

## Legend

### Environment

Computer VM on XEON E5-2430 2.2GHz; assigned 2 cores, 4GB RAM  
OS Windows Server 2012, x64  
Storage iSCSI SAN, using spinning SCSI discs

### Tests

log \$repo/ -v --limit 50000  
export \$ruby/trunk -q or \$bsd/head -q (target is same volume on SAN)  
null-log \$repo/ -v --limit 50000 -q  
null-export \$ruby/trunk -q or \$bsd/head -q  
dump \$repo -q

SVN client and server were run as 32 bit applications.

Uses standard SVN CL client, serf 1.3.6 and server [/trunk@1607811](#), release build.

Client and server run on the same machine.

Stdout redirected to NUL by TimeWin.EXE.

Machine otherwise idle.

### Extra options used in the different configurations

slow	Apache	(all default)
	svnserve	(all default)
	file:	(all default)
	dump	(all default)
medium	Apache	SVNInMemoryCacheSize=256
	svnserve	-M 256
	file:	memory-cache-size=256 (in config file)
	dump	-M 256
fast	Apache	SVNInMemoryCacheSize=1024
		SVNCacheRevProps=on
		SVNBlockRead=on
		SVNCompressionLevel=0
	svnserve	-M 1024 -c 0 --cache-revprops yes --client-speed 1000 --block-read yes
	file:	memory-cache-size=1024 (in config file)
	dump	-M 1024

### Repositories

ruby r46054 <http://svn.ruby-lang.org/repos/ruby/>  
bsd r263988 <http://svn0.eu.FreeBSD.org/base>  
3 interleaved copies created with 'copy\_repo.py \$src \$dst 3 128' (51GB repo data)

### Methodology

<https://wiki.apache.org/subversion/MeasuringRepositoryPerformance>

Repeat tests 3x (once per repo copy)

OS disk caches were cleared before each individual "cold" test.

Servers got restarted before each individual test except for "hot SVN".

"Hot" tests ran immediately after the respective "cold" run (preserving disk and / or server caches)

Cache heatup: Repeat OS cache reads and SVN cache reads twice (5 runs total)

## Legend

### Results

Uses the median values from the 3 repetitions

Runtime	lifetime of the respective client process, given in seconds	
	<i>outlier</i>	
	>10%	Variation between median and MIN or MAX
	>20%	Variation between median and MIN or MAX
F7 ./ F6	$(\text{runtime format 6 repo}) / (\text{runtime format 7 repo}) - 1$	
	> 100%	unchanged
	(twice as fast)	< -50%
		(half as fast)
Pack/nopack	$(\text{runtime non-packed repo}) / (\text{runtime packed repo}) - 1$	
	> 100%	unchanged
	(twice as fast)	< -50%
		(half as fast)
CPU	$\text{Median}(\text{user} + \text{kernel time}) / \text{Median}(\text{runtime})$	(may exceed 100%)
	0%	100%

Log -v

Elapsed Time		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack-f6	422.1	413.6	408.7	13.4	13.5	13.8	13.4	7.6	5.0
	ruby-nopack-f7	366.7	354.0	352.8	11.7	11.4	23.5	11.6	7.3	4.9
	ruby-pack-f6	103.9	86.0	79.0	18.5	18.4	11.0	19.1	13.3	5.0
	ruby-pack-f7	33.8	30.3	12.7	16.5	16.5	5.9	16.4	13.0	4.8
	bsd-nopack-f6	650.4	444.5	450.7	26.6	26.7	28.6	26.8	25.1	16.7
	bsd-nopack-f7	434.8	413.6	390.2	24.2	24.2	41.7	24.2	24.1	17.0
	bsd-pack-f6	175.3	172.0	164.3	31.5	31.5	23.9	31.7	31.3	16.8
	bsd-pack-f7	94.7	91.3	41.8	28.6	29.0	20.0	28.7	28.9	16.7
svn:	ruby-nopack-f6	415.7	413.5	414.0	9.6	9.5	10.2	9.5	4.2	3.1
	ruby-nopack-f7	357.9	357.5	352.8	7.9	7.8	19.3	7.8	4.0	3.0
	ruby-pack-f6	103.3	87.6	77.3	14.9	15.0	7.2	14.8	10.1	3.1
	ruby-pack-f7	27.7	26.6	9.7	13.1	13.2	3.5	13.0	10.0	3.0
	bsd-nopack-f6	527.7	432.2	423.0	13.6	13.8	14.1	13.6	13.9	11.7
	bsd-nopack-f7	467.5	400.8	365.7	12.6	12.7	28.6	12.6	12.8	11.9
	bsd-pack-f6	169.1	160.6	154.0	17.7	18.4	12.3	17.7	17.9	11.6
	bsd-pack-f7	77.0	77.9	27.2	15.9	16.0	12.3	15.8	16.0	11.6
file:	ruby-nopack-f6	419.8	435.6	422.5	11.8	11.8	12.0	11.8	11.6	11.9
	ruby-nopack-f7	350.1	381.6	356.6	10.0	9.9	10.0	9.9	9.9	10.0
	ruby-pack-f6	90.5	96.4	97.3	17.3	17.4	17.7	17.4	17.6	17.6
	ruby-pack-f7	30.3	31.5	30.9	15.4	15.2	15.5	15.4	15.4	15.6
	bsd-nopack-f6	437.5	500.8	506.8	21.8	22.0	22.8	21.9	21.9	22.4
	bsd-nopack-f7	407.1	468.7	524.2	20.1	20.2	20.3	20.2	20.2	20.3
	bsd-pack-f6	170.3	186.7	176.1	27.3	26.9	27.3	27.2	27.0	27.2
	bsd-pack-f7	87.5	92.1	92.6	25.2	25.1	25.0	25.1	24.9	24.9

