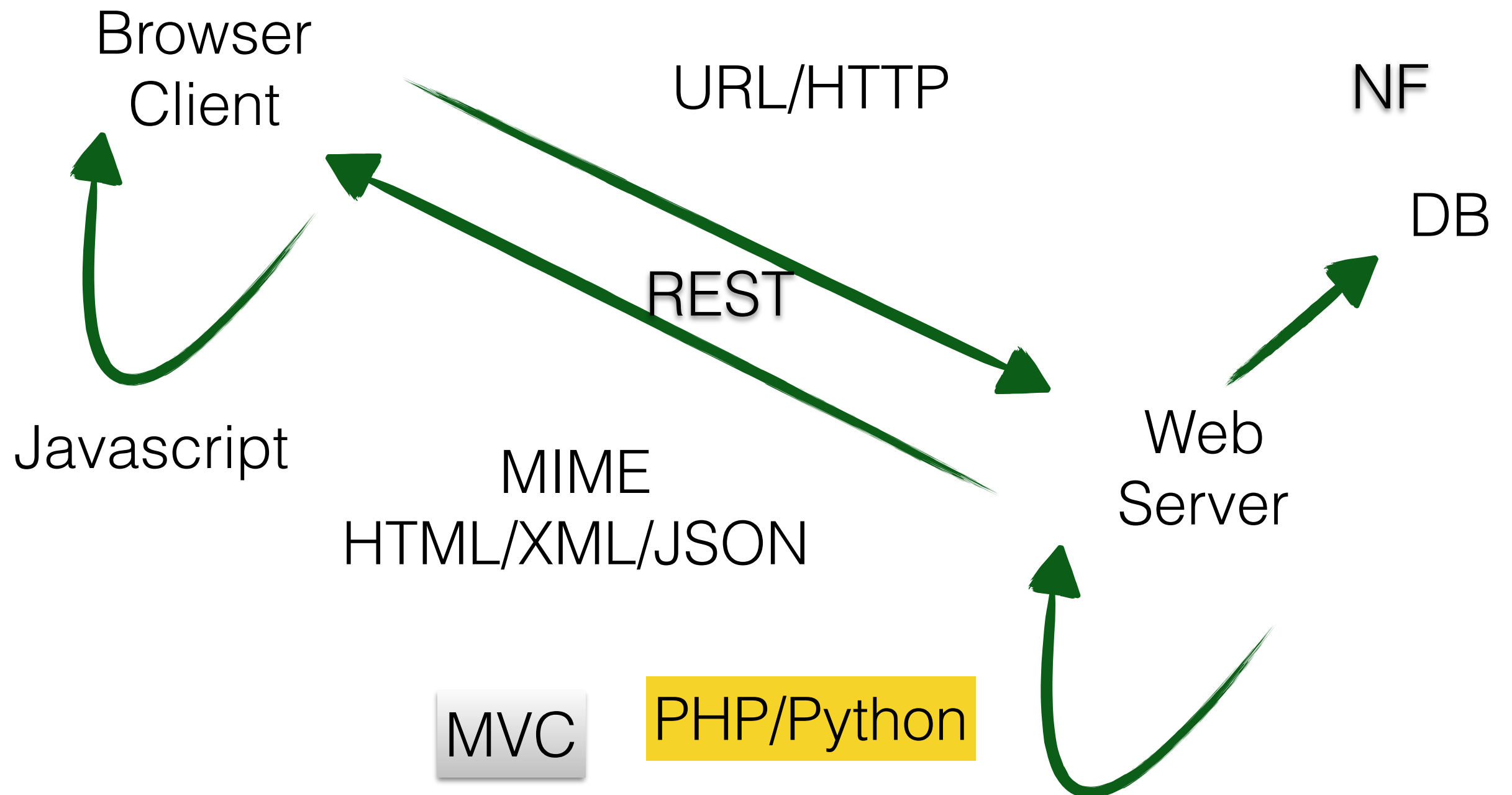


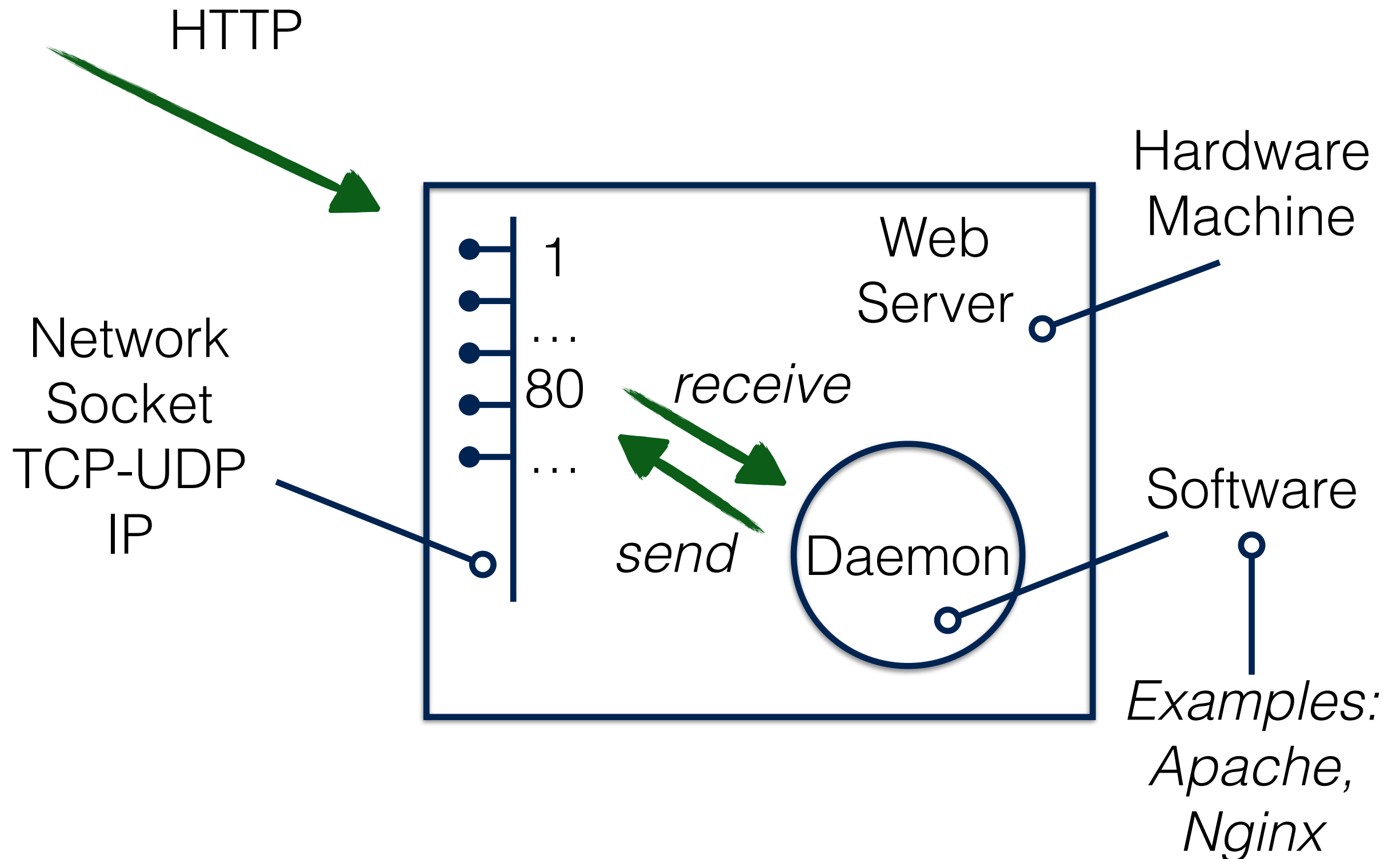
Web dynamic Web Programming Languages

Frédéric Le Mouëll

The Big Picture

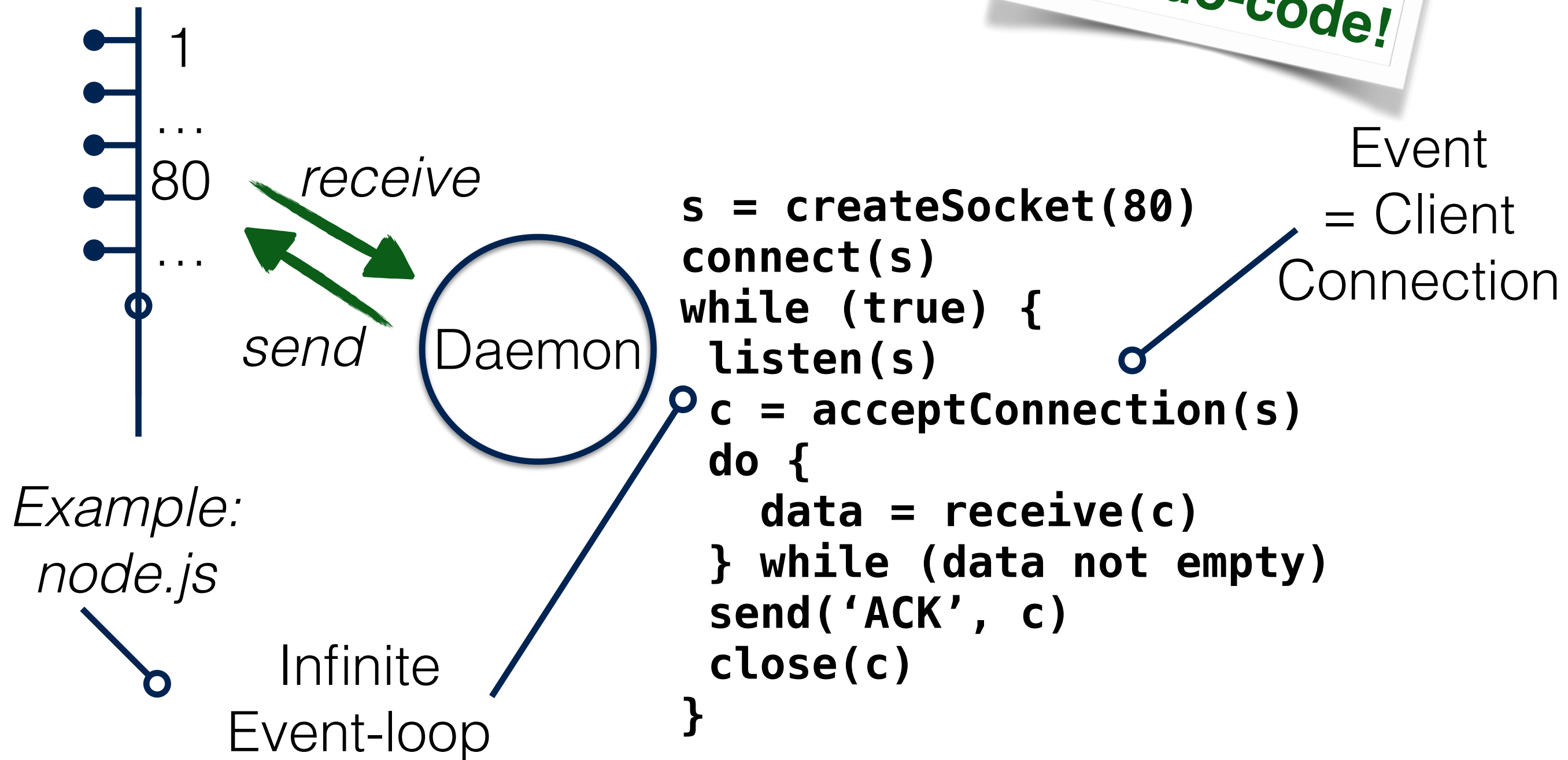


Zoom Back-end



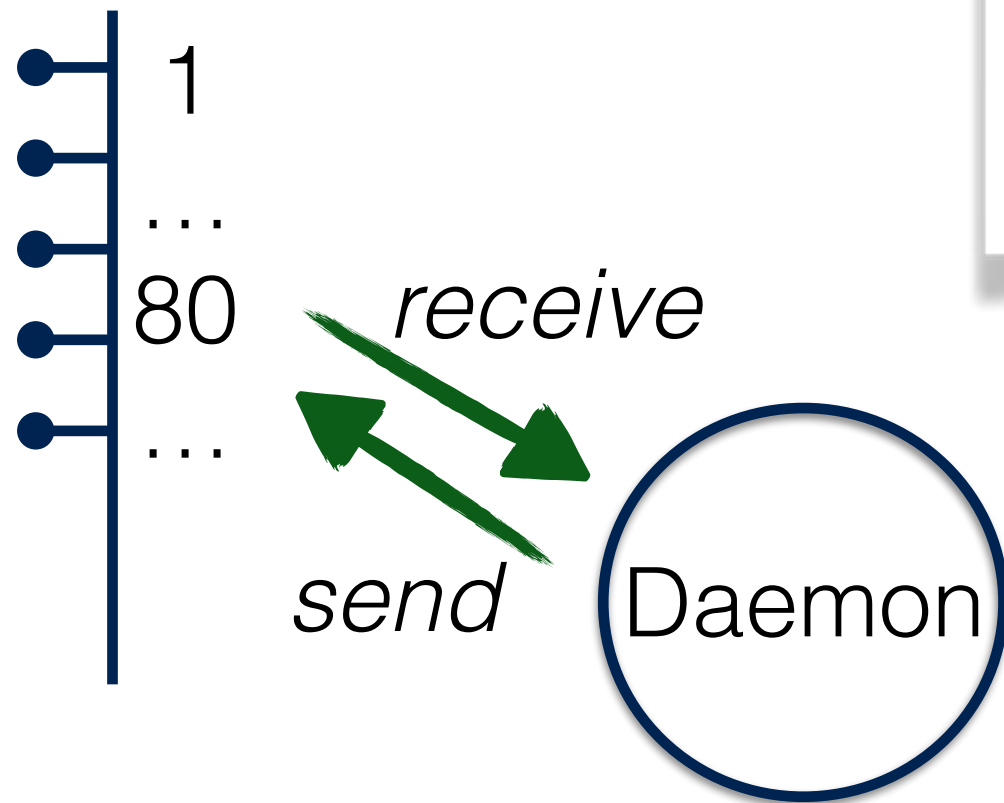
Zoom Daemon

Pseudo-code!



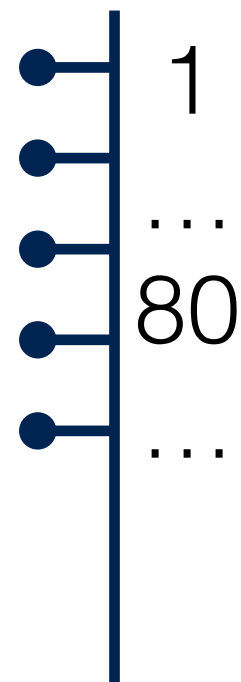
