

# Why Is My App Slow?

## Tools & Techniques To Identify System Performance Issues

Pete Campbell

[pete@sumirolabs.com](mailto:pete@sumirolabs.com)

[@sumirolabs](#)

[github.com/campbell](https://github.com/campbell)

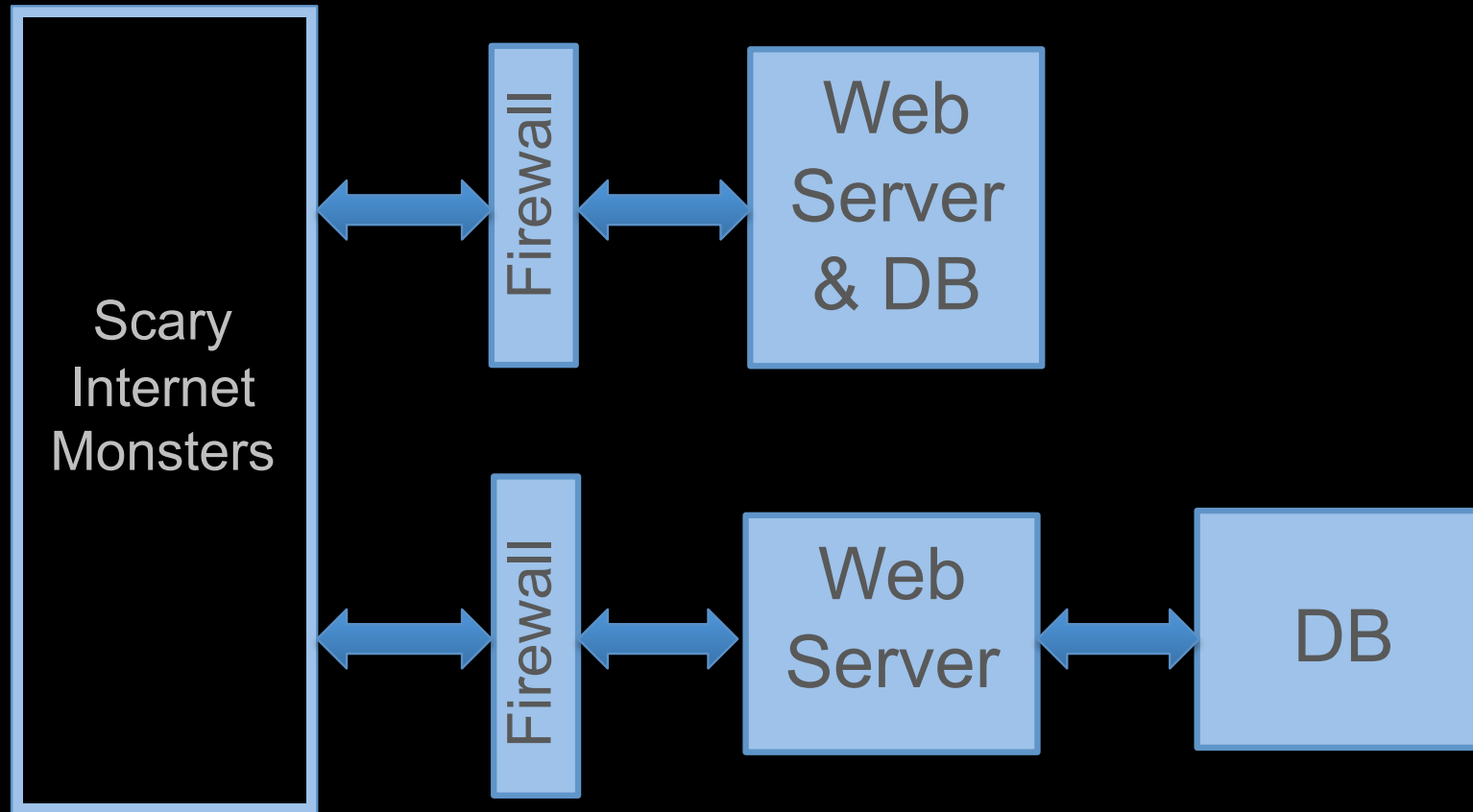
# Why Is My App Slow?

- You have a slow app!
- Network congestion
- Database load
- External services\*
- Garbage collection\*
- Other users & processes

# Where is the problem?

- Can't fix it (easily) if we can't find it
- Need some system knowledge (e.g. architecture)
- Need some system expertise (e.g. Linux sysadmin)
- Lucky you! I have some tools for you...

# Typical Architectures



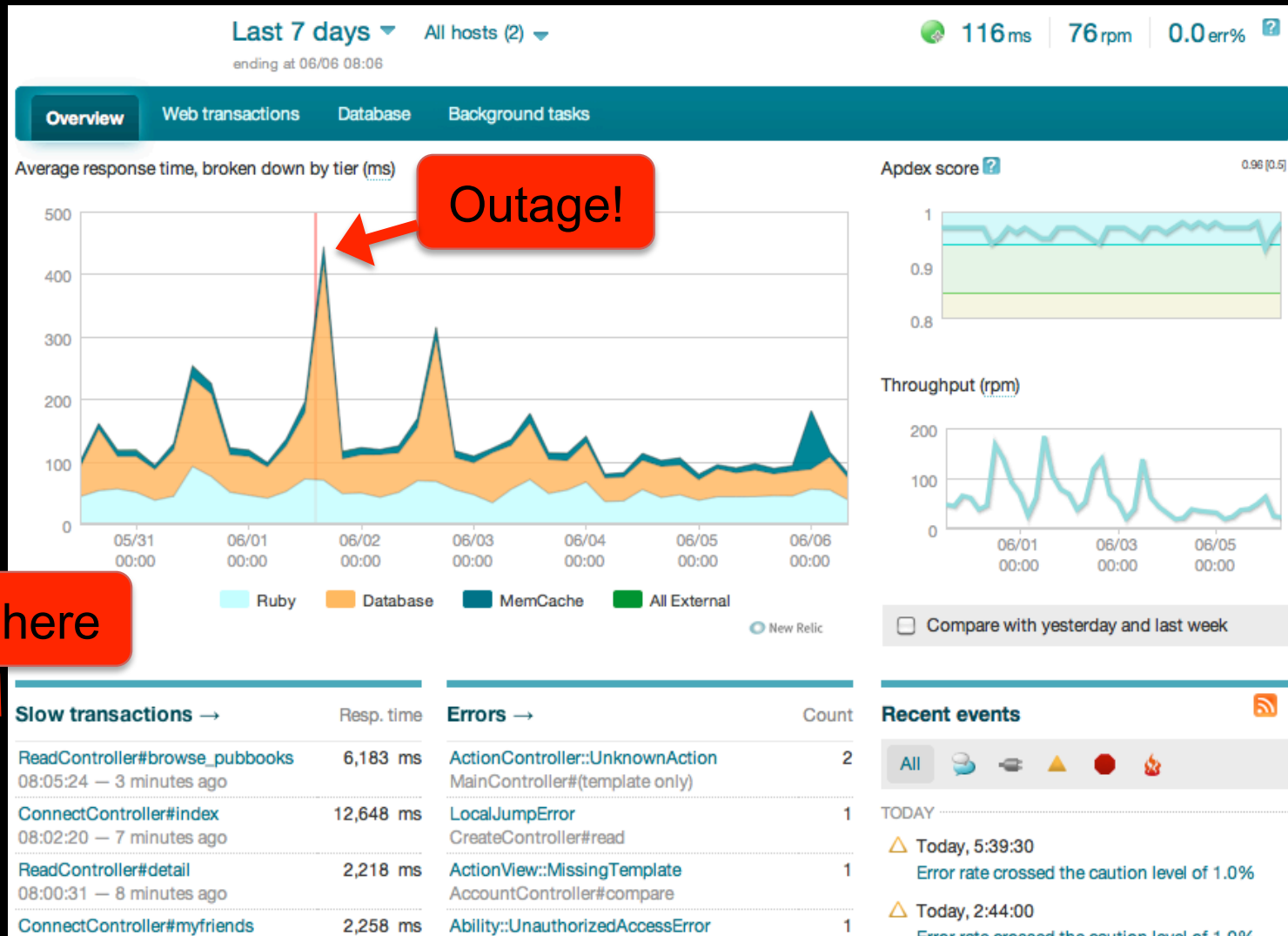
(I'm assuming we're using Apache, Passenger, MySQL)

