

# Apache JMeter

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# JMeter

The screenshot shows the Apache JMeter 2.3.4 interface. The title bar indicates the file path: simple.jmx (/Users/fb/github/Talk/jmeter/plans/simple.jmx) - Apache JMeter (2.3.4 r785646). The menu bar includes File, Edit, Run, Options, and Help. The left sidebar shows a tree view with 'Test Plan' expanded, containing 'Thread Group' with two 'HTTP - studivz.net/' entries, 'View Results Tree', 'Summary Report' (highlighted), and 'WorkBench'. The main window displays the 'Summary Report' for the selected test plan. It includes fields for 'Name' (Summary Report), 'Comments', and 'Write results to file / Read from file'. Below these are buttons for 'Browse...', 'Log/Display Only' (with checkboxes for Errors and Successes), and 'Configure'. A table of results is shown with columns: Label, # Samples, Average, Min, Max, Std. Dev., Error %, Throughput, KB/sec, and Avg. Bytes. The table contains three rows: 'HTTP - studivz.net/' (48 samples, average 443), 'HTTP - studivz.net//press' (46 samples, average 430), and 'TOTAL' (94 samples, average 436). At the bottom, there are checkboxes for 'Include group name in label?' and a 'Save Table Data' button.

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	KB/sec	Avg. Bytes
HTTP - studivz.net/	48	443	341	1340	147.35	0.00%	5.5/sec	131.55	24502.0
HTTP - studivz.net//press	46	430	336	871	82.14	0.00%	5.6/sec	129.44	23509.0
TOTAL	94	436	336	1340	120.12	0.00%	10.8/sec	252.50	24016.1



**Folien unter <http://github.com/notfb/Talk/>**



**Fragen? Dann fragt ...**



# Agenda

Einleitung

Simpler HTTP-Testplan

Erweiterungen

Testpläne parametrisieren

Fallstricke

Zusammenfassung



## Einleitung

Simpler HTTP-Testplan

Erweiterungen

Testpläne parametrisieren

Fallstricke

Zusammenfassung



# Einleitung

- Warum Lasttests?
- Warum JMeter?
  - Flexibel
  - Java, leicht erweiterbar
  - Apache 2.0 Lizenz
  - Nicht zu langsam



# Einleitung

- Warum Lasttests?
- Warum JMeter?
  - Flexibel
  - Java, leicht erweiterbar
  - Apache 2.0 Lizenz
  - Nicht zu langsam





# Grundlagen Lasttests

- Setup aufwändig
- Iterativer Lernprozess
- Last langsam erhöhen



# Auswertung von Lasttests

- Was wollen wir testen?
- Welche Metriken sind sinnvoll?
- Wie bewerten wir die Metriken?



# Auswertung von Lasttests

- Was wollen wir testen?
- Welche Metriken sind sinnvoll?
- Wie bewerten wir die Metriken?



# Metriken - Lastgenerator

- Latenz & Antwortzeit
- Durchsatz
- Standardabweichung (Jitter)
- I.d.R. misst man den Lastgenerator mit!



# Metriken - Applikation

- Profiler
- Applikations-Monitoring
- Logfiles
- Exceptions, Core-dumps, usw.



# “Release It!: Design and Deploy Production-Ready Software”

## Kapitel 8

(Pragmatic Programmers)

ISBN-13: 978-0978739218



# JMeter Konzepte

- Testpläne
- Komponenten
- Scoping



# JMeter Komponenten

- Thread Groups
- Sampler und Listener
- Logic Controller
- Assertions
- ...





Stellt JMeter auf englisch um (“Optionen”). Die deutsche Lokalisierung ist unerträglich.