Zoom Data

```
GET /fr/recherche/labos HTTP/1.1
User-Agent: curl/7.30.0
Host: insa-lyon.fr
Accept: */*
```



```
s = createSocket(80)
connect(s)
while (true) {
  listen(s)
  c = acceptConnection(s)
  do {
    data = receive(c)
  } while (data not empty)
  send('ACK', c)
  close(c)
}
```

Zoom HTTP server



receive
send

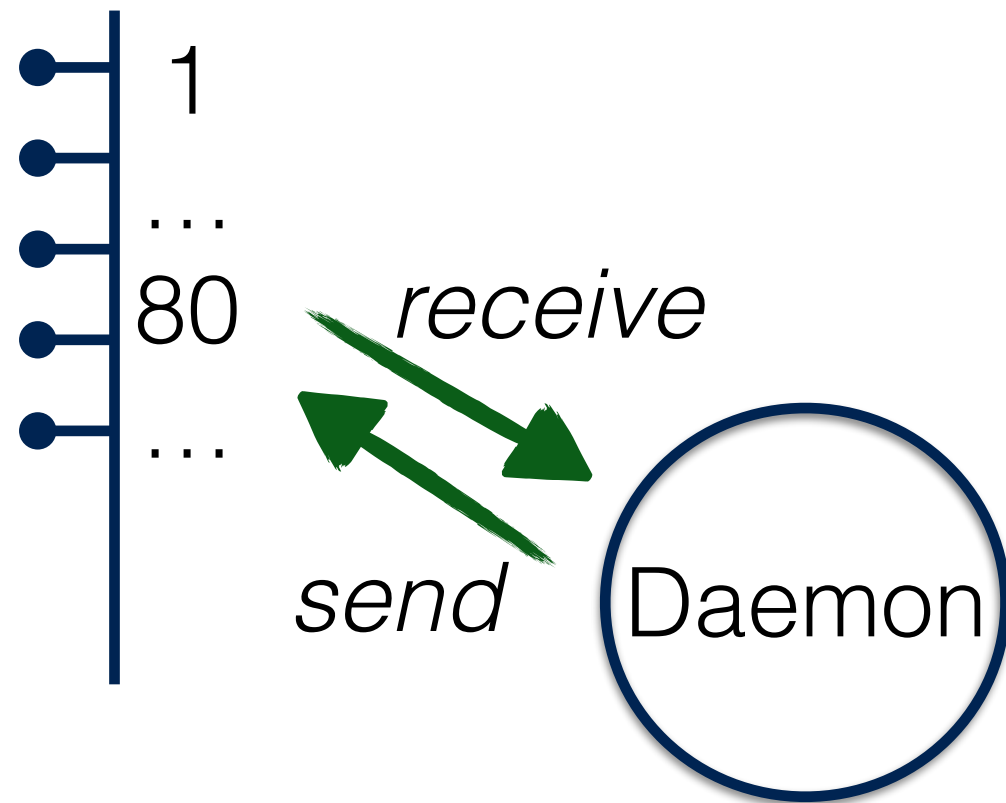


```
resHTTP = {  
  « command »: « GET »,  
  « URL »: « /fr/recherche/labos » }  
}
```

```
...  
do {  
  data = receive(c)  
} while (data not empty)  
resHTTP = HTTPParsing(data)  
send('ACK', c)  
close(c)  
}
```

Protocol
Parsing
(RFC-following)

