

Caching in Drupal



APC and Memcached,

CacheRouter and Memcache API

Benchmarking tests for a heavy drupal 6 demo site

Characteristics:

- Linode VPS, 1GB RAM, single server setup
- Debian GNU/Linux 5.0 64-bit
- Kernel 2.6.35.4-x86_64-linode16, x86_64
- Apache 2.2.9
- PHP 5.2.6, running as FastCGI
- APC 3.0.19
- Memcached 1.2.2
- MySQL 5.0.51
- Drupal 6.20
- Authenticated User Page Caching (authcache) 1.0-rc2
- Cache Router (cachrouter) 1.0-rc1
- Cache Router Statistics (cachrouter_stats) 1.0-beta3
- Memcache API and Integration (memcache) 1.0-beta3
- JavaScript Aggregator (javascript_aggregator) 1.5
- CSS Gzip (css_gzip) 1.3
- heavy drupal site (182 modules, 95 projects)

Methodology:

- daemon restart between tests (apache2, mysql, memcached)
- page refresh ("Recent posts" page, tracker2), followed by multiple visits - average results taken
- login session in firefox, anonymous session in chrome
- login session not user 1, but full administrator nonetheless

Daemon settings:

- APC on (1x256MB, standby)
- Memcached on (128MB, standby)

Drupal settings:

- Block cache on
- Page compression on
- CSS and JavaScript aggregation on
- CSS compression on (CSS Gzip)
- JavaScript compression on and minify on (JavaScript Aggregator)
- Devel on (collect query, display timer, display memory)
- Tracker 2 on

/etc/php/conf.d/custom.ini:

```
[apc]
apc.enabled = 1
apc.shm_segments = 1
#apc.shm_size = 30
apc.shm_size = 256
apc.num_files_hint = 1000
apc.user_entries_hint = 4096
apc.ttl = 0
apc.user_ttl = 0
apc.gc_ttl = 3600
apc.cache_by_default = 1
apc.slam_defense = 0
apc.file_update_protection = 2
apc.enable_cli = 0
#apc.max_file_size = 500K
apc.max_file_size = 1M
apc.mmap_file_mask=""
apc.use_request_time = 1
apc.stat = 1
apc.write_lock = 1
apc.report_autofilter = 0
apc.include_once_override = 0
apc.filters=""
apc.rfc1867 = 1
apc.rfc1867_prefix = "upload_"
apc.rfc1867_name = "APC_UPLOAD_PROGRESS"
apc.rfc1867_freq = 0
apc.rfc1867_ttl = 3600
apc.localcache = 0
apc.localcache.size = 512
apc.coredump_unmap = 0
apc.stat_ctime = 0
apc.file_md5 = 0
apc.canonicalize = 1
apc.lazy_functions = 0
apc.lazy_classes = 0

[memcache]
session.save_handler="memcache"
session.save_path="tcp://127.0.0.1:11211?persistent=1&weight=1&timeout=1&retry_interval=15"
memcache.dbpath=""
memcache.protocol=ascii
memcache.default_port=11211
memcache.default_timeout_ms=1000
memcache.chunk_size=32768
memcache.hash_strategy="consistent"
memcache.hash_function="crc32"
memcache.redundancy=1
memcache.session_redundancy=2
memcache.allow_failover=0
memcache.max_failover_attempts=5
memcache.maxratio=0
memcache.maxreclevel=0
memcache.maxfiles=0
memcache.maxfilesize=0
memcache.archivememlim=0
```

/etc/memcached.conf:

```
# memcached default config file
# 2003 - Jay Bonci <jaybonci@debian.org>
# This configuration file is read by the start-memcached script provided as
# part of the Debian GNU/Linux distribution.

# Run memcached as a daemon. This command is implied, and is not needed for the
# daemon to run. See the README.Debian that comes with this package for more
# information.
-d

# Log memcached's output to /var/log/memcached
logfile /var/log/memcached.log

# Be verbose
# -v

# Be even more verbose (print client commands as well)
# -vv

# Start with a cap of 64 megs of memory. It's reasonable, and the daemon default
# Note that the daemon will grow to this size, but does not start out holding this much
# memory
#-m 64
-m 128

# Default connection port is 11211
-p 11211

# Run the daemon as root. The start-memcached will default to running as root if no
# -u command is present in this config file
-u nobody

# Specify which IP address to listen on. The default is to listen on all IP addresses
# This parameter is one of the only security measures that memcached has, so make sure
# it's listening on a firewalled interface.
#-l 127.0.0.1
-l 127.0.0.1 213.228.141.39 192.168.0.101
-l 127.0.0.1

# Limit the number of simultaneous incoming connections. The daemon default is 1024
# -c 1024

# Lock down all paged memory. Consult with the README and homepage before you do this
# -k

# Return error when memory is exhausted (rather than removing items)
# -M

# Maximize core file limit
# -r
```

