COMP 110/L Lecture 5

Kyle Dewey

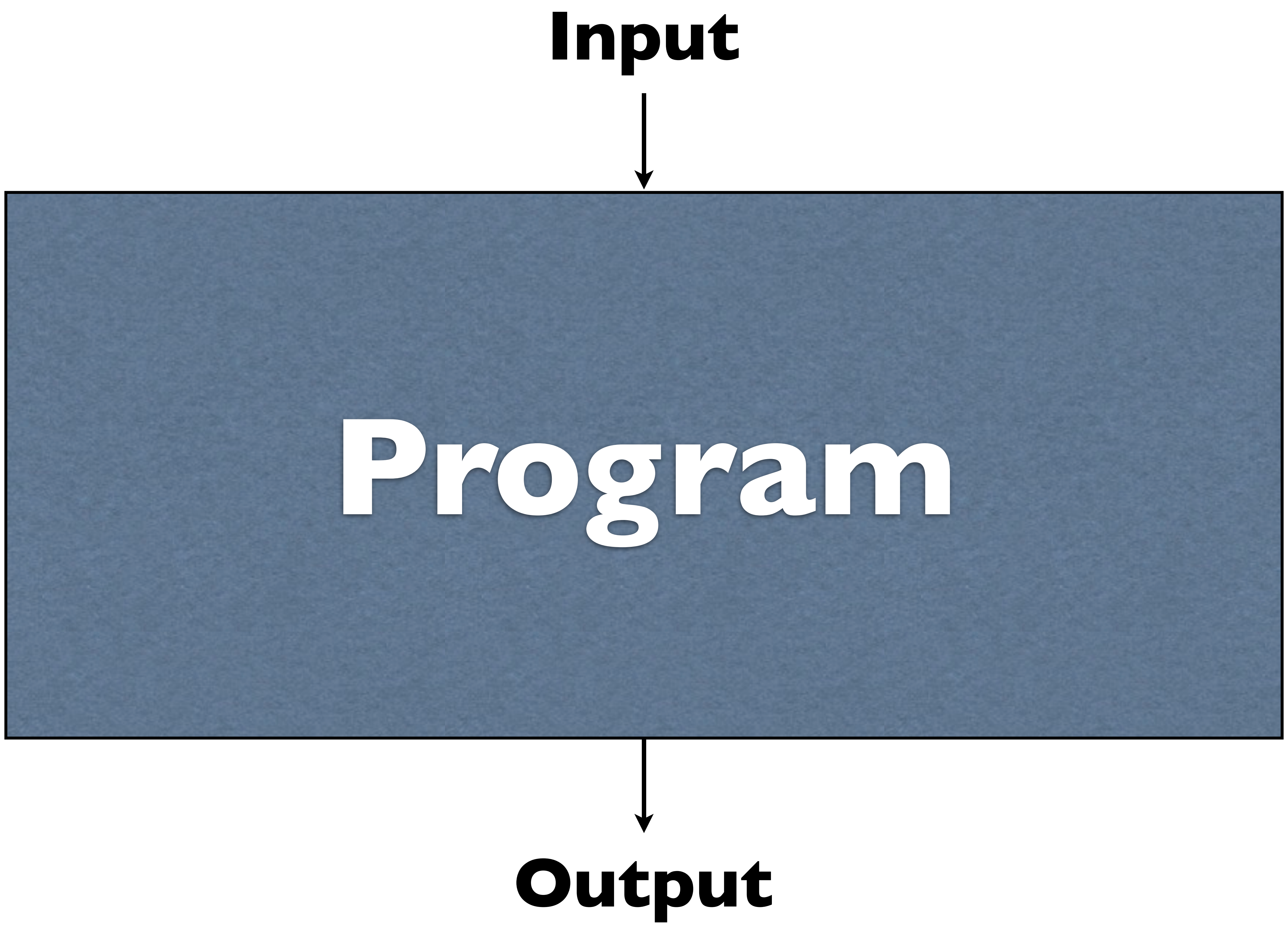
Outlines

- Methods
    - Defining methods
    - Calling methods

Methods

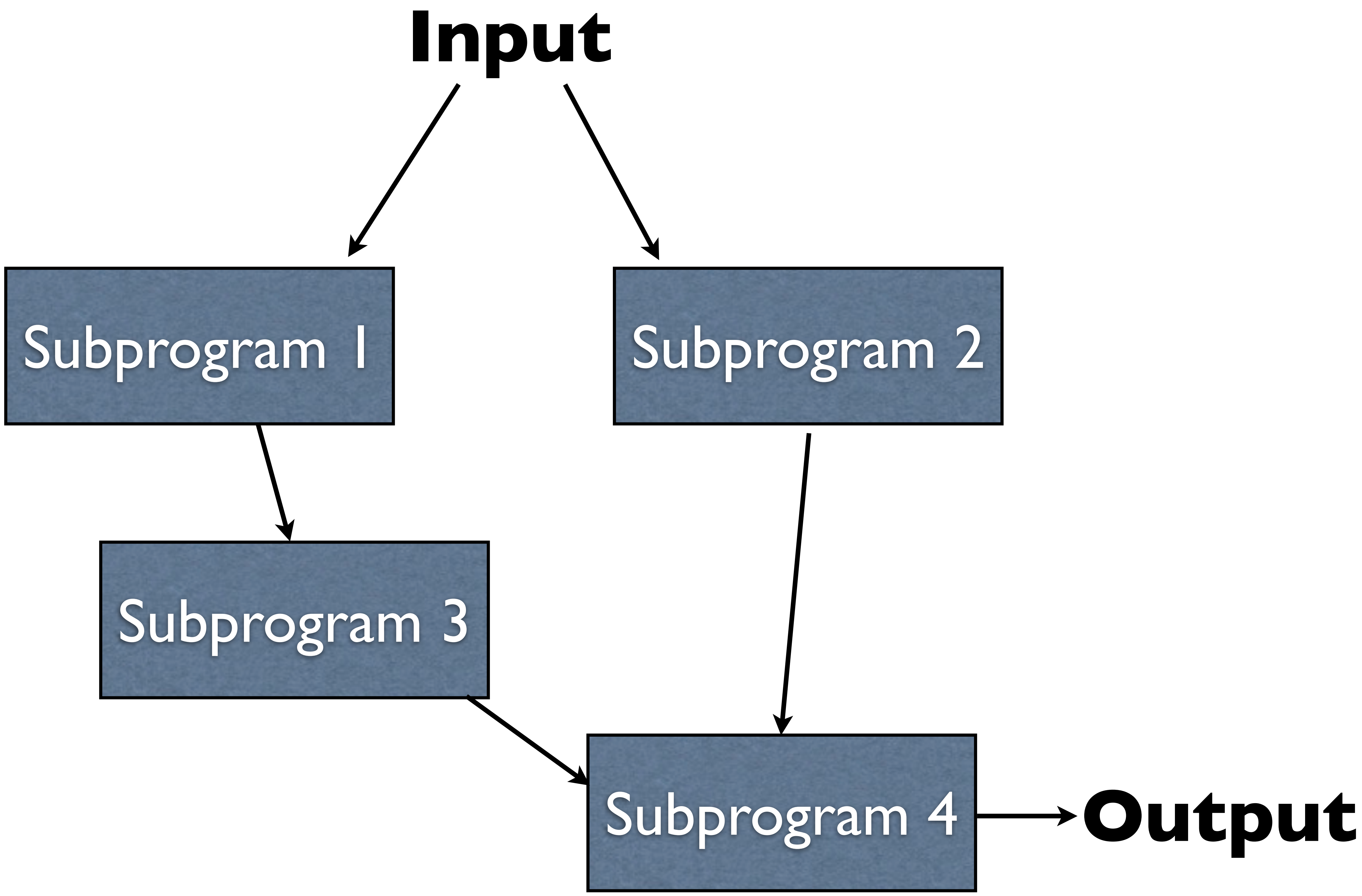
Motivation

Motivation



-Start off with some high-level motivation
-You write your program, and it's one giant block
-This is difficult to reason about

Motivation



-Simpler approach: write a bunch of smaller programs, and stitch them together
-Each program is a lot easier to reason about than the one big program
-If we're careful about how these different pieces interact with each other, then we only ever have to think about the small programs

Code Reuse

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```
System.out.println(...)
```

–You’re already familiar with these

Code Reuse

```
System.out.println(...)
nextInt()
```

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System.out.println(...)
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Code Reuse

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System.out.println(...)
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```

You have used all of these multiple times.

–You’re already familiar with these, and you’ve used them a bunch of times

Code Reuse