Zoom HTTP server

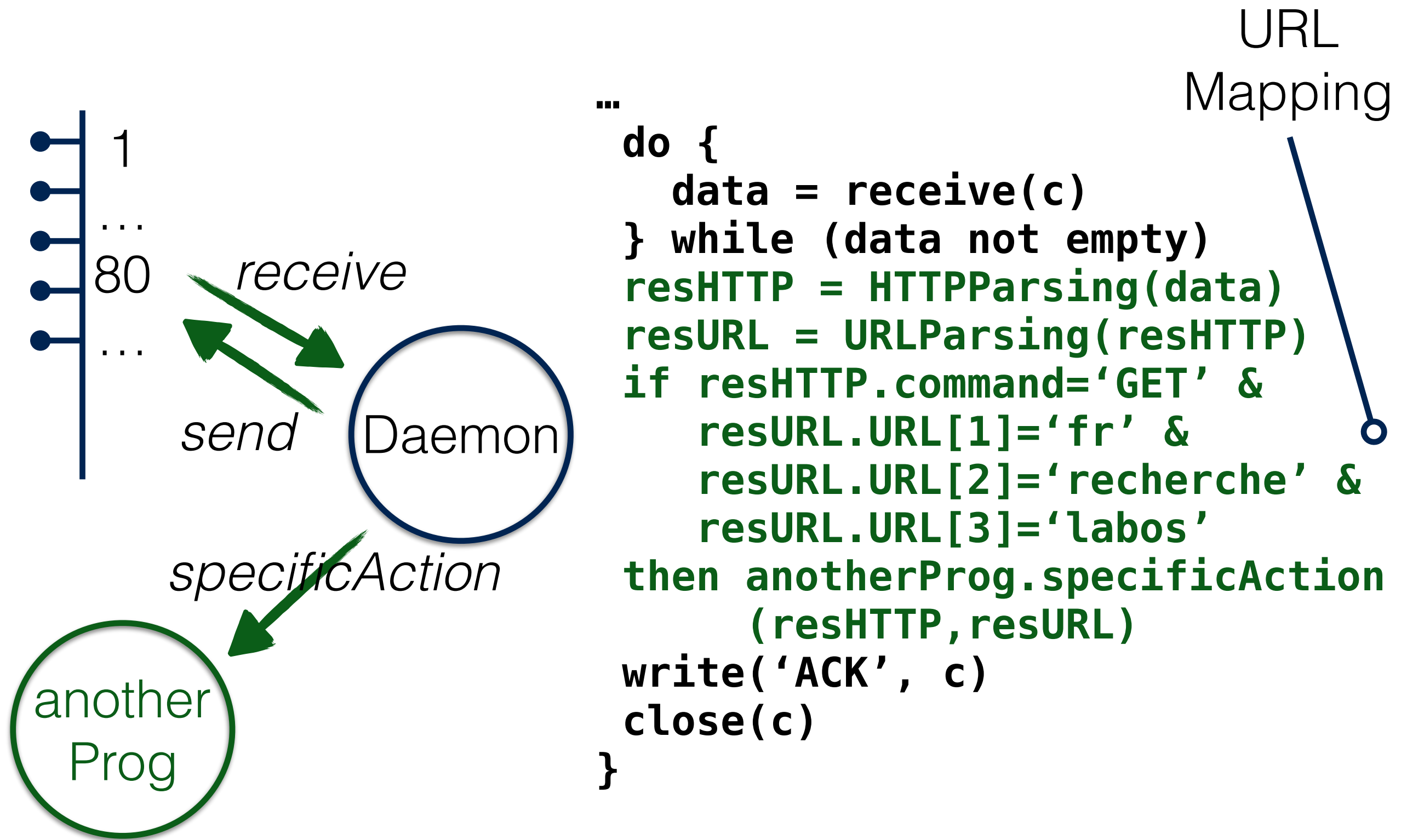


```
resURL = {  
    « URL »: « fr »,  
             « recherche »,  
             « labs » }  
}
```

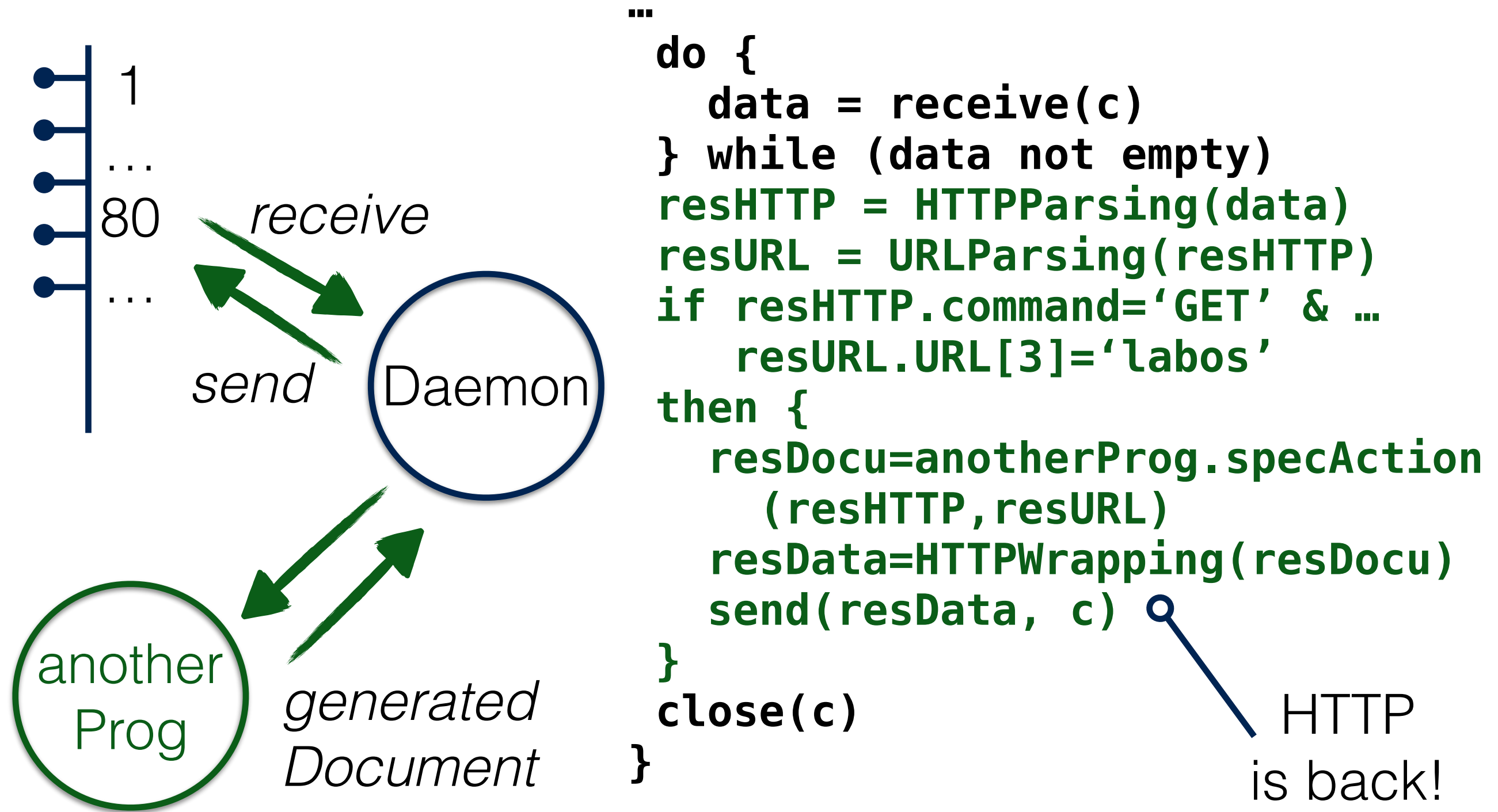
```
...  
do {  
    data = receive(c)  
} while (data not empty)  
resHTTP = HTTPParsing(data)  
resURL = URLParsing(resHTTP)  
send('ACK', c)  
close(c)  
}
```

