



# Praegus

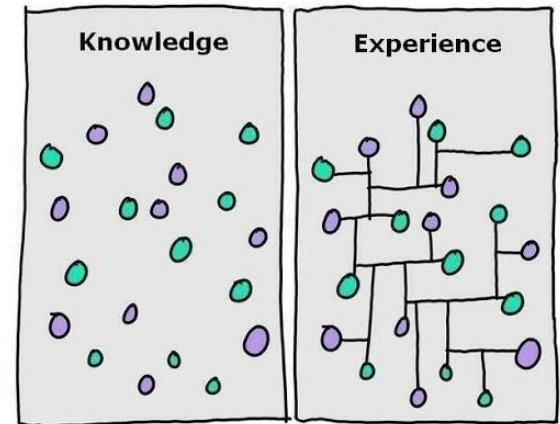
Intelligent Compassionate Testing

## Performance testen

Gekalibreerd performance testen met  
Jmeter e.a. tools

# Agenda

- Wie zijn wij
- Performance testen?
  - » Acceptatie criteria
  - » Soort performance test
- Tooling
  - » Chrome addon Speedtracer
  - » Firefox addon Firebug
- USB Sticks & Vmware
- Jmeter introductie
  - » Scripts opnemen
- Bonus ronde 1: Wireshark
- Bonus ronde 2: Plugins & Rapporteren



# Wie zijn wij



## **Roland Leusden**

Senior Test Consultant at Praegus

Almere Stad Area, Netherlands | Computer Software

Current: Praegus



## **Bas Vegter**

Test Consultant at Praegus

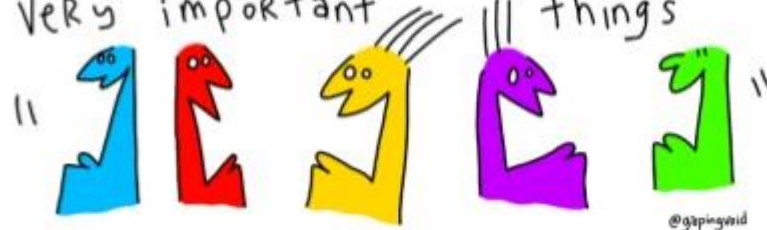
Tilburg Area, Netherlands | Information Technology and Services

Current: Praegus

# Wie, wat en waarom zijn jullie

The people attending are  
**REALLY IMPORTANT!**

Very important things very important  
thing very important things very  
important things very important  
things very important things  
very important things



# Performance testen?

- Release 'readiness'
- Ondervangen van Risico's:
  - » Continuïteit
  - » Reputatie
- Omgevingsstabiliteit
  - » Servers
  - » Infrastructuur
  - » Toekomstvastheid
- Software kwaliteit
  - » Efficiëntie
  - » Vergelijking
- Performance by design
  - » Architectonische beslissing
  - » Requirements
  - » Code reviews



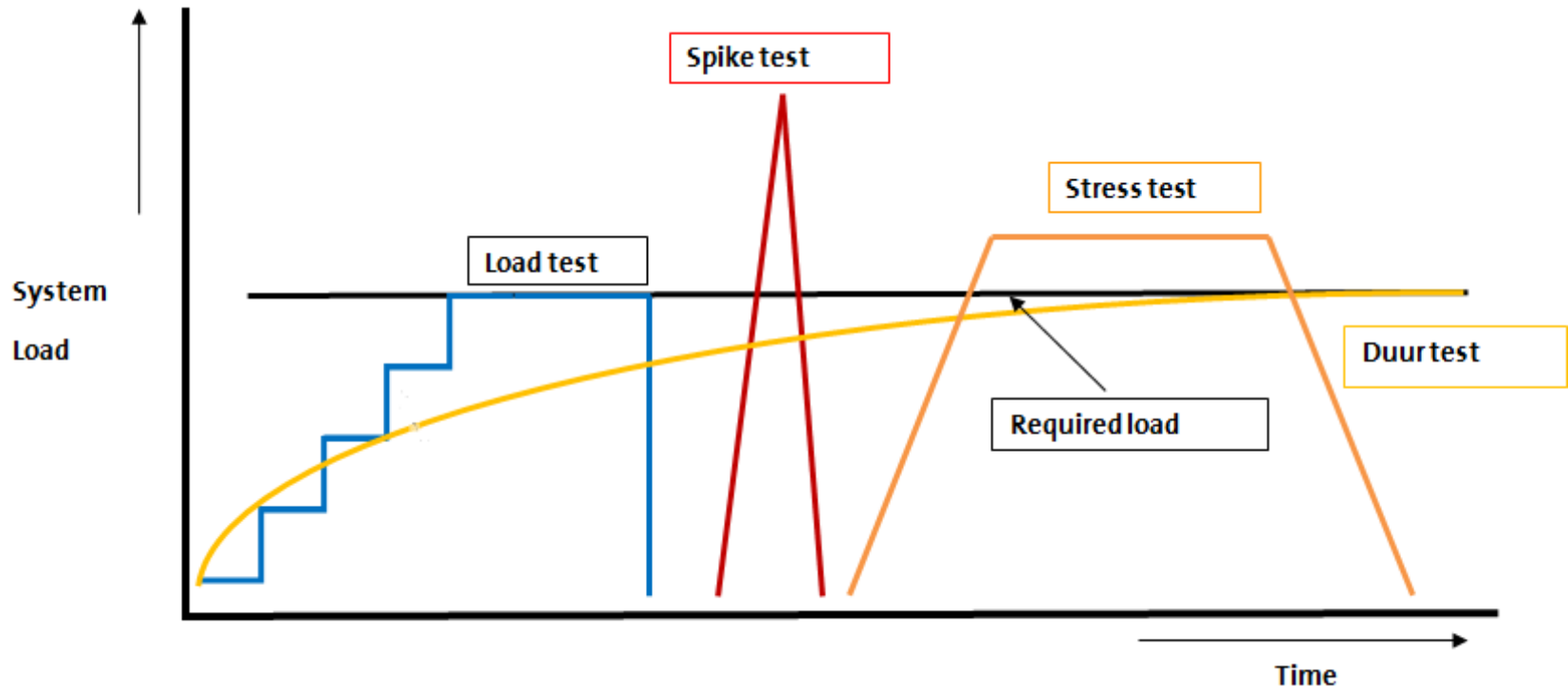
The new application is so slow, we have lot's of time for a nap....

# Acceptatie Criteria

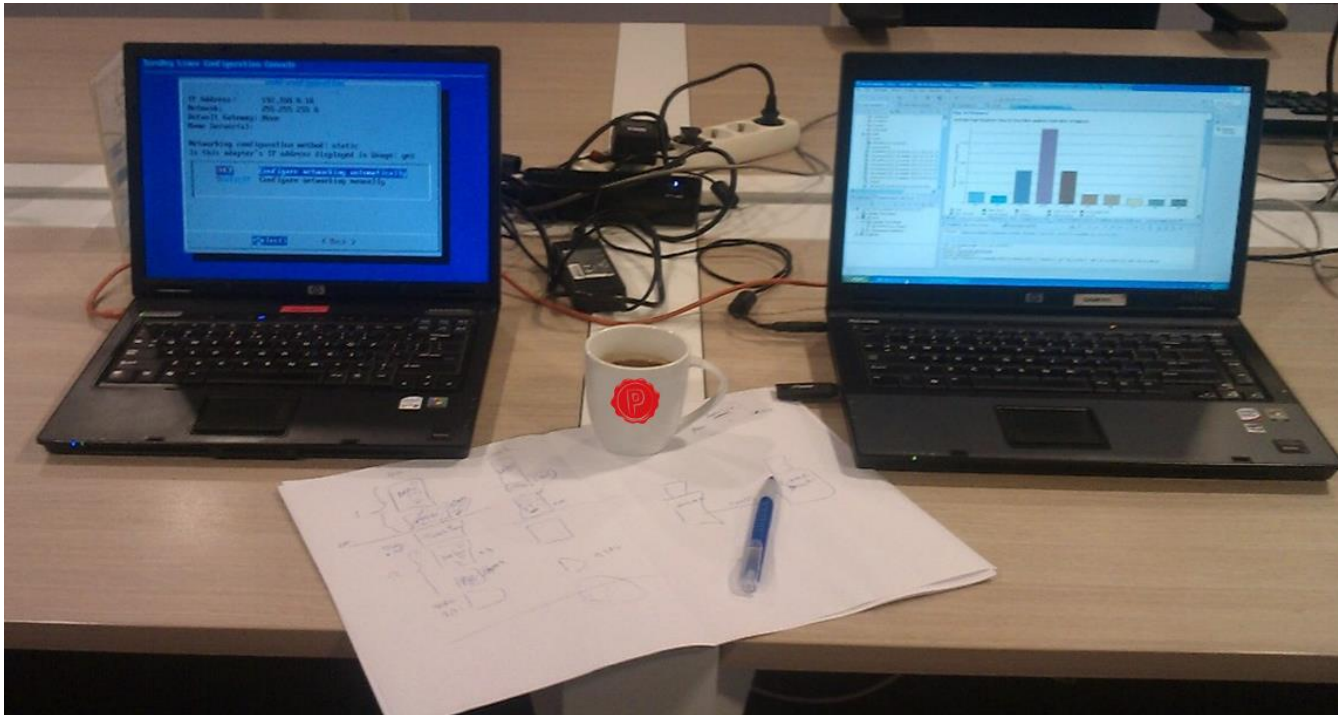
## Wanneer is de performance goed?