# Where to Start?


## *NewRelic*

- Its easy
- Its great
- Its free!\*
- Tell me more!

# NewRelic = Awesomeness!



# More \$ = More Love

 **New Relic.** Professional trial

[My preferences](#) [Account settings](#) [Support](#) [Logout](#)

[Applications](#) [Alerts](#) [Notes](#) [Embedded charts](#) [Custom views](#)

[End user](#) [App server](#) [Diagnostics](#) [Reports](#) [Settings](#)

Last 7 days ▾ All hosts (2) ▾

ending at 06/06 08:17

124ms

57 rpm

0.0 err% ?

Transaction traces

Errors

Alerts

Start time	Action	Resp. time	Average
06/01/11 14:00:28	BureaderController#book_metadata	260,439 ms	702 ms
06/01/11 14:00:09	BureaderController#book_metadata	254,082 ms	702 ms
06/01/11 14:00:25	MemberController#adduserlist	238,359 ms	326 ms
06/01/11 14:01:28	ReadController#read	225,364 ms	263 ms
06/01/11 14:00:40	ReadController#read	223,287 ms	263 ms
06/01/11 14:01:10	MemberController#adduserlist	218,060 ms	326 ms
06/01/11 14:02:28	BureaderController#book_metadata	201,739 ms	702 ms
06/02/11 14:00:06	MemberController#signout	153,285 ms	1,044 ms
06/02/11 14:00:19	MemberController#do_signin	152,481 ms	381 ms
06/02/11 14:00:52	BureaderController#book_metadata	122,068 ms	702 ms
05/31/11 09:44:43	MemberImportController#import_users	111,352 ms	16,669 ms
06/02/11 14:01:02	ReadController#read	105,761 ms	263 ms

**Search options**

Action name

Type

Web transactions only ▾

Sort by

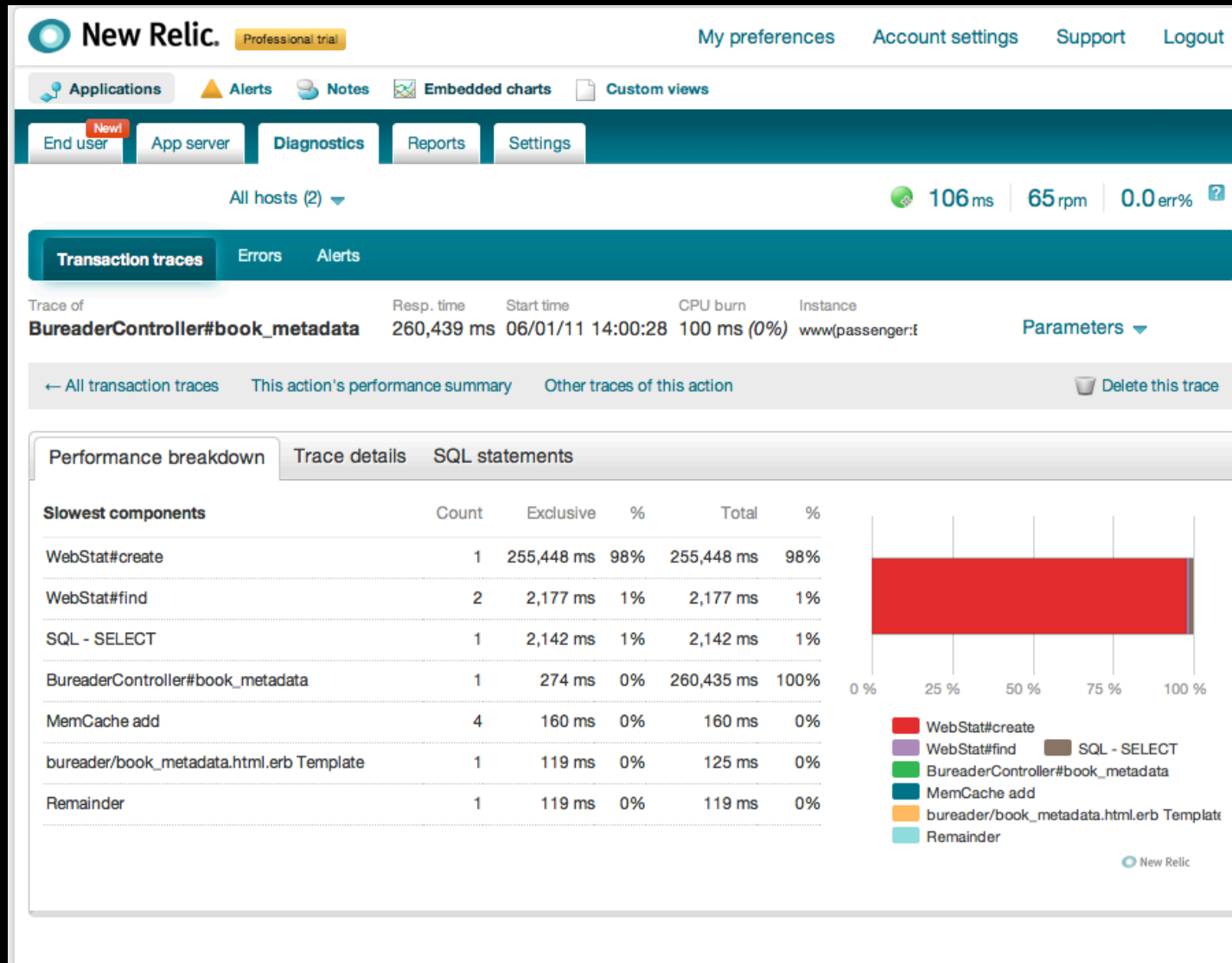
Response time ▾

Search →

**What are transaction traces?** ?

New Relic collects transaction traces — detailed performance diagnostics on a single execution