URL
Parsing

Zoom HTTP server



Zoom HTTP server



HTTP Wrapping

```
> GET /fr/recherche/labos HTTP/1.1
> User-Agent: curl/7.30.0
> Host: telecom.insa-lyon.fr
> Accept: */*
```

```
< HTTP/1.1 302 Found
```

```
< Date: Mon, 15 Nov 2013 20:12:22 GMT
```

```
< Server: Apache
```

```
< X-Powered-By: PHP/5.3.18-pl0-gentoo
```

```
< Set-Cookie: SESS216677=t9vco4t34qssdsd;
expires=Wed, 29-Nov-2013 23:45:42 GMT; path=/fr/
recherche/labos; domain=.insa-lyon.fr
```

```
< Expires: Sun, 19 Nov 1978 05:00:00 GMT
```

```
< Last-Modified: Mon, 15 Nov 2013 20:12:22 GMT
```

```
< Cache-Control: store, no-cache, must-revalidate
```

```
< Cache-Control: post-check=0, pre-check=0
```

```
< Location: https://telecom.insa-lyon.fr/
```

```
< Content-Length: 6
```

```
< Content-Type: text/html; charset=utf-8
```

```
< <HTML>
```

```
< ...
```

HTTP
header

cookies
(if needed)

stamping

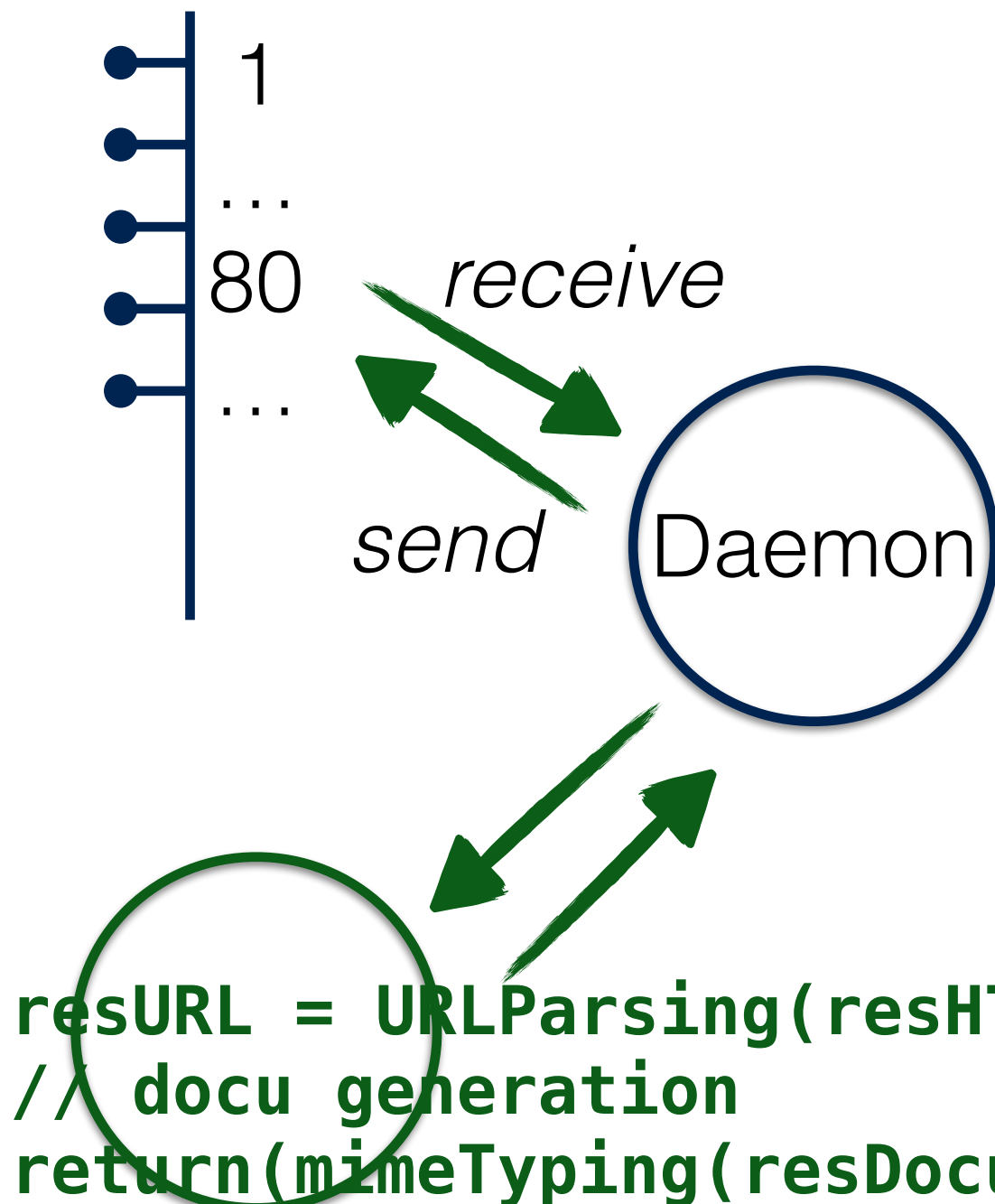
mimeTyping
in resDocu

resDocu

In reality...

