



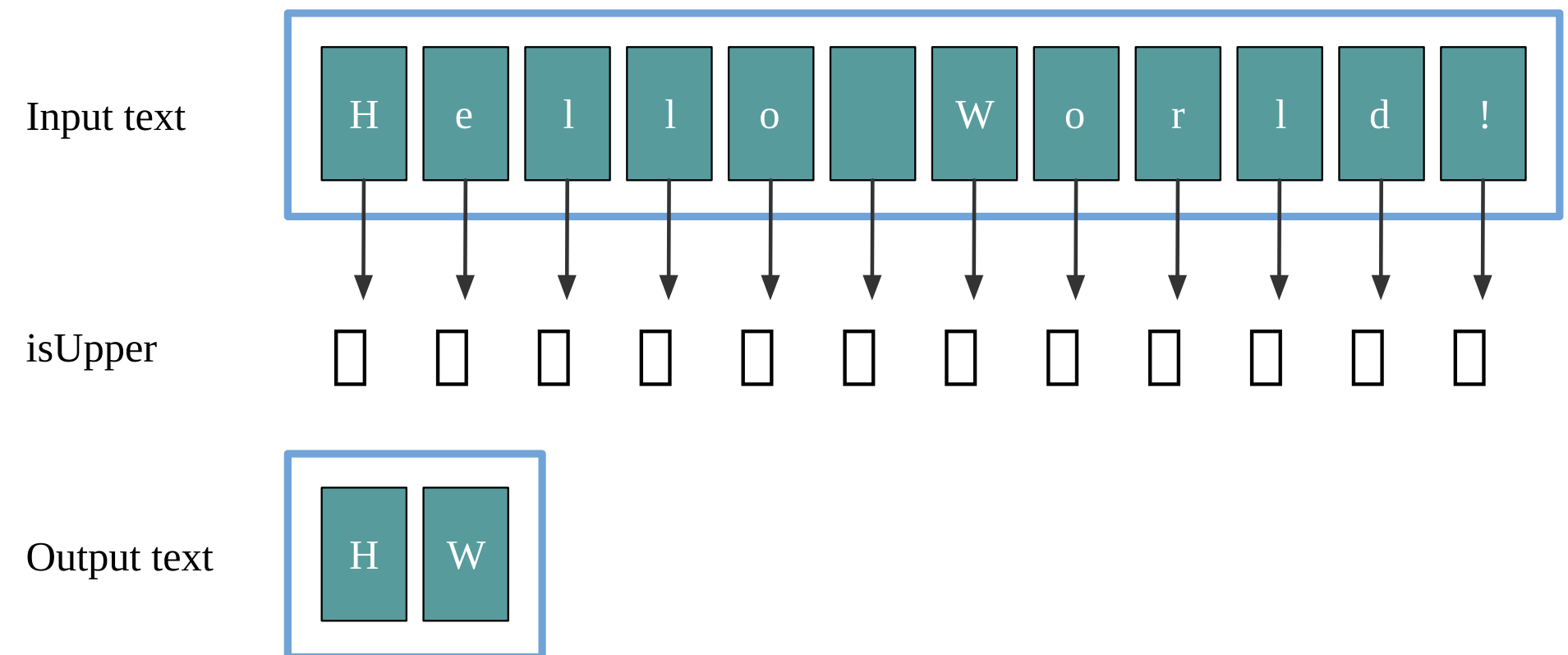
FUNCTION AS INPUTS

Function as inputs

```
def filter(  
  text      : String,  
  predicate: Char => Boolean  
): String = ...
```

Function as inputs

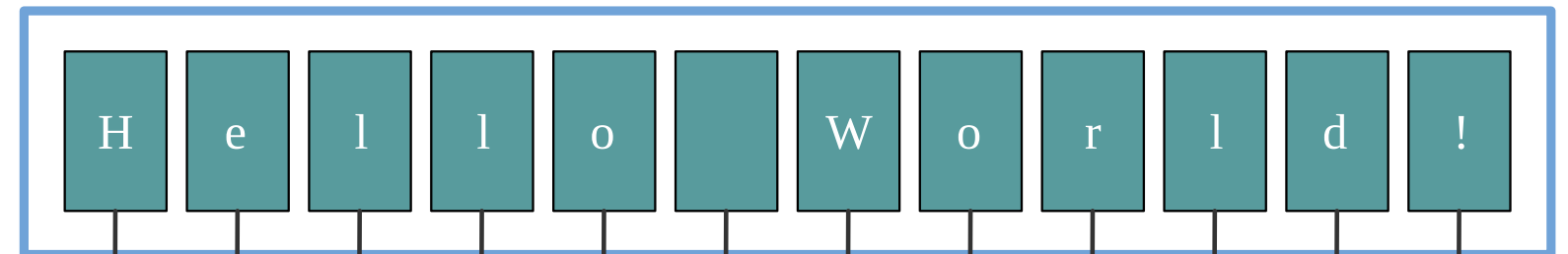
```
filter(  
  "Hello World!",  
  (c: Char) => c.isUpper  
)  
// res0: String = "HW"
```