```
System.out.println(...)
nextInt()
nextLong()
nextDouble()
```

You have used all of these multiple times.

These are all *methods*.

–You’re already familiar with these, and you’ve used them a bunch of times

Methods

Distinct subprograms.

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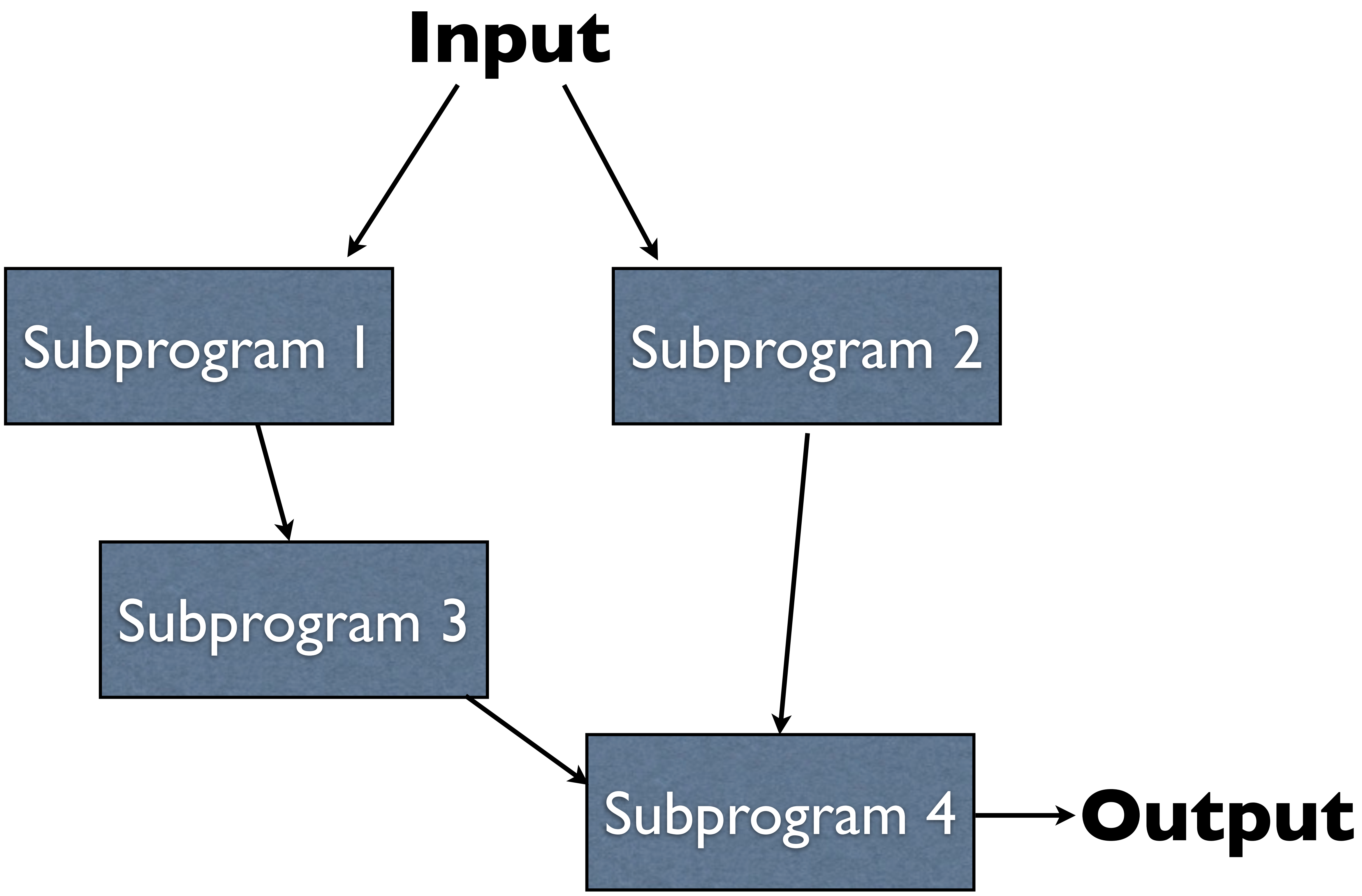
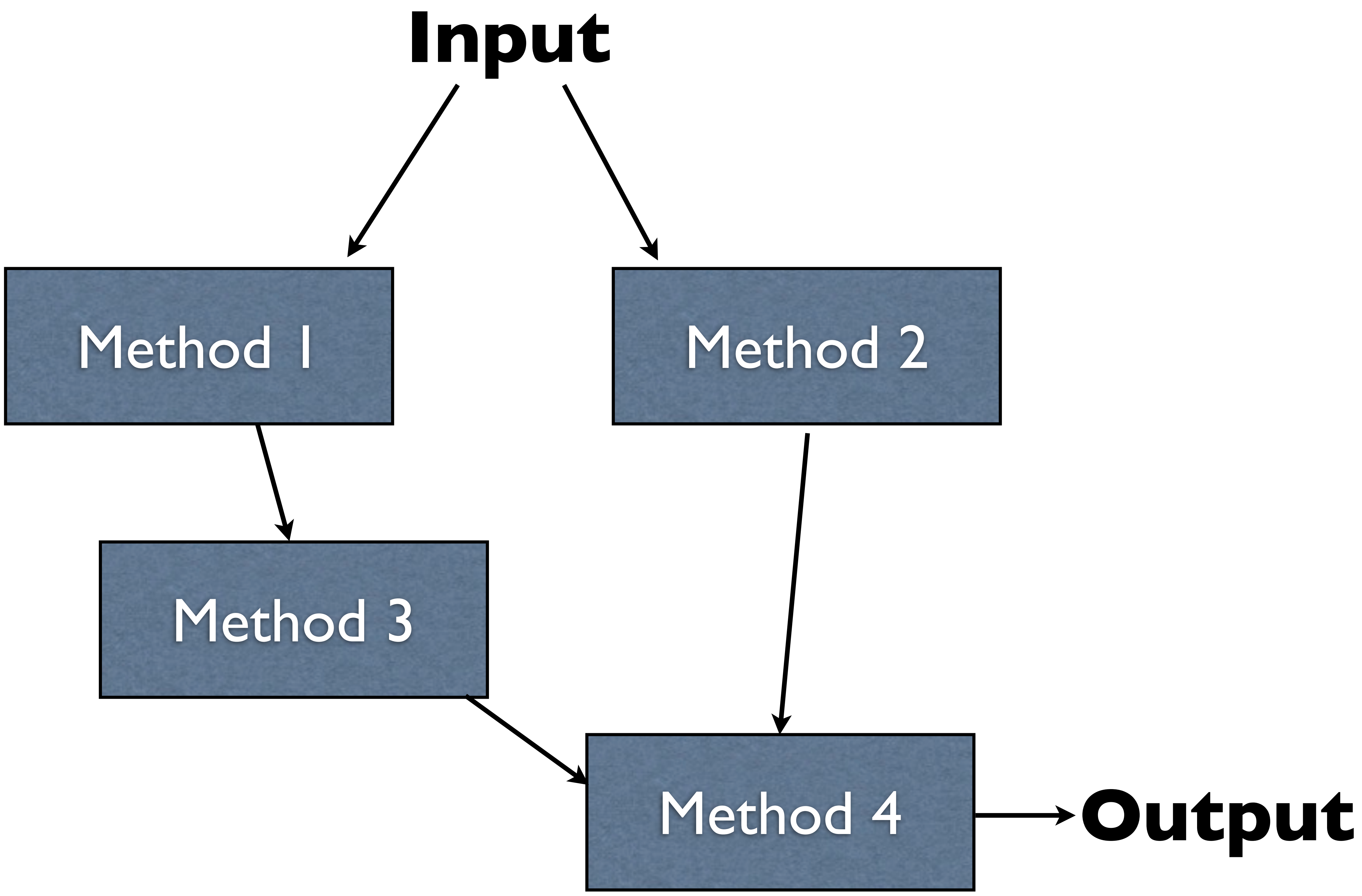


-Taking that illustration from before...

Methods

Distinct subprograms.



-...each one of those subprograms is a method