# More \$\$ = Love^2





# You Had Me At "Trace"...

The screenshot displays the New Relic Professional trial interface. At the top, navigation links include 'My preferences', 'Account settings', 'Support', and 'Logout'. Below these are tabs for 'Applications', 'Alerts', 'Notes', 'Embedded charts', and 'Custom views'. A secondary navigation bar contains 'End user', 'App server', 'Diagnostics', 'Reports', and 'Settings'. The main content area shows 'All hosts (2)' with performance metrics: 106ms, 65rpm, and 0.0err%. A sub-navigation bar includes 'Transaction traces', 'Errors', and 'Alerts'. The selected 'Transaction traces' view shows a trace for 'BureaderController#book\_metadata' with a response time of 260,439 ms, start time of 06/01/11 14:00:28, CPU burn of 100 ms (0%), and instance www(passenger:). Below this, a bar contains links: '← All transaction traces', 'This action's performance summary', 'Other traces of this action', and a 'Delete this trace' button. The 'SQL statements' tab is active, showing a table with columns 'Timestamp', 'Duration', and 'SQL'. The table lists several SQL queries with their respective timestamps and durations, including a SELECT query (711 ms), a BEGIN statement (31 ms), an INSERT query (255,448 ms), a SELECT query (1,466 ms), another SELECT query (2,142 ms), and a COMMIT statement (18 ms).

New Relic. Professional trial

My preferences Account settings Support Logout

Applications Alerts Notes Embedded charts Custom views

New! End user App server Diagnostics Reports Settings

All hosts (2) 106ms 65rpm 0.0err%

Transaction traces Errors Alerts

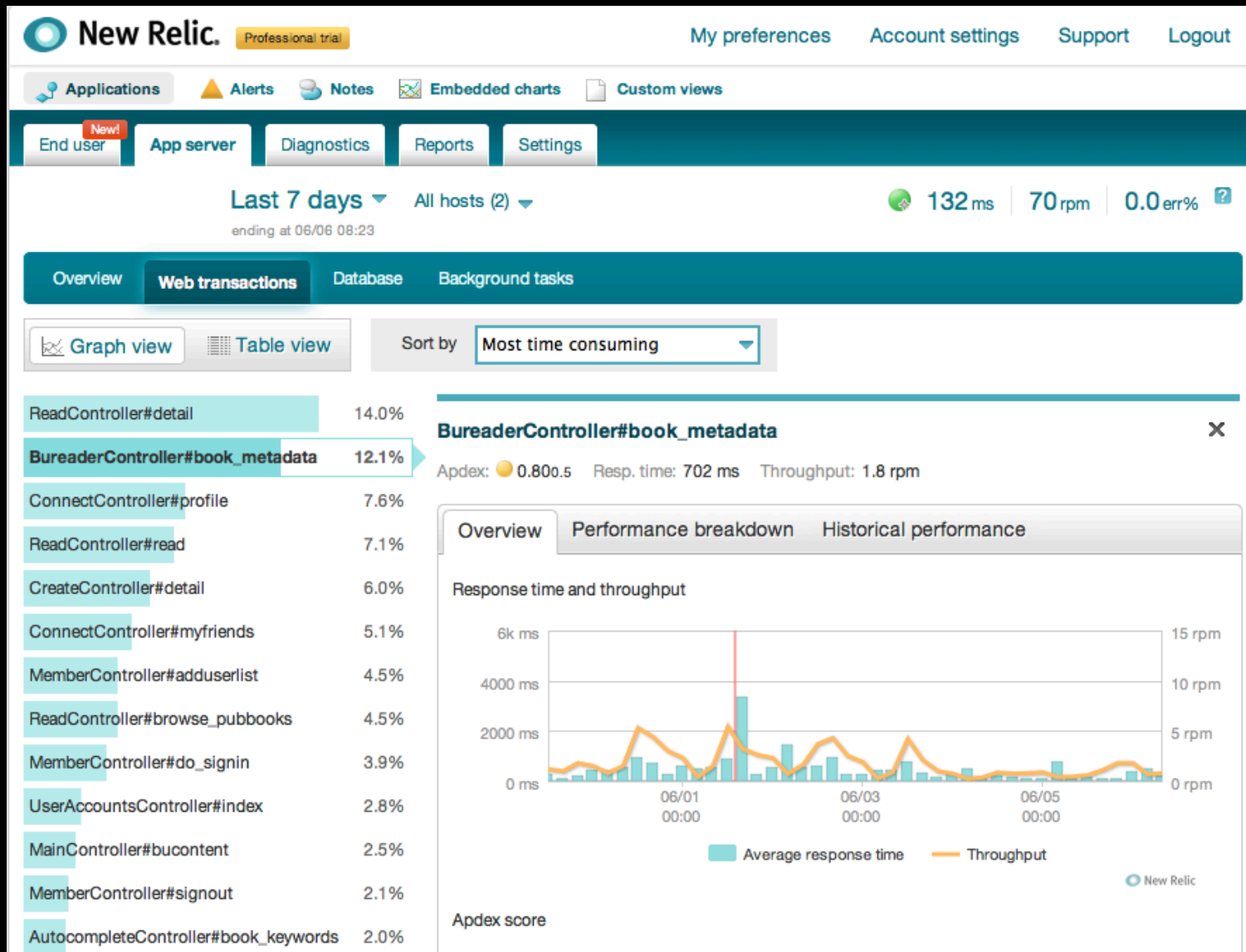
Trace of BureaderController#book\_metadata Resp. time 260,439 ms Start time 06/01/11 14:00:28 CPU burn 100 ms (0%) Instance www(passenger: Parameters

← All transaction traces This action's performance summary Other traces of this action Delete this trace

Performance breakdown Trace details SQL statements

Timestamp	Duration	SQL
0.015 s	711 ms	SELECT * FROM `web_stats` WHERE (request_type = ? AND request_id = ? AND referral_host_address = ?) ORDER BY id DESC LIMIT ?
0.727 s	31 ms	BEGIN
0.759 s	255,448 ms	INSERT INTO `web_stats` (`referral_host_address`, `request_path`, `request_id`, `user_account_id`, `http_referer`, `mod_datetime`, `request_type`) VALUES(?, NULL, ?, ?, NULL, ?, ?)
256.229 s	1,466 ms	SELECT id FROM `web_stats` WHERE (`web_stats`.`referral_host_address` = ? AND `web_stats`.`request_id` = ? AND `web_stats`.`request_type` = ?)
257.697 s	2,142 ms	SELECT count(*) AS count_all FROM `web_stats` WHERE (`web_stats`.`referral_host_address` = ? AND `web_stats`.`request_id` = ? AND `web_stats`.`request_type` = ?)
259.840 s	18 ms	COMMIT

# ...and "Web Transactions"



# But Why Was It Slow?

- NewRelic can tell you where time was spent...
- NewRelic can tell you how it was spent...
- NewRelic can't tell you why it was spent

# To The Bat-Cave!

Need to investigate at the system & architecture level.

