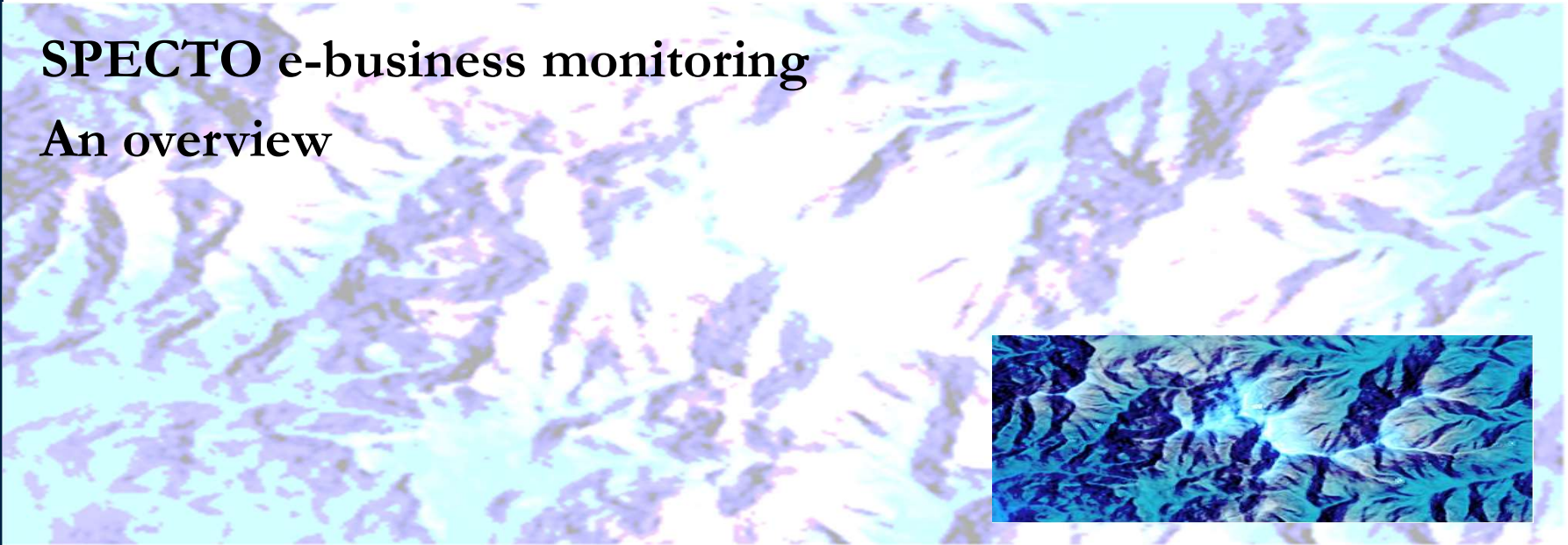


SPECTO e-business monitoring

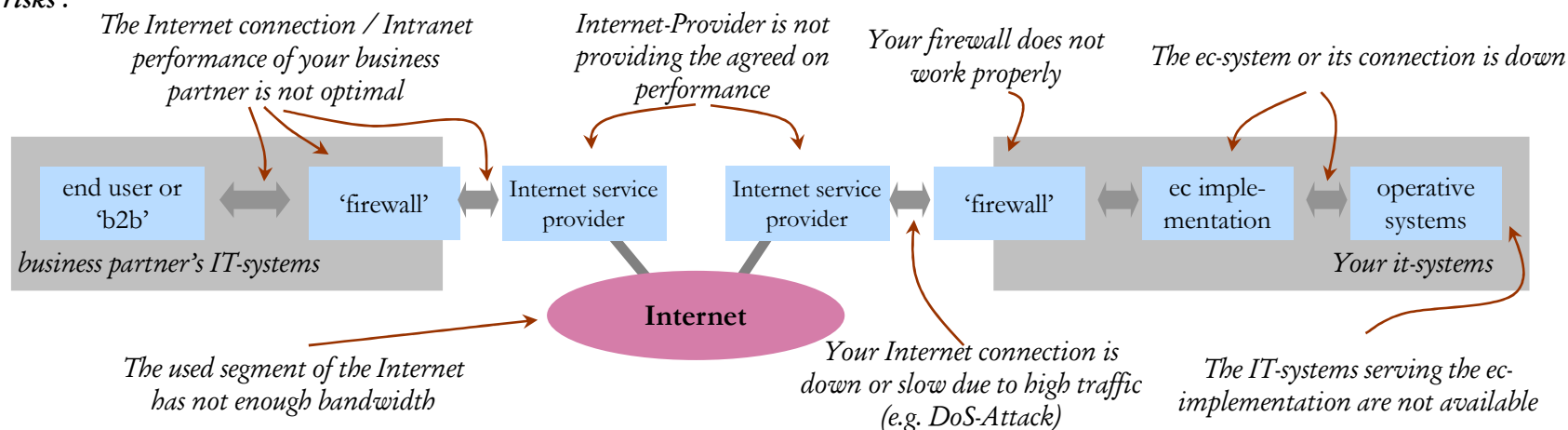
An overview



SPECTO motivation

- Together with your business partners you have created a valuable e-business solution.
- You are satisfied with the content and usability of this solution.
- It is running in the supervised environment of your data center.
- But do you really know, what degree of quality your business partners will see?

Known risks :



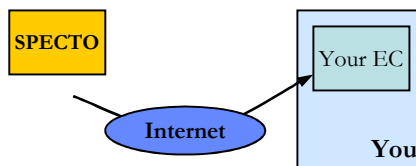
- Those risks can not be avoided, not even by good design.
- Only an early or precautionary detection of failures can reduce those problems.
- This detection is only possible through continuously monitoring from outside.
- **SPECTO exactly provides this.**

SPECTO scenarios

A)

'in-house implemented ec solution'

You deploy an e-business solution at your location. The solution may be developed by yourself or based on an product (e.g.. 'intershop').

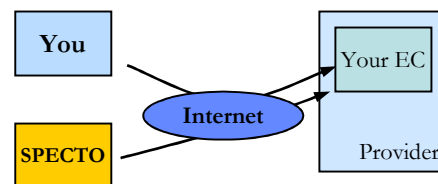


SPECTO: continuously scans your implementation from different parts of the internet

B)

'outsourced ec site'

Like case A). Your site is hosted by an internet provider; or your are using the service of an ASP 'providers' (e.g. SAP Markets').

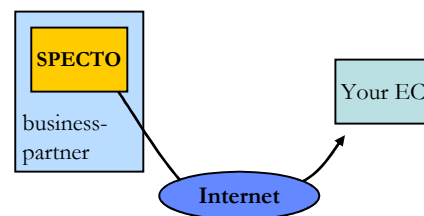


SPECTO: like A). You get information about the quality of service of your provider.

C)

'ec - partner'

Similar to cases A) and B). You deal with several important large partners and want to assure your ec-service is excellent at **their** location

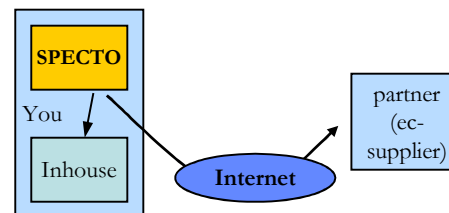


SPECTO: installed in the intranet of your business partner it will report from that point of view

D)

'in-house usage of ec-services'

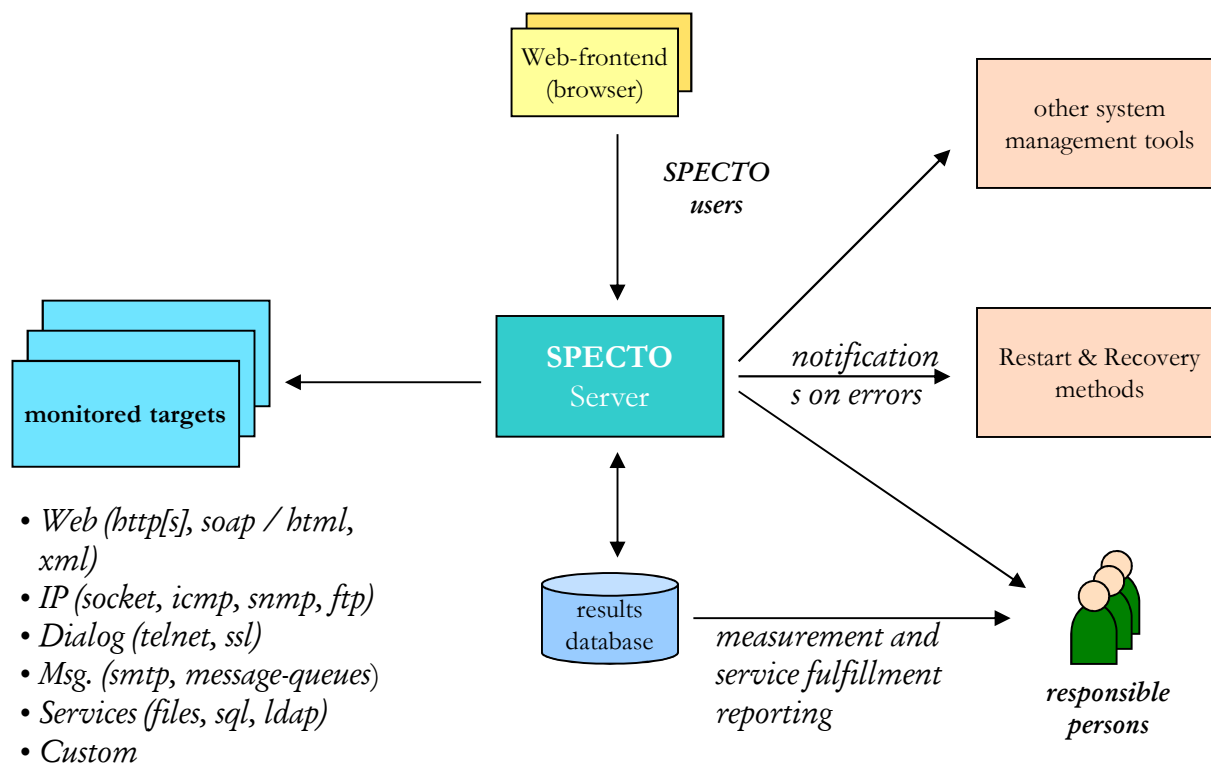
Your company internally uses services supplied by the own edp department or by an external supplier



SPECTO: reports about your view of the services. Results can be used to monitor 'service level agreements'

SPECTO structure

- The central SPECTO engine continuously monitors the defined targets. On errors or deviations it actively informs responsible persons and other tools.
- All relevant protocols are supported as targets. Business processes are defined by dynamic sequences.
- Configuration supports multiple clients, multiple users and rights.
- All data storage is within standard relational databases.
- Results may be viewed online or distributed via email (PDF formats)
- SPECTO operation is via standard browsers.
- The engine features self-control/healing, 'am-alive' and hot-standby.

