



Going Live! with Comet

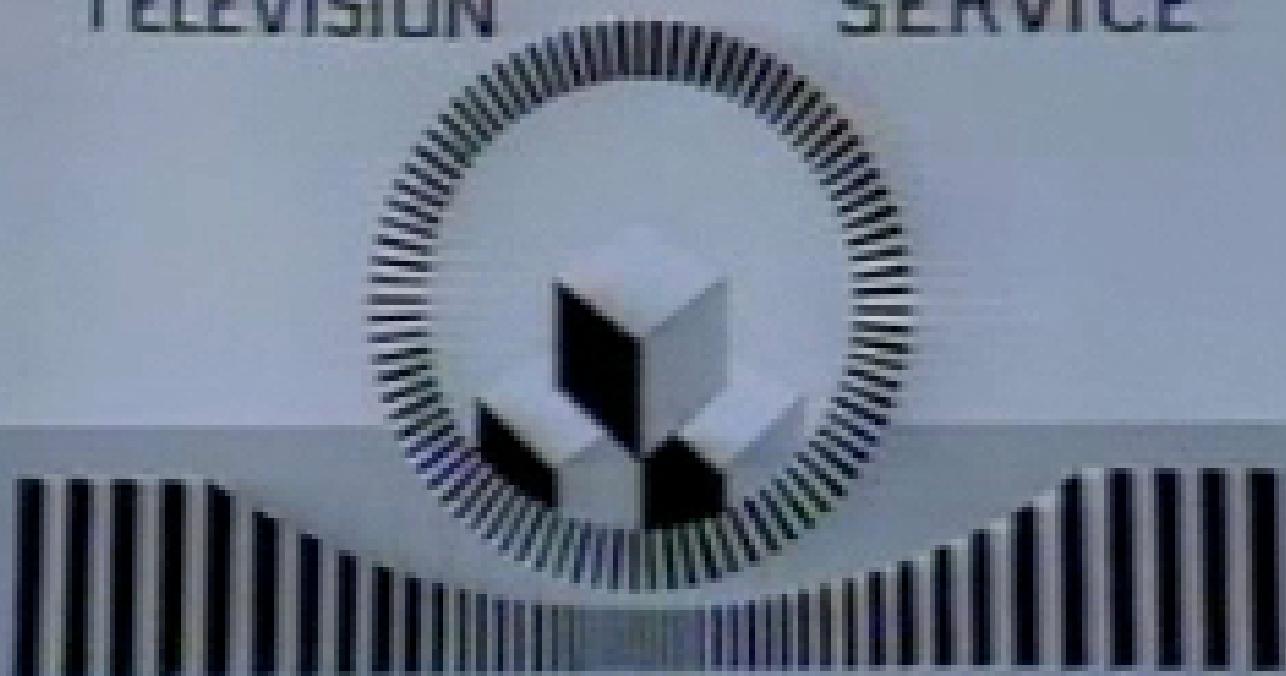
Simon Willison - <http://simonwillison.net/>

SkillSwap Brighton, 11th June 2008

BBC

TELEVISION

SERVICE



TUNING SIGNAL

Live data on the Web

- A new frontier for web apps
- Chat, everywhere - Meebo, Facebook, GChat...
- Twitter (well, it would be nice if it was live)
- Life-casting, live video
- Collaboration tools
- Push, not Pull



<http://www.engadget.com/2008/06/09/iphone-push-notification-service-for-devs-announced/>

Comet: any method that
allows a web server to
push events “live” to
connected browsers

A new name for a very old technique

- Also known as...
 - HTTP push
 - Server push
 - Reverse Ajax
 - Pushlets
 - ...

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Continuing Intermittent Incoherency

Alex Russell being boring, when comprehensible

Fri 3
Mar
2006

Comet: Low Latency Data for the Browser

Posted by alex under [programming](#), [javascript](#), [webdev](#)

An old web technology is slowly being resurrected from the depths of history. Browser features that have gone untouched for years are once again being employed to bring better responsiveness to UIs. Servers are learning to cope with a new way of doing things. And I'm not talking about Ajax.

New services like [Jot Live](#) and [Meebo](#) are built with a style of data transmission that is neither traditional nor Ajax. Their brand of low-latency data transfer to the browser is unique, and it is becoming ever-more common. Lacking a better term, I've taken to calling this style of event-driven, server-push data streaming "Comet". It doesn't stand for anything, and I'm not sure that it should. There is much confusion about how these techniques work, and so using pre-existing definitions and names is as likely to get as much wrong as it would get right.

Archived Entry

Post Date :

Friday, Mar 3rd, 2006 at
10:37 pm

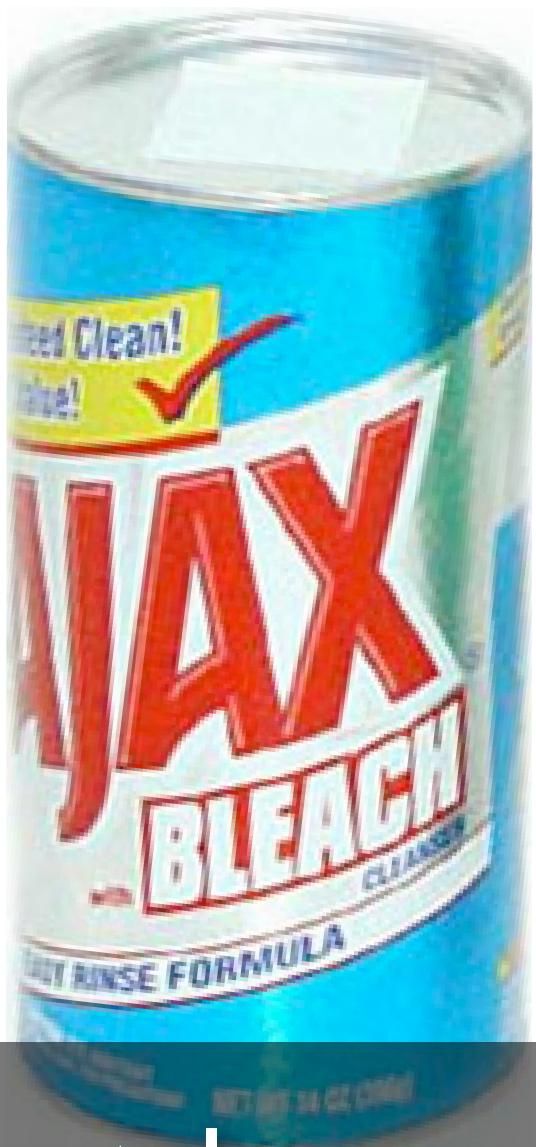
Category :

