

Leveraging the Social Web for Situational Application Development and Business Mashups

Stefan Tai
stefan.tai@kit.edu



Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft



Universität Karlsruhe (TH)
Research University · founded 1825



About the Speaker: Stefan Tai

- Professor, KIT (Karlsruhe Institute of Technology)

- Karlsruhe Service Research Institute (KSRI)



- Institute for Applied Informatics



- Director, FZI Research Center for Information Technology



- Background: IBM T.J. Watson Research Center, New York, USA (1999-2007)

The eOrganization Research Group

www.fzi.de



www.eOrganization.de



aifb.uni-karlsruhe.de

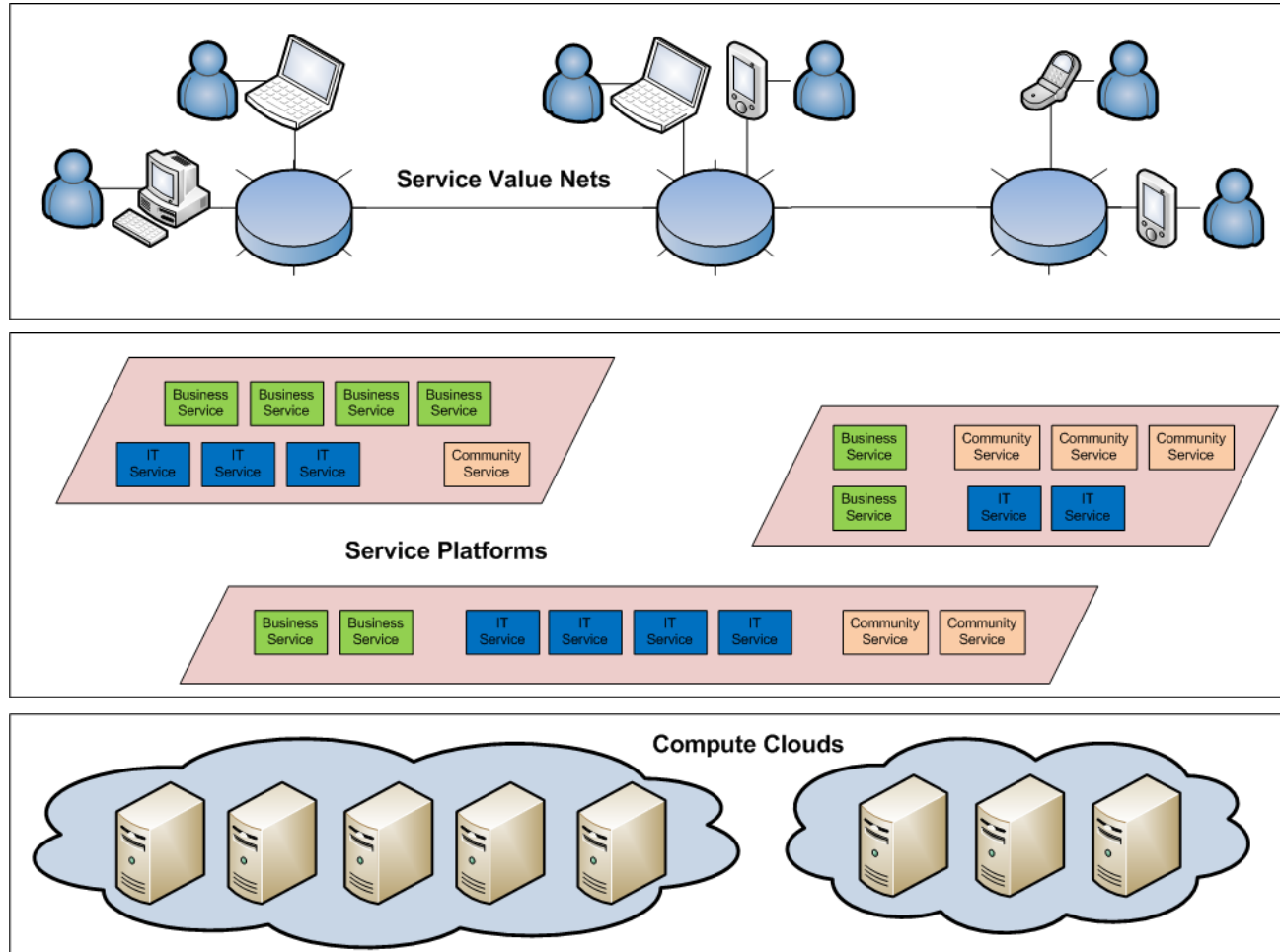


ksri.uni-karlsruhe.de



www.kit.edu

eOrganization Research

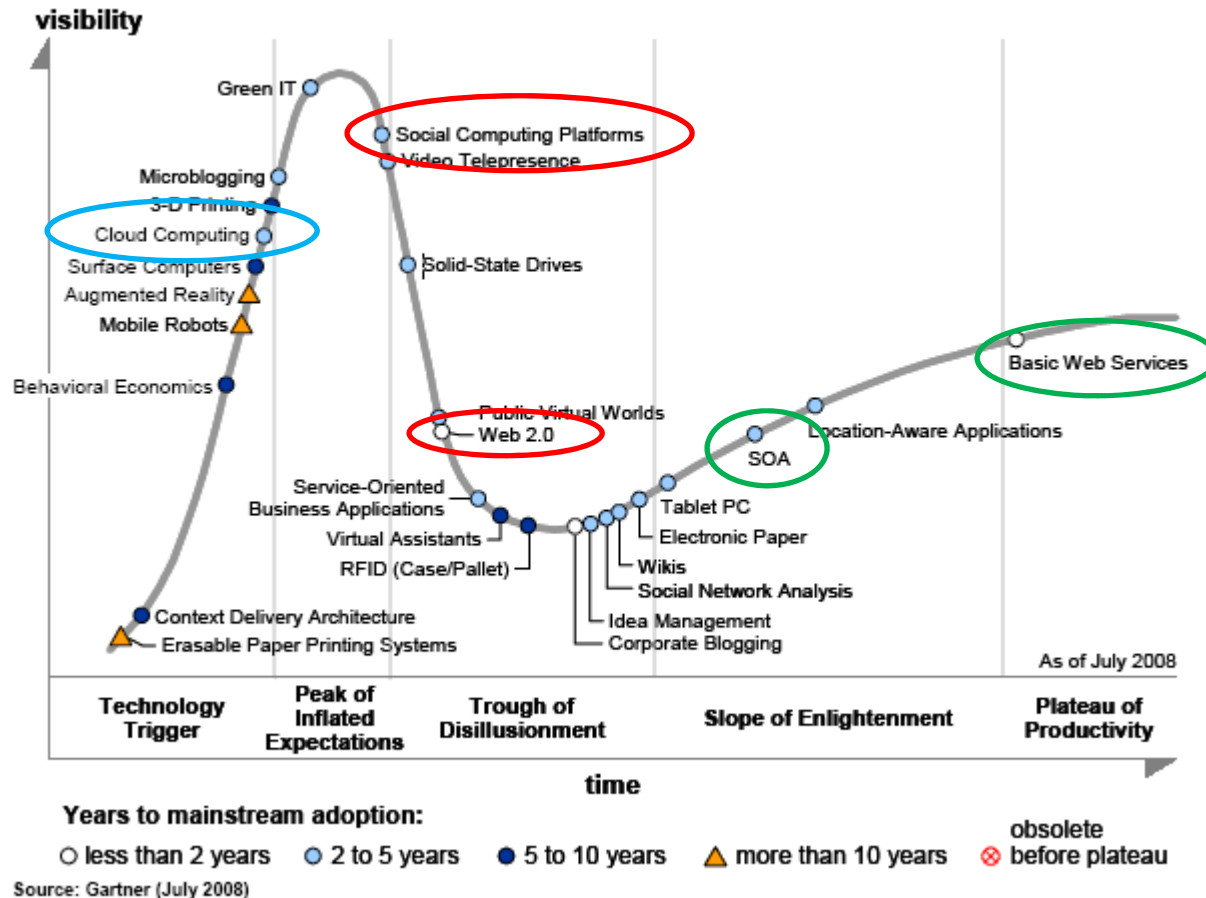


Agenda

- **Introduction:
The Long Tail and Situational Applications (Mashups)**
- **The Swashup Platform and DSL**

