Developing and Integrating WebSharper Applications with Facebook

http://www.intellifactory.com
sales@intellifactory.com

About me

3x F# MVP – 2010, 2011, 2012
(Most Valuable Professional)

Coauthor of **4 F# books**, 3 of them with Don Syme, the designer of F#

CEO of IntelliFactory,
The F# Company

Regular **speaker** in numerous conferences and developer workshops

Steering Committee member of the Commercial Users of Functional Programming (CUFP) workshop, representing F#

F# Books I coauthored

Expert F# - 2007

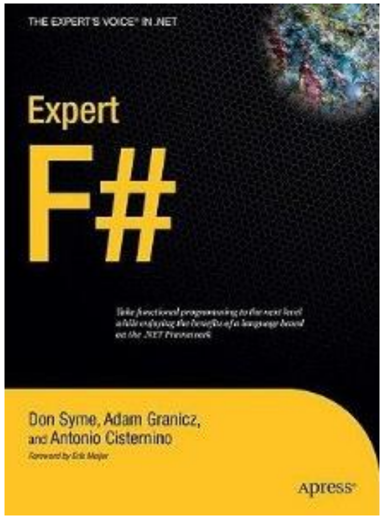
Expert F# 2.0 – 2010

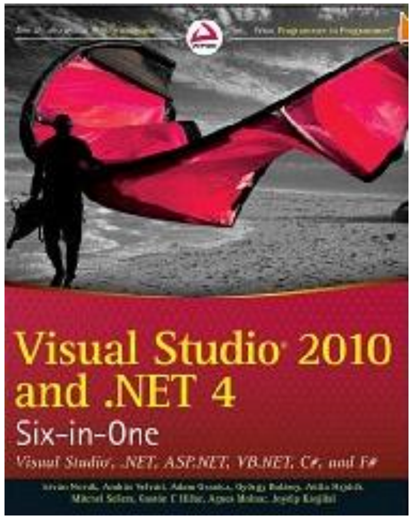
Visual Studio 2010 and .NET 4 Six-in-One – 2010

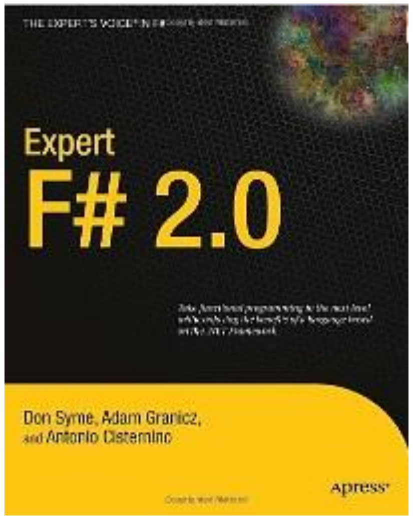
Expert F# 3.0 – 2012

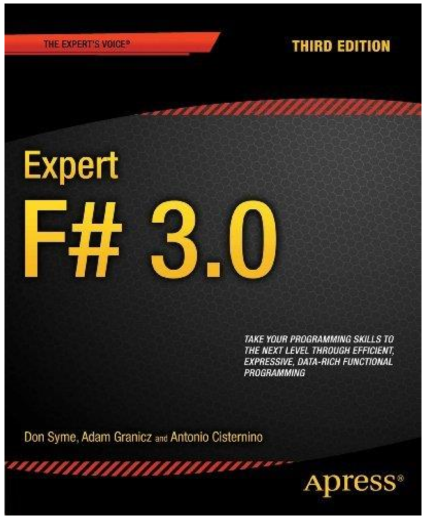
More publications at

`http://intellifactory.com/publications.aspx`


THE EXPERT'S VOICE® IN .NET
Expert
F#
Don Syme, Adam Granicz, and Antonio Cisternino
Apress®


Visual Studio 2010 and .NET 4
Six-in-One
Visual Studio, .NET, ASP.NET, VB.NET, C#, and F#




THE EXPERT'S VOICE®
THIRD EDITION
Expert
F# 3.0
TAKE YOUR PROGRAMMING SKILLS TO THE NEXT LEVEL THROUGH EFFICIENT, EXPRESSIVE, DATA-RICH FUNCTIONAL PROGRAMMING
Don Syme, Adam Granicz and Antonio Cisternino
Apress®

IntelliFactory – The F# Company

First F# consultancy worldwide, founded in 2004

We do **research** and **product development**

Development in F# - we built up **significant expertise** in 100+ projects

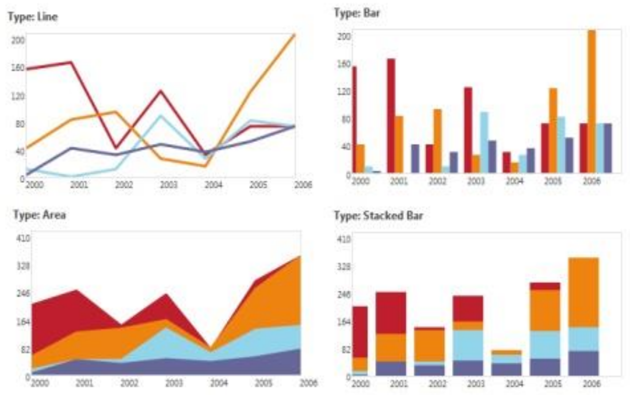
Combining creative ideas and cutting edge research

Agile processes, **mature development practices**

Emphasis on **quick prototyping** and **getting things done**

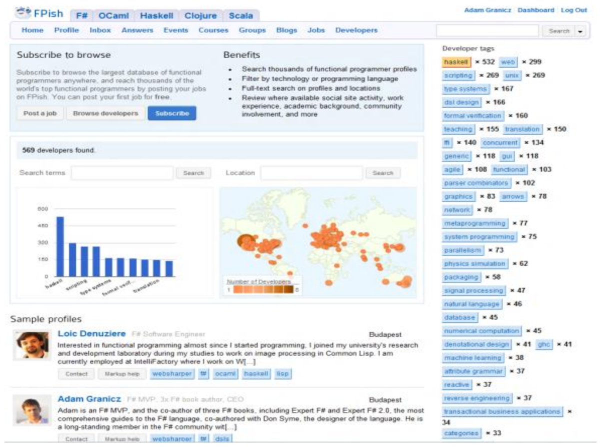
WebSharper

- **Mature, enterprise-ready framework**
- Write **all your server+client code in F#**
- Get a **complete web or mobile application**
- Interface with **any** client-side JS library via F#
- **Powerful functional abstractions**
- **Automatic** resource management
- **Safe URLs**, type-safe URLs
- and much-much more…



Develop applications with

Less code - 50-90% less
Quicker to develop – on average we find 2-3x
Easier to maintain – Significant $$ savings



Subscribe to browse

Subscribe to browse the largest database of functional programmers anywhere, and reach thousands of the world's top functional programmers by posting your jobs on FPish. You can post your first job for free.

Post a job | Browse developers | Subscribe

Benefits

- Search thousands of functional programmer profiles
- Filter by technology or programming language
- Full-text search on profiles and locations
- Review where available social site activity, work experience, academic background, community involvement, and more

569 developers found.