Einleitung

**Simpler HTTP-Testplan**

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# Thread Group

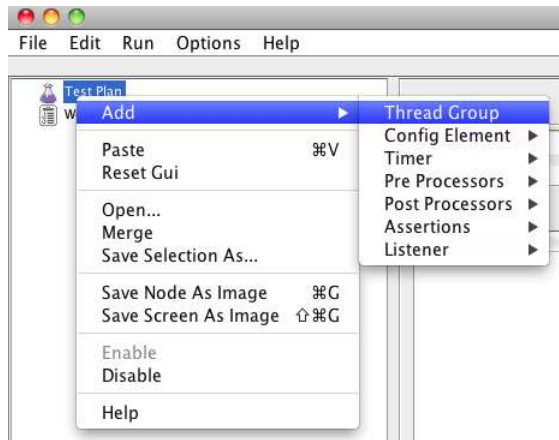
- Führt For-Schleife mit  $n$  Threads aus
- JMeter erzeugt Komponenten-Instanzen aus Testplan
- Jeder Thread tut etwas mit seinen Instanzen
  - z.B. HTTP-Request senden

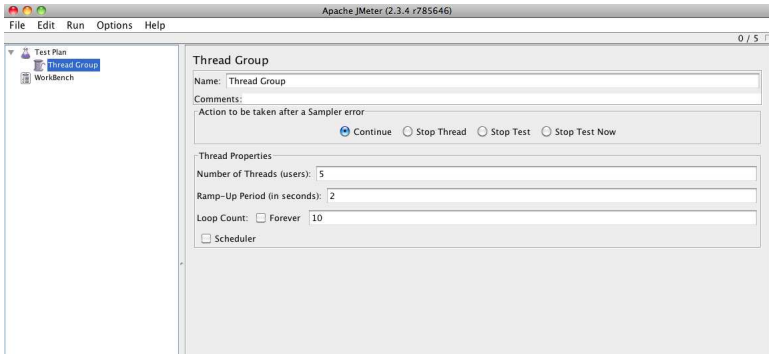


# Thread Group

- Führt For-Schleife mit  $n$  Threads aus
- JMeter erzeugt Komponenten-Instanzen aus Testplan
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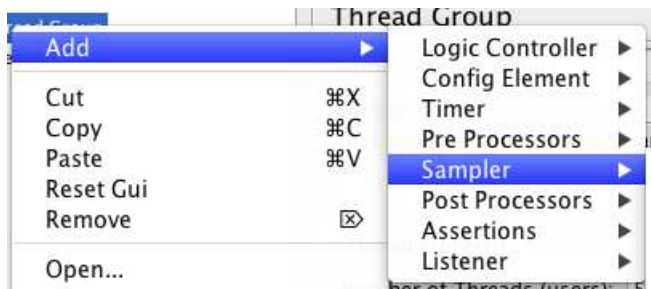




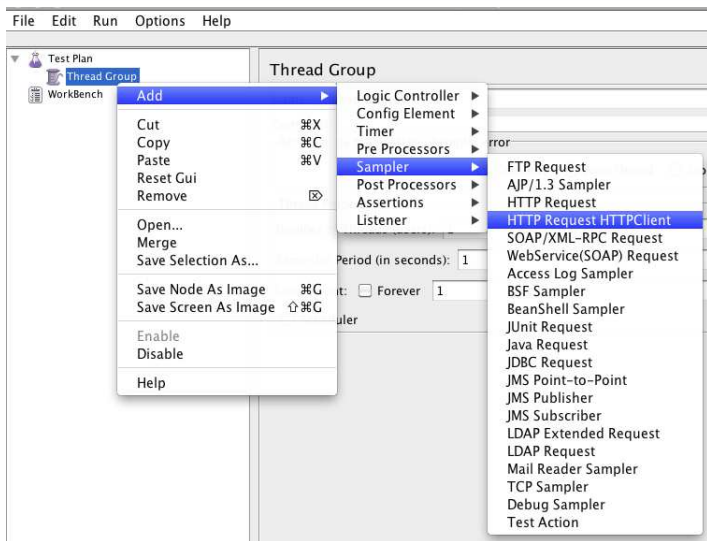
# Sampler

- “Meßpunkt”
- Erzeugt Sample Result
  - Success?, Request, Response, Headers, Timing, ...
- z.B. HTTP Request **HTTPClient**









Test Plan

Thread Group

HTTP Request HTTPClient

WorkBench

### HTTP Request HTTPClient

Name:

Comments:

Web Server:

Server Name or IP:  Port Number:

Timeouts (milliseconds): Connect:  Response:

HTTP Request

Protocol (default http):  Method:  Content encoding:

Path:

☒ Redirect Automatically
 ☐ Follow Redirects
 ☒ Use KeepAlive
 ☐ Use multipart/form-data for HTTP POST

Send Parameters With the Request:

ParamName	Name	ParamValue	Value	Encode?	Include Eq...
				<input type="checkbox"/>	<input checked="" type="checkbox"/>

Send Files With the Request:

File Path	Parameter...	MIME Type

Optional Tasks

☐ Retrieve All Embedded Resources from HTML Files
 ☐ Use as Monitor
 ☐ Save response as MD5 hash?

Embedded URLs must match:

# Listener

- Wertet ein Sample-Result aus
- “View Results Tree” und “Summary Report” sind meine Favoriten
- Simple Data Writer (CSV oder XML)



simple.jmx (/Users/fb/lib/jakarta-jmeter-2.3.4/simple.jmx) – Apache JMeter (2.3.4 r785646)

File Edit Run Options Help

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Test Plan

- Thread Group
  - HTTP Request HTTPClient
    - GET /open
    - Save Responses to a file:
    - Summary Report
    - View Results Tree
- WorkBench

### Summary Report

Name: Summary Report

Comments:

Write results to file / Read from file

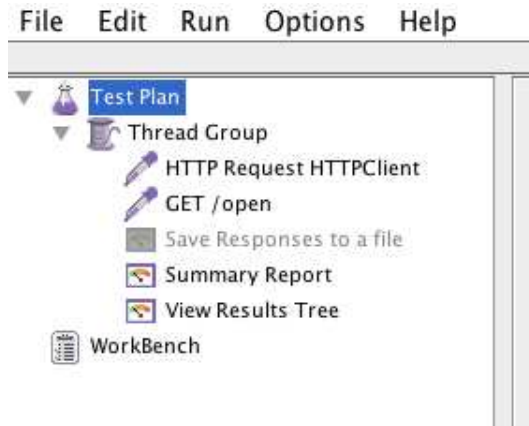
Filename   Log/Display Only: ☐ Errors ☐ Successes

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	KB/sec	Avg. Bytes
HTTP Request HTTPClient	14	1780	1044	2495	367.16	0.00%	1.3/sec	49.72	40333.2
GET /open	12	1934	1531	2178	186.05	0.00%	1.2/sec	38.48	33243.0
TOTAL	26	1851	1044	2495	307.39	0.00%	2.3/sec	84.27	37060.8



The screenshot shows the Apache JMeter 2.3.4 interface. The title bar indicates the file path: simple.jmx (/Users/fb/lib/jakarta-jmeter-2.3.4/simple.jmx) - Apache JMeter (2.3.4 r785646). The menu bar includes File, Edit, Run, Options, and Help. The left sidebar shows a Test Plan with a Thread Group containing an HTTP Request HTTPClient, a GET /open sampler, and options to save responses to a file, generate a summary report, and view the results tree. The 'View Results Tree' button is highlighted in blue. The main window displays the 'View Results Tree' dialog. The 'Name' field is 'View Results Tree'. The 'Comments' field is empty. The 'Write results to file / Read from file' section has an empty 'Filename' field and a 'Browse...' button. The 'Log/Display Only' section has checkboxes for 'Errors' and 'Successes', both of which are unchecked. A 'Configure' button is present. The 'View Results Tree' dialog has three tabs: 'Sampler result' (selected), 'Request', and 'Response data'. The 'Sampler result' tab shows the following details for the selected 'GET /open' sampler:  
Thread Name: Thread Group 1-1  
Sample Start: 2010-01-23 11:47:39 CET  
Load time: 1044  
Latency: 322  
Size in bytes: 40284  
Sample Count: 1  
Error Count: 0  
Response code: 200  
Response message: OK  
Response headers:  
HTTP/1.1 200 OK  
Date: Sat, 23 Jan 2010 10:47:38 GMT  
Server: Apache  
Vary: Accept-Encoding,User-Agent  
Connection: close  
Transfer-Encoding: chunked  
Content-Type: text/html; charset=utf-8  
HTTPSampleResult fields:  
ContentType: text/html; charset=utf-8  
DataEncoding: utf-8