Gartner's Hype Cycle for Emerging Technologies, July 2008

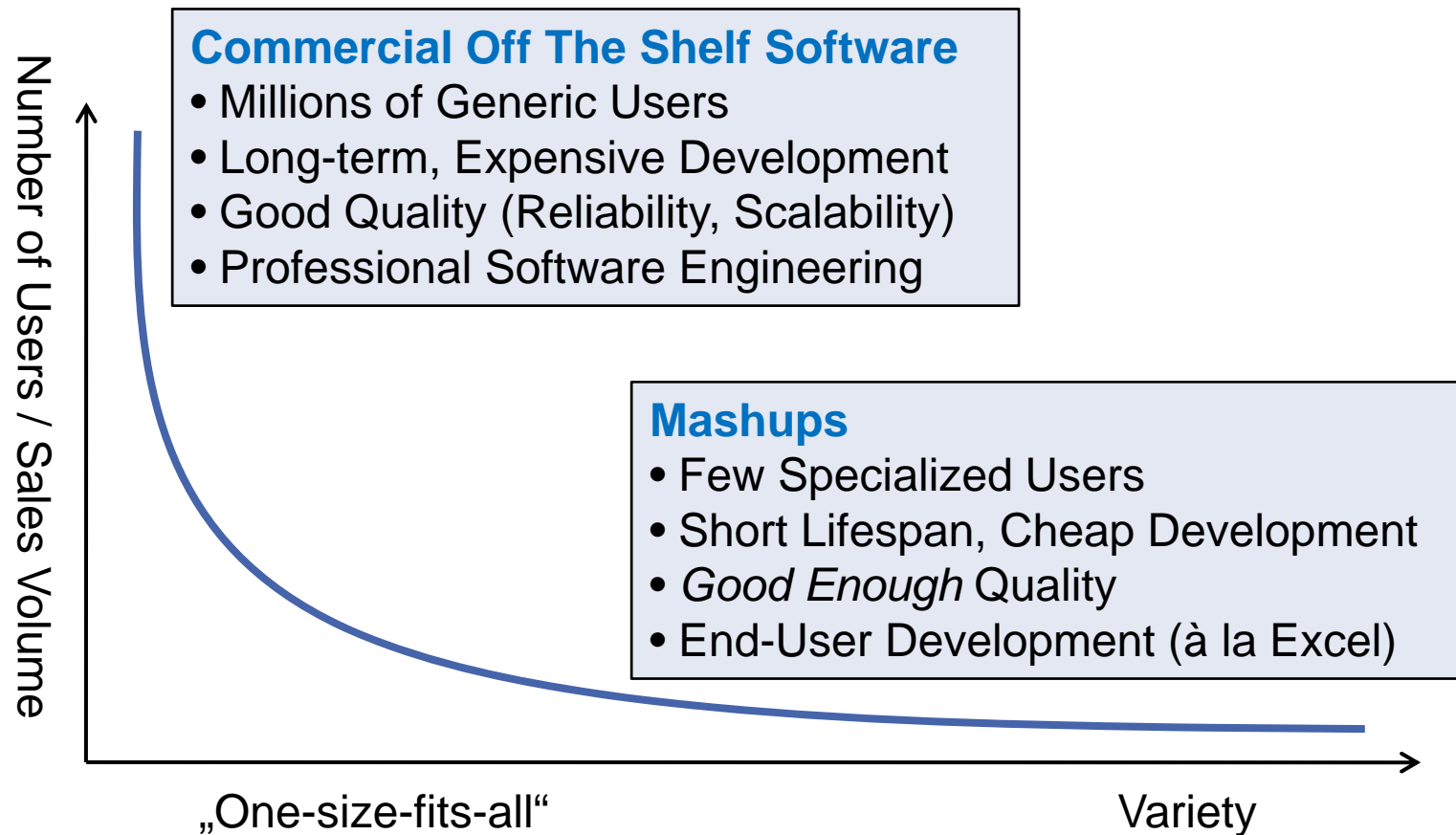
Figure 1. Hype Cycle for Emerging Technologies, 2008



Why Social Computing?

- Explosion in Web usage and content, fueled by global use, mobile device access, and the **participation Web**: user-generated content, cooperation and innovation
- The Web as the desktop (your desktop!)
- New concepts, methods, and technology needed to leverage the Web as a **combined** compute platform, business platform, and collaboration platform

The Long Tail of Business: Mass Servicing of Micro-Markets



Mashup Example: housingmaps.com

HousingMaps - Mozilla Firefox

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

http://www.housingmaps.com/

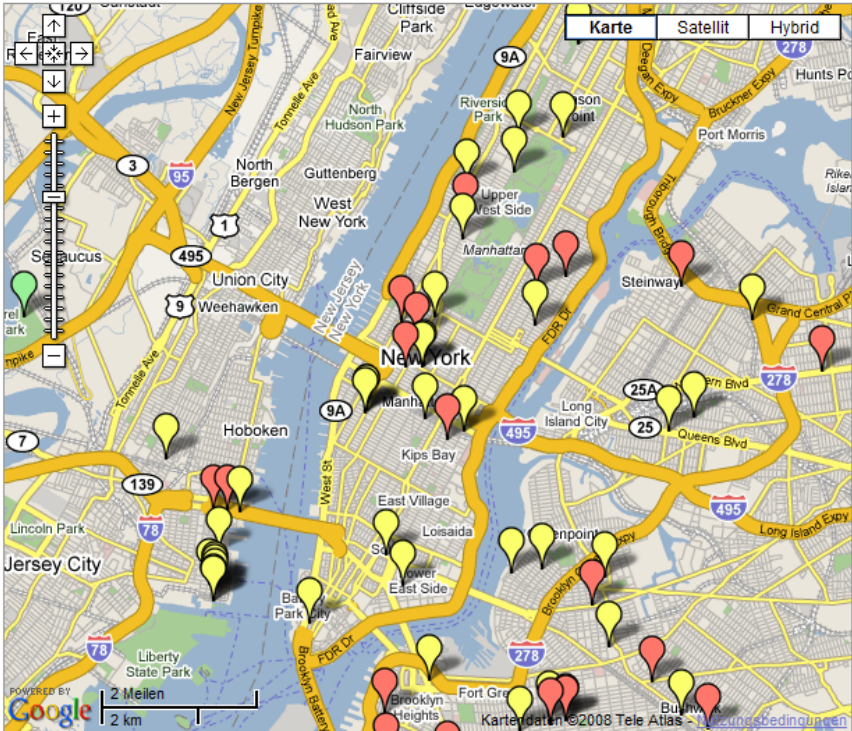
Erste Schritte Aktuelle Nachrichten

For Rent For Sale Rooms Sublets

Powered by [craigslist](#) and [Google Maps](#)
(this site is in no way affiliated with craigslist or Google)

