An Overview of Amazon Silk

Amazon’s new cloud-powered browser

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Web Page Complexity is Steadily Increasing
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2 elements
1 domain
10 kilobytes
Amazon’s Home Page

~1996

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2 elements
1 domain
10 kilobytes

2011

96 elements
12 domains
530 kilobytes
<table>
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<th>Year</th>
<th>Total Elements</th>
<th>Total Kilobytes</th>
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<td>2008</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>2010</td>
<td></td>
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</table>
HTTP Archive Data

Total Elements Per Page

Total Kilobytes Per Page
HTTP Archive Data

HTML Elements Per Page

HTML Kilobytes Per Page
HTTP Archive Data

Images Per Page

Image Kilobytes Per Page
Are we losing the battle? war?
Migration to Mobile Makes the Problem Even Worse
What do you get for $500?

<table>
<thead>
<tr>
<th></th>
<th>Desktop</th>
<th>Laptop</th>
<th>Tablet</th>
<th>Phone</th>
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<td>Dual 2.1Ghz</td>
<td>Dual 1.2Ghz</td>
<td>Dual 1Ghz</td>
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<td>1GB</td>
<td>512MB</td>
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<td>320GB</td>
<td>32GB</td>
<td>8GB</td>
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<td>Network</td>
<td>1Gbps</td>
<td>54Mbps</td>
<td>54Mbps</td>
<td>10Mbps</td>
</tr>
</tbody>
</table>
The Network Matters

Power Saving Mode (PSM) degrades wi-fi performance

Radio Resource Control (RRC) degrades cellular performance
Mobile Platform Load Times

Amazon Detail Page Load Times By Platform (milliseconds)
Complex Web + Mobile = 😞
Complex Web + Amazon Silk = 😊
What Makes Amazon Silk Different?
The Architecture of the Web
The Architecture of the Web
Introducing Silk
A Tale of Two Web Pages

www.google.com
15 elements  238 kilobytes
2 domains    1.951 sec load time

www.cnn.com
175 elements 1,737 kilobytes
23 domains   11.181 sec load time
Dynamic Split
Silk Architecture

Browser Frontend
WebKit

SPDY

Browser Backend

AWS
Distributed Cache

Optimizers

HTTP(S)

Internet
Client Architecture

Rendering engine is Webkit

JavaScript engine is V8

The application layer is built from scratch

Automatic user agent mode

Flash 10.3 support

Falls back to local rendering on failure
Server Architecture

Infrastructure is hosted on AWS

No user-identifiable data logged

Logs not kept for more than 30 days

Optimizers will evolve over time
Protocols

Silk client and server communicate via SPDY
- Multiplexed concurrent streams
- Request prioritization
- Compression
- Encryption
- Server push

Silk server communicates via HTTP(S)

Silk client uses HTTP(S) when turned off

SSL is always routed direct to origin
User Agent Strings At Launch

- **Mobile**
  Mozilla/5.0 (Linux; U; Android 2.3.4; en-us; Cloud9/1.0.0) AppleWebKit/533.1 (KHTML, like Gecko) Version/4.0 Mobile Safari/533.1

- **Desktop**
  Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10_6_3; en-us; Cloud9/1.0.0) AppleWebKit/533.16 (KHTML, like Gecko) Version/5.0 Safari/533.16

User Agent String After First Software Update

- **Mobile – Acceleration On**
  Mozilla/5.0 (Linux; U; Android 2.3.4; en-us; Silk/1.1.0-72) AppleWebKit/533.1 (KHTML, like Gecko) Version/4.0 Mobile Safari/533.1 Silk-Accelerated=true

- **Desktop – Acceleration On**
  Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10_6_3; en-us; Silk/1.1.0-72) AppleWebKit/533.16 (KHTML, like Gecko) Version/5.0 Safari/533.16 Silk-Accelerated=true

- **Mobile – Acceleration Off**
  Mozilla/5.0 (Linux; U; Android 2.3.4; en-us; Silk/1.1.0-72) AppleWebKit/533.1 (KHTML, like Gecko) Version/4.0 Mobile Safari/533.1 Silk-Accelerated=false

- **Desktop – Acceleration Off**
  Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10_6_3; en-us; Silk/1.1.0-72) AppleWebKit/533.16 (KHTML, like Gecko) Version/5.0 Safari/533.16 Silk-Accelerated=false
Info for Web Developers

Original IP address propagated in x-forwarded-for header

We strictly obey caching headers

Caching reduces sites bandwidth costs for site owners

Content is optimized, but never replaced
Info for Users

Everything is encrypted when in acceleration mode

Caching on Silk server saves storage on the client

Content compression saves bandwidth

Acceleration can be turned off in settings menu

Flash can be turned off in settings menu

Browser works in offline mode for local content
What AWS Services Does Silk Use?

- Elastic Compute Cloud
- Elastic Block Store
- Elastic Load Balancing
- Auto Scaling
- CloudWatch
- CloudFormation
- Identity & Access Mgmt
- Route 53
- Simple Queue Service
- Simple Storage Service
- Elasticache
Final Thoughts
Wi-fi Power Saving Mode (slide 16)

Radio Resource Control (slide 16)
http://stevesouders.com/ms/

Data about growth of mobile (slide 14)

Web Page Test Data for CNN (slide 24)
http://www.webpagetest.org/result/111107_5T_23VNE/

Web Page Test Data for Google (slide 24)
http://www.webpagetest.org/result/111108_JP_23ZW2/

HTTP Archive Data (slide 6)
http://httparchive.org/trends.php?s=intersection

Internet Wayback Machine (slide 5)