

AFP '10 Web Comparison

Tom Tervoort, Renze Droog & Derek de Rie

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Haskell & Websites

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Case Study

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Yesod

HTTPD-Shed

Happstack + HSP

Hack + Loli + Moe

Other Packages

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Why use Haskell to build websites?

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- ▶ Traditional tools: HTML, PHP, CSS, JavaScript...
- ▶ HTML and PHP: repeating patterns very common
- ▶ ...but no way to generalise besides copy+paste
- ▶ Haskell provides a lot of room for generalisation
- ▶ This highly improves maintainability and extensibility

Other advantages:

- ▶ Type system \Rightarrow stricter compile-time error checking
- ▶ Good environment for web-related DSEL's
- ▶ Less code
- ▶ All the power of Haskell available for server-side calculations

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HackageDB: An Impression

- ▶ HackageDB
- ▶ Web: 200(!) packages
- ▶ Sprawl (“Wildgroei”)
- ▶ Comparison

Web

- ▶ [accentuateus](#) library: A Haskell implementation of the Accentu
- ▶ [authenticate](#) library: Authentication methods for Haskell web a
- ▶ [bamboo](#) library: A blog engine on Hack
- ▶ [bamboo-launcher](#) program: bamboo-launcher
- ▶ [bamboo-plugin-highlight](#) library: A highlight middleware
- ▶ [bamboo-plugin-photo](#) library: A photo album middleware
- ▶ [bamboo-theme-blueprint](#) library: bamboo blueprint theme
- ▶ [bamboo-theme-mini-html5](#) library: bamboo mini html5 theme
- ▶ [bird](#) library and program: A simple, sinatra-inspired web frame
- ▶ [Bitty](#) library and program: A library and a command line tool to
- ▶ [blogination](#) library and program: Very simple static blog softwa
- ▶ [BlogLiterately](#) program: A tool for posting Haskell articles to t
- ▶ [BlueprintCSS](#) library: Html document layout library.
- ▶ [botpp](#) library and program: Build tool for Lambdabot
- ▶ [cgi-utils](#) library: Simple modular utilities for CGI/FastCGI (sess
- ▶ [CHXHtml](#) library: A W3C compliant (X)HTML generating librar
- ▶ [clientsession](#) library and program: Store session data in a coc
- ▶ [codepad](#) library: Submit and retrieve paste output from CodeP
- ▶ [cookie](#) library: HTTP cookie parsing and rendering
- ▶ [darcsden](#) programs: darcs project hosting and collaboration
- ▶ [DarcsHelpers](#) library: Code used by Patch-Shack that seeme
- ▶ [data-object-yaml](#) library and program: Serialize data to and fro
- ▶ [delicious](#) library: Accessing the del.icio.us APIs from Haskell (
- ▶ [dgs](#) library: Haskell front-end for DGS' bot interface
- ▶ [digestive-functors](#) library: A general way to consume input usi
- ▶ [digestive-functors-blaze](#) library: Snap backend for the digesti
- ▶ [digestive-functors-happstack](#) library: Happstack backend for
- ▶ [digestive-functors-hsp](#) library: HSP support for digestive-func
- ▶ [digestive-functors-snap](#) library: Snap backend for the digestiv
- ▶ [doc-review](#) programs: Document review Web application, like
- ▶ [DOM](#) library: DOM Level 2 bindings for the WebBits package.
- ▶ [esotericbot](#) library and program: Esotericbot is a sophisticatec
- ▶ [extemp](#) program: automated printing for extemp speakers
- ▶ [fckeditor](#) library: Server-Side Integration for FCKeditor
- ▶ [feed-cli](#) program: A simple command line interface for creating
- ▶ [feed2lj](#) program: Cross-post any RSS/Atom feed to LiveJourn
- ▶ [feed2twitter](#) library and program: Send posts from a feed to Tw
- ▶ [FermatsLastMargin](#) program: Annotate ps and pdf documents
- ▶ [ffeed](#) library and programs: Haskell binding to the FriendFeed
- ▶ [Finance-Quote-Yahoo](#) library: Obtain quote data from finance.
- ▶ [Finance-Treasury](#) library: Obtain Treasury yield curve data.