[programming](#) and
[javascript](#) and [webdev](#)

Do More :

You can [leave a response](#),
or [trackback](#) from your own
site.

Defining Comet
For a return to the usefulness of minimalist web code, some examples of the technology, a list of the problems being solved, and properties which distinguish it from other techniques. As with Ajax, these aren't hard to find.



Deliberately named after a kitchen cleaner

What can you do with it?

Google Mail - Inbox (6655) - swillison@gmail.com

https://mail.google.com/mail/?shva=1#inbox

Mail Calendar Documents Photos Groups Web more ▾

swillison@gmail.com | Settings | Older version | Help | Sign out

Compose Mail

Inbox (6655)

Starred ★ Chats Sent Mail Drafts (9) All Mail Spam (1414) Trash Contacts

▼ Chat

Search, add, or invite

Simon Willison Set status here

Derek Hansen

Mark Pilgrim

Nathaniel Brown

Ryan King @home

damian

Give it up, I'm not in!

Dori Smith too busy to chat

Natalie Downe Away

Scott Johnson

Code ! CODE ! Code

Stuart Langridge

doing work. Wish I was

Waiting for mail.google.com...

Engadget - Photographer drops suit against Apple for lifting images in advertising - 3 hours ago

Archive Report Spam Delete More Actions Refresh

1 - 100 of 7018 [Older](#) [Oldest](#)

Select: All, None, Read, Unread, Starred, Unstarred

Chris, Pat (2) [oauth] IIW/OAuth gathering tonight - Apologies for the absolute last minuteness 2:59 am

alex bodnaru (2) [sqlalchemy] migration deprecation? - BEGIN PGP SIGNED MESSAGE Hash: S1 2:41 am

Laura .. Merl, Tristan (12) [Atg] Break my form! (A bit like pimp my ride but more geeky...) - Hola I've mad 1:27 am

Michael Shook [ydn-delicious] https://api.del.icio.us/v1/posts/all? hasn't worked for me for a ye 12:10 am

matej .. esquifit (11) [greasemonkey-users] Can I fire onchange() event in GM script? - Hi, trying to r 12:00 am

David, Michael (5) [sqlalchemy] should a dns error return true in dialect.is_disconnect() ? - Hi, I've 11:22 pm

Atom .. Shreyas (10) [oauth] Language Preference Extension - Service Providers with a multinational 10:49 pm

Ronald Lew [sqlalchemy] Collection class using OrderedDict and MappedCollection - I am c 9:56 pm

Eran .. Pelle, Blaine (30) [oauth] Group Survey / RFI (request for introduction) - Well, not really a survey.. 8:51 pm

Eran, Lachlan (2) [oauth] OAuth Core 1.0 Released - December 4, 2007 – The OAuth Working Grou 8:03 pm

Alexandre Conrad [sqlalchemy] Representation of boolean logic in a database - hi, this is more a d 7:51 pm

P K Kothari Read these articles career development : Forward to your children. - How and 7:04 pm

Kapil, Michael (2) [sqlalchemy] orm overrides explicit value sets - I've attached an example, wher 7:04 pm

Eran Hammer-Lahav [oauth] OAuth Sessions at IIW - If you are in the area you are welcomed to join us 7:04 pm

Glaucio, Michael (3) [sqlalchemy] problem with cast in postgres - Hi all, I'm using the funct.cast in post 7:04 pm

Vladimir, Marco, Michael (3) [sqlalchemy] column_property() caching - hi, is it possible to add a non-caching 7:04 pm

Mitch Buchannon [LRUG] LRUG Nights - Tonight - Hey Guys and Girls. It's that time of the day when 7:04 pm

Guy Huntington [oauth] Group Survey / RFI (request for introduction) - I'm 7:04 pm

Andrew, Tom (3) [LRUG] Dumping A Database Ruby-Style - Hi, I need to du 7:04 pm

Shane .. Michael (10) [dojo-contributors] Dojo demo framework - Hi All, So, I've 7:04 pm

Michael, Andrew (3) [Pythonmac-SIG] Embedding Python in Cocoa - Hi, Suppo 7:04 pm

Atom [oauth] Extension for short-lived service credentials for p 7:04 pm

Margaret Harper Fwd: FW: I LOVE YOU - Note: forwarded message attached. 7:04 pm

Chris .. Jon, Eran (6) [oauth] OAuth Final Release Plan - Hey all, Now that OAuth 7:04 pm

imgrey .. Michael (26) [sqlalchemy] concurrent modification - Does someone hav 7:04 pm

Natalie Downe

me: Hey Nat!

Options Pop-out

Google Mail - Inbox (6655) - swillison@gmail.com

https://mail.google.com/mail/?shva=1#inbox

Mail Calendar Documents Photos Groups Web more ▾

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Zimbra

Chris Smith

Compose Mail

Inbox (6655)

Starred

Chats

Sent Mail

Drafts (9)

All Mail

Spam (1414)

Trash

Contacts

Chat

Search, add

Simon W

Set status

Derek H

Mark Pilg

Nathanie

Ryan Kin

@home

damian

Give it up

Dori Smi

too busy

Natalie C

Away

Scott Joh

Code ! C

Stuart La

doing wo

Waiting for m...