F6 ./. F7		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack	15%	17%	16%	14%	18%	-41%	15%	4%	1%
	ruby-pack	207%	184%	524%	12%	12%	86%	16%	2%	4%
	bsd-nopack	50%	7%	16%	10%	10%	-31%	11%	4%	-2%
	bsd-pack	85%	88%	293%	10%	9%	20%	10%	8%	0%
svn:	ruby-nopack	16%	16%	17%	22%	22%	-47%	21%	3%	4%
	ruby-pack	273%	229%	695%	14%	14%	106%	13%	2%	3%
	bsd-nopack	13%	8%	16%	8%	8%	-51%	8%	9%	-2%
	bsd-pack	119%	106%	466%	11%	15%	0%	12%	12%	0%
file:	ruby-nopack	20%	14%	18%	18%	19%	20%	19%	17%	20%
	ruby-pack	199%	206%	215%	12%	14%	14%	13%	14%	13%
	bsd-nopack	7%	7%	-3%	8%	9%	12%	9%	8%	10%
	bsd-pack	95%	103%	90%	8%	7%	9%	8%	8%	9%

Nopack ./. Pack		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-f6	306%	381%	417%	-28%	-27%	26%	-30%	-43%	-1%
	ruby-f7	985%	1068%	2686%	-29%	-31%	298%	-29%	-44%	2%
	bsd-f6	271%	158%	174%	-16%	-15%	20%	-15%	-20%	0%
	bsd-f7	359%	353%	833%	-15%	-16%	109%	-16%	-17%	2%
svn:	ruby-f6	302%	372%	436%	-35%	-37%	42%	-36%	-59%	1%
	ruby-f7	1191%	1243%	3530%	-40%	-41%	456%	-40%	-60%	-1%
	bsd-f6	212%	169%	175%	-23%	-25%	15%	-23%	-22%	0%
	bsd-f7	507%	415%	1245%	-21%	-20%	133%	-21%	-20%	2%
file:	ruby-f6	364%	352%	334%	-32%	-32%	-33%	-32%	-34%	-32%
	ruby-f7	1057%	1113%	1055%	-35%	-35%	-36%	-35%	-36%	-36%
	bsd-f6	157%	168%	188%	-20%	-18%	-16%	-19%	-19%	-18%
	bsd-f7	365%	409%	466%	-20%	-19%	-19%	-20%	-19%	-19%

Log -v

RA ./ ra_serf		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
svn:	ruby-nopack-f6	2%	0%	-1%	39%	41%	36%	42%	82%	59%
	ruby-nopack-f7	2%	-1%	0%	49%	46%	21%	48%	81%	63%
	ruby-pack-f6	1%	-2%	2%	25%	23%	53%	29%	31%	61%
	ruby-pack-f7	22%	14%	30%	26%	25%	70%	26%	30%	59%
	bsd-nopack-f6	23%	3%	7%	96%	94%	103%	97%	81%	44%
	bsd-nopack-f7	-7%	3%	7%	92%	90%	46%	92%	89%	44%
	bsd-pack-f6	4%	7%	7%	78%	71%	95%	79%	75%	45%
	bsd-pack-f7	23%	17%	54%	80%	81%	62%	81%	81%	44%
file:	ruby-nopack-f6	1%	-5%	-3%	13%	14%	16%	13%	-35%	-58%
	ruby-nopack-f7	5%	-7%	-1%	17%	15%	136%	17%	-27%	-51%
	ruby-pack-f6	15%	-11%	-19%	8%	6%	-38%	10%	-25%	-71%
	ruby-pack-f7	12%	-4%	-59%	7%	8%	-62%	7%	-16%	-69%
	bsd-nopack-f6	49%	-11%	-11%	22%	21%	25%	22%	15%	-25%
	bsd-nopack-f7	7%	-12%	-26%	20%	20%	105%	20%	19%	-16%
	bsd-pack-f6	3%	-8%	-7%	15%	17%	-12%	17%	16%	-38%
	bsd-pack-f7	8%	-1%	-55%	13%	16%	-20%	14%	16%	-33%

