Engineer for Serendipity

Roy T. Fielding, Ph.D

Chief Scientist, Day Software

Cofounder, The Apache Software Foundation

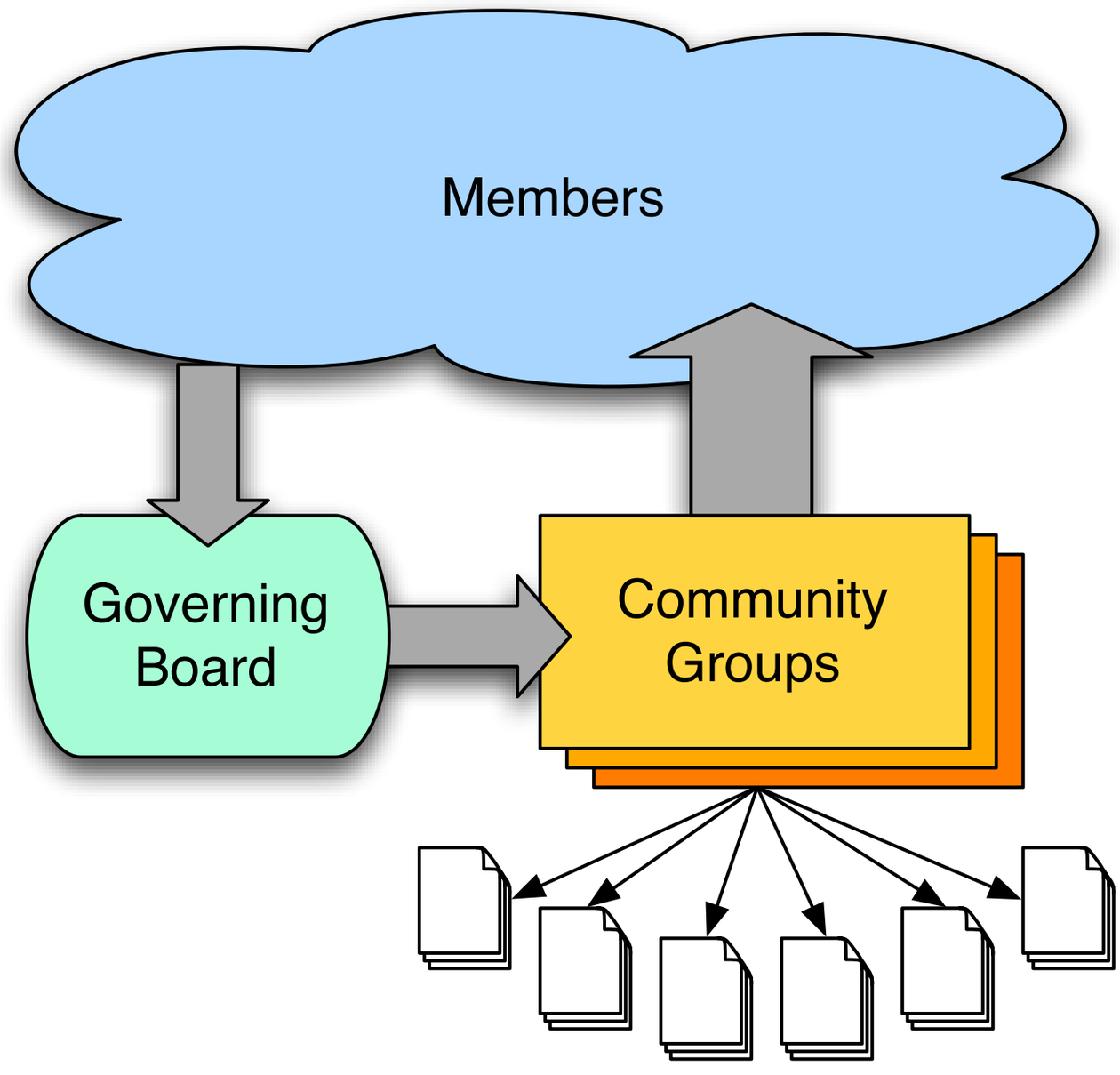
Vice President, Apache HTTP Server

Community Advisory Board / OGB, OpenSolaris

OpenSolaris Constitution

Day

OpenSolaris Governance Structure



http://www.genunix.org/wiki/index.php/OpenSolaris_Governance_Draft_03

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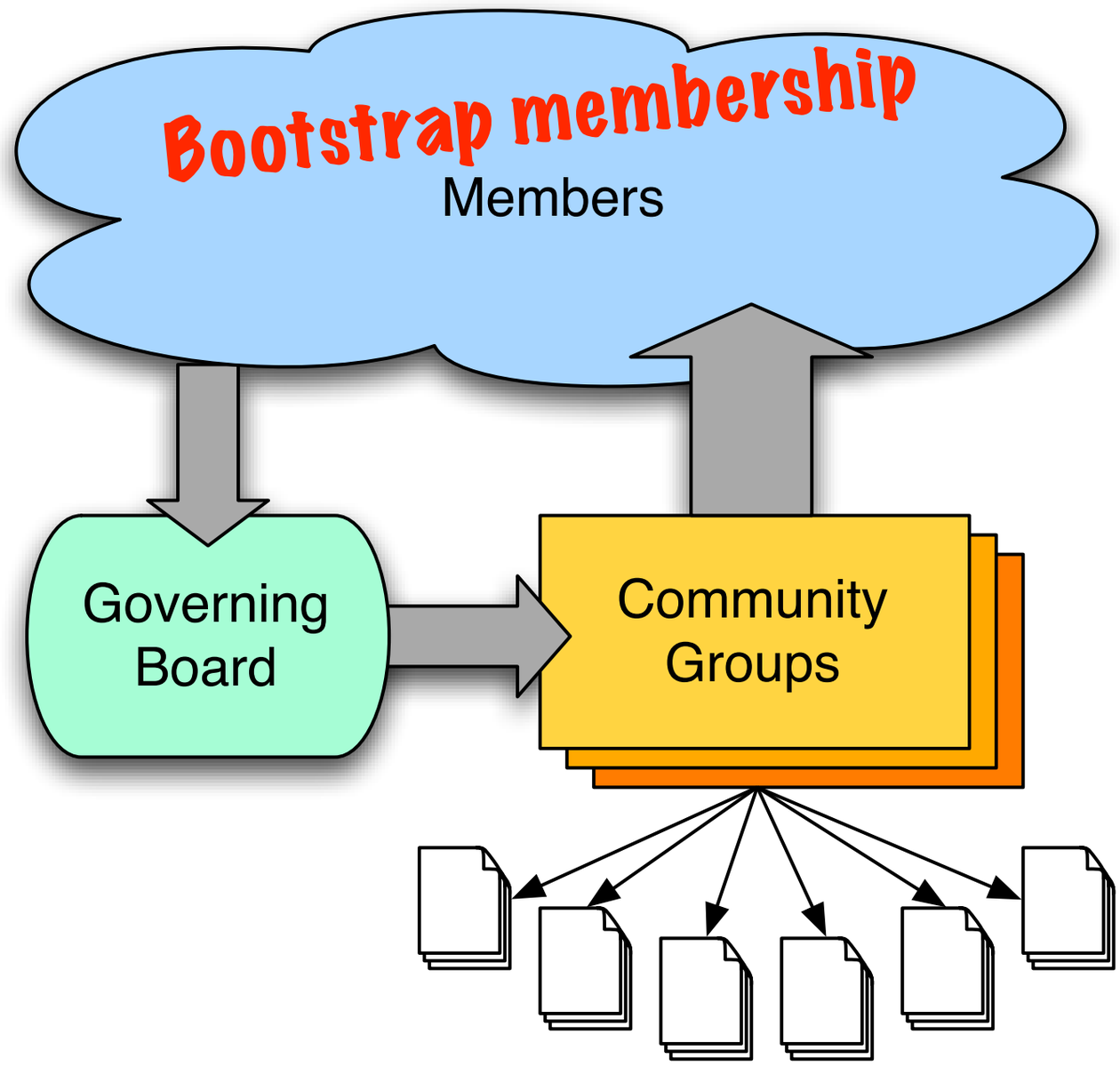

