Spring School on Integrated Operational Problems

May 14-16, 2018, Troyes, France

PLAN

1rst session

Introduction (15-30 minutes)

C++ (1 hour)
- The Clarke and Wright algorithm
- Modifying the CAW and testing it
- Adding your own strategy to the CAW
- How to debug ?

2nd session

JSON (30 minutes)
- Understanding the role of the JSON files
- Adding two new algorithms to the CAW

PHP (30 minutes)
- Adding a new problem to the web-site

Conclusion will be yours !

Pierre Bomel & Marc Sevaux
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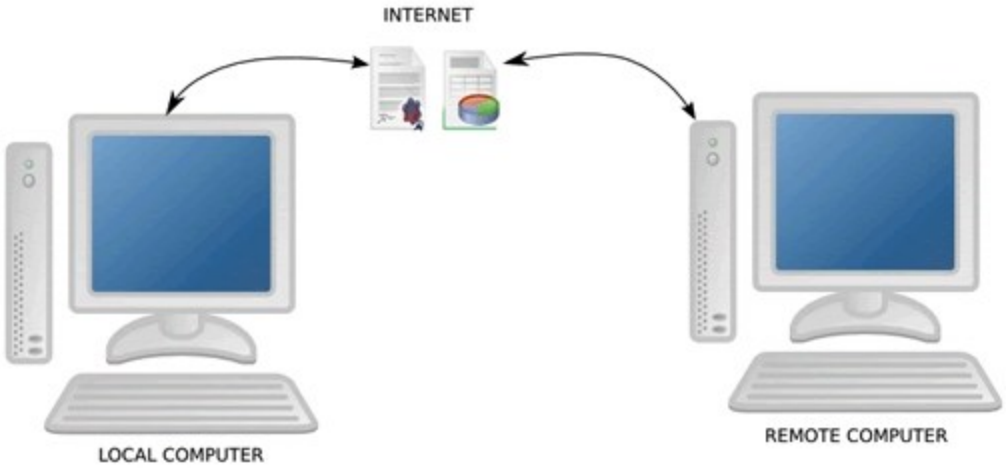
Introduction
What is a web service for operational problems ?

What is a web-service ?

This is an Internet-based remote computing service.

This is a client/server application,
The client does RPCs which means "remote procedure calls".



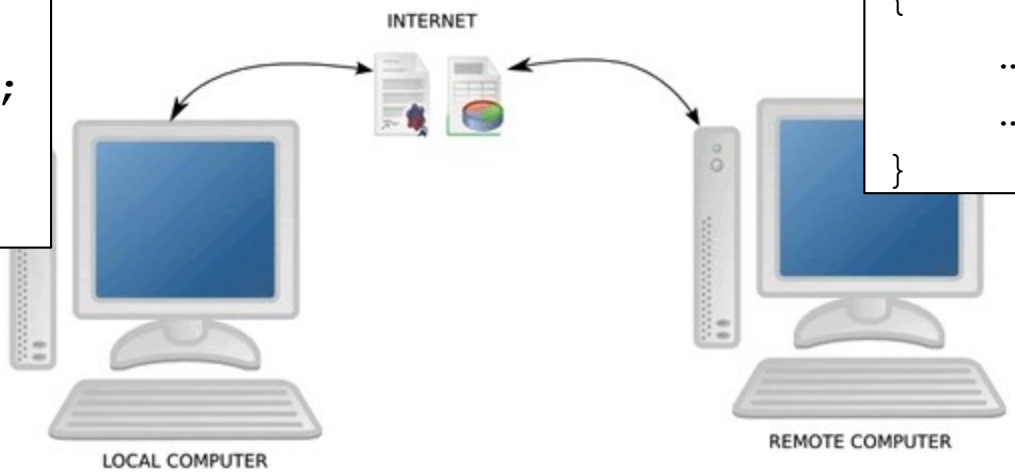
There a client

and a server.

What is a web-service ?

With the "magic of Internet", a service is executed at a given IP address, which can be any (even the computer where the client resides = localhost).

```
function A()
{
     …
     B(params);
     …
}
```




```
function B(params)
{
     …
     …
}
```

There a client
Client IP

and a server
Server IP

What is a web-service ?