February 2008

S	M	T	W	T	F	S
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16

New Buddy

Filter

Buddy List

Zimbra Assistant

Buddies

- AmyA
- GregA
- sdietsen

Search

Email ▾

Search

Save

Advanced

Search the Web...

Mail Address Book Calendar Tasks IM [Beta] Documents Briefcase Preferences

New online Refresh

offline

online

available for chat

do not disturb

away

extended away

invisible

Custom Status Message

GregA

sample

Hey, how did the meeting go?

11:47 AM

GregA

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https://mail.google.com/mail/?shva=1#inbox

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Zimbra Chris Smith

Compose Mail

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Trash

Contacts

New Buddy

Filter

Buddy List

Zimbra As

Buddies

AmyA

GregA

sdtietze

Search

Email Search Save Advanced

Search the Web...

meebo.com

http://www.meebo.com/

Google

meebo

instant messaging everywhere

aim

login

password

[forgot password?](#) [sign up!](#)

yahoo!

login

password

[forgot password?](#) [sign up!](#)

meebo

meebo id

password

[forgot password?](#) [sign up!](#)

remember me Sign On

google talk

login

password

[forgot password?](#) [sign up!](#)

msn

login

password

[forgot password?](#) [sign up!](#)

more networks: sign on as invisible Sign On

English | Afrikaans | Albanian | Arabic | အာရာ့သုတေသန | રાજી | Euskara | Bork! | Bosanski | Български | Català | Sugbuhanon | 中国话 | 中國話
Code Monkey | Creole | hrvatski jezik | Česky | Dansk | Nederlands | British English | Esperanto | Eesti keel | Filipino | Suomi
Français | Français Québec | Galego | Deutsch | ??????? | Ελληνική | ગુજરાતી | Hebrew | हिन्दी | Magyar | Íslenska | Ilokano
Indonesian | Gaeilge | Italiano | 日本語 | Bahasa Jawa | ທ່ານຮັງ Hol | ວຽງ ທ່ານຮັງ Hol | 한국어 | Latne | Lolcat | i337
lietuvių kalba | Lojban | Македонски | Malagasy | Malayalam | Bahasa Melayu | मराठी | Монгол | Li Niha | Norsk bokmål | Norsk nynorsk
Persian | Igpay Atinlay | Polski | Português Brasileiro | Português | ਪੰਜਾਬੀ | Română | Русский | Backwards | српски језик | Slovensky
Slovenian | Español | Castellano | Español México | Kiswahili | Svenska | Schwyzerdütsch | Tagalog | தமிழ் | தென்தென் | తామిల్
Türkçe | Українська | Ўзбекча | tiếng Việt | Cymraeg | Xhosa | Yorùbá | Help translate!

Waiting for mail

February

S	M	T	W
27	28	29	30
1	2	3	4
10	11	12	13

Google Mail - Inbox (6655) - swillison@gmail.com

<https://mail.google.com/mail/?shva=1#inbox>

Mail Calendar Documents Photos Groups Web more ▾ [Settings](#) | [Older version](#) | [Help](#) | [Sign out](#)

Zimbra Chris Smith

Inbox (6655) Starred Chats Sent Mail Drafts (9) All Mail Spam (1414) Trash Contacts Chat

Compose Mail New Buddy Filter Buddy List Zimbra Buddy List Buddies AmyA GregA sdietze

Search Email Search Save Advanced Search the Web...

meebo.com http://www.meebo.com/ Google

The Facebook Blog | Facebook http://blog.facebook.com/blog.php?post=12811122130 Google

facebook

Email: Password: Remember me Login Forgot Password? Everyone Can Join Sign Up

The Facebook Blog

Back to The Facebook Blog

Facebook Chat: Now We're Talking
by Josh Wiseman Sunday, April 6, 2008 at 2:33am

This week marks the launch of Facebook Chat—a new way for you to communicate with your friends in real-time. The Wall and Inbox have been the primary ways to communicate, but when more immediacy is necessary—for example when making plans for lunch in half an hour or arguing over a foul call in the NCAA tournament—they might not be enough. Chat aims to fill this gap.

We'll be rolling this out slowly going forward, but fairly soon you'll notice our new Chat bar at the bottom of your browser—no installation or assembly required. From this bar you can view your list of online friends and open conversations with any or all of them. There's no need to setup a "buddy list." Unlike the Wall or Inbox, the messages are delivered and displayed to your friend as soon as they're sent, so you should expect a response right away and without any page loading. Of course, Chat has to play nice with the rest of the Facebook experience. You can collapse conversations to get them out of the way, and go offline if you don't want to use Chat at all. Chat is there when you want it, and tucked away when you don't.

We're working on pulling other features of the site into the real-time Chat world. Your notifications will now arrive in the Chat bar, and while chatting you'll see your friend's Mini-Feed activity thrown into the conversation, as it occurs.

Chat Popout Chat | Settings | Help You are Online. Go Offline Zach is seeing who's

Archived Posts by Date

2008 June (1) May (5) April (6) March (2) February (4) January (3) 2007 December (4) November (4) October (1) September (3) August (4) July (4) June (2) May (5) April (9) March (8) February (7) January (4) 2006 December (3) November (6) October (5) September (7) August (4)

Archived Posts by Blogger

Aditya Agarwal (2) Alexandre Roche (1) Andrew 'Boz' Bosworth (2) Ari Steinberg (2) Blair Heuer (1) Bob Trahan (2) Brian Shire (1) Carolyn Abram (11) Cherie Nunnally (2)

to.

