

The New Web: Characterizing AJAX Traffic

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Passive and Active Measurement Conference 2008/04/29

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AJAX

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2 / 16

AJAX vs. normal Web browsing



Motivation

Motivation



- Network traffic generation has to be realistic for networking experiments
- Real-world traffic characteristics change with the applications used
- Need to check if traffic models are still applicable, on a regular basis
- \Rightarrow Do new Web applications change the characteristics?
 - We picked four popular representative of AJAX apps and studied their traffic:
 - Google Maps
 - Google Mail
 - gmx.de (popular German webmailer)
 - lokalisten.de (popular German social network)

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Outline





1 How AJAX applications work

- 2 Analysis approach
- **3** Measurement results
- 4 Conclusions

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Google Maps internals



A brief overview of Google Maps internals

Google Maps ...

- Is an AJAX application
- Prefetches tiles
- Opens multiple TCP connections to various different servers
- Uses Cookies to identify users
- Transfers data via persistent and pipelined HTTP



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Challenges of identifying Google Maps related traffic

Identifying Google Maps related traffic by:

- Server IP's: not precise enough
- Server name: very costly
- URL prefix: good enough

" / " (general) " /kh " (satellite) " /mt " (map) " /maps " (meta) " /mapfiles " (meta) " /mld " (route planning) " /intl " (meta) " /mapstt " (traffic) " /favicon.ico " (general)

Table: URL prefixes used in Google Maps requests.

We found similar methodologies for the other three AJAX applications.

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Traces

Trace-based analysis



- Three HTTP (Port 80) full packet traces: MWN-05¹: Munich, 2.5 TB, 24 h, weekday MWN-07: Munich, 2.4 TB, 32 h, weekend LBNL-07: Berkeley, 214 GB, 9h, weekday
- Two environments:
 - Large scientific user populations, including student housing
 - High bandwidth internet access
- Analysis Procedure:
 - Bro for TCP stream reassembly and HTTP protocol analysis
 - Extract one-line summaries per HTTP request/reply pair

Selecting AJAX traffic



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- Identifying the complete AJAX-based traffic is not possible by looking a the request/response stream only
- Need to chose Web applications that are AJAX-enabled
- We chose the 4 most popular AJAX applications that we found in our traces:
 - Google Maps
 - Google Mail
 - gmx.de (popular German webmailer)
 - lokalisten.de (popular German social network)
- Compare AJAX vs. All-HTTP traffic



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Results

Results



- Parameters studied (more in paper):
 - Number of bytes transfered (HTTP payload)
 - Number of HTTP requests
 - Inter-request-times
- Reported results are consistent over all data sets
- Results presented as CCDF and PDF
- Colors used:

red/pink All-HTTP green Google Maps

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Session Tracking



- Session: set of connections related to a user browsing on a webpage
- AJAX traffic:
 - Track the cookie of connections to the entry pages
 - Connections with the same user identification cookie are grouped into a session
- All-HTTP traffic:
 - All connections where the 3-tuple (server IP, server Port, client IP) is identical are group into a session
- For both All-HTTP and AJAX sessions, an inactivity timeout of 10 minutes was applied

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8 11 / 16

Bytes per session (HTTP payload)









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Inter-Request-Times



Inter-Request-Times



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- On average AJAX apps transfer more bytes per connection/session
- The number of requests per session is higher for AJAX apps
- Significantly shorter inter-request-times
- \Rightarrow Larger sessions and burstier traffic is upcoming with AJAX applications
- $\Rightarrow\,$ Existing traffic models are still applicable, but need new parameterization

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15 / 16





Questions?

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