Table with results:

Test method	Apache MB	SHR/APC in Apache MB	Memcache MB	MySQL MB	Login Apache ms	Login MySQL query	Login MySQL ms	Anon Apache ms	Anon MySQL query	Anon MySQL ms
APC + Memcache API + AuthCache	164	78	15	77	421.5	93	15.78	217.63	53	9.98
Memcache API + AuthCache	100	8.6	20	80	828.33	93	16.37	621.42	53	10.96
APC + CacheRouter (file+apc) + AuthCache	125	61	-	78	420.14	92	18.04	264.17	54	12.91
APC + CacheRouter (apc) + AuthCache	165	79	-	76	450.48	92	17.79	211.47	54	10.77
APC + CacheRouter (memcache) + AuthCache	166	78	22	76	1674.38	95	16.4	1225.27	54	10.48
APC + CacheRouter (file) + AuthCache	124	61	-	77	420.06	92	18	226.66	54	12.95
CacheRouter (apc) + AuthCache	96	10	-	76	845.46	92	18.35	543.44	54	9.51
CacheRouter (memcache) + AuthCache	99	8.4	21	76	1880.83	92	18.22	1438.02	54	10.38
CacheRouter (file) + AuthCache	72	8.3	-	77	843.55	92	17.41	630.09	54	10.7
CacheRouter (db) + AuthCache	76	8.3	-	79	900.79	114	39.37	578.12	74	27.4
Drupal cache	96	8.4	-	80	846.13	114	35.85	569.77	79	28.29

Conclusions:

- For maximum performance, APC should be turned on by default (global) for the virtual host.
- While not compared in these benchmarks, having AuthCache enabled makes a huge difference for authenticated users.
- Having file-based caching (CacheRouter, Boost+) can save a lot of memory, but its performance can be hampered by I/O.
- Memcache based caching (Memcache API) is also equally effective, spending about the same resources.
- Do not use Memcache with CacheRouter - the module performs very poorly with that caching backend.
- Avoid using APC turned on by default (global) in conjunction with APC enabled on Drupal (CacheRouter, APC).

The three best configurations for a single server are as follows:

- APC + CacheRouter (file+apc) + AuthCache: high performance; not scalable; lower memory consumption
- APC + CacheRouter (file) + AuthCache: high performance; not scalable; lower memory consumption; hampered in I/O
- APC + Memcache API + AuthCache: best performance, scalable; higher memory consumption

All information collected

APC on by default, Memcache API on, AuthCache on, Drupal cache on:

System Stats:

Mem: 1019180k total, 864564k used, 154616k free, 34412k buffers
Swap: 262140k total, 12844k used, 249296k free, 528036k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
5514	galaxy-n	20	0	552m	164m	78m	S	0	16.5	0:03.46	php5-cgi
5227	mysql	20	0	248m	77m	5448	S	0	7.8	0:03.84	mysqld
5287	nobody	20	0	31476	15m	712	S	0	1.5	0:00.03	memcached

Session - logged in, manager:

Page execution time was 421.5 ms. Executed 93 queries in 15.78 milliseconds.
Memory used at: devel_init()=**0.76** MB, devel_shutdown()=**20.53** MB.

Session - anonymous:

Page execution time was 217.63 ms. Executed 53 queries in 9.98 milliseconds.
Memory used at: devel_init()=**0.75** MB, devel_shutdown()=**11.87** MB.

APC off by default, Memcache API on, AuthCache on, Drupal cache on:

System Stats:

Mem: 1019180k total, 854840k used, 164340k free, 73244k buffers
Swap: 262140k total, 12844k used, 249296k free, 457740k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
5973	galaxy-n	20	0	557m	100m	8572	S	0 10.1	0:20.65		php5-cgi
5720	mysql	20	0	244m	80m	5708	S	0 8.1	0:06.38		mysqld
5779	nobody	20	0	36600	20m	712	S	0 2.0	0:00.06		memcached

Session - logged in, manager:

Page execution time was 828.33 ms. Executed 93 queries in 16.37 milliseconds.
Memory used at: devel_init()=**4.68** MB, devel_shutdown()=**73.8** MB.