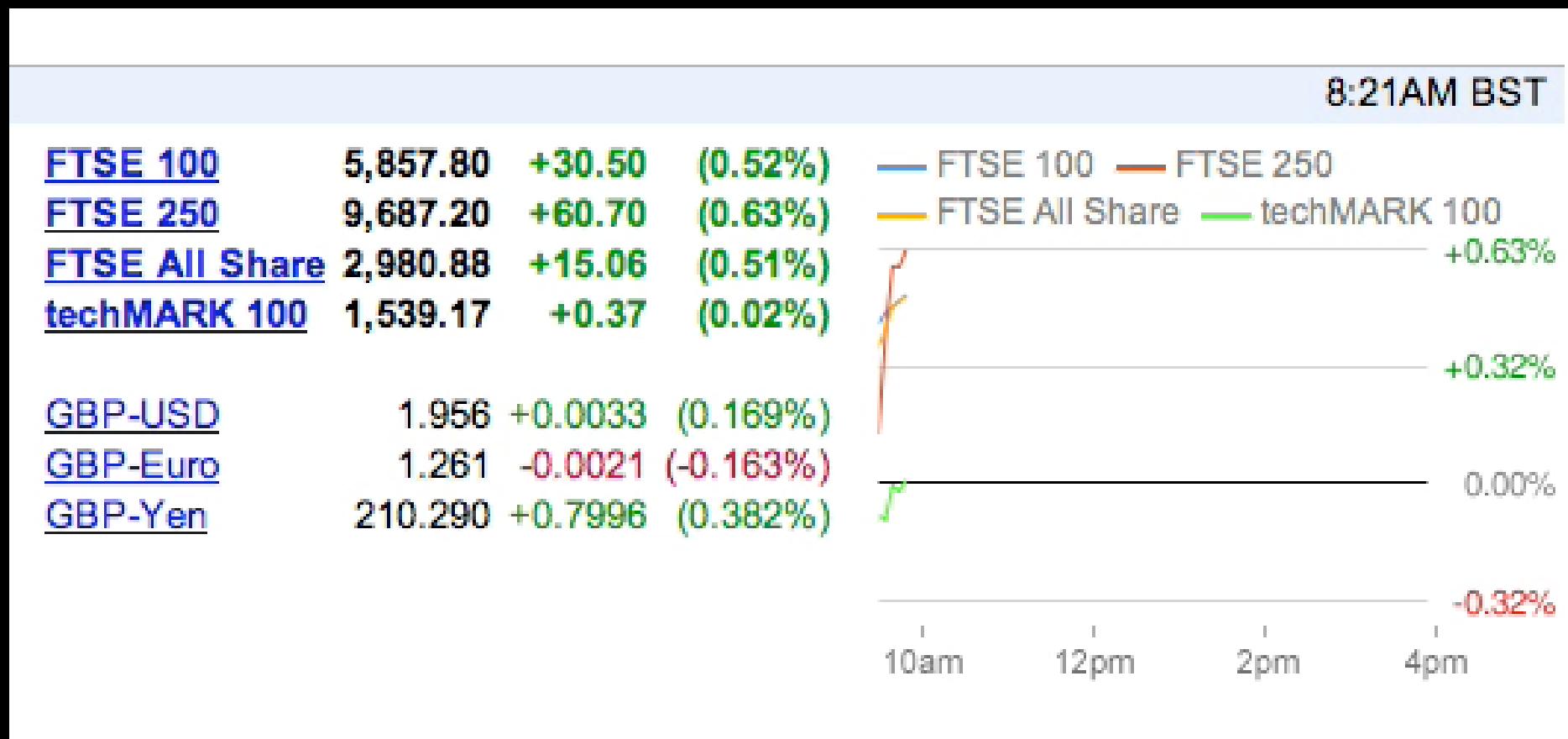


Preferences

Friends Advertising Developers Terms Privacy Help



Google Finance



example spreadsheet – Google Docs

http://spreadsheets.google.com/ccc?key=p0GUf1c5U9mzr3Ey5pnQvYA&hl=en_GB

Google Docs BETA

example spreadsheet

File Edit Sort F

Format A B

	A	B
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

example spreadsheet – Google D

http://spreadsheets.google.com/ccc?key=p0GUf1c5U9mzr3Ey5pnQvYA

Google Docs BETA

example spreadsheet Autosaved at 4 Nov 2007 09:06:13 GMT

File Edit Sort Formulas Revisions

Format B I U Abc f tT T Align

	A	B	C	D	E	F	G
1							
2							
3							
4							
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6							
7							
8							
9							
10							
11							
12							

Early Comet



Back



Forward



Home



Reload



Images



Open



Print



Find



Stop

Location:

about:mozilla



What's New!

What's Cool!