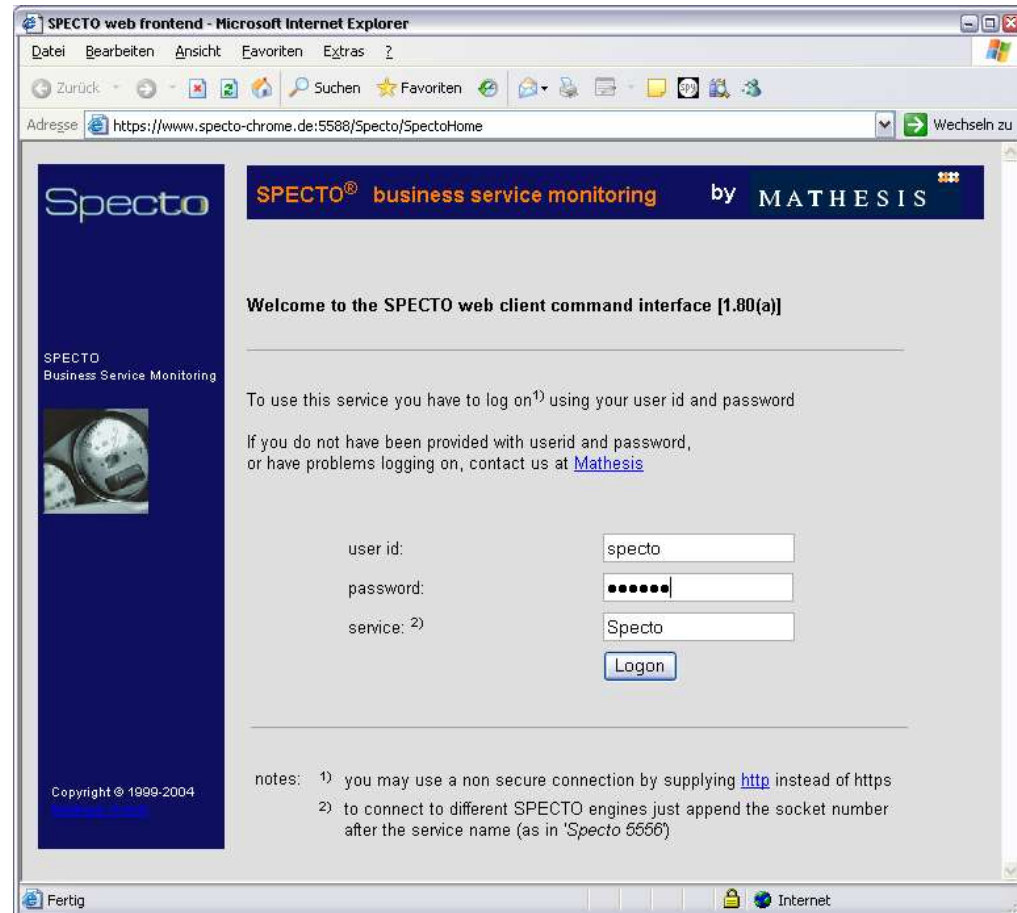


The following pages will give an overview on the capabilities of the SPECTO system by a virtual tour through the most relevant components.

However, the complete implementation is much broader, consisting of over 100 screens and numerous internal documents and scripts.

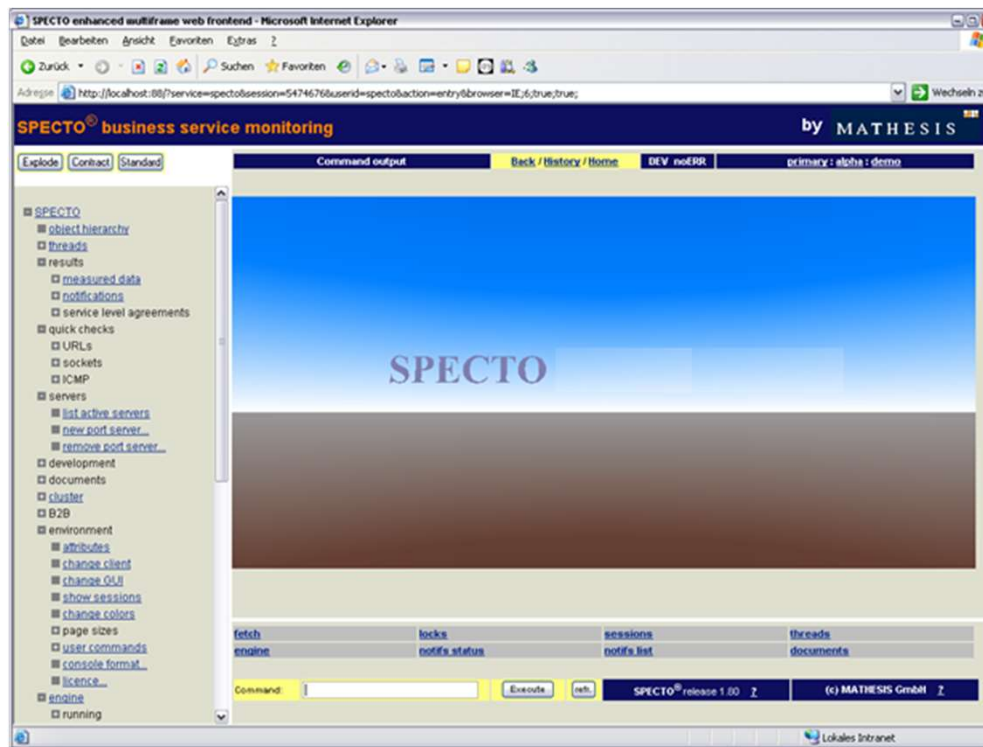
SPECTO logon

- Users use a standard web browser to talk to the SPECTO engine
- Multiple users & sessions are possible
- HTTP and secure HTTPS connections are supported
- Multiple SPECTO instances on a single host are supported
- As alternative to the web front-end also email, SAP R/3 and SNMP front ends are available.



SPECTO engine enhancements

- The SPECTO GUI is divided into :
- the navigation frame (left side) providing a structured access to all features of the engine
- the main frame (top right) displaying the commands output
- the command frame (lower right) consisting of the user defined links and the command line



SPECTO 'clients'

- The SPECTO engine supports multiple, independent clients.
- Users are assigned to one or several of the clients; any access to other clients is prohibited.
- Clients may be flagged 'read only'

SPECTO® business service monitoring by MATHESIS

Explore Contract Standard Back / History / Home DEV noERR primary: alpha: demo

id	client name	user name	# chains	deploy to	NET	DEV
client 0	0	demo	demo	69	system white	true true
client 1	1	Tutorial	Tutorial	22	system white	true true
client 2	2	DAX companies	DAX companies	78	system white	true true
client 3	3	MDAX companies	MDAX companies	56	system white	true true
client 4	4	DOW companies	DOW companies	19	system green	true true
client 5	5	NASDAQ companies	NASDAQ companies	14	system green	true true
client 6	6	Technologie DEMOs	Technologie DEMOs	11	system white	true true
client 7	7	Existing customers	Existing customers	72	system white	true true
client 8	8	potential customers	potential customers	21	system white	true true
client 9	9	new tech tests	new tech tests	34	system white	true true
client 10	10	Governments	Governments	11	system orange	true true
client 11	11	other non-profit orgs	other non-profit orgs	3	system orange	true true

fetch locks sessions threads
engine notif status notif list documents

Command: SPECTO® release 1.80 ? (c) MATHESIS GmbH ?

SPECTO monitored business processes 'chains'

- Within every client, there are the defined business processes ('chains').
- Every running chain (a 'thread') executes the chain's steps and writes the measured results to the database.
- There may be multiple threads per chain.
- The innovation period of a chain is customizable and may be changed dynamically by the thread itself (e.g. narrower monitoring during critical periods).
- chains may be moved and copied
- for every chain there are quick links for the chains details, to start/stop a chain thread and to the reporting.