Is the problem...

- cpu maxed out?
- network bandwidth?
- server needs more memory?
- external (web services, file system)?
- all of the above?

# Tools In Our Bat-Utility Belt

- CPU - top, htop, mpstat\*
- Disk - iostat, nfsiostat\*
- Network - iftop, ntop\*, etherape\*
- Memory - vmstat, free
- Passenger - passenger-status,  
passenger-memory-stats
- "Resources" - lsof, sar\*
- MySQL slow query log

# CPU - Old-School

## TOP - List of all running processes

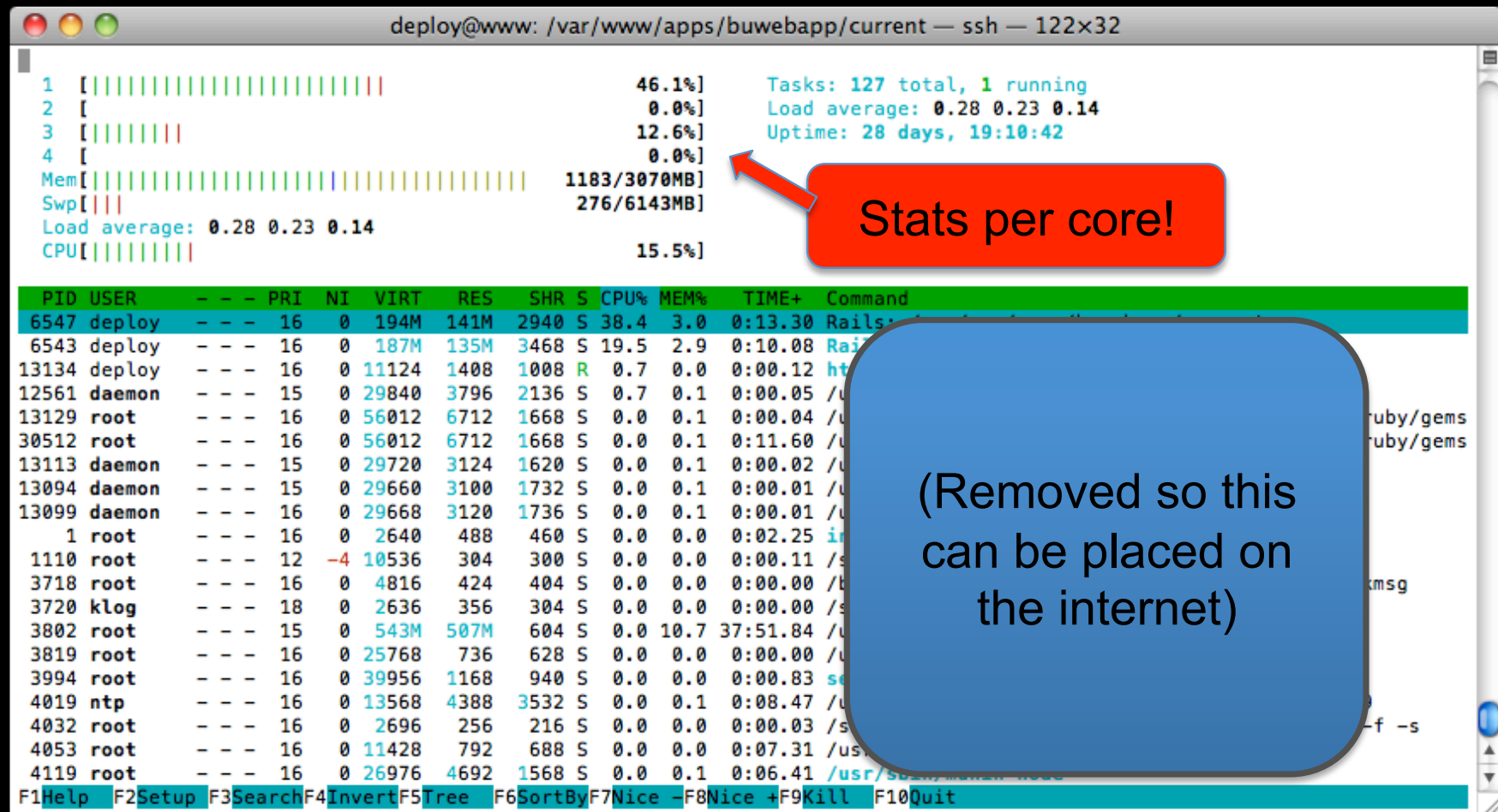
```
deploy@www: /var/www/apps/buwebapp/current — ssh — 122x32
top - 14:17:47 up 28 days, 20:40, 1 user, load average: 1.18, 0.50, 0.50
Tasks: 121 total, 10 running, 111 sleeping, 0 stopped, 0 zombie
Cpu(s): 68.4% us, 3.2% sy, 0.0% ni, 27.3% id, 0.0% wa, 0.0% hi, 1.0% si
Mem: 3144448k total, 2924444k used, 220004k free, 24000k buffers
Swap: 6291448k total, 283560k used, 6007888k free, 407832k cached
```

Stats per core?

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
14484	deploy	15	0	192m	140m	2900	R	18	4.6	0:23.07	ruby
19351	deploy	15	0	186m	134m	2856	S	17	4.4	0:09.29	ruby
20121	deploy	16	0	184m	132m	2844	R	16	4.3	0:05.91	ruby
6533	deploy	16	0	194m	141m	2992	R	16	4.6	0:18.17	ruby
20082	deploy	15	0	189m	136m	2936	S	15	4.4	0:12.53	ruby
14478	deploy	15	0	191m	139m	3496	S	15	4.5	0:25.36	ruby
14486	deploy	16	0	190m	138m	2960	R	13	4.5	0:20.90	ruby
20084	deploy	16	0	192m	140m	2932	R	11	4.6	0:19.71	ruby
20128	deploy	16	0	184m	132m	2884	R	8	4.3	0:07.49	ruby
19334	deploy	15	0	189m	137m	3472	S	8	4.5	0:22.10	ruby
19344	deploy	15	0	185m	133m	2872	S	6	4.3	0:08.24	ruby
20113	deploy	15	0	197m	144m	3492	S	5	4.7	0:20.42	ruby
20086	deploy	16	0	193m	140m	2948	R	4	4.6	0:12.43	ruby
14480	deploy	15	0	191m	139m	2928	S	3	4.5	0:15.85	ruby
3802	root	16	0	543m	507m	604	R	3	16.5	38:03.93	memcached
20063	deploy	15	0	187m	134m	2852	S	3	4.4	0:12.82	ruby
26341	daemon	15	0	29768	3712	2140	S	2	0.1	0:00.14	httpd
30512	root	15	0	56012	6756	1668	S	1	0.2	0:15.19	ApplicationPool
19340	deploy	15	0	195m	143m	2932	S	1	4.7	0:15.96	ruby
20130	deploy	16	0	193m	140m	2924	S	1	4.6	0:16.47	ruby
19346	deploy	15	0	187m	134m	2908	S	1	4.4	0:07.99	ruby
20061	deploy	15	0	189m	136m	2832	S	1	4.5	0:08.21	ruby
20047	deploy	15	0	186m	134m	2840	S	0	4.4	0:07.54	ruby
20118	deploy	16	0	187m	134m	2852	S	0	4.4	0:07.10	ruby
20124	deploy	16	0	196m	143m	2916	S	0	4.7	0:15.95	ruby