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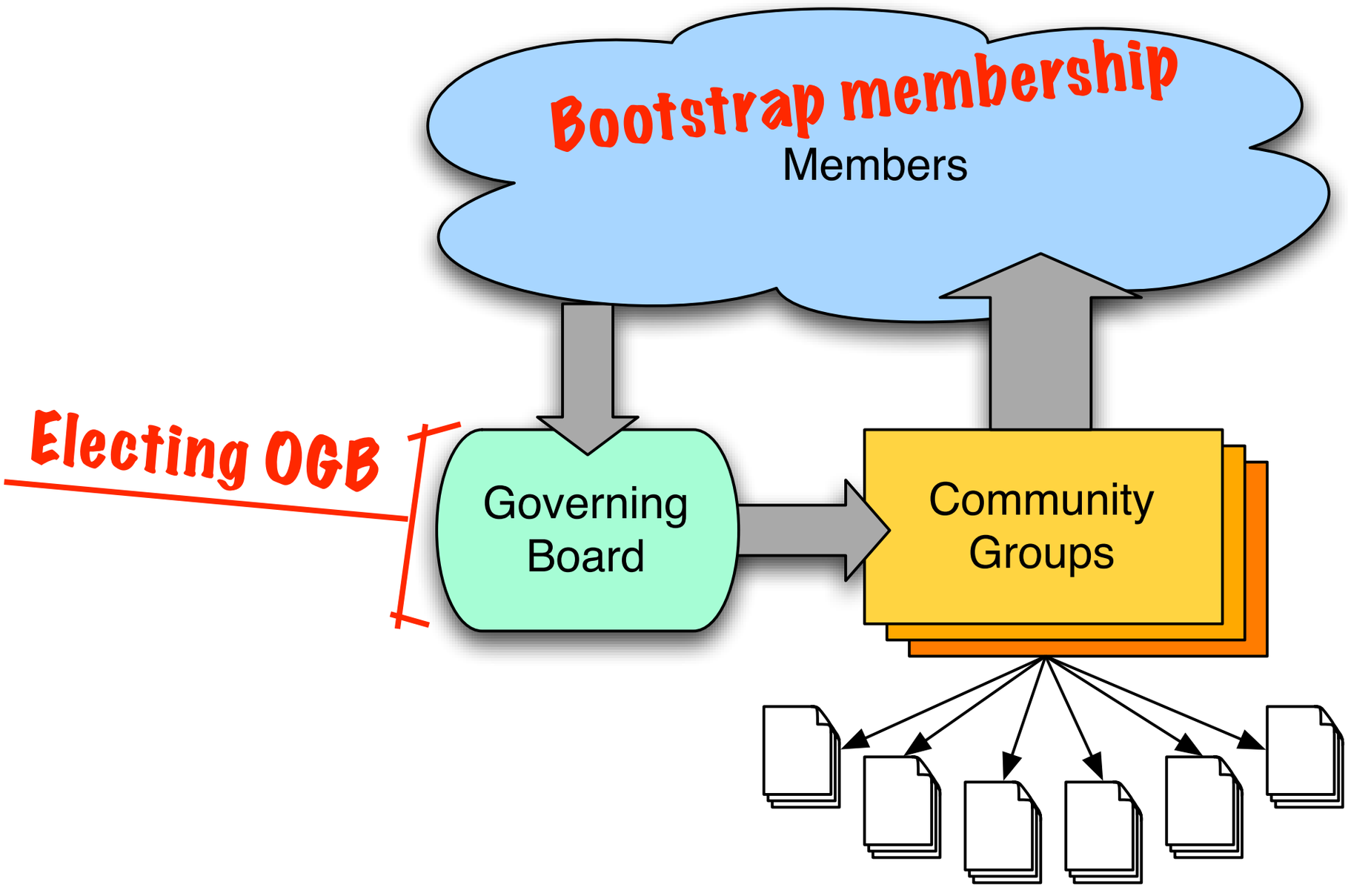

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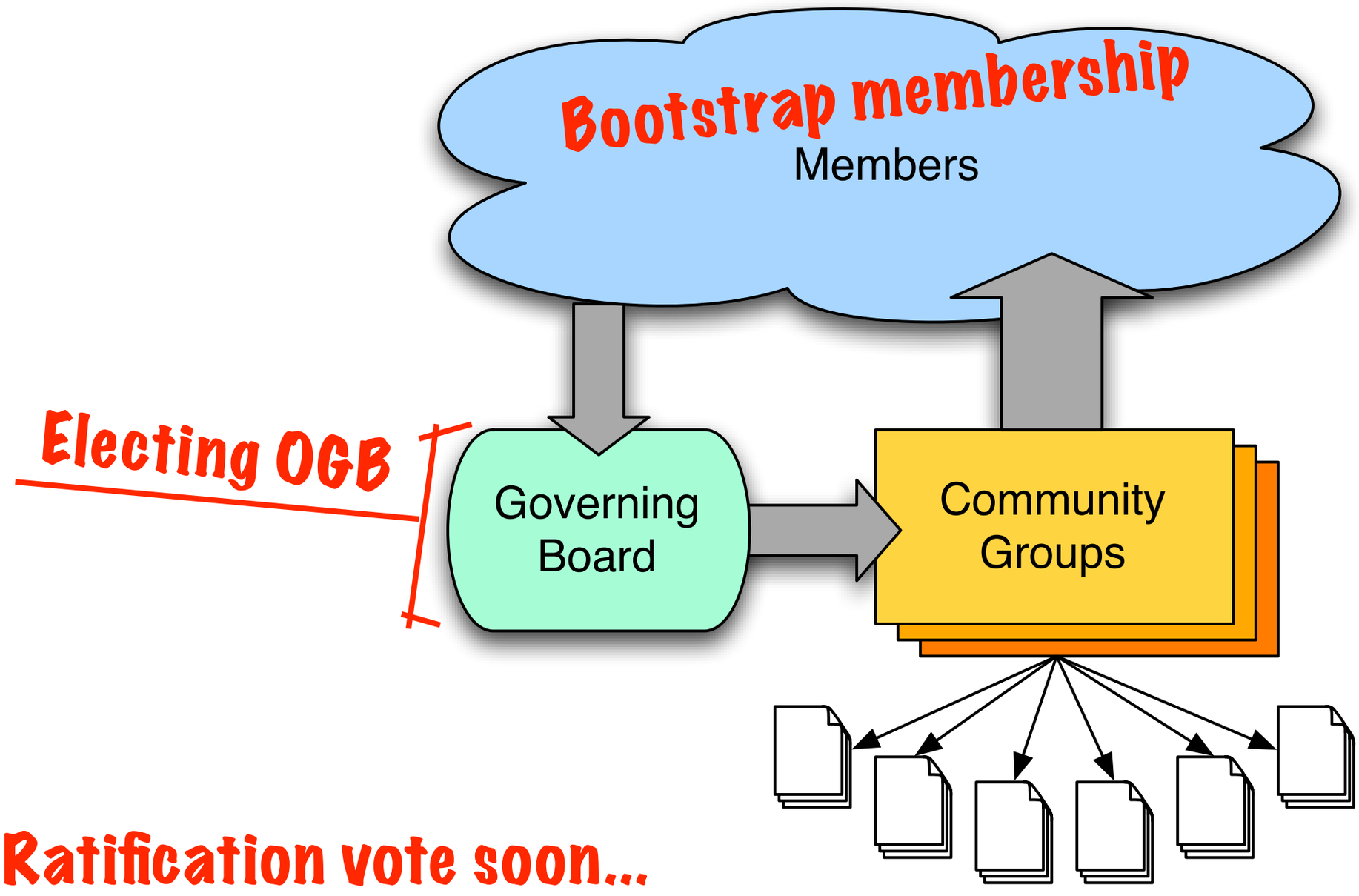

Ratification vote soon...

http://www.genunix.org/wiki/index.php/OpenSolaris_Governance_Draft_03

Confessions of a Unix Hacker

My first real job ...