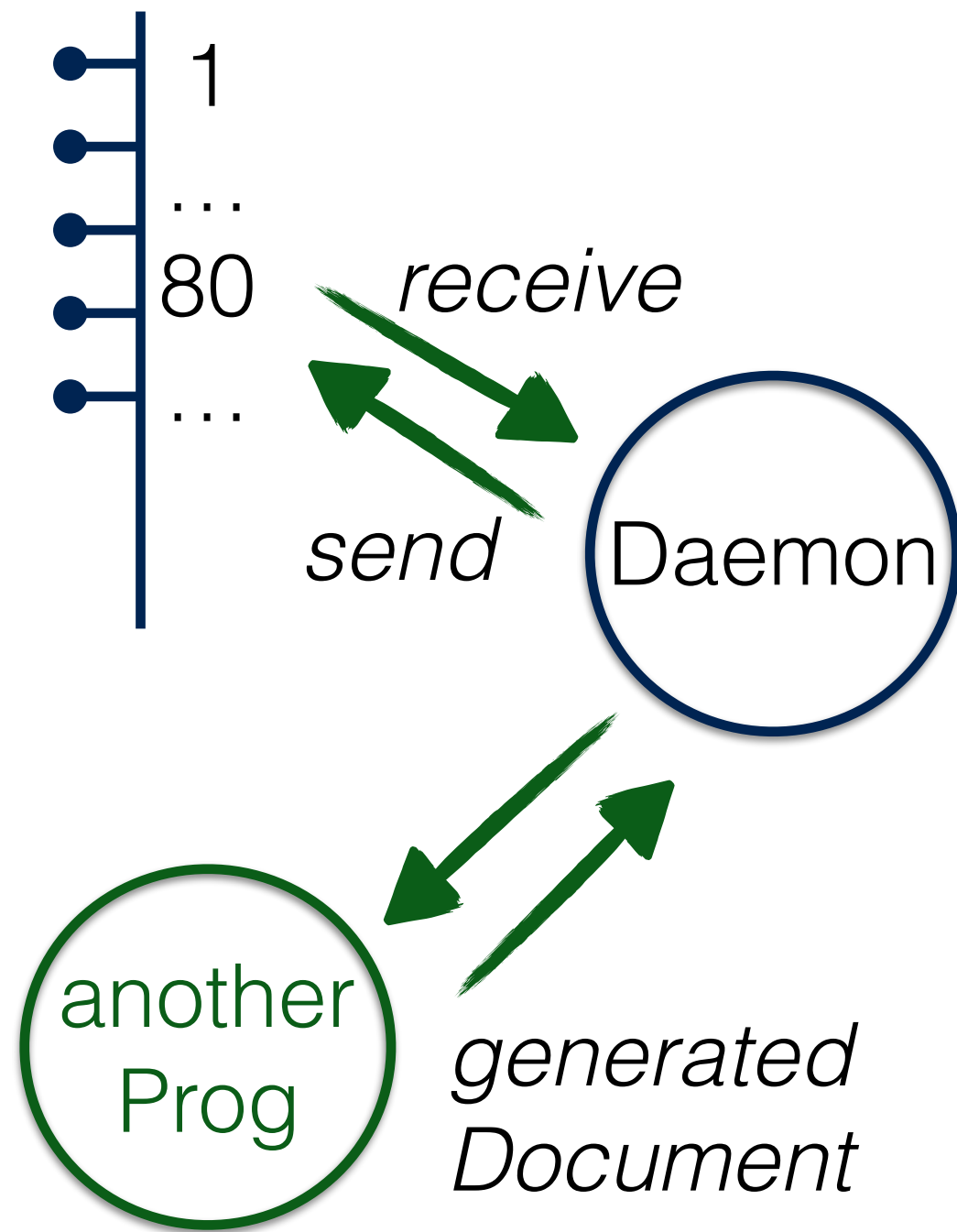
```
...  
do {  
    data = receive(c)  
} while (data not empty)  
resHTTP = HTTPParsing(data)  
if resHTTP.command='GET'  
then {  
    resDocu=anotherProg.specAction  
        (resHTTP)  
    resData=HTTPWrapping(resDocu)  
    send(resData, c)  
}  
close(c)  
}
```

Prog Mapping



URL Mapping

another Prog?



- Here comes the Dynamic Web!
- another Prog = Document Gen Prog
 - ‘Internal’ Program, managed by the Daemon
 - Example: libphp in Apache
 - External Program
 - Examples: python, ruby

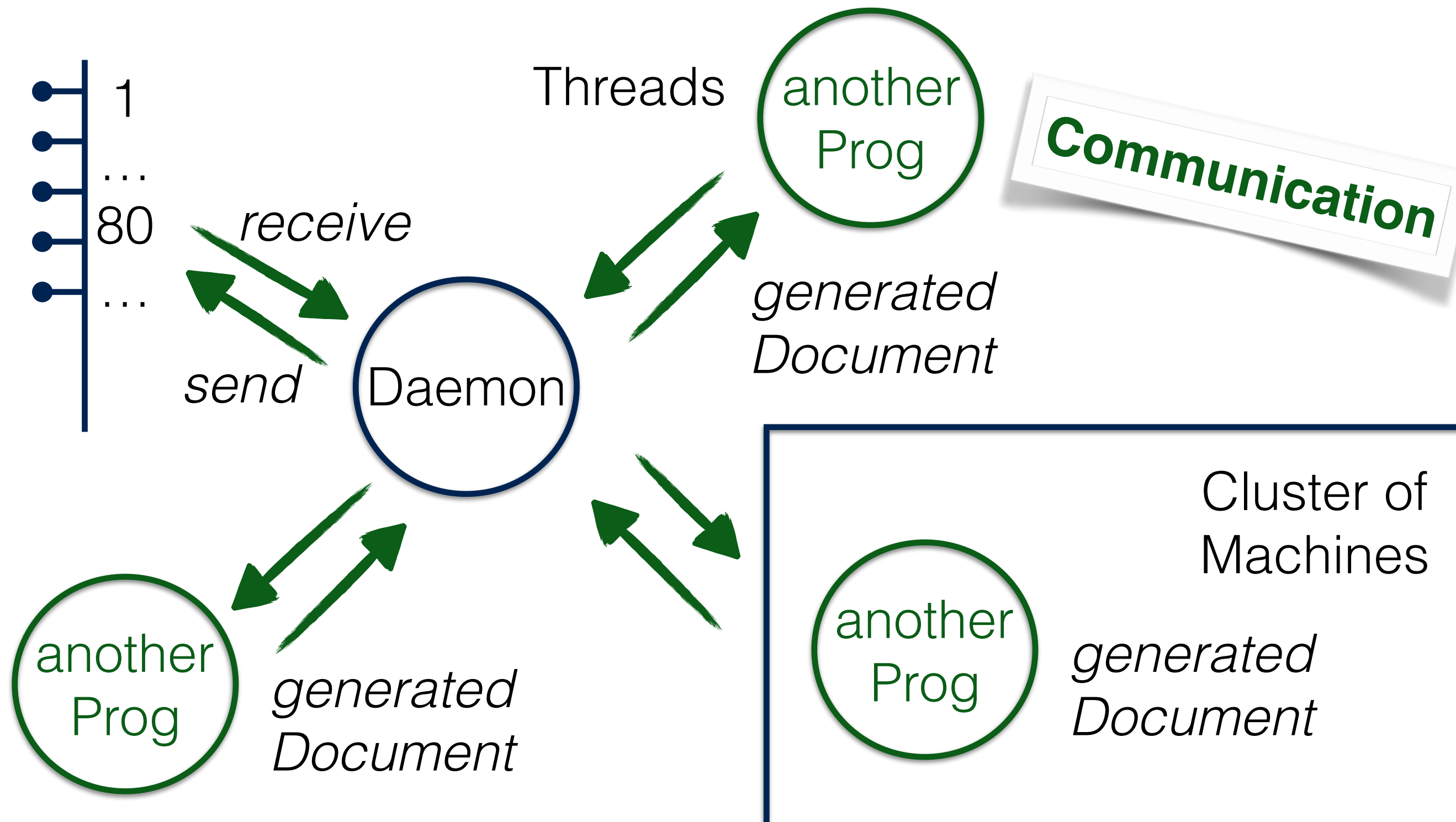
another Prog? where?