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Commonly Found Issues

- ▶ No documentation
- ▶ No or poor maintenance
- ▶ Installing issues
- ▶ Too extensive
- ▶ Too limited
- ▶ Too complicated

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- ▶ Website consisting of 4 pages
- ▶ Target on Haskell reasons
- ▶ Page 1: Home
 - ▶ Fully used HTML/CSS
 - ▶ Generalization
- ▶ Page 2: Contact
 - ▶ Submit
 - ▶ Form: handling input
- ▶ Page 3: Photo Gallery
 - ▶ JavaScript/jQuery
- ▶ Page 4: Haskell
 - ▶ Excel-like SpreadSheet

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► "Consumentengids"

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- ▶ "Consumentengids"
- ▶ 5 main criteria
 1. Installation
 2. Maintenance/support/community
 3. Documentation
 4. Accessibility
 5. Features (CSS, JavaScript, Forms, Haskell Integration, Databases and Miscellaneous)

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- ▶ Released March 2010
- ▶ Currently version 6.7
- ▶ <http://docs.yesodweb.com>
- ▶ Goals
 - ▶ type-safe
 - ▶ secure
 - ▶ RESTful
 - ▶ fast

Yesod: Structure

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```
import Yesod
```

```
data HelloWorld = HelloWorld  
mkYesod "HelloWorld" [$parseRoutes|  
/ HomeR GET  
/page2 Page2R GET  
|]
```

```
getHomeR  = defaultLayout ...  
getPage2R = defaultLayout ...
```

```
main = basicHandler 3000 HelloWorld
```

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Yesod: Hamlet Example

```
getHomeR = defaultLayout $ do
```

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Yesod: Hamlet Example

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```
getHomeR = defaultLayout $ do
  let x = "Title of this page!"
  let y = ["first","second","third"]
  let z = True
  addHamlet [$hamlet|
    %h1 Normal header
    %p
      %a!href=@HomeR@
    $if z
      %h2 Sometimes you write this
    %h1 $x$
    $forall y word
      %p $word$
  |]
```

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Yesod: Forms

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```
pFormletString = fieldsToTable $ stringField "Name: "
```

```
getHomeR :: GHandler HelloWorld HelloWorld RepHtml
getHomeR = do
    (res, wform, enctype) <- runFormGet $ pFormletString Nothing
    defaultLayout $ do
        form <- extractBody wform
        addHamlet [$hamlet|
%p Your name: $show.res$
%form!enctype=$enctype$
    %table
        ^form^
        %tr
            %td!colspan=2
                %input!type=submit
|]
```

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    %tr  
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            %input!type=submit  
|]
```

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|]  
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%form!enctype=$enctype$  
  %table  
    ~form~  
  %tr  
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|]  
]
```

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Case Study: HTTPD-Shed + Text.HTML

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- ▶ HTTPD Shed
 - ▶ Very small server
- ▶ Text.HTML
 - ▶ Standard Haskell HTML library
- ▶ Easy to start working with them

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- ▶ HTTPD Shed
 - ▶ Very small server
- ▶ Text.HTML
 - ▶ Standard Haskell HTML library
- ▶ Easy to start working with them
- ▶ Not everything included:

```
p (tag "label" (stringToHtml "Name:") ! [strAttr "for" "name"])
p (label      (stringToHtml "Name:") ! [for          "name"])
```

- ▶ Easy to implement yourself, but...

Case Study: HTTPD-Shed + Text.HTML

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- ▶ HTTPD Shed
 - ▶ Very small server
- ▶ Text.HTML
 - ▶ Standard Haskell HTML library
- ▶ Easy to start working with them
- ▶ Not everything included:

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p (tag "label" (stringToHtml "Name:") ! [strAttr "for" "name"])
p (label      (stringToHtml "Name:") ! [for      "name"])
```

- ▶ Easy to implement yourself, but...