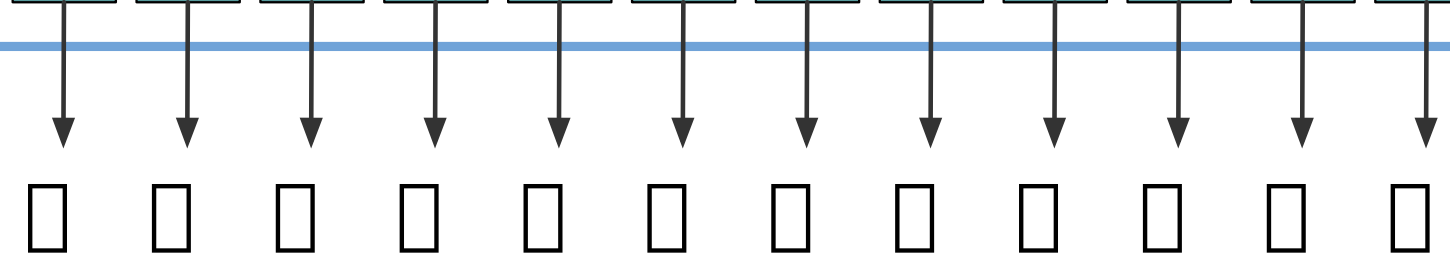
Function as inputs

```
filter(  
  "Hello World!",  
  (c: Char) => c.isLetter  
)  
// res1: String = "HelloWorld"
```

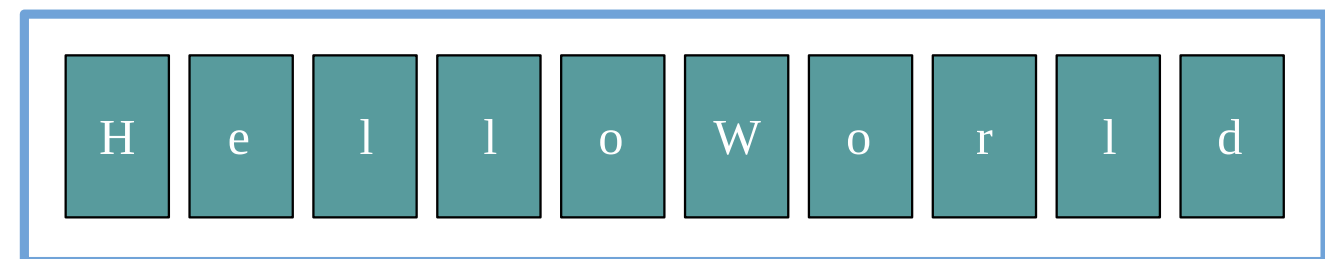
Input text



isLetter



Output text



Reduce code duplication

```
def upperCase(text: String): String = {  
  val characters = text.toArray  
  for (i <- 0 until text.length) {  
    characters(i) = characters(i).toUpper  
  }  
  new String(characters)  
}
```

```
upperCase("Hello")  
// res2: String = "HELLO"
```

```
def lowerCase(text: String): String = {  
  val characters = text.toArray  
  for (i <- 0 until text.length) {  
    characters(i) = characters(i).toLowerCase  
  }  
  new String(characters)  
}
```

```
lowerCase("Hello")  
// res3: String = "hello"
```

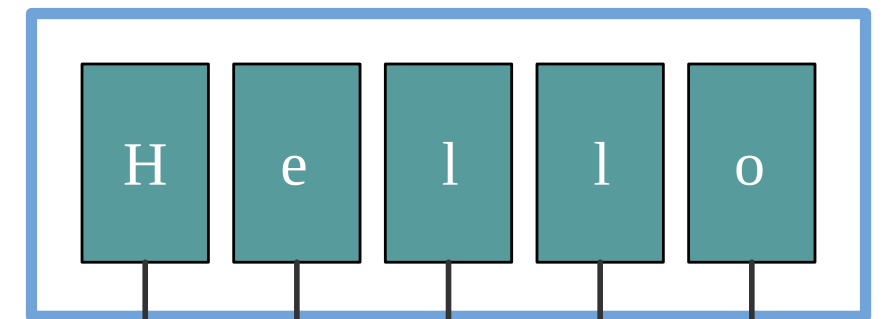
Capture pattern

```
def map(text: String, update: Char => Char): String =  
  val characters = text.toArray  
  for (i <- 0 until text.length) {  
    characters(i) = update(characters(i))  
  }  
  new String(characters)  
}
```