# Simpler HTTP-Testplan



Einleitung

Simpler HTTP-Testplan

**Erweiterungen**

Testpläne parametrisieren

Fallstricke

Zusammenfassung



# Assertions

- analog zu *assert(...)*
- Zusicherung wird verletzt → Sample fehlgeschlagen
- z.B.: Response Assertion, Duration Assertion





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Test Plan

- Thread Group
  - HTTP Request HTTPClient
    - GET /open
    - Save Responses to a file
    - Summary Report
    - View Results Tree
    - HTML Assertion
- WorkBench

### HTML Assertion

Name: HTML Assertion

Comments: validate HTML ...

Tidy Settings

Doctype: omit

Format

☒ HTML

☐ XHTML

☐ XML

☐ Errors only

Error threshold: 1 Warning threshold: 2

Write JTidy report to file

Filename

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### View Results Tree

Name: View Results Tree

Comments:

Write results to file / Read from file

Filename:   Log/Display Only: ☐ Errors ☐ Successes

- ▶ HTTP Request HTTPClient
- ▶ HTTP Request HTTPClient
- ▼ GET /open
- ▶ **HTTP Assertion**
- ▶ HTTP Request HTTPClient
- ▶ GET /open
- ▶ GET /open
- ▶ GET /open
- ▶ HTTP Request HTTPClient
- ▶ HTTP Request HTTPClient
- ▶ GET /open

Assertion result

Assertion error: false  
Assertion failure: true  
Assertion failure message: Tidy Parser errors: 0 (allowed 1) Tidy Parser warnings: 20 (allowed 2)



# Logic Controller

- Ändern den Kontroll-Fluß
- z.B. Loop Controller, Once Only Controller





simpleLogic.jmx (/Users/fb/lib/jakarta-jmeter-2.3.4/simpleLogic.jmx) - Apache JMeter (2.3.4 r785646)

File Edit Run Options Help

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Test Plan

- Thread Group
  - Random Order Controller
    - HTTP Request HTTPClient
      - GET /open
      - Save Responses to a file
      - Summary Report
      - View Results Tree**
      - HTML Assertion

WorkBench

**View Results Tree**

Name: View Results Tree

Comments:

Write results to file / Read from file

Filename:   Log/Display Only: ☐ Errors ☐ Successes

V<

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☐ Show Text
 ☒ Render HTML
 ☐ Render XML
 ☐ Render JSON
 ☐ Download embedded resources

**Fragen?**



Einleitung

Simpler HTTP-Testplan

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**Testpläne parametrisieren**

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Zusammenfassung



# Variablen

- $\${ VARIABLE}$
- $\${ UNDEF} == UNDEF$
- JMeter trim()ed Leerzeichen (Version > 2.3.1)





# Funktionen

- `${__functionName(var1, var2, var3)}`
- `${__threadNum}`
- `${__Random(1, 63, LOTTERY)}`
- `${__javaScript(expr, RETVAL)}`
- Escape “,” as “\,”



# Funktionen

HTTP Request HTTPClient

Name:

Comments:

Web Server

Server Name or IP:  Port Number:

Timeouts (milliseconds)

Connect:  Response:

HTTP Request

Protocol (default http):  Method:

Content encoding:

Path:

☒ Redirect Automatically
 ☐ Follow Redirects
 ☒ Use KeepAlive
 ☐ Use multipart/form-data for HTTP POST

Send Parameters With the Request:

Name:	Value	Encode?	Include Eq...
ParamName	ParamValue	<input type="checkbox"/>	<input checked="" type="checkbox"/>
foo	\${_Random(1,10,RAND)}	<input type="checkbox"/>	<input checked="" type="checkbox"/>
t	\${RAND}	<input type="checkbox"/>	<input checked="" type="checkbox"/>