# CPU - New Generation

TOP with more info, abilities



# CPU + Disk

## IOSTAT - cpu & device utilization

```
deploy@www: /var/www/apps/buwebapp/current — ssh — 122x32
deploy@www: /var/www/apps/buwebapp/current$ iostat 4
Linux 2.6.16.29-xen (www)      06/06/11


avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           1.93    0.00   0.37   0.68   0.34   96.67

Device:            tps    Blk_read/s    Blk_wrtn/s    Blk_read    Blk_wrtn
sda1                3.12         5.85         55.60    14583414    138642728
sda2                0.03         0.36         0.36      895396     900144

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           18.17    0.00   1.13   0.00   19.95   60.75
Device:            tps    Blk_read/s    Blk_wrtn/s    Blk_read    Blk_wrtn
sda1                3.67         0.00         70.42         0         288
sda2                0.00         0.00         0.00         0          0

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           43.54    0.00   2.19   0.19   45.78   8.31
Device:            tps    Blk_read/s    Blk_wrtn/s    Blk_read    Blk_wrtn
sda1                0.00         0.00         0.00         0          0
sda2                0.00         0.00         0.00         0          0

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           23.96    0.00   2.49   0.13   31.55   41.87
Device:            tps    Blk_read/s    Blk_wrtn/s    Blk_read    Blk_wrtn
sda1                2.48         0.00         51.49         0         208
sda2                0.00         0.00         0.00         0          0
```



Test Started



# Home Movies!

```
deploy@www: /var/www/apps/buwebapp/current — ssh — 129x19
x deploy@ww...rrent — ssh x deploy@dev...rrent — ssh

1 [||||| 5.1% Tasks: 435 total, 1 running
2 [|| 0.8% Load average: 2.52 0.93 0.52
3 [||||| 6.9% Uptime: 28 days, 21:09:35
4 [|| 2.1%
Mem[||||| 2703/3070MB]
Swp[||| 276/6143MB]
Load average: 2.52 0.93 0.52
CPU[||| 3.9%

PID USER - - - PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
30438 deploy - - - 16 0 11388 1620 1008 R 2.7 0.0 0:02.83 htop
20086 deploy - - - 16 0 193M 140M 2952 S 2.0 1.3 0:14.25 Rails: /var/www/apps/buwebapp/current
20063 deploy - - - 16 0 187M 134M 2852 S 1.4 1.2 0:14.07 Rails: /var/www/apps/buwebapp/current
20082 deploy - - - 15 0 189M 136M 2936 S 1.4 1.3 0:14.08 Rails: /var/www/apps/buwebapp/current
26507 deploy - - - 16 0 192M 139M 2980 S 0.0 1.3 0:24.74 Rails: /var/www/apps/buwebapp/current
31230 daemon - - - 15 0 29924 3360 1732 S 0.0 0.0 0:00.03 /usr/local/apache2/bin/httpd -k start
20047 deploy - - - 16 0 186M 134M 2840 S 0.0 1.2 0:08.29 Rails: /var/www/apps/buwebapp/current
F1Help F2Setup F3Search F4Invert F5Tree F6SortBy F7Nice -F8Nice +F9Kill F10Quit

Request size [B]: 109.0

Reply rate [replies/s]: min 0.0 avg 7.8 max 18.0 stddev 6.6 (5 samples)
Reply time [ms]: response 14680.3 transfer 1089.1
Reply size [B]: header 553.0 content 63940.0 footer 0.0 (total 64493.0)
Reply status: 1xx=0 2xx=200 3xx=0 4xx=0 5xx=0

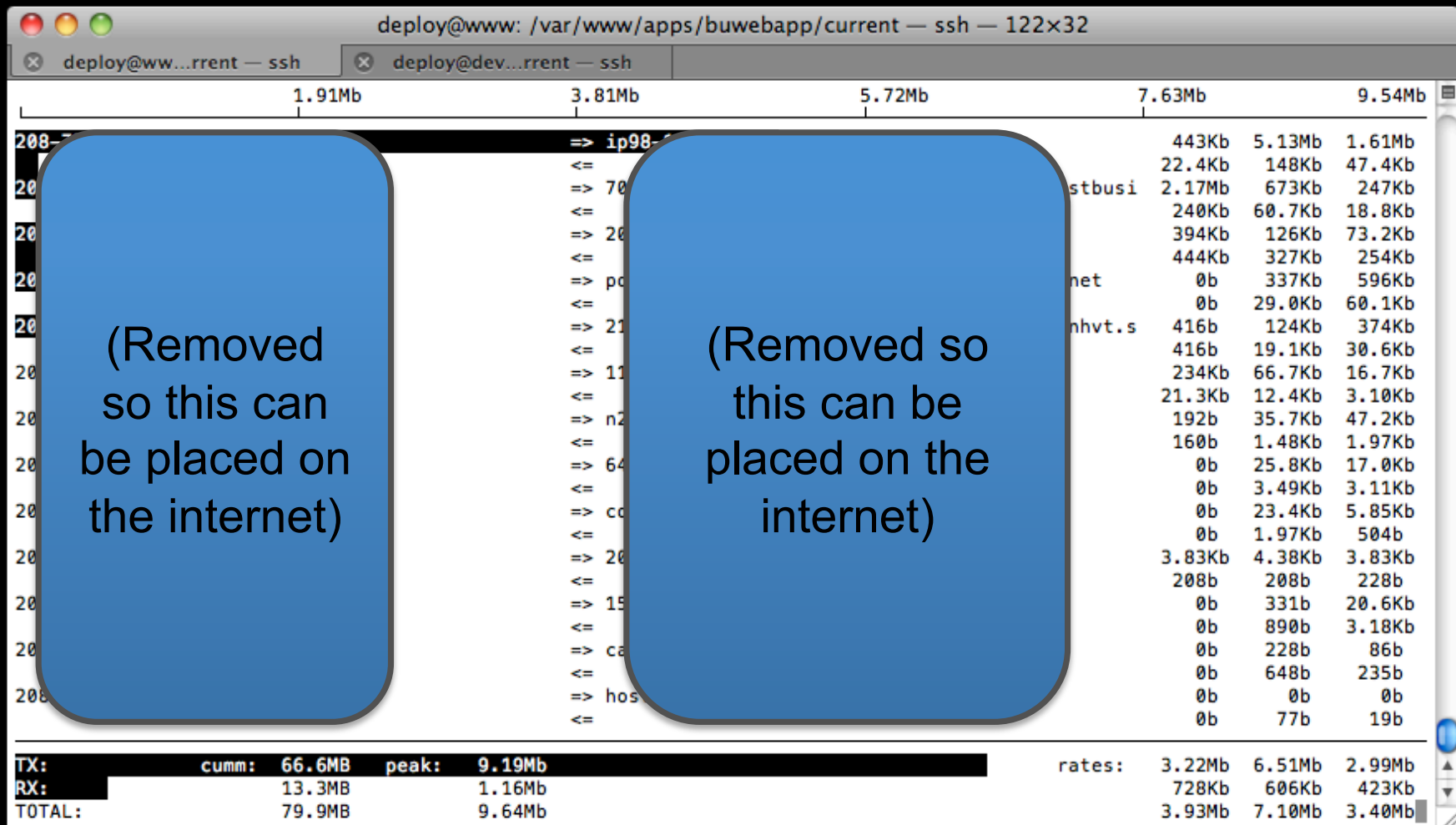
CPU time [s]: user 1.94 system 27.28 (user 6.5% system 91.4% total 97.9%)
Net I/O: 422.6 KB/s (3.5*10^6 bps)

Errors: total 0 client-timo 0 socket-timo 0 connrefused 0 connreset 0
Errors: fd-unavail 0 addrunavail 0 ftab-full 0 other 0
deploy@www: /var/www/apps/buwebapp/current$
```