- Gebruikers:
  - » Gevoelsmatige performance
  - » Responsetijden (subjectief)
  - » Max. aantal gebruikers?
- IT:
  - » Server gebruik / belasting
  - » Infrastructuur gebruik / belasting
- Bouw
  - » Hoe efficiënt is mijn code?
  - » Waar zitten de problemen?
- Architecten
  - » Hoe stabiel en betrouwbaar is de applicatie
  - » Hoe betrouwbaar zijn de resultaten?

# Soort performance test



# Kalibratie



VMWare XP images:

- » Tool A
- » Tool B
- » Tool C
- » Tool D
- » Schoon image

- Server: Bootable Linux CD
- Turnkey Linux & OsCommerce  
[www.turnkeylinux.org/oscommerce](http://www.turnkeylinux.org/oscommerce)



# Resultaten

	Handmatig	Tool A	Tool B	Tool C	Tool D
Startpagina	0,815	1,715	0,669	0,912	0,875
Selecteer DVD Speed	0,942	0,99	0,473	0,946	0,313
Voeg toe aan cart		0,197	2,071	3,21	0,14
Zoek "Mary"	5,98		4,689	1,22	5,984
Voeg toe aan cart	1,367	6,92	2,092	3,538	0,094
Check Out	0,421	1,715	0,25	0,897	0,078
Nieuwe klant	0,408		0,637	0,896	
Account gemaakt	0,389	0,795	0,6	0,798	1,297
Ga door	0,498				0,156
Verzenden	0,374	0,13	0,417	0,883	0,312
Betaalwijze	0,431		0,358	0,787	0,141
Bevestig bestelling	0,488	1,92	0,64	0,909	0,266
Startpagina	0,418		0,383	0,808	0,188
Uitloggen	0,542	0,72	0,444	0,829	3,547
	<b>13,073</b>	<b>15,102</b>	<b>13,723</b>	<b>16,633</b>	<b>13,391</b>

Resultaten zijn een gemiddelde van 10 runs.



# Tooling

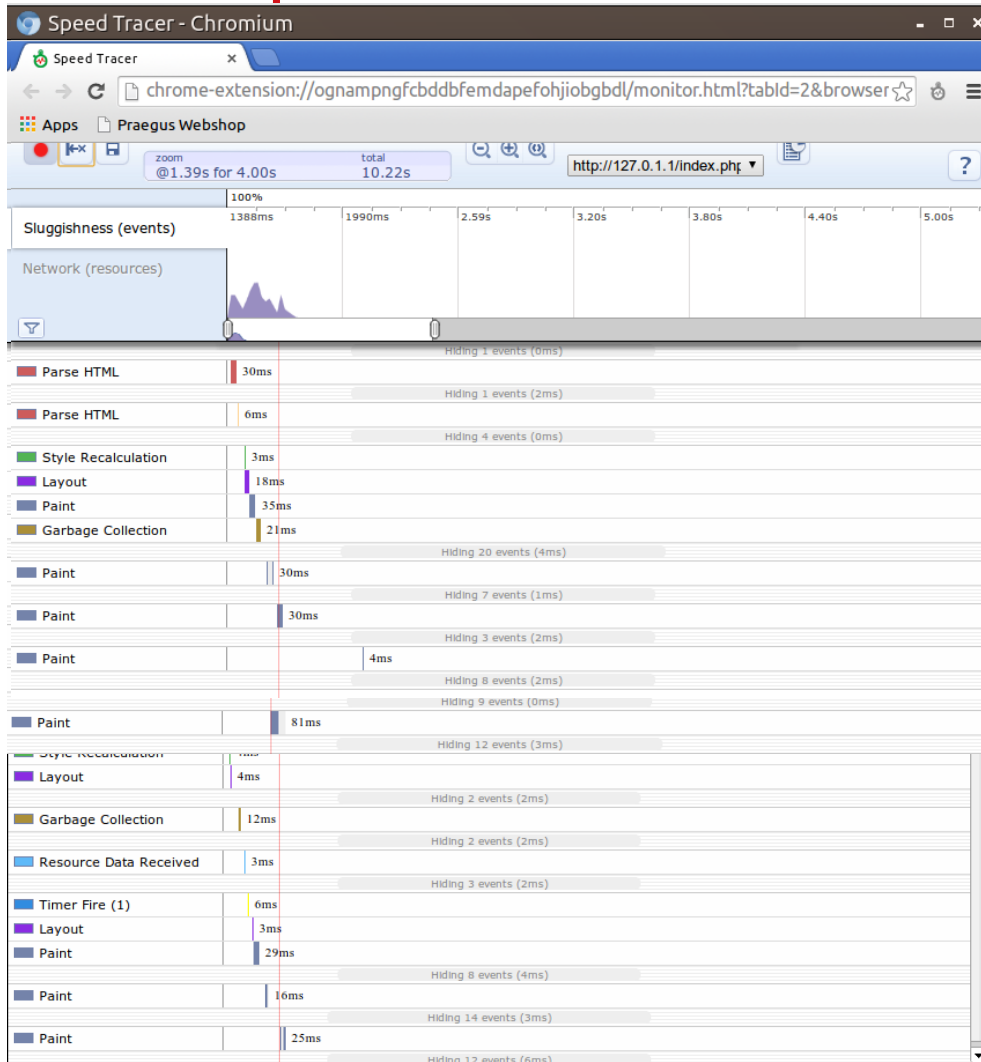


Function	Calls	Percent	Own Time	Time	Avg	Min	Max	File
k	1	4.25%	29.285ms	77.023ms	77.023ms	77.023ms	77.023ms	like.p...light=35 (line 13)
then	1	3.98%	27.434ms	27.562ms	27.562ms	27.562ms	27.562ms	widgets.js (line
clean	29	3.61%	24.839ms	32.435ms	1.118ms	0.325ms	4.112ms	jquery...min.js (line 11
end	116	3.09%	21.272ms	35.786ms	0.309ms	0.036ms	3.405ms	jquery...min.js (line 2
filter	72	2.86%	19.677ms	39.851ms	0.553ms	0.228ms	7.759ms	jquery...min.js (line 7

Started	Duration	Type	Breakdown by Time
@92.68s	310ms	XMLHttpRequest	65.3% XMLHttpRequest, 7.9% Layout, 5.1% Style Recalculation
@93.00s	6ms	Parse HTML	87.9% Script Evaluation, 12.1% Parse HTML
@93.01s	11ms	Paint	100.0% Paint
@93.02s	239ms	Timer Fire (17)	

Event name	Duration	Style calculation
Style calculation	0.088 ms (0.0019 ms)	Duration (inclusive): 0.088 ms
Layout	0.5 ms (0.22 ms)	Duration (exclusive): 0.0019 ms
Paint [3596]	0.78 ms (0.36 ms)	Start time: 167.24 ms
Style calculation	0.09 ms (0.0017 ms)	Thread: UI thread
Layout	0.53 ms (0.23 ms)	
Paint [3596]	0.9 ms (0.48 ms)	

# Compensatie browser verwerking 1/2



## Gaussian Random Timer

Name: Gaussian Random Timer

Parse HTML 30.9ms  
Parse HTML 7.5ms  
Style Recalculation 36ms  
Parse HTML 9ms  
Script Evaluation 6ms  
Resource Data Received 6.2ms  
Layout 21ms  
Paint 64ms