Client CPU		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack-f6	1%	1%	1%	34%	32%	31%	32%	56%	84%
	ruby-nopack-f7	1%	1%	1%	37%	39%	18%	38%	59%	86%
	ruby-pack-f6	5%	5%	6%	23%	24%	39%	21%	34%	84%
	ruby-pack-f7	13%	13%	33%	27%	27%	72%	27%	33%	87%
	bsd-nopack-f6	3%	4%	4%	62%	62%	58%	62%	65%	99%
	bsd-nopack-f7	4%	4%	4%	68%	68%	40%	68%	68%	98%
	bsd-pack-f6	9%	10%	10%	53%	53%	69%	52%	51%	100%
	bsd-pack-f7	17%	18%	39%	57%	56%	82%	58%	57%	100%
svn:	ruby-nopack-f6	1%	1%	1%	31%	33%	29%	32%	71%	96%
	ruby-nopack-f7	1%	1%	1%	39%	39%	15%	39%	76%	100%
	ruby-pack-f6	3%	3%	4%	21%	21%	41%	21%	30%	97%
	ruby-pack-f7	11%	11%	30%	24%	24%	86%	23%	29%	99%
	bsd-nopack-f6	2%	3%	3%	86%	85%	82%	86%	85%	100%
	bsd-nopack-f7	3%	3%	3%	93%	92%	40%	93%	92%	100%
	bsd-pack-f6	7%	7%	8%	66%	62%	95%	65%	64%	100%
	bsd-pack-f7	15%	15%	43%	73%	73%	96%	73%	72%	100%
file:	ruby-nopack-f6	5%	5%	5%	96%	96%	97%	96%	97%	96%
	ruby-nopack-f7	5%	4%	5%	95%	95%	96%	95%	95%	96%
	ruby-pack-f6	21%	20%	21%	100%	100%	100%	100%	100%	100%
	ruby-pack-f7	52%	50%	51%	100%	100%	100%	100%	100%	100%
	bsd-nopack-f6	7%	7%	6%	98%	98%	98%	98%	98%	98%
	bsd-nopack-f7	7%	6%	6%	98%	98%	98%	98%	98%	97%
	bsd-pack-f6	18%	16%	18%	100%	100%	100%	100%	100%	100%
	bsd-pack-f7	31%	30%	29%	100%	100%	100%	100%	100%	100%

Quality of the measured data

- Median data is pretty consistent with a single outlier
- Variation between test runs exceeds 20% on for actual disk I/O
- The noise on CPU load is about 5%  
(“Hot SVN” in “fast” config should not depend on format nor packing unless with file:)

Impact of the repository format

- Cold disks: Packed f7 is 2x .. 3x as fast with defaults; >5x with advanced settings
- Cached: block-read brings unnecessary CPU overhead for non-packed repos (prefetched data never used)
- F6 seems to have a 10..20% disadvantage  
(probably due to reading the revision trailer to find the change lists offset)

### **Impact of packing**

- Cold disks: Packed repositories are massively faster (>10x for f7)
- Cached: 20 .. 50% revprop parsing overhead can be eliminated by revprop caching

### **Impact on RA layer**

- When the protocol overhead is high (client CPU high), ra\_svn is 50...100% faster than ra\_serf
- file: is slower only against hot SVN caches and advanced options (neither available to it)

### **Impact of caching and advanced settings**

- SVN cache size has little impact when reading from disk or OS caches
- Revprop caching eliminates packing overhead and gives 50% speed up with hot SVN caches
- Block-read is complete overhead for non-packed revs but gives >2x extra boost when SVN cache is cold
- Cached "fast" configuration gets CPU bound by the client side



