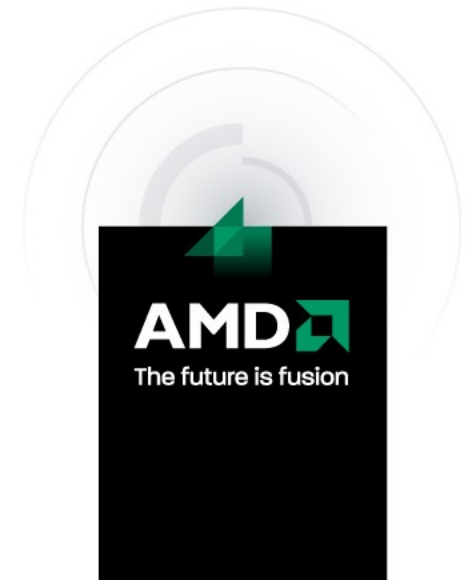


Cinderella 'TAP

The lazy evaluation sisters of TAP::Parser

Steffen Schwigon, AMD | August 04, 2009
YAPC::EU 2009

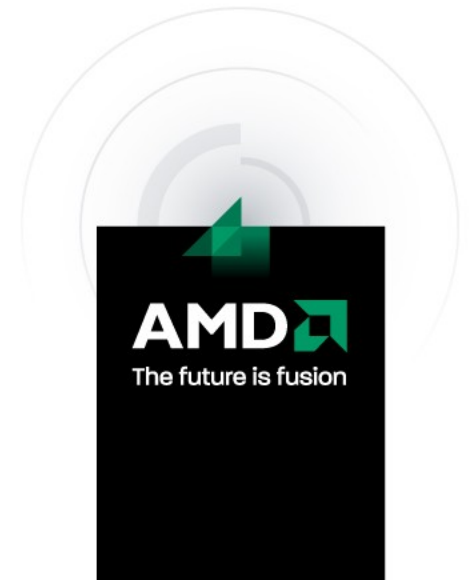




Cinderella 'TAP

The lazy evaluation sisters of TAP::Parser

Steffen Schwigon, AMD | Aug 04, 2009
YAPC::EU 2009



Agenda

- Context
 - Test automation
 - Participation model
 - Producing and consuming
- Problem
 - The no-problem
 - The Query Gap
- Solution
 - SYNOPSIS: Query Interface
 - Query language
 - Modules
 - Glue



Context



4 Cinderella 'TAP: The lazy evaluation sisters of TAP::Parser | Aug 4, 2009

Our Mission

- AMD
- Operating System Research Center (OSRC)
- QA team → **Testing**
- OS x Virtualization x AMD hardware x OSRC patches



Target audience

- “Classical” end users
 - Web user-interface
- Developers
 - Command line advocates
 - But too busy to fiddle with complicated toolchain



Test Infrastructure - Key ideas

- KVM/Xen Test Automation
 - <http://xrl.us/xentestautomation>
 - German Perl Workshop 2009
- TAP (“Test Anything Protocol”)
- Trivial reporting
- Reports archive and query framework
- “non-aristocratic” participation model



Non-aristocratic?

- Make the toolchain trivially accessible
 - Shell script level,
 - “no XML”,
 - `netcat`
- Non-interactive protocols (`fire & forget` reporting)
- Easy interactive protocols
- Scalable complexity – start easy, then escalate
 - Test protocol
 - Query language



TAP example

1..3

Artemis-Suite-Name: oprofile

Artemis-Suite-Version: 2.013

ok 1 - Looks like oprofile kernel

ok 2 - other stuff

not ok 3 - last line # **TODO** just specced

message: Failed test 'last line' at t/ltp.t line 317.

data:

got: 'foo'

expected: 'bar'

...



test_script.sh

- Easy with shell

```
#!/bin/sh
echo "1..2"
echo "# Artemis-Suite-Name: oprofile"
echo "# Artemis-Machine-Name: " `hostname`
if uname | grep -vq oprofile ; then echo -n "not " ; fi
echo "ok - Looks like oprofile kernel"
echo "ok - other stuff"
```

- Same with C, Python, Perl, ...
 - with or without toolchain



Report interface (1)

- `./test_script.sh | netcat bancroft 7357`
 - Produce TAP
 - Just drop into port
 - “fire & forget”



Report interface (2)

- Hide internal complexity
 - `TAP::Parser`
 - `TAP::Formatter::HTML`
 - `TAP::DOM`
 - Meta information
 - Sections
 - Aggregated results

- How to trivially access results?



Problem



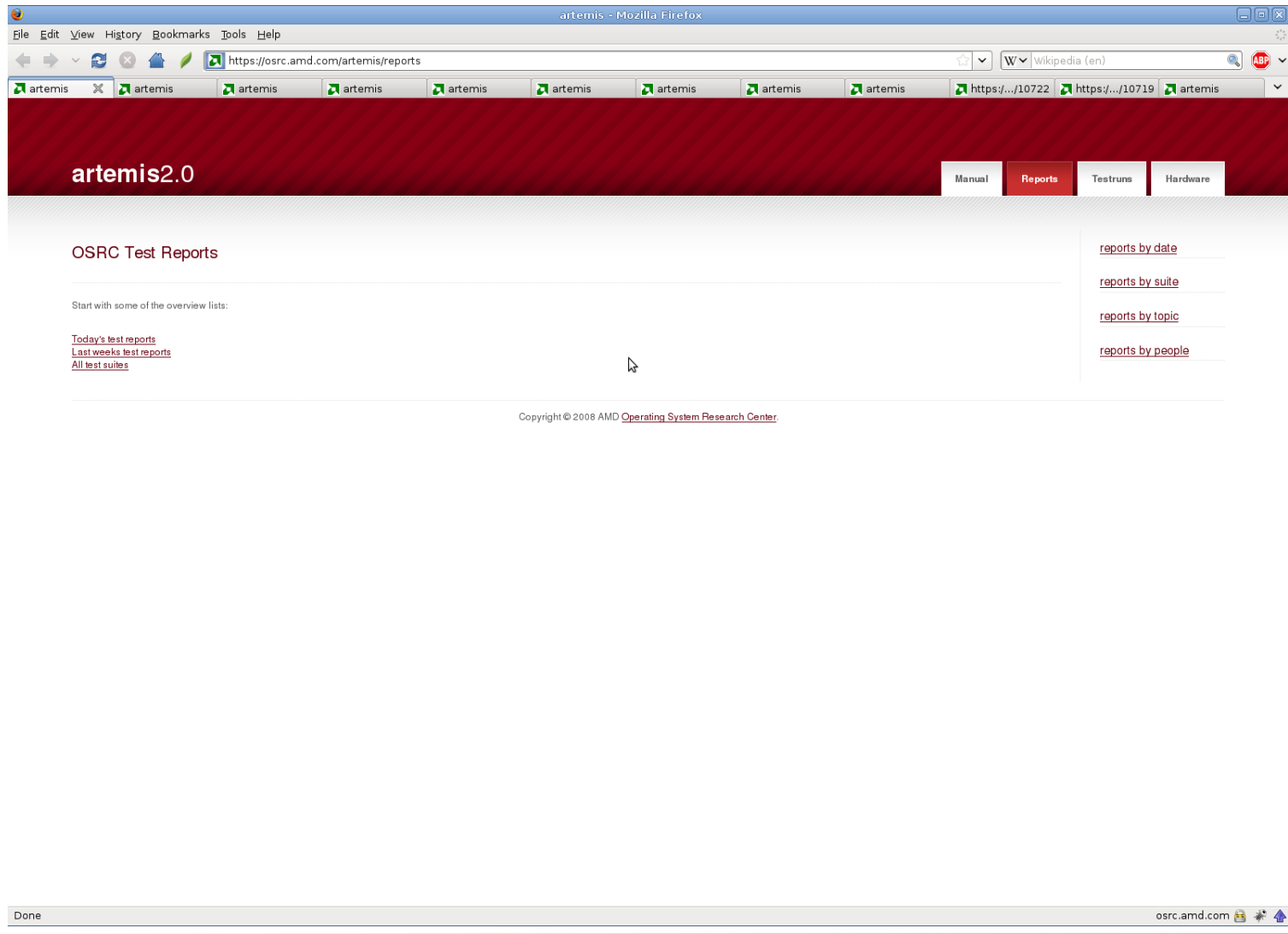
13 Cinderella 'TAP: The lazy evaluation sisters of TAP::Parser | Aug 4, 2009