# Network - Look Ma, Bandwidth!

IFTOP - TOP for interfaces

2s, 10s, 40s  
averages



# Home Movies!



# Memories...

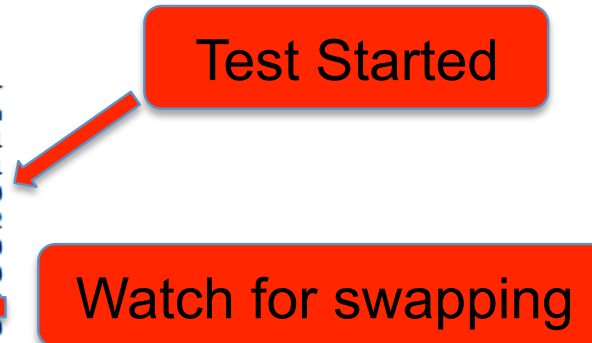
FREE - free & used memory

VMSTAT - processes, memory, paging, cpu

```
deploy@www: /var/www/apps/buwebapp/current — ssh — 122x32
x deploy@ww...rrent — ssh x deploy@dev...rrent — ssh
deploy@www: /var/www/apps/buwebapp/current$ free -s 2
              total        used        free      shared    buffers     cached
Mem:          3144448      3129672       14776           0        32972      727344
-/+ buffers/cache: 2369356      775092
Swap:         6291448      283560      6007888

              total        used        free      shared    buffers     cached
Mem:          3144448      3129748       14700           0        32972      727344
-/+ buffers/cache: 2369432      775016
Swap:         6291448      283560      6007888

deploy@www: /var/www/apps/buwebapp/current$ vmstat 2
procs-----memory-----swap-----io-----system-----cpu-----
r  b   swpd   free   buff  cache   si   so    bi   bo    in   cs  us  sy  id  wa
0  0   283560  16640  32972  727344    0    0     1    7    3    4   2   0  97   1
0  0   283560  17240  32972  727604    0    0     0    0   124  55   0   0  99   1
29 0   283560  16348  32972  727604    0    0     0    0  1063 1669 45   5  50   0
9  0   283560  11224  32972  727604    0    0     0   60  811 1847 64   6  28   2
15 0   283560   9540  32912  720124    0    0     0    0   956 2128 86   6   8   0
20 0   283560   9944  32908  718048    0    0     0   72  983 1680 86   2  12   0
1  0   283560  10772  32876  716520    0    0     0    0  1433 1377  6   2  91   0
2  0   283560  10616  32716  712780    0    0     0    0  1112 1236  5   1  90   4
1  0   283560   9664  32716  712780    0    0     0    0  1112 1236  5   1  90   4
```



# Passenger Status

Passenger-status - threads, status, memory

```
deploy@www: /var/www/apps/buwebapp/current — ssh — 122x32
x deploy@ww...rrent — ssh x deploy@dev...rrent — ssh

Thread 'Client 10':
  in 'void Client::threadMain(boost::weak_ptr<Client>)' (ApplicationPoolServerExecutable.cpp:406)

Thread 'Client 19':
  in 'void Client::threadMain(boost::weak_ptr<Client>)' (ApplicationPoolServerExecutable.cpp:406)

General information
max      = 30
count    = 30
active   = 2
inactive = 28
Waiting on global queue: 0

Domains
/var/www/apps/buwebapp/current:
PID: 19580 Sessions: 0 Processed: 196 Uptime: 28m 1s
PID: 20057 Sessions: 0 Processed: 332 Uptime: 27m 10s
PID: 20084 Sessions: 0 Processed: 181 Uptime: 27m 9s
PID: 20082 Sessions: 0 Processed: 123 Uptime: 27m 9s
PID: 20113 Sessions: 0 Processed: 213 Uptime: 27m 8s
PID: 14484 Sessions: 0 Processed: 417 Uptime: 1h 6m 54s
PID: 20121 Sessions: 0 Processed: 87 Uptime: 27m 8s
PID: 14486 Sessions: 0 Processed: 441 Uptime: 1h 6m 54s
PID: 19334 Sessions: 0 Processed: 418 Uptime: 32m 1s
PID: 20128 Sessions: 0 Processed: 117 Uptime: 27m 7s
PID: 19351 Sessions: 0 Processed: 145 Uptime: 31m 57s
PID: 14478 Sessions: 0 Processed: 471 Uptime: 1h 7m 2s
PID: 19344 Sessions: 0 Processed: 140 Uptime: 31m 59s
PID: 20086 Sessions: 0 Processed: 180 Uptime: 27m 9s
```