Null-log -v

RA ./ ra_serf		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
svn:	ruby-nopack-f6	-20%	24%	1%	39%	39%	33%	36%	97%	289%
	ruby-nopack-f7	-16%	16%	-1%	40%	48%	17%	30%	104%	339%
	ruby-pack-f6	-7%	-38%	1%	21%	20%	48%	21%	31%	258%
	ruby-pack-f7	-11%	-8%	23%	23%	24%	107%	23%	29%	351%
	bsd-nopack-f6	-10%	-14%	4%	105%	101%	96%	109%	81%	698%
	bsd-nopack-f7	-10%	-22%	6%	113%	117%	47%	108%	115%	453%
	bsd-pack-f6	-14%	-42%	5%	75%	72%	129%	76%	71%	691%
	bsd-pack-f7	2%	-8%	52%	81%	79%	158%	84%	78%	670%
file:	ruby-nopack-f6	1%	30%	0%	42%	40%	50%	44%	-25%	-57%
	ruby-nopack-f7	-2%	16%	1%	52%	59%	191%	53%	-2%	-55%
	ruby-pack-f6	-1%	7%	-10%	25%	25%	-35%	24%	-12%	-75%
	ruby-pack-f7	13%	8%	-59%	27%	28%	-59%	26%	-1%	-73%
	bsd-nopack-f6	5%	21%	5%	122%	122%	125%	129%	108%	21%
	bsd-nopack-f7	5%	8%	-4%	141%	143%	316%	139%	142%	52%
	bsd-pack-f6	9%	8%	1%	86%	85%	42%	86%	82%	-13%
	bsd-pack-f7	23%	22%	-48%	94%	94%	34%	94%	93%	-7%

Client CPU		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack-f6	0%	0%	0%	12%	13%	12%	13%	23%	41%
	ruby-nopack-f7	0%	0%	0%	14%	13%	7%	13%	22%	39%
	ruby-pack-f6	2%	2%	2%	8%	9%	15%	9%	12%	40%
	ruby-pack-f7	5%	5%	13%	10%	8%	30%	10%	13%	42%
	bsd-nopack-f6	1%	1%	1%	24%	25%	24%	24%	25%	43%
	bsd-nopack-f7	2%	1%	2%	28%	26%	16%	27%	28%	42%
	bsd-pack-f6	4%	4%	4%	21%	21%	28%	21%	21%	43%
	bsd-pack-f7	7%	7%	16%	22%	22%	33%	23%	22%	47%
svn:	ruby-nopack-f6	0%	0%	0%	3%	4%	3%	4%	11%	35%
	ruby-nopack-f7	0%	0%	0%	5%	5%	2%	4%	11%	51%
	ruby-pack-f6	0%	0%	0%	3%	3%	5%	3%	4%	37%
	ruby-pack-f7	1%	1%	4%	3%	3%	13%	3%	4%	47%
	bsd-nopack-f6	0%	0%	0%	13%	12%	11%	12%	11%	83%
	bsd-nopack-f7	0%	0%	0%	14%	16%	6%	14%	15%	57%
	bsd-pack-f6	1%	1%	1%	9%	8%	14%	8%	9%	82%
	bsd-pack-f7	2%	1%	6%	11%	9%	18%	9%	11%	94%
file:	ruby-nopack-f6	4%	4%	4%	95%	94%	95%	94%	95%	95%
	ruby-nopack-f7	4%	4%	4%	92%	93%	93%	93%	92%	94%
	ruby-pack-f6	18%	18%	19%	100%	100%	100%	100%	100%	100%
	ruby-pack-f7	47%	47%	46%	100%	100%	100%	100%	100%	100%
	bsd-nopack-f6	5%	5%	5%	95%	96%	96%	95%	96%	96%
	bsd-nopack-f7	5%	5%	5%	94%	95%	95%	94%	95%	95%
	bsd-pack-f6	13%	13%	13%	100%	100%	100%	100%	100%	100%
	bsd-pack-f7	23%	22%	22%	100%	100%	100%	100%	100%	100%

**Quality of the measured data**

- For cached scenarios, median data is pretty consistent with a single outlier
- Variation exceeded 20% for longer periods when requiring disk I/O.  
Due to temporal and physical interleave, relative performance did fluctuate much less (see outliers)
- The noise on CPU load is about +/-10%  
(“Hot SVN” in “fast” config should not depend on format nor packing unless with file:)

**Impact of the repository format**

- Cold disks: Packed f7 is 2x .. 3x as fast with defaults; >5x with advanced settings
- Cached: block-read brings unnecessary CPU overhead for non-packed repos (prefetched data never used)
- F6 seems to have a 10..20% disadvantage  
(probably due to reading the revision trailer to find the change lists offset)