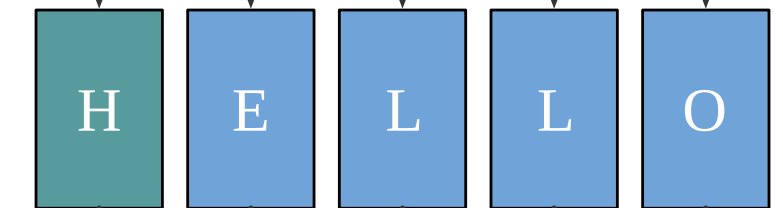
```
def upperCase(text: String): String =  
  map(text, c => c.toUpperCase)
```

```
def lowerCase(text: String): String =  
  map(text, c => c.toLowerCase)
```

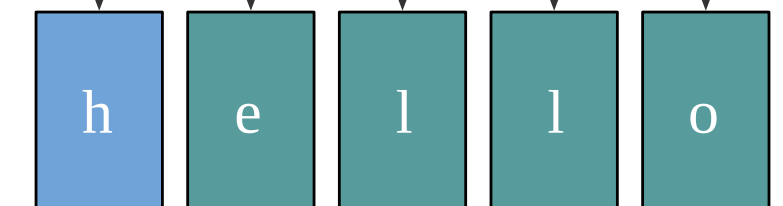
Input text



toUpper



toLowerCase

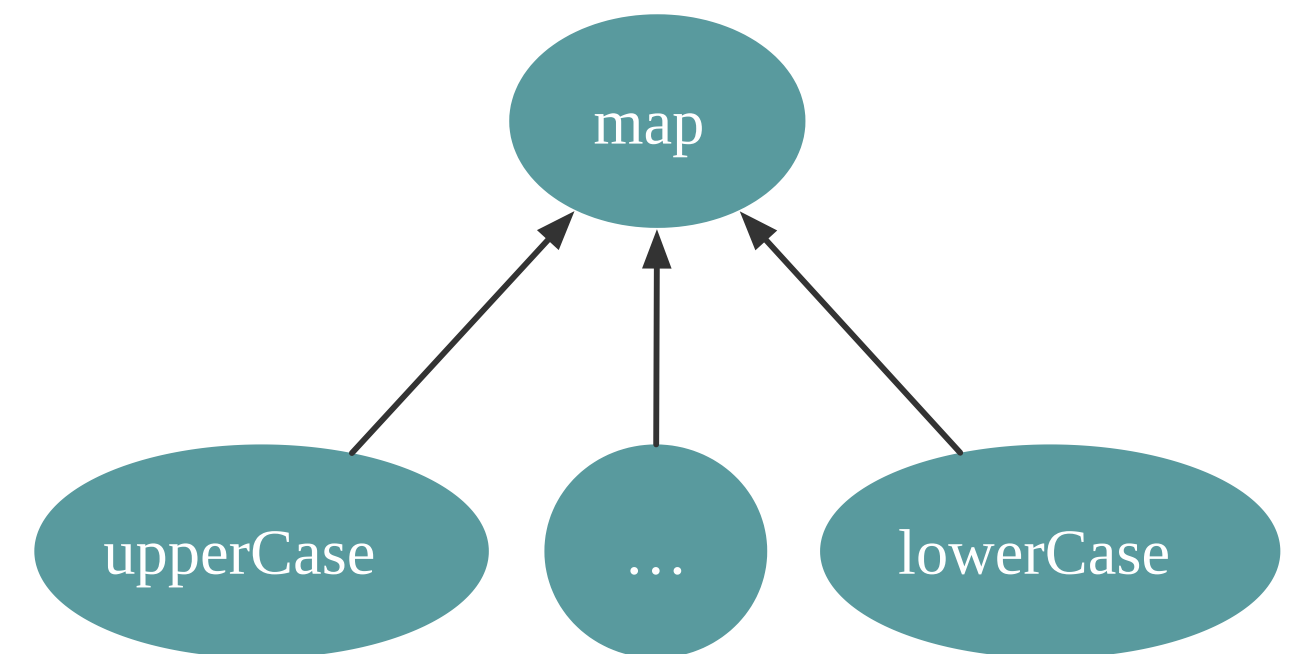


Capture pattern

```
def map(text: String, update: Char => Char): String =  
  val characters = text.toArray  
  for (i <- 0 until text.length) {  
    characters(i) = update(characters(i))  
  }  
  new String(characters)  
}
```