"We just bought a WICAT minicomputer.
Go figure it out, and then teach the others."

June 1983

Motorola 68000, 2MB RAM, 50MB HD

Unix System 7

... and hooked ever since

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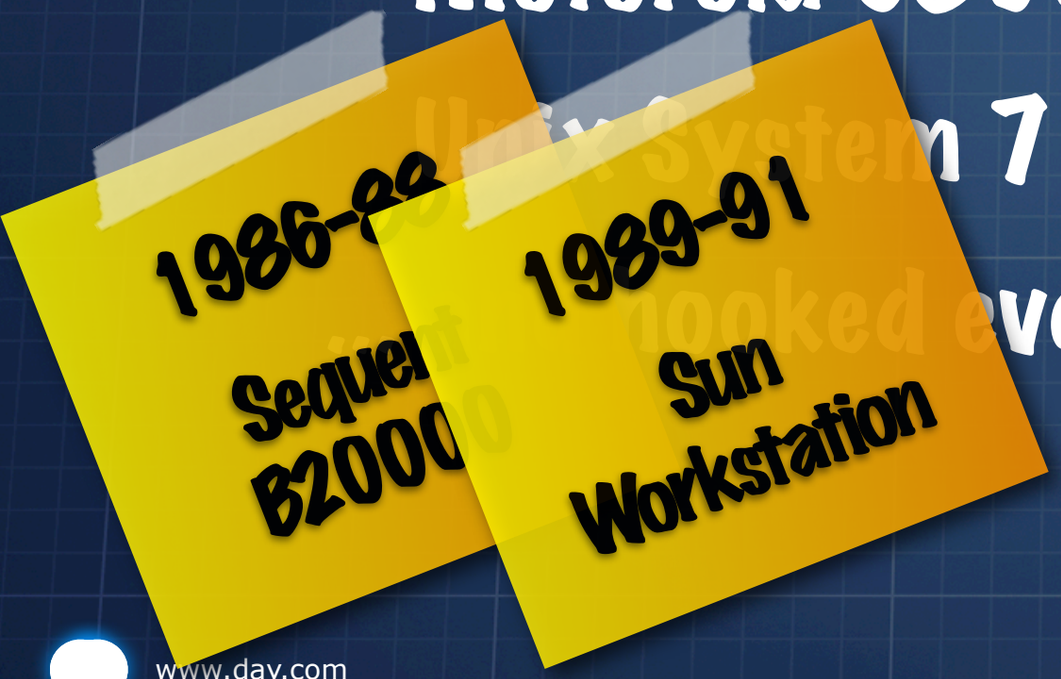

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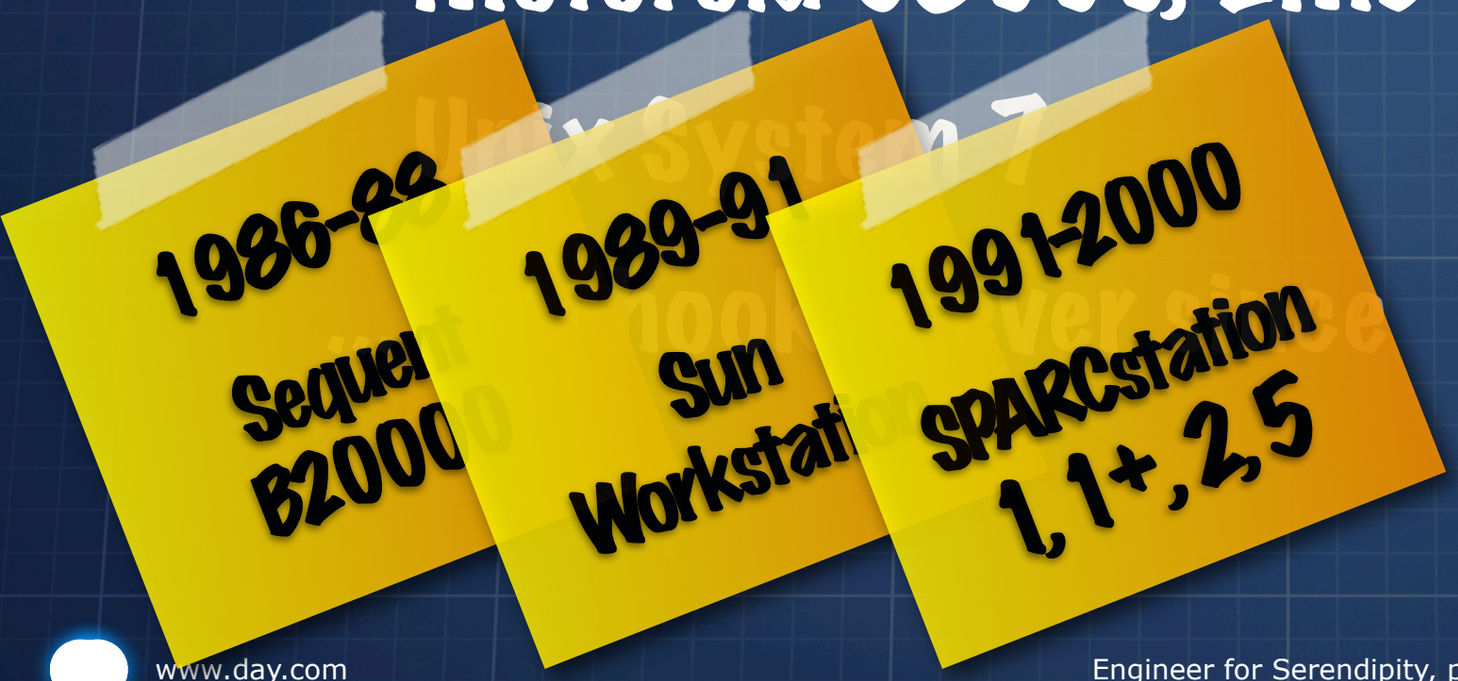

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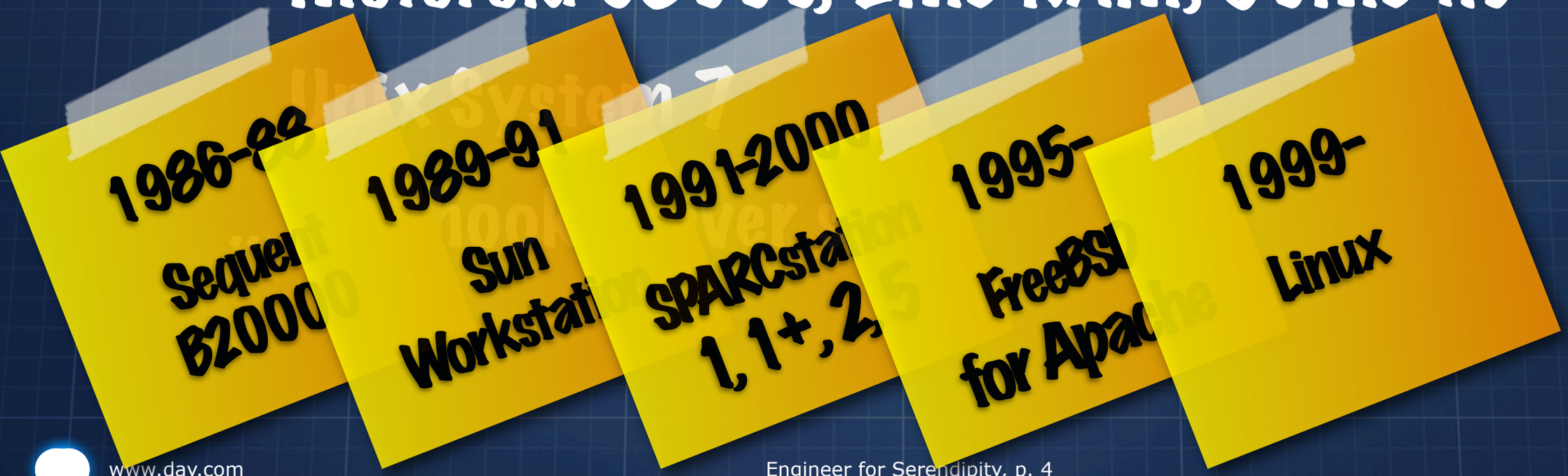

