Ocsigen

Web applications with Js_of_ocaml and Eliom

Vincent Balat

OUPS meetup — 8 july 2014

The project

created in 2004, more than 200 000 l.o.c., LGPL

People:

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AGENCE NATIONALE DE LA RECHERCHE ANR

IRILL

Inria INVENTEURS DU MONDE NUMÉRIQUE

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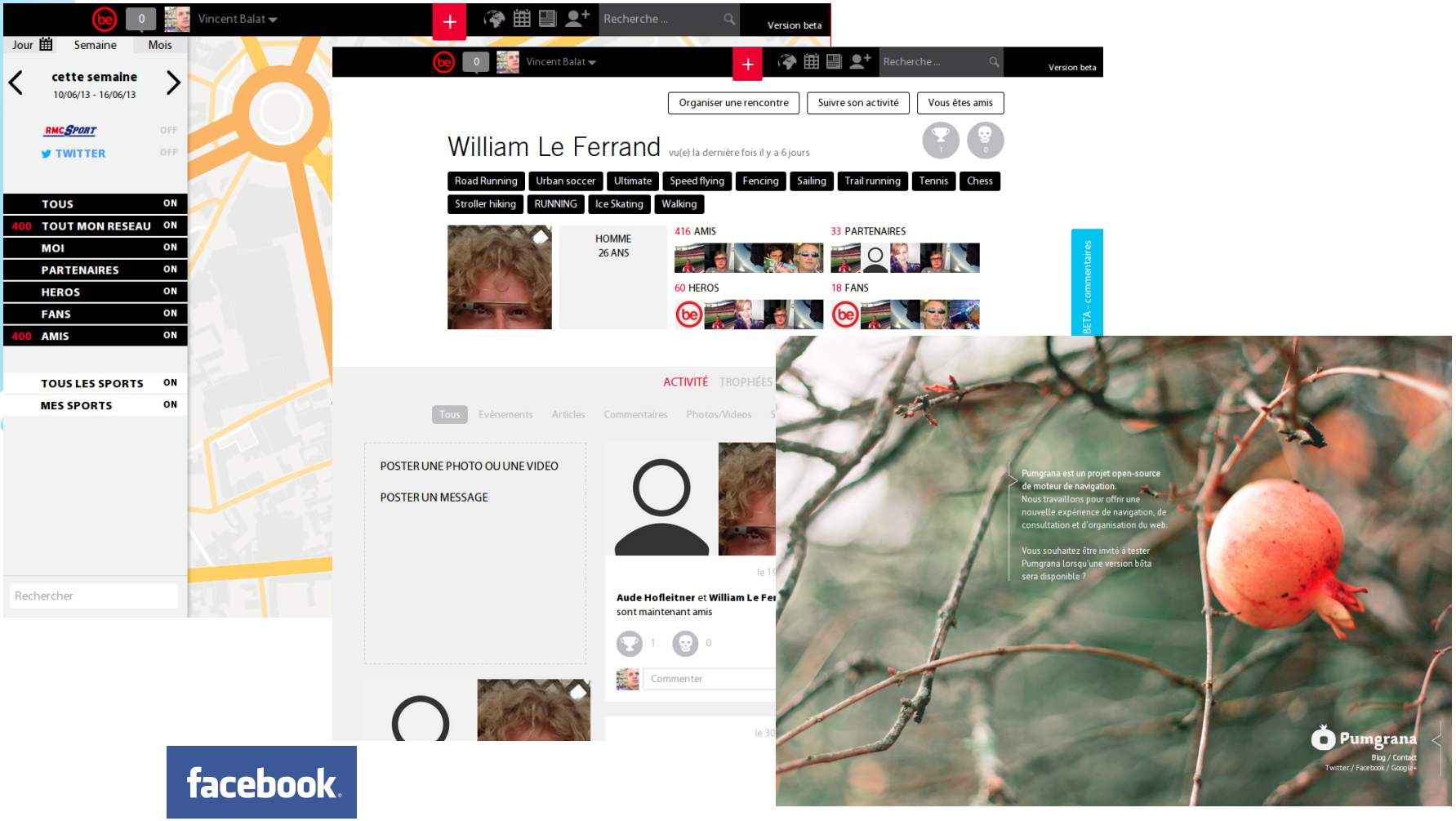
Users



Some companies and open source projects:

BeSport, NYU CGSB Genomics Core, Pumgrana, Facebook, Life.tl, Ashima Arts, Metaweb/Freebase, Hypios, Ocamlcore, Ocamlpro, Baoug, Nleyten...

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Some of our projects

ocsigen eliom

More information

Write client/server Web applications in very few lines of OCaml code!

ocsigen js_of_ocaml

More information

An OCaml to Javascript compiler.

ocsigen lwt

More information

A cooperative threading library for OCaml.

ocsigen server

More information

A full-featured and extensible Web server.

> And many other projects ...

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What for?