Search terms [ ] Search   Location [ ] Search

Number of Developers 1 … 8

Sample profiles

Loic Denuziere F# Software Engineer — Budapest
Interested in functional programming almost since I started programming. I joined my university's research and development laboratory during my studies to work on image processing in Common Lisp. I am currently employed at IntelliFactory where I work on W[...]
Contact | Markup help | websharper | f# | ocaml | haskell | lisp

Adam Granicz F# MVP, 3x F# book author, CEO — Budapest
Adam is an F# MVP, and the co-author of three F# books, including Expert F# and Expert F# 2.0, the most comprehensive guides to the F# language, co-authored with Don Syme, the designer of the language. He is a long-standing member in the F# community wit[...]
Contact | Markup help | websharper | f# | dsls

Developer tags

haskell × 532, web × 299, scripting × 269, unix × 269, type systems × 167, dsl design × 166, formal verification × 160, teaching × 155, translation × 150, ffi × 140, concurrent × 134, generic × 118, gui × 118, agile × 108, functional × 103, parser combinators × 102, graphics × 83, arrows × 78, network × 78, metaprogramming × 77, system programming × 75, parallelism × 73, physics simulation × 62, packaging × 58, signal processing × 47, natural language × 46, database × 45, numerical computation × 45, denotational design × 41, ghc × 41, machine learning × 38, attribute grammar × 37, reactive × 37, reverse engineering × 37, transactional business applications × 34, categories × 33

A quick introduction

WebSharper

… is a web development platform that enables you to:

Program entire web applications in F#

Like "GWT for F#" – write F# instead of JavaScript

Develop, next to ordinary client-server applications, entirely **client-based web applications** (--> HTML5 and mobile)

Develop client-based web applications in F#

HOW?

WebSharper

… is a web development platform that gives you:

- **Nearly the entire F# language**, most notably
  - Data types – unions, tuples, records, lists, seqs, sets, maps, etc.
  - Constructs – pattern matching, active patterns, computation expressions, etc.
- **Using F# StdLibs & many .NET namespaces** -- *easy to extend*
- **Addressing third-party JavaScript libraries** -- *easy to extend*

Uniform, Extensible Development Model

WebSharper

… is a web development platform that gives you:

Powerful abstractions

Pagelets, formlets, flowlets, sitelets

Automatic resource management (CSS, JS, etc.)

Web programming abstractions

WebSharper

… is a web development platform that gives you:

ASP.NET and ASP.NET MVC integration for compatibility

- Via server controls that add client-side functionality

Visual Studio 2008/2010/2012 integration

- Project templates
- Compiler integration
- Single-click deployment

Seamless environment integration

WebSharper Abstractions for the Web

Pagelets

- Dynamic, client-side functionality in F#

Sitelets

- Composable, type safe web applications

Formlets

- Composable, type safe web forms
  - **Dependent** formlets – web forms with element dependencies
  - **Flowlets** – sequences of web forms

Extensions

- Type safe mappings of JavaScript libraries

Slidelets

- Modeling mobile and Windows 8 UIs

Powerful Abstractions - Sitelets

- Type-safe
- Composable
- First-class

Parameterized over a union type:

```
/// Actions that correspond to the different pages in the site.
type Action =
    | Home
    | Contact
    | Protected
    | Login of option<Action>
    | Logout
    | Echo of string
```

WebSharper sitelets – Static templates

Strongly-typed, safe URLs

Skin.xml

Skin.xml.fs

```
...
module Templates =
    module Skin =
        let Skin title   = ...
```

```
let WithTemplate title main : Content<Action> =
        Templates.Skin.Skin (Some title)
            {
                Body = main
                ...
            }
```

WebSharper sitelets – Dynamic templates

Runtime-checked, safe URLs

Main.html

```
module Skin =
    type Page =
        {
            Body : Content.HtmlElement list
        }

    let MainTemplate =
        let path = Path.Combine(__SOURCE_DIRECTORY__, "Main.html")
        Content.Template<Page>(path)
            .With("body", fun x -> x.Body)

    let WithTemplate body : Content<Action> =
        Content.WithTemplate MainTemplate <| fun context ->
            {
                Body = body context
            }
```

WebSharper sitelets – Combinators

Composing web applications from pieces

```
let EntireSite =
    let home = Sitelet.Content ...
    let authenticated = Sitelet.Protect filter <| ...
    let basic = Sitelet.Infer <| fun action -> ...

    Sitelet.Sum
        [
            home
            authenticated
            basic
        ]
```

Powerful abstractions - Formlets

- Type-safe
- Composable
- First-class

Dependent formlets – can express dependencies

Flowlets – provide step-by-step rendering

Layout – via combinators such as

`Formlet.Horizontal` and `Formlet.Vertical`

WebSharper formlets - Example

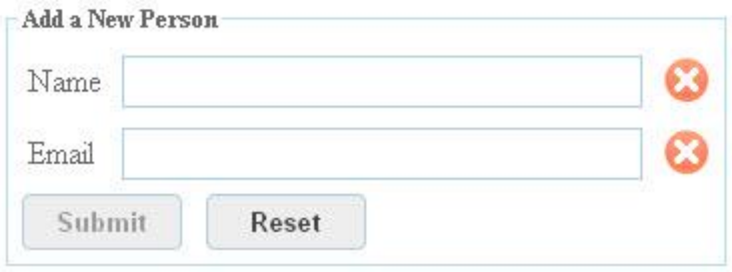
```
let TB label msg =
    Controls.Input ""
    |> Validator.IsNotEmpty msg
    |> Enhance.WithValidationIcon
    |> Enhance.WithTextLabel label
```

General form:

```
Formlet.Yield (fun v1 v2 ... vn -> <compose all vi's>)
<*> formlet1
<*> formlet2
...
<*> formletn
```

WebSharper formlets - Example

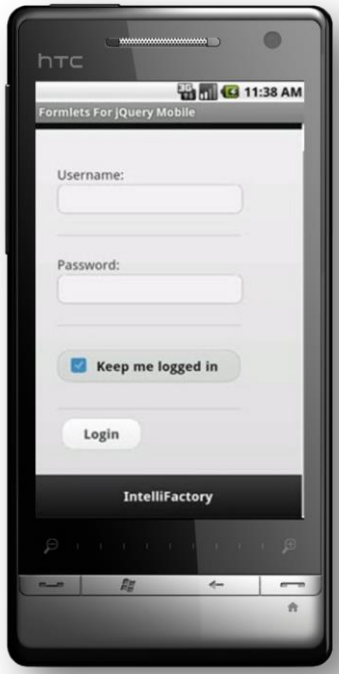
```
type Person = { Name: string; Email: string }

[<JavaScript>]
let PersonFormlet () : Formlet<Person> =
    let nameF = TB "Name" "Empty name not allowed"
    let emailF = TB "Email" "Please enter a valid email address"
    Formlet.Yield (fun name email -> { Name = name; Email = email })
    <*> nameF
    <*> emailF
    |> Enhance.WithSubmitAndResetButtons
    |> Enhance.WithLegend "Add a New Person"
    |> Enhance.WithFormContainer
```