SPECTO client configuration		Back / History / Home		DEV noERR		primary : alpha : demo		
Client 0 : 'demo'						doc	deploy	
Id	Chain	Period	Type	action	run	status	reporting	
Chain 12	Local tests	3	HTML/HTTP		run	not running	Sep 09 ov	
Chain 13	GMX email check	-1	HTML/HTTP		run	not running	Jul 22 ov	
Chain 14	GMX 1	300	HTML/HTTP		run	not running	Jan 01 ov	
Chain 15	self doc demo	300	HTML/HTTP		run	not running	Jun 23 ov	
Chain 16	Exit demo	300	HTML/HTTP		run	not running	Mar 04 ov	
Chain 17	CMD notif	300	HTML/HTTP		run	not running	Jan 01 ov	
Chain 18	NSF (Notes) based URLs demo	300	HTML/HTTP		run	not running	Mar 23 ov	
Chain 19	Authentication HTTP	300	HTML/HTTP		run	not running	Mar 23 ov	
Chain 20	Authentication HTTPS	300	HTML/HTTP		run	not running	Jan 01 ov	
Chain 21	Authentication DEMO	300	HTML/HTTP		run	not running	Feb 27 ov	
Chain 22	Authentication NTLM	300	HTML/HTTP		run	not running	Feb 27 ov	
Chain 23	Authentication SELF	300	HTML/HTTP		run	not running	Aug 27 ov	

SPECTO chain details

- Any chains consists of steps 'URLs' which are executed in sequence.
- Chain processing may be enhanced by custom scripts ('PBT' – process before thread, 'PBC' – process before chain, 'PAC' – process after chain, 'PAT' – process after thread)
- The sequence may be altered dynamically (e.g. based on the progress of the current step)
- For any chain a set of addresses which are to be notified in case of errors can be defined
- For any chain 'off times' during which no measurements will take place can be specified.
- links to documentation, reporting and the chain details are available

SPECTO chain configuration Back / History / Home DEV noERR primary : alpha : demo

Client 0 : 'demo' doc no notif today results up to:

Chain 14 : 'GMX email check' doc sla active:0 none

persistent use PBT use PAT use PBC use PAC execute AT

id	URL	timeout	2long	type	session	action
Page 0	http://www.gmx.net/	3500	2001	HTML/HTTP		
Page 1	http://www@clusterid@gmx.net/de/cgi/login	3500	2001	HTML/HTTP		
Page 2	http://www@clusterid@gmx.net/de/cgi/startpage	3500	2001	HTML/HTTP		
Page 3	http://www@clusterid@gmx.net/de/cgi/foindex	3500	2001	HTML/HTTP		
Page 4	http://www.gmx.net/de/cgi/logoutpage	3500	2001	HTML/HTTP		

id	notification	message	type	period	level	action
Id 0	specto_notif1@mathesis.de	GMX failure	email	30	6	
Id 1	192.168.73.85		snmp	30	2	
Id 2	log_failure	GMX	script	30	6	

check	Type	bday	eday	bhour	ehour	reason	action
not during	daily			21	22	Backup	

Execute one run single step start prev. chain next chain

SPECTO 'notifications'

- A notification is triggered after the amount of errors during chain execution reaches a certain limit.
- During the error count stays above the limit notifications are repeated ('reminders')
- Optionally, after the error count falls below another limit a 'release' notification is send
- Notifications may be bound to a set of certain error classes (e.g. content or timing)
- A notification may be enhanced with a custom script ('PBN' – process before notification)
- Notifications may be tested individually.

The screenshot shows the 'notification configuration' page in a web application. The page has a dark blue header with the text 'notification configuration', 'Back / History / Home', 'DEV noERR', and 'primary : alpha : demo'. Below the header, there are two yellow buttons labeled 'doc'. The main content area is a form with several fields and checkboxes. The 'Chain' is set to '14 (GMX email check)'. There are four checkboxes for 'use for' options: 'content', 'too long', 'timeout', and 'waitloop', all of which are checked. There is also a 'disabled' checkbox and a 'use PBN' checkbox, both of which are unchecked. The 'Address' field contains 'specto_notif1@mathesis.de', the 'Message' field contains 'GMX failure', the 'Type' dropdown is set to 'email', the 'Period (minutes)' field contains '30', and the 'Level' field contains '6'. Below these fields, there is a section for 'computes to:' with two lines of text: ''too long'/waitLoop' : upper limit = 4, on level = 3, off level = 1' and 'Others : upper limit = 6, on level = 4, off level = 1'. A yellow banner at the bottom of the form states 'This notification is currently not active'. At the bottom of the page, there are three buttons: 'save', 'test', and 'next'.

SPECTO 'off times'

- For any chain a set of 'off times' during which no measurements will take place may be defined.
- off times can be named
- An off time can be scheduled on day, wee, month, year or singular basis.
- The resulting off time is shown graphically
- A summary display of all off times of a chain is available, together with a test execution for a to be specified concrete date/time.

check	Type	bday	eday	bhour	ehour	reason	action
not during	daily	0	0	22	23	application restart	
not during	once	12	12	4	7	release upgrade (singular)	
not during	week daily	4	6	18	20	is regular offline	
not during	weekly	7	2	19	5	possible weekend maintenance	

execution time configuration Back / History / Home DEV noERR primary: alpha : demo

Client = '0' (demo) doc

Chain = '14' (GMX email check) doc

Type: week daily

Reason: Backup (online)

begin day: tuesday '1' = sunday - '7' = saturday

end day: friday '1' = sunday - '7' = saturday

start time (hour:minutes): 21:00 from 00:00 to 23:59; format 'hh' or 'hh:mm' (e.g. eg '12' or '00:15')

end time (hour:minutes): 23:00 from 00:00 to 23:59; format 'hh' or 'hh:mm' (e.g. eg '12' or '00:15')

Graphical overview for week 2:

Su	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mo	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Tu	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
We	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Th	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Fr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sa	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Execute Overview Check

type	date	time	result
daily		22:0 - 23:0	no match
once	days: 12 to 12; months: 1 to 1; year: 2005	4:0 - 7:0	no match
week daily	days: 4 to 6	18:0 - 20:0	no match
weekly	days: 7 to 2	19:0 - 5:0	no match

Result : chain will **execute** at the specified date/time.

Graphical overview for week 2:

Su	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mo	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Tu	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
We	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Th	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Fr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sa	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

SPECTO chain steps – 'URLs'

- An URL ('uniform resource locator') is the basis of execution of the SPECTO engine. URLs are the steps executed during chain runs.
- The URL may be given a symbolic name, easing identification and out of sequence execution.
- URL processing may be enhanced by custom scripts ('PBU' – process before URL and 'PAU' – process after URL)
- URLs may have parameters with fixed or dynamic values.
- The returned output of an executed URL is checked against content qualifiers. The qualifiers may be fixed or dynamic (even scripts and exits)
- URLs may be hidden for reporting or SLA processing
- For any URL a reference may be specified (allowing comparisons between 'own' and 'common' sites)

SPECTO URL configuration Back / History / Home DEV noERR primary: alpha: demo

Client 0: 'demo' doc

Chain 14: 'GMX email check' doc

URL 1: 'http://www@clusterid@gmx.net/de/cgi/login' doc

Post
 No redir.
 dyn. redir
 binary cont.
 Abortable
 Use VIA
 Hide in rep.
 not for SLA
 Force 1.0
 Force 1.1
 Force 1.2
 Render
 Trace
 par order
 use PBU
 use PAU

Delay to next URL (ms): 1000 Symbolic name: login page

id	parameter	value	type	action
0	AREA	1	direct	
1	EXT		variable	
2	EXT2		direct	
3	id	Specto@gmx.net	username	
4	p	secret	password	

id	content	type	parent	level	next	action
0	npage:HREF=\u0022:\u0022\u003ehere\u003cA\u003e	var betw.	-1	0	next	
1	tt=de:	var betw.	-1	0	next	
2	customer: CUSTOMERNO=:	var betw.	-1	0	next	

Execute page analysis page test one run single step prev. URL next URL

SPECTO URL types

- Though HTTP/HTML being the most common pair of monitorable protocol and content type the SPECTO engine supports a much more rich set of protocols and formats.
- All capabilities of the sequencing engine and the content processing is available for all those protocols and formats.
- The protocols and formats may custom extensible via exits

protocols :

- http
- https
- soap
- smtp (email)
- ftp
- telnet
- ssh
- sockets
- snmp
- ldap

formats :

- html
- xml
- applets
- pdf
- flash
- plain
- ebcdic
- unicode

SPECTO tesing of chains

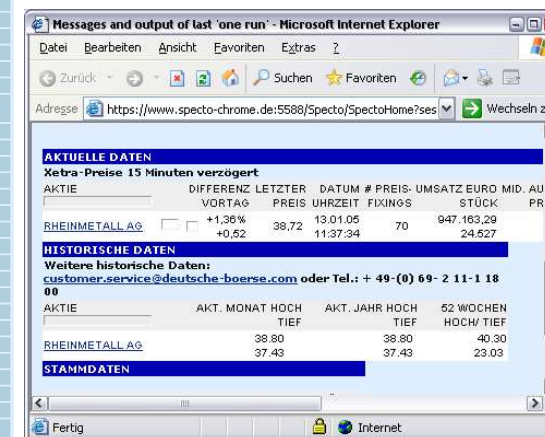
- To test a newly defined chain the 'one run' capability is available.
- 'one run' executes a chain once by displaying any step in detail.
- During and after the 'one run' all messages, the defined variables, the resulting content and HTML rendering may be displayed.

wait for 'one run' termination		Back / History / Home	noERR	Specto-Chrome : Mathesis-HSQL-Chrome : DAX100_2							
	chain	URL	symbolic name	status	response	start time	delay				
terminated	2	0	[Rheinmetall - Startseite] ...//www.rheinmetall.com/	okay / K	795 ms	12:02:20	500	msg	var	src	disp
check for termination	2	1	[Geschäftsberichte] ...www.rheinmetall.com/index.php	okay / K	1106 ms	12:02:21	500	msg	var	src	disp
stop run	2	2	[Geschäftsberichte - Bestellformular] ...m/index.php	okay / K	805 ms	12:02:23	500	msg	var	src	disp
results index	2	3	[R/Aktie - Aktienkurse] ...rheinmetall.com/index.php	okay / K	773 ms	12:02:24	500	msg	var	src	disp
results without source	2	4	[Details - Aktienkurs Vorzugsaktien] ...e_aktien.html	okay / K	74 ms	12:02:25	500	msg	var	src	disp
result with source	2	5	[Kontakt - Konzernzentrale] ...inmetall.com/index.php	okay / K	803 ms	12:02:26	500	msg	var	src	disp
	2	6	[Karte - Konzernzentrale] ...ngservice.de/jump_in.asp	okay / K	824 ms	12:02:27	500	msg	var	src	disp

(if defined, the content of variable 'chainResult' would be reflected here)