# Home Movies!

```
deploy@ww...rrent — ssh  deploy@dev...rrent — ssh
Thread 'Client 217':
  in 'void Client::threadMain(boost::weak_ptr<Client>)' (ApplicationPoolServerExecutable.cpp:406)

----- General information -----
max      = 30
count    = 29
active   = 1
inactive = 28
Waiting on global queue: 0

----- Domains -----
/var/www/apps/buwebapp/current:
PID: 31468  Sessions: 0    Processed: 55    Uptime: 3m 14s
PID: 20113  Sessions: 0    Processed: 394   Uptime: 1h 13m 42s
PID: 26473  Sessions: 0    Processed: 51    Uptime: 31m 25s
PID: 14486  Sessions: 0    Processed: 497   Uptime: 1h 53m 28s
PID: 20128  Sessions: 0    Processed: 172   Uptime: 1h 13m 41s
PID: 14478  Sessions: 0    Processed: 499   Uptime: 1h 53m 36s

Total: connections 200 requests 200 replies 200 test-duration 9.867 s

Connection rate: 20.3 conn/s (49.3 ms/conn, <=175 concurrent connections)
Connection time [ms]: min 46.3 avg 4627.5 max 8936.6 median 4680.5 stddev 2422.5
Connection time [ms]: connect 18.4
Connection length [replies/conn]: 1.000

Request rate: 20.3 req/s (49.3 ms/req)
Request size [B]: 109.0

Reply rate [replies/s]: min 17.2 avg 17.2 max 17.2 stddev 0.0 (1 samples)
Reply time [ms]: response 4284.9 transfer 324.1
Reply size [B]: header 63940.0 footer 0.0 (total 64493.0)
```



# Passenger Memory Stats

Passenger-memory-stats - check for memory leaks

```
deploy@www: /var/www/apps/buwebapp/current — ssh — 122x32
deploy@www: /var/www/apps/buwebapp/current$ passenger-memory-stats
Passenger memory stats for version 2.2.2
----- Apache processes -----
### Processes: 0
### Total private dirty RSS: 0.00 MB

----- Nginx processes -----
### Processes: 0
### Total private dirty RSS: 0.00 MB

----- Passenger processes -----


| PID   | Threads | VMSize   | Private  | Name                                                                                                                       |
|-------|---------|----------|----------|----------------------------------------------------------------------------------------------------------------------------|
| 30512 | 22      | 54.7 MB  | 5.0 MB   | /usr/local/ruby-enterprise-1.8.7-2010.02/lib/ruby/gems/1.8/gems/passenger-2.2.2/ext/ap                                     |
|       |         |          |          | ache2/ApplicationPoolServerExecutable 0 /usr/local/ruby-enterprise-1.8.7-2010.02/lib/ruby/gems/1.8/gems/passenger-2.2.2/bi |
|       |         |          |          | n/passenger-spawn-server /usr/local/ruby-enterprise-1.8.7-2010.02/bin/ruby /tmp/passenger.14582                            |
| 30513 | 1       | 50.7 MB  | 9.3 MB   | Passenger spawn server                                                                                                     |
| 6533  | 1       | 194.3 MB | 133.6 MB | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 14478 | 1       | 190.3 MB | 53.6 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 14480 | 1       | 191.3 MB | 54.2 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 14484 | 1       | 192.3 MB | 54.1 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 14486 | 1       | 190.3 MB | 52.4 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19334 | 1       | 189.3 MB | 52.7 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19338 | 1       | 188.3 MB | 47.0 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19340 | 1       | 195.3 MB | 59.2 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19344 | 1       | 185.2 MB | 42.1 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19346 | 1       | 187.3 MB | 45.7 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19348 | 1       | 198.3 MB | 59.7 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19351 | 1       | 186.2 MB | 44.6 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |
| 19580 | 1       | 191.3 MB | 51.4 MB  | Rails: /var/www/apps/buwebapp/current                                                                                      |


```

# Whats In Your Process?

LSOF - list of open "files" (actually resources)  
- see what the process is using

```
deploy@www: /var/www/apps/buwebapp/current — ssh — 122x32
x deploy@ww...rrent — ssh x deploy@dev...rrent — ssh
deploy@www:/var/www/apps/buwebapp/current$ sudo lsof -p 26507
lsof: WARNING: can't stat() tmpfs file system /dev/shm/var.run
Output information may be incomplete.
lsof: WARNING: can't stat() tmpfs file system /dev/shm/var.lock
Output information may be incomplete.
COMMAND  PID  USER  FD  TYPE  DEVICE  SIZE  NODE NAME
ruby     26507  deploy  cwd  DIR    8,1      4096  5570682 /va
ruby     26507  deploy  rtd  DIR    8,1      4096      2 /
ruby     26507  deploy  txt  REG    8,1  2837660 12503743 /us
ruby     26507  deploy  mem  REG    0,0          0 [he
ruby     26507  deploy  mem  REG    8,1    94448  7225582 /li
ruby     26507  deploy  mem  REG    8,1   758583 12503748 /us
lloc_minimal.so.0.0.0
ruby     26507  deploy  mem  REG    8,1    32520  7225629 /li
ruby     26507  deploy  mem  REG    8,1    10056  7225600 /li
ruby     26507  deploy  mem  REG    8,1    20376  7225597 /li
ruby     26507  deploy  mem  REG    8,1   546000  7225608 /li
ruby     26507  deploy  mem  REG    8,1  1267544  7225591 /li
ruby     26507  deploy  mem  REG    8,1   959808 11979587 /us
ruby     26507  deploy  mem  REG    8,1    54256  7225604 /li
ruby     26507  deploy  mem  REG    8,1    98224  7225626 /lib
ruby     26507  deploy  mem  REG    8,1    49939 12504288 /usr/
8/x86_64-linux/thread.so
```

(Removed so this can be placed on the internet)



# MySQL

- Use system tools to look at CPU & memory usage
- Turn on the slow-query log
  - Set `slow_query_log` & `slow_query_log_file` in `my.cnf`
  - Specify `long_query_time` minimum time threshold (default = 10s)