WebSharper formlet - Extensions

Available for various UI control set libraries such as:

- jQuery UI
- Yahoo UI
- Ext JS
- jQuery Mobile



Formlets For jQuery Mobile

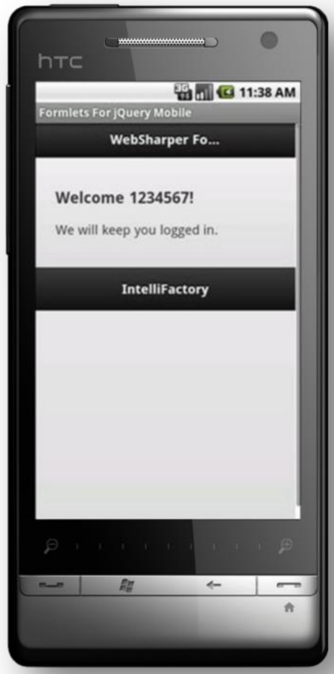
Username:

Password:

Keep me logged in

Login

IntelliFactory



Formlets For jQuery Mobile

WebSharper Fo...

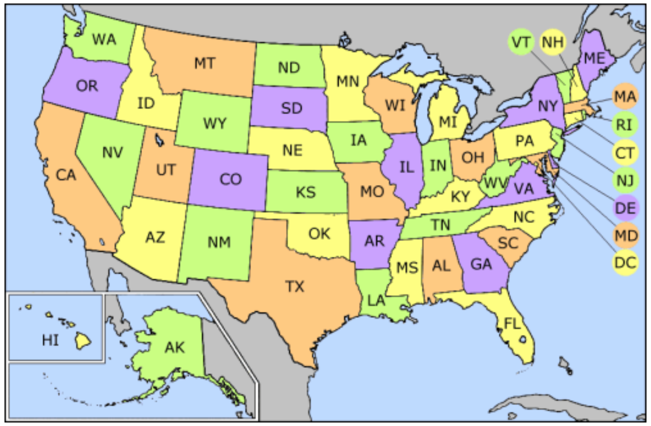
Welcome 1234567!

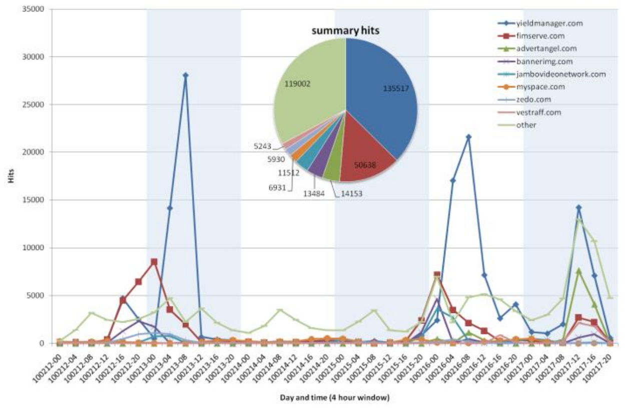
We will keep you logged in.

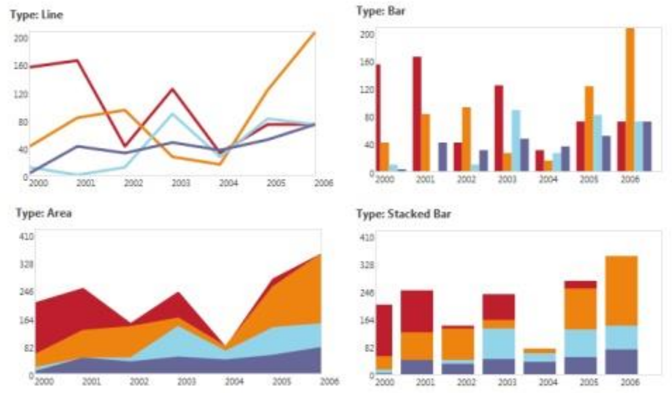
IntelliFactory

Other extensions

- GIS
  - Google Maps
  - Bing Maps
- Visualization
  - Infovis
  - Protovis
  - Google Visualization

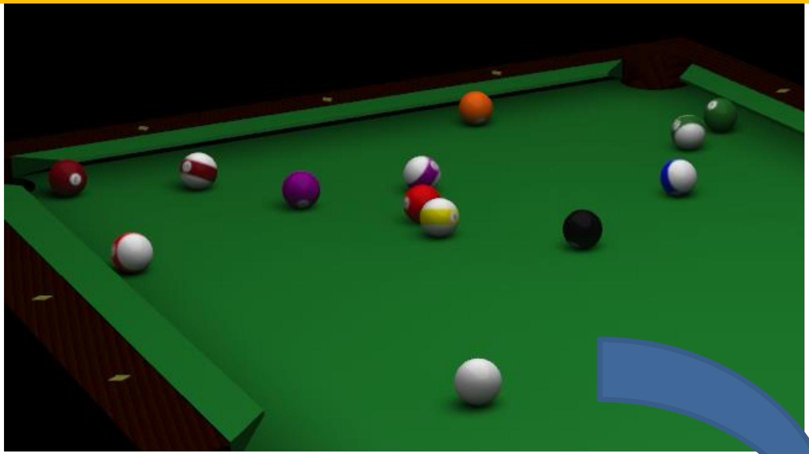






Other extensions

- HTML5
  - WebGL
  - O3D
  - GlMatrix



WebSharper extensions

Dozens of extensions available at:

`http://websharper.com/extensions`

WebSharper Mobile

- Exposes mobile capabilities to JavaScript
- Provides the necessary packaging
- Enables quick and seamless multi-targeting
- Scales into the cloud