First the “no-problem”

- WebApp for “end users”
 - `Catalyst`
 - `DBIx::Class (::Schema::Versioned)`
 - `TAP::* (Parser, Formatter::HTML)`



Web Application for “end users”



Web Application for “end users”

artemis2.0

Manual Reports Testruns Hardware

Last weeks reports

237 reports 181 pass 56 fail 0 unknown

Thu Jul 16, 2009

ID	date	suite	machine	success	ratio	grouped by
11104	2009-07-16	Daily-Report	nagult	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11103	2009-07-16	Daily-Report	microbe	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11102	2009-07-16	Daily-Report	uruk	FAIL	<div style="width: 90%; height: 10px; background-color: green;"></div>	
11101	2009-07-16	Daily-Report	azael	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11098	2009-07-16	Daily-Report	schwarteite	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11097	2009-07-16	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	testrun 4624

Wed Jul 15, 2009

ID	date	suite	machine	success	ratio	grouped by
11018	2009-07-15	Topic-Xen	satyr	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	testrun 4649
11017	2009-07-15	KernBench	satyr-amarth	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
10999	2009-07-15	CTCS	satyr-ymir	FAIL	<div style="width: 90%; height: 10px; background-color: green;"></div>	
10950	2009-07-15	Host-Overview	satyr	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
10976	2009-07-15	Daily-Report	schwarteite	FAIL	<div style="width: 90%; height: 10px; background-color: green;"></div>	
10973	2009-07-15	Topic-Xen	kobold	FAIL	<div style="width: 90%; height: 10px; background-color: green;"></div>	testrun 4666
10957	2009-07-15	Host-Overview	kobold	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
10955	2009-07-15	Topic-Xen	lemure	FAIL	<div style="width: 90%; height: 10px; background-color: green;"></div>	testrun 4679
10954	2009-07-15	CTCS	lemure-sivara	FAIL	<div style="width: 90%; height: 10px; background-color: green;"></div>	
10932	2009-07-15	Host-Overview	lemure	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
10953	2009-07-15	Topic-Kernel	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	testrun 4624
11096	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11095	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11094	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11093	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11092	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11091	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11090	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11089	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11088	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11087	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	
11086	2009-07-15	Kernel-Boot	athene	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	

reports by date

- [today](#)
- [1 week](#)
- [2 weeks](#)
- [3 weeks](#)
- [1 month](#)
- [2 months](#)

reports by suite

reports by topic

reports by people



Web Application for “end users”

artemis2.0

Manual Reports Testruns Hardware

All test suites

name	type	reports
Artemis	software	38
Artemis-Acme	software	31
Artemis-Cmd	software	35
Artemis-Contig	software	32
Artemis-CTCS	unknown	442
Artemis-Error-Software	unknown	8
Artemis-Error-Xen	unknown	64
Artemis-ErrorHandler	unknown	23
Artemis-KernBench	unknown	27
Artemis-LMBench	unknown	22
Artemis-LTP-Bench	unknown	57
Artemis-MCP-Software	unknown	17
Artemis-MCP-Xen	unknown	1297
Artemis-Model	software	32
Artemis-PyTest	software	1
Artemis-Reports-API	software	7
Artemis-Reports-DPath	software	3
Artemis-Reports-DPath-2.010005	software	1
Artemis-Reports-Receiver	software	31
Artemis-Schema	software	32
Artemis-TAP-Harness	software	31
Artemis-Test	software	37
CTCS	unknown	429
Daily-Report	unknown	2053
Daily-Report-Dummy	unknown	21
Dom0-Overview	unknown	1198
Foo-Bar	unknown	1
Host-Overview	unknown	536
KernBench	unknown	427
Kernel-Boot	unknown	394
KVM-Migration-Checkpoint	software	1
LMBench	unknown	308
LTP	unknown	433
manual-telnet-session	unknown	1
Topic-Kernel	unknown	471
Topic-KVM	unknown	207
Topic-Misc	unknown	25
Topic-Software	unknown	7
Topic-Xen	unknown	2119
unknown	unknown	22
Win-EventLog	unknown	2

reports by date

reports by suite

reports by topic

reports by people

Done osrc.amd.com



Web Application for “end users”

artemis2.0

Manual Reports Testruns Hardware

All reports by suite: **Artemis-CTCS**
442 reports 0 pass 442 fail 0 unknown

All reports

ID	date	suite	machine	success	ratio	grouped by
3627	2009-02-02	Artemis-CTCS	californium	FAIL	0	
3618	2009-02-02	Artemis-CTCS	rutherfordium	FAIL	0	
3546	2009-01-27	Artemis-CTCS	francium.osrc.amd.com	FAIL	0	
3519	2009-01-27	Artemis-CTCS	californium.osrc.amd.com	FAIL	0	
3512	2009-01-27	Artemis-CTCS	actinium.osrc.amd.com	FAIL	0	
3509	2009-01-27	Artemis-CTCS	americium.osrc.amd.com	FAIL	0	
3504	2009-01-27	Artemis-CTCS	sles94	FAIL	0	
3502	2009-01-27	Artemis-CTCS	dubnium.osrc.amd.com	FAIL	0	
3496	2009-01-27	Artemis-CTCS	curium.osrc.amd.com	FAIL	0	
3486	2009-01-26	Artemis-CTCS	uran.osrc.amd.com	FAIL	0	
3485	2009-01-26	Artemis-CTCS	californium	FAIL	0	
3480	2009-01-26	Artemis-CTCS	uran.osrc.amd.com	FAIL	0	
3475	2009-01-26	Artemis-CTCS	americium	FAIL	0	
3449	2009-01-26	Artemis-CTCS	rutherfordium.osrc.amd.com	FAIL	0	
3445	2009-01-26	Artemis-CTCS	darmstadtium	FAIL	0	
3432	2009-01-23	Artemis-CTCS	roentgenium.osrc.amd.com	FAIL	0	
3421	2009-01-23	Artemis-CTCS	protactinium	FAIL	0	
3414	2009-01-23	Artemis-CTCS	actinium.osrc.amd.com	FAIL	0	
3408	2009-01-23	Artemis-CTCS	actinium.osrc.amd.com	FAIL	0	
3399	2009-01-23	Artemis-CTCS	plutonium	FAIL	0	
3397	2009-01-22	Artemis-CTCS	protactinium	FAIL	0	
3395	2009-01-22	Artemis-CTCS	roentgenium.osrc.amd.com	FAIL	0	
3392	2009-01-22	Artemis-CTCS	sles10sp2	FAIL	0	
3383	2009-01-22	Artemis-CTCS	plutonium	FAIL	0	
3382	2009-01-22	Artemis-CTCS	curium.osrc.amd.com	FAIL	0	
3375	2009-01-22	Artemis-CTCS	francium.osrc.amd.com	FAIL	0	
3361	2009-01-22	Artemis-CTCS	fermium.osrc.amd.com	FAIL	0	
3359	2009-01-22	Artemis-CTCS	berkelium	FAIL	0	
3345	2009-01-22	Artemis-CTCS	roentgenium.osrc.amd.com	FAIL	0	
3306	2009-01-21	Artemis-CTCS	uran.osrc.amd.com	FAIL	0	
3287	2009-01-20	Artemis-CTCS	seaborgium.osrc.amd.com	FAIL	0	
3260	2009-01-15	Artemis-CTCS	meitnerium.osrc.amd.com	FAIL	0	