Handbook

Net Search

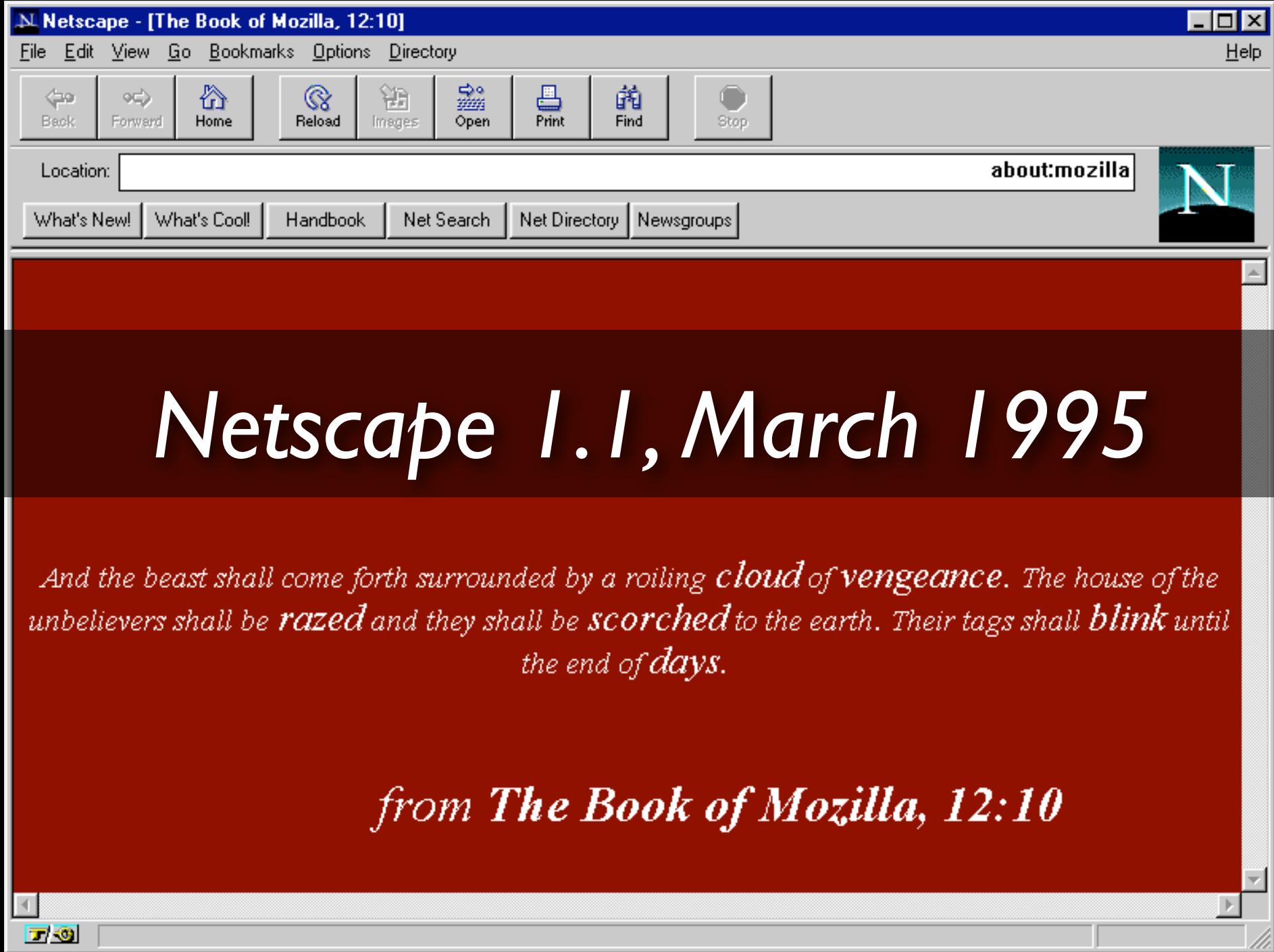
Net Directory

Newsgroups

And the beast shall come forth surrounded by a roiling cloud of vengeance. The house of the unbelievers shall be razed and they shall be scorched to the earth. Their tags shall blink until the end of days.

from The Book of Mozilla, 12:10





Netscape 1.1 new features

Netscape 1.1 new features

- Tables

Netscape 1.1 new features

- Tables
- Background images

Netscape 1.1 new features

- Tables
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- “Dynamic Documents”

Netscape 1.1 new features

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 - Client Pull

Netscape 1.1 new features

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 - **Server Push**

Netscape 1.1 new features

- Tables
- Background images
- “Dynamic Documents”
 - Client Pull
 - **Server Push**
- Predates JavaScript, Internet Explorer and Flash



AN EXPLORATION OF DYNAMIC DOCUMENTS

INTRODUCTION

This document explores the "server push" and "client pull" dynamic document capabilities of Netscape Navigator 1.1 (Windows, Mac, and Unix versions). Please send comments to pushpull@netscape.com. Also, if you are using either server push or client pull in a real-world application, please drop us a note at pushpull@netscape.com and let us know -- thanks!

Examples are given at the end, along with an important note on implementing server push CGI programs as shell scripts.

THE GREAT IDEA

The general idea is that browsers have always been driven by user input. You click on a link or an icon or an image and some data comes to you. As soon as people saw they could do that, they wanted to give a server the ability to push new data down to the browser. (An obvious example is a stock trader who wants to see new quote data every 5 minutes.) Up until now, that hasn't been possible.

Netscape Navigator 1.1 gives content creators and server administrators two new open standards-based mechanisms for making this work. The mechanisms are similar in nature and effect, but complementary. They are:

1. **Server push** -- the server sends down a chunk of data; the browser displays the data but leaves the connection open; whenever the server wants it sends more data and the browser displays it, leaving the connection open; at some later time the server sends down yet more data and the browser displays it; etc.
2. **Client pull** -- the server sends down a chunk of data, including a directive (in the HTTP response or the document header) that says "reload this data in 5 seconds", or "go load this other URL in 10 seconds". After the specified amount of time has elapsed, the client does what it was told -- either reloading the current data or getting new data.

In server push, a HTTP connection is held open for an indefinite period of time (until the server knows it is done sending data to the client and sends a terminator, or until the client disrupts the connection). In client pull, HTTP connections are never held open; rather, the client is told when to open a new connection, and what data to fetch when it does.

Server Push, Client Pull

In server push, the magic is accomplished by using a variant of the MIME message format "multipart/mixed", which lets a single message (or HTTP response) contain many data items. In client pull, the magic is accomplished by an HTTP response header (or equivalent HTML tag) that tells the client what to do after some specified time delay.

“Client Pull”

```
<META HTTP-EQUIV="Refresh" CONTENT=1>
```

“Server Push”

Content-type: **multipart/x-mixed-replace;boundary=XXooXX**

--XXooXX

Content-type: text/plain

Data for the first object.

--XXooXX

Content-type: text/plain

Data for the second and last object.

--XXooXX--



• RESERVATIONS

• CONTACT US

• WEBCAM

• HOME

• PACKAGES

• DINING

• ROOMS & SUITES

• VIEW ROOMS

• ATTRACTIONS

Web Cam

Adobe Resort
PO Box 219,
1555 Hwy 101,
Yachats, OR 97498.

Reservations:
1-800-522-3623
Or
(541) 547-3141
Fax: (541) 547-4234
or [email us](#).