Case Study: HTTPD-Shed + Text.HTML(2)

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- ▶ Home
 - ▶ Straightforward
 - ▶ Generalization possible!
 - ▶ But not in menu
- ▶ Contact
 - ▶ Sending form data:
 - ▶ Via POST hard (manually parsing)
 - ▶ Via GET possible with Network.URI (not safe)
- ▶ Photo gallery
 - ▶ Straightforward
 - ▶ Photo-generalization function
- ▶ Haskell
 - ▶ Easy because of same packages

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Conclusion

- ▶ Huge framework
- ▶ Well-known for high-order database interface
- ▶ Map Haskell datastructures directly to database, no need for SQL and such
- ▶ We mainly concentrated on Happstack.Server
- ▶ Third-party library required for HTML generation

Haskell Server Pages (HSP)

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Other Packages

Conclusion

- ▶ XML generation library
- ▶ Fully compatible with XHTML
- ▶ Directly embed XML in Haskell source code
- ▶ Or, alternatively, embed Haskell in XML
- ▶ How: XML tags are directly translated into Haskell datatypes
- ▶ So even pattern matching on XML is possible
- ▶ Also supports CSS and JavaScript

HSP Sample Code

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```
dressed name xml =
```

```
  <html>
    <head>
      <title><% name %></title>
    </head>
    <body>
      <% xml %>
    </body>
  </html>
```

```
showFactorial :: Int -> HSP XML
```

```
showFactorial n = <p> The factorial of <% show n %>
is <b> <% show $ product [1..n] %> </b> </p>
```

```
page = dressed "A web page" (showFactorial 5)
```

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Advantages Happstack/HSP

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- ▶ Advantages Happstack
 - ▶ Good tutorial
 - ▶ Very easy request routing
 - ▶ Resulting code is short and easily readable
- ▶ Advantages HSP
 - ▶ Incredibly easy to mix Haskell and XHTML
 - ▶ Can also be used by HTML-programmers unfamiliar with Haskell
- ▶ Advantages combination
 - ▶ HSP pages can be directly used as web pages by Happstack

Disadvantages Happstack/HSP

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- ▶ Disadvantages Happstack
 - ▶ No built-in HTML generator
 - ▶ Still under construction, quite some features still unavailable
- ▶ Disadvantages HSP
 - ▶ Required preprocessor, is a hassle to use
 - ▶ Generated code results in obscure error messages
 - ▶ XHTML is XML, but XML is not necessarily XHTML
 - ▶ No check whether a certain tag is valid
 - ▶ Could do more error-checking

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Case: Hack + Loli + Moe (+ Happstack)

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- ▶ Hack: webserver interface/middleware
- ▶ Loli: webprototyping
- ▶ Moe: HTML
- ▶ Happstack: only `Hack.Handler.Happstack.run`

Case: Hack + Loli + Moe (2)

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Conclusion

- ▶ Hack, Loli and Moe developed by nfjinjing
- ▶ Fairly new
- ▶ Lack of information

Case: Hack + Loli + Moe (3)

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- ▶ Home
 - ▶ Not generalizable over menu

Case: Hack + Loli + Moe (3)

► Home

- Not generalizable over menu
- No simple `String ++ link ++ String` available
- `p-tag`, ...

```
do p ! [] - do
  str "This is a"
  a ! [href "www.cs.uu.nl"] - do str "link"
  str "."
```


Case: Hack + Loli + Moe (3)

► Home

- Not generalizable over menu
- No simple `String ++ link ++ String` available
- `p-tag`, ...

```
do p ! [] - do
  str "This is a"
  a ! [href "www.cs.uu.nl"] - do str "link"
  str "."
```

Case: Hack + Loli + Moe (4)

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- ▶ Contact
 - ▶ File-sending is hard
- ▶ Photo gallery
 - ▶ Just like HTTPD Shed
 - ▶ Easy
- ▶ Haskell
 - ▶ Looks like Server → copy paste with little editing
 - ▶ Familiarity with Text.HTML

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- ▶ A lot more packages available on HackageDB
- ▶ We were unable to install many
- ▶ RedHandlers and Haskoon: undocumented and unsupported
- ▶ Therefore practically unusable

- ▶ Promoting package
- ▶ Claims to have very high performance
- ▶ Many features
- ▶ Still in early stages of development
- ▶ Not enough tutorials and documentation yet
- ▶ Too complicated to use

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And the winner is.....

1. **Yesod**, for experienced Haskell Programmers
2. **HSP/Happstack**, for web developpers with Haskell knowledge

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Honorary mentions:

- ▶ Snap (future)
- ▶ Hack/Loli/Moe

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Some advice for a starting web developers:

1. Follow the mass
2. Documentation is everything
3. Take your time choosing
4. Stay loyal

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Our results are published at:

www.cs.uu.nl/wiki/bin/view/AFP2010WebComparison

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