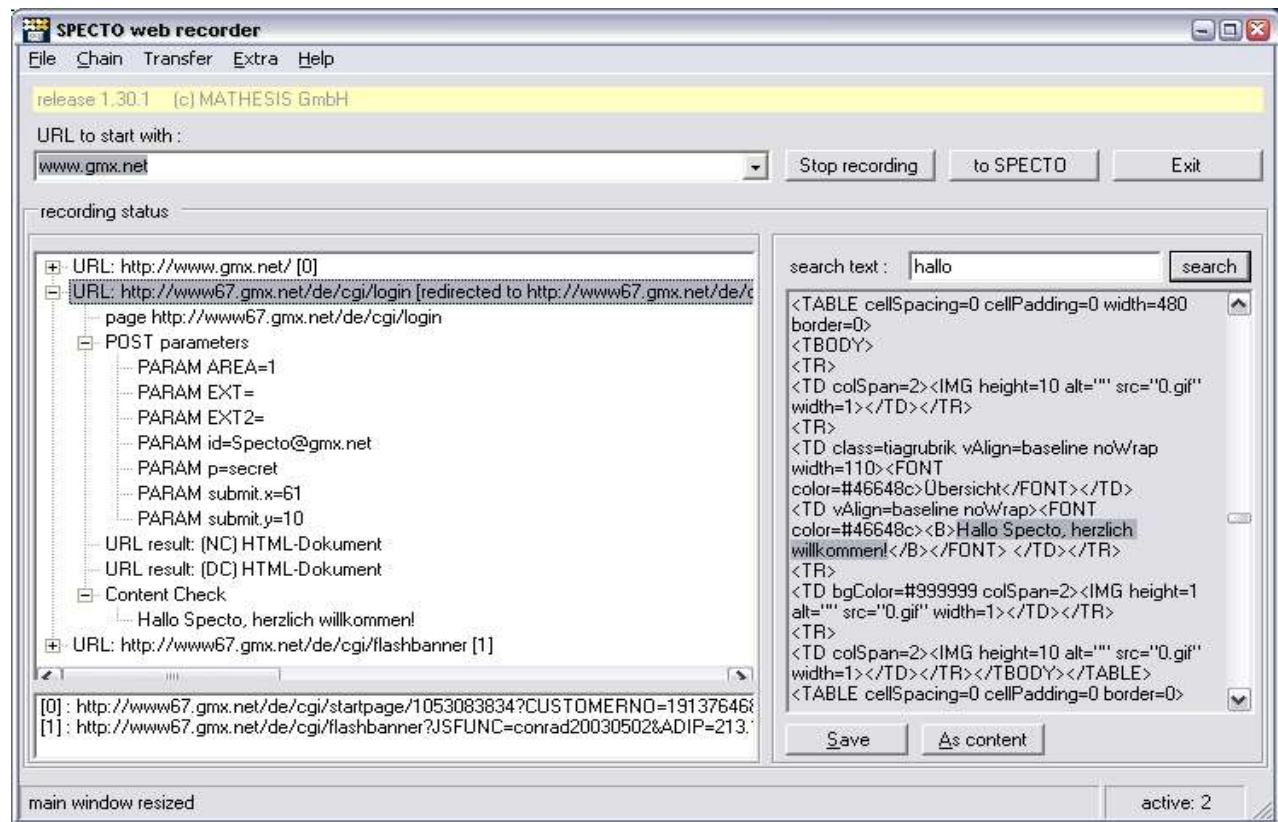
[back](#) [again](#) [customizing](#)

type	message	value
message		
message	REQUEST	
message	Authenticator	Implementation by JDK : true
message	Authenticator	no authentication defined
message	Authenticator	no proxy authentication defined
message	Session	No Session ID inserted - no id defined
message	Property lock mode 1	
message	HTTP	'http://www.rheinmetall.com/index.php?lang=2&fid=1165'
message	Method	'GET'
message	Host	'www.rheinmetall.com'
message	HTTP Referer	'http://www.rheinmetall.com/index.php?lang=2&fid=1061'
message	Cookie	no cookies inserted
header	User-Agent	[Mozilla/4.0 (compatible; MSIE 5.0; Windows NT; DigExt)]
header	Host	[www.rheinmetall.com]
header	Accept-Language	[en, de]
header	Referer	[http://www.rheinmetall.com/index.php?lang=2&fid=1061]
header	Content-Type	[text/html]
header	Accept	[image/gif, image/x-bitmap, image/jpeg, image/pjpeg, application/vnd.ms-excel,]
message	RESPONSE	
header	Date	'Thu, 13 Jan 2005 11:02:32 GMT'
header	Server	'Apache/1.3.33 (Unix) PHP/4.3.8 mod_ssl/2.8.22 OpenSSL/0.9.7e'
header	X-Powered-By	'PHP/4.3.8'
header	Keep-Alive	'timeout=15,max=93'
header	Connection	'Keep-Alive'
header	Transfer-Encoding	'chunked'
header	Content-Type	'text/html'
message	Method	GET
message	Code	200, Text = OK
message	Redir	true/false
message	Referer	http://www.rheinmetall.com/index.php?lang=2&fid=1165
message	Host	http://www.rheinmetall.com
message	Location	null
message	Encoding =	
message	CONTENT	
message	binary content	
message	Session	session id = " : false, value = 'null'
message	Contentcheck: Bitte schicken Sie mir kostenlos die aktuellen Publikationen=true	
message	RESULT & NEXT	
message	PAU script started	
message	Result of 4/2/2[1]: okay with par [URL]{X} d=805	
message	Next position	chain 2 URL 3



SPECTO recording of chains

- chains consisting of HTML/HTTP steps need not be created manually but can be recorded by the SPECTO 'web recorder' (only available for Windows / Internet Explorer)
- The web recorder plugs into the web browser and records any user action.
- web recorder handles multi-windows and multi-frames situations
- It also allows for the marking of 'content check' candidates
- web recordings can be online transferred into a SPECTO chain
- web recordings can also be saved as a local file in an XML format, allowing an Internet user to create the recording and hand it over to an expert for further processing

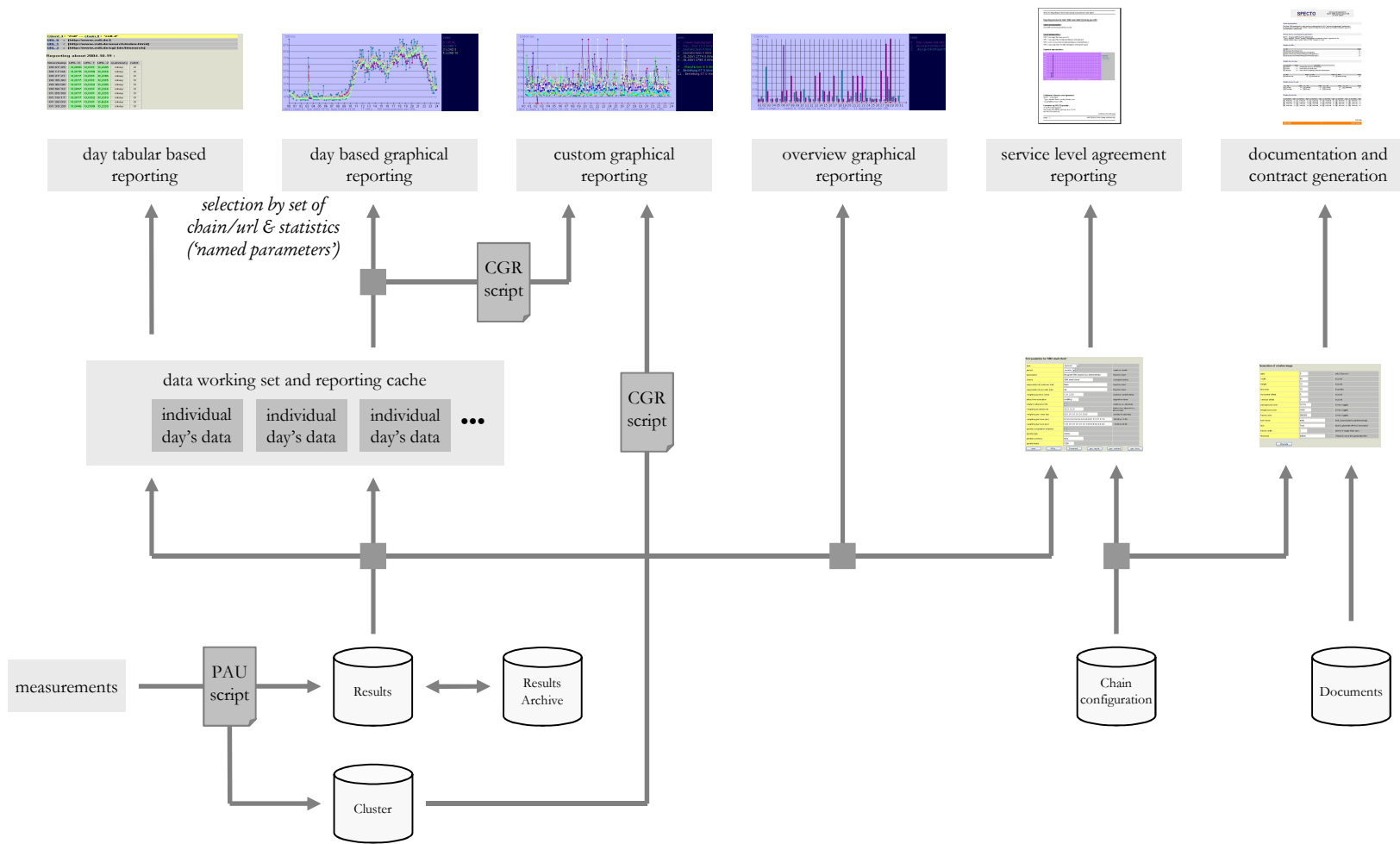


The measurement results of the SPECTO engine are available for different reporting aspects