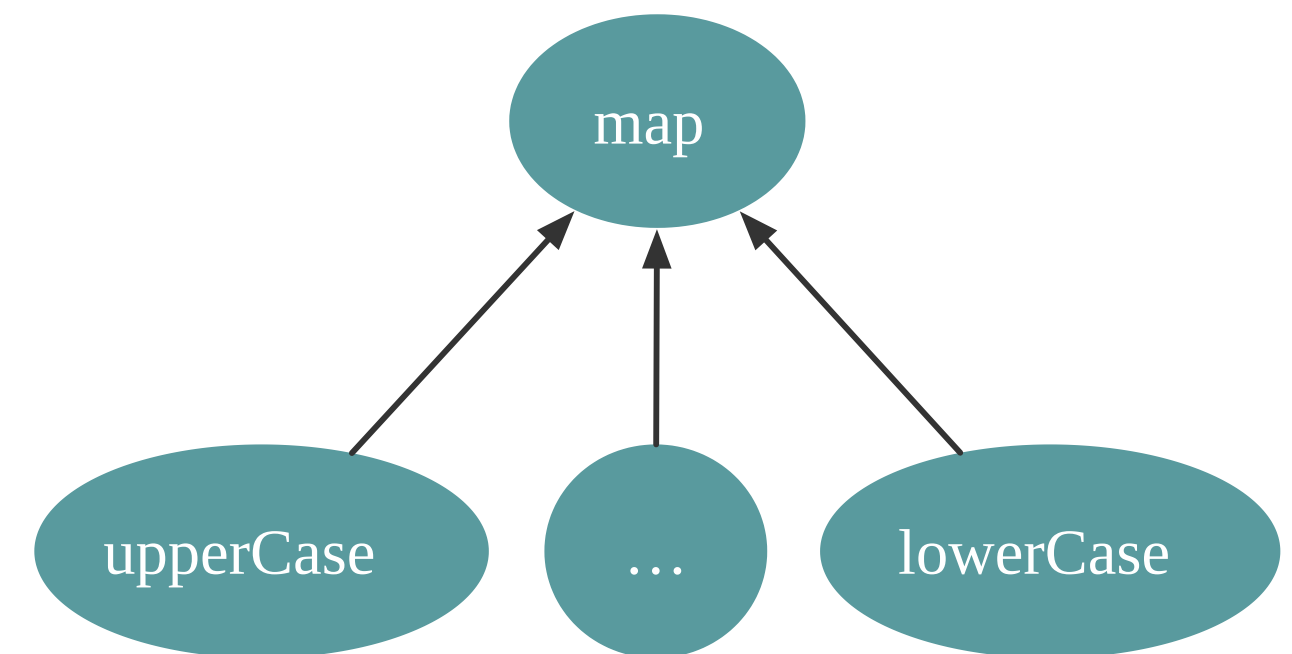
```
def upperCase(text: String): String =  
  map(text, c => c.toUpperCase)
```

```
def lowerCase(text: String): String =  
  map(text, c => c.toLowerCase)
```