reports by date
reports by suite
reports by topic
reports by people

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Web Application for “end users”

artemis - Mozilla Firefox

File Edit View History Bookmarks Tools Help

https://osrc.amd.com/artemis/reports/date/14

Wikipedia (en)

artemis

ID	date	suite	machine	success	ratio	grouped by
10753	2009-07-09	Topic-Kernel	kobold	PASS		testrun 4606
10752	2009-07-09	Kernel-Boot	kobold	PASS		
10751	2009-07-09	Daily-Report	uruk	FAIL		
10750	2009-07-09	Topic-Xen	satyr	PASS		testrun 4601
10749	2009-07-09	KernBench	satyr-amroth.osrc.amd.com	PASS		
10748	2009-07-09	Host-Overview	satyr	PASS		
10747	2009-07-09	Topic-Kernel	kobold	PASS		testrun 4602
10746	2009-07-09	Kernel-Boot	kobold	PASS		
10745	2009-07-09	Topic-Xen	kobold	FAIL		testrun 4598
10744	2009-07-09	Topic-Kernel	satyr	PASS		testrun 4597
10743	2009-07-09	Kernel-Boot	satyr	PASS		
10742	2009-07-09	Topic-Xen	kobold	PASS		testrun 4594
10741	2009-07-09	KernBench	kobold-tatsu.osrc.amd.com	PASS		
10740	2009-07-09	Host-Overview	kobold	PASS		

Wed Jul 8, 2009

ID	date	suite	machine	success	ratio	grouped by
10738	2009-07-08	Topic-Xen	kobold	PASS		testrun 4590
10737	2009-07-08	CTCS	kobold-ygrain	FAIL		
10734	2009-07-08	Host-Overview	kobold	PASS		
10736	2009-07-08	Topic-Xen	satyr	FAIL		testrun 4589
10739	2009-07-08	KernBench	satyr-galion	PASS		
10735	2009-07-08	Host-Overview	satyr	PASS		
10733	2009-07-08	Topic-Kernel	satyr	PASS		testrun 4585
10732	2009-07-08	Kernel-Boot	satyr	PASS		
10731	2009-07-08	Topic-Xen	satyr	PASS		testrun 4581
10730	2009-07-08	KernBench	satyr-atani	PASS		
10724	2009-07-08	Host-Overview	satyr	PASS		
10729	2009-07-08	Daily-Report	selimaga	PASS		
10728	2009-07-08	Daily-Report	azael	FAIL		
10727	2009-07-08	Daily-Report	laery	PASS		
10726	2009-07-08	Daily-Report	naqult	FAIL		
10725	2009-07-08	Topic-Xen	kobold	FAIL		testrun 4582
10723	2009-07-08	Host-Overview	kobold	PASS		
10722	2009-07-08	Topic-Xen	kobold	PASS		testrun 4578
10721	2009-07-08	LTP	kobold-amlach.osrc.amd.com	FAIL		
10720	2009-07-08	LTP	kobold-ygrain	FAIL		
10719	2009-07-08	KernBench	kobold-finarin	FAIL		
10716	2009-07-08	Host-Overview	kobold	PASS		
10718	2009-07-08	Daily-Report	incubus	FAIL		
10717	2009-07-08	Daily-Report	microbe	FAIL		
10715	2009-07-08	Daily-Report	uruk	PASS		
10714	2009-07-08	Topic-Xen	satyr	PASS		testrun 4573
10713	2009-07-08	KernBench	satyr-anacalagon.osrc.amd.com	PASS		
10712	2009-07-08	CTCS	satyr-haradrim	FAIL		

Done

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Web Application for “end users”

artemis2.0

Manual Reports Testruns Hardware

Topic-Xen 1.0
report id: 10722 | 2009-07-08 12:21:08 GMT | Host: 'kobold'

Context

Test results

PASSED

Test file	Test results	%
./section-000		100.0%

1 files 12 tests, 12 ok, 0 failed, 0 todo, 0 skipped, 0 parse errors
exit status: 0, wait status: 0
elapsed time: 0 wallclock secs (0.08 usr + 0.03 sys = 0.11 CPU) 100.0%

[raw TAP report](#)
[Preconditions in YAML](#)

Attachments

console	347528 Bytes	created 2009-07-08 12:21:07 GMT
test_quest-1_console	0 Bytes	created 2009-07-08 12:21:07 GMT
test_opt_artemis_bin_metainfo_stdout	48 Bytes	created 2009-07-08 12:21:07 GMT
test_quest-1_opt_artemis_bin_py_ltp_stderr	0 Bytes	created 2009-07-08 12:21:08 GMT
test_quest-2_console	19778 Bytes	created 2009-07-08 12:21:08 GMT
test_quest-1_opt_artemis_bin_py_ltp_stdout	0 Bytes	created 2009-07-08 12:21:08 GMT
test_quest-2_opt_artemis_bin_py_ltp_stdout	0 Bytes	created 2009-07-08 12:21:08 GMT
test_opt_artemis_bin_metainfo_stderr	0 Bytes	created 2009-07-08 12:21:09 GMT
test_quest-2_opt_artemis_bin_py_ltp_stdout	0 Bytes	created 2009-07-08 12:21:09 GMT
test_quest-3_console	18896 Bytes	created 2009-07-08 12:21:09 GMT
test_quest-3_opt_artemis_bin_py_kernbench_stdout	0 Bytes	created 2009-07-08 12:21:09 GMT
test_quest-3_opt_artemis_bin_py_kernbench_stderr	0 Bytes	created 2009-07-08 12:21:09 GMT

Reports of same group (Testrun)

ID	date	suite	machine	success	ratio	grouped by
10722	2009-07-08	Topic-Xen	kobold	PASS	<div style="width: 100%;"></div>	testrun 4578
10721	2009-07-08	LTP	kobold-amleach.osrc.amd.com	FAIL	<div style="width: 0%;"></div>	
10720	2009-07-08	LTP	kobold-ygrain	FAIL	<div style="width: 0%;"></div>	
10719	2009-07-08	KernBench	kobold-linearfin	FAIL	<div style="width: 0%;"></div>	
10716	2009-07-08	Host-Overview	kobold	PASS	<div style="width: 100%;"></div>	



Web Application for “end users”

The screenshot shows a web browser window displaying a test report for 'KernBench 0.020016'. The report is titled 'FAILED' in a large red banner. Below this, a table lists test files and their results. The 'Test file' column lists various test components, and the 'Test results' column shows progress bars and percentages. The overall status is 'FAILED' with a 79.3% completion rate. A summary at the bottom indicates 29 tests, 23 ok, 6 failed, 8 todo, 0 skipped, and 0 parse errors. A table below the report shows reports of the same group (Testrun).

