Real Time Monitoring and Troubleshooting of Web browsing sessions

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Context

- New trends towards application level Internet protocols (e.g. QUIC),

- New web metrics are brought along by W3C and research community to better qualify and quantify users’ experience,

- Goal: Identify bottleneck in web browsing sessions:
  - Domestic network or devices,
  - Internal operator’s network or border network,
  - Distant Web server.

Proposal of a tool to evaluate web browsing Quality of Experience (QoE),
MORIS: Measuring and Observing Representative Information on webSites
MORIS: Architecture

- **Alexa Plugin.**
  - Websites to be measured

- **Test Configuration.**
  - Set up configurations

- **Test Engine.**
  - Drive measurement campaigns

- **Test Execution.**
  - Perform measurements (graphical or in headless mode)
  - Collect data (web metrics, HAR, network capture, etc.)

- **Data Computation & Interpretation**
  - Computation (server localization, % of resources delivered protocol-wise, origin/non-origin domains, etc.)

- Automated graphical analysis and visualization

- Data storage
Web metrics

- PLT (Page Load Time): Time between first request being sent and entire web page loaded,

- Resource Timing: Characteristics of the resources downloaded,

- ATF (Above The Fold): Loading time of the visible portion of the web page,

- Paint Timing API: Measure a web page loading progression through time,

- TFVR (Time for Full Visual Rendering): Loading time of each resource in the visible portion of the web page.
Configurable monitoring parameters

- Browser: Chrome, Firefox, Safari, etc. (Graphical or Headless)
- Connection: First (Disabled cache), Repeat (activated cache)
- Protocol: HTTP/1.1, HTTP/2.0 or QUIC
- Network: ADSL, FIBER, Wifi or mobile
- With/without proxy
- Adaptable browser’s window size
- Visible portion: End-user’s web page visible surface at first glance
- Disk and RAM availabilities
- Ping time retrieved from network capture (here only main web page)
- Ad blockers: None, uBlockOrigin, AdBlock Plus, Ghostery
- Number of downloaded resources
- Protocol through which resources are downloaded
- First pixel on screen
- Visual loading time
- Time for full visual rendering
- Page load time

All parameters are customizable
## Monitoring results

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<tr>
<th>Timestamp</th>
<th>VLT</th>
<th>SpeedIndex</th>
</tr>
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<tbody>
<tr>
<td>20180126_115220.631134</td>
<td>770.6 ms</td>
<td>2837.49747728</td>
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<tr>
<td>20180126_115220.631154</td>
<td>1679.8 ms</td>
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<td>20180126_115220.631214</td>
<td>73.02554 %</td>
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<td>Nb SA Domains: 0</td>
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<tr>
<td>20180126_115220.703620</td>
<td>END MEASUREMENTS</td>
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</tbody>
</table>

**Duration:** 0:00:10.659249
Troubleshooting

- Example of bottleneck identification
Networking complexity of web browsing
Proposal for integration

- Integrate the tool to RIPE anchors as VMs (pilot phase as of now)

- Tool adaptable to corresponding parameters for web browsing measurement campaigns

- Obtain finer details regarding IP Maps (not only main web page)
Conclusion

- Provide a free tool to the RIPE community to perform measurements on an application layer

- Perform measurement campaigns on a worldwide scale

- Identify the download-link of the requests from content servers

- Offer measurements’ capabilities of RIPE NCC for troubleshooting
Thank you

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Internet protocols through time

- HTTP/1.0
- HTTP/1.1
- HTTP/2.0
- QUIC

Timeline:
- 1996
- 1997
- 2009
- 2015
- 2016