Session - anonymous:

Page execution time was 621.42 ms. Executed 53 queries in 10.96 milliseconds.
Memory used at: devel_init()=**4.66** MB, devel_shutdown()=**63.92** MB.

APC on by default, CacheRouter on (file+apc), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 872392k used, 146788k free, 73004k buffers
Swap: 262140k total, 9632k used, 252508k free, 486928k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
19651	galaxy-n	20	0	529m	125m	61m	S	0 12.6	0:05.28		php5-cgi
19403	mysql	20	0	225m	78m	5552	S	0 7.9	0:04.07		mysqld

Session - logged in, manager:

Page execution time was 420.14 ms. Executed 92 queries in 18.04 milliseconds.
Memory used at: devel_init()=**0.73** MB, devel_shutdown()=**20.53** MB.

Session - anonymous:

Page execution time was 264.17 ms. Executed 54 queries in 12.91 milliseconds.
Memory used at: devel_init()=**0.72** MB, devel_shutdown()=**11.77** MB.

APC on by default, CacheRouter on (apc), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 852432k used, 166748k free, 73620k buffers
Swap: 262140k total, 9632k used, 252508k free, 479092k cached

```
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
20150 galaxy-n 20 0 551m 165m 79m S 0 16.6 0:02.91 php5-cgi
19902 mysql 20 0 264m 76m 5432 S 0 7.6 0:04.36 mysqld
```

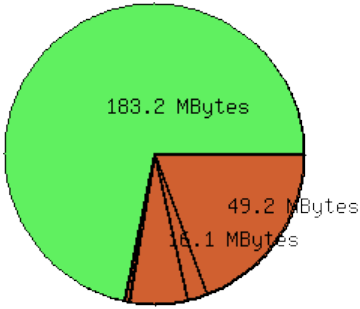
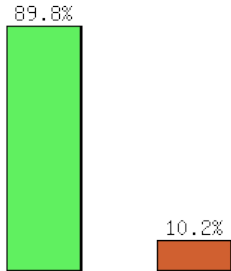
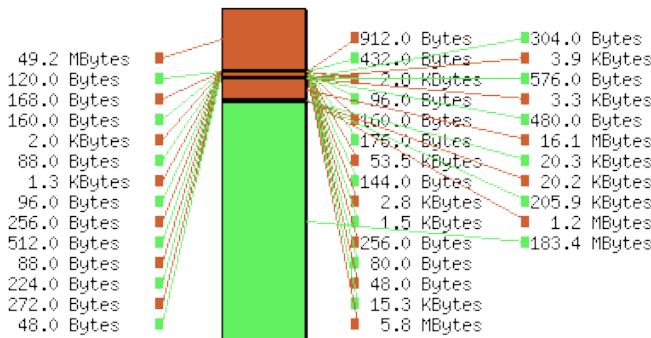
Session - logged in, manager:

Page execution time was 450.48 ms. Executed 92 queries in 17.79 milliseconds.
Memory used at: devel_init()=0.73 MB, devel_shutdown()=20.49 MB.

Session - anonymous:

Page execution time was 211.47 ms. Executed 54 queries in 10.77 milliseconds.
Memory used at: devel_init()=0.72 MB, devel_shutdown()=11.73 MB.

CacheRouter Stats:

	Cached Files: 684 (61.1 MBytes) Hits: 4709 Misses: 684
	Cached Variables: 34 (2.1 MBytes) Hits: 177 Misses: 0
	Fragmentation: 0.13% (246.6 KBytes)

APC on by default, CacheRouter on (memcache), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 999240k used, 19940k free, 70172k buffers
Swap: 262140k total, 10936k used, 251204k free, 541336k cached

```
PID USER   PR NI VIRT RES  SHR S %CPU %MEM  TIME+ COMMAND
27257 galaxy-n 20  0 554m 166m 78m S   0 16.8 0:35.85 php5-cgi
27009 mysql  20  0 264m 76m 5536 S   0 7.7 0:04.19 mysqld
27068 nobody 20  0 38528 22m 712 S   0 2.2 0:22.00 memcached
```