### Comments:

### Thread Delay Properties

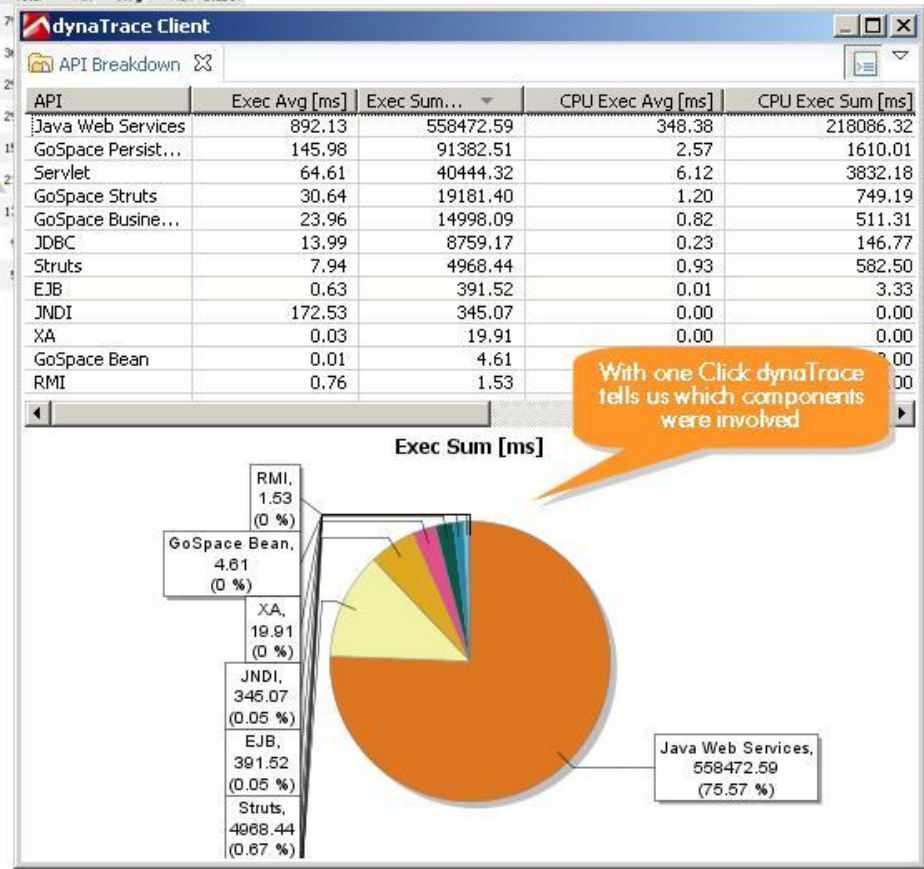
Deviation (in milliseconds):

Constant Delay Offset (in milliseconds):

**Probleem:** Tools doen geen verwerking zoals een browser

**Oplossing:** Voeg in de tool een wachttijd toe om te compenseren voor de interne verwerking van de browser

# Compensatie browser verwerking 2/2



Silk Performer 10  
Browser-Driven Web Load Testing  
Loadrunner 12 (True Client)

# Caching (Post en Get Requests)

## ▼ Response Headers [view source](#)

```
access-control-allow-origin: *  
cache-control: private, max-age=31536000  
content-length: 2991  
content-type: image/png
```

Met Browser caching

## ▼ Response Headers [view source](#)

```
cache-control: private, no-cache  
content-length: 0  
content-type: image/gif
```

Zonder browser caching



Compensatie voor cache content met een  
“Only once Loop Controller”.

# Netwerk gedrag

Oplossing: Stel het aantal concurrente verbindingen per VU in.

The screenshot displays two instances of the 'TCP Conversations' filter in JMeter. The left instance has a filter: `http.cookie == "osCsId=sb5ftf211n9vvh8jko1tl2h5"`. The right instance has a filter: `http.cookie == "osCsId=02rvdng8t55n6c1cmeun8jmdh2"`. Both show a list of addresses (192.168.234.132) and a table of statistics.

Overlaid on the right instance is the 'search\_create\_order.jmx' configuration dialog. The 'Optional Tasks' section is highlighted with a red box, showing the 'Use concurrent pool. Size:' set to 4.

Address A	Port A	Address B	Port B	Packets	Bytes	Packets A-B	Bytes A-B	Packets A-B
192.168.234.132				6	2 423			
192.168.234.132				5	2 083			
192.168.234.132				5	2 130			
192.168.234.132				3	1 266			
192.168.234.132				4	1 681			
192.168.234.132				4	1 742			
				4	1 857			
				2	856			
				2	848			
				2	842			
				1	433			
				2	845			
				9	4 610			
192.168.28.1	1766	192.168.28.128	80	2	837	2	837	
192.168.28.1	1767	192.168.28.128	80	2	854	2	854	
192.168.28.1	1768	192.168.28.128	80	4	1 662	4	1 662	

Referentie

Tool



# Resultaten na kalibratie



## Voor kalibratie

Referentie	Tool A	Tool B	Tool C	Tool D
13,073	15,102	13,723	16,633	13,391

## Na kalibratie

13,073	13,658	13,252	14,276	13,221
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# USB Sticks (Vmware)

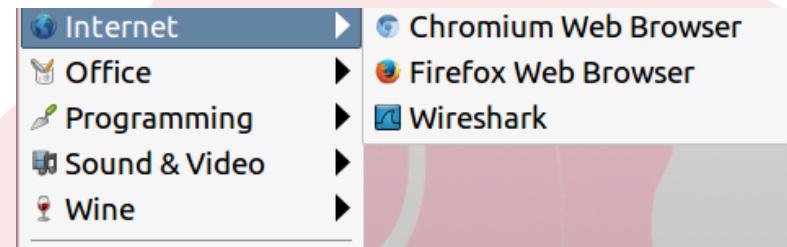
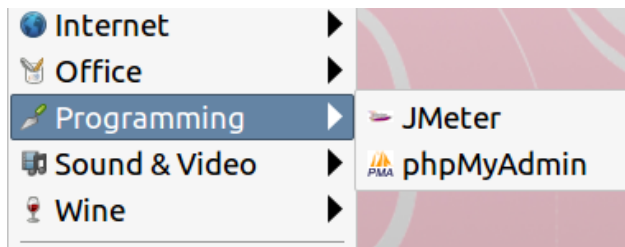


- Pak de image uit naar je pc, dit kan even duren.
- Start de image op door de Praegus Summerschool 2014.vmx te openen
- Wacht op verdere instructies 😊

