Comet

The Rise of Highly Interactive Websites

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Introduction
Perspectives
Technical Architectures

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Pushing data to the browser without needing the browser to ask

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Long lived HTTP (i.e. not polling)

A pattern not a protocol

Reverse Ajax == Comet + Polling

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Why now?

Ajax made individual pages interactive

The web is getting more social
== more transient

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Comet is for ...

keeping **me** up to date

... with ...

every**one** else, and

every**thing** else

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Everyone else

What are the other guys are doing?

- Editing things that interest you
- Talking to / about you
- Saying and doing interesting things
- Playing games

Everything else

What is System X doing?

- Data streaming
- Async processing
- Transaction fulfillment

Chat is everywhere: GMail, Meebo, Facebook ...
Collaborative Editing: GDocs, Thinkature
Streaming Financial Data: Lightstreamer, Caplin
Asynch Updates: GMail, Yes.com
Online Gaming: GPokr, Chess.com
Async Server Processing: Polar Rose

The web was designed connectionless

Comet gives you the connection back

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The web was designed
client-server

Comet starts to make it look
far more peer-to-peer

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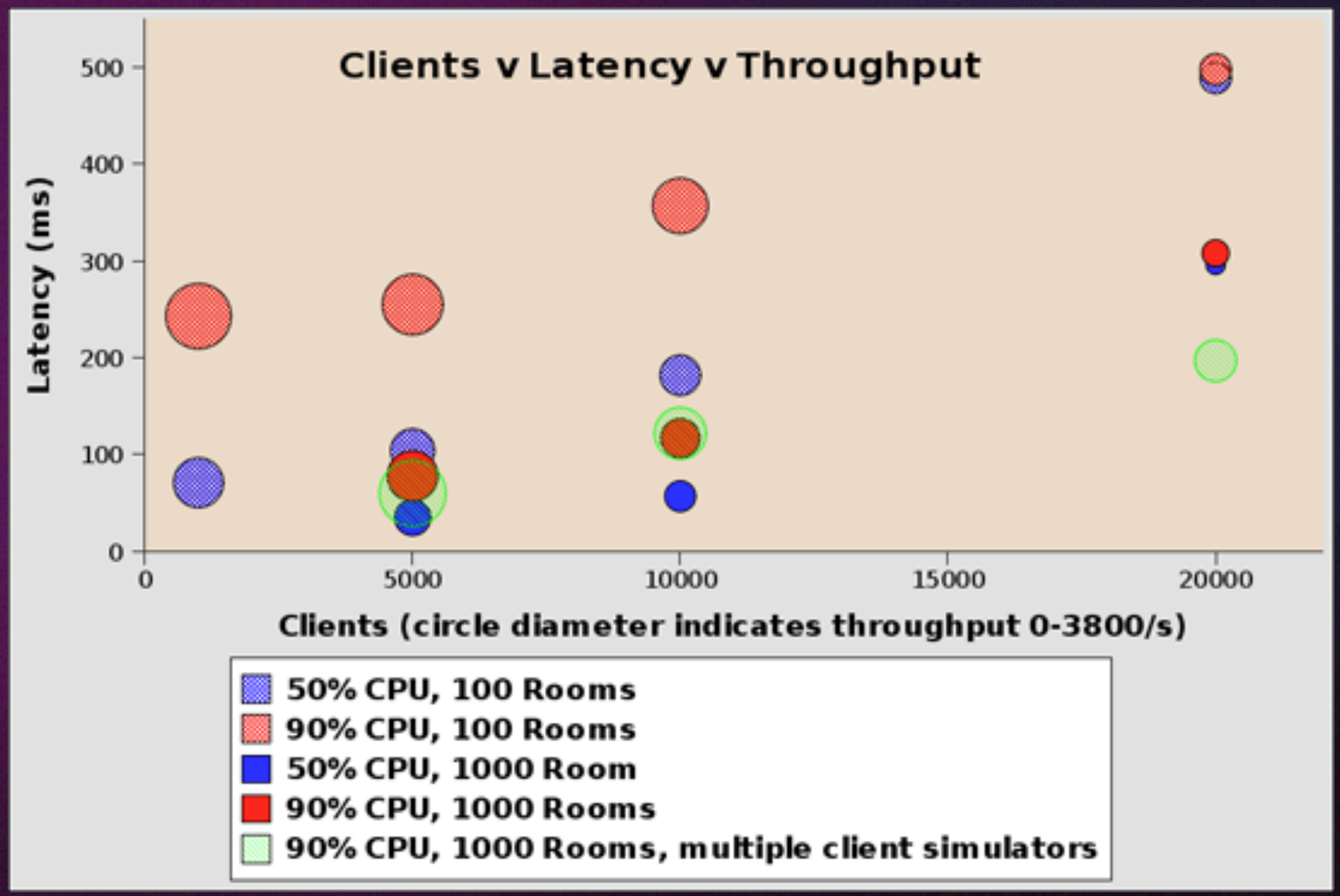
Performance



