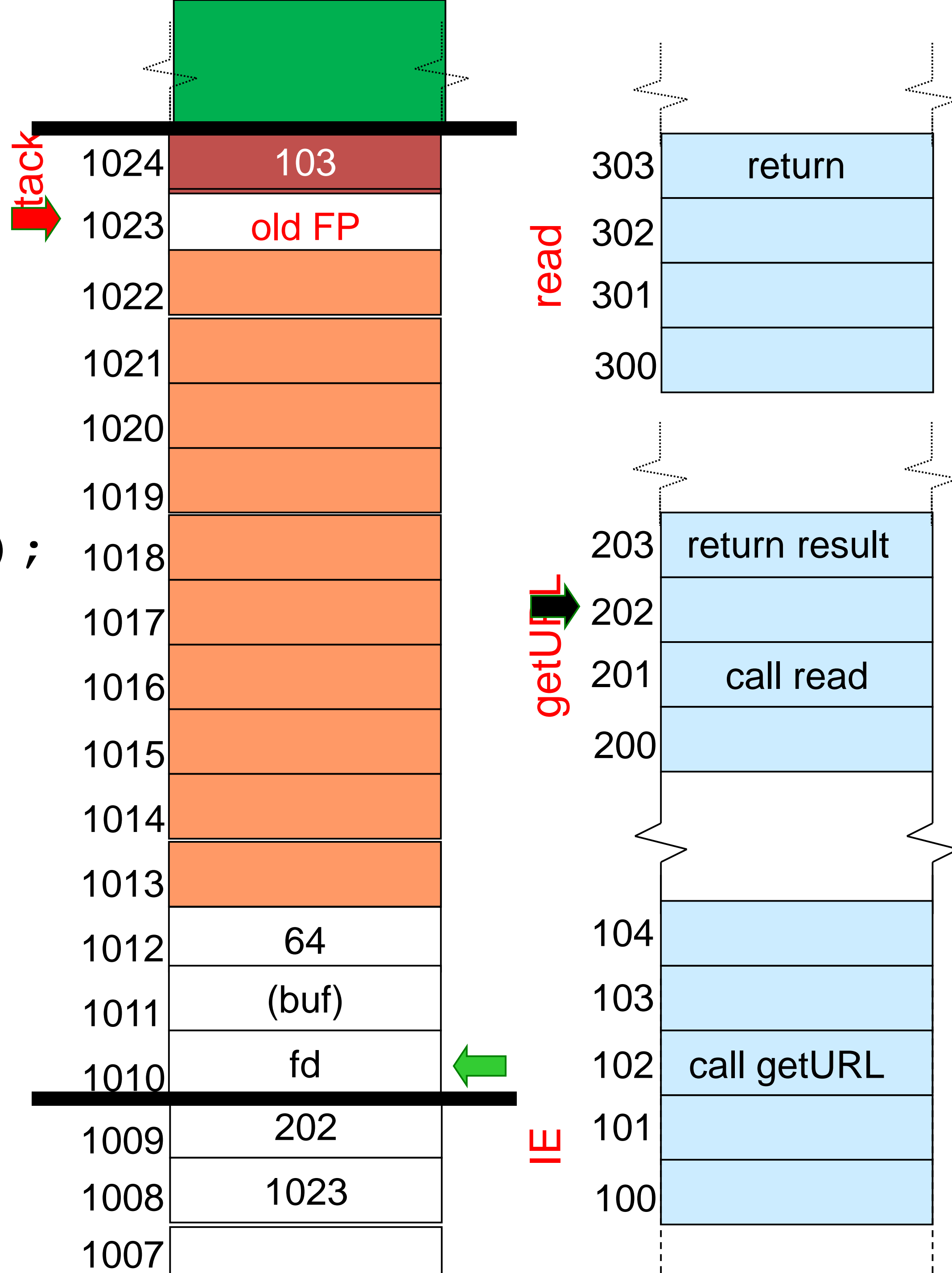


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# Where is the vulnerability?

# Exploit

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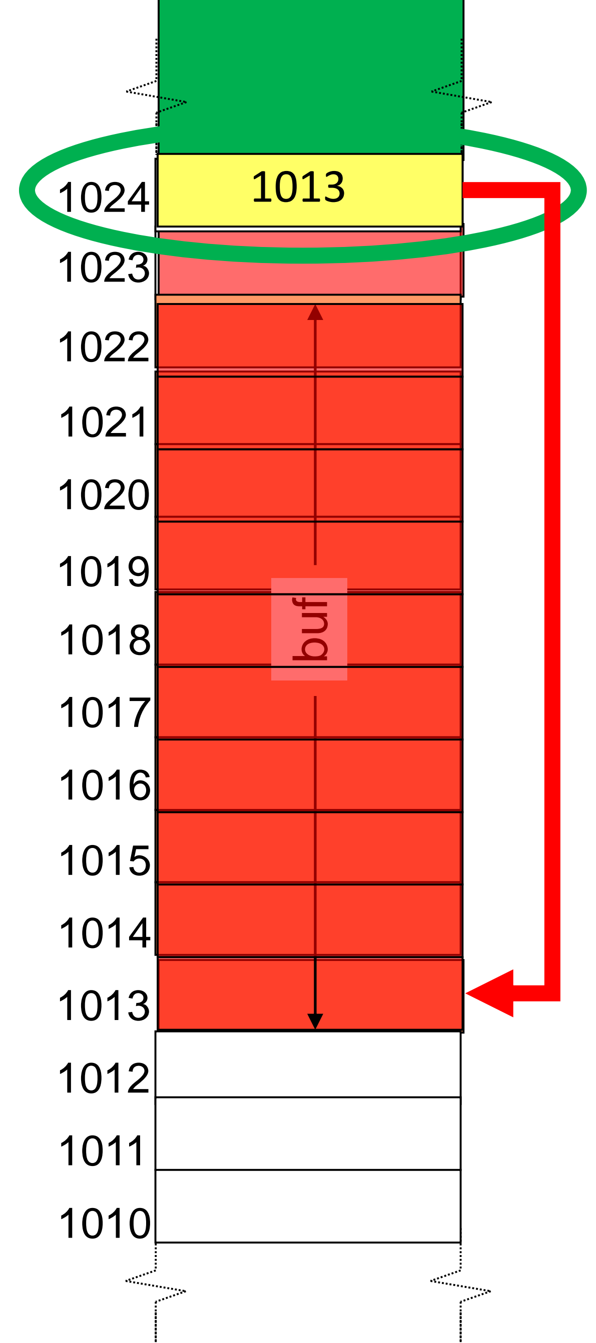


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# You may also overwrite other things

- For instance:
  - Other variables that are also on the stack
  - Other addresses
  - Etc.

# Memory Corruption

## Final words Part I

- We have sketched only the most common memory corruption attack
  - many variations, e.g.:
    - heap ← → stack
    - more complex overflows
    - off-by-one
- But there are others also
  - integer overflows
  - format string attacks
  - double free
  - etc.
- Not now, perhaps later…



*different kinds