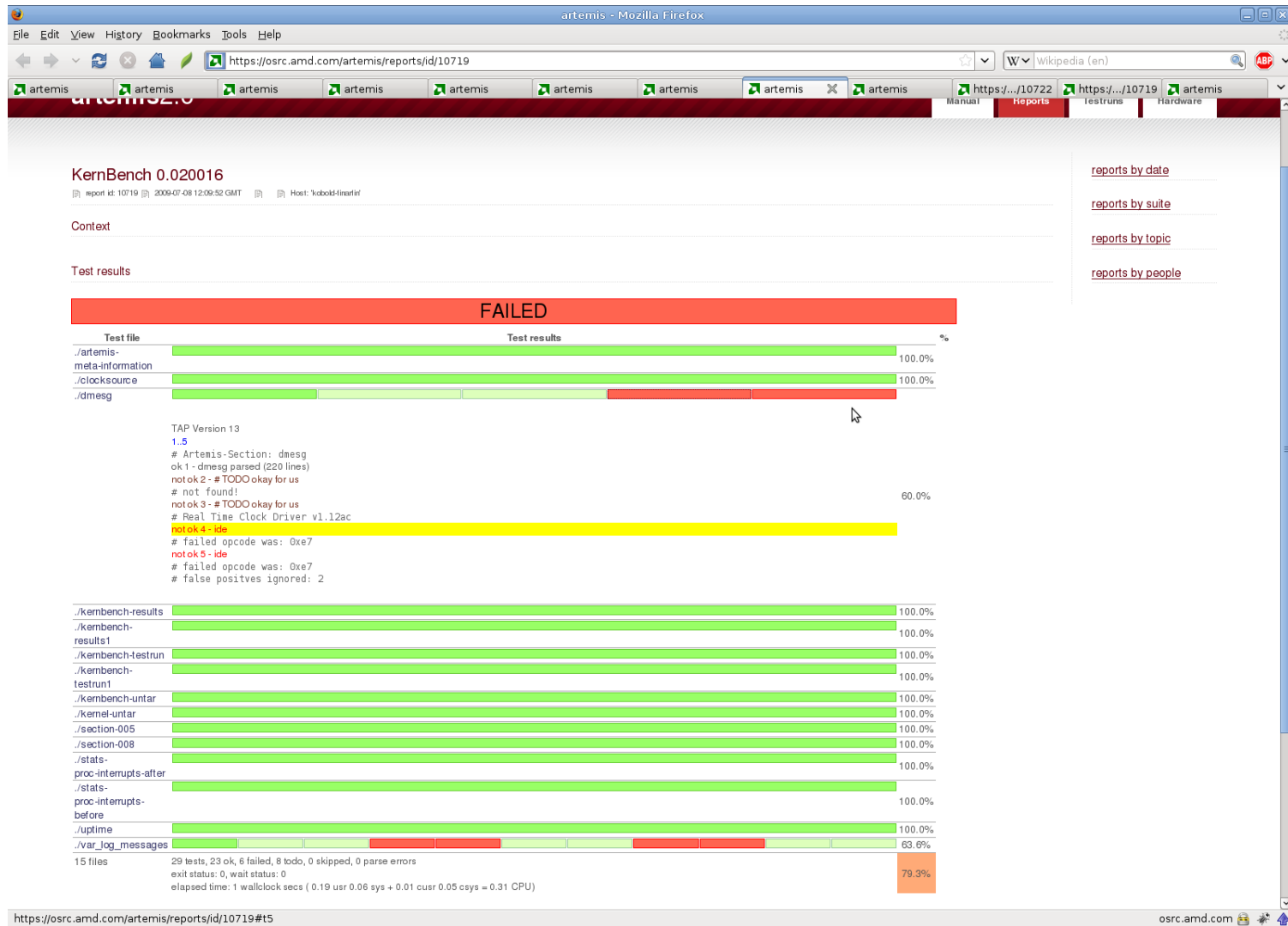
Test file	Test results	%
./artemis-meta-information	100.0%	100.0%
./clocksource	100.0%	100.0%
./dmesg	60.0%	60.0%
./kernbench-results	100.0%	100.0%
./kernbench-results1	100.0%	100.0%
./kernbench-testrun	100.0%	100.0%
./kernbench-testrun1	100.0%	100.0%
./kernbench-untar	100.0%	100.0%
./kernel-untar	100.0%	100.0%
./section-005	100.0%	100.0%
./section-008	100.0%	100.0%
./stats	100.0%	100.0%
./stats-proc-interrupts-after	100.0%	100.0%
./stats-proc-interrupts-before	100.0%	100.0%
./uptime	100.0%	100.0%
./var_log_messages	63.6%	63.6%

15 files: 29 tests, 23 ok, 6 failed, 8 todo, 0 skipped, 0 parse errors
exit status: 0, wait status: 0
elapsed time: 0 wallclock secs (0.16 usr 0.06 sys + 0.00 cusr 0.04 csys = 0.26 CPU)
79.3%

ID	date	suite	machine	success	ratio	grouped by
10722	2009-07-08	Topic-Xen	kobold	PASS	100%	testrun 4578
10721	2009-07-08	LTP	kobold-amleach.osrc.amd.com	FAIL	0%	
10720	2009-07-08	LTP	kobold-ygrain	FAIL	0%	
10719	2009-07-08	KernBench	kobold-linearfin	FAIL	79.3%	
10716	2009-07-08	Host-Overview	kobold	PASS	100%	



Web Application for “end users”



Web Application for “end users”

artemis2.0

Manual Reports Testruns Hardware

Testrun 4578

Automatically generated Xen test

Testruns

Testrun by state

Summary

Host

- Architecture: linux32
- Root image: suse/suse_sles10_sp2_32b_smp_raw.tar.gz
- Test: metainfo

Guest number 1

- Architecture: linux32
- Root image: osko:/export/image_files/official_testing/opensuse_11_1_32bpaе_qcow.img
- Test: py_ltp

Guest number 2

- Architecture: linux32
- Root image: osko:/export/image_files/official_testing/redhat_rhe5u4_alpha_32bpaе_qcow.img
- Test: py_ltp

Guest number 3

- Architecture: linux32
- Root image: osko:/export/image_files/official_testing/suse_suse10_32b_up_qcow.img
- Test: py_kernbench

[Preconditions in YAML](#)