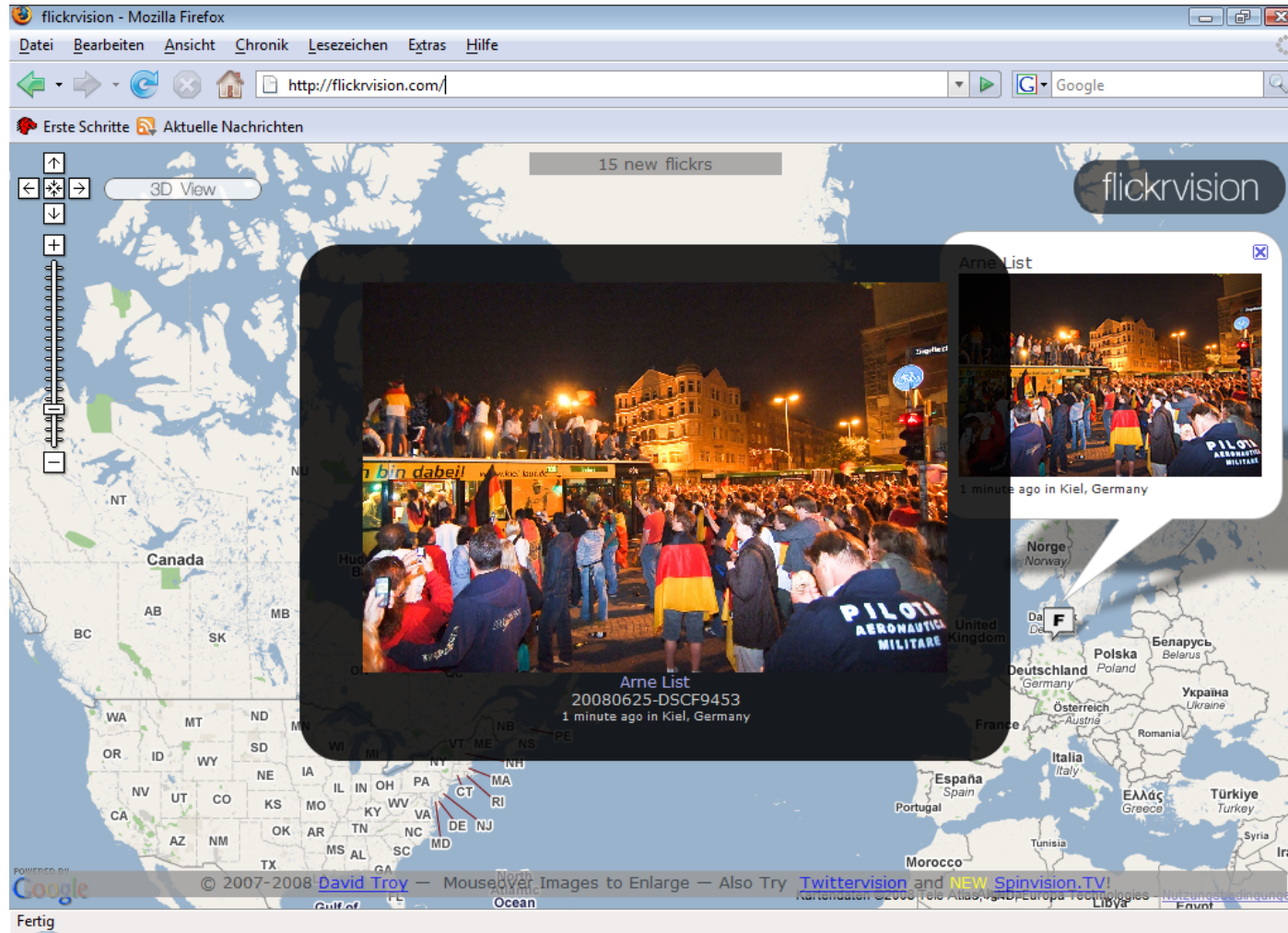
City: Price: [Show Filters](#) [Refresh](#) [Link](#)

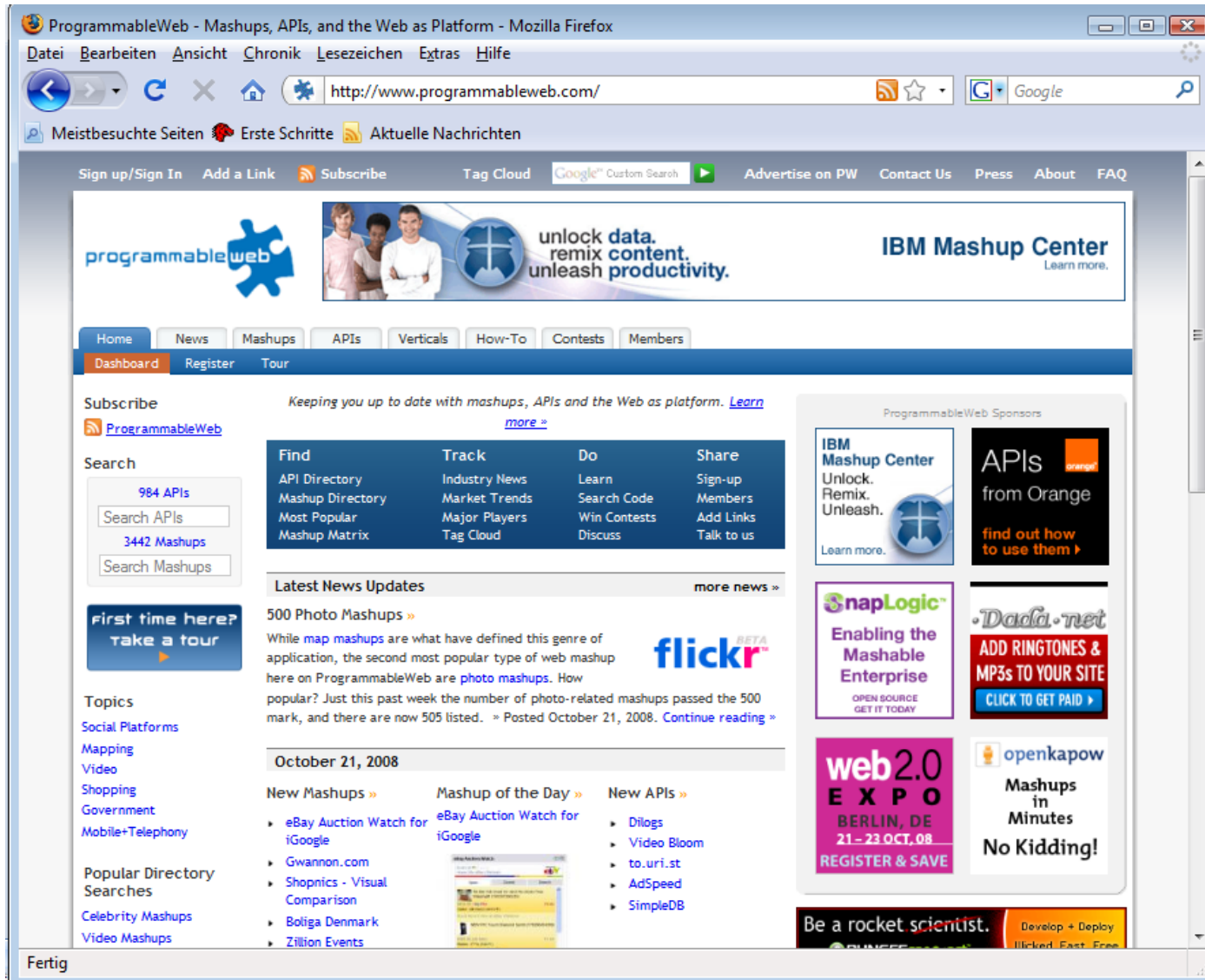
[About / Feedback](#)



pics	price	bd	description	city	date
	\$2000	1bd	Luxury 1 BR Condo for Rent! - No Fees -	Jersey City	6/26
	\$2100	3bd	3 bedroom apt for rent -	Queens	6/26
	\$2500	1bd	Rare 1BR Washer & Dryer, dishwasher, marble bath, balcony -	New York	6/26
	\$2300	2bd	No Fee - The Last Huge And Spacious 2 BR - New Luxury 1900 Sq Ft P/Roof -	New York	6/26
	\$2400	1bd	No Fees! - 1Bd Ultra Luxury, Magnificent Location-7 Mins To Nyc - Wow! -	Jersey City	6/26
	\$2120		Large Renovated Alcove Studio -	New York	6/26
	\$2100	2bd	Large rooms, newly renovated street level apartment in private home -	Yonkers	6/26
	\$2300	3bd	Renovated 3 Bedrooms Duplex, 1 1/2 Bath, Garage Avail. Near Subway -	Queens	6/26
	\$2000	2bd	Brownstone upscale Renovation - Just Renovated Large 2	Brooklyn	6/26
	\$2000	2bd	Bedrooms, yard/parking, Minutes To Midtown -	Queens	6/26
	\$2000	3bd	House For Rent -	Bronx	6/26
	\$2200	1bd	Fabulous 1- Bedroom 1.5 Bath Duplex on West 89th -	New York	6/25
	\$2000	2bd	One and a half bedrooms! -	Jersey City	6/25
	\$2250	2bd	2BR/2BA Brand New Apartment -	Staten Island	6/25
	\$2300	3bd	Luxurious Apt. ~ Exposed Brick ==Prime Location== A&C @	Brooklyn	6/25

Fertig





The screenshot shows the ProgrammableWeb.com website in a Mozilla Firefox browser window. The browser title is "ProgrammableWeb - Mashups, APIs, and the Web as Platform - Mozilla Firefox". The address bar shows "http://www.programmableweb.com/". The website features a navigation menu with links like "Home", "News", "Mashups", "APIs", "Verticals", "How-To", "Contests", and "Members". A prominent banner at the top reads "unlock data. remix content. unleash productivity." and "IBM Mashup Center". Below the banner, there are sections for "Subscribe", "Search" (with 984 APIs and 3442 Mashups), "Latest News Updates" (500 Photo Mashups), and "Topics" (Social Platforms, Mapping, Video, etc.). A "New Mashups" section lists items like "eBay Auction Watch for iGoogle" and "Gwannon.com". The page also includes various advertisements and a "Fertig" status indicator at the bottom left.