SPECTO reporting : architecture

www.nls.de +49 6321 9685-40
67435 Neustadt Hirschhornring 55

NLS GmbH



SPECTO reporting : values

- The individual measurement values are available in tabular lists.
- Beside the URL measurement, the result of the optional reference may be shown
- Any combination of chains/URLs are allowed
- Several computations (avg, min, max, dev) are available.
- The number of active notifications (at the time of the measurement) is shown
- Navigation on chain, URL and date basis is available
- Links to the reporting overview and the graphical display of the data are available
- The result may also be downloaded in .csv format

SPECTO results - time period overview (node 0) [Back](#) / [History](#) / [Home](#) DEV noERR primary: alpha: demo

Client 0: 'demo' --- chain 0: 'C4 demo'

URL 0 : [http://localhost/get.html]
 URL 1 : [http://localhost/get.html]
 URL 3 : 'fourth chain' [http://localhost/post.html]
 URL 4 : [nothing]

Reporting about 2004-07-06 : [bottom](#)

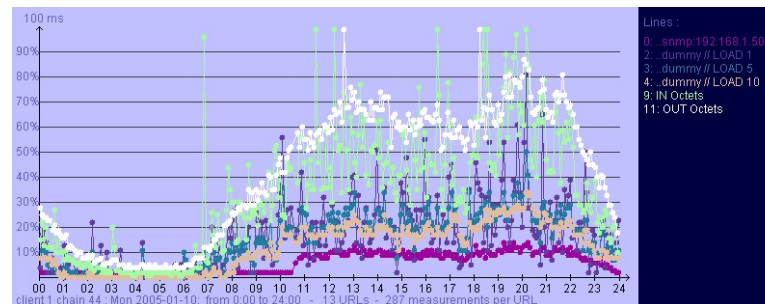
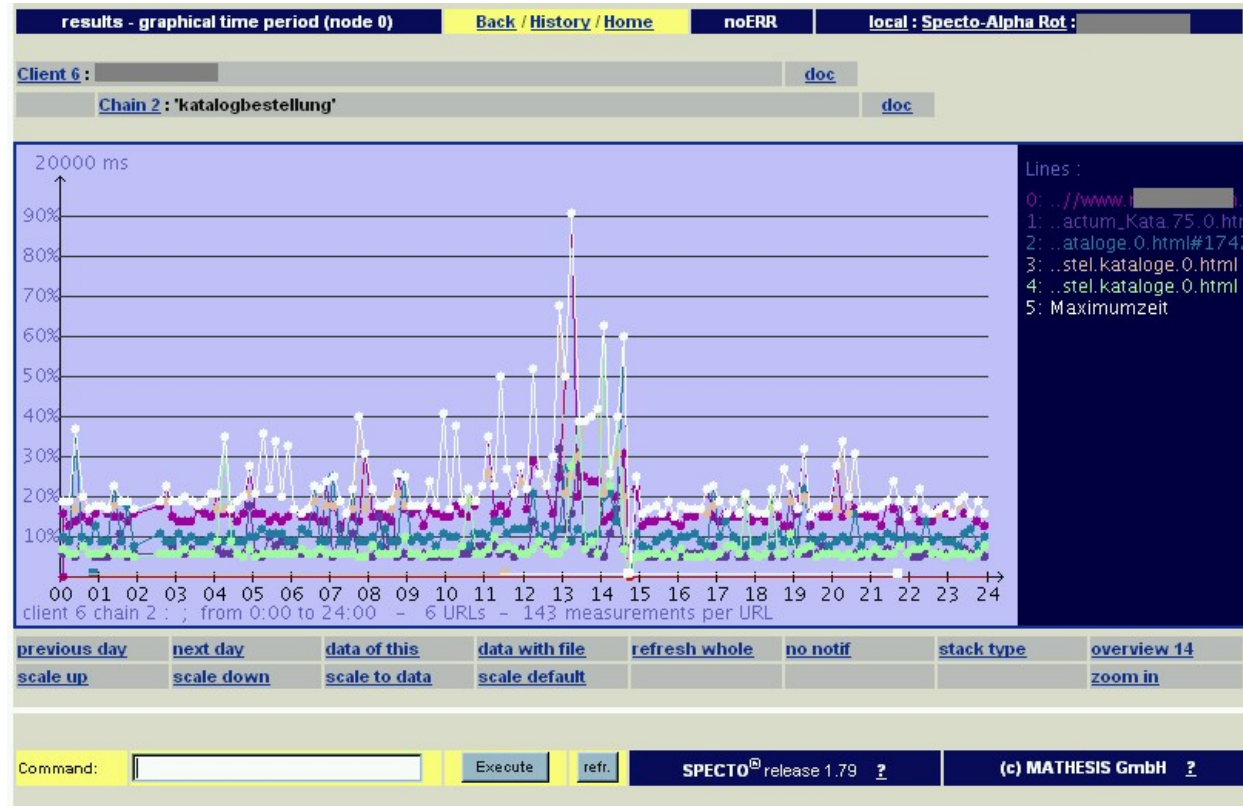
timestamp	url 0/0	url 0/1	url 0/3	url 0/4	summary	notif.	succ.
08:40:45	n.a.	0,017 R 0,711	0,015 R 0,490	n.a.	okay (note: n.a.)	0	2
08:40:57	n.a.	0,020 R 0,511	0,013 R 0,671	n.a.	okay (note: n.a.)	0	2
08:41:09	n.a.	0,001 R 0,511	0,020 R 0,651	n.a.	okay (note: n.a.)	0	2
08:41:20	n.a.	0,030 R 0,661	0,011 R 0,661	n.a.	okay (note: n.a.)	0	2
08:41:32	n.a.	0,001 R 0,591	0,091 R 0,571	n.a.	okay (note: n.a.)	0	2

Number of reference entries : 9

[top](#) [top of data](#)
[prev. day](#) [next day](#) [w/o file](#) [with file](#) [graphic of this](#) [refresh day](#) [overview 14](#) [overview 28](#)

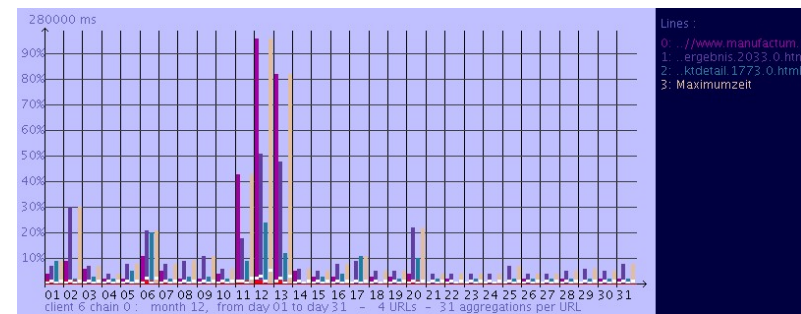
SPECTO reporting : day graphics

- The measurements of a day may be shown graphically in several formats
- Any combination of chain/URL is allowed
- Zooming and panning in the graphic is available
- The axis may be scaled manually or automatically
- mouse pointing to a measurement point shows the exact value
- Periods of active notifications may be shown or hidden
- The graphic may be formatted as GIF or SVG ('scaleable vector graphics')
- Navigation on chain and date basis and to the reporting overview is available.
- Colors are selectable



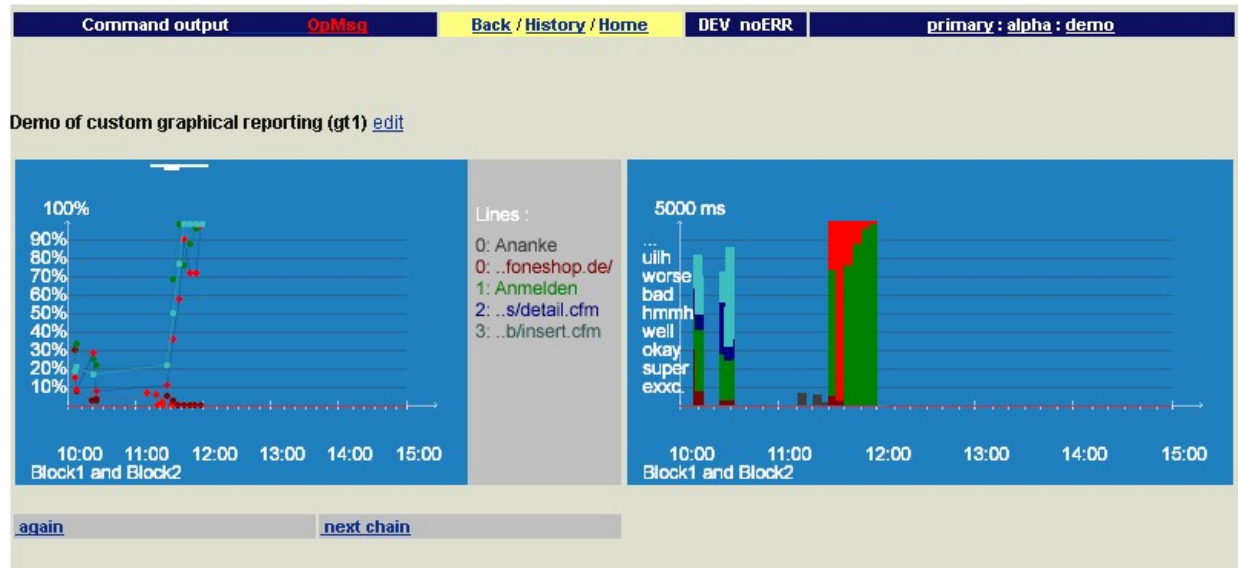
SPECTO reporting : summary graphics

- Summary graphics may be generated on day, week or month basis
- Shown is the measurement area (min/max), the average and errors



SPECTO reporting: script based custom reporting

- Reports may also be created by using the SPECTO engine's scripting capability together with the reporting library
- This allows for unlimited type of reports; especially combinations of multiple tables, graphics and links in one document.
- Such documents may also be output as PDF documents which may also be distributed automatically via email