[DIRECTIONS](#)



Enter Address Here



TELL A FRIEND

RESET

Copyright 2004 by Adobe Resort





Chat Using Dynamic Animated Images

This page demonstrates how text can be typeset and pushed to a web browser in real time. The chat box below is an interactive, dynamically generated, animated GIF image. Each time a line of text is to be displayed, the server renders and sends the next frame of the animation.

```
12:13: teets - dada
12:13: teets - ddaaad
Ping joined at 20:35 on 2007-12-03.
20:35: Ping - Hi Simon
ramana joined at 00:57 on 2007-12-04.
00:57: ramana - hi
Caca joined at 04:04 on 2007-12-04.
04:04: Caca - Salut
04:07: Caca - ca va?
04:07: Caca - Fuck you!
dave joined at 14:37 on 2007-12-04.
14:37: dave - hello
hi joined at 14:41 on 2007-12-04.
hi left at 14:41 on 2007-12-04.
Simon joined at 22:00 on 2007-12-04.
```



Simon:

 Say it

This technique makes it possible to provide a real-time chat service with no software for users to download, no firewall or proxy problems, no dynamic HTML, no Java or Javascript required, no Flash, and no automatically reloading frames. This would have worked long before Netscape, Sun, and Microsoft introduced their buggy and bloated implementations of these features.

This little look-alike window in the niche card was built on Saturday 25 September 1999. The font is the product of some early word-processor editing.

Javascript is used for displaying the text in a window-like fashion, except when you close this window, but the Javascript isn't necessary in order to make text typed by others appear in real-time. Sorry I didn't get around to implementing word-wrapping.

<http://zesty.ca/chat/> (1999)

Modern Comet

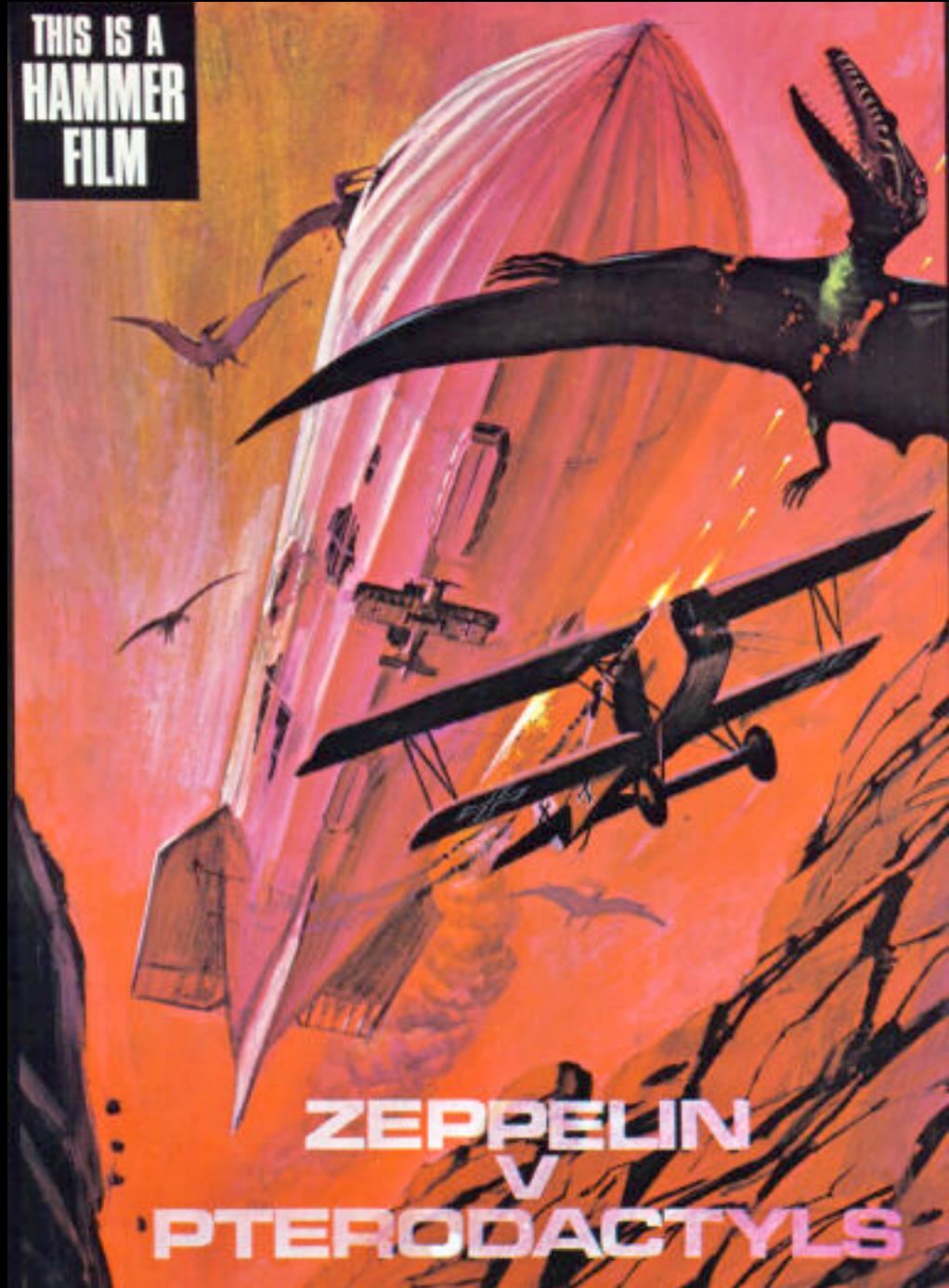
```
var xhr = new XMLHttpRequest();
xhr.open('GET', '/comet', true);

xhr.onreadystatechange = function() {
    if (readyState == 3) {
        // Process xhr.responseText
    }
};
```

If only it were
that simple...