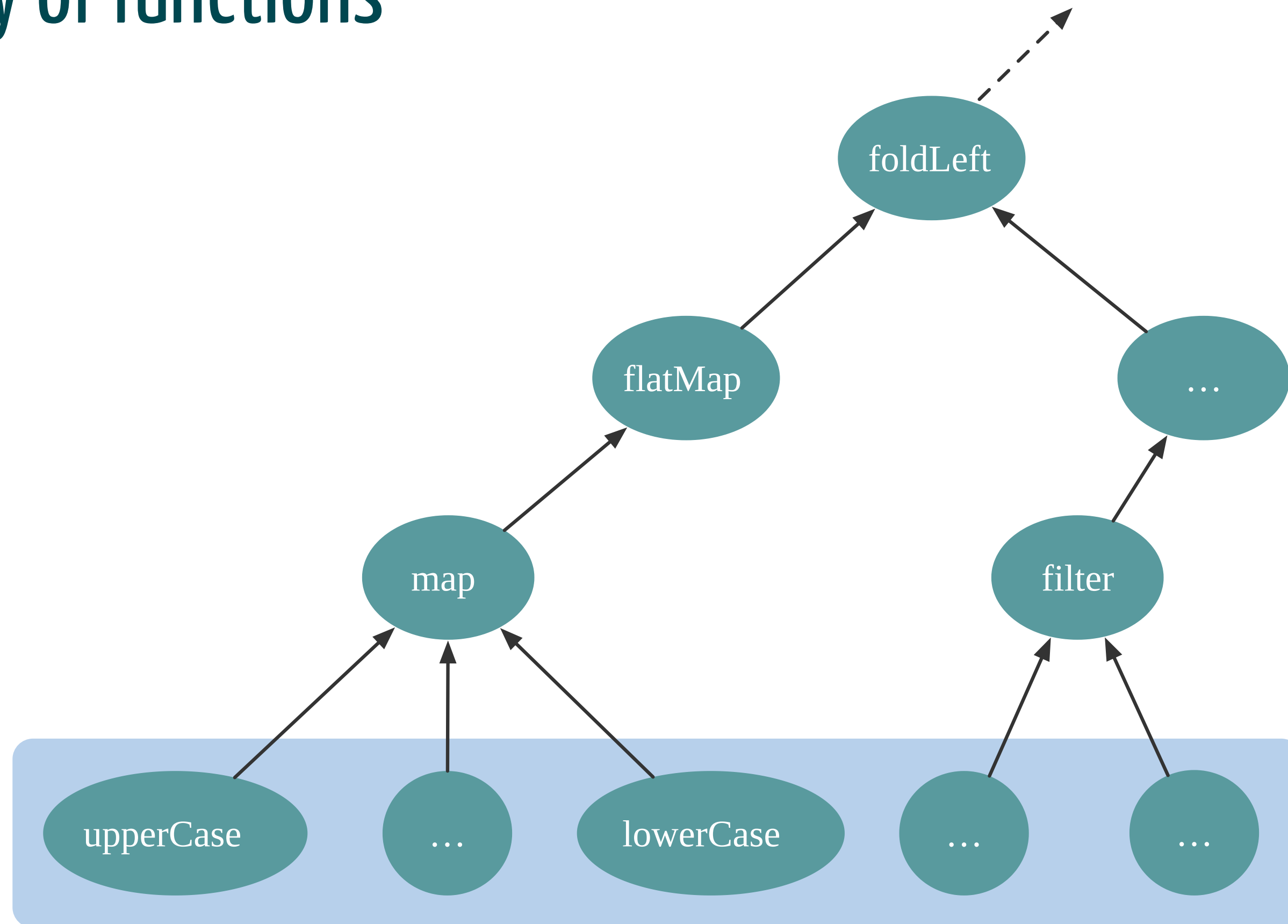


Property based testing

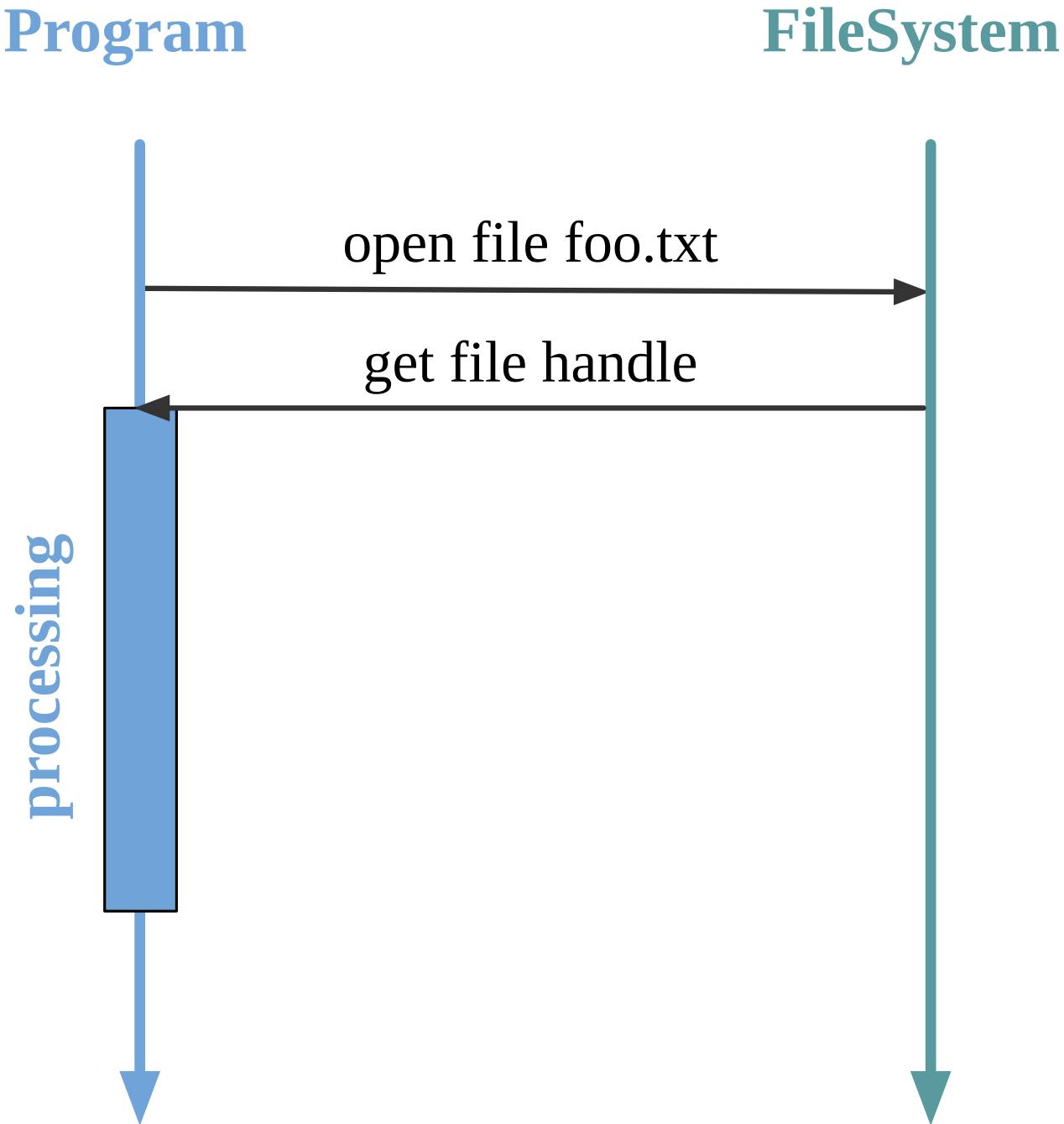
```
test("map does not modify the size of a text") {  
  forAll(  
    text : String,  
    update: Char => Char  
  ) =>  
    val outputText = map(text, update)  
    outputText.length == text.length  
  )  
}
```