- API Communications
 - Internal: function/method calls
 - External, API Socket: RPC
 - Example: load balancing



Communication

another Prog? where?



Document Generation Program Language?

- another Prog = Document Generation Program
- Daemon & Document Generation Program \neq Programming Languages
- Every Programming Language can be used!



C



```
#include <stdio.h>
int main() {
    printf("Content-Type: text/html\r\n\r\n");
    printf("<html> <head>\n");
    printf("<title>Hello, World!</title>\n");
    printf("</head>\n");
    printf("<body>\n");
    printf("<h1>Hello, World!</h1>\n");
    printf("</body> </html>\n");
}
```


Object-Oriented

C++

**Compiled
Language**

```
#include <iostream.h>
using namespace std;
int main() {
    cout << "Content-Type: text/html\r\n\r\n";
    cout << "<html> <head>\n";
    cout << "<title>Hello, World!</title>\n";
    cout << "</head>\n";
    cout << "<body>\n";
    cout << "<h1>Hello, World!</h1>\n";
    cout << "</body> </html>\n";
    return 0;
}
```

Object-Oriented

Embeddable

C#

MSIL inside!

**Compiled
+ Interpreted
Language**

```
class ExampleClass
{
    static void Main()
    {
        System.Console.WriteLine("Hello, world!");
    }
}
```

Embeddable

Object-Oriented

Java

bytecode inside!

Compiled
+ Interpreted
Language

```
class HelloTest {  
    public static void main(String[] args) {  
        System.out.println("Content-type: text/html\n");  
        System.out.println("Hello World!"); //Display the string.  
    }  
}
```

Fastidious Programming Languages?

- Quit annoying to compile everything!
- Difficult to test / debug Web Applications!

ASP

(Active Server Pages)

Data+Code Mix!

**Interpreted
Language**

```
<html>  
<body>
```

```
<%  
dim name  
name="Donald Duck"  
response.write("My name is: " & name)  
%>
```

```
</body>  
</html>
```

PHP

Data+Code Mix!

**Interpreted
Language**

```
<!DOCTYPE html>
<html>
  <head>
    <title>PHP Hello World</title>
  </head>
  <body>
    <?php echo "hello world"; ?>
  </body>
</html>
```

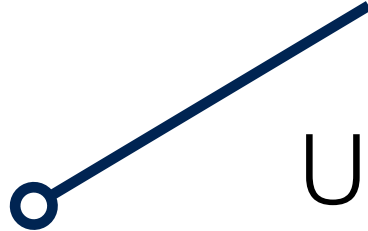
PHP

Data+Code Mix!

**Interpreted
Language**

```
<!DOCTYPE html>
<html>
  <head>
    <title>PHP Hello World</title>
  </head>
  <body>
    <?php
      if(isset($_GET['showHtml']))
      {
        ?>
        <h1>The GET variable showHtml is set.</h1>
        <?php
      }
      ?>
  </body>
</html>
```

Session
Variables /
URL Parameters



Fastidious Programming Languages?

- Quit annoying to write everything by hand to stdout!
- Existing HTTP / WEB API in the programming languages ?


```
import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;
```

```
// Extend HttpServlet class
public class HelloWorld extends HttpServlet {
```

```
    private String message;
```

```
    public void init() throws ServletException
    {
        // Do required initialization
        message = "Hello World";
    }
```

```
    public void doGet(HttpServletRequest request,
                       HttpServletResponse response)
                       throws ServletException, IOException
```

```
    {
        // Set response content type
        response.setContentType("text/html");

        // Actual logic goes here.
        PrintWriter out = response.getWriter();
        out.println("<h1>" + message + "</h1>");
    }
```

```
    public void destroy()
    {
        // do nothing.
    }
}
```

Java

Java Servlet
(JSP)

Handle HTTP
Commands

Fastidious Programming Languages?

- A bit verbose, isn't it?
- Easiest API?
- Why not even move to complete external framework?

Perl

Script language

**Interpreted
Language**

```
#!/usr/bin/env perl  
use Dancer;  
get '/' => sub  
{  
    "Hello World!"  
};  
dance;
```

Easy URL
Mapping

Dancer
Framework

Javascript

Script language

Embeddable

**Interpreted
Language**

node-router module

```
// Load the node-router library by creationix  
var server = require('node-router').getServer();
```

```
// Configure our HTTP server to respond with Hello World  
the root request  
server.get("/", function (request, response) {  
    response.simpleText(200, "Hello World!");  
});
```

```
// Listen on port 8080 on localhost  
server.listen(8000, "localhost");
```