An Epic Saga

Of geek v.s. browser



<http://airminded.org/2007/05/25/the-movie-that-time-forgot/>

Problem #1

Problem #1



Problem #1



`xhr.responseText` isn't available until
the page has finished loading

A hidden iframe

(The forever frame technique)

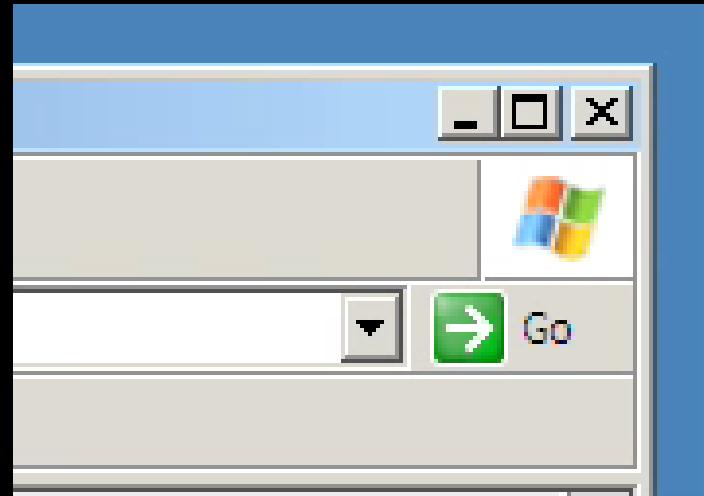
- Add a hidden iframe pointing at a streaming page
- Send down chunks of <script> blocks, which the browser will execute as part of progressive rendering
- Add 1KB of junk at the start to trigger progressive rendering in IE

Problem #2



The throbber!

Problem #2



The throbber!

Problem #3

The click!

Solved for GChat

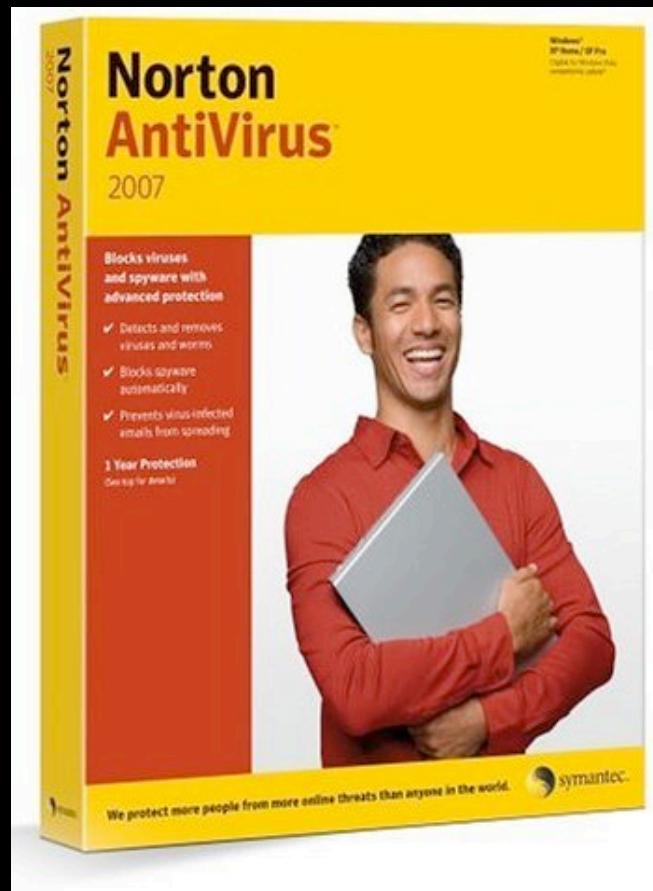
```
var htmlfile = new ActiveXObject('htmlfile');
```

- An undocumented ActiveX extension
 - Create an "htmlfile" instance
 - Create an iframe inside it
 - Set up some cross-frame scripting hooks
 - Run comet using the iframe
- No clicks! No throbber!

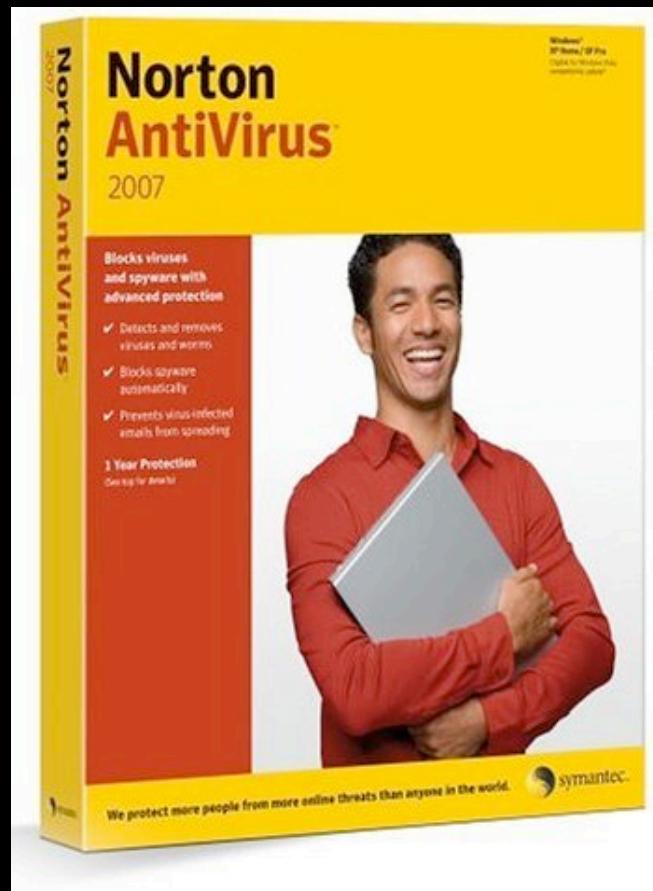
Confuse IE with enough nested iframes and it forgets to click



Problem #4



Problem #4



Proxies!