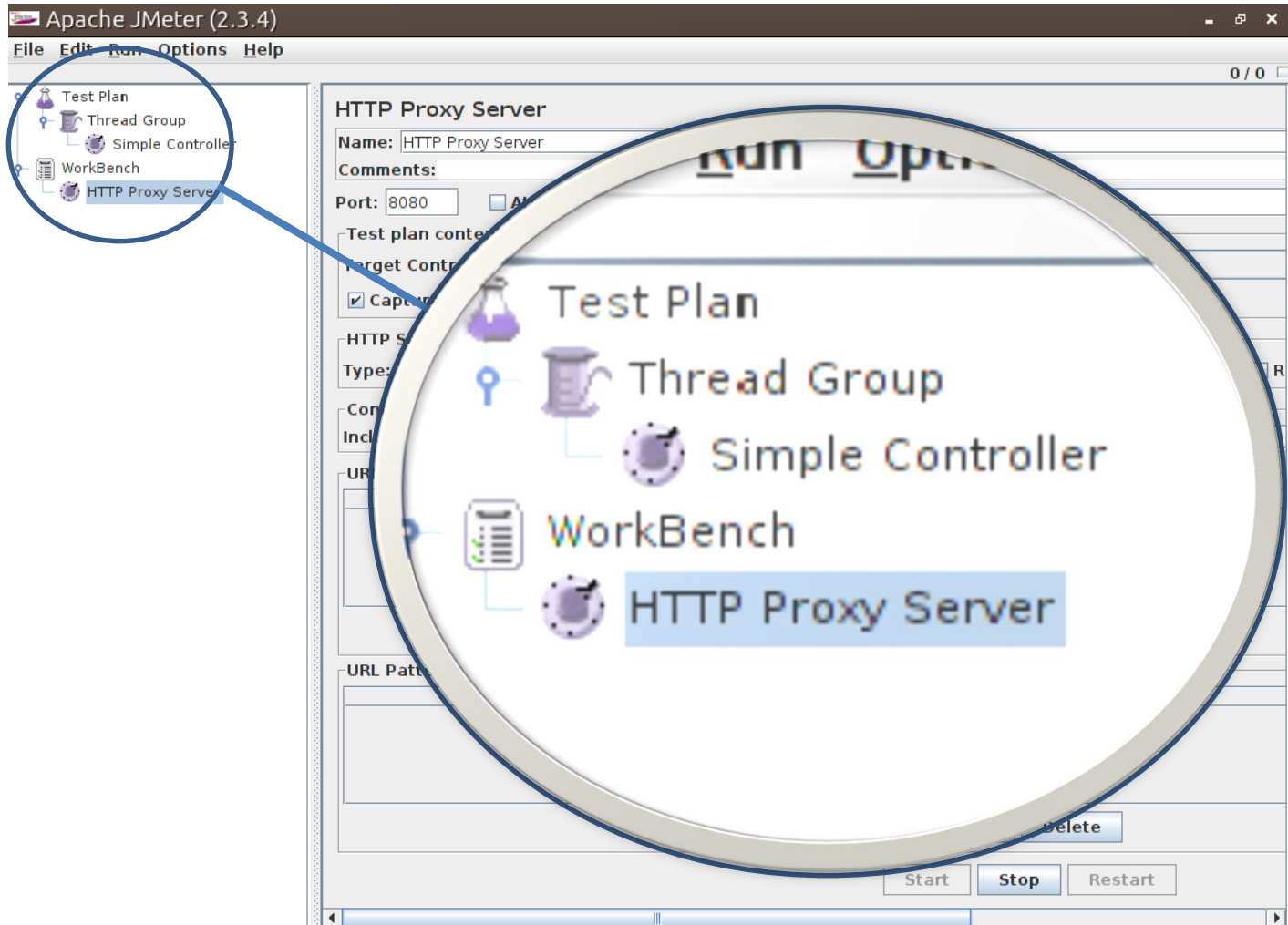


# Image introductie

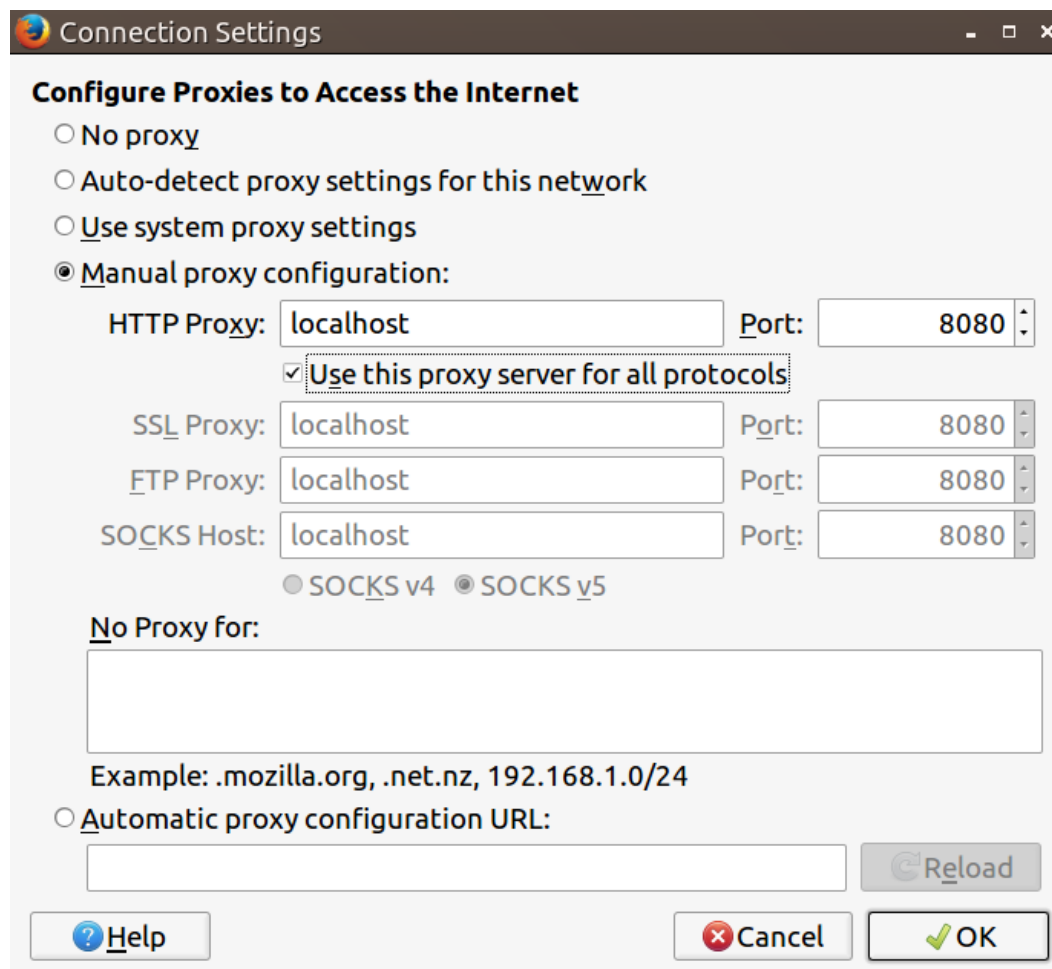
- Wat staat er op de image
  - » Webshop
  - » Jmeter
  - » Chromium (incl. speedtracer)
  - » Firefox (incl. firebug)
  - » Wireshark



# Jmeter introductie



# Opnemen HTTP Proxy Server



The screenshot shows the 'Connection Settings' dialog box in Windows. The title bar reads 'Connection Settings'. The main heading is 'Configure Proxies to Access the Internet'. There are four radio button options: 'No proxy', 'Auto-detect proxy settings for this network', 'Use system proxy settings', and 'Manual proxy configuration:'. The 'Manual proxy configuration' option is selected. Below this, there are four rows of proxy settings, each with a text box for the host and a spinner box for the port. The 'HTTP Proxy' row has 'localhost' in the text box and '8080' in the spinner. A checkbox labeled 'Use this proxy server for all protocols' is checked. The 'SSL Proxy' row has 'localhost' and '8080'. The 'FTP Proxy' row has 'localhost' and '8080'. The 'SOCKS Host' row has 'localhost' and '8080'. Below these are two radio buttons for 'SOCKS v4' and 'SOCKS v5'. A section titled 'No Proxy for:' has an empty text box. Below that is an example: 'Example: .mozilla.org, .net.nz, 192.168.1.0/24'. At the bottom, there is an 'Automatic proxy configuration URL:' section with an empty text box and a 'Reload' button. At the very bottom are three buttons: 'Help', 'Cancel', and 'OK'.

**Configure Proxies to Access the Internet**

No proxy

Auto-detect proxy settings for this network

Use system proxy settings

**Manual proxy configuration:**

HTTP Proxy: localhost Port: 8080

Use this proxy server for all protocols

SSL Proxy: localhost Port: 8080

FTP Proxy: localhost Port: 8080

SOCKS Host: localhost Port: 8080

SOCKS v4  SOCKS v5

**No Proxy for:**

Example: .mozilla.org, .net.nz, 192.168.1.0/24

Automatic proxy configuration URL:

Reload

Help Cancel OK

# Scripts opnemen

But what if I fail?  
We all get to laugh at you.

@hugh

- Zoek naar IBM
- In mandje
- Zoek naar Loadrunner
- In mandje
- Zoek naar Koffiebekerhouder
- In mandje
- Ga naar Goodies
- Winkelwagenmuntje in mandje
- Check out
- Sign In ([test@praegus.nl](mailto:test@praegus.nl) / praegus)
- Continue
- Payment methode

**Welcome, Please Sign In**

**Note:** Your "Visitors Cart" contents will be merged with your "Members Cart" contents once you have logged on. [More Info]

**New Customer**

I am a new customer.

By creating an account at Praegus you will be able to shop faster, be up to date on an orders status, and keep track of the orders you have previously made.

**Continue**

**Returning Customer**

I am a returning customer.

**E-Mail Address:**

**Password:**

Password forgotten? Click here.