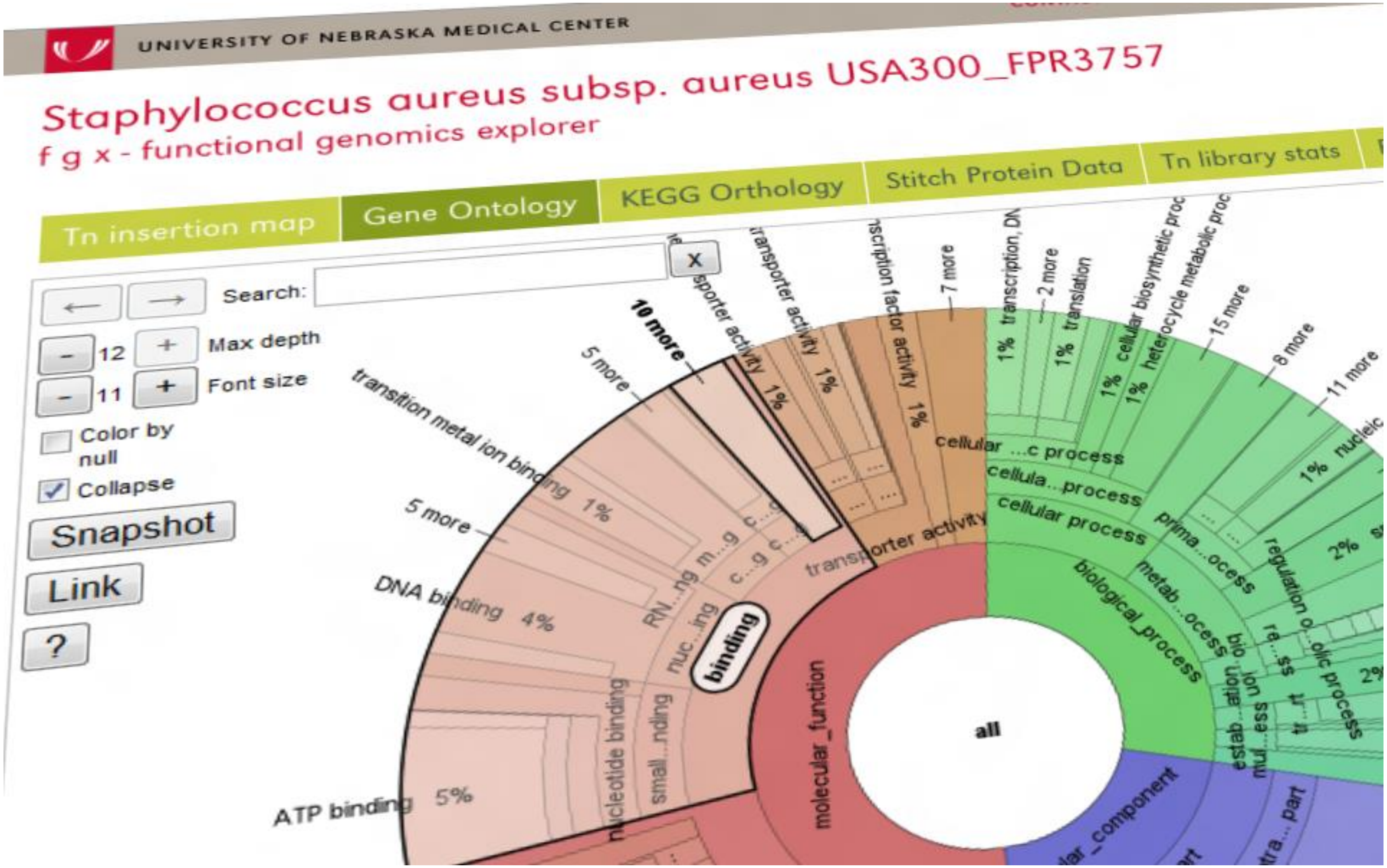
Mobile: Native vs. web

- JavaScript is the IL …
  - of client-side web applications

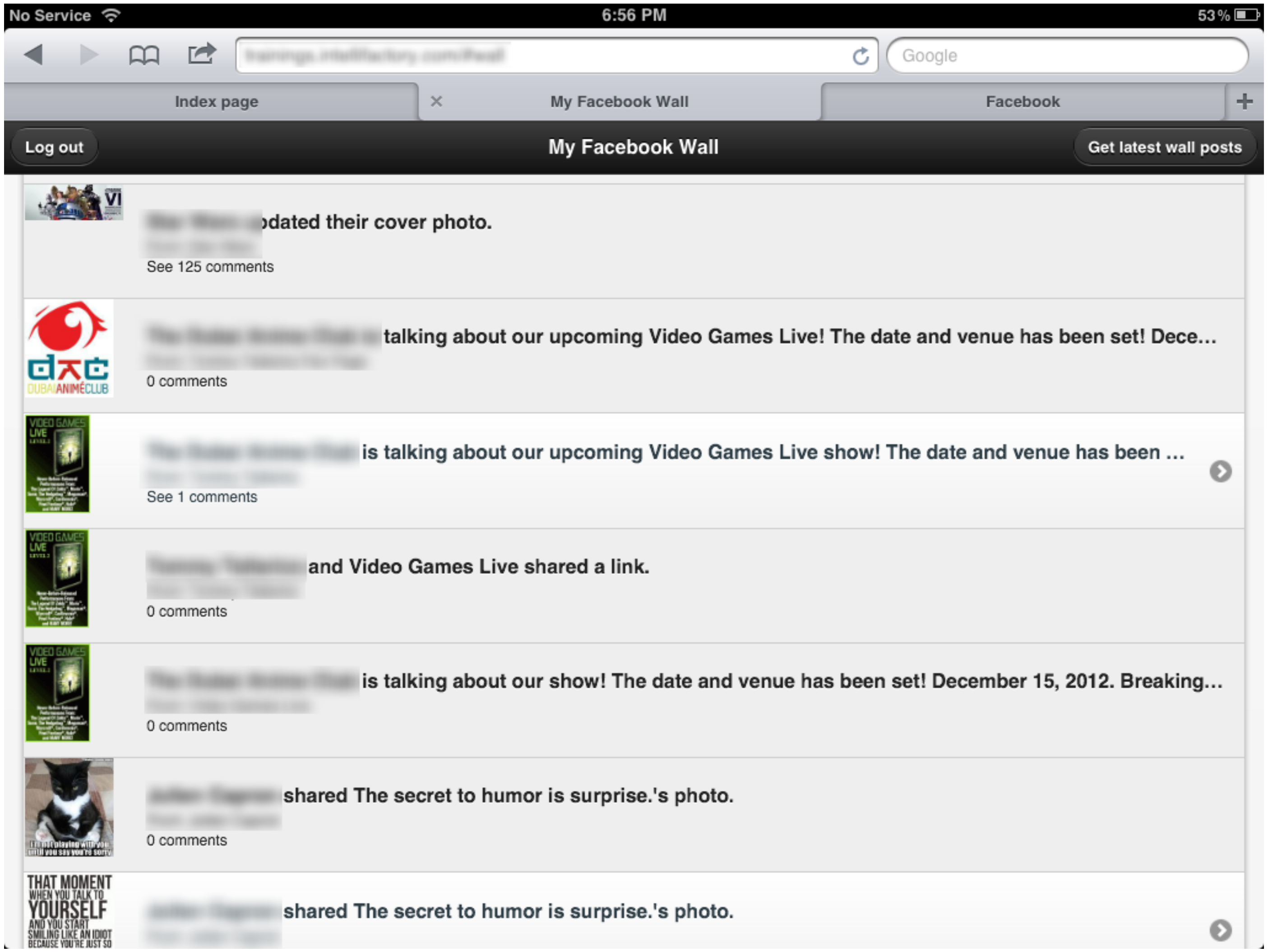
    and is becoming the IL …

  - of desktop applications: Windows 8
  - of mobile applications: Android, WP7, etc.
- Some even write the server side in JavaScript

HTML5 Applications



My Facebook Wall – The Application



Log out | **My Facebook Wall** | Get latest wall posts

[redacted]pdated their cover photo.
[redacted]
See 125 comments

[redacted] talking about our upcoming Video Games Live! The date and venue has been set! Dece...
[redacted]
0 comments

[redacted] is talking about our upcoming Video Games Live show! The date and venue has been ...
[redacted]
See 1 comments