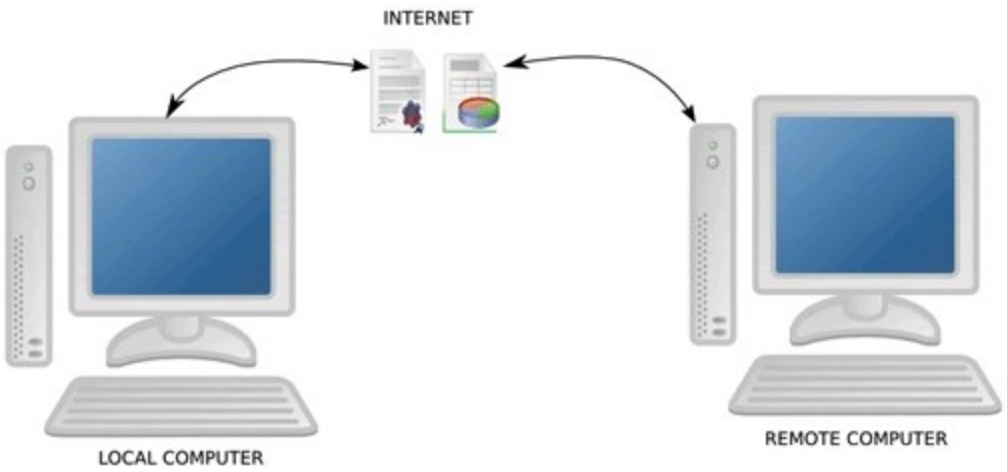
```
// the caller
function A()
{
     …
     call B()
     at serverIP
     with IO params
     …
}
```

```
// the callee
function B(params)// the service
{
     …
     …
}
main() // the server
{    for(;;) {
        wait for call (on a port number)
        get functionID
        switch (functionID)
            case functionB:
               get params of B
               call B()
               send results to caller
               break
            case ...
               …
}    }
```

What is a web-service ?

You already know and use a lot of such services

FTP
email
ping
web surfing
...



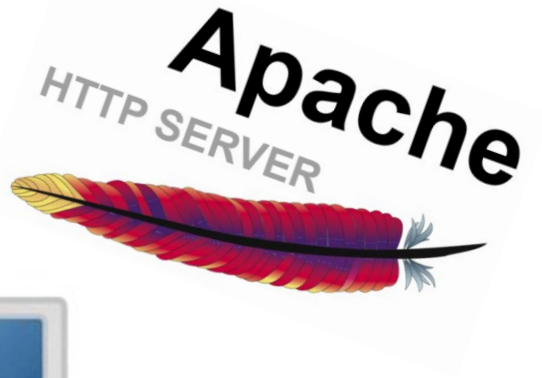
ftpd
mail servers
ping server
HTTP server
...