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BUT

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Connection Options

Long polling: XHR
Forever Frame: iframe
Script tags
WebSockets
ActiveXObject(“htmlfile”)
Mime Messaging
Flash Remoting

Long Polling

‘Slow’ XHR request

But:

- Restart required
- XHR.responseText on IE

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Client How-to: Forever Frame

Open a slow iframe, poll for content

IE lies about the content

- Send text/plain + 4k whitespace to flush IE
- Flush with <script> tag for each data block

iframe needs restarting to avoid memory leak

But IE clicks when iframe starts

Client How-to: htmlfile

‘htmlfile’ is an ActiveX control like XHR:

```
hf = new ActiveXObject("htmlfile");
hf.open();
hf.write("<html><iframe/></html>");
hf.close();
hf.parentWindow.dwr = dwr;
```

Avoids ‘clicking’, but not IE/Server 2003

Not supported in Firefox, Safari, Opera, etc.

Client How-to: Callback Polling

Dynamic <script> blocks

Can point to any domain

Does not stream

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Client How-to: Web Standards

HTML 5 makes it better:

- WebSockets
- DOM Storage provides way to synchronize across tabs and frames

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Other Options

Mime Messaging

- Multipart Mime: x-multipart-replace
- Not IE
- Excellent performance

Flash Remoting

2 Connection Issue

Coordination using:

- window.name
- cookies

Multi-home DNS

All modern browsers raise number of connections

Other Issues

HTTP streaming is download only (except WebSockets)

Detection of failed connections

Server Tricks

Stream-stoppers:

- Apache: mod_jk
- Buggy network proxies
- Application firewalls

Thread starvation (Servlet 3.0)

Multi-threading

Does that stop us?

So it’s a hack ...

- But that hasn’t stopped Ajax
- And Comet does work

Library Solutions

Open Solutions:

- DWR http://directwebremoting.org
- Jetty http://jetty.mortbay.org (Cometd)
- Orbited http://orbited.org
- Ice Faces http://icefaces.org
- Atmosphere http://atmosphere.dev.java.net

Comet vs. Polling

For Polling:

- More efficient for very low latencies
- Simpler to implement

For Comet:

- More efficient in general case
- More adaptable

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Technical Architectures

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Inboard vs Outboard

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Inboard Comet

Comet is part of the main web server infrastructure

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Inboard (e.g. DWR)

- Simpler for new development
- Harder scaling
- Comet is just part of the infrastructure

Outboard (e.g. Cometd)

Comet is deployed to a separate set of servers

Outboard (e.g. Cometd)

- Add-on that doesn't affect the server
- Easier to add to existing apps
- Harder to get started

API Styles:

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API Styles:

Level 0: P2P Data

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Level 0: P2P Data with WebSocket

```
var s = new WebSocket("ws://eg.com/demo");

s.onOpen = function(e) { alert("Open"); }
s.onRead = function(e) { alert(e.data); }
s.onClose = function(e) { alert("Close"); }

s.send("Hello World");
```

API Styles:

Level 1: Pub / Sub

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Level 1: Pub/Sub with Bayeux / Jetty

```
// Bayeux Example
// Get a channel
dojox.cometd.Channel c =
      bayeux.getChannel(chanName, true);

// Subscribe to things published
c.subscribe(client);

// Publish something ourselves
c.publish(fromClient, data, msgId);
```

Level 1: Pub/Sub with Atmosphere

```
@Grizzlet(Grizzlet.Scope.APPLICATION)
@Path("myGrizzlet")
public class MyGrizzlet {
  @Broadcaster(Grizzlet.Scope.VM)
  private Broadcaster bc;
  @Suspend(6000) @GET @Push
  public String onGet() {
    bc.brodcast("New user");
    return "Suspending the connection";
  }
}
```

Pub / Sub Advantages

- Low coupling
- Inter-language interoperability

API Styles:

Level 2: API Based

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Level 2: API Based

```
<span id="price"></span>

<script>
  dwr.util.setValue("price", 42);
</script>
```

Level 2: API Based

```
<span id="price"></span>

// on the server
import org.directwebremoting.ui.dwr.Util;
Util.setValue("price", 42);
```

Level 2: API Based

```
<span id="price"></span>

// on the server
import org....scriptaculous.Effect;
Effect.shake("price");
```

Level 2: API Based

```
import org.dojotoolkit.dijit.Dijit;
import org.dojotoolkit.dijit.Editor;

Editor e = Dijit.byId("price",Editor.class);
e.setValue(42);
```

Level 2: API Based

- Tighter coupling
- Richer API

API Styles:

Level 3: Data Sync Based

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Level 3: Data Sync API

```
dataStore.add(person);
```

Level 3: Data Sync Based

- Trivial to understand
- Enables smart network control
- Very hard to get 100%

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http://directwebremoting.org/
http://cometdaily.org/
http://sitepen.com/

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