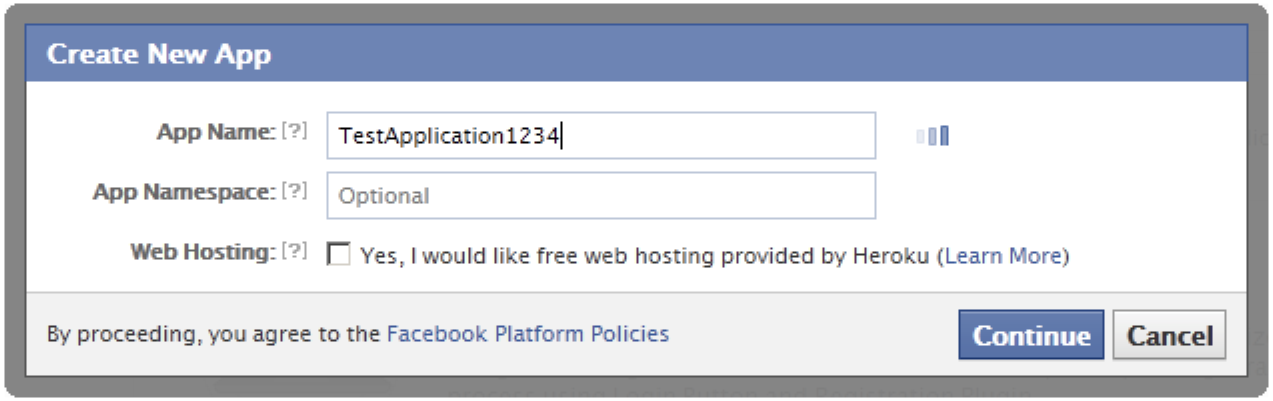
[redacted] and Video Games Live shared a link.
[redacted]
0 comments

[redacted] is talking about our show! The date and venue has been set! December 15, 2012. Breaking...
[redacted]
0 comments

[redacted] shared The secret to humor is surprise.'s photo.
[redacted]
0 comments

[redacted] shared The secret to humor is surprise.'s photo.
[redacted]

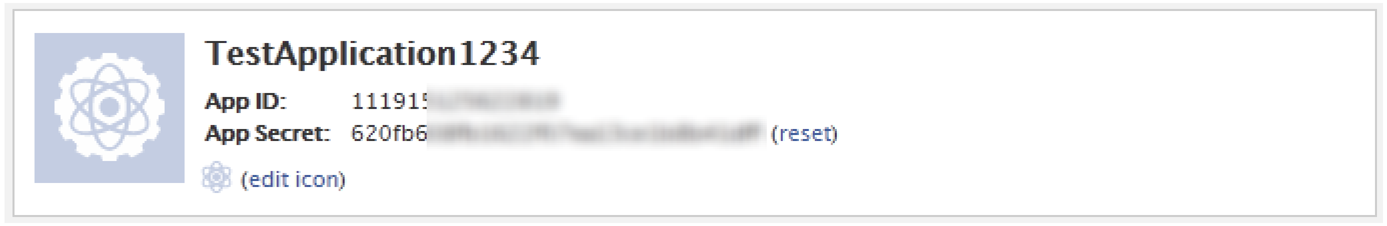
My Facebook Wall – Configuration



Create New App

App Name: [?]	TestApplication1234
App Namespace: [?]	Optional
Web Hosting: [?]	☐ Yes, I would like free web hosting provided by Heroku (Learn More)

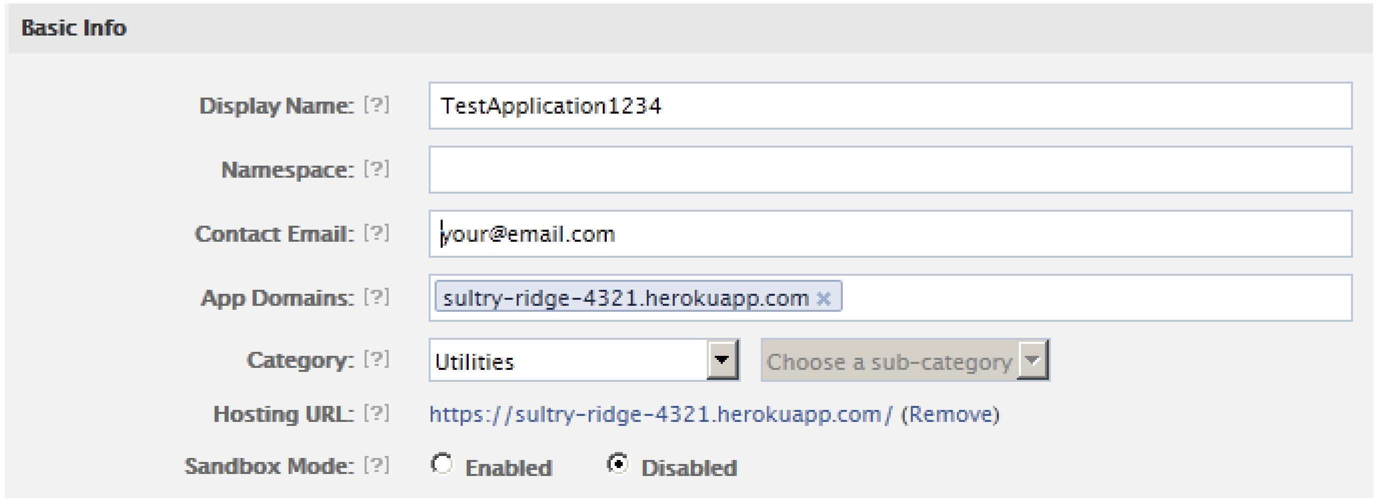
By proceeding, you agree to the Facebook Platform Policies



TestApplication1234

App ID:	11191[redacted]
App Secret:	620fb6[redacted] (reset)

My Facebook Wall – Configuration



Basic Info

Display Name: [?]	TestApplication1234
Namespace: [?]	
Contact Email: [?]	your@email.com
App Domains: [?]	sultry-ridge-4321.herokuapp.com
Category: [?]	Utilities / Choose a sub-category
Hosting URL: [?]	https://sultry-ridge-4321.herokuapp.com/ (Remove)
Sandbox Mode: [?]	Enabled [✓ Disabled]

Binding the Facebook API

```
namespace IntelliFactory.WebSharper.Facebook

module Definition =
    ...
    let FB =
        Class "FB"
        |+> [  ...
               "login" => (LoginResponse ^-> T<unit>) * !?LoginOptions ^-> T<unit>
               "getLoginStatus" => (LoginResponse ^-> T<unit>) ^-> T<unit>
               "api" => T<string>?url * !?T<string>?``method`` * !?T<obj>?options
                           * (T<obj> ^-> T<unit>)?callback ^-> T<unit>
            ]
        |> Requires [Res.FacebookAPI]

    let Assembly =
        Assembly [
            Namespace "IntelliFactory.WebSharper.Facebook" [
                ...; FB
            ] ...
        ]
```

Binding the Facebook API

Defining resources

Resources are annotated on code units and their use is automatically tracked.

```
module Definition =
    open IntelliFactory.WebSharper.InterfaceGenerator
    open IntelliFactory.WebSharper.Dom

    module Res =
        let FacebookAPI =
            Resource "FacebookAPI" "https://connect.facebook.net/en_US/all.js"
```