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**Fallstricke**

Zusammenfassung



# Fallstricke

- Synchrones I/O,  $n \geq 1000$  Threads
- Einige Sampler machen ineffizientes I/O (z.B. DNS)
- HTTP Request HttpClient vs. ~~HTTP Request~~
- Java GC (500ms Full GC → Test steht 0,5sec)



# Fallstricke

- **WhileController eval()ed eine JMeter-Funktion**
- IfController eval()ed JavaScript
  - Jedes JavaScript-Statements muss mit ";" enden
- "Read the fine source (and fix it)"
- Parametrisierung von Testplänen ist etwas anstrengend



# Fallstricke

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# Fallstricke

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# Fehlersuche

- View Result in Tree (evtl. mit “log errors only”)
- Test mit einen Thread und einen Loop-Count von eins laufen lassen
- JMeter-Log-Level in `bin/jmeter.properties` erhöhen
- “What’s this node?” Menü-Option gibt Klassennamen aus
- Live HTTP Headers und Firebug Firefox-Plugins





# Live HTTP Headers

The screenshot shows a web browser window displaying the 'brands4friends' website. The website has a navigation menu on the left with categories like 'ESPRIT', 'Ringe', 'JUNK FOOD KIDS', 'FIT IN DEN FRÜHLING', 'ED HARDY', 'TENEUES', 'GREEN COTTON / DRAPPA DOT', 'MEHR GAMING, MEHR SPASS', 'LOVE MOSCHINO', 'LUXUSDÖPFE & Kosmetik', and 'CRUISER COLLECTION'. The main content area features a large image of a silver ring. The 'Live HTTP Headers' tool is overlaid on the right side of the browser window. The tool has tabs for 'Headers', 'Generator', 'Config', and 'About'. The 'Generator' tab is active, showing a list of HTTP requests and responses. The 'Show' checkbox is checked, and the 'request' checkbox is also checked. The 'Capture' button is highlighted in blue.

Product Details - brands4friends.de

Most Visited - Getting Started - Latest Headlines 3h

Product Details - brands4friends.de

brands4friends  
Marken zum Freundschaftspreis

Startseite → ESPRIT → Ringe

**ESPRIT**

Ringe  
Armbandschmuck  
Halsbandschmuck  
Ohrringschmuck  
Uhren

JUNK FOOD KIDS  
FIT IN DEN FRÜHLING  
ED HARDY  
TENEUES  
GREEN COTTON / DRAPPA DOT  
MEHR GAMING, MEHR SPASS  
LOVE MOSCHINO  
LUXUSDÖPFE & Kosmetik  
CRUISER COLLECTION