Long polling

- Make a request (iframe, XHR or even a <script> tag)
- Server pretends to be processing it really slowly...
- An event occurs; the server finally returns the response
- The browser starts a new request straight away

Problem #5

The two connection limit

- `mysite.com` - regular site
- `comet.mysite.com` - comet server
- Cross-domain communication is easy - just add another iframe and set `document.domain` to enable cross-frame scripting

- `mysite.com` - regular site
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- Cross-domain communication is easy - just add another iframe and set `document.domain` to enable cross-frame scripting
- (Then solve the resulting browser history problems with a few more iframes)

- `mysite.com` - regular site
- `comet.mysite.com` - comet server
- Cross-domain communication is easy - just add another iframe and set `document.domain` to enable cross-frame scripting
- (Then solve the resulting browser history problems with a few more iframes)
- Facebook go a step further and use incrementing subdomains for every request

And if all else fails...



Are we there yet?
Are we there yet?
Are we there yet?

Fall back to polling

THIS IS A
HAMMER
FILM

Pterodactyls win!

ZEPPELIN
V
PTEROVACTYLS

Key techniques

- Streaming (ideal)
 - XMLHttpRequest
 - Forever frame (for IE)
- Long polling (works through proxies)
- Polling (if all else fails)

Future Comet

HTML 5 event-source

<http://www.whatwg.org/specs/web-apps/current-work/#event-source>

```
<event-source src="/comet">
```

Content-Type: **application/x-dom-event-stream**

Event: server-time
data: [time on the server]



Support added in Opera 9.5

Google Gears

http://gears.google.com/ Google

Google Gears™ BETA Improving Your Web Browser

Google Gears is an open source project that enables more powerful web applications, by adding new features to your web browser:

-  Let web applications interact naturally with your desktop
-  Store data locally in a fully-searchable database
-  Run JavaScript in the background to improve performance

Install Google Gears

Mac OS X

System requirements

- Mac OS X 10.2+
- Firefox 1.5+

Google Gears is available for [Windows](#), [Windows Mobile](#), [Mac](#), and [Linux](#)

[Developer site](#)
[Frequently asked questions](#)
[More help](#)

Google Gears 0.2

©2008 Google - [Gears Home](#) - [Privacy Policy](#)

Done

“Wow, client-side
Comet sucks”...

that’s not the half of it



Scaling the server

<http://flickr.com/photos/adrianblack/254968866/> craiglblack

- Comet requires potentially tens of thousands of simultaneous HTTP connections
- Apache and other mainstream servers are designed to handle a single request as quickly as possible
 - Requests are generally served by a worker process or thread
 - This absolutely will not scale to Comet

Event-based IO

- Alternative architecture designed to handle thousands of simultaneous connections
 - Twisted (Python)
 - Jetty (Java)
 - Perlbal
 - Orbited
 - Meteor
 - Facebook used MochiWeb (in Erlang)

HAROLD D:

Bayeux

Bayeaux

- Bayeaux is a *protocol* for Comet
- Any Bayeaux client can talk to any Bayeaux server
- The protocol is based on clients publishing and subscribing to channels
- Data is encoded using JSON
- Clients can create a permanent connection using a handshake, or send simple one-off messages

Dumb Comet servers

- The principle advantage of Bayeaux is that your Comet server can be **stupid** - it doesn't need any application logic, it just needs to route messages around
- It's a black box which you simply drop in to your architecture
- This means your application logic can stay on your favourite platform

Cometd

- Cometd (Comet Daemon) is an umbrella project for a number of Bayeaux implementations
 - cometd-python (in Twisted)
 - cometd-perl (also a Perlbal plugin)
 - cometd-java (on Jetty)
 - dojox.cometd (JavaScript client)
- <http://cometd.com/>

So despite all of that...
Comet applications
are *easy* to build

How to build a Comet application (in 5 minutes)

Set up Jetty

- Download and unzip Jetty-6.1 from www.mortbay.org
- Install Maven from <http://maven.apache.org/>
- cd jetty-6.1.6/contrib/cometd/demo/
- mvn jetty:run
- Browse to <http://localhost:8080/>
- Mess around with the JS in src/main/webapp/examples/

dojox.cometd

```
dojo.addOnLoad(function() {  
    dojox.cometd.init("http://127.0.0.1:8080/cometd");  
    dojox.cometd.subscribe("/mychannel", function(comet) {  
        alert(comet.data); // a JSON object  
    });  
});
```

dojox.cometd

```
dojo.addOnLoad(function() {
    dojox.cometd.init("http://127.0.0.1:8080/cometd");
    dojox.cometd.subscribe("/mychannel", function(comet) {
        alert(comet.data); // a JSON object
    });
}

dojo.byId('send').onclick = function() {
    dojox.cometd.publish("/mychannel", {
        'msg': "A message sent by Comet"
    });
    return false;
};
}) ;
```

A slideshow in 5 lines of code

```
<script type="text/javascript">
dojo.require("dojox.cometd");
jQuery(function($) {
    dojox.cometd.init("http://127.0.0.1:8080/cometd");
    dojox.cometd.subscribe("/slideshow/change", function(comet) {
        $('#currentSlide').attr('src', comet.data.src);
    });
});
</script>
```

Conclusions

- Comet is possible, therefore it's inevitable
- It requires hacks, but they're reasonably well abstracted and understood
- Bayeaux and Cometd abstract away the nastiness and make Comet accessible to sane developers

More crazy hacks...

- <http://meteorserver.org/browser-techniques/>
- <http://cometdaily.com/2007/10/25/http-streaming-and-internet-explorer/>
- <http://cometdaily.com/2007/11/18/ie-activexhtmlfile-transport-part-ii/>
- <http://orbited.org/svn/orbit/trunk/daemon/orbited/static/orbited.js>
- <http://simonwillison.net/tags/comet/>

Thank you