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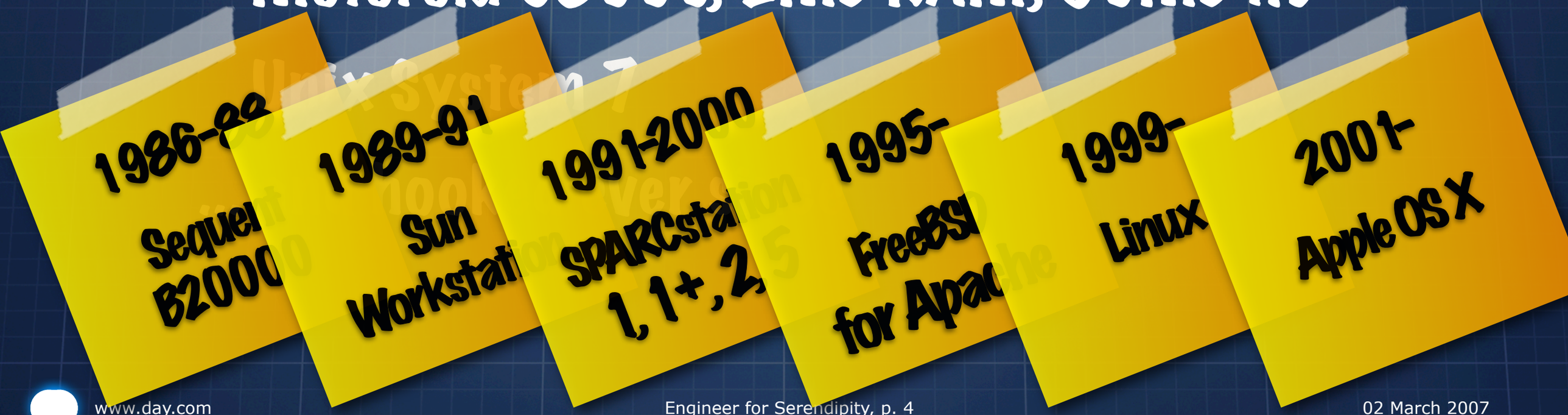


... and what did I learn?

How to Engineer for Serendipity

```
egrep '^From: ' 200511.mbox | \
   cut -d '<' -f 2 | cut -d '>' -f 1 | sort | uniq
```

"The genius of the Unix pipeline is precisely that it is constructed from the very same commands used constantly in simplex fashion. The mental leap needed to see this possibility and to invent the notation is large indeed." [Ritchie, 1979]

Architected by M. Douglas McIlroy, 1972.

Pipe and Filter Style

Simple construction of coroutines
  each filter can be understood on its own
  functionality is a multiple of composition
  complexity is reduced, test independently

Reusable, Extensible, and Evolvable
  filters can be replaced with better versions
  filters can be added by third parties

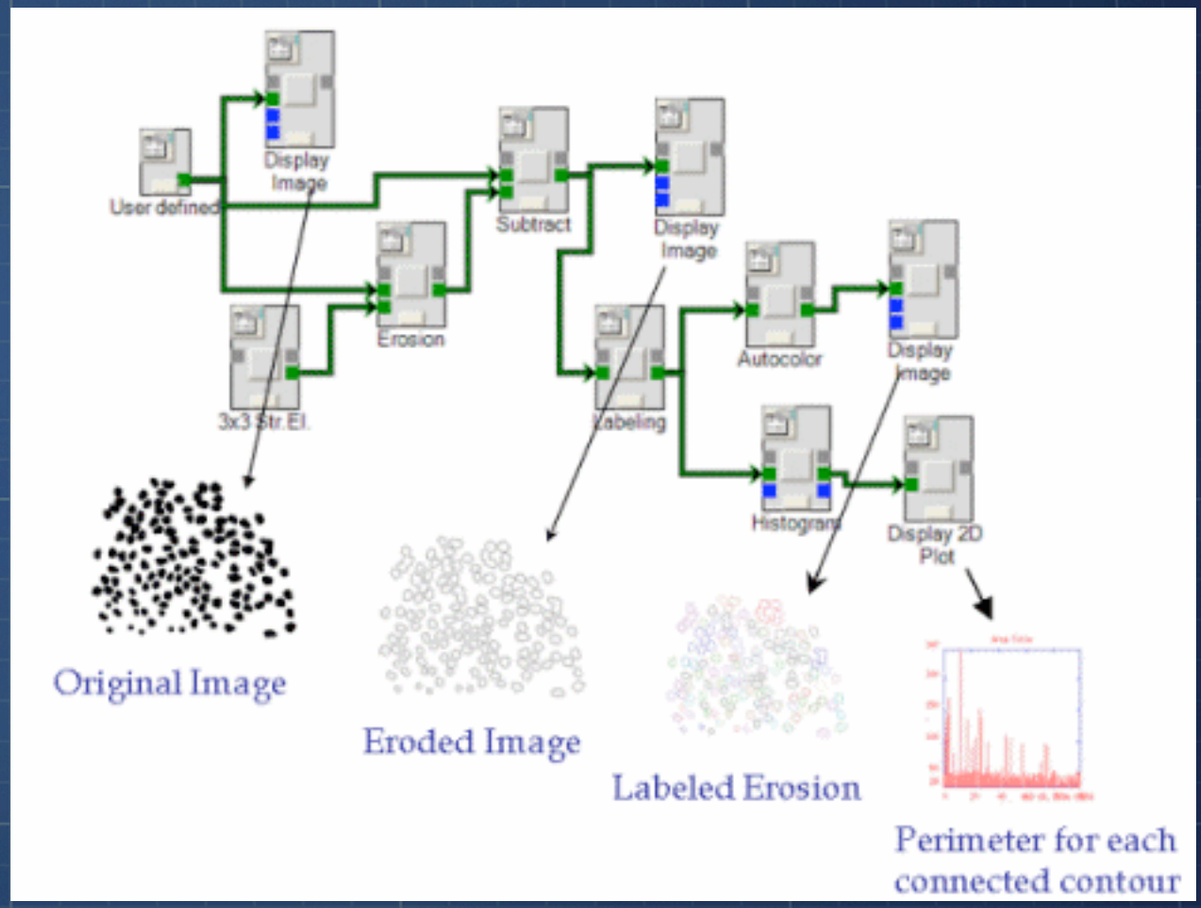
No interactivity (requires pre-configuration)