Method Terminology

- We can *define* a method
  - Make it available to the rest of the program
- We can *call* a method
  - Execute the subprogram

Method Anatomy

Methods take some number of inputs (can be 0).

Methods may produce an output.

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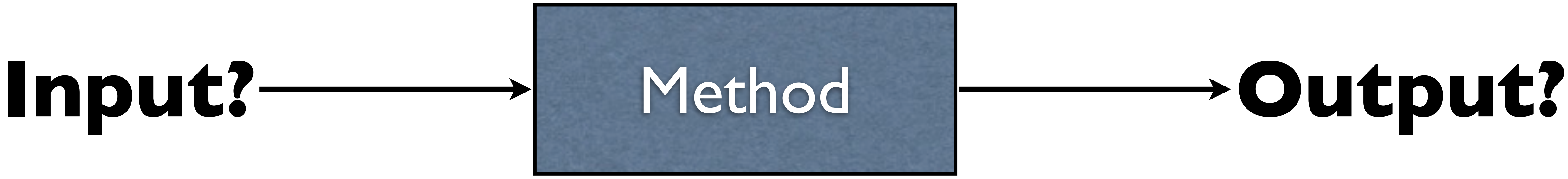

Method Anatomy

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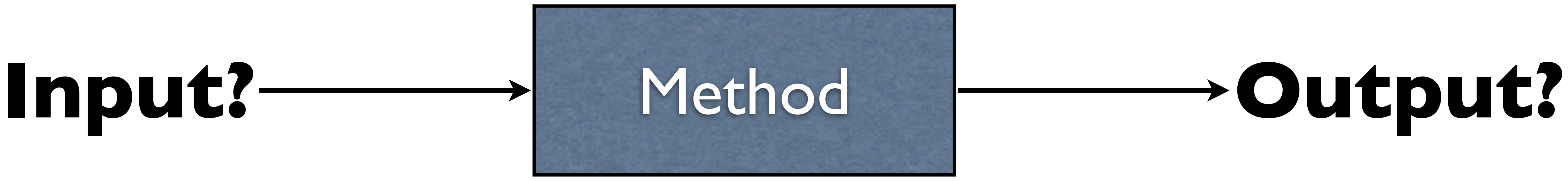
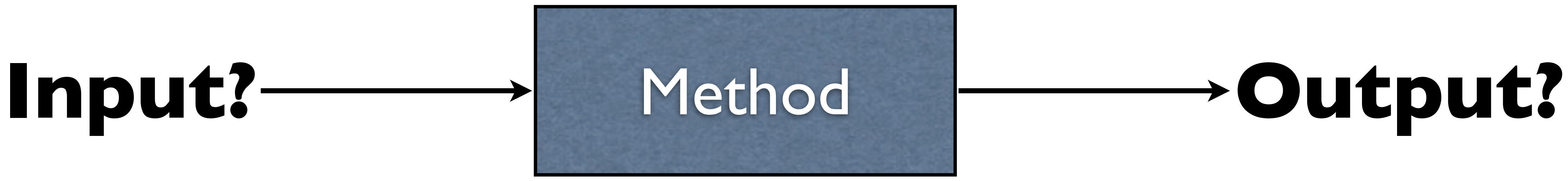