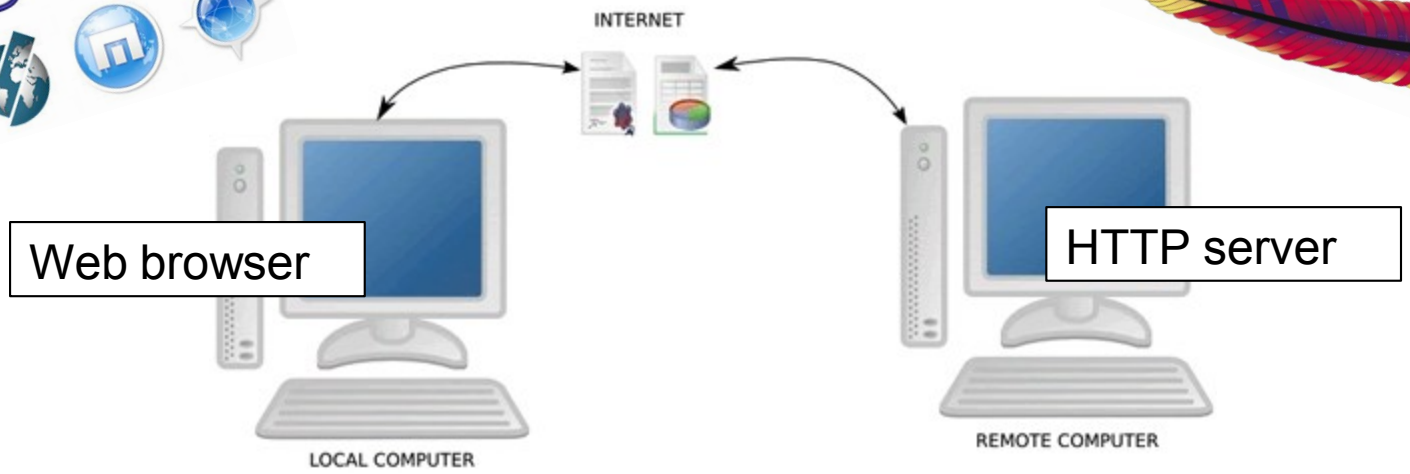
There a client

and a server.

What is a web-service ?

To work, a web-service ABSOLUTELY NEEDS
a server → a HTTP server
and a client → a web browser

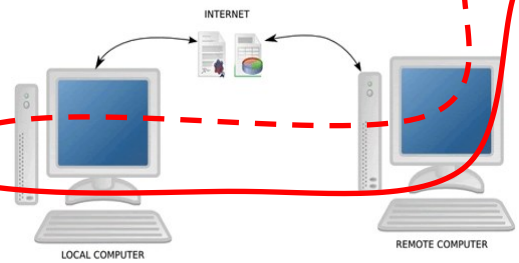


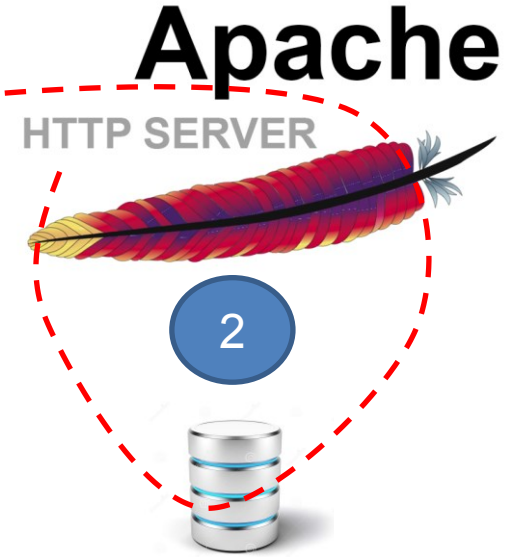


What is web-specific ?
URL, HTTP and HTML

1

URL = http://labsticc.univ-ubs.fr/WS4RP

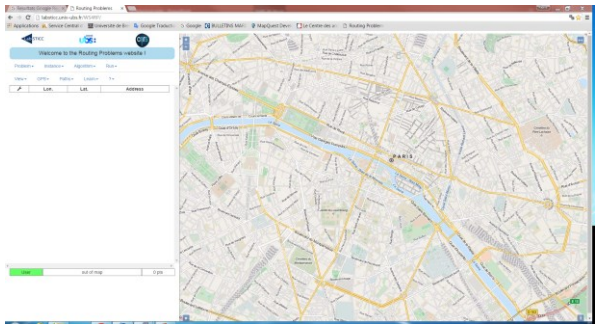




2

3

index.html



/var/www/html/RPWS/index.html

URL ?
Uniform Resource Locator

Path = WS4RP
=> Location of service
"inside the private file-system
of the HTTP server"

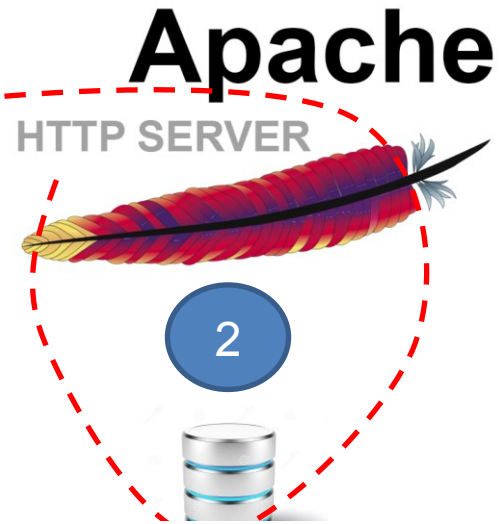
What protocol = HTTP
This is an IP port number

What computer = labsticc.univ-ubs.fr
This is an IP address obtained via the DNS.
DNS(URL) → IP address
DNS is another remote service !!!!