SPECTO reporting: pdf generation and distribution

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SPECTO WAP Status: Aktuelle Störungen (1) (kpi=855) - Nachricht (HTML)

Von: specto@specto-titan.de Gesendet: Di 22.08.2006 08:38
An: [Redacted]
Cc: [Redacted]
Betreff: SPECTO WAP Status: Aktuelle Störungen (1) (kpi=855)
Anlagen: atn1Wap.pdf (45 KB)

SPECTO WAP Tagesbericht für 22.08.2006 08:40:00

Laufende WAP Monitore:

Prozess	Letzter Lauf
WAP Warenkorb mit Suche [ID14]	22.08.2006 08:32:17
WAP	22.08.2006 08:21:51
WAP Erweiterte Suche [ID16]	22.08.2006 08:25:35
WAP Kinderwelt [ID17]	22.08.2006 08:32:10
WAP Herrenwelt [ID18]	22.08.2006 08:24:01
WAP Damenwelt [ID19]	22.08.2006 08:24:49
WAP Schnitz/zappchenwelt [ID20]	22.08.2006 08:31:03
WAP SpecialWelt [ID21]	22.08.2006 08:37:17
WAP Freizeitwelt [ID22]	22.08.2006 08:23:07
WAP Technikwelt [ID23]	22.08.2006 08:32:36
WAP Wohnwelt [ID28]	22.08.2006 08:23:32

Aktuelle Störungen:

Prozess	Fehlerbeschreibung	Nachricht	seit
W	'Content' in URL 'Specials 3.2.2'		11.08.2006 09:32:28
V	'Content' in URL 'Specials 3.2.2'		11.08.2006 09:32:29
W	'Content' in URL 'Specials 3.2.2'		11.08.2006 09:32:30

Störungen am Vortag:

Zeitpunkt	Prozess	Status	Adressat
04:36:52	WA	Sch	
04:36:52	WA	Sch	
04:36:53	WA	Sch	

Statistiken des Vortags:

Prozess	avg URLs	avg	min	max
WAP Warenkorb mit Suche	0=90, 1=82, 2=1138, 3=1114, 4=636, 5=114, 6=76, 7=62, 8=73, 9=2999, 10=538,	629	52	19173
WAP	0=83, 1=447, 2=1235, 3=347, 4=623, 5=58, 6=434,	183	49	21127
WAP Erweiterte Suche	0=84, 1=91, 2=78, 3=11185,	2859	52	14707
WAP Kinderwelt	0=101, 1=0, 2=921, 3=770, 4=838, 5=570, 6=1950, 7=433,	697	0	21438
WAP Herrenwelt	0=91, 1=671, 2=733, 3=414, 4=385, 5=369, 6=1980, 7=781,	678	55	3404
WAP Damenwelt	0=244, 1=578, 2=722, 3=652, 4=1482, 5=832,	751	49	18716
WAP Schnitz/zappchenwelt	0=130, 1=664, 2=3435, 3=416,	1161	53	8196
WAP SpecialWelt	0=86, 1=714, 2=392, 3=0, 4=0, 5=0, 6=0, 7=766,	244	0	3509
WAP Freizeitwelt	0=134, 1=1527, 2=798, 3=708, 4=697, 5=1809, 6=662,	905	52	23689
WAP Technikwelt	0=104, 1=762, 2=725, 3=676, 4=420, 5=1436, 6=472,	656	58	5520
WAP Wohnwelt	0=259, 1=658, 2=733, 3=549, 4=744, 5=1063, 6=482,	641	66	16924

KPI (key performance indicator = overall AVG) : 855 ms.

In Anlage eine graphische Darstellung des Verlaufs des vergangenen Tags (PDF Format)

Erzeugt durch SPECTO Instanz : Titan

process monitoring

Tagesverlauf von [Redacted] am 21.08.2006

Die Graphiken sind i. W. auf 5 Sekunden skaliert. Balken am oberen Bildrand kennzeichnen Zeitbereiche mit Fehlern.

08/22/2006 - 1 - Mandant "Online-Shop"

1 von 5

created by SPECTO

SPECTO reporting: online desktop

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- SPECTO desktop provides a self refreshing status overview for all defined chains of a client
- Items may be arranged, named and grouped individually
- Each item features links to its configuration, reporting and error screens.
- Inter-client configurations are supported

The screenshot displays the SPECTO business service monitoring interface within a Microsoft Internet Explorer browser window. The browser title is "SPECTO neckermann.de - Microsoft Internet Explorer". The address bar shows the URL: "https://85.214.57.12/Specto/SpectoHome?service=Specto&session=7196&userid=specto&action=entry".

The interface features a navigation bar with tabs: "user's desktop", "OpMas", "Back / History / Home", "noERR", "Titan", and "Online-Shop". A sidebar on the left lists a tree structure under "SPECTO", including categories like "object hierarchy", "threads", "results", "quick checks", "servers", "development", "documents", "cluster", "environment", "engine", "running", "properties", and "network".

The main dashboard area contains several colored boxes representing different service components and their status. These include:

- Algemein** (General): VirtualMod, Umwelt
- Berater** (Consultant): Kaufberatung, Produktber, Geschenkfe, Fachfinder
- Speziell** (Special): Checkout_S, EmailPruef, Kontoausku, Partner, Stellenanga
- WAP** (WAP): WAP Damen, WAP Herre, WAP Kinde, WAP Freiz, WAP Techn, WAP Schny, WAP Speci, WAP Wohnw, WAP Erwei
- Other**: SpectoLoad, CSV-Messve

On the right side, there is a legend for status colors:

- Meta (blue)
- disabled (grey)
- not running (light grey)
- should run (pink)
- off time (green)
- okay (light green)
- warning (yellow)
- error (red)

At the bottom, there is a "Command:" input field with "Execute" and "refr." buttons. The footer indicates "SPECTO® release 1.91 sup doc" and "© MATHESIS GmbH".

SPECTO service level agreements

The service level agreement (SLA) module extends SPECTO measurements to the 'business' level :

Basic idea :

- Maintain goals/limits, formally (→ contract) agreed to by both parties (*whenever there are changes*)
- Summarize measurements on an hour/day base over a period (week/month), compute the deviation and generate fulfillment reports (*regularly, automated*)

Functionality :

- maintenance of SLA definitions
- SLA contract generation
- SLA fulfillments report generation
- optional SLA penalty computation

Coming :

- Script based custom extensions (e.g. penalty formulas)

Primary design principle was to make SLA definition, maintenance and usage as easy to use as possible.

SPECTO service level agreements (SLA) : definition

- SLAs (‘service level agreements’) are used to define the delivery between a service provider and its customers
- Such an SLAs grading relies on real measurements
- SPECTO supports SLA definition and fulfillment computation based on the defined chains and goals.
- The goals and additional SLA specific parameters are maintained in the SLA component
- Any parameter may be weighted
- Penalties may be defined
- Based on the SLA definition, SLA contracts are generated (as PDF documents) assuring the compliance with the specified parameters

SLA parameters for 'GMX email check'

type	standard	
period	monthly	week or month
description	the great GMX based SLA demonstrator	free form text
chains	GMX email check	included chains
responsible at customer side	them	free form text
responsible at provider side	me	free form text
weighting by error class	1.0 1.2 0.5	protocol content delay
delay time evaluation	crediting	algorithm name
relate to reference URL	<input checked="" type="checkbox"/>	relative vs. absolute
weighting by delay time	-0.2 1.0 2.0	below low, above low, above high
weighting per week day	0.5 1.0 1.0 1.0 1.0 1.0 0.5	sunday to saturday
weighting per hour (am)	0.2 0.2 0.4 0.4 0.4 0.4 0.8 0.8 1.0 1.0 1.0 1.0	00.00 to 11.59
weighting per hour (pm)	1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.8 0.8 0.4 0.4 0.4	12.00 to 23.59
penalty computation enabled	<input checked="" type="checkbox"/>	
penalty type	money	
penalty currency	euro	
penalty factor	1000	

save URLs... Comment... gen. report gen. contract gen. docu


SLA parameters for 'GMX email check'

URL 0 [start page]	1.0	weight (default 1.0)
URL 1 [login page]	1.0	weight (default 1.0)
URL 2 [email overview]	1.0	weight (default 1.0)
URL 3 [logout page]	1.0	weight (default 1.0)

save Edit... Comment... gen. report gen. contract

SPECTO service level agreements (SLA) : contract generation

- The SLA contract contains all defined parameters.
- Because it is based on the actual SPECTO definition it is accurate.
- The re-generation of a contract is done within seconds – allowing frequent updates to the parameters without need to complicated rewriting of contracts
- Contracts may be automatically distributed by email



Service Level Agreement for :
chain 'GMX email check' [12]
of client 'demo'

Chain documentation

The chain "GMX email check" is here used as an demonstrator for SLA ("service level agreement") maintenance. It consists of just four URLs with variable "clusterid" holding the source system and cookies holding the session id. Last maintained : 20040312,bw

Primary Service Level Agreement parameters

SLA #1 : the great GMX based SLA demonstrator
Type = 'standard'; Period = 'monthly'; Responsible: at customer is 'hem'; at provider is 'me'
Penalty enabled: type is 'money'; factor is '1000'; currency is 'euro'.