```
System.out.println("Hello");
```

Method Anatomy

Methods take some number of inputs (can be 0).

Methods may produce an output.



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One input, no outputs (cannot assign to a variable).

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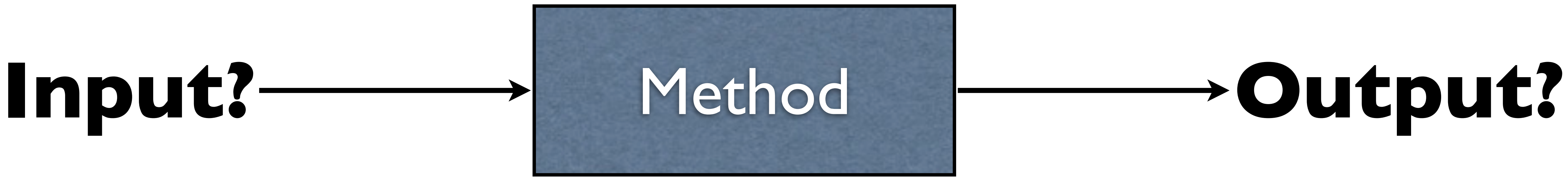

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Math.pow(2, 3);
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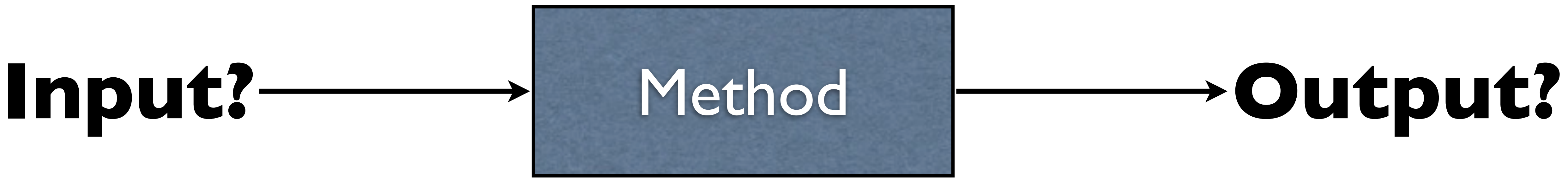