HTTP protocol/server ?

The apache server is a running process on
the remote computer, associated with the HTTP protocol.
Traditionally this is a process listening at port 80

It has been configured to map the "user's path" = WS4RP
to a file system local path = /var/www/html/RPWS

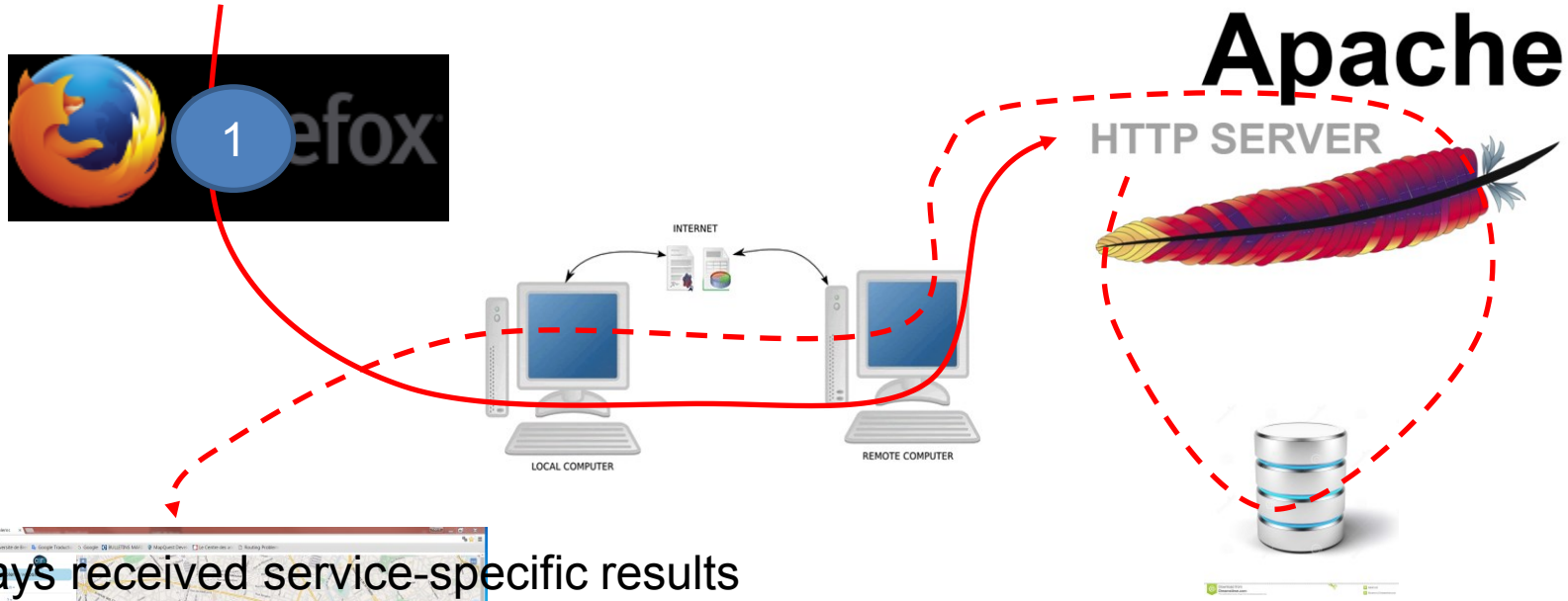


When called by a browser, it searches
for an index.html file.
If found, it sends it back to the browser
that will interpret its content.

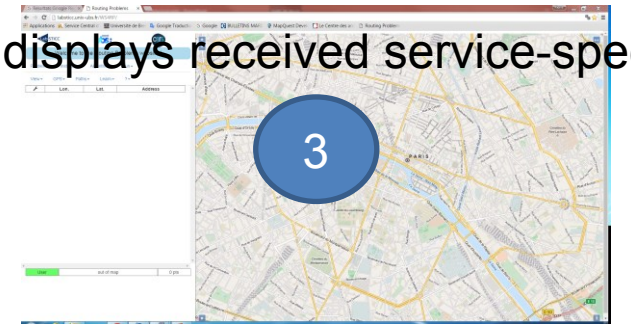
The browser interprets the
index.html
There is javascript (code)
and CSS (look and feel)
embedded into the HTML file.