Reports of this Testrun

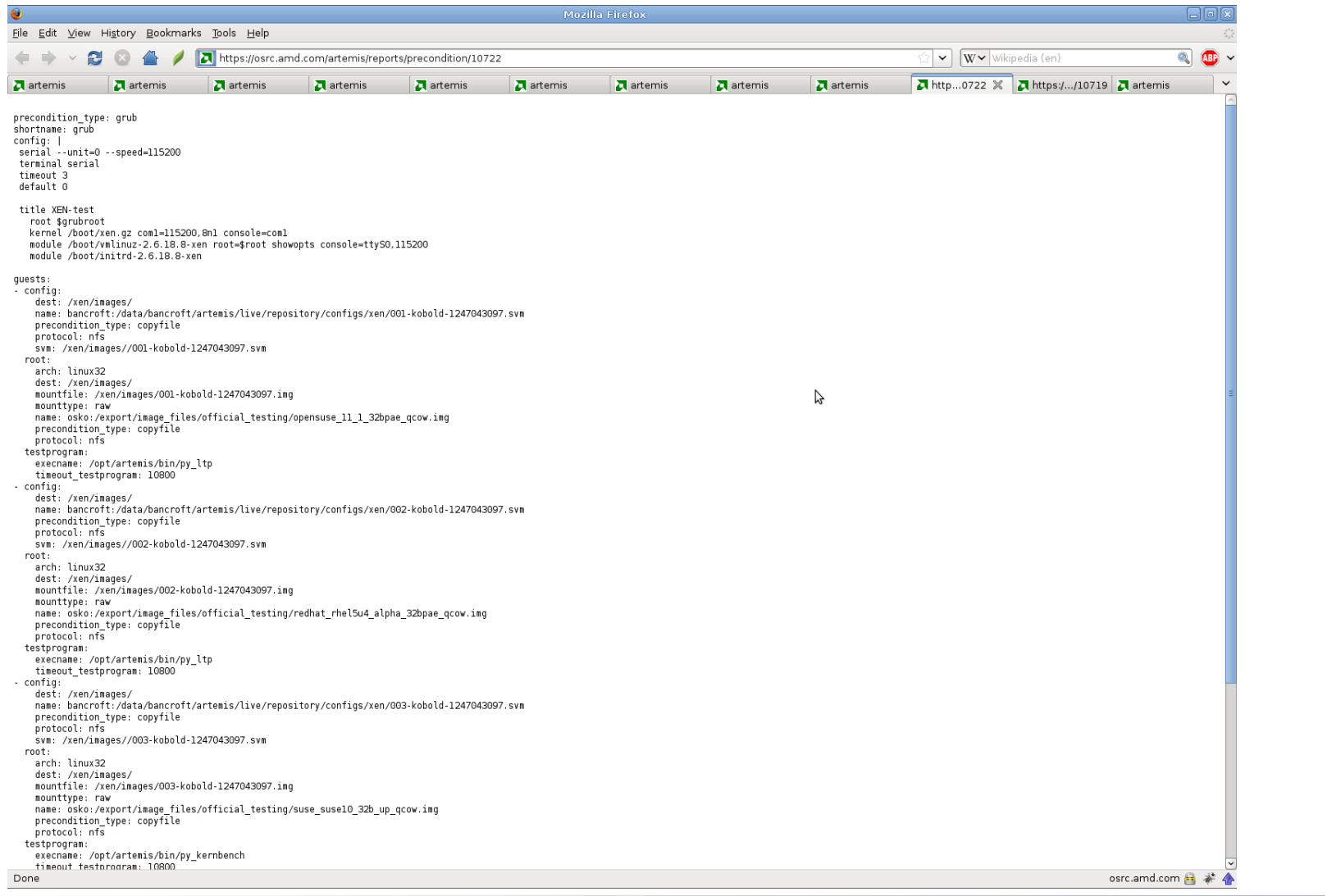
ID	date	suite	machine	success	ratio	grouped by
10722	2009-07-08	Topic-Xen	kobold	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	testrun 4578
10721	2009-07-08	LTP	kobold-amlach.osrc.amd.com	FAIL	<div style="width: 0%; height: 10px; background-color: green;"></div>	
10720	2009-07-08	LTP	kobold-ygrain	FAIL	<div style="width: 0%; height: 10px; background-color: green;"></div>	
10719	2009-07-08	KernBench	kobold-finartin	FAIL	<div style="width: 0%; height: 10px; background-color: green;"></div>	
10716	2009-07-08	Host-Overview	kobold	PASS	<div style="width: 100%; height: 10px; background-color: green;"></div>	

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Web Application for “end users”



The screenshot shows a Mozilla Firefox browser window displaying a web application interface. The address bar shows the URL `https://osrc.amd.com/artemis/reports/precondition/10722`. The browser has several tabs open, all titled 'artemis'. The main content area displays a pre-configuration report for a 'grub' precondition. The report is structured as follows:

```
precondition_type: grub
shortname: grub
config: |
serial --unit=0 --speed=115200
terminal serial
timeout 3
default 0

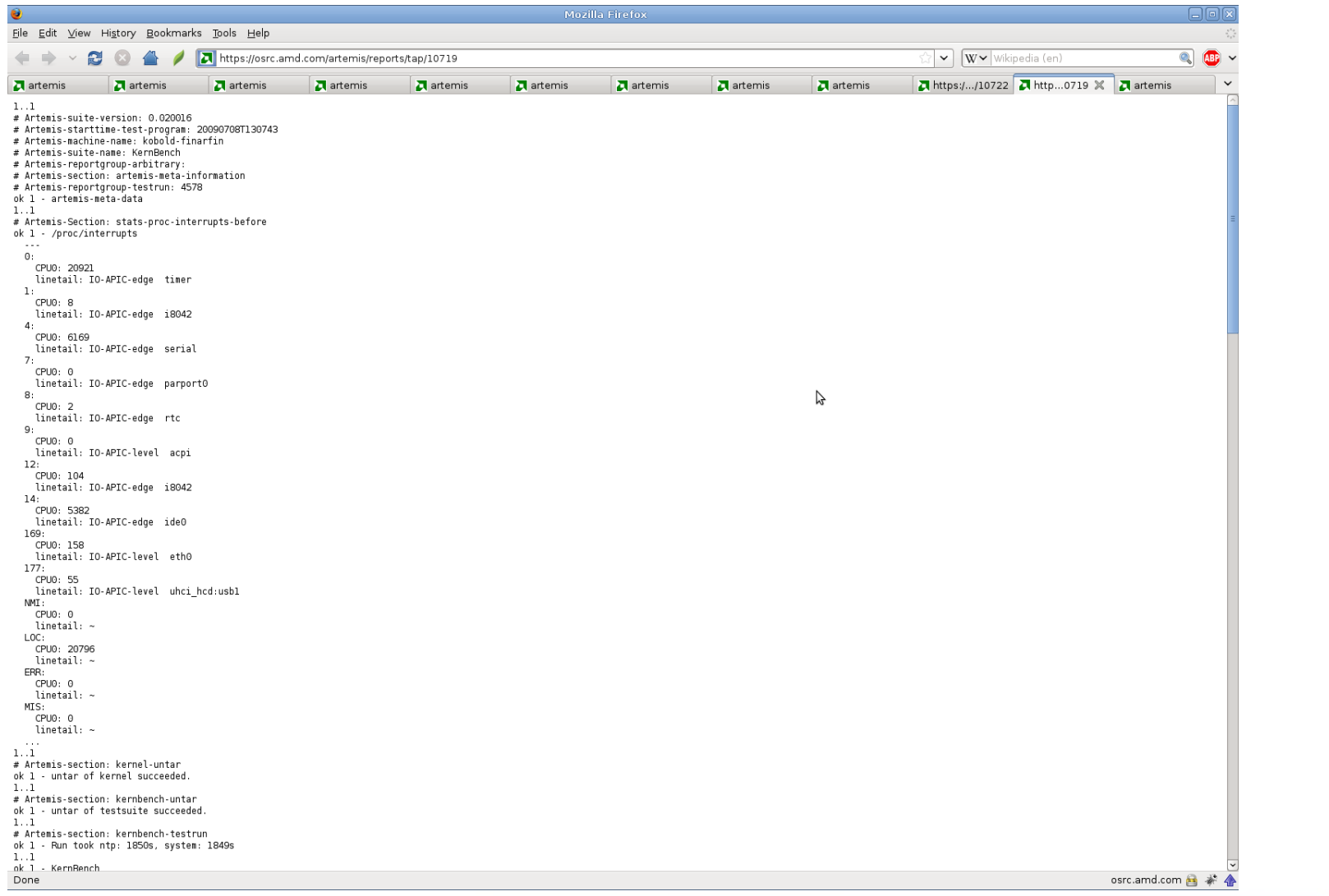
title XEN-test
root $grubroot
kernel /boot/xen.gz com1=115200,8n1 console=com1
module /boot/vmlinuz-2.6.18.8-xen root=$root showopts console=ttyS0.115200
module /boot/initrd-2.6.18.8-xen

guests:
- config:
  dest: /xen/images/
  name: bancroft:/data/bancroft/artemis/live/repository/configs/xen/001-kobold-1247043097.svm
  precondition_type: copyfile
  protocol: nfs
  svm: /xen/images//001-kobold-1247043097.svm
  root:
  arch: linux32
  dest: /xen/images/
  mountfile: /xen/images/001-kobold-1247043097.img
  mounttype: raw
  name: osko:/export/image_files/official_testing/opensuse_11_1_32bpaq_qcow.img
  precondition_type: copyfile
  protocol: nfs
  testprogram:
  execname: /opt/artemis/bin/py_ltp
  timeout_testprogram: 10800
- config:
  dest: /xen/images/
  name: bancroft:/data/bancroft/artemis/live/repository/configs/xen/002-kobold-1247043097.svm
  precondition_type: copyfile
  protocol: nfs
  svm: /xen/images//002-kobold-1247043097.svm
  root:
  arch: linux32
  dest: /xen/images/
  mountfile: /xen/images/002-kobold-1247043097.img
  mounttype: raw
  name: osko:/export/image_files/official_testing/redhat_rhel5u4_alpha_32bpaq_qcow.img
  precondition_type: copyfile
  protocol: nfs
  testprogram:
  execname: /opt/artemis/bin/py_ltp
  timeout_testprogram: 10800
- config:
  dest: /xen/images/
  name: bancroft:/data/bancroft/artemis/live/repository/configs/xen/003-kobold-1247043097.svm
  precondition_type: copyfile
  protocol: nfs
  svm: /xen/images//003-kobold-1247043097.svm
  root:
  arch: linux32
  dest: /xen/images/
  mountfile: /xen/images/003-kobold-1247043097.img
  mounttype: raw
  name: osko:/export/image_files/official_testing/suse_suse10_32b_up_qcow.img
  precondition_type: copyfile
  protocol: nfs
  testprogram:
  execname: /opt/artemis/bin/py_kernbench
  timeout_testprogram: 10800
```