Weights by URLs

id	URL	weight
0	start page [http://www.gmx.net/]	1.0
1	login page [http://www@clusterid@gmx.net/ide/cgi/login]	1.0
2	email overview [http://www@clusterid@gmx.net/ide/cgi/olindex]	1.0
3	logout page [http://www@clusterid@gmx.net/ide/cgi/hph-logout]	1.0

Weights by error type

id	error class	weight	description
0	protocol	1.0	communication errors; e.g. 'host not found'
1	content	1.2	errors detected by content checks
2	delay time	0.5	further refined by 'weighting by delay time' (following table)

id	delay	weight	id	delay	weight	id	delay	weight
0	better than 'low'	-0.2	1	worse than 'low'	1.0	2	worse than 'high'	2.0

Weights by day of week

id	day	weight	id	day	weight	id	day	weight	id	day	weight
0	Sunday	0.5	1	Monday	1.0	2	Tuesday	1.0	3	Wednesday	1.0
4	Thursday	1.0	5	Friday	1.0	6	Saturday	0.5			

Weights by day time

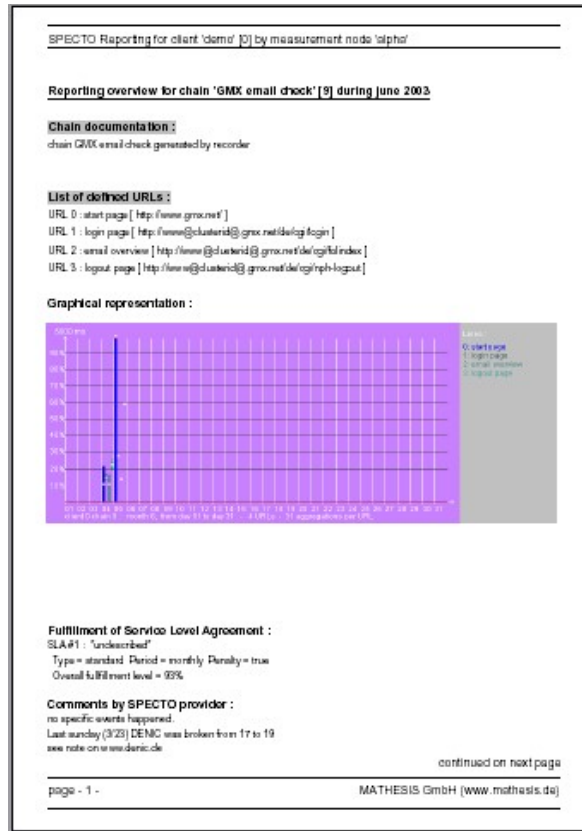
id	time frame	wght	id	time frame	wght	id	time frame	wght	id	time frame	wght	id	time frame	wght	id	time frame	wght
0	00:00-00:50	0.2	1	01:00-01:50	0.2	2	02:00-02:50	0.4	3	03:00-03:50	0.4	4	04:00-04:50	0.4	5	05:00-05:50	0.4
6	06:00-06:50	0.8	7	07:00-07:50	0.8	8	08:00-08:50	1.0	9	09:00-09:50	1.0	10	10:00-10:50	1.0	11	11:00-11:50	1.0
12	12:00-12:50	1.0	13	13:00-13:50	1.0	14	14:00-14:50	1.0	15	15:00-15:50	1.0	16	16:00-16:50	1.0	17	17:00-17:50	1.0
18	18:00-18:50	1.0	19	19:00-19:50	0.8	20	20:00-20:50	0.8	21	21:00-21:50	0.4	22	22:00-22:50	0.4	23	23:00-23:50	0.4

last page

22.07.2004
- 1 -
Client "demo"

SPECTO service level agreements (SLA) : report

- SLA fulfillment reports may also be created on daily, weekly or monthly basis.
- They consist of daily measurement summaries and an overall summary
- A fulfillment percentage is computed
- Penalties may be computed



SPECTO Reporting for client 'demid' [2] by measurement node 'alpha'

Page 2 of reporting overview for chain 'GMX email check' [9] during June 2003

SLA computation in detail:

day	url 00	url 01	url 02	url 03	result
01	1.0	1.0	1.0	1.0	01
02	2.0	2.0	2.0	2.0	02
03	3.0	3.0	3.0	3.0	03
04	4.0	4.0	4.0	4.0	04
05	5.0	5.0	5.0	5.0	05
06	6.0	6.0	6.0	6.0	06
07	7.0	7.0	7.0	7.0	07
08	8.0	8.0	8.0	8.0	08
09	9.0	9.0	9.0	9.0	09
10	10.0	10.0	10.0	10.0	10
11	11.0	11.0	11.0	11.0	11
12	12.0	12.0	12.0	12.0	12
13	13.0	13.0	13.0	13.0	13
14	14.0	14.0	14.0	14.0	14
15	15.0	15.0	15.0	15.0	15
16	16.0	16.0	16.0	16.0	16
17	17.0	17.0	17.0	17.0	17
18	18.0	18.0	18.0	18.0	18
19	19.0	19.0	19.0	19.0	19
20	20.0	20.0	20.0	20.0	20
21	21.0	21.0	21.0	21.0	21
22	22.0	22.0	22.0	22.0	22
23	23.0	23.0	23.0	23.0	23
24	24.0	24.0	24.0	24.0	24
25	25.0	25.0	25.0	25.0	25
26	26.0	26.0	26.0	26.0	26
27	27.0	27.0	27.0	27.0	27
28	28.0	28.0	28.0	28.0	28
29	29.0	29.0	29.0	29.0	29
30	30.0	30.0	30.0	30.0	30
31	31.0	31.0	31.0	31.0	31

The URL values are deviations from the 'warning' level, scaled to 1.0
The result column are points normalized to 100

page - 2 - MATHESIS GmbH (www.mathesis.de)

The SPECTO engine features a script processor allowing for custom enhancements.

- Scripts may be used as extensions to the chain processing (PBT, PBC, ... PAU), within reporting, within the consoles, as batch elements or as individually executable programs
- Two script languages are available: 'specto script' and 'java script'
- JavaScript conforms to the ECMA Script 1.5 level
- The script languages may access SPECTO components through the scripting libraries
- A test environment is available

The screenshot shows a web-based interface for SPECTO scripting. At the top, it says "Client = 0' (demo)". Below this, there are fields for "status:", "Last changed:" (2004-03-11 14:14:58), and "name:" (xml_parse_demo1). A "link id:" field contains 3600. On the left side, there are several buttons: Save, Cancel, height-, height+, Prev., Next, Similar, and Run. The main area is a code editor containing a JavaScript script. The script defines a demo XML string and uses the SPECTO parser to traverse the XML tree, outputting the structure and content of each node. The output is displayed in a separate pane on the right, showing the hierarchical structure of the XML document with comments indicating the type of content (outer content, inner content, tag name, attribute).

```

// script=js:
// a demo XML string
p =
"<?xml version=\u00271.0\u0027 encoding=\u0027UTF-8\u0027?" +
"<first>333</first>" +
"<all xmlns:xsi=\u0027http://www.w3.org/1999/XMLSchema-instance\u0027" +
" <bbb>666</bbb>" +
" <bbb/>" +
" <bbb>999</bbb>" +
"</all>";

// some variables for HTML formatting
var bo=specto.html("bold");
var no=specto.html("normal");

// SPECTO parser
specto.message(bo+"\r\nxml by SPECTO - 1 (parse specific)+"no);
spx = specto.getXMLObject(p);
e1 = spx.getFirst("all");
if (e1 != null) {
  specto.message("attributes");
  for (;;) {
    e2 = e1.getNext("bbb");
    if (e2 == null) break;
    specto.message(e2.getOuterContent());
    // now the real content. (no
    specto.message(e2.getInnerContent());
  }
}
    
```

Script xml_parse_demo1 (3600) :

```

xml by SPECTO - 2 (parse all)
<?xml version='1.0' encoding='UTF-8'?> // outer content
// inner content
?xml // tag name
UTF-8 // attribute

<first>333</first> // outer content
333 // inner content
first // tag name

<all xmlns:xsi='http://www.w3.org/1999/XMLSchema-instance'>
  <bbb>666</bbb>
  <bbb/>
  <bbb>999</bbb>
</all> // outer content

<bbb>666</bbb>
<bbb/>
<bbb>999</bbb> // inner content
all // tag name

result: finished
    
```

back refresh

SPECTO scripting : library

- The objects of the script library (methods and structures) are available online.
- For every method a description is available
- Any method may be executed online.

api reference		Back / History / Home	DEV noERR	primary : alpha : demo	
name	description	details	execute		
specto.finalize	public java.lang.String Specto.finalize(java.lang.String)	desc.	exec		
specto.setProperty	public boolean Specto.setProperty(java.lang.String,java.lang.String)	desc.	exec		
specto.getProperty	public java.lang.String Specto.getProperty(java.lang.String)	desc.	exec		
specto.compare	public boolean Specto.compare(java.lang.String,java.lang.String)	desc.	exec		
specto.getThreads	public Specto.ThreadEntry[] Specto.getThreads(int)	desc.	exec		
specto.sleep	public void Specto.sleep(int)	desc.	exec		
specto.log	public void Specto.log(java.lang.String)	desc.	exec		
specto.parse	public java.lang.String Specto.parse(java.lang.String,java.lang.String,java.lang.String)	desc.	exec		
specto.parse	public java.lang.String Specto.parse(java.lang.String,java.lang.String)	desc.	exec		
specto.parse	Method 'link'				
specto.stopThreads	Description : Generate a HTML link to a SPECTO command.'				
specto.stopAllThreads	Returning : The HTML code.' [java.lang.String]				
specto.getGregorianCalendar	Parameters :				
specto.message	name	description			
specto.getAttribute	name	The text to be displayed [class java.lang.String]			
	command	The SPECTO command [class java.lang.String]			
	back	list			

structure reference		Back / History / Home	DEV noERR
name	description	details	
specto.AttributesChain	AttributesChain	desc.	
specto.AttributesURL	AttributesURL	desc.	
specto.AddressEntry	AddressEntry	desc.	
specto.NotificationEntry	NotificationEntry	desc.	
specto.SessionEntry	SessionEntry	desc.	
specto.ThreadEntry	ThreadEntry	desc.	
specto.SpectoCheckURL	SpectoCheckURL	desc.	
specto.ResponseFromURL	ResponseFromURL	desc.	
specto.ReportConfigEntry	ReportConfigEntry	desc.	

SPECTO engine enhancements

The SPECTO engine features several aspects for internal management.