Khoros Cantata

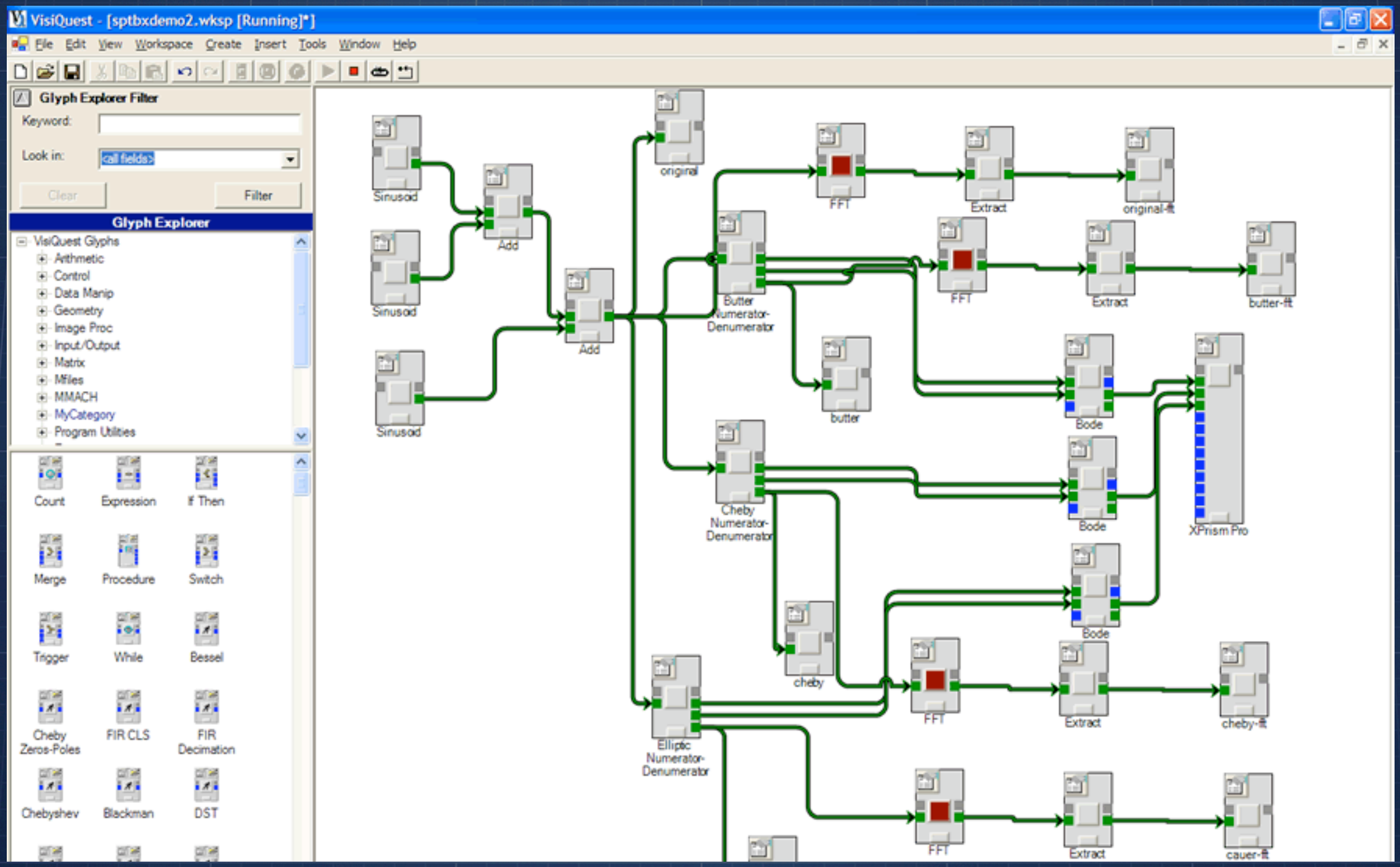
UNM, 1990

Visual programming for large datasets

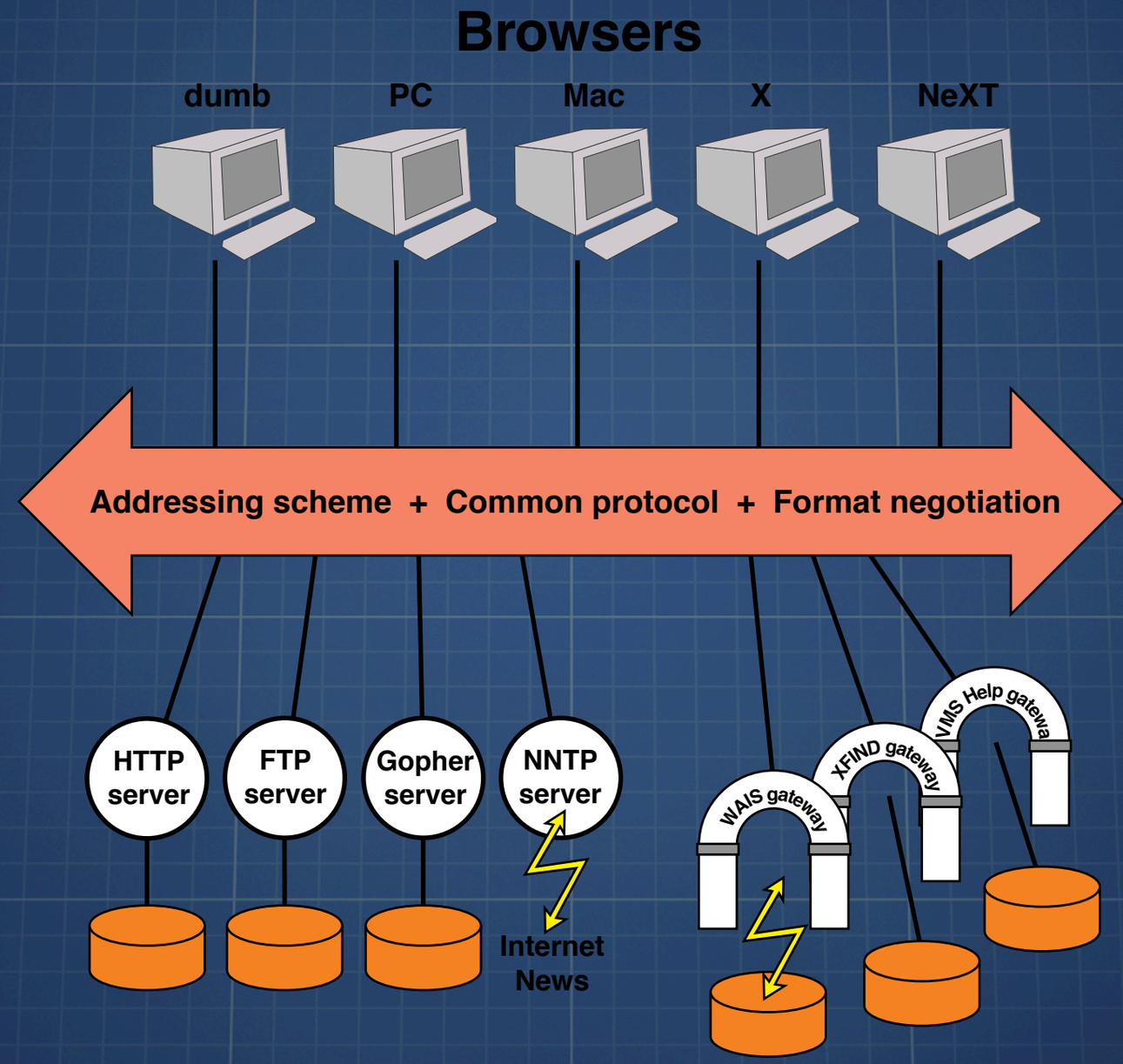
(AccuSoft Visiquest)