Binding the Facebook API

Defining classes – useful operators

- =? : Member

```
let FlashHidingArgs =
    Class "FB.FlashHidingArgs"
    |+> Protocol [
        "state" =? T<string>
        "elem" =? T<Element>
    ]
```

Binding the Facebook API

Defining optional members

- Typical in most JavaScript libraries
- Used heavily in configuration objects

```
let InitOptions =
    Pattern.Config "FB.InitOptions" {
        Required = []
        Optional =
            [
                "appId", T<string>
                "cookie", T<bool>
                ...
                "hideFlashCallback", FlashHidingArgs ^-> T<unit>
                ]
        }
```

Binding the Facebook API

Defining safe enumerations

- Typical in most JavaScript libraries
- Used heavily in configuration objects

```
let UserStatus =
    Pattern.EnumStrings "FB.UserStatus"
        ["connected"; "not_authorized"; "unknown"]
```

Building the main application

Walk through in

… In Visual Studio …

Building the main application

Main points:

Performing Login/Logout

```
A [Attr.HRef "#"] -< [<"Login" or "Logout" depending on status>]
|>! OnClick (fun el ev ->
    FB.GetLoginStatus <| fun resp ->
        if resp.Status = UserStatus.Connected then
            FB.Logout updateStatus
        else
            FB.Login(updateStatus, LoginOptions(Scope = "read_stream"))
)
```

Building the main application

Main points:

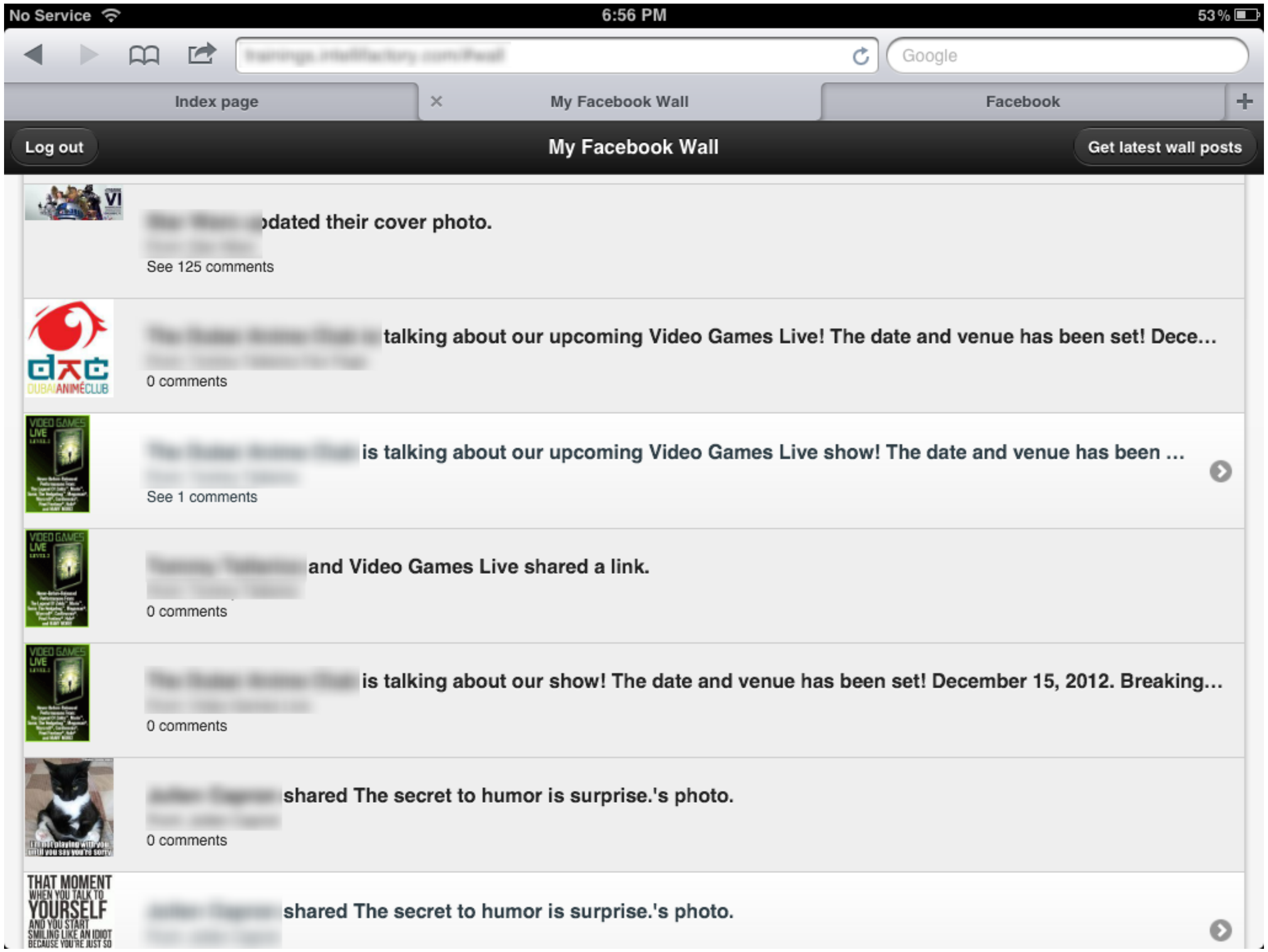
Getting wall posts

```
  btnGetPosts
  |>! OnClick (fun el ev ->
      Mobile.Instance.ShowPageLoadingMsg("a", "Receiving wall posts...")
      FB.Api("/me/home", fun o ->
          wall.Clear()
          o?data |> Array.iter (fun x ->
              let message = x?message ||? x?story ||? x?caption
              LI [
                  yield H6 [Text message]
                  yield P [Text ("From: " + x?from?name)]
                  ...
              ]
         |> wall.Append
         Mobile.Instance.HidePageLoadingMsg()
    )
    JQuery.Of(wall.Body) |> ListView.Refresh
    )
)
```

Application – Deployment

Deployment to a public URL, as configured in the Facebook application

Application – Running!