What does the javascript at client side ?

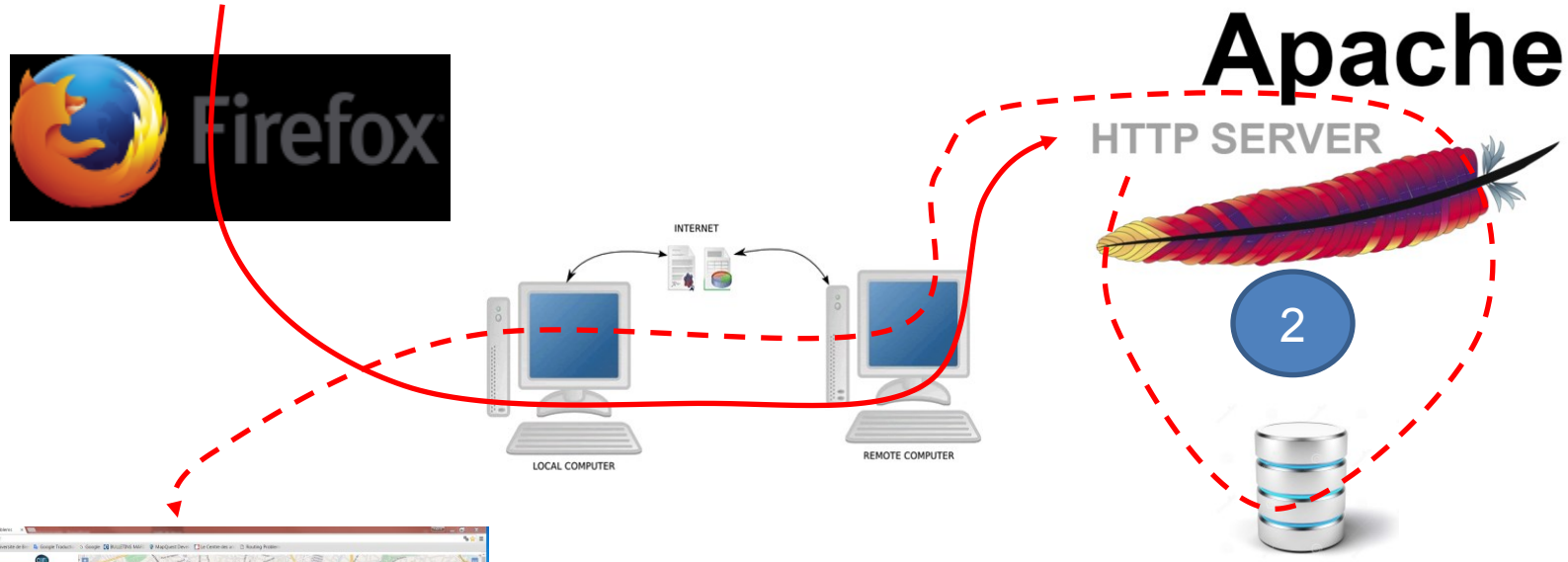
It collects and sends service-specific parameters to the server

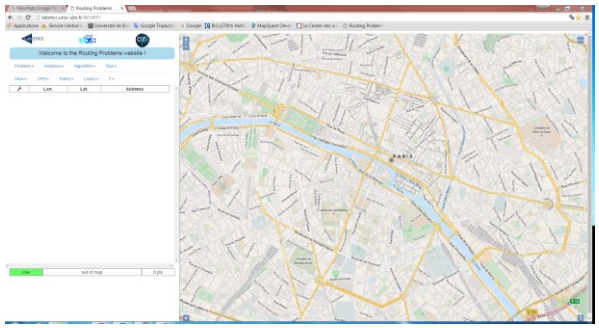


It displays received service-specific results



What happens on the server side again ?





PHP: receive call + params
& convert network data to program data

Call C++ (or any programing langage)
Algorithm.

Let's sum up
What shall we do and where ?

```
// the caller
function A()
{
```

localhost

CUSTOMIZE ! (json)

```
//                    lee
f                    ams) // the service
}
main() // the server
{    for(;;) {
        wait for call
        get functionID
        swi          (functionID)
                                    aller
            case ...
                …
}    }
```

CODE ! (php, c++)

USE and "forget"

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