The browser's status bar at the bottom shows 'Done' on the left and 'osrc.amd.com' on the right.



Web Application for “end users”



```
1..1
# Artemis-suite-version: 0.020016
# Artemis-starttime-test-program: 20090708T130743
# Artemis-machine-name: kobold-finarfin
# Artemis-suite-name: KernBench
# Artemis-reportgroup-arbitrary:
# Artemis-section: artemis-meta-information
# Artemis-reportgroup-testrun: 4578
ok 1 - artemis-meta-data
1..1
# Artemis-Section: stats-proc-interrupts-before
ok 1 - /proc/interrupts
...
0:
  CPU0: 20921
  linetail: IO-APIC-edge timer
1:
  CPU0: 8
  linetail: IO-APIC-edge i8042
4:
  CPU0: 6169
  linetail: IO-APIC-edge serial
7:
  CPU0: 0
  linetail: IO-APIC-edge parport0
8:
  CPU0: 2
  linetail: IO-APIC-edge rtc
9:
  CPU0: 0
  linetail: IO-APIC-level acpi
12:
  CPU0: 104
  linetail: IO-APIC-edge i8042
14:
  CPU0: 5382
  linetail: IO-APIC-edge ide0
169:
  CPU0: 158
  linetail: IO-APIC-level eth0
177:
  CPU0: 55
  linetail: IO-APIC-level uhci_hcd:usb1
NMI:
  CPU0: 0
  linetail: ~
LOC:
  CPU0: 20796
  linetail: ~
ERR:
  CPU0: 0
  linetail: ~
MIS:
  CPU0: 0
  linetail: ~
...
1..1
# Artemis-section: kernel-untar
ok 1 - untar of kernel succeeded.
1..1
# Artemis-section: kernbench-untar
ok 1 - untar of testsuite succeeded.
1..1
# Artemis-section: kernbench-testrun
ok 1 - Run took ntp: 1850s, system: 1849s
1..1
ok 1 - KernBench
Done
```



Web Application for “end users”

The screenshot shows a Mozilla Firefox browser window displaying the Artemis 2.0 manual page. The browser's address bar shows the URL <https://osrc.amd.com/artemis/manual/>. The page has a dark red header with the text "artemis2.0" and navigation buttons for "Manual", "Reports", "Testruns", and "Hardware". The main content area is titled "ARTEMIS Manual" and includes a navigation menu on the right with links such as "Synopsis", "Technical Infrastructure", "Test Protocol", "Test Suite Wrappers", "Preconditions", "Web User Interface", "Reports API", "Complete Use-Cases", and "Artemis Development". The main text area contains a "Table of Contents" with a list of sections and sub-sections, including "1 Synopsis", "2 Technical Infrastructure", "3 Test Protocol", "3.1 Test Anything Protocol (TAP)", "3.2 Tutorial", "3.3 Special Artemis headers inside TAP", "3.4 Particular use-cases", "3.4.1 Report Groups", and "3.4.2 Report grouping by arbitrary identifier". The browser's status bar at the bottom shows the URL <https://osrc.amd.com/artemis/hardware/>.



The Query Gap

- Scriptable querying
- The same ease as reporting
- Again: shell level, `netcat`



The Query Gap (2)

- Use Cases
 - generally access our own reports
 - track single test over time
 - track benchmark results (YAML in TAP)
 - custom visualize the data

- Challenges
 - test suites change over time → fuzzy find
 - hide the toolchain



Solution



29 Cinderella 'TAP: The lazy evaluation sisters of TAP::Parser | Aug 4, 2009

Query interface (1)

- Provide template mechanism
- With embedded query language “DPath”
- Dialog-oriented protocol
 - send with `netcat`
 - HERE-doc style
 - receive answer



Query interface (2) - Synopsis

- Command:

```
$ cat report.mas | netcat bancroft 7358 > result.txt
```

- Template:

```
#! mason <<EOF
```

```
Planned oprofile tests:
```

```
% foreach $plan (reportdata '{ suite_name => "oprofile" } :: //tap/tests_planned') {
```

```
  <% $plan %>
```

```
% }
```

```
EOF
```

- Result

```
Planned oprofile tests:
```

```
3
```

```
4
```

```
17
```



Query interface (3) - Synopsis

```
#! mason debug=1 <<EOTEMPLATE
TITLE = "success ratio: CTCS"
set title TITLE offset char 0, char -1
set style data linespoints
set term png size 1200, 800
set output "CTCS_ratio.png"
set yrange [80:110]
plot '-' using 0:2 with linespoints lt 3 lw 1 title "ratio"

% my @time = reportdata '{ suite_name => "CTCS" } :: /report/created_at_ymd';
% my @ratio = reportdata '{ suite_name => "CTCS" } :: //success_ratio';
% foreach my $i (0..@ratio) {
    <% $time[$i] %> <% $ratio[$i] %>
% }

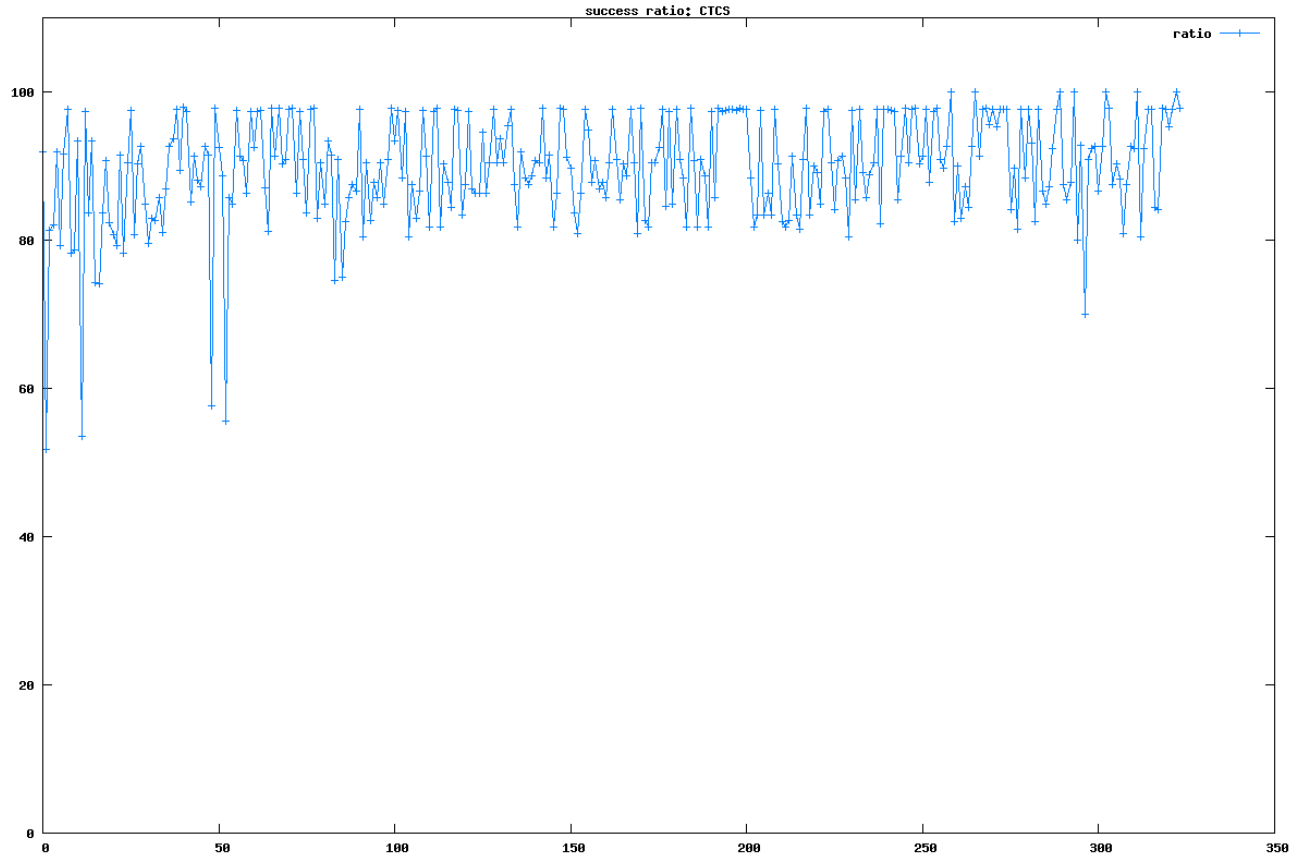
EOTEMPLATE
```