Produkt empfehlen

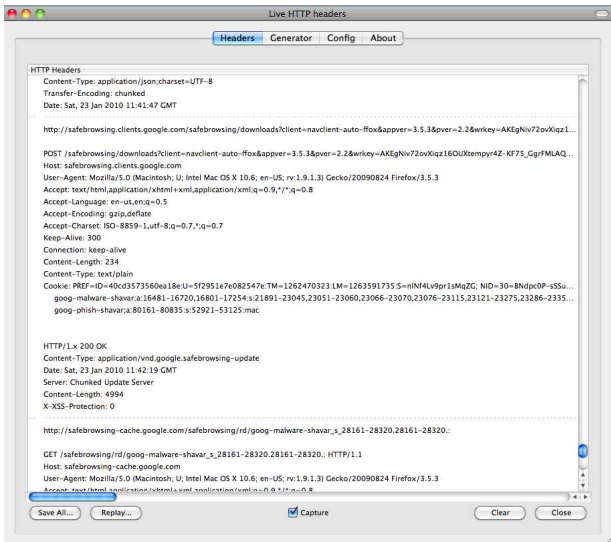
Live HTTP headers

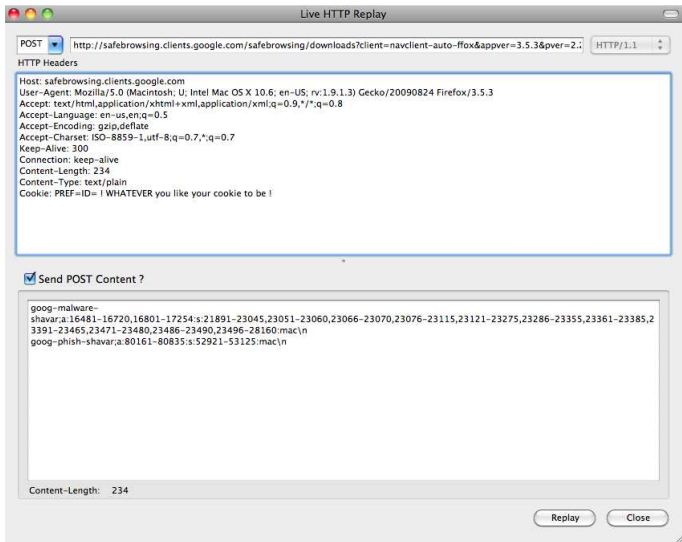
Headers Generator Config About

Generator List

```
GET /static/css/components/ShopCompactDirectory.css
GET /static/js/leSelectboxFixer.js
GET /static/js/components/ShopDetailsViewer.js
GET /static/js/components/ShopCompactDirectory.js
GET /static/images/layout_2009/button_right-large.gif
GET /static/images/layout_2009/arrow_left.gif
GET /100111ESPR/med/4250293424793_001.jpg
GET /100111ESPR/rmb/4250293424793_002.jpg
GET /100111ESPR/rmb/4250293424793_003.jpg
GET /stuff/facebook/mail.jpg
GET /stuff/facebook/FacebookLogoSmall.gif
GET /100111ESPR/med/4250293424038_001.jpg
GET /100111ESPR/med/4250293424045_001.jpg
GET /100111ESPR/med/4250293424061_001.jpg
GET /100111ESPR/med/4250293424061_001.jpg
GET /100111ESPR/med/4250293425219_001.jpg
GET /100111ESPR/med/4250293425257_001.jpg
GET /100111ESPR/med/4250293425004_001.jpg
GET /b/ss/pgmhbrands4friendslive/1/H/17/s93739869993487AQ8-1&ndh=1&t=23/0/2010K2012K3A41N3A42N206N20-60...
GET /rde_server/res/75da58dec64/event/user/session/sid/701645126/userid/701645126
GET /100111ESPR/med/4250293425103_001.jpg
GET /static/images/layout_2009/button_left-large.gif
GET /rde_server/res/75da58dec64/event/getcontrolgroup/sid/701645126
GET /rde_server/res/75da58dec64/recomm/detail/view/sid/701645126?item=170239
GET /100111ESPR/rec/4250293424250_001.jpg
GET /100111ESPR/rec/4250293424250_001.jpg
GET /100111ESPR/rec/4250293424281_001.jpg
GET /100111ESPR/rec/4250293424144_001.jpg
POST /shop/productdetail.shoppingform/170239/653aformdata=H4sIAAAAAAAAAAAGWGUU7DQ8B8UpAgOSNT8K70okOV9K9FW3...
GET /b/ss/pgmhbrands4friendslive/1/H/17/s92958912013387TAQ8-1&ndh=1&t=23/0/2010K2012K3A41N3A42N206N20-6...
GET /rde_server/res/75da58dec64/recomm/detail/view/sid/701645126?item=170239
POST /safebrowsing/downloads?Client=msciClient-auto-FlowAppver=3.5.38pver=2.2&key=AkEgNiv72onXiqz16OUZtempr4Z...
GET /safebrowsing/rd/gooq-malware-shaver_v_28161-28320-28161-28320
```

Save All... Capture Clear Close





Einleitung

Simpler HTTP-Testplan

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**Zusammenfassung**



# Zusammenfassung

- Konzepte
- Testpläne und Parametrisierung
- Fallstricke



# Dokumentation

- `http://jakarta.apache.org/jmeter/usermanual/`
- “Help! My boss wants me to load test our web app!”
  - `http://jakarta.apache.org/jmeter/usermanual/boss.html`
- Mailinglisten
  - `http://jakarta.apache.org/site/mail2.html#JMeter`
- `svn co`  
`http://svn.apache.org/repos/asf/jakarta/jmeter/`