Easy URL
Mapping

Object-Oriented

Python

**Interpreted
Language**

```
from flask import Flask  
app = Flask(__name__)
```

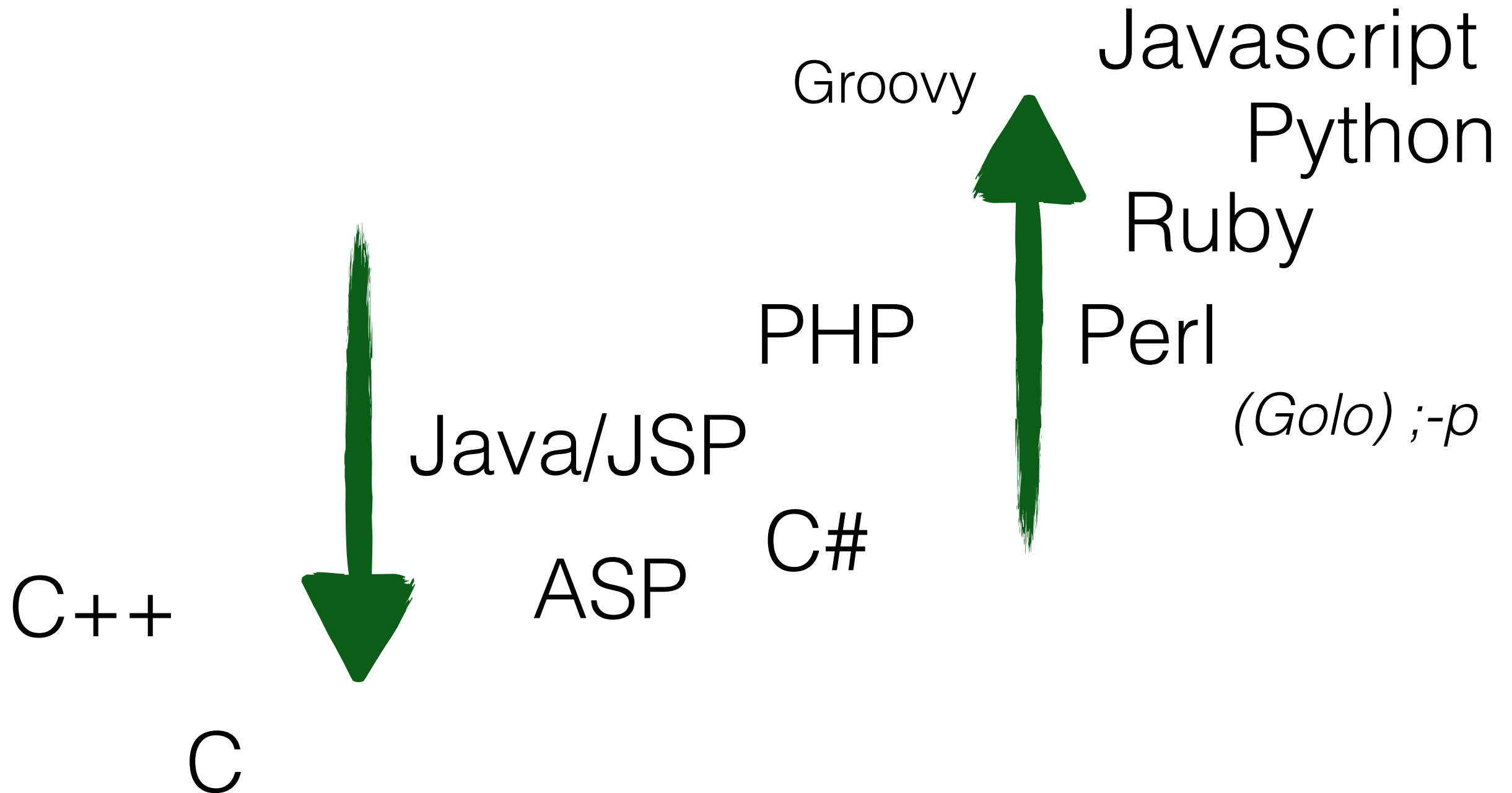
```
@app.route('/')  
def hey():  
    return 'Coucou !'
```

```
if __name__ == '__main__':  
    app.run(debug=True)
```

Flask
Framework

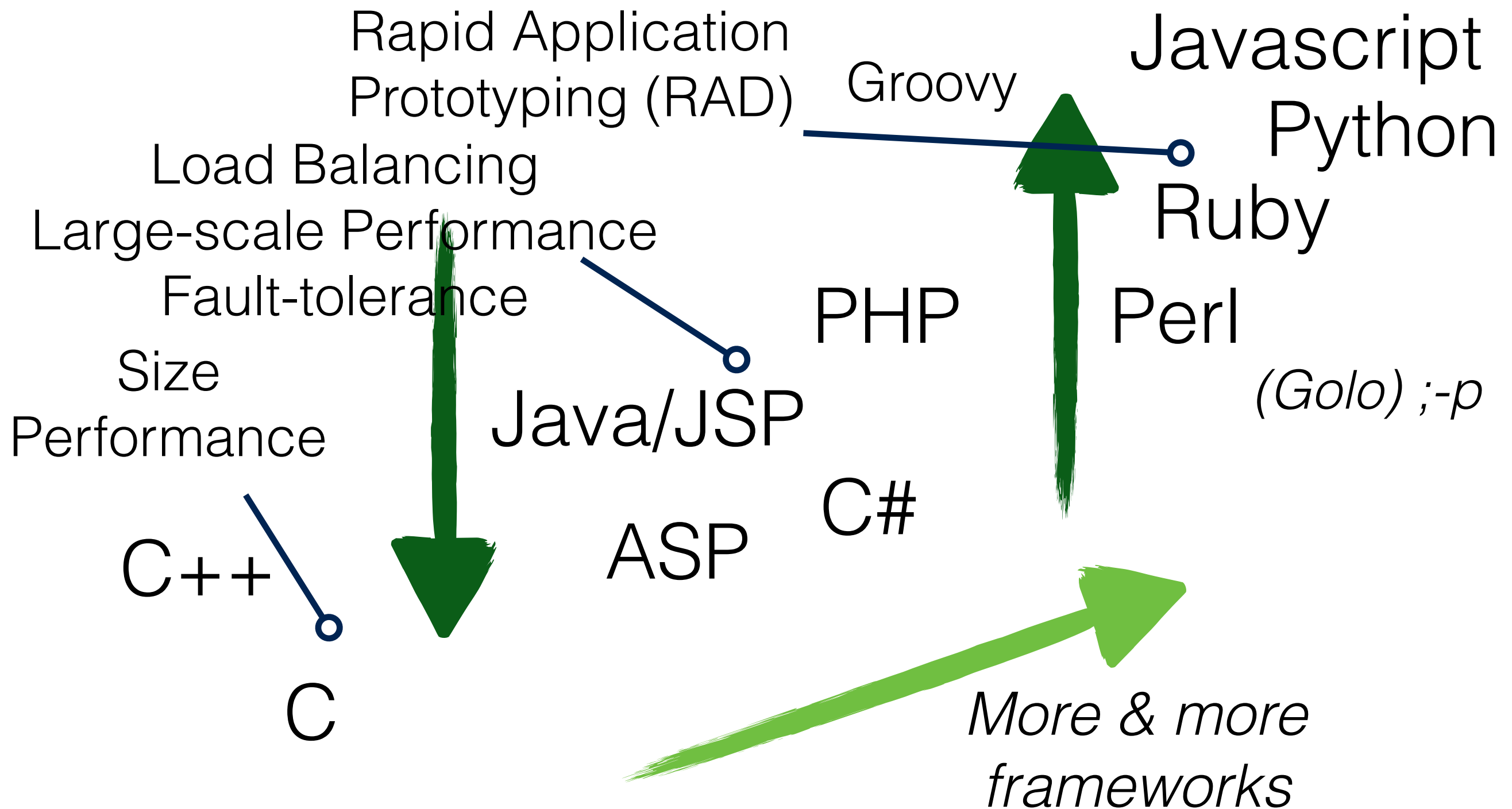
Easy URL
Mapping

Popular Web Programming Languages



Web Prog Languages

No good, no Bad



Webography

- TIOBE index
- http://www.tiobe.com/tiobe_index?page=index