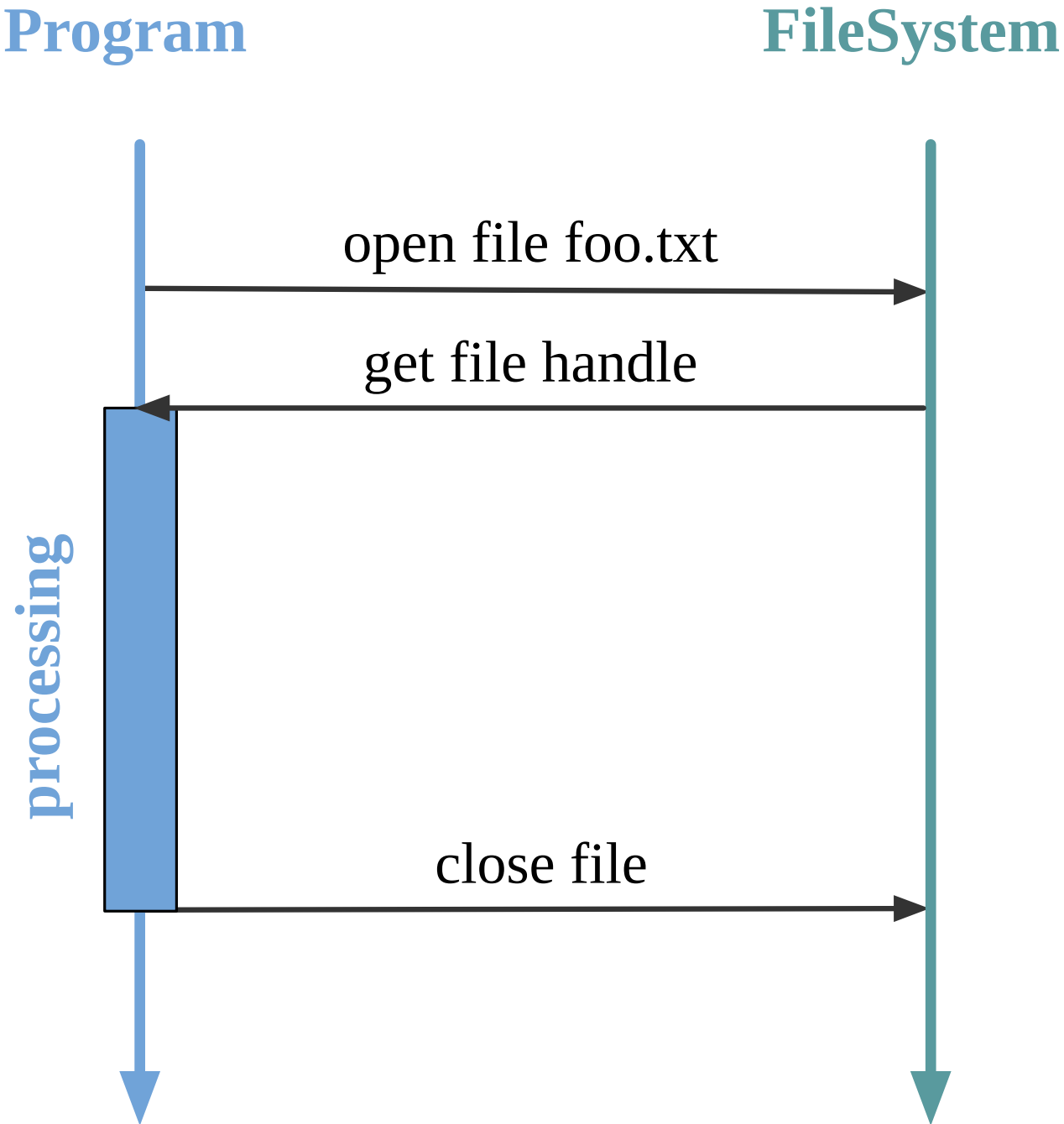
Hierarchy of functions



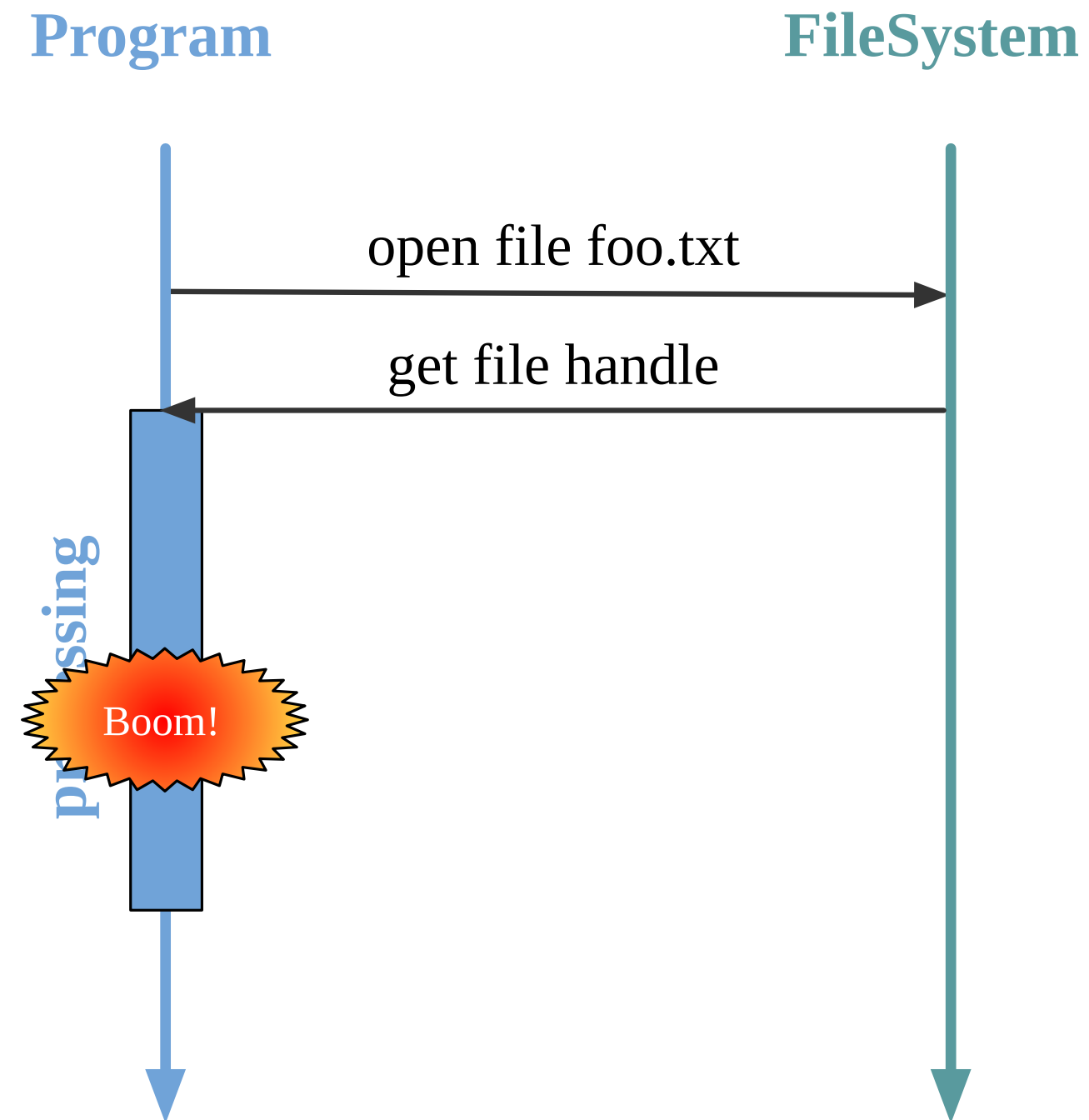
File processing



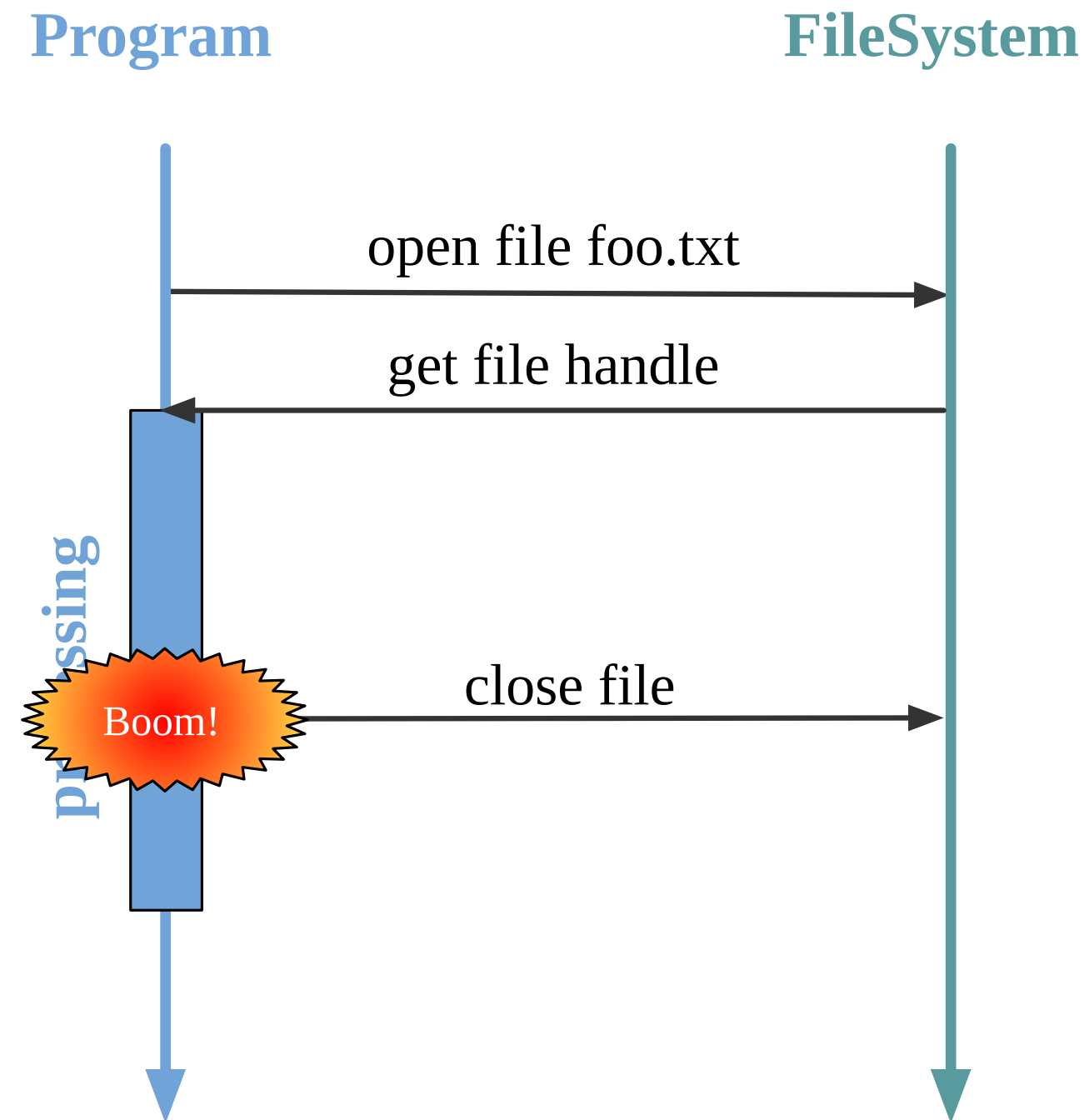
File processing



File processing



File processing



Write tricky code once

```
import scala.io.Source

def usingFile(fileName: String, processing: Iterator[String] => Int): Int = {
  val source = Source.fromResource(fileName)
  try {
    processing(source.getLines())
  } finally {
    source.close()
  }
}
```

Write tricky code once

```
import scala.io.Source

def usingFile(fileName: String, processing: Iterator[String] => Int): Int = {
  val source = Source.fromResource(fileName)
  try {
    processing(source.getLines())
  } finally {
    source.close()
  }
}
```

```
val countLines: Iterator[String] => Int =
  lines => lines.size
```

```
val countWords: Iterator[String] => Int =
  lines => ...
```

Write tricky code once

```
import scala.io.Source

def usingFile(fileName: String, processing: Iterator[String] => Int): Int = {
  val source = Source.fromResource(fileName)
  try {
    processing(source.getLines())
  } finally {
    source.close()
  }
}
```

```
usingFile("50-word-count.txt", countLines)
// res7: Int = 2
```

```
usingFile("50-word-count.txt", countWords)
// res8: Int = 50
```


Summary

- Higher order function
- Reduce code duplication
- Improve code quality