AccuSoft VisiQuest



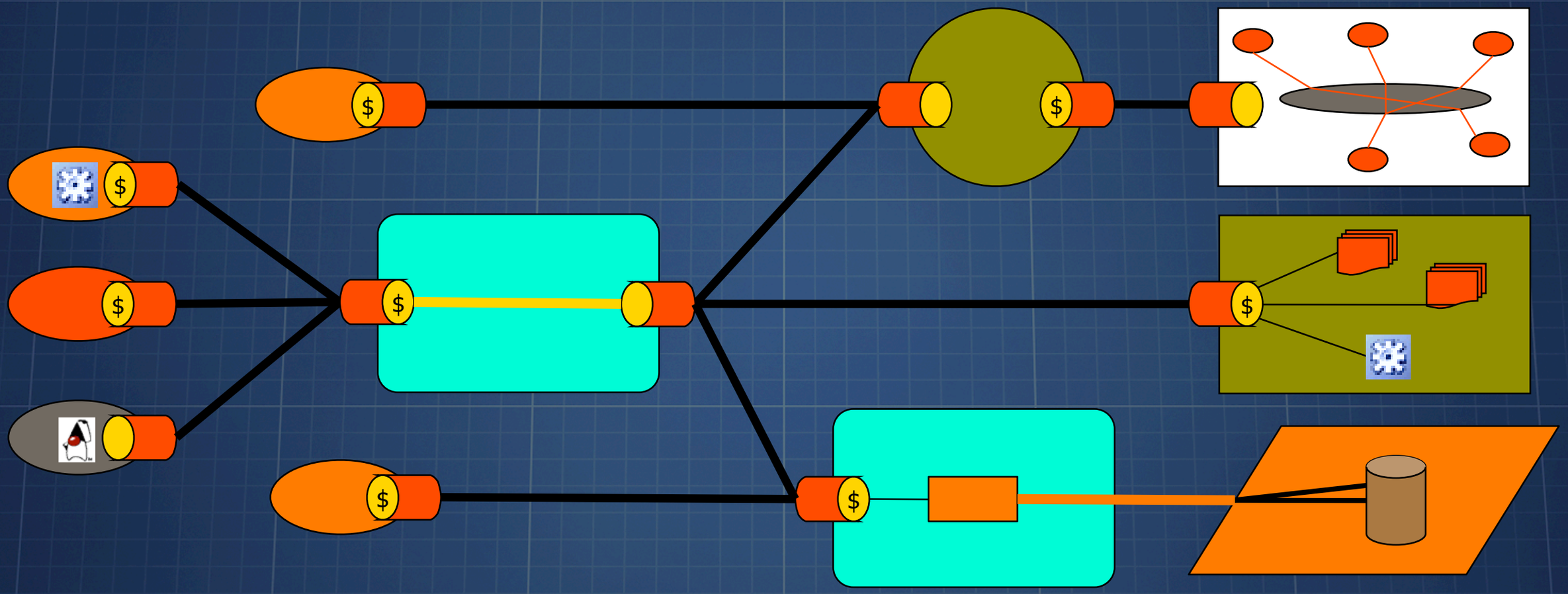
Web Architecture (1992)



Servers/Gateways

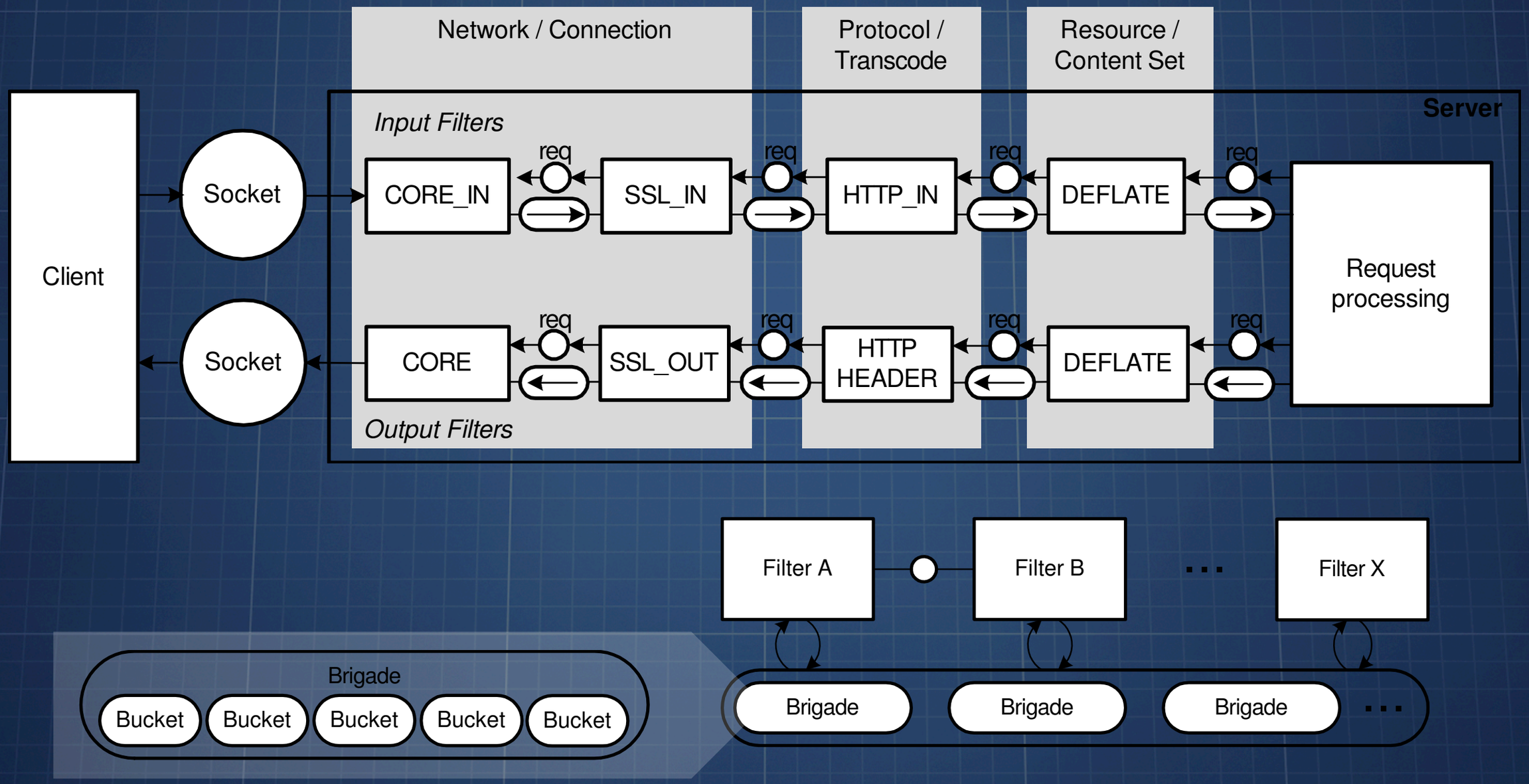
© 1992 Tim Berners-Lee, Robert Cailliau, Jean-François Groff, C.E.R.N.

REST



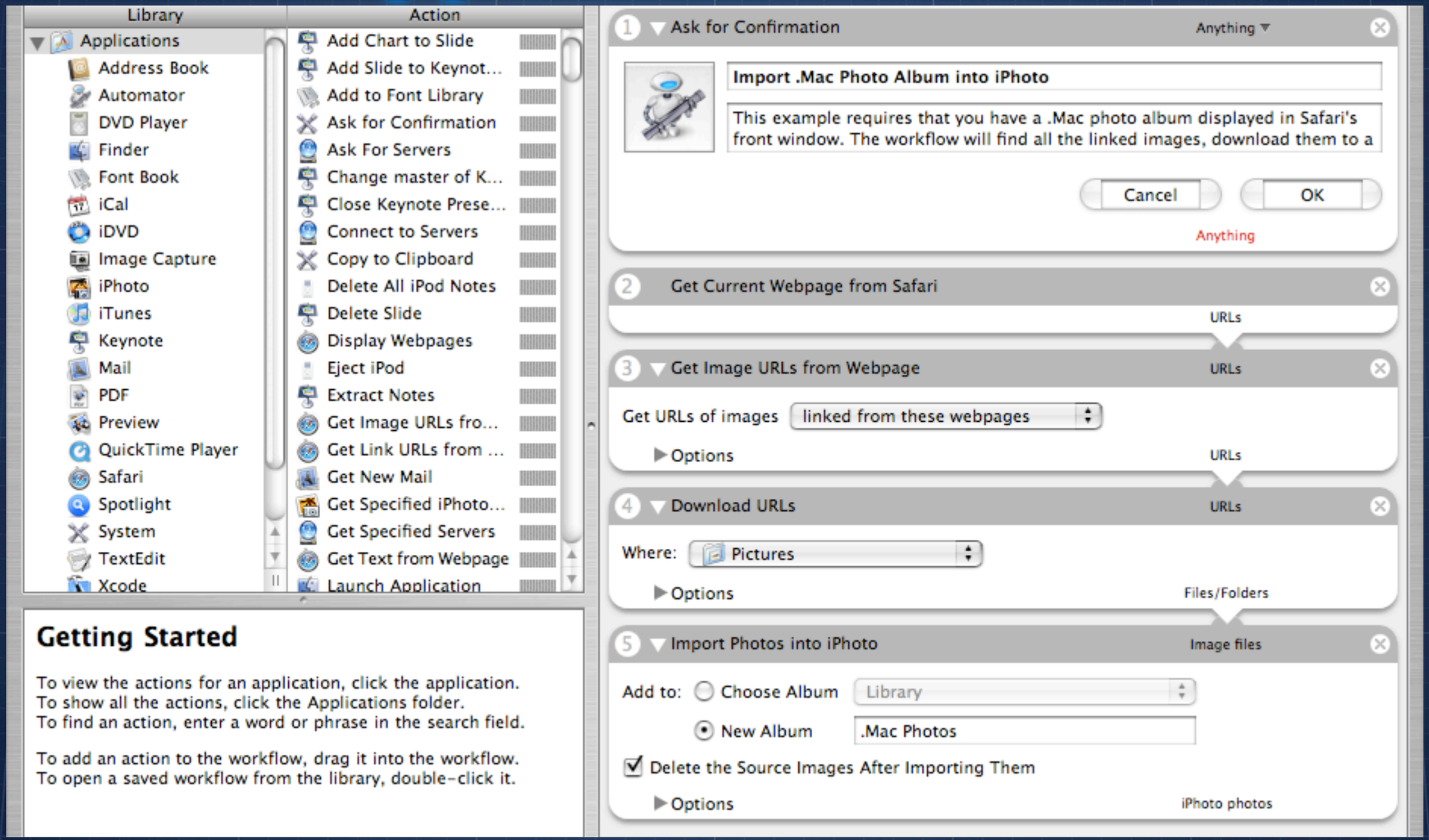
The Web, Re-Architected (1994-98)