# Testing

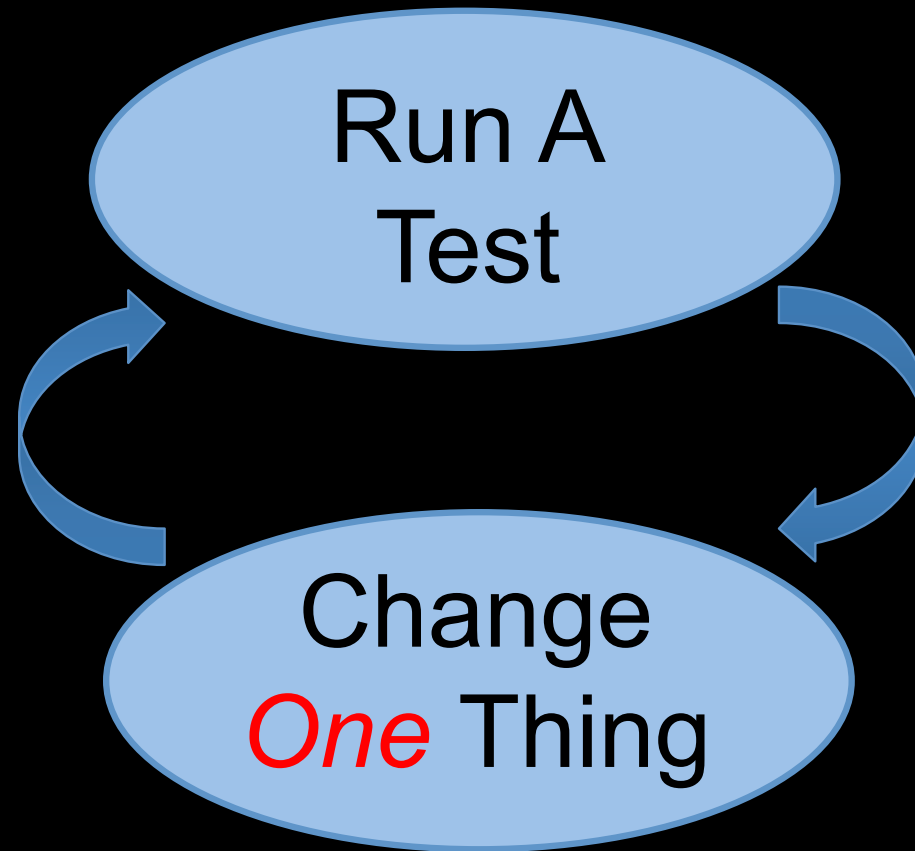
- Now that you have the tools, you need to use them correctly
- Goal is to methodically determine how your system behaves and how you can change this behavior (for good or evil)
- So how do we successfully test our system?

# Testing Is Complicated



Run A  
Test

# Testing *Isn't* Complicated



# Testing Isn't Complicated

- Be methodical & precise
- Change one thing at a time to verify cause & effect
- Make sure you can reproduce previous results (otherwise something else has changed!)
- Add focused methods to your app to isolate & test just one thing (e.g. rendering, db...)
- Bracket performance - min / max effect

# "The site seems slow."

## Before:

Boss: "The site seems slow today."

You: "We haven't made any changes.  
Maybe its your connection?"

Boss: "Google is fast, the site is slow.  
Fix it!"

You: # \$ @ # ( ) ! ~

# "The site seems slow."

## After:

Boss: "The site seems slow today."

You: "We haven't made any changes.  
The NewRelic APDEX score hasn't  
changed either."

Boss: "Ah, hmm, ok, maybe it is my DSL  
line. Dang AOL!"

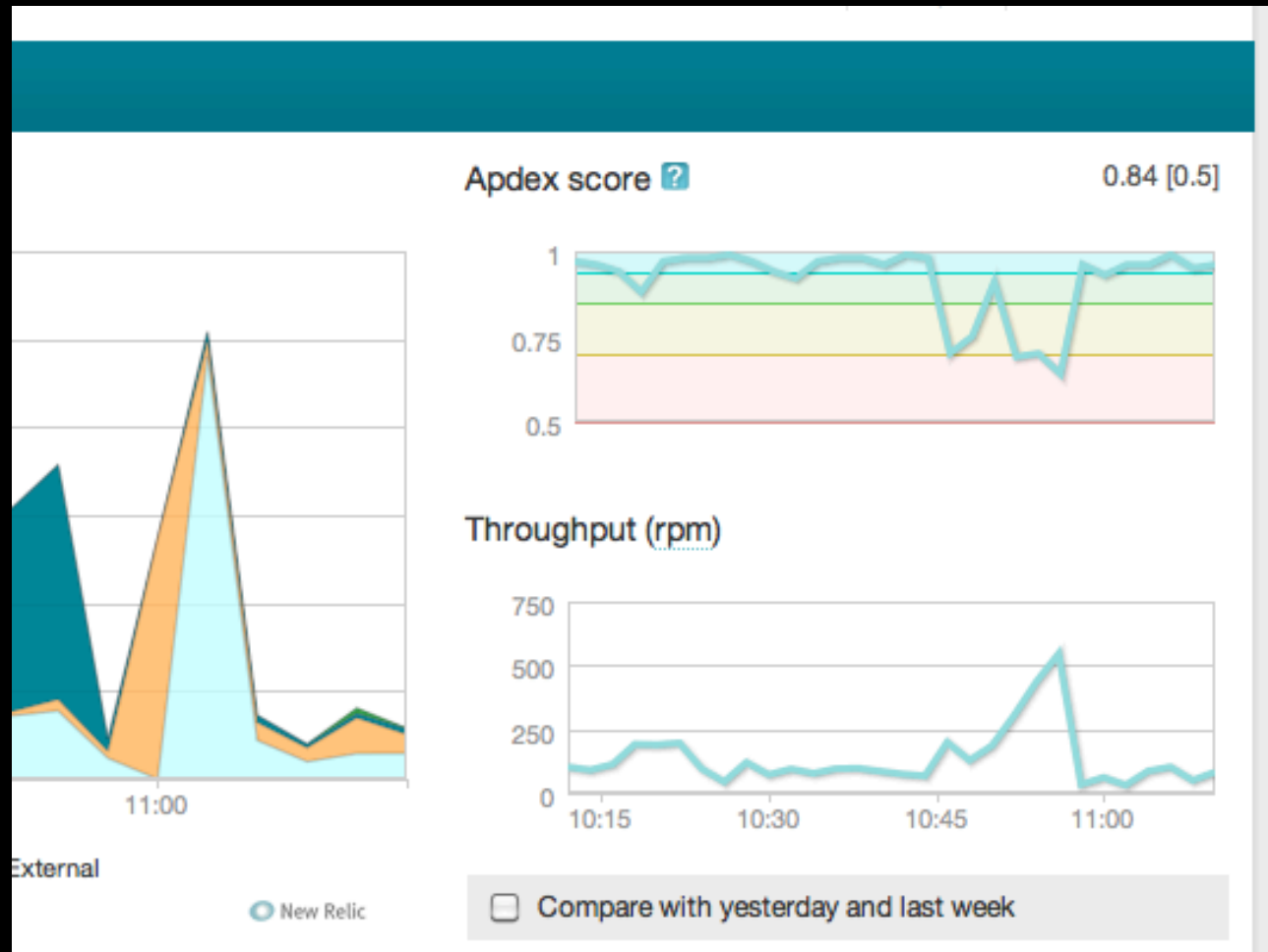
You: :-)

# APDEX = You.happy!

- APDEX is a 'user-experience metric', i.e. a way of measuring user satisfaction
- "This is the one-number metric that senior management can easily understand and use to manage IT across many applications." <http://apdex.org/index.php/about/apdex-faq/>
- Shows how all of your users are experiencing the site



# NewRelic To The Rescue



# Remember This Stuff

- Use NewRelic to find sad-paths
- Use these Linux tools to see why the paths are so sad
- Use focused tests to isolate & tune parts of the system
- Change one thing, retest, & make sure you can reproduce earlier results

# Why Was My App Slow?

Thanks to Dave Bock @codesherpas  
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Pete Campbell

pete@sumirolabs.com  
@sumirolabs  
github.com/campbell