**Sign In**

**Shopping Cart**

1 x RPT Consultant  
1 x Loadrunner Consultant  
1 x Koffiebekerhouder

\$204.00

**Bestsellers**

01. Koffiebekerhouder  
02. Loadrunner Consultant  
03. Performance Consultant  
04. RPT Consultant

**Reviews**

There are currently no product reviews

# Kalibratie – Firebug 1/2

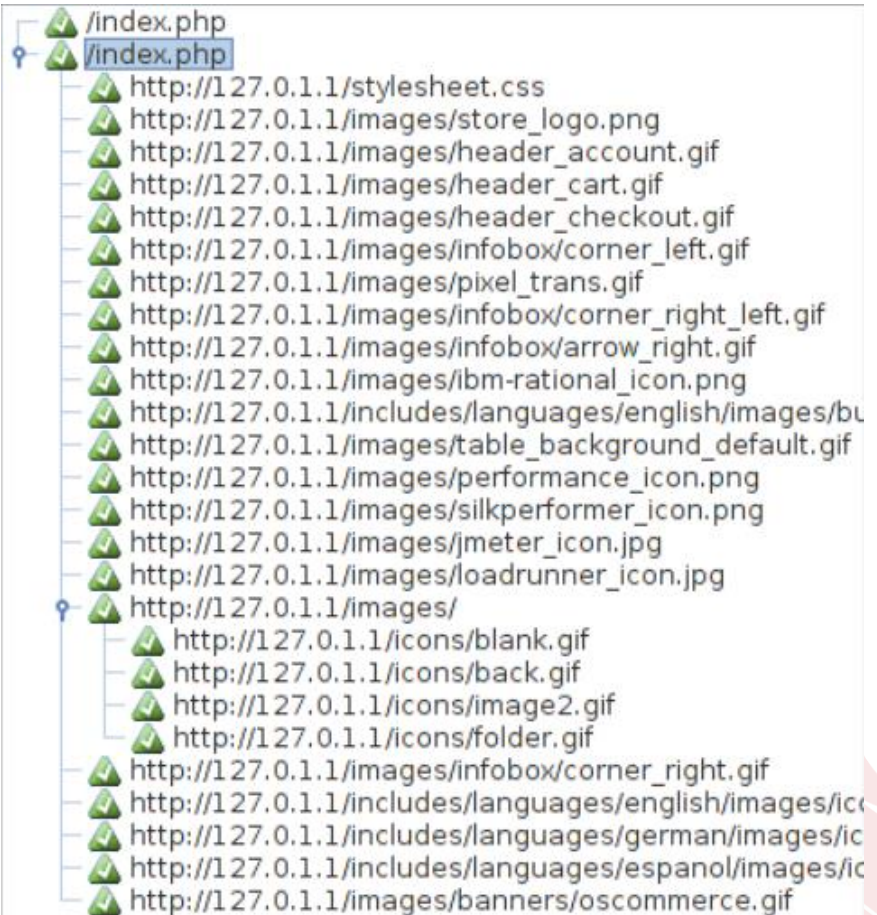
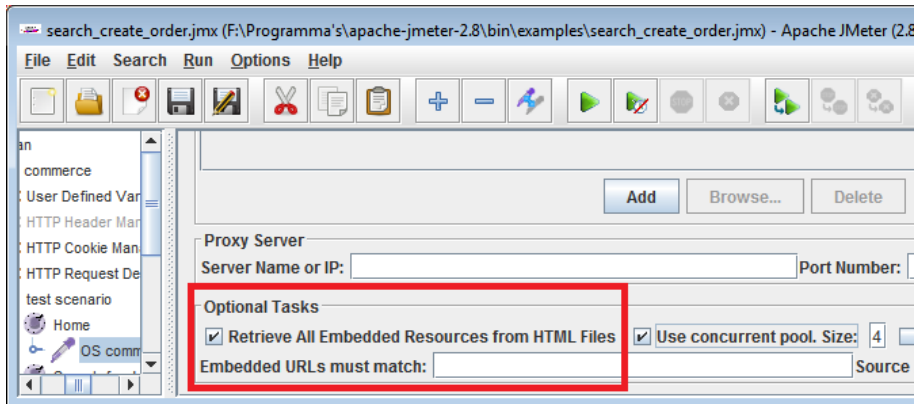
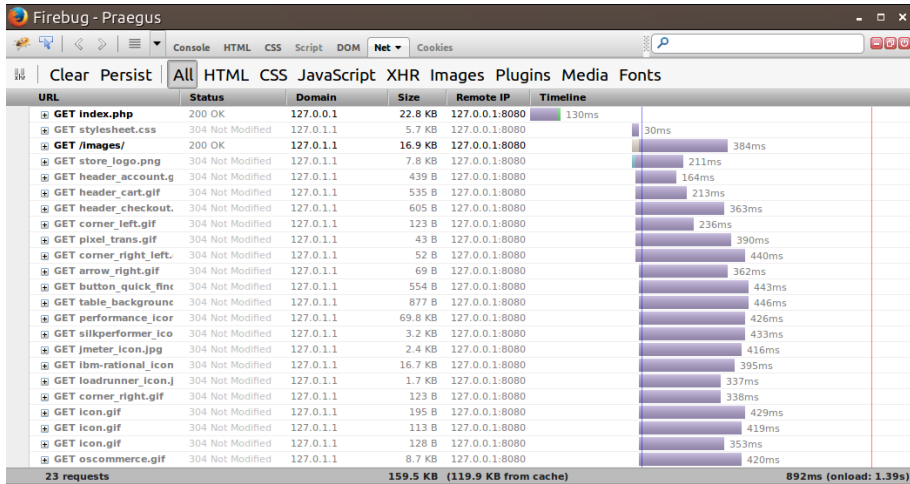
- Vergelijken Jmeter & Handmatig

The screenshot displays a Mozilla Firefox browser window with the Firebug extension open. The Network tab is active, showing a list of 23 requests. The table below summarizes the data from the screenshot:

URL	Status	Domain	Size	Remote IP	Timeline
GET index.php	200 OK	127.0.0.1	2.9 KB	127.0.0.1:80	93ms
GET stylesheet	200 OK	127.0.1.1	1.4 KB	127.0.1.1:80	1ms
GET /images/	200 OK	127.0.1.1	1.7 KB	127.0.1.1:80	38ms
GET store_logo	200 OK	127.0.1.1	7.8 KB	127.0.1.1:80	37ms
GET header_ac	200 OK	127.0.1.1	439 B	127.0.1.1:80	37ms
GET header_ca	200 OK	127.0.1.1	535 B	127.0.1.1:80	36ms
GET header_ch	200 OK	127.0.1.1	605 B	127.0.1.1:80	37ms
GET corner_left	200 OK	127.0.1.1	123 B	127.0.1.1:80	5ms
GET pixel_trans	200 OK	127.0.1.1	43 B	127.0.1.1:80	16ms
GET corner_rigl	200 OK	127.0.1.1	52 B	127.0.1.1:80	39ms
GET arrow_righ	200 OK	127.0.1.1	69 B	127.0.1.1:80	41ms
GET jmeter_ico	200 OK	127.0.1.1	2.4 KB	127.0.1.1:80	47ms
GET button_qu	200 OK	127.0.1.1	554 B	127.0.1.1:80	47ms
GET table_back	200 OK	127.0.1.1	877 B	127.0.1.1:80	46ms
GET performan	200 OK	127.0.1.1	69.8 KB	127.0.1.1:80	440ms
GET silkperfor	200 OK	127.0.1.1	3.2 KB	127.0.1.1:80	1.44s
GET ibm-ration	200 OK	127.0.1.1	16.7 KB	127.0.1.1:80	1.45s
GET loadrunne	200 OK	127.0.1.1	1.7 KB	127.0.1.1:80	2.45s
GET corner_rigl	200 OK	127.0.1.1	123 B	127.0.1.1:80	2.45s
GET icon.gif	200 OK	127.0.1.1	195 B	127.0.1.1:80	2.46s
GET icon.gif	200 OK	127.0.1.1	113 B	127.0.1.1:80	2.46s
GET icon.gif	200 OK	127.0.1.1	128 B	127.0.1.1:80	3.49s
GET oscommer	200 OK	127.0.1.1	8.7 KB	127.0.1.1:80	3.49s
23 requests					3.73s (onload: 3.9s)

On the right side of the browser window, the Test Plan tree is visible, listing various resources such as /index.php, /images/store\_logo.png, /stylesheet.css, and various image files like /images/infobox/arrow\_right.gif, /images/table\_background\_default.gif, etc.

# Kalibratie – Firebug 2/2



# (Herhaling) Caching (Post en Get Requests)

## ▼ Response Headers [view source](#)

```
access-control-allow-origin: *  
cache-control: private, max-age=31536000  
content-length: 2991  
content-type: image/png
```

Met Browser caching

## ▼ Response Headers [view source](#)

```
cache-control: private, no-cache  
content-length: 0  
content-type: image/gif
```

Zonder browser caching



Compensatie voor cache content met een  
“Only once Loop Controller”.



# Kalibratie - Speedtracer

The screenshot displays the Speed Tracer interface within a Chrome browser window. The browser's address bar shows the URL: `chrome-extension://ognampngfcbddbfbemdapefohjjobgbd/monitor.html?tabId=2&browserId=0`. The page title is "Speed Tracer". The main content area shows a performance timeline with various resource and event categories. A pie chart on the right indicates the following breakdown:

- 68.8% Style Recalculation (36ms)
- 18.3% Parse HTML (9ms)
- 12.9% Script Evaluation (6ms)