Mashups

- ...are Web applications composing a variety of Web sources via Web APIs, services and feeds (RSS, Atom)
 - Content provider, mashup site, client Web browser
- For situational purpose, fast and good enough
 - Consumer mashups vs. enterprise mashups
- Creation is mostly end-user oriented (often graphical)
- Typically data-driven, aggregating data streams
 - Yahoo Pipes, Microsoft Popfly, IBM Mashup Center, SAP Research Rooftop
- Sometimes process-driven using lightweight workflows
 - IBM Research Bite, Serena Mashup Suite

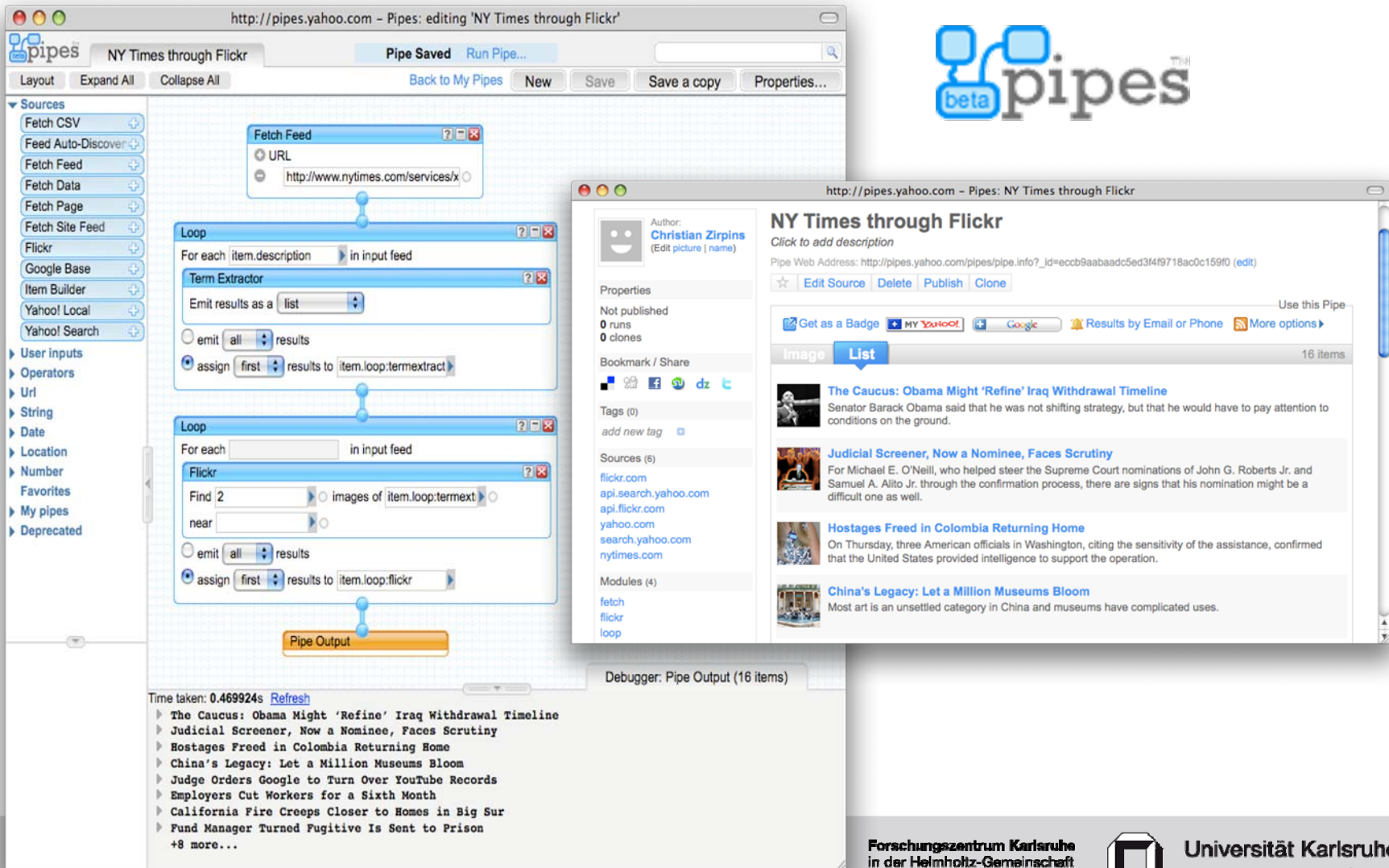
Yahoo! Pipes

- ... provides a graphical user interface for building applications that aggregate web feeds, web pages, and other services, creating *data mashups* from various sources, and publishing them
- The site works by letting users "**pipe**" information from different sources and then set up rules for how that content should be modified (e.g. filtering, cf. the New York Times through Flickr example)



source: wikipedia.org

NY Times Through Flickr! (Yahoo! Pipes)



The image shows a screenshot of the Yahoo! Pipes web interface. The main window is titled "http://pipes.yahoo.com - Pipes: editing 'NY Times through Flickr'". The interface includes a sidebar with various source and operator modules, a central workspace with a flowchart, and a preview window on the right.

Flowchart Components:

- Fetch Feed:** URL: `http://www.nytimes.com/services/x`
- Loop:** For each `item.description` in input feed
- Term Extractor:** Emit results as a `list`. Assign `first` results to `item.loop:termextract`.
- Loop:** For each [] in input feed
- Flickr:** Find `2` images of `item.loop:termext`. Assign `first` results to `item.loop:flickr`.
- Pipe Output:** Final output stage.

Preview Window: NY Times through Flickr

Author: **Christian Zirpins** (Edit picture | name)

Properties: Not published, 0 runs, 0 clones

Bookmark / Share: [Icons for Facebook, Twitter, etc.]

Sources (6): flickr.com, api.search.yahoo.com, api.flickr.com, yahoo.com, search.yahoo.com, nytimes.com

Modules (4): fetch, flickr, loop

Use this Pipe: [Get as a Badge] [MY Yahoo!] [Google] [Results by Email or Phone] [More options]

Image List (16 items)

- The Caucus: Obama Might 'Refine' Iraq Withdrawal Timeline**
Senator Barack Obama said that he was not shifting strategy, but that he would have to pay attention to conditions on the ground.
- Judicial Screener, Now a Nominee, Faces Scrutiny**
For Michael E. O'Neill, who helped steer the Supreme Court nominations of John G. Roberts Jr. and Samuel A. Alito Jr. through the confirmation process, there are signs that his nomination might be a difficult one as well.
- Hostages Freed in Colombia Returning Home**
On Thursday, three American officials in Washington, citing the sensitivity of the assistance, confirmed that the United States provided intelligence to support the operation.
- China's Legacy: Let a Million Museums Bloom**
Most art is an unsettled category in China and museums have complicated uses.