Query interface (4) - Synopsis

```
$ cat CTCS_ratio.gnuplot | netcat bancroft 7358 | gnuplot
```

(generated CTCS_ratio.png)



How does it work

- Modules
 - `TAP::DOM` - TAP as data structure
 - `Data::DPath` - XPath like language

 - `MyApp::DOM` - Project add-ons (report meta)
 - `MyApp::DPath` - Project add-ons (db layer)



Anatomy of a `MyApp::DPath`

```
{ suite_name => "CTCS" } :: //tests_planned[value > 10]/../summary/passed
```

- Virtual DOM, 2 orthogonal concepts
 - **database axis**: provide but hide relational access
 - `DBIx::Class`
 - `SQL::Abstract`
 - project-specific add-ons
 - the “history of reports”
 - **report axis**: inside single reports data structure
 - `TAP::DOM`
 - `Data::DPath`
 - “at one point in history”



Data::DPath

- XPath like language
- Optimized for Perl
 - data structures
 - filter sub language
 - more “Why not XPath?” in Data::DPath docs
→ <http://xrl.us/dpathvsxpath>



Data::DPath - Synopsis (1)

```
use Data::DPath 'dpath';  
my $data = { AAA => { BBB => { CCC => [ qw/ XXX YYY ZZZ / ] },  
              RRR => { CCC => [ qw/ RR1 RR2 RR3 / ] },  
              DDD => { EEE => [ qw/ uuu vvv www / ] } }  
};
```

```
$resultlist = $data ~~ dpath '/AAA/*/CCC';
```

```
→ [ [ 'XXX', 'YYY', 'ZZZ' ],  
     [ 'RR1', 'RR2', 'RR3' ] ]
```



Data::DPath - Synopsis (2)

```
use Data::DPath 'dpath';  
my $data = { AAA => { BBB => { CCC => [ qw/ XXX YYY ZZZ / ] },  
              RRR => { CCC => [ qw/ RR1 RR2 RR3 / ] },  
              DDD => { EEE => [ qw/ uuu vvv www / ] } }  
};
```

```
$resultlist = $data ~~ dpath '/AAA/*/CCC';
```

```
→ [ [ 'XXX', 'YYY', 'ZZZ' ],  
     [ 'RR1', 'RR2', 'RR3' ] ]
```



Data::DPath - Synopsis (3)

```
$data ~~ dpath '/AAA/*/CCC'  
$data ~~ dpath '/AAA/BBB/CCC/../../../../'  
$data ~~ dpath '//AAA'  
$data ~~ dpath '//AAA/*'  
$data ~~ dpath '//AAA//SOMEWHERE//BELOW'  
$data ~~ dpath '/"EE/E"/CCC'  
$data ~~ dpath '/AAA/BBB/CCC/*[1]'  
$data ~~ dpath '//AAA/BBB/*[key eq "CCC"]'  
$data ~~ dpath '//CCC/*[value eq "RR2"]'
```



Data::DPath - Synopsis (3)

```
$data ~~ dpath '/AAA/*/CCC'  
$data ~~ dpath '/AAA/BBB/CCC/../../../../'  
$data ~~ dpath '//AAA'  
$data ~~ dpath '//AAA/*'  
$data ~~ dpath '//AAA//SOMEWHERE//BELOW'  
$data ~~ dpath '/"EE/E"/CCC'  
$data ~~ dpath '/AAA/BBB/CCC/*[1]'  
$data ~~ dpath '//AAA/BBB/*[key eq "CCC"]'  
$data ~~ dpath '//CCC/*[value eq "RR2"]'
```

- What is our \$data?



TAP::DOM

- TAP as data structure
- TAP → TAP::Parser → TAP::DOM → DOM



TAP::DOM - Synopsis (1)

```
use TAP::DOM;
```

```
# same options as TAP::Parser
```

```
my $tapdata = new TAP::DOM ( tap => $tap );
```

```
print Dumper( $tapdata );
```



TAP::DOM - Synopsis (2)

```
bless ({
  'tests_planned' => 6
  'tests_run'      => 8,
  # [...]
  'summary' => {
    'status'      => 'FAIL',
    'total'       => 8,
    'passed'      => 6,
    'failed'      => 2,
    'skipped'     => 1,
    'todo'        => 4,
    'todo_passed' => 2,
    # [...]
  },
  'lines' => [
    { 'number'      => '1',
      'is_ok'       => 1,
      'description' => '- use Data::DPath;',
      '_children'  => [ # subsequent comments/yaml
        { 'is_yaml' => 1,
          'data' => [ {'name' => 'Hash one',
                      'value' => '1' },
                    {'name' => 'Hash two',
                      'value' => '2' } ] ] } ] ] }

  # [... lines ...]
] }, 'TAP::DOM')
```



Complex TAP::DOM is easy with Data::DPath

- Look at complete DOM once, use `dpath '/'`
- Find interesting keys
- Use `dpath '//key'`:

```
dpath '//summary/passed'
```

```
dpath '//description//foo'
```



Daemon + Template + DPath

- One function for everything, hide iterating `$data`
→ `reportdata($path)`
- Prelude in template engine
- Daemon answers after HERE-documents

```
#!/mason <<EOTEMPLATE
Planned oprofile tests:
% foreach $plan (reportdata '{ search } :: //path') {
  <% $plan %>
% }
EOTEMPLATE
```

```
$ cat report.mas | netcat bancroft 7358 > result.txt
```



Data::DPath - Modern Perl

- New-school dependencies

```
use MooseX::Declare;
use 5.010;

class Data::DPath is dirty {
    clean;
    method match (Any $data, Str $path) {
        given ($step->kind) {
            when ('ANYWHERE') {
                # ...
            }
        }
    }
}
```



Challenges

- `Data::DPath` → speed!
- `TAP::DOM` → size!