```
System.out.println("Hello");
```

One input, no outputs (cannot assign to a variable).

```
Math.pow(2, 3);
```

Two inputs, one output.

```
inputScanner.nextInt();
inputScanner.nextInt();
```

No inputs, one output.

```
inputScanner.nextInt();
```

No inputs, one output.

```
System.out.print("Goodbye");
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```
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No inputs, one output.

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One input, no outputs (cannot assign to a variable)

```
inputScanner.nextInt();
```

No inputs, one output.

```
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One input, no outputs (cannot assign to a variable)

```
inputScanner.nextLong();
inputScanner.nextInt();
```

No inputs, one output.

```
System.out.print("Goodbye");
```

One input, no outputs (cannot assign to a variable)

```
inputScanner.nextLong();
```

No inputs, one output.

```
inputScanner.nextInt();
```

No inputs, one output.

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One input, no outputs (cannot assign to a variable)

```
inputScanner.nextLong();
```

No inputs, one output.

```
inputScanner.nextDouble();
inputScanner.nextInt();
```

No inputs, one output.

```
System.out.print("Goodbye");
```

One input, no outputs (cannot assign to a variable)

```
inputScanner.nextLong();
```

No inputs, one output.

```
inputScanner.nextDouble();
```

No inputs, one output.

Defining a Method

Easiest to see with real code.

Example:

`Return42.java`

-The `return` reserved word says that the method should end and return with a given value at this point

Example:
`ReturnParameter.java`

Example:
`MultParameters1.java`

Example:
`MultParameters2.java`

Example:
`MultParameters3.java`

Method Definition General Form

```
public static
returnType
methodName(parameter_list) {
   ...
   return expression;
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Name given to method; same naming rules as variables

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Inputs to method (`int x`)

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Magic

Type of value produced

Inputs to method (`int x`)

Name given to method; same naming rules as variables

Method ends here, evaluates `expression`, and produces its result

Methods which Produce no Values

Methods which produce no values have a `void` return type

Example: `ReturnNothing.java`

`main` Method

`main` is just another method.

`main` serves as the entry point to your program.

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`main` is just another method.

`main` serves as the entry point to your program.

```
public static
void
main(String[] args) {
   ...
}
```

-main’s return type is void - it produces no value (doesn’t return anything)
-String[] is actually a type, so args is a parameter
-Later on we’ll get into what the type `String[]` is (not the same as just String), along with what this parameter to main holds

Calling Methods

- Execution enters the method calls
- The method is executed
- The method returns to wherever it was called from

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Execution
Method 1
Method 2

-Initially, execution is in method 1

Calling Methods

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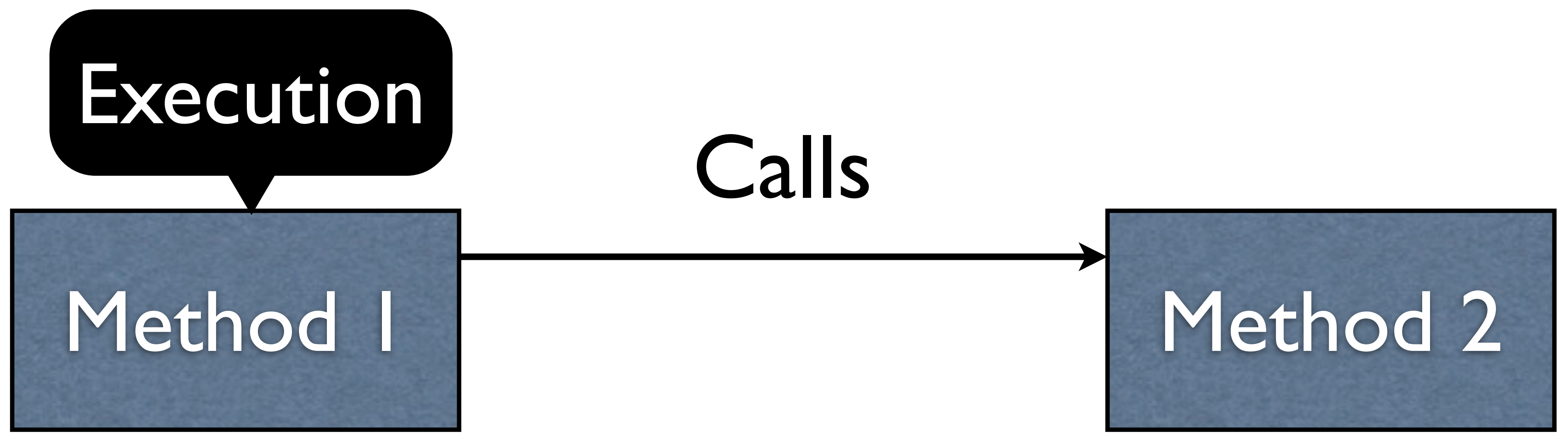