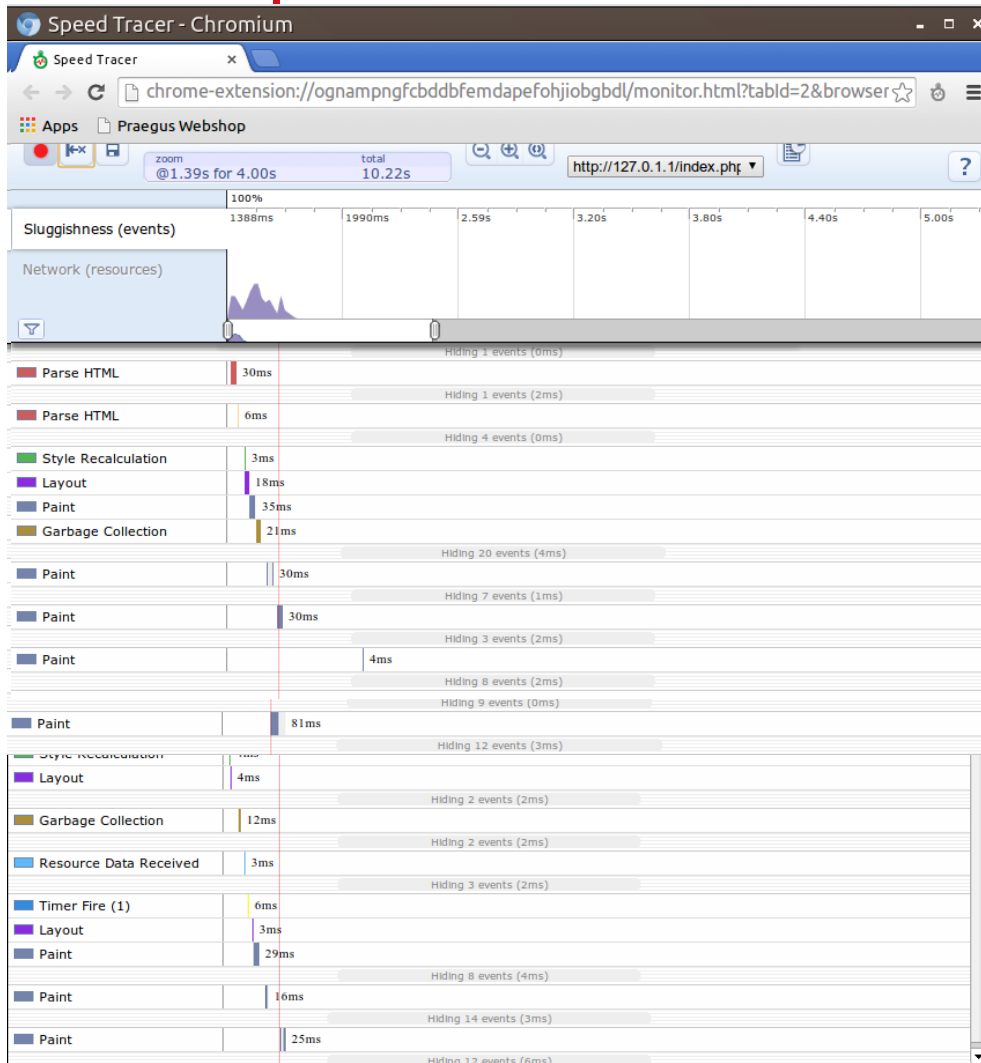
The "Event Trace" section on the left shows a detailed view of the "Parse HTML" event, which took 53.0ms (self 9.7ms). This event includes sub-events such as "Style Recalculation" (36.4ms, self 36.4ms), "Script Evaluation" (6.8ms, self 6.8ms), "Timer Installed" (0.0ms, self 0.0ms), and "Document Parsing Complete" (0.0ms, self 0.0ms). The "Details for Parse HTML" table on the right provides further information:

Property	Value
Description	A block of HTML was parsed.
@	26094ms
Duration	52.964ms
Line Number	415
Length	undefined characters

The bottom of the screenshot shows the Windows taskbar with several open applications: Apache JMeter, Praegus - Mozilla, Firebug - Praegus, Praegus - Chromium, and Speed Tracer - Chr... The system tray on the right indicates the time is 15:49 on 06-07-2014.



# Compensatie browser verwerking 1/2



## Gaussian Random Timer

Name: Gaussian Random Timer

Parse HTML 30.9ms  
Parse HTML 7.5ms  
Style Recalculation 36ms  
Parse HTML 9ms  
Script Evaluation 6ms  
Resource Data Received 6.2ms  
Layout 21ms  
Paint 64ms

### Comments:

### Thread Delay Properties

Deviation (in milliseconds):

Constant Delay Offset (in milliseconds):

**Probleem:** Tools doen geen verwerking zoals een browser

**Oplossing:** Voeg in de tool een wachttijd toe om te compenseren voor de interne verwerking van de browser

# Bonus ronde 1: Wireshark – Handmatig (Chrome)

The Wireshark Network Analyzer [Wireshark 1.6.7]

File Edit View Go Capture Analyze Statistics

Filter:

**WIRESHARK** The World's Most Popular Network Protocol Analyzer  
Version 1.6.7

**Capture**

**Interface List**  
Live list of the capture interfaces (counts incoming packets)

Start capture on interface:

- eth0**
- Pseudo-device that captures on all interfaces**
- lo**

**Capture Options**  
Start a capture with detailed options

**Capture Help**

- How to Capture**  
Step by step to a successful capture setup
- Network Media**

Ready to load or capture No Packets

Praegus - Chromium

127.0.1/index.php

osCommerce Online Merchant

**Capturing from lo [Wireshark 1.6.7]**

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: Expression... Clear Apply

No.	Time	Source	Destination	Protocol	Length	Info
91	0.185366	127.0.0.1	127.0.1.1	TCP	66	58802 > http [ACK] Seq=3673 Ack=18800 Win=32768 Len=0 TSeq=1967999 TSecr=1967998
92	0.213221	127.0.0.1	127.0.1.1	TCP	66	58804 > http [ACK] Seq=1372 Ack=2897 Win=32768 Len=0 TSeq=1968006 TSecr=1967996
93	0.213234	127.0.0.1	127.0.1.1	TCP	66	58805 > http [ACK] Seq=1371 Ack=3581 Win=32768 Len=0 TSeq=1968006 TSecr=1967996
94	0.213237	127.0.0.1	127.0.1.1	TCP	66	58803 > http [ACK] Seq=1380 Ack=18737 Win=32768 Len=0 TSeq=1968006 TSecr=1967996
95	0.217839	127.0.0.1	127.0.1.1	TCP	66	58806 > http [ACK] Seq=1379 Ack=13148 Win=32768 Len=0 TSeq=1968007 TSecr=1967997
96	0.320954	127.0.0.1	127.0.1.1	HTTP	408	GET /favicon.ico HTTP/1.1
98	0.321741	127.0.0.1	127.0.1.1	TCP	66	58806 > http [ACK] Seq=1721 Ack=13647 Win=32768 Len=0 TSeq=1968033 TSecr=1968033
104	5.217181	127.0.0.1	127.0.1.1	TCP	66	58805 > http [ACK] Seq=1371 Ack=3582 Win=32768 Len=0 TSeq=1969257 TSecr=1969247
105	5.217224	127.0.0.1	127.0.1.1	TCP	66	58803 > http [ACK] Seq=1380 Ack=18738 Win=32768 Len=0 TSeq=1969257 TSecr=1969247
106	5.217237	127.0.0.1	127.0.1.1	TCP	66	58804 > http [ACK] Seq=1372 Ack=2898 Win=32768 Len=0 TSeq=1969257 TSecr=1969247
107	5.217243	127.0.0.1	127.0.1.1	TCP	66	58807 > http [ACK] Seq=1384 Ack=72525 Win=65536 Len=0 TSeq=1969257 TSecr=1969247
108	5.229203	127.0.0.1	127.0.1.1	TCP	66	58802 > http [ACK] Seq=3673 Ack=18809 Win=32768 Len=0 TSeq=1969260 TSecr=1969250
110	5.365912	127.0.0.1	127.0.1.1	TCP	66	58806 > http [ACK] Seq=1721 Ack=13648 Win=32768 Len=0 TSeq=1969294 TSecr=1969284
111	8.148714	127.0.0.1	127.0.0.1	TCP	74	39826 > http [SYN] Seq=0 Win=32792 Len=0 MSS=16396 SACK_PERM=1 TSeq=1969989 TSecr=0 WS=16
112	8.148758	127.0.0.1	127.0.0.1	TCP	74	http > 39826 [SYN, ACK] Seq=0 Ack=1 Win=32768 Len=0 MSS=16396 SACK_PERM=1 TSeq=1969989 TSecr=1969989 WS=16
113	8.148785	127.0.0.1	127.0.0.1	TCP	66	39826 > http [ACK] Seq=1 Ack=1 Win=32800 Len=0 TSeq=1969989 TSecr=1969989
114	8.148859	127.0.0.1	127.0.0.1	HTTP	152	OPTIONS * HTTP/1.0
115	8.148891	127.0.0.1	127.0.0.1	TCP	66	http > 39826 [ACK] Seq=1 Ack=87 Win=32768 Len=0 TSeq=1969989 TSecr=1969989
116	8.148997	127.0.0.1	127.0.0.1	TCP	66	39826 > http [FIN, ACK] Seq=87 Ack=1 Win=32800 Len=0 TSeq=1969989 TSecr=1969989
117	8.149481	127.0.0.1	127.0.0.1	HTTP	192	HTTP/1.1 200 OK
118	8.149630	127.0.0.1	127.0.0.1	TCP	54	39826 > http [RST] Seq=88 Win=0 Len=0
119	10.188905	127.0.0.1	127.0.1.1	TCP	66	58804 > http [FIN, ACK] Seq=1372 Ack=2898 Win=32768 Len=0 TSeq=1970499 TSecr=1969247
121	10.189091	127.0.0.1	127.0.1.1	TCP	66	58805 > http [FIN, ACK] Seq=1371 Ack=3582 Win=32768 Len=0 TSeq=1970499 TSecr=1969247
123	10.189158	127.0.0.1	127.0.1.1	TCP	66	58803 > http [FIN, ACK] Seq=1380 Ack=18738 Win=32768 Len=0 TSeq=1970499 TSecr=1969247
125	10.189211	127.0.0.1	127.0.1.1	TCP	66	58807 > http [FIN, ACK] Seq=1384 Ack=72525 Win=65536 Len=0 TSeq=1970499 TSecr=1969247
127	10.189256	127.0.0.1	127.0.1.1	TCP	66	58802 > http [FIN, ACK] Seq=3673 Ack=18809 Win=32768 Len=0 TSeq=1970499 TSecr=1969250
129	10.189303	127.0.0.1	127.0.1.1	TCP	66	58806 > http [FIN, ACK] Seq=1721 Ack=13648 Win=32768 Len=0 TSeq=1970499 TSecr=1969284