Cache!

- 3 levels
 - **TAP::DOM**
 - in DB
 - **Data::DPath** queries
 - path + report_id
 - `Cache::FileCache`
 - **MyApp::DPath** queries
 - path + count of matching reports
 - `Cache::FileCache`



Superlarge TAP::DOMs

- Single monster TAPs still in RAM
 - 70MB TAP → xGB TAP::DOM
 - how to compress data structure?
 - open issue



Project spin-offs

- App::DPath
- Emacs tap-mode



App::DPath

- App::DPath
 - cmdline tool “dpath” around Data::DPath
 - input filters: `YAML`, `JSON`, `Data::Dumper`, `INI`, **TAP**
 - output filters: `YAML`, `JSON`, `Data::Dumper`
 - useful for developing/debugging DPaths



App::DPath - Example

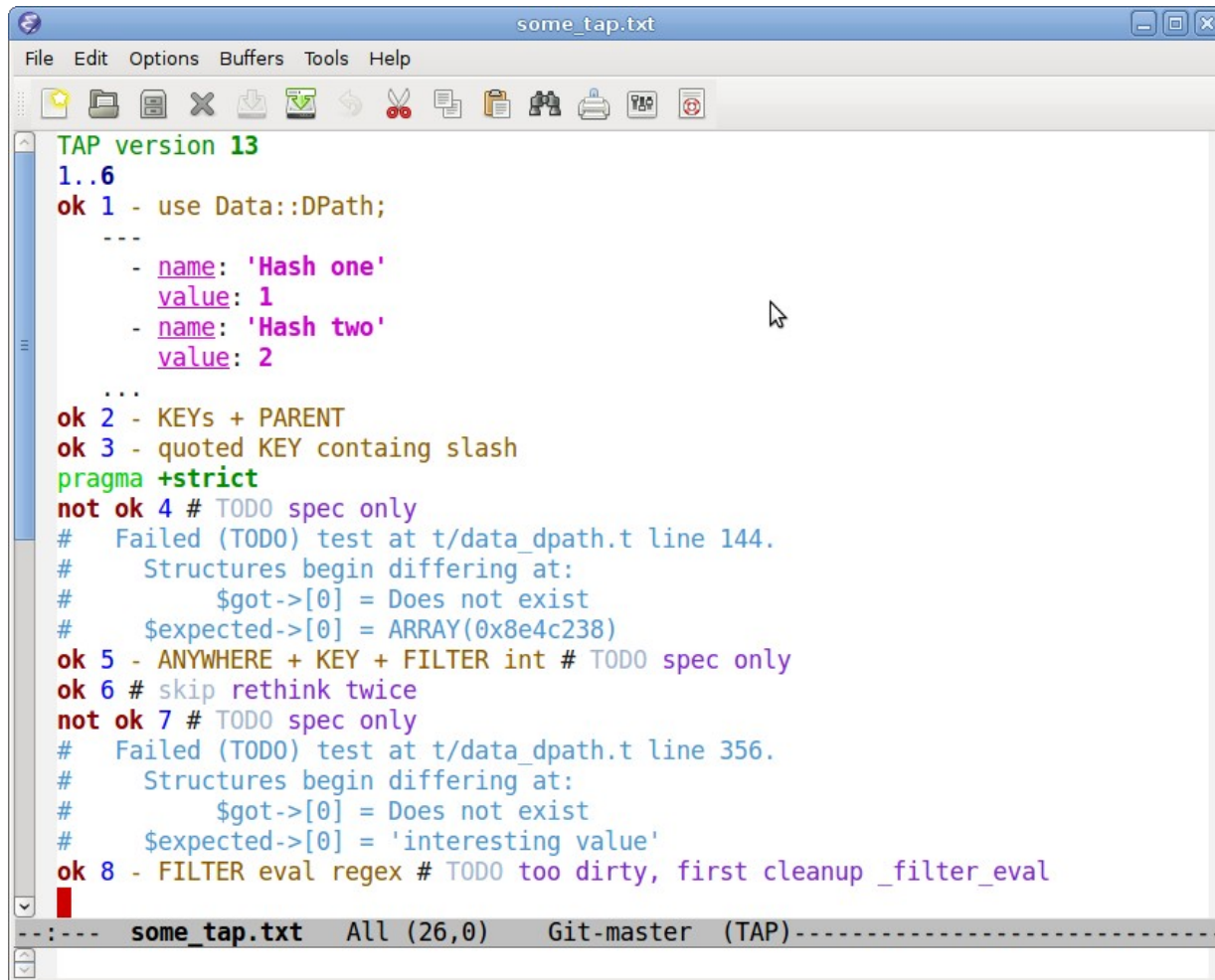
- Find passing TODO tests

```
perl foo.t | dpath -i tap '//has_todo[value==1]/../is_actual_ok[value==1]/..'
```

```
---  
- as_string:      "ok 149 - ANYWHERE + NOSTEP # TODO deferred"  
  description:   "- ANYWHERE + NOSTEP"  
  directive:     TODO  
  explanation:   deferred  
  has_todo:      1  
  is_actual_ok:  1  
  is_ok:         1  
  is_test:       1  
  number:        149  
  type:          test
```



Emacs tap-mode



```
some_tap.txt
File Edit Options Buffers Tools Help
TAP version 13
1..6
ok 1 - use Data::DPath;
  ---
  - name: 'Hash one'
    value: 1
  - name: 'Hash two'
    value: 2
  ...
ok 2 - KEYS + PARENT
ok 3 - quoted KEY containing slash
pragma +strict
not ok 4 # TODO spec only
# Failed (TODO) test at t/data_dpath.t line 144.
# Structures begin differing at:
#   $got->[0] = Does not exist
#   $expected->[0] = ARRAY(0x8e4c238)
ok 5 - ANYWHERE + KEY + FILTER int # TODO spec only
ok 6 # skip rethink twice
not ok 7 # TODO spec only
# Failed (TODO) test at t/data_dpath.t line 356.
# Structures begin differing at:
#   $got->[0] = Does not exist
#   $expected->[0] = 'interesting value'
ok 8 - FILTER eval regex # TODO too dirty, first cleanup _filter_eval
--:--- some_tap.txt All (26,0) Git-master (TAP)-----
```



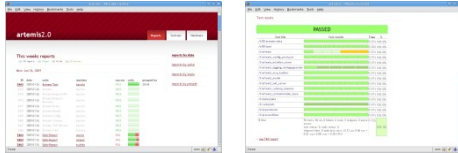
Summary (1)

- Test **automation** & **participation** infrastructure
- Test scripts emitting **TAP**
 - echo '1..2'
 - echo 'ok'
 - echo 'not ok'
- Trivially report
 - \$./testscript | netcat



Summary (2)

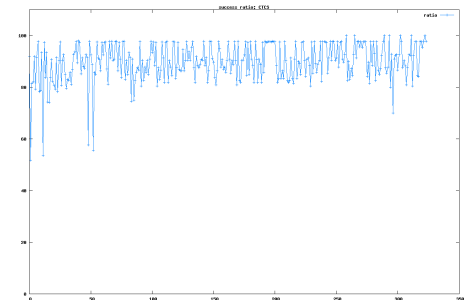
- Review results via WebApp



- Query interface
 - Data::DPath
 - TAP::DOM
 - Templates

```
% my @ratio = reportdata '{ search } :: //dpath';  
% foreach my $i (0..@ratio) {  
    <% $time[$i] %> <% $ratio[$i] %>  
% }
```

```
$ cat template | netcat > result
```



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