Debugger: Pipe Output (16 items)

Time taken: 0.469924s [Refresh](#)

- ▶ The Caucus: Obama Might 'Refine' Iraq Withdrawal Timeline
- ▶ Judicial Screener, Now a Nominee, Faces Scrutiny
- ▶ Hostages Freed in Colombia Returning Home
- ▶ China's Legacy: Let a Million Museums Bloom
- ▶ Judge Orders Google to Turn Over YouTube Records
- ▶ Employers Cut Workers for a Sixth Month
- ▶ California Fire Creeps Closer to Homes in Big Sur
- ▶ Fund Manager Turned Fugitive Is Sent to Prison
- ▶ +8 more...

The Importance of Communities: Yahoo! Pipes Developer Community

- Pipe repository with some 10,000 mashups
 - Advanced searching, querying, and ranking capabilities
 - Reuse: Pipe Clones or references
- Web 2.0 support for pipes developers: tagging, feeds, blogs, forums

Agenda

- Introduction:
The Long Tail and Situational Applications (Mashups)
- The Swashup Platform and DSL

An Online Platform for **S**ituational **W**eb **A**pplications and **M**ashups Development and Management

- Started out as a research project at IBM Research
- Now an IBM alphaworks services offering:
<http://services.alphaworks.ibm.com/isc/>
- Joint work with E. Michael “max” Maximilien, IBM ARC
 - <http://www.maximilien.com>
 - <http://blog.maximilien.com>



Motivation

- Mashups are **ad hoc**
 - Difficult to reuse and to share
 - Difficult to discover, to find, and to manage
- (Too) Many service models and types, e.g., SOAP/WSDL, REST, APP, Atom, RSS, ...
- JavaScript UI-based mashups lead to nightmarish code maintenance and security issues
- **Lack of unified models and design for mashups**

A uniform platform for developing, sharing, and managing Web 2.0 applications and mashups

- Common service models and mashup design
- Domain-specific languages (DSL) – abstraction
 - data, APIs, services, and mashup
 - tagging, commenting, digging, searching
- Web-based tooling

- Platform as a set of smaller parts
 - Web applications (tools)
 - Web APIs (services)
 - Reusable components (plugins and gems)
- Interactions between components via APIs
- The platform is itself mashable

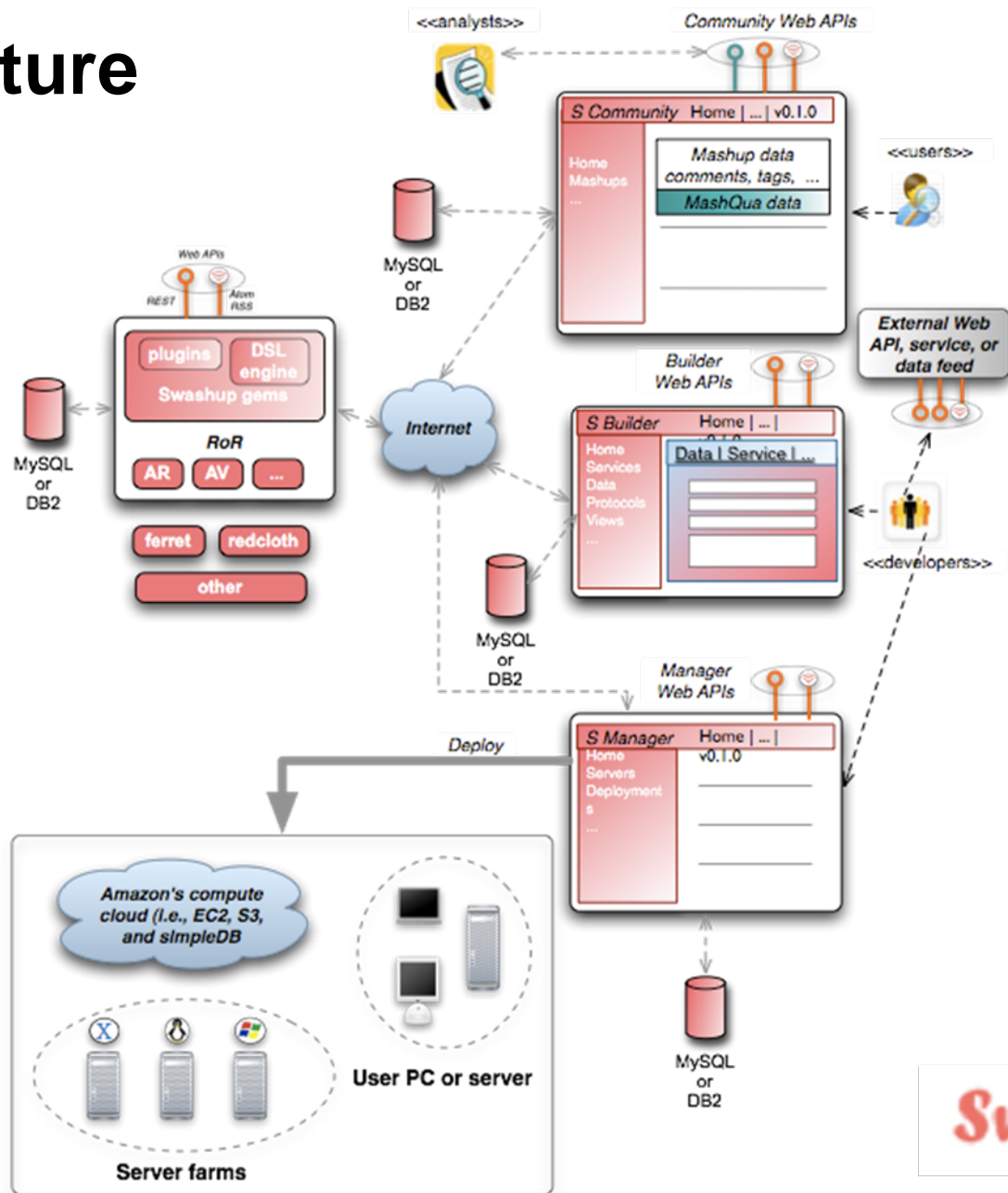
- *Web Computing is social, ergo sharable models, sharable components, and sharable designs are key to easier and more productive Web tools*

The platform itself is mashable and designed as a modern RESTful SOA

- **Builder** application (mashup creator)
 - Enables “easy” design and creation of mashups
 - Agile and social development of mashups parts
- **Community** application
 - Advertisement and community of deployed mashups
 - Discussions, usages, tagging, searching, and ratings
- **Manager** application
 - One-click deployment of mashups to different servers or clouds
 - Management of deployments, e.g., clone, delete, version, ...