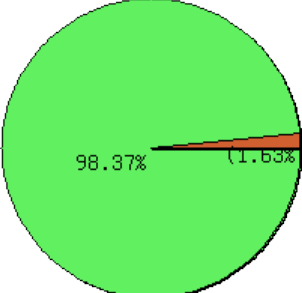
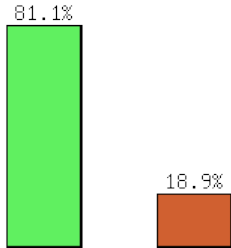
Session - logged in, manager:

Page execution time was 1674.38 ms. Executed 95 queries in 16.4 milliseconds.
Memory used at: devel_init()=0.77 MB, devel_shutdown()=21.96 MB.

Session - anonymous:

Page execution time was 1225.27 ms. Executed 54 queries in 10.48 milliseconds.
Memory used at: devel_init()=0.76 MB, devel_shutdown()=12.54 MB.

CacheRouter Stats:

	Used Cache Size: 2.1 MBytes Total Cache Size: 128.0 MBytes
	Current Items (total): 36 (237) Hits: 226 Misses: 55

APC on by default, CacheRouter on (file), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 811756k used, 207424k free, 74864k buffers
Swap: 262140k total, 9632k used, 252508k free, 460672k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
20646	galaxy-n	20	0	529m	124m	61m	S	0 12.5	0:11.74		php5-cgi
20398	mysql	20	0	224m	77m	5472	S	0 7.8	0:04.22		mysqld

Session - logged in, manager:

Page execution time was 420.06 ms. Executed 92 queries in 18 milliseconds.
Memory used at: devel_init()=**0.73** MB, devel_shutdown()=**20.52** MB.

Session - anonymous:

Page execution time was 226.66 ms. Executed 54 queries in 12.95 milliseconds.
Memory used at: devel_init()=**0.72** MB, devel_shutdown()=**11.75** MB.

APC off by default, CacheRouter on (apc), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 782616k used, 236564k free, 76500k buffers
Swap: 262140k total, 9624k used, 252516k free, 408248k cached

```
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
21640 galaxy-n 20 0 552m 96m 10m S 0 9.7 0:09.92 php5-cgi
21392 mysql 20 0 264m 76m 5476 S 0 7.6 0:03.88 mysqld
```

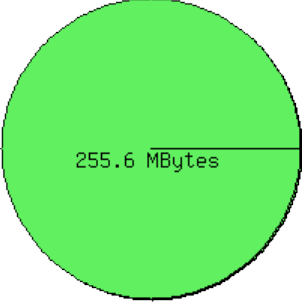
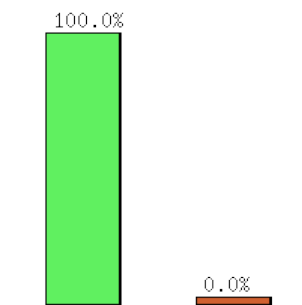
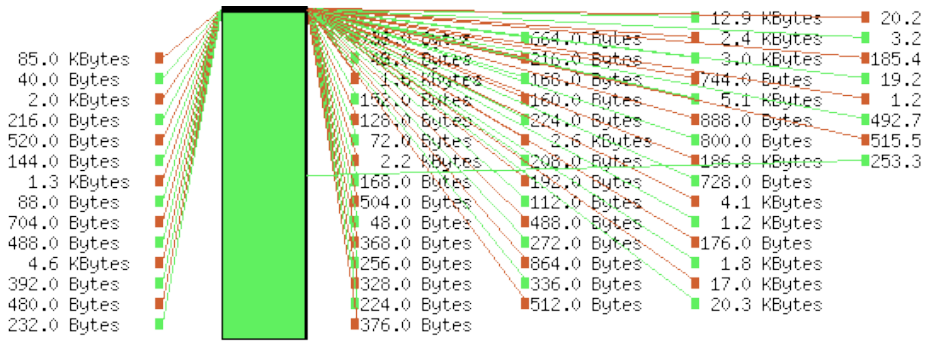
Session - logged in, manager:

Page execution time was 845.46 ms. Executed 92 queries in 18.35 milliseconds.
Memory used at: devel_init()=4.52 MB, devel_shutdown()=73.48 MB.