Frame 118: 54 bytes on wire (432 bits), 54 bytes captured (432 bits)

Ethernet II, Src: 00:00:00:00:00:00 (00:00:00:00:00:00), Dst: 00:00:00:00:00:00 (00:00:00:00:00:00)

Internet Protocol Version 4, Src: 127.0.0.1 (127.0.0.1), Dst: 127.0.0.1 (127.0.0.1)

Transmission Control Protocol, Src Port: 39826 (39826), Dst Port: http (80), Seq: 88, Len: 0

# Bonus ronde 1: Wireshark – Handmatig (Firefox)

Capturing from lo [Wireshark 1.6.7]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: Expression... Clear Apply

No.	Time	Source	Destination	Protocol	Length	Info
306	9.283413	127.0.0.1	127.0.0.1	TCP	66	39943 > http [ACK] Seq=1 Ack=1 Win=32800 Len=0 TSval=2100750 TSecr=2100750
307	9.283499	127.0.0.1	127.0.0.1	HTTP	152	OPTIONS * HTTP/1.0
308	9.283533	127.0.0.1	127.0.0.1	TCP	66	http > 39943 [ACK] Seq=1 Ack=87 Win=32768 Len=0 TSval=2100750 TSecr=2100750
309	9.283607	127.0.0.1	127.0.0.1	TCP	66	39943 > http [FIN, ACK] Seq=87 Ack=1 Win=32800 Len=0 TSval=2100750 TSecr=2100750
310	9.284359	127.0.0.1	127.0.0.1	HTTP	192	HTTP/1.1 200 OK
311	9.284471	127.0.0.1	127.0.0.1	TCP	54	39943 > http [RST] Seq=88 Win=0 Len=0
312	10.286181	127.0.0.1	127.0.0.1	TCP	74	39944 > http [SYN] Seq=0 Win=32792 Len=0 MSS=16396 SACK_PERM=1 TSval=2101000 TSecr=0 WS=16
313	10.286205	127.0.0.1	127.0.0.1	TCP	74	http > 39944 [SYN, ACK] Seq=0 Ack=1 Win=32768 Len=0 MSS=16396 SACK_PERM=1 TSval=2101000 TSecr=2101000 WS=16
314	10.286219	127.0.0.1	127.0.0.1	TCP	66	39944 > http [ACK] Seq=1 Ack=1 Win=32800 Len=0 TSval=2101000 TSecr=2101000
315	10.286261	127.0.0.1	127.0.0.1	HTTP	152	OPTIONS * HTTP/1.0
316	10.286280	127.0.0.1	127.0.0.1	TCP	66	http > 39944 [ACK] Seq=1 Ack=87 Win=32768 Len=0 TSval=2101000 TSecr=2101000
317	10.286320	127.0.0.1	127.0.0.1	TCP	66	39944 > http [FIN, ACK] Seq=87 Ack=1 Win=32800 Len=0 TSval=2101000 TSecr=2101000
318	10.286757	127.0.0.1	127.0.0.1	HTTP	192	HTTP/1.1 200 OK
319	10.286813	127.0.0.1	127.0.0.1	TCP	54	39944 > http [RST] Seq=88 Win=0 Len=0
320	10.518146	127.0.0.1	127.0.0.1	TCP	66	58918 > http [FIN, ACK] Seq=769 Ack=2016 Win=32768 Len=0 TSval=2101058 TSecr=2099896
321	10.518200	127.0.0.1	127.0.0.1	TCP	66	http > 58918 [ACK] Seq=2016 Ack=770 Win=32768 Len=0 TSval=2101058 TSecr=2101058
322	10.518264	127.0.0.1	127.0.0.1	TCP	66	58913 > http [FIN, ACK] Seq=718 Ack=1559 Win=32768 Len=0 TSval=2101058 TSecr=2099896
323	10.518277	127.0.0.1	127.0.0.1	TCP	66	http > 58913 [ACK] Seq=1559 Ack=719 Win=32768 Len=0 TSval=2101058 TSecr=2101058
324	10.518300	127.0.0.1	127.0.0.1	TCP	66	58917 > http [FIN, ACK] Seq=736 Ack=3899 Win=32768 Len=0 TSval=2101058 TSecr=2099896
325	10.518309	127.0.0.1	127.0.0.1	TCP	66	http > 58917 [ACK] Seq=3899 Ack=737 Win=32768 Len=0 TSval=2101058 TSecr=2101058
326	10.518331	127.0.0.1	127.0.0.1	TCP	66	58919 > http [FIN, ACK] Seq=719 Ack=4834 Win=32768 Len=0 TSval=2101058 TSecr=2099896
327	10.518340	127.0.0.1	127.0.0.1	TCP	66	http > 58919 [ACK] Seq=4834 Ack=720 Win=32768 Len=0 TSval=2101058 TSecr=2101058
328	10.518357	127.0.0.1	127.0.0.1	TCP	66	58914 > http [FIN, ACK] Seq=718 Ack=9171 Win=32768 Len=0 TSval=2101058 TSecr=2099896
329	10.518365	127.0.0.1	127.0.0.1	TCP	66	http > 58914 [ACK] Seq=9171 Ack=719 Win=32768 Len=0 TSval=2101058 TSecr=2101058
330	10.518381	127.0.0.1	127.0.0.1	TCP	66	58920 > http [FIN, ACK] Seq=741 Ack=17924 Win=32768 Len=0 TSval=2101058 TSecr=2099896
331	10.518389	127.0.0.1	127.0.0.1	TCP	66	http > 58920 [ACK] Seq=17924 Ack=742 Win=32768 Len=0 TSval=2101058 TSecr=2101058

▶ Frame 331: 66 bytes on wire (528 bits), 66 bytes captured (528 bits)

▶ Ethernet II, Src: 00:00:00\_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00\_00:00:00 (00:00:00:00:00:00)

▶ Internet Protocol Version 4, Src: 127.0.1.1 (127.0.1.1), Dst: 127.0.0.1 (127.0.0.1)

▶ Transmission Control Protocol, Src Port: http (80), Dst Port: 58920 (58920), Seq: 17924, Ack: 742, Len: 0

# Bonus ronde 1: Wireshark - JMeter

Capturing from lo [Wireshark 1.6.7]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: Expression... Clear Apply