*Swashup*beta

Big Picture



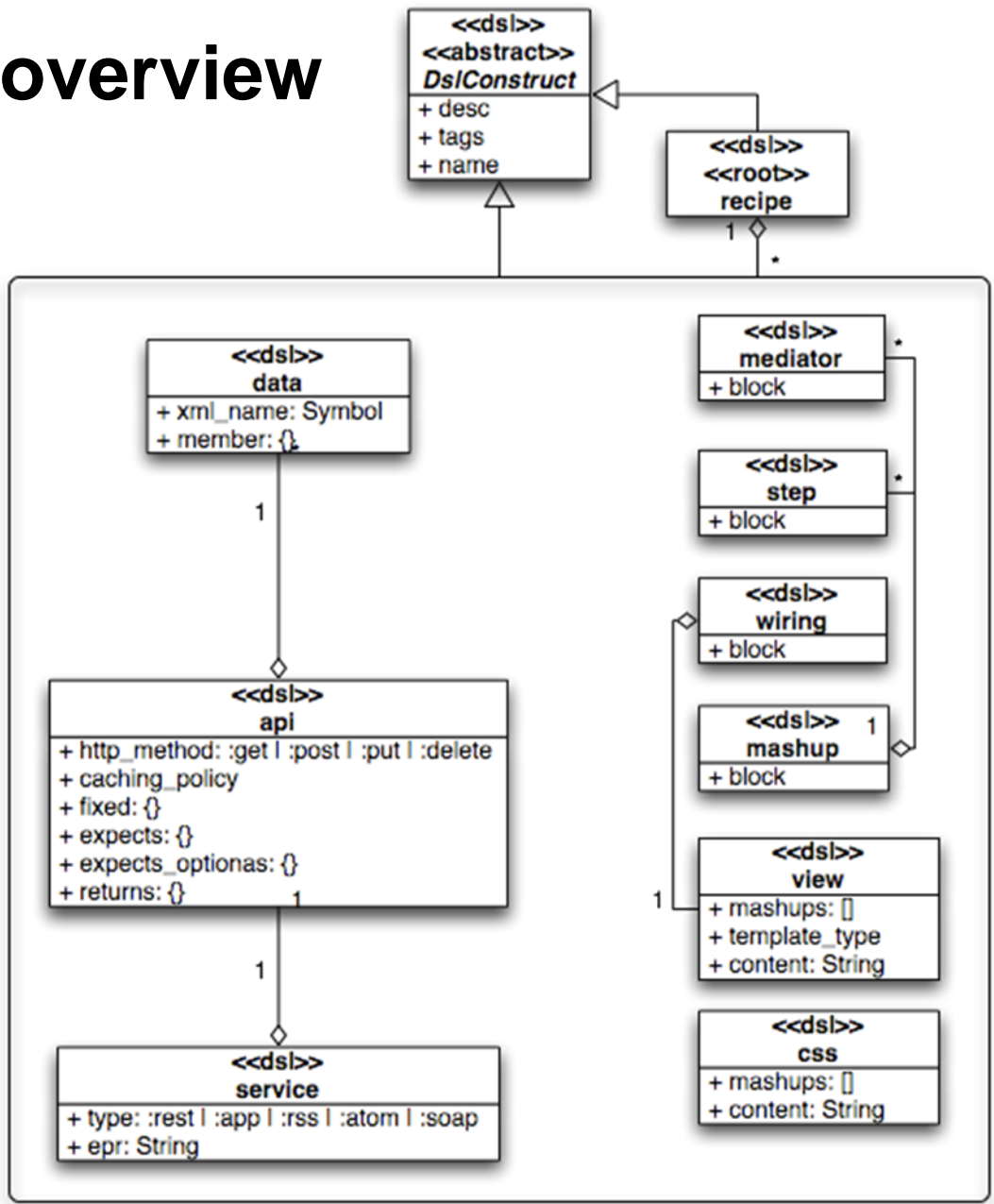
Swashup_{beta}

A Domain-specific language (DSL) for mashups

- “mini” language built on top of a hosting language that provides a common syntax and semantics
- High-level, mostly declarative, design and programming particular to mashup concepts and behaviors
- Enables easier sharing of parts
- Facilitates the creation of code and tools

- Mashups' designs as **recipes** (like cooking recipes)
 - Web APIs, services, data, views, ... are ingredients
 - Mashups are unique combinations of Web “ingredients”
- **Constructs**
 - Represent all basic concepts for creating mashups
 - data, api, service, mashup, connection to user (wiring), connection between services (step), data transformations (mediator), and user interfaces (views)

DSL overview



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DSL details

- **recipe** – Top level construct; aggregates all others
- **data** – Describes the schema (data elements) of service's data
- **api** – Describes the service's API interface
- **service** – Binds to the actual endpoint, service type, and any special considerations (e.g., caching, headers, ...)
- **mashup** – One or more services that comprise a collection of wiring and mediation declarations
- **mediation** – Facilitates data transformation
- **wiring** – Captures one point of interaction with user
- **step** – one atomic step in wiring; interaction between services
- **view** – Captures the view template code for a wiring
- **css** – Captures view styling via cascading stylesheets
- **tag, tags, desc** – Captures metadata and English text

Sample Recipe

```
flickr_google_news_recipe.rb — swashup
x digg_rest_recipe.rb x eventful_rest_recipe.rb x eventful_stanford_recipe.rb x you_tube_flickr_recipe.rb

desc "Recipe for flickr.com REST and Google News Atom mashups"
tags ['mashup', 'rest', 'atom']
recipe :flickr_google_news_recipe do

  desc "Flickr's error response part"
  data :FlickrErr do

  desc "Flickr's error <rsp> part"
  data :FlickrErrRsp do

  desc "Flickr's <username>Some name</username> response part"
  data :FlickrUsername do

  desc "Flickr's <photo>...</photo> response part"
  data :FlickrPhoto do
    xml_name :photo

    member :id, :integer, :xml_attribute
    member :owner, :string, :xml_attribute
    member :secret, :string, :xml_attribute
    member :server, :integer, :xml_attribute
    member :farm, :integer, :xml_attribute
    member :title, :string, :xml_attribute
    member :ispublic, :integer, :xml_attribute, :desc => 'integer encoded boolean'
    member :isfriend, :integer, :xml_attribute, :desc => 'integer encoded boolean'
    member :isfamily, :integer, :xml_attribute, :desc => 'integer encoded boolean'
  end

  desc "Flickr's <photos>...</photos> response part"
  data :FlickrPhotos do
    xml_name :photos

    member :page, :integer, :xml_attribute
    member :pages, :integer, :xml_attribute
    member :perpage, :integer, :xml_attribute
    member :total, :integer, :xml_attribute

    member :photos, :FlickrPhoto, :xml_object_array, :desc => 'an array of FlickrPhoto'
  end
end
```

Sample Recipe

```
x digg_rest_recipe.rb x eventful_rest_recipe.rb x eventful_stanford_recipe.rb x you_tube_flickr_recipe.rb >>
desc "Flickr's API"
tags ['api', 'rest', 'flickr', 'yahoo']
api :FlickrApi do
  desc "Returns the list of interesting photos for the most recent day or a user-specified date"
  api_method :flickr_interestingness_getList, :http_method => :get, :method_name_as_path => false,
    :fixed => [{:method => 'flickr.interestingness.getList', :desc => "Flickr interestingness.getList",
      {:api_key => '4eff1ee476946621a69091344fc0d0bc', :desc => "API key"}],
    :expects => [],
    :expects_optional => [{:name => :date, :type => :string, :desc => 'A date in ISO 8601 format',
      {:name => :extras, :type => :string, :desc => 'A comma-separated list of extra keys to return'},
      {:name => :per_page, :type => :integer, :desc => 'The number of items to return per page'},
      {:name => :page, :type => :integer, :desc => 'The page number to return'}],
    :returns => [:FlickrPhotosRsp],
    :fails_with => [:FlickrErrRsp]

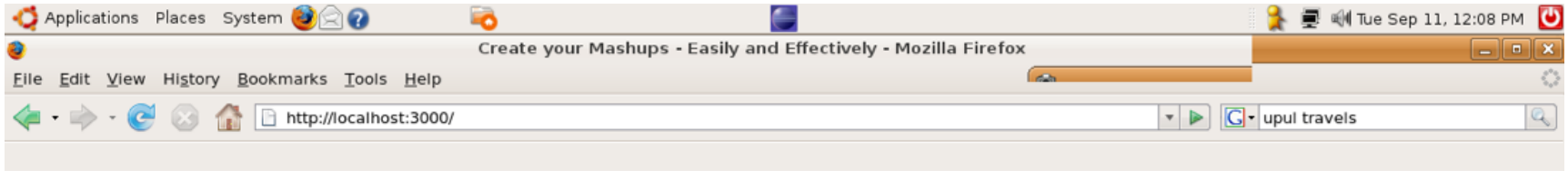
  desc "Get information about a user."
  api_method :flickr_people_getInfo, :http_method => :get, :method_name_as_path => false,
    :fixed => [{:method => 'flickr.people.getInfo'},
      {:api_key => '4eff1ee476946621a69091344fc0d0bc', :desc => "API key"}],
    :expects => [[:user_id, :string, {:desc => 'The NSID of the user to get information about'}],
    :expects_optional => [],
    :returns => [:FlickrPeopleGetInfoRsp],
    :fails_with => [:FlickrErrRsp]

  desc "Return a user's NSID, given their email address"
  api_method :flickr_people_findByEmail, :http_method => :get, :method_name_as_path => false,
    :fixed => [{:method => 'flickr.people.findByEmail'},
      {:api_key => '4eff1ee476946621a69091344fc0d0bc', :desc => "API key"}],
    :expects => [[:find_email, :string, {:desc => 'The email address of the user to find'}],
    :expects_optional => [],
    :returns => [:FlickrPeopleFindByEmailRsp],
    :fails_with => [:FlickrErrRsp]
end

desc "Flickr's REST service definition"
tags ['flickr', 'rest', 'service']
service :flickr_rest_service,
  :type => :rest, :api => :FlickrApi, :alias => :flickr,
  :endpoint => 'http://api.flickr.com/services/rest'
```

Screen shots: Builder

Swashup^{beta}



Swashup^{beta}
Application Creator

[log in](#) | [register](#)

[Home](#) | [Projects](#) | [Deployments](#)

Welcome to the Mashup creator

This mashup creator enables you to create interesting mashups easily using the swashup platform.

please [log in](#) to use this mashup builder. If you don't have a password please [register](#). Nothing to worry It is completely free :)

[News](#) | [FAQ](#) | [User Details](#)

[RSS feed](#)  [ATOM feed](#) 

This is a list of frequently asked questions and will be updated regularly.