Apache httpd 2.x Filters

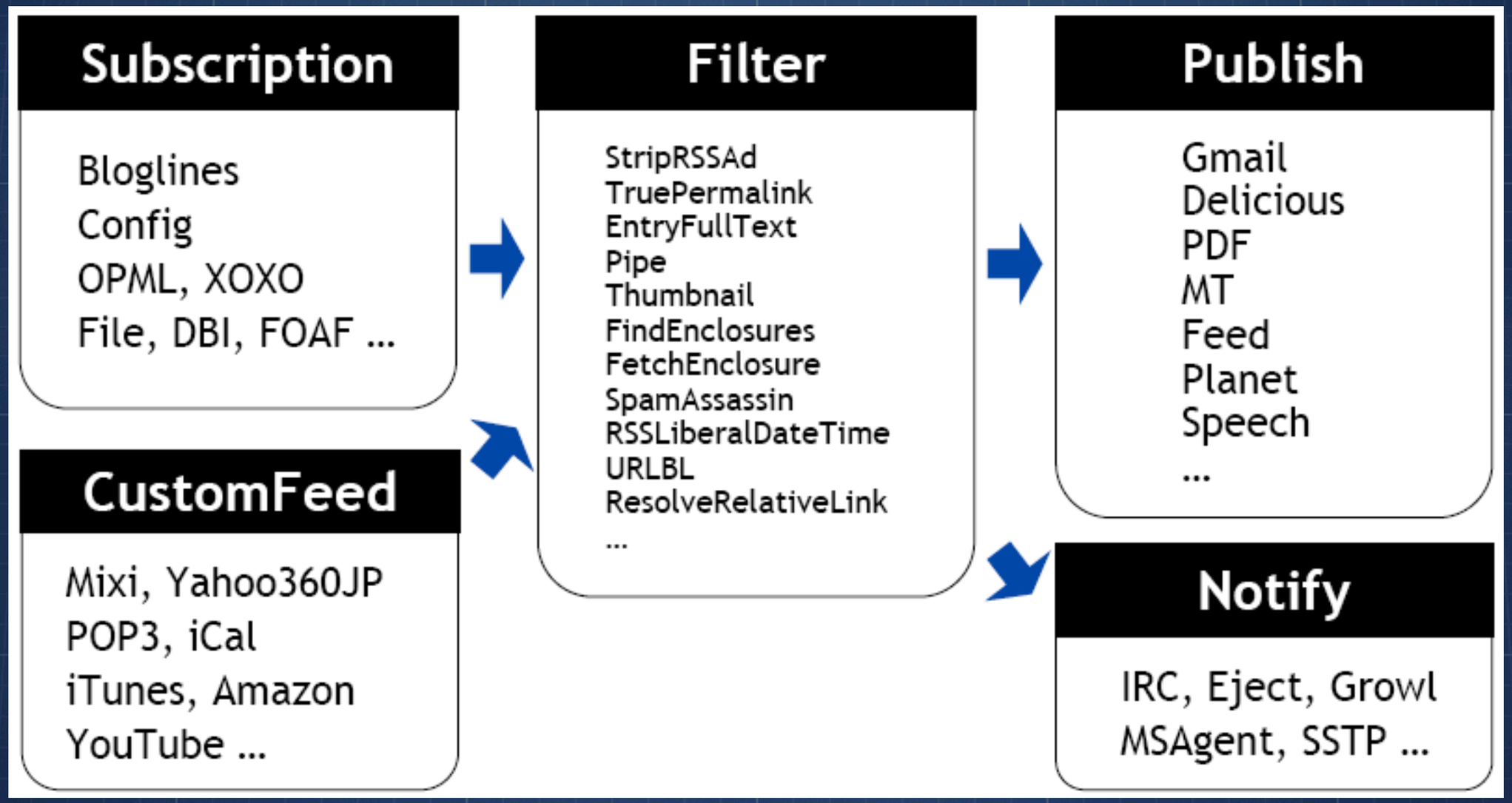


[HPI Apache Modeling Project, http://apache.hpi.uni-potsdam.de/]

Apple Automator



Plagger



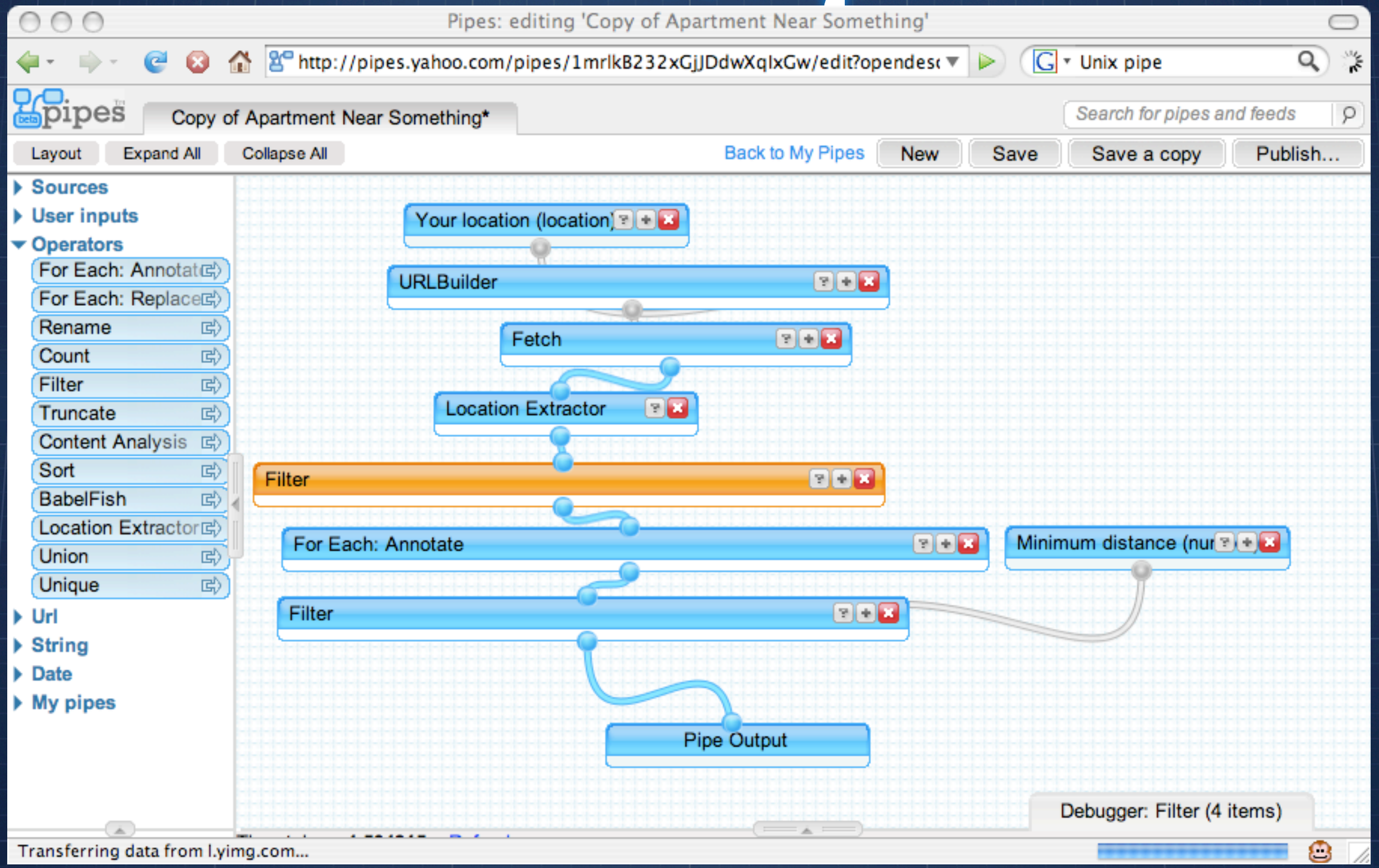
[Tatsuhiko Miyagawa, Six Apart, Ltd.]