No Service 6:56 PM 53 %

[redacted]

Google

Index page | My Facebook Wall | Facebook

Log out

My Facebook Wall

Get latest wall posts

[redacted] pdated their cover photo.
[redacted]
See 125 comments

[redacted] talking about our upcoming Video Games Live! The date and venue has been set! Dece...
[redacted]
0 comments

[redacted] is talking about our upcoming Video Games Live show! The date and venue has been ...
[redacted]
See 1 comments

[redacted] and Video Games Live shared a link.
[redacted]
0 comments

[redacted] is talking about our show! The date and venue has been set! December 15, 2012. Breaking...
[redacted]
0 comments

[redacted] shared The secret to humor is surprise.'s photo.
[redacted]
0 comments

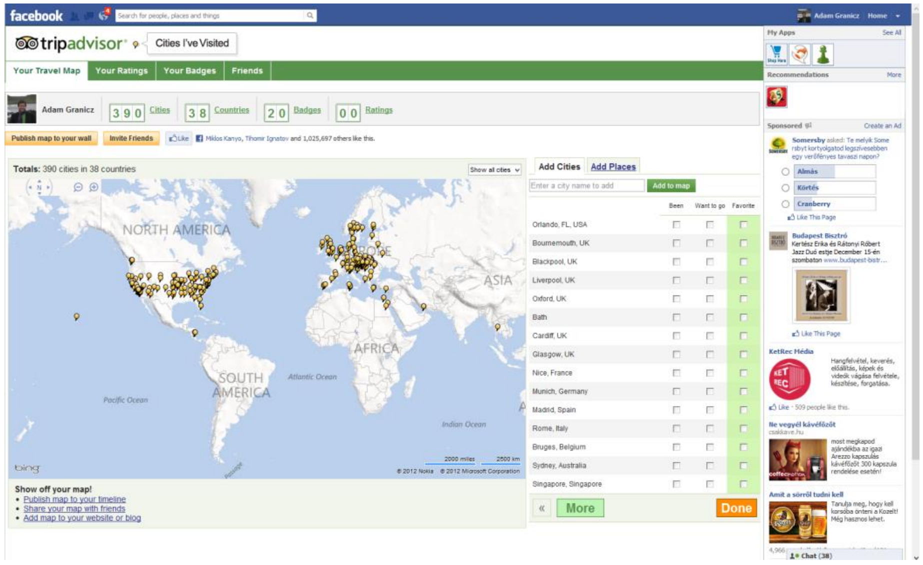
[redacted] shared The secret to humor is surprise.'s photo.
[redacted]

Going multi-platform

Same code base

Facebook Application

Mobile Application



Totals: 390 cities in 38 countries

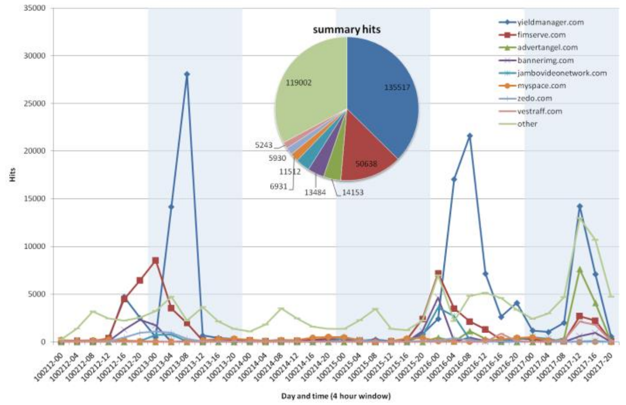
	Been	Want to go	Favorite
Orlando, FL, USA			
Bournemouth, UK			
Blackpool, UK			
Liverpool, UK			
Oxford, UK			
Bath			
Cardiff, UK			
Glasgow, UK			
Nice, France			
Munich, Germany			
Madrid, Spain			
Rome, Italy			
Bruges, Belgium			
Sydney, Australia			
Singapore, Singapore			

Show off your map!
- Publish map to your timeline
- Share your map with friends
- Add map to your website or blog

Summary – WebSharper

F# + WebSharper gives:

- Massive **productivity gain**
- Access to a **growing market** opportunity
- Quick path to **multiple mobile platforms**
- Scaling from **desktop** and to the **cloud**



Advocates functional programming

- Using **more powerful** abstractions
- **Cutting development time**
- Producing **shorter, more maintainable code**

Extras

Wait, it's not over!

FPish – fpish.net – FP Community Site

Aggregates and catalogs FP content about:

Q&A

Events/Conferences

Courses

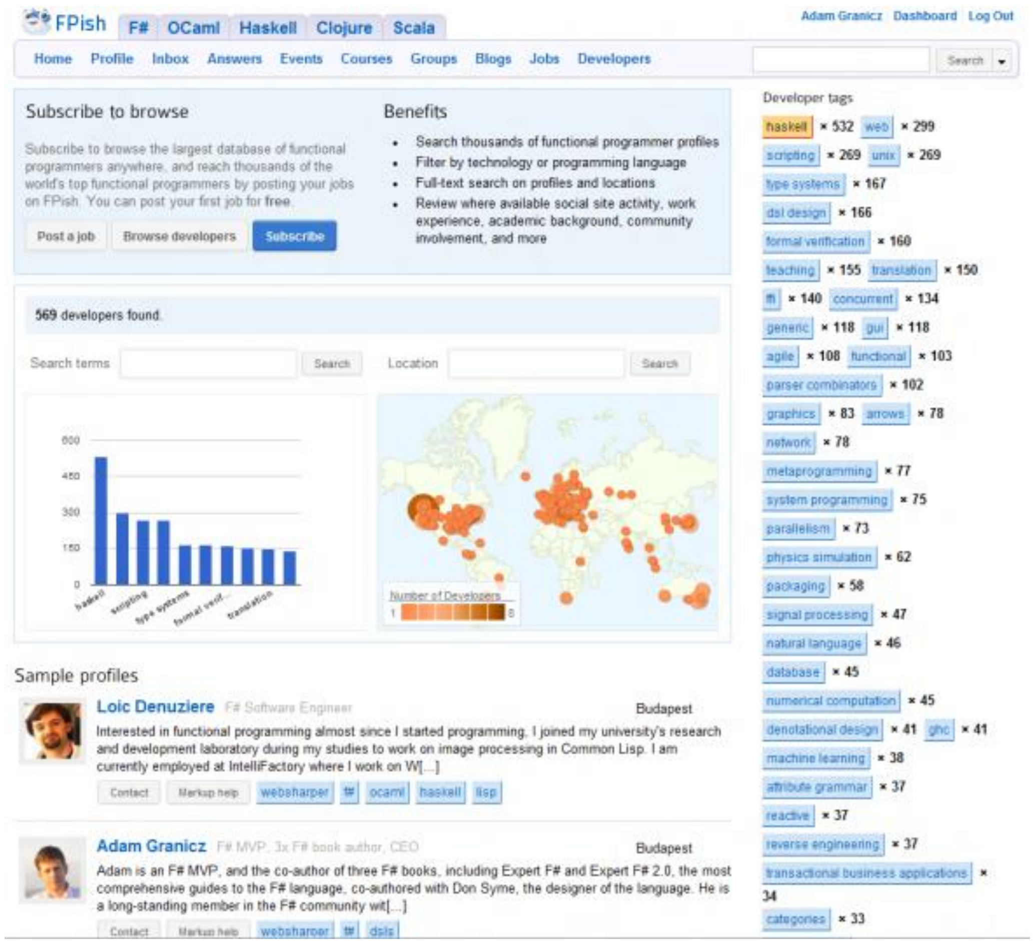
User Groups

Blogs

Jobs

Developers

etc…



Subscribe to browse

Subscribe to browse the largest database of functional programmers anywhere, and reach thousands of the world's top functional programmers by posting your jobs on FPish. You can post your first job for free.

Benefits

- Search thousands of functional programmer profiles
- Filter by technology or programming language
- Full-text search on profiles and locations
- Review where available social site activity, work experience, academic background, community involvement, and more

569 developers found.