**Danke!**

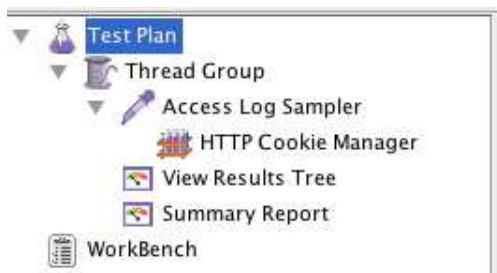


**Fragen? Anregungen? Kritik?**

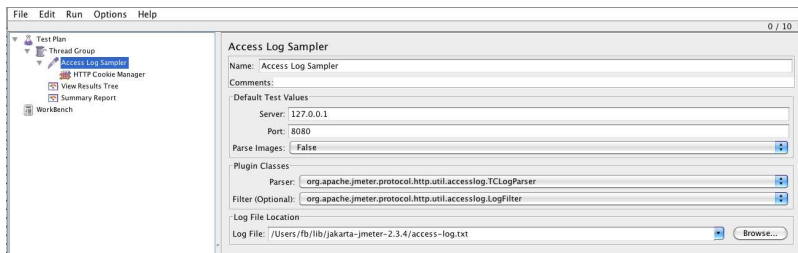




# Access Log Testplan



# Access Log Sampler



# Access Log Sampler

- Keine POST-Parameter
- Session Filter
- Cookie Manager sorgt für die richtigen<sup>TM</sup> Cookies



## Summary Report

Name: Summary Report

Comments:

Write results to file / Read from file

Filename

Browse...

Log/Display Only:

☐ Errors

☐ Successes

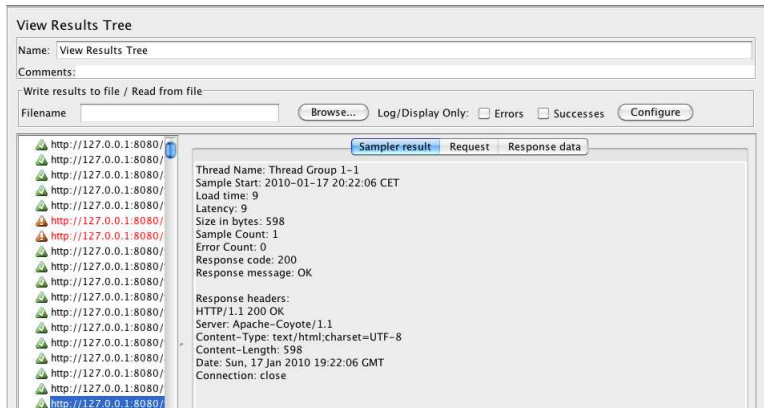
Configure

Label	# Sam...	Average	Min	Max	Std. D...	Error %	Throu...	KB/sec	Avg.Bytes
http://127.0.0.1:8080/	40	7	0	41	8.63	0.00%	14.9/...	113.10	7777.0
http://127.0.0.1:8080/tomcat.gif	40	12	0	134	25.33	0.00%	14.9/...	28.12	1934.0
http://127.0.0.1:8080/asf-logo-wide.gif	40	10	1	138	24.20	0.00%	14.9/...	85.15	5866.0
http://127.0.0.1:8080/tomcat-power.gif	40	6	0	44	8.48	0.00%	14.9/...	33.71	2324.0
http://127.0.0.1:8080/favicon.ico	130	8	1	90	13.20	0.00%	46.7/...	985.64	21630.0
http://127.0.0.1:8080/manager/html	40	9	1	57	12.83	100.00%	15.2/...	27.15	1833.0
http://127.0.0.1:8080/tapDemo/	100	19	4	209	27.35	0.00%	36.3/...	21.21	598.0
http://127.0.0.1:8080/tapDemo/assets/tapestry/5.1.0.5/default.css	120	9	1	123	15.29	0.00%	41.5/...	322.18	7951.0
http://127.0.0.1:8080/tapDemo/assets/blackbird/5.1.0.5/blackbird.css	110	9	1	82	13.56	0.00%	40.4/...	283.59	7194.0
http://127.0.0.1:8080/tapDemo/index.actionlink	20	19	3	82	24.05	0.00%	7.7/sec	0.00	.0
http://127.0.0.1:8080/tapDemo/guess	20	14	4	44	11.53	0.00%	7.7/sec	5.33	710.0
http://127.0.0.1:8080/tapDemo/address/create	40	36	10	136	30.93	0.00%	14.9/...	78.34	5385.0
http://127.0.0.1:8080/tapDemo/assets/blackbird/5.1.0.5/blackbird.js	30	8	1	22	5.71	0.00%	11.6/...	137.02	12104.0
http://127.0.0.1:8080/tapDemo/assets/tapestry/5.1.0.5/tapestry-mes...	30	9	2	62	11.99	0.00%	11.6/...	17.90	1581.0
http://127.0.0.1:8080/tapDemo/assets/scriptaculous/5.1.0.5/scriptacu...	40	11	1	62	14.04	0.00%	15.1/...	40.53	2753.0
http://127.0.0.1:8080/tapDemo/assets/tapestry/5.1.0.5/tapestry.js	30	9	2	40	10.84	0.00%	11.5/...	598.55	53140.0
http://127.0.0.1:8080/tapDemo/assets/scriptaculous/5.1.0.5/prototyp...	30	10	3	34	8.86	0.00%	11.5/...	1462.15	12976...
http://127.0.0.1:8080/tapDemo/assets/scriptaculous/5.1.0.5/effects.js	30	9	2	51	9.66	0.00%	11.5/...	436.75	38745.0
http://127.0.0.1:8080/tapDemo/assets/tapestry/5.1.0.5/field-error-m...	30	10	1	34	8.87	0.00%	11.6/...	12.08	1067.0
http://127.0.0.1:8080/tapDemo/assets/tapestry/5.1.0.5/spacer.gif	30	9	1	42	10.49	0.00%	11.6/...	0.49	43.0
Error	10	0	0	0	0.00	100.00%	.0/hour	0.00	428.0
TOTAL	1000	11	0	209	18.03	5.00%	2061....	25861....	12843.8

☐ Include group name in label?

Save Table Data

## Sample Result



# Sample Request

**View Results Tree**

Name: View Results Tree

Comments:

Write results to file / Read from file

Filename:   Log/Display Only: ☐ Errors ☐ Successes

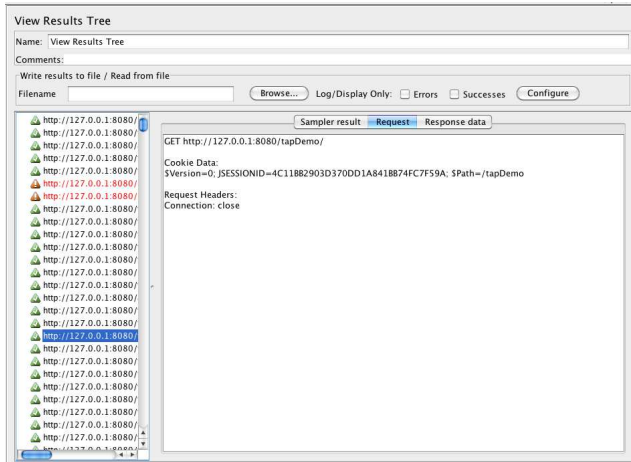
**View Results Tree**

**Sampler result** **Request** **Response data**

GET http://127.0.0.1:8080/tapDemo/

Cookie Data:  
\$Version=0; JSESSIONID=4C118B2903D370DD1A8418B74FC7F59A; \$Path=/tapDemo

Request Headers:  
Connection: close



# Sample Response

**View Results Tree**

Name:

Comments:

Write results to file / Read from file

Filename:   Log/Display Only: ☐ Errors ☐ Successes

**Hi/Lo Guess**

I'm thinking of a number between one and ten ...

[Start guessing](#)

**Address Book**

- [Create new address](#)

There is no data to display.

REACTESOFT