Plagger

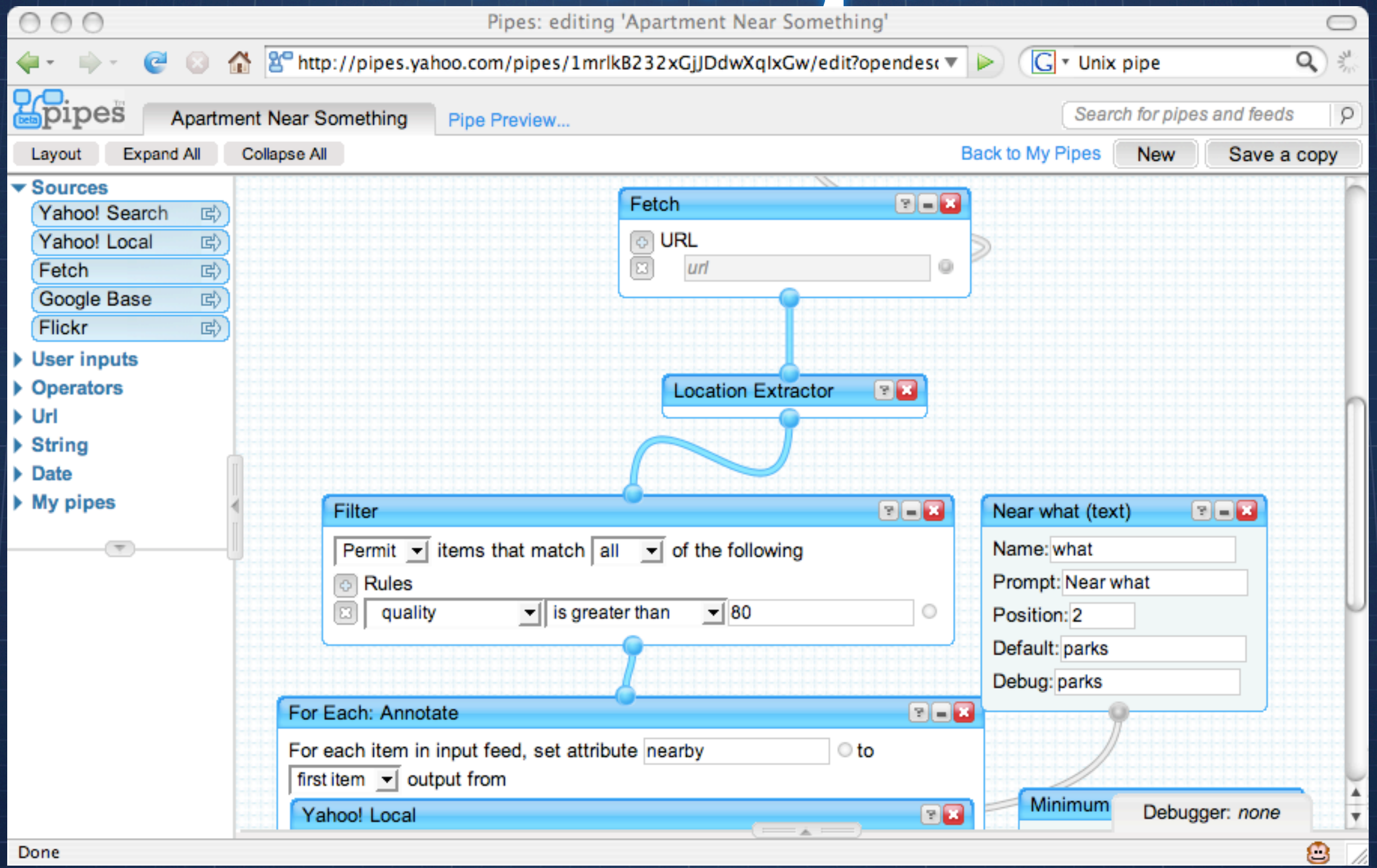
```
plugins:
  - module: Subscription::Bloglines
    config:
      username: you@example.com
      password: foobar
      mark_read: 1
  - module: Publish::Gmail
    config:
      mailto: example@gmail.com
      mailfrom: miyagawa@example.com
      mailroute:
        via: smtp
        host: smtp.example.com
```

[Tatsuhiko Miyagawa, Six Apart, Ltd.]

Yahoo! Pipes


Pipes: editing 'Copy of Apartment Near Something'
http://pipes.yahoo.com/pipes/1mrlkB232xGjJDdwXqlxGw/edit?opendes
Unix pipe
pipes
Copy of Apartment Near Something*
Search for pipes and feeds
Layout
Expand All
Collapse All
Back to My Pipes
New
Save
Save a copy
Publish...
Sources
User inputs
Operators
For Each: Annotat
For Each: Replace
Rename
Count
Filter
Truncate
Content Analysis
Sort
BabelFish
Location Extractor
Union
Unique
Url
String
Date
My pipes
Your location (location)
URLBuilder
Fetch
Location Extractor
Filter
For Each: Annotate
Minimum distance (nur
Filter
Pipe Output
Debugger: Filter (4 items)
Transferring data from l.yimg.com...

Yahoo! Pipes


Pipes: editing 'Apartment Near Something'
http://pipes.yahoo.com/pipes/1mrlkB232xGjJDdwXqlxGw/edit?opendes
Unix pipe
pipes
Apartment Near Something
Pipe Preview...
Search for pipes and feeds
Layout
Expand All
Collapse All
Back to My Pipes
New
Save a copy
Sources
Yahoo! Search
Yahoo! Local
Fetch
Google Base
Flickr
User inputs
Operators
Url
String
Date
My pipes
Fetch
URL
url
Location Extractor
Filter
Permit items that match all of the following
Rules
quality
is greater than
80
Near what (text)
Name: what
Prompt: Near what
Position: 2
Default: parks
Debug: parks
For Each: Annotate
For each item in input feed, set attribute nearby to
first item output from
Yahoo! Local
Minimum
Debugger: none
Done

Deficiencies

Unix pipes
- single stream, no metadata

HTTP
- one stream each direction
- metadata up front

RSS/Atom Feeds
- multiple single-stream inputs
- limited media types, embedded metadata

waka

A replacement for HTTP (under development)
- Token-based, length-delimited syntax
- Self-descriptive messages

Interleaved message (meta)data packets:
- Up to 64 channels per connection
- Up to 63 payload streams per message

Complete transport independence
- TCP, UDP, multicast, ...