-Method 1 then calls method 2

Calling Methods

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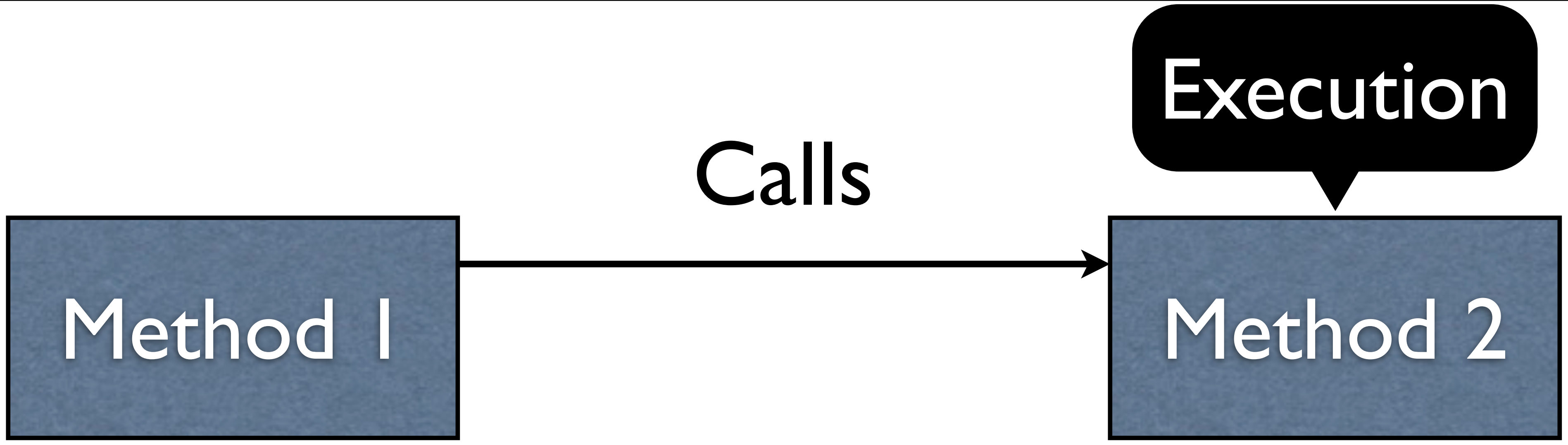