1. what is Swashup ?

Swashup is a framework for making mashups. The creator allows you to create a single description of the mashup.

Please type in you username and password

Name:

Password:

on questions.

(in Specific Language) which makes it possible to create

Screen shots: Builder

Swashup^{beta}



Swashup^{beta}
Application Creator

Eugene Maximilien | [log out](#)

project:new_project

[Home](#) | [Projects](#) | [Deployments](#)

Your Project Details You currently have 1 active project **new_project**

Create new Project

- project:new_project
 - Tags
 - recipe:recipe_1
 - Data
 - API
 - Services
 - Mashups
 - View
 - CSS

Data Schema

[help](#)

[Create](#)

[Custom](#) | [From Template](#) | [From Example](#)

Give a name for the data source

Name: *

Description: *

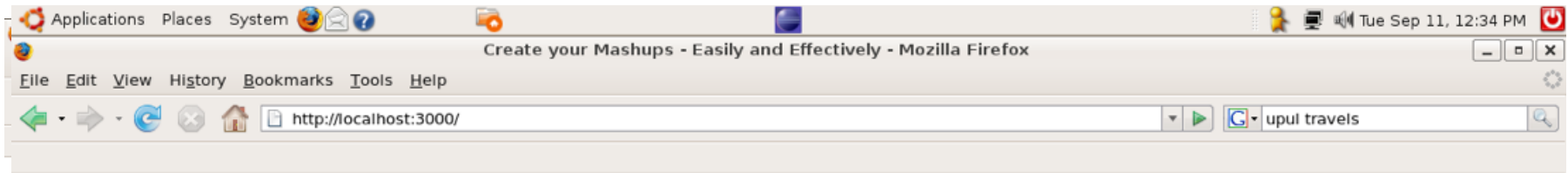
Xml Name :

Add members to this Data Schema

Name	Description	Type	Representation	
<input type="text"/>	<input type="text"/>	string	xml_text	<input type="button" value="Add"/>

Screen shots: Builder

Swashup beta



Swashup beta
Application Creator

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Data Schema

[help](#)

Create

[Custom](#) [From Template](#) [From Example](#)

Atom

Fill in Details for Atom feed template
Load the Atom feed to see extra fields

URL:

Select the fields you need to use from this entry

- element:entry
- element:title
- element:summary
- element:content
- element:category
- element:id
- [... From this list](#)

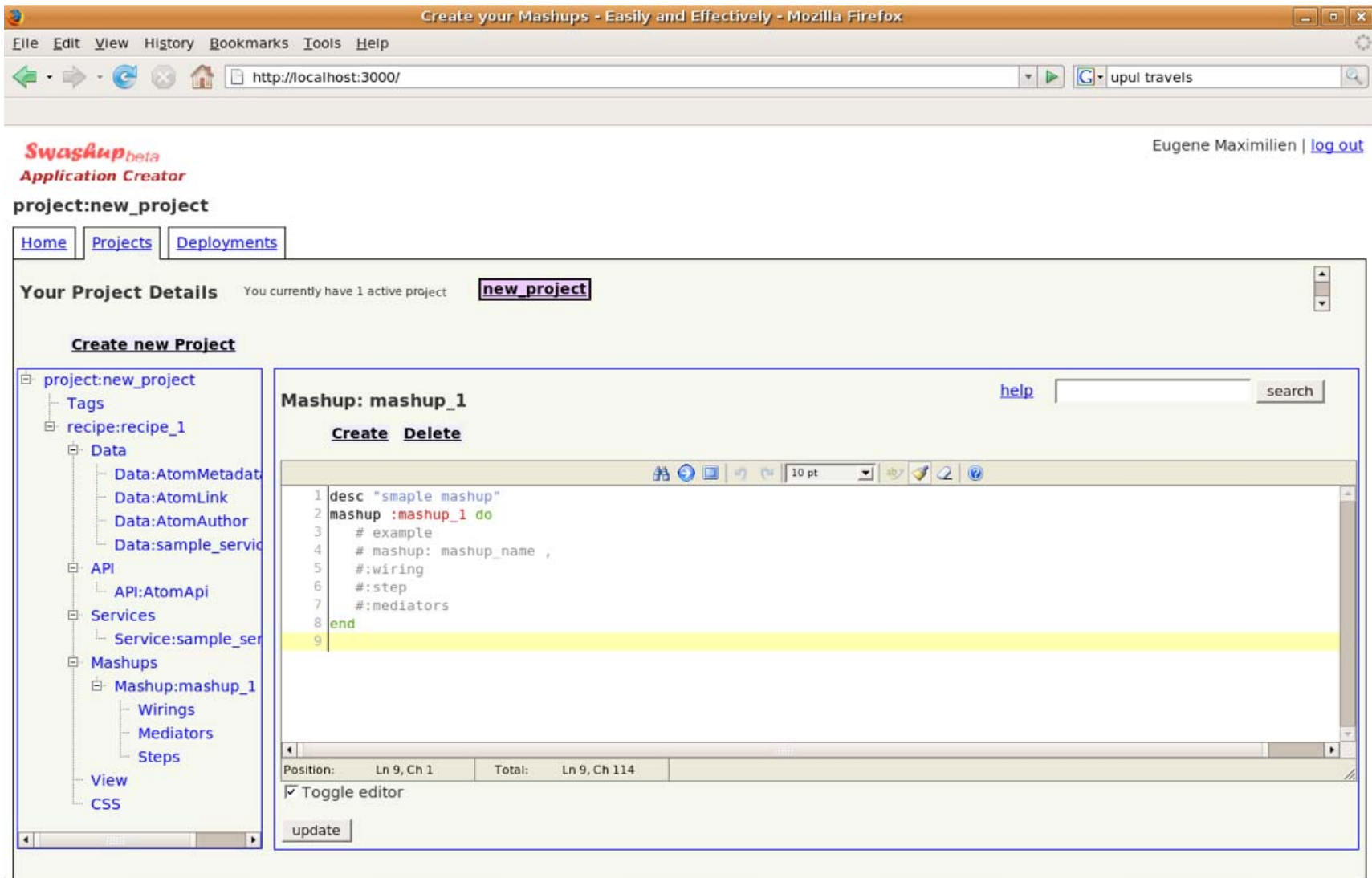
Service Name:

Service Alias:

Entry Name:

Screen shots: Builder

Swashup^{beta}



Create your Mashups - Easily and Effectively - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost:3000/ upul travels

Swashup^{beta} Application Creator Eugene Maximilien | [log out](#)

project:new_project

[Home](#) [Projects](#) [Deployments](#)

Your Project Details You currently have 1 active project **new_project**

Create new Project

- project:new_project
 - Tags
 - recipe:recipe_1
 - Data
 - Data:AtomMetadata
 - Data:AtomLink
 - Data:AtomAuthor
 - Data:sample_servic
 - API
 - API:AtomApi
 - Services
 - Service:sample_ser
 - Mashups
 - Mashup:mashup_1
 - Wirings
 - Mediators
 - Steps
 - View
 - CSS

Mashup: mashup_1 [help](#)

[Create](#) [Delete](#)

```
1 desc "smaple mashup"
2 mashup :mashup_1 do
3   # example
4   # mashup: mashup_name ,
5   #:wiring
6   #:step
7   #:mediators
8 end
9
```