SPECTO user management

- Any SPECTO client automatically gets a 'master' user assigned.
- Additional users may be created, maintained and deleted.
- To any users sets of attributed rights may be assigned and revoked.
- All changes come in effect immediately
- Any users actions are recorded and may be reported

type	user	full name	status	right	object	value	action
user	Charlie	Charlie Brown	active	add right		password	delete
right				command.limitChains	demo	charlie chain	delete
right				command.limitCommands		el:ec:eu:ro:rg:	delete
right				engine.allowClients		demo	delete
right				engine.logon			delete
user	Demo	Demo User	active	add right		password	delete
right				engine.allowClients		demo	delete
right				engine.logon		true	delete
right				users.edit			delete
user	Mathesis	Mathesis demo user	active	add right		password	delete
right				batch.edit		true	delete
right				command.limitChains	test	tutorial	delete
right				engine.allowClients		test	delete
right				engine.logon		true	delete
right				exits.edit		true	delete
add user							

SPECTO commands, batch processor & background execution

- Commands and scripts may be executed automatically and repeatedly by the batch processor
- Execution of commands and scripts may be postponed to the background. Execution status and result is available.
- All executed commands are logged
- All commands executed by an user may be re-executed or re-edited

Batches: list of active batches

id	action	client	chain	URL	type	next at	command	period	base time	repeat
0	delete	0	0	0	C	2004-05-18 17:11:14	es ttt	7d 0h	2004-05-18 17:11:14	true
1	delete	0	0	0	C	2004-06-11 13:13:00	cs 3	monthly	2004-06-11 13:13:00	true

[back](#)

Background commands: list of executions

id	result	action	client	type	command	started at	ended at
0	show	delete	0	C	rl 0 0	2005-01-13 16:30:44	2005-01-13 16:30:46
1	show	delete	0	C	ra 0 0	2005-01-13 16:30:55	2005-01-13 16:30:55
2	show	delete	0	C	cs	2005-01-13 16:31:15	2005-01-13 16:31:15
3	show	delete	0	C	rg 2 0 1 500 ;group 2 3 4	2005-01-13 16:31:29	2005-01-13 16:31:29

[again](#) [back](#)

SPECTO customizing

- Many aspects of the SPECTO engine may be customized.
- Customizing is menu driven ('root node 'customizing')
- Customizing may be client specific or cross-client.
- Any customizing parameter has a description.
- Customizing parameters may be reset to their default globally or individually

The screenshot shows the SPECTO customizing interface. On the left is a tree view with the following structure:

- customizing
 - URLs
 - users
 - security
 - look & feel
 - browser
 - GUI
 - page sizes
 - PDF formatting
 - reporting
 - reporting data
 - reporting cache
 - service level agr.
 - development
 - screens
 - console
 - system
 - master
 - internal checks
 - auto export
 - limits
 - network
 - certificates
 - web server
 - time base / NTP
 - engine
 - database
 - delaved write
 - mail transport
 - SPECTO Net
 - messages

The main area displays the 'customizing modul: reporting' configuration. It contains a table with the following data:

name	client	value	action	description
CSVSeparator	-1	,	delete	character to separate values in a CSV export file (usually , or ;)
DefaultUpperLimit	-1	5000	delete	maximum vertical value of graphical result display
GColor0	-1	200,128,255	delete	background color of left section in the graphical display of results (red,green,blue)
GColor1	-1	192,192,192	delete	background color of right section in the graphical display of results (red,green,blue)
GColor10	-1	0,0,255	delete	null
GColor2	-1	255,255,255	delete	color of arrows in the graphical display of results (red,green,blue)
GColor3	-1	255,255,255	delete	color of text in the graphical display of results (red,green,blue)
GColor4	-1	63,63,63	delete	color of first line in the graphical display of results (red,green,blue)
GColor5	-1	0,32,32	delete	color offset to first line for non-first lines in the graphical display of results (offset red,offset green,offset blue)
LimitWriteToFirst	-1	true	delete	if multiple processe are running for the same chain only the first will write data into the results table (true/false)
Reporting.DisplhLog	-1	true	delete	null
Reporting.Prefetch	-1	true	delete	whether to prefetch the timestamp of the last result (true/false)
Reporting.TextBold	-1	true	delete	Whether to show results in bold text (true/false)
Reporting.TextInvers	-1	true	delete	Whether to display results text invers (coloring the background) (true/false)
Reporting.UseSVG	-1	true	delete	Whether to use SCG (scalable vector graphics) instead of GIF for result presentation

Below the table, there is a 'new entry:' section with input fields for 'client' (set to -1) and 'value'. An 'Execute' button is located at the bottom of the interface.

SPECTO internal 'high availability'

- All aspects of the SPECTO engine are continually determined
- The status may be checked in a 'health' page
- Erroneous tasks are restarted automatically
- Errors are reported as 'operator messages' and/or via email.
- 'am alive' messages may be send
- Stand by engine(s)
- Statistics
- table size checks
- Auto export
- Archiving

SPECTO technical information and health check [Back](#) / [History](#) / [Home](#) **DEV noERR**

Commandline parameters		parameter	value
		DBCon	10
		DBName	/localhost:1433;Select Method=cursor;databasename=spectod
		DBUser	spectod
		DBPassword	██████
		COMSocket	5555
		CreateDB	true
		BaseDir	
		Options	

Internal processes			
process	status	restarts	priority
Master	alive	0	5
Monitor	alive	0	7
Mail	alive	0	3
Net	alive	0	4
Notification	alive	0	5
Batch	alive	0	4
Persistence	alive	0	4
DelayedWrite	alive	0	4
ReportingCache	alive	0	5
Local	alive	0	5
RemoteS	alive	0	5

Database status		
table	current size	next warning level
documents	25373	25934
results	63595	1000000
archive	0	10000000
logging	246434	1000000
urls	845	10000

Memory	
Max memory	66650112
Total memory	
Free memory	

Current check status :

again	checks	check type	period	next invocation
		table size checks	10 min	Thu Jan 13 13:09:07 CET 2005
		base threads check	2500 ms	Thu Jan 13 13:01:49 CET 2005
		chain threads check	1500 ms	Thu Jan 13 13:01:49 CET 2005
		user connections check	5000 ms	Thu Jan 13 13:01:52 CET 2005
		'am alive' messages	125 min	Thu Jan 13 14:44:07 CET 2005

SPECTO consoles

- SPECTO consoles provide customizable overview on all aspects of a SPECTO instance
- A cross-client 'master console' and client specific 'client consoles' are available
- The console displays are refreshed automatically.

master console
[Back / History / Home](#)
noERR
Specto-Chrome : Mathesis-HSQL-Chrome : DAX100_2

engine: OKAY
chains: Warning !
Thu Jan 13 10:43:04 CET 2005

client name	chain	status	set
DAX100	Merck	1/0	focus
DAX100	Micronas	1/0	focus
DAX100	MLP	1/0	focus
DAX100	Norddtaffinerie	1/4	focus
DAX100	Nordex	1/0	focus
DAX100	Pfeiffervacuum	1/0	focus
DAX100	ProSiebenSat1	1/4	focus
DAX100_2	Repower	1/0	focus
DAX100_2	Rheinmetall	1/0	shown
DAX100_2	RhoenKlinik	1/0	focus

Health check

[details](#)

Engine and chains:

engine restarts 0 chain restarts 0

Internal processes:

Btch	Comm.	Net	Mail	Mon.	Notif.	Pers.	Rem.
alive	alive	alive	alive	alive	alive	alive	alive

System:

#processors 1

memory 84 % used

storage (=logging)

5000 ms

client 4 chain 2 : Thu 2005-01-13

Last 10 logging entries:

Time	Log entry
10:41:26	Result of 5/4/3[0]: okay with par [URL](K) d=3
10:41:27	Result of 5/4/4[0]: okay with par [URL](K) d=3
10:41:28	Result of 5/4/5[0]: okay with par [URL](K) d=3
10:41:29	Result of 5/4/6[0]: okay with par [URL](K) d=3
10:41:30	Result of 5/4/7[0]: okay with par [URL](K) d=4
10:42:09	Initialize 'SpectoSOAPjaxm'
10:42:09	'AmAliveMessage;ns1;AmAlive:http://www.mathesis
10:42:14	RemoteSC: received='5905:specto:*mc '
10:43:03	Result of 5/6/0[0]: okay with par [URL](K) d=9
10:43:04	Result of 5/6/1[0]: okay with par [URL](K) d=2

[to console configurator](#)

row	leftmost column	middle column	rightmost column
row 1	status	time	none
row 2	processes	graphic	none
row 3	health	log	none
row 4	none	none	none
row 5	none	none	none

[to console](#)

SPECTO engine enhancements

- To extend the SPECTO engine a set of predefined exits is built into relevant places of the engine.
- Exits have to be implemented using the Java programming language
- A 'exit building tutorial' and sample implementations are available

SPECTO exits configuration			Back / History / Home	noERR	Specto-Chrome : Mathesis-HSQL-Chrome : DAX100_2		
name	enabled	custom	class	method	calls	errors	
engine initialize	<input type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	engineInitialize	0	0	exec
engine exit	<input type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	engineExit	0	0	exec
before chain	<input type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	beforeChain	0	0	exec
after chain	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	afterChain	2	0	exec
before URL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Mathesis.Specto.DemoExits	beforeURLLog	15	6	exec
after URL	<input type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	afterURL	0	0	exec
at URL error	<input type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	atURLError	0	0	exec
before notification	<input type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	beforeNotification	0	0	exec
command extension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Mathesis.Specto.InternalExits	customCommand	0	0	exec
update of an object	<input type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	objectUpdate	0	0	exec
0.5 second heartbeat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Specto.SpectoStandardExits	heartBeat	24	0	exec
URL type extension	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mathesis.Specto.InternalExits	customURLType	0	0	exec

The following pages shows the overall structure of a typical SPECTO implementation.

SPECTO overall architecture

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