-Execution transfers to method 2 as a result of the call

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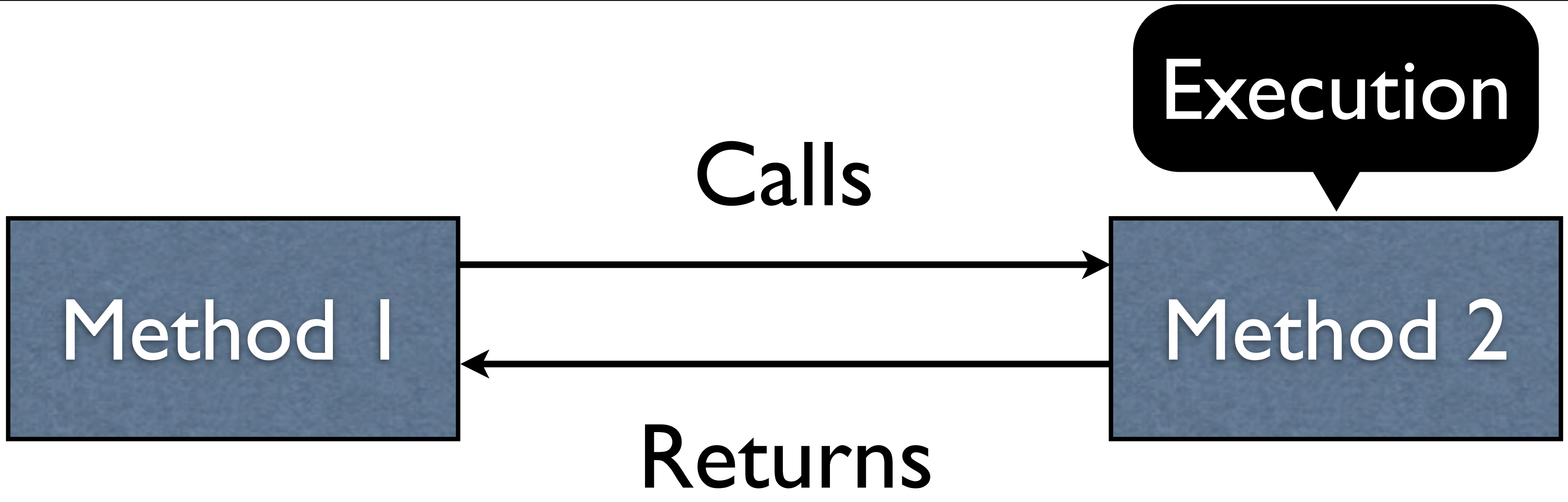

-Method 2 eventually completes, returning back to method 1

Calling Methods

- Execution enters the method calls
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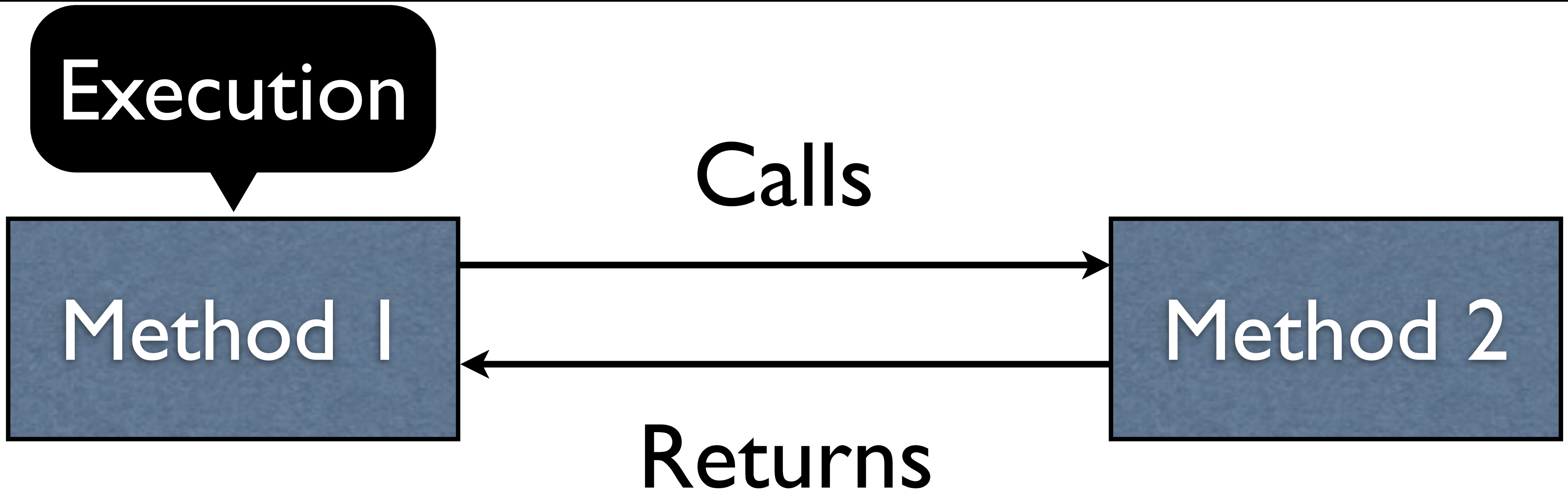

-Once the return is complete, execution resumes back in method 1 wherever it left off