Position: Ln 9, Ch 1 Total: Ln 9, Ch 114

Toggle editor

Screen shots: Builder

Swashup^{beta}



Create your Mashups - Easily and Effectively - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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Swashup^{beta} Application Creator Eugene Maximilien | [log out](#)

project:new_project

[Home](#) [Projects](#) [Deployments](#)

Your Project Details You currently have 1 active project **new_project**

Create new Project

- project:new_project
 - Tags
 - recipe:recipe_1
 - Data
 - Data:AtomMetadata
 - Data:AtomLink
 - Data:AtomAuthor
 - Data:sample_service
 - API
 - API:AtomApi
 - Services
 - Service:sample_service
 - Mashups
 - Mashup:mashup_1
 - Wirings
 - Mediators
 - Steps
 - View
 - CSS

View search

Create

[Custom](#) [Template](#)

Give a name for the View

Name: *

Description: *

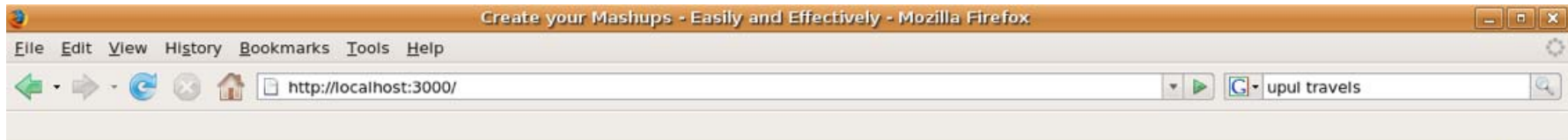
Name
mashup_1 remove

Specify the Mashups this view belongs to

* required fields

Screen shots: Builder

Swashup^{beta}



Swashup^{beta}
Application Creator

Eugene Maximilien | [log out](#)

project:new_project

[Home](#) [Projects](#) [Deployments](#)

Your Project Details You currently have 1 active project **new_project**

Create new Project

Tags

- recipe:recipe_1
 - Data
 - Data:AtomMetadata
 - Data:AtomLink
 - Data:AtomAuthor
 - Data:sample_service_e
 - API
 - API:AtomApi
 - Services
 - Service:sample_service
 - Mashups
 - Mashup:mashup_1
 - Wirings
 - Wiring:sample_v
 - Mediators
 - Steps
 - View
 - View:sample_view
 - CSS

View : sample_view

[Create](#) [Delete](#)

```
1 view :sample_view,  
2 :mashups => [:mashup_1],  
3 :content => %{\br/>4  
5 <html> <body>  
6 <!-- add the components according to wiring detail here -->  
7 </body></html>  
8 }|
```

Position: Ln 8, Ch 3 Total: Ln 8, Ch 332

Toggle editor

Screen shots: Builder

Swashup^{beta}



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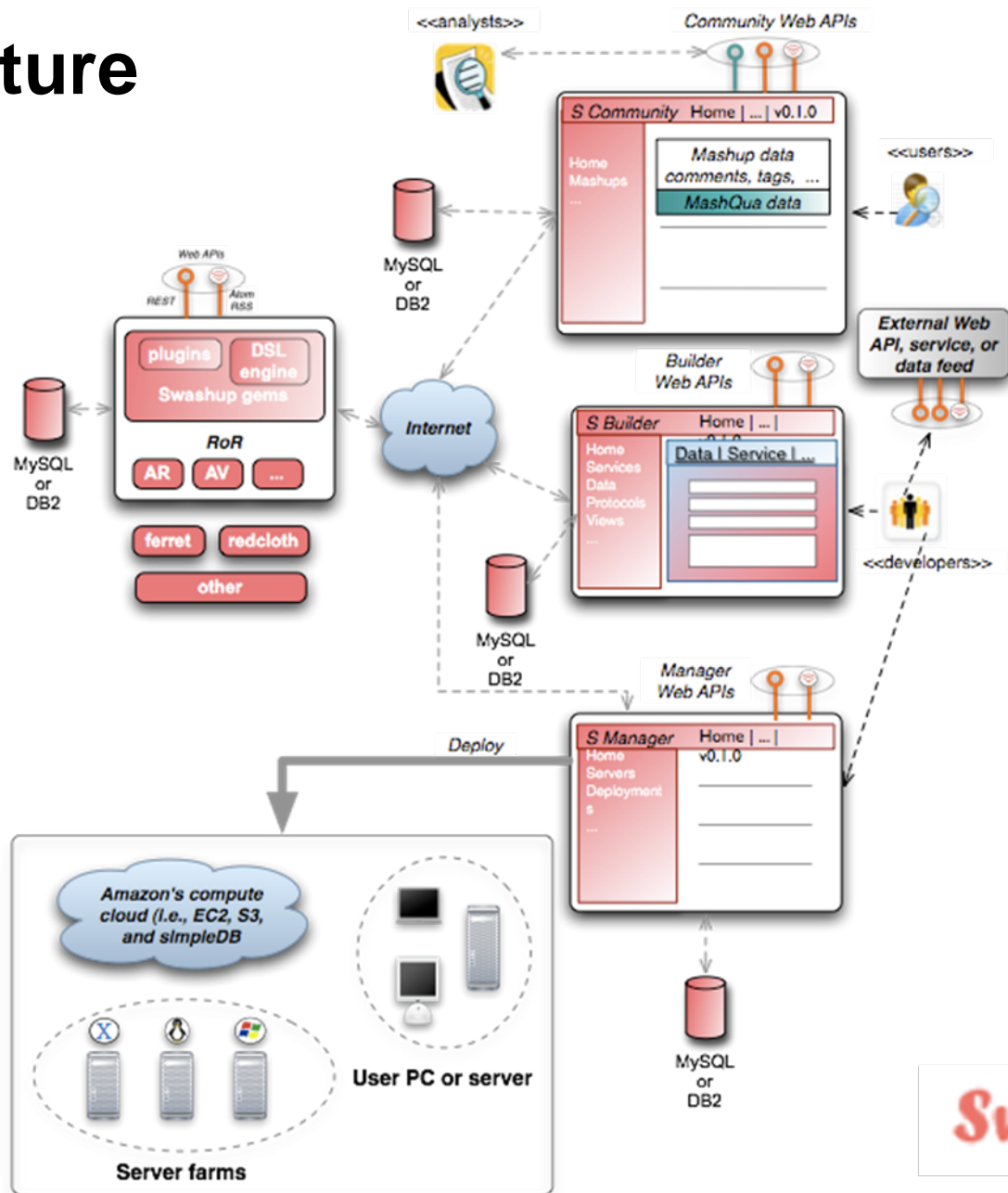
project:new_project

[Home](#) [Projects](#) [Deployments](#)

Deployments

Name	Description	Created	Updated	Status	Link
recipe_1_deployment	Deployment for recipe_1 recipe v1. Created on Tu..	Tue, 11 Sep 2007 16:38:13 GMT	Tue, 11 Sep 2007 16:38:24 GMT	In process [check]	click me Delete

Big Picture



References

- E. M. Maximilien, A. Ranabahu, and S. Tai. “Swashup: Situational Web Applications Mashups”, OOPSLA 2007 poster
- E. M. Maximilien, H. Wilkinson, N. Desai, and S. Tai. “A Domain-Specific Language for Web Services and APIs Mashups”, ICSSOC 2007 paper
- E.M. Maximilien, A. Ranabahu, and K. Gomadam. “An Online Platform for Web APIs and Service Mashups”, IEEE Internet Computing 2008 article
- IBM Sharable Code repository: <http://knoesis.wright.edu/isc>

Some Open Research Questions

- **Mashups **programming model****
 - **End-user-oriented integration paradigms**
 - Mashup exploration, organization, search and integration
 - Reusable and customizable patterns for mashup creation
 - Combined user interface and application integration
 - **Semantic Interoperability**
- **Mashup **platform****
 - **Lightweight support of enterprise features (e.g security, transactions)**
 - **Deployment and management in (various) clouds**
- **Community-driven & collaborative mashup development**
 - **Challenges of social networking applications**
 - **Integration with advances in mobile networking**

Thank You!