Session - anonymous:

Page execution time was 543.44 ms. Executed 54 queries in 9.51 milliseconds.
Memory used at: devel_init()=4.51 MB, devel_shutdown()=63.61 MB.

CacheRouter Stats:

	Cached Files: 0 (0.0 Bytes) Hits: 1 Misses: 0
	Cached Variables: 34 (2.1 MBytes) Hits: 158 Misses: 0
	Fragmentation: 0.12% (318.6 KBytes)

APC off by default, CacheRouter on (memcache), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 817072k used, 202108k free, 77144k buffers
Swap: 262140k total, 9624k used, 252516k free, 406108k cached

```
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
22124 galaxy-n 20 0 557m 99m 8376 S 0 10.0 0:20.83 php5-cgi
21870 mysql 20 0 264m 76m 5512 S 0 7.7 0:04.12 mysqld
21929 nobody 20 0 37440 21m 712 S 0 2.1 0:10.96 memcached
```

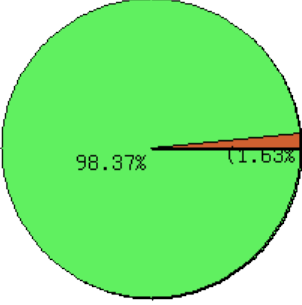
Session - logged in, manager:

Page execution time was 1880.83 ms. Executed 92 queries in 18.22 milliseconds.
Memory used at: devel_init()=4.58 MB, devel_shutdown()=74.98 MB.

Session - anonymous:

Page execution time was 1438.02 ms. Executed 54 queries in 10.38 milliseconds.
Memory used at: devel_init()=4.57 MB, devel_shutdown()=64.44 MB.

CacheRouter Stats:

	Used Cache Size: 2.1 MBytes Total Cache Size: 128.0 MBytes
	Current Items (total): 36 (204) Hits: 171 Misses: 46

APC off by default, CacheRouter on (file), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 760056k used, 259124k free, 75796k buffers
Swap: 262140k total, 9624k used, 252516k free, 405980k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
20893	mysql	20	0	239m	77m	5512	S	0 7.8	0:03.89		mysqld
21141	galaxy-n	20	0	530m	72m	8284	S	0 7.3	0:05.53		php5-cgi

Session - logged in, manager:

Page execution time was 843.55 ms. Executed 92 queries in 17.41 milliseconds.
Memory used at: devel_init()=4.57 MB, devel_shutdown()=73.55 MB.

Session - anonymous:

Page execution time was 630.09 ms. Executed 54 queries in 10.7 milliseconds.
Memory used at: devel_init()=4.56 MB, devel_shutdown()=63.68 MB.

APC off by default, CacheRouter on (db), AuthCache on, Drupal cache off:

System Stats:

Mem: 1019180k total, 777448k used, 241732k free, 78668k buffers
Swap: 262140k total, 9624k used, 252516k free, 406284k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
22859	mysql	20	0	201m	79m	5584	S	0	8.0	0:03.86	mysqld
23114	galaxy-n	20	0	533m	76m	8296	S	0	7.6	0:08.50	php5-cgi

Session - logged in, manager:

Page execution time was 900.79 ms. Executed 114 queries in 39.37 milliseconds.
Memory used at: devel_init()=4.51 MB, devel_shutdown()=74.05 MB.

Session - anonymous:

Page execution time was 578.12 ms. Executed 74 queries in 27.4 milliseconds.
Memory used at: devel_init()=4.49 MB, devel_shutdown()=64.18 MB.

APC off by default, all cache modules off, Drupal cache on:

System Stats:

Mem: 1019180k total, 798084k used, 221096k free, 80852k buffers
Swap: 262140k total, 9624k used, 252516k free, 411832k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
24165	galaxy-n	20	0	554m	96m	8360	S	0 9.7	0:11.46		php5-cgi
23914	mysql	20	0	259m	80m	5608	S	0 8.1	0:04.23		mysqld

Session - logged in, manager:

Page execution time was 846.13 ms. Executed 114 queries in 35.85 milliseconds.
Memory used at: devel_init()=4.03 MB, devel_shutdown()=73.14 MB.

Session - anonymous:

Page execution time was 569.77 ms. Executed 79 queries in 28.29 milliseconds.
Memory used at: devel_init()=4.05 MB, devel_shutdown()=63.49 MB.