Static Web sites

Dynamic Web sites (server only)

Browser apps (client only)

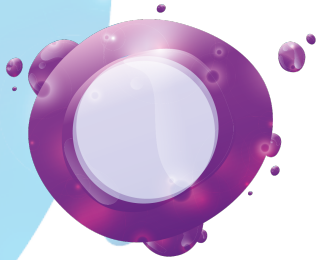
Web apps (client-server)

Mobile apps (HTML5 based)

1

Running OCaml programs in a Browser

1 Running OCaml programs in a Browser



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js_of_ocaml

A compiler that translates OCaml to JS

1 Running OCaml programs in a Browser

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js_of_ocaml

A compiler that translates OCaml's bytecode to JS

Any program can be translated

- even if it is using non-open source libraries
- provided it is not using preemptive threads
- provided the external functions are implemented in JS

Interact with JS

- using external functions written in JS
- using unsafe calls
- or type safe calls using a syntax extension:

```
elt##style##background <- Js.string "#45fe65";

Dom_html.document##body##appendChild(elt);
```

To bind a library in type safe manner,
you just need to write the types of all the functions/objects you need.

Typing HTML

```
html
  (head (title (pcdata "Typing html")) [])
  (body [h1 [pcdata "Non-valid page"];
         p [p [pcdata "a paragraph in a paragraph"]]]))))
```

Typing HTML

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  (head (title (pcdata "Typing html")) [])
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        p [p [pcdata "a paragraph in a paragraph"]]]))
```

```
Error: This expression has type
         ([> Html5_types.p ] as 'a) Eliom_content.Html5.F.elt
       but an expression was expected of type
         ([< Html5_types.p_content_fun ] as 'b) Eliom_content.Html5.F.elt
       Type 'a = [> `P ] is not compatible with type
         'b =
           [< `A of Html5_types.phrasing_without_interactive
            | `Abbr
            | `Audio of Html5_types.phrasing_without_media
            | `Audio_interactive of Html5_types.phrasing_without_media
            | `B
            ...
           ]
```

Services

Raw HTML links:

```
Raw.a ~href:"http://desertsuperstar.tumblr.com/page/8"
      [pcdata "Click"]
```

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Links using *services*:

```
let myservice = Eliom_service.Http.external_service
                ~prefix:"http://desertsuperstar.tumblr.com"
                ~path:["page";""]
                ~get_params:(suffix (int "num"))
                ()

... a ~service:myservice [pcdata "Click"] 4
```

Services

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... a ~service:myservice [pcdata "Click"] 4
```

Typing of links and forms

Writing services in OCaml

```
let myservice2 =
  Eliom_registration.Html_text.register_service
    ~path:["aaa"; "bbb"]
    ~get_params:Eliom_parameter.any
    (fun params () ->
       Lwt.return "<html>
                     <head><title>A</title></head>
                     <body>B</body>
                   </html>")
```

Writing services in OCaml

```
let myservice2 =
  Eliom_registration.Html5.register_service
    ~path:["aaa"; "bbb"]
    ~get_params:Eliom_parameter.any
    (fun params () ->
       Lwt.return (html (head ...) (body [...])))
```

Writing services in OCaml

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Services may return:

HTML, Files, Redirections Actions, Applications, JSON, etc.

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→ **See tutorial *"Writing a RESTful app with Eliom"***

NEW! (contribution by Domoco)

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Client-server communication

Syntax %v makes possible to use on *client side* a value v defined on *server side*.

The value is send together with the page.

```
let s = "hello"
```

```
p [pcdata %s]
```

6 Client-server communication

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If f is a server side function, calling %f will do a remote procedure call.

```
let f l = List.map succ l
```

```
... match %f [1; 2; 3] with [] -> ...
```

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... match %f [1; 2; 3] with [] -> ...
```

Function f must be exported explicitely:

```
let f = server_function Json.t<int list> f
```

Client and server sections

```
{server{

  let myservice = ...

}}
{client{

  ... a ~service:%myservice [pcdata "Click"] ()

}}
```

Client and server sections

```
{shared{

  type toto = ...

}}
{server{

  let myservice = ...

}}
{client{

  ... a ~service:%myservice [pcdata "Click"] ()

}}
```

Client values

```
let mybutton s =
  let d = div [pcdata "click"] in
  let _ =
    {{ Lwt_js_events.clicks %d
         (fun ev ->
            Dom_html.window##alert(Js.string s))
    }}
  in
  d
```

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→ Makes possible to generate pages from server side

(good for indexing by search engines)

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In a shared section you can call the function from server or client sides according to your needs

8 Client values

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  d
```

In a shared section you can call the function from server or client sides according to your needs

→ See tutorial *"Client-server widgets"*

Client values

```
{server{

  let client_fun = {{ fun x -> x+1 }}

}}
{client{
        ... %client_fun 3 ...
}}
```

Other features

- Service identification mechanism
- Advanced sessions, with scope (browser, tab, user …)
- Bidirectional client-server communication
- Client-server reactive pages NEW! **(contribution by Besport)**
- …

Documentation

The starting point: `ocsigen.org/tuto/`

- A short tutorial for writing client-server page widgets
- A short tutorial for sending basic untyped pages
- Tutorial: write a collaborative drawing application in 80 lines
- Tutorial: write a RESTful API using Eliom
- …

+ manual and API documentation for each project