No.	Time	Source	Destination	Protocol	Length	Info
33	0.285693	127.0.0.1	127.0.1.1	HTTP	423	GET /images/pixel_trans.gif HTTP/1.1
35	0.302851	127.0.0.1	127.0.1.1	HTTP	436	GET /images/table_background_default.gif HTTP/1.1
37	0.309898	127.0.0.1	127.0.1.1	HTTP	408	GET /images/ HTTP/1.1
39	0.340612	127.0.0.1	127.0.1.1	HTTP	427	GET /images/loadrunner_icon.jpg HTTP/1.1
41	0.360865	127.0.0.1	127.0.1.1	HTTP	426	GET /images/header_account.gif HTTP/1.1
43	0.365814	127.0.0.1	127.0.1.1	HTTP	429	GET /images/ibm-rational_icon.png HTTP/1.1
46	0.366290	127.0.0.1	127.0.1.1	TCP	66	58812 > http [ACK] Seq=5061 Ack=37379 Win=32768 Len=0 TSval=2015365 TSecr=2015365
47	0.387588	127.0.0.1	127.0.1.1	HTTP	430	GET /images/banners/oscommerce.gif HTTP/1.1
49	0.398594	127.0.0.1	127.0.1.1	HTTP	428	GET /images/performance_icon.png HTTP/1.1
52	0.399971	127.0.0.1	127.0.1.1	TCP	66	58812 > http [ACK] Seq=5787 Ack=79397 Win=26608 Len=0 TSval=2015374 TSecr=2015373
54	0.400520	127.0.0.1	127.0.1.1	TCP	66	58812 > http [ACK] Seq=5787 Ack=95781 Win=26608 Len=0 TSval=2015374 TSecr=2015374
57	0.401050	127.0.0.1	127.0.1.1	TCP	66	58812 > http [ACK] Seq=5787 Ack=118375 Win=4016 Len=0 TSval=2015374 TSecr=2015374
58	0.401178	127.0.0.1	127.0.1.1	TCP	66	[TCP Window Update] 58812 > http [ACK] Seq=5787 Ack=118375 Win=23152 Len=0 TSval=2015374 TSecr=2015374
59	0.421618	127.0.0.1	127.0.1.1	HTTP	442	GET /includes/languages/german/images/icon.gif HTTP/1.1
61	0.458666	127.0.0.1	127.0.1.1	HTTP	443	GET /includes/languages/english/images/icon.gif HTTP/1.1
63	0.459629	127.0.0.1	127.0.1.1	TCP	66	58812 > http [ACK] Seq=6540 Ack=119263 Win=65536 Len=0 TSval=2015389 TSecr=2015389
64	0.493253	127.0.0.1	127.0.1.1	HTTP	430	GET /images/silkperformer_icon.png HTTP/1.1
66	0.530384	127.0.0.1	127.0.1.1	HTTP	443	GET /includes/languages/espanol/images/icon.gif HTTP/1.1
68	0.542506	127.0.0.1	127.0.1.1	HTTP	423	GET /images/jmeter_icon.jpg HTTP/1.1
70	0.575924	127.0.0.1	127.0.1.1	HTTP	432	GET /images/infobox/corner_right.gif HTTP/1.1
72	0.615416	127.0.0.1	127.0.1.1	TCP	66	58812 > http [ACK] Seq=8004 Ack=126411 Win=114864 Len=0 TSval=2015428 TSecr=2015418
73	5.089427	127.0.0.1	127.0.0.1	TCP	66	http > 39829 [FIN, ACK] Seq=3441 Ack=338 Win=32768 Len=0 TSval=2016546 TSecr=2015296
74	5.127716	127.0.0.1	127.0.0.1	TCP	66	39829 > http [ACK] Seq=338 Ack=3442 Win=32768 Len=0 TSval=2016556 TSecr=2016546
76	5.618948	127.0.0.1	127.0.1.1	TCP	66	58812 > http [ACK] Seq=8004 Ack=126412 Win=114864 Len=0 TSval=2016679 TSecr=2016669
77	10.093132	127.0.0.1	127.0.0.1	TCP	66	39829 > http [FIN, ACK] Seq=338 Ack=3442 Win=32768 Len=0 TSval=2017797 TSecr=2016546
78	10.093266	127.0.0.1	127.0.0.1	TCP	66	http > 39829 [ACK] Seq=3442 Ack=339 Win=32768 Len=0 TSval=2017797 TSecr=2017797
79	10.093481	127.0.0.1	127.0.1.1	TCP	66	58812 > http [FIN, ACK] Seq=8004 Ack=126412 Win=114864 Len=0 TSval=2017797 TSecr=2016669

▶ Frame 58: 66 bytes on wire (528 bits), 66 bytes captured (528 bits)

▶ Ethernet II, Src: 00:00:00\_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00\_00:00:00 (00:00:00:00:00:00)

▶ Internet Protocol Version 4, Src: 127.0.0.1 (127.0.0.1), Dst: 127.0.1.1 (127.0.1.1)

▶ Transmission Control Protocol, Src Port: 58812 (58812), Dst Port: http (80), Seq: 5787, Ack: 118375, Len: 0  
Source port: 58812 (58812)

# Bonus ronde 1: Wireshark - Analyse

- **Filter:** `http.request.method == "GET"`
  - » Jmeter: 23 Requests
    - » Analyse: Exact zoals gespecificeerd
  - » Chrome: 24 Requests
    - » Analyse: Inclusief favicon.ico
  - » Firefox: 44 Requests
    - » Analyse: Dubbele requests (Firefox issue)

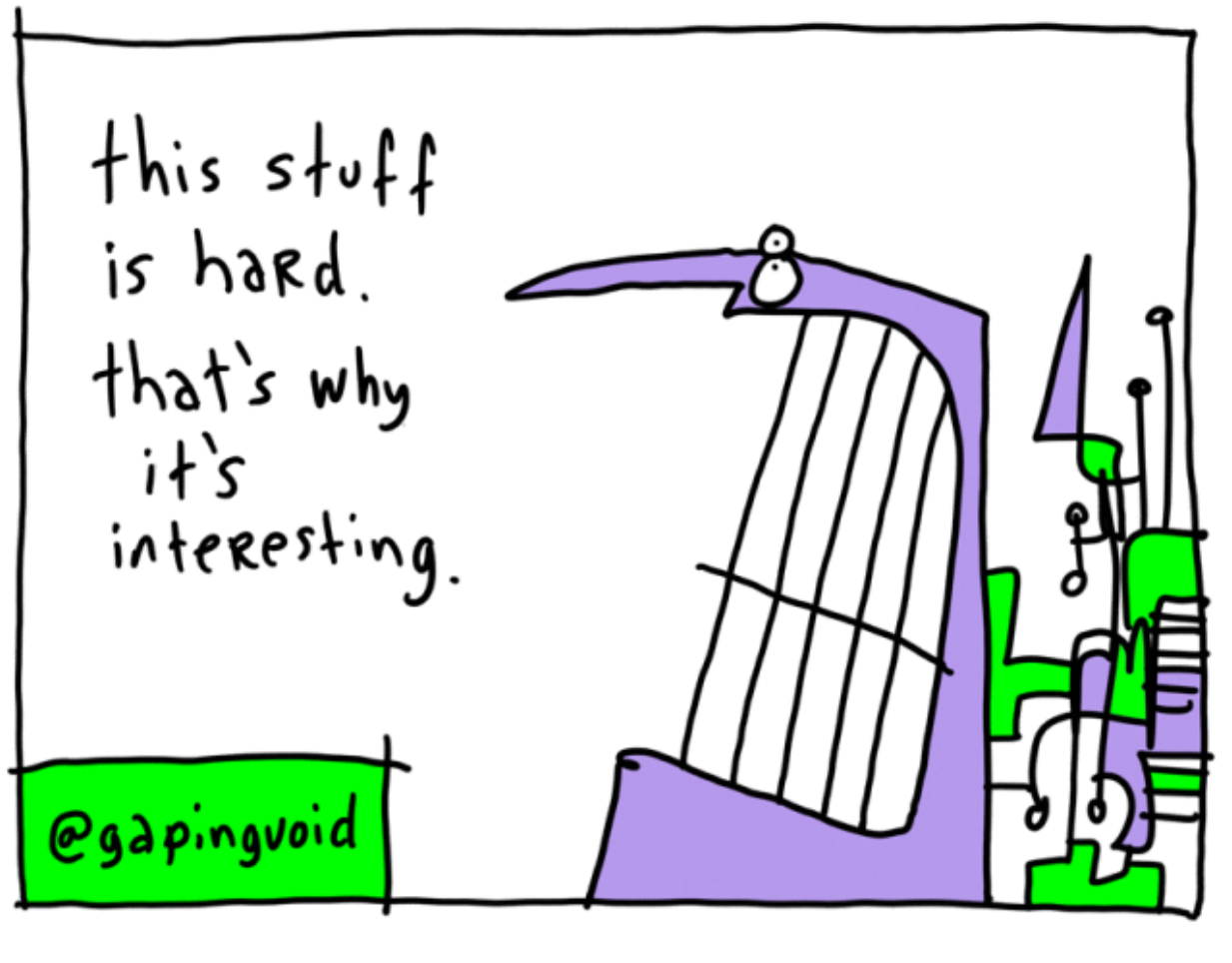
## Info

```
GET http://127.0.0.1/index.php HTTP/1.1
GET /index.php HTTP/1.1
GET http://127.0.1.1/stylesheet.css HTTP/1.1
GET /stylesheet.css HTTP/1.1
```

# Bonus ronde 1: Wireshark - Analyse

- **Filter:** `http.response.code == 200`
  - » Jmeter: 23 Responses
    - » Analyse: Exact zoals verzonden
  - » Chrome: 24 Responses
    - » Analyse: Exact zoals verzonden
  - » Firefox: 44 Responses
    - » Analyse: Exact zoals verzonden

# Bonus ronde 2: Plugins & Rapporteren











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