Sample profiles

Loic Denuziere F# Software Engineer Budapest

Interested in functional programming almost since I started programming. I joined my university's research and development laboratory during my studies to work on image processing in Common Lisp. I am currently employed at IntelliFactory where I work on W[...]

Adam Granicz F# MVP, 3x F# book author, CEO Budapest

Adam is an F# MVP, and the co-author of three F# books, including Expert F# and Expert F# 2.0, the most comprehensive guides to the F# language, co-authored with Don Syme, the designer of the language. He is a long-standing member in the F# community wit[...]

Developer tags

haskell	× 532
web	× 299
scripting	× 269
unix	× 269
type systems	× 167
dsl design	× 166
formal verification	× 160
teaching	× 155
translation	× 150
ffi	× 140
concurrent	× 134
generic	× 118
gui	× 118
agile	× 108
functional	× 103
parser combinators	× 102
graphics	× 83
arrows	× 78
network	× 78
metaprogramming	× 77
system programming	× 75
parallelism	× 73
physics simulation	× 62
packaging	× 58
signal processing	× 47
natural language	× 46
database	× 45
numerical computation	× 45
denotational design	× 41
ghc	× 41
machine learning	× 38
attribute grammar	× 37
reactive	× 37
reverse engineering	× 37
transactional business applications	× 34
categories	× 33

F# Cloud IDE

Feature-rich, online, cloud-hosted development environment

Provides syntax highlighting, semantic and type checking on the fly

Supports multi-project solutions, switching between them with a single click

Automated building, versioning, dependency tracking

Uses no Silverlight, requires no installed extra software or browser plugins

F# Cloud IDE

Full F# language support

Multi-project solutions

Web and mobile Apps

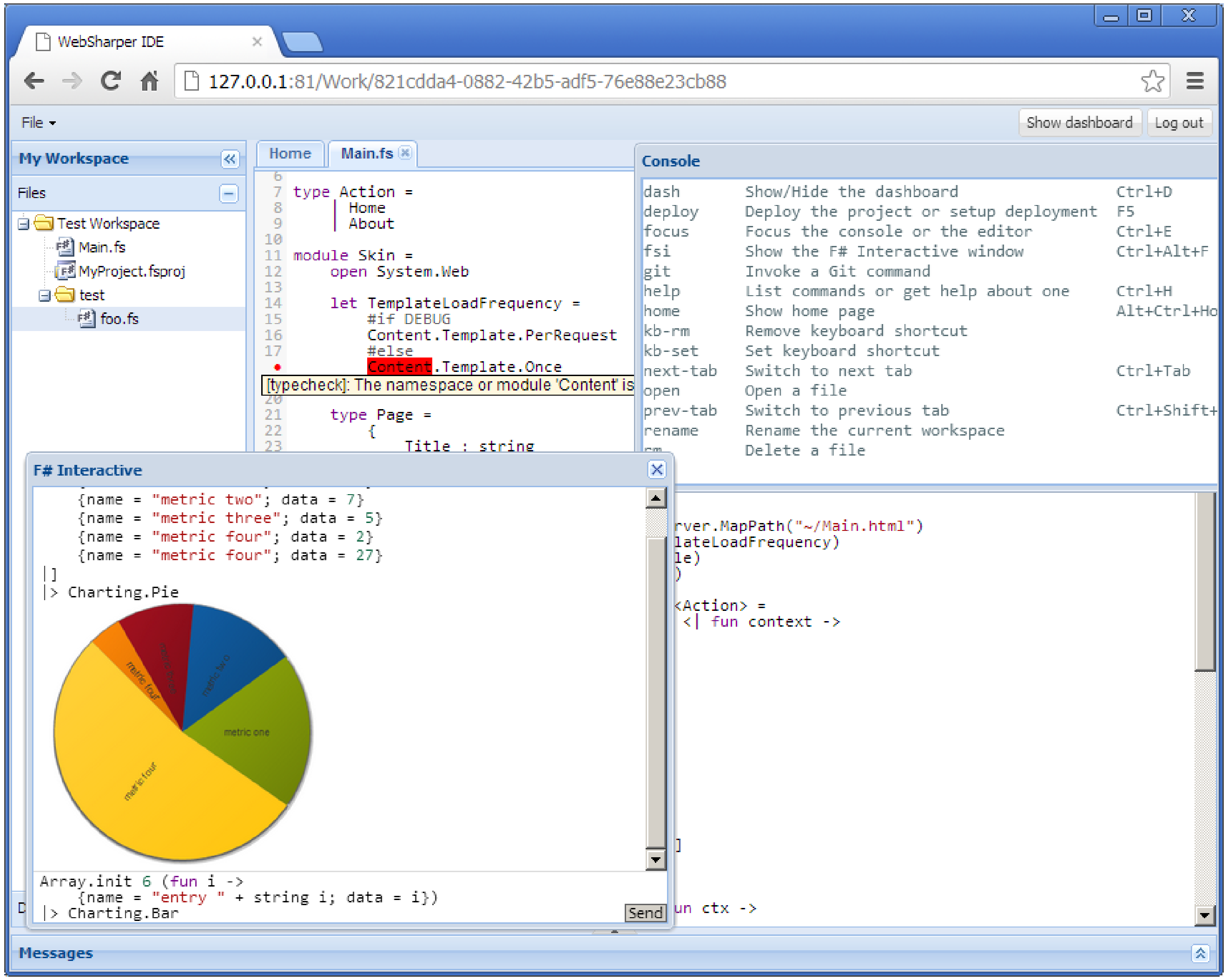
Syntax highlighting

On the fly type checking

Interactive exploration

Integration with data

Support for type providers



```
type Action =
    | Home
    | About

module Skin =
    open System.Web

    let TemplateLoadFrequency =
        #if DEBUG
        Content.Template.PerRequest
        #else
        Content.Template.Once
[typecheck]: The namespace or module 'Content' is

    type Page =
        {
            Title : string
```

```
dash        Show/Hide the dashboard                  Ctrl+D
deploy      Deploy the project or setup deployment   F5
focus       Focus the console or the editor          Ctrl+E
fsi         Show the F# Interactive window           Ctrl+Alt+F
git         Invoke a Git command
help        List commands or get help about one      Ctrl+H
home        Show home page                           Alt+Ctrl+Ho
kb-rm       Remove keyboard shortcut
kb-set      Set keyboard shortcut
next-tab    Switch to next tab                       Ctrl+Tab
open        Open a file
prev-tab    Switch to previous tab                   Ctrl+Shift+
rename      Rename the current workspace
            Delete a file
```

```
    {name = "metric two"; data = 7}
    {name = "metric three"; data = 5}
    {name = "metric four"; data = 2}
    {name = "metric four"; data = 27}
|]
|> Charting.Pie
```

```
Array.init 6 (fun i ->
    {name = "entry " + string i; data = i})
|> Charting.Bar
```

```
rver.MapPath("~/Main.html")
lateLoadFrequency)
le)
)

<Action> =
 <| fun context ->

]

un ctx ->
```

Get in touch

Find out more at:

http://intellifactory.com
http://websharper.com
http://infoq.com/articles/WebSharper

Twitter: **#granicz, #websharper**
granicz.adam@intellifactory.com