### **Impact of packing**

- Cold disks: Packed repositories are massively faster (>10x for f7)
- Cached: 20 .. 100% revprop parsing overhead can be eliminated by revprop caching

### **Impact on RA layer**

- ra\_svn has up to 8x the peak throughput of ra\_serf when fed from SVN caches
- file: ra\_serf has significant protocol overhead unless fed from hot SVN caches with advanced options

### **Impact of caching and advanced settings**

- SVN cache size has little impact when reading from disk or OS caches
- Revprop caching eliminates packing overhead and gives 2x..4x speed up with hot SVN caches
- Block-read is complete overhead for non-packed revs but gives >2x extra boost when SVN cache is cold



Export trunk

Elapsed Time		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack-f6	141.2	149.3	186.7	8.4	6.8	32.5	18.3	8.1	29.4
	ruby-nopack-f7	139.1	143.7	165.8	9.0	7.4	26.3	10.6	7.0	37.0
	ruby-pack-f6	30.5	34.1	79.5	8.3	7.3	40.2	8.2	6.3	37.3
	ruby-pack-f7	21.6	21.2	25.3	10.5	6.9	26.4	10.3	8.1	37.1
	bsd-nopack-f6	1214.6	1323.9	1463.5	312.3	122.7	714.5	278.3	117.3	740.7
	bsd-nopack-f7	1303.4	1272.8	1502.1	246.3	121.3	494.1	302.8	136.9	594.3
	bsd-pack-f6	467.5	520.7	736.8	242.6	119.3	205.8	272.0	111.6	172.8
	bsd-pack-f7	322.7	369.4	409.9	215.5	132.7	272.8	324.1	132.2	275.1
svn:	ruby-nopack-f6	113.1	105.5	109.4	7.3	6.4	6.8	6.3	7.2	6.5
	ruby-nopack-f7	114.7	108.8	86.5	6.2	7.3	6.6	7.0	8.0	7.0
	ruby-pack-f6	37.4	34.8	35.0	7.7	6.1	6.3	6.7	6.9	6.9
	ruby-pack-f7	23.1	23.7	19.4	6.9	6.5	6.4	7.4	7.1	8.4
	bsd-nopack-f6	807.0	749.8	755.9	109.5	106.1	102.5	110.5	105.9	105.1
	bsd-nopack-f7	838.5	770.7	620.1	112.2	108.6	120.9	112.0	110.3	112.1
	bsd-pack-f6	439.9	435.0	418.4	126.9	106.0	99.2	136.5	102.9	103.6
	bsd-pack-f7	391.0	325.5	215.5	139.2	103.5	97.6	116.8	104.3	109.3
file:	ruby-nopack-f6	109.5	129.0	113.6	8.0	8.1	8.4	8.3	11.1	8.3
	ruby-nopack-f7	113.1	132.0	122.2	8.8	9.5	10.9	8.5	9.8	9.4
	ruby-pack-f6	43.2	50.0	44.0	8.6	9.1	9.4	8.2	9.3	10.3
	ruby-pack-f7	30.2	32.5	35.1	8.8	10.2	8.4	9.0	9.4	8.6
	bsd-nopack-f6	866.1	1087.9	876.7	119.0	162.8	122.4	120.5	129.7	139.8
	bsd-nopack-f7	838.0	976.4	868.0	139.0	131.8	136.5	129.0	154.6	124.7
	bsd-pack-f6	490.6	528.3	489.0	122.0	133.0	122.9	122.3	125.8	124.4
	bsd-pack-f7	364.8	395.2	377.9	120.8	167.6	121.8	122.9	165.2	118.9

F6 .I. F7		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack	2%	4%	13%	-7%	-7%	24%	72%	16%	-20%
	ruby-pack	41%	60%	215%	-20%	6%	52%	-20%	-22%	1%
	bsd-nopack	-7%	4%	-3%	27%	1%	45%	-8%	-14%	25%
	bsd-pack	45%	41%	80%	13%	-10%	-25%	-16%	-16%	-37%
svn:	ruby-nopack	-1%	-3%	27%	18%	-13%	2%	-9%	-10%	-7%
	ruby-pack	62%	47%	80%	13%	-6%	-1%	-9%	-3%	-18%
	bsd-nopack	-4%	-3%	22%	-2%	-2%	-15%	-1%	-4%	-6%
	bsd-pack	13%	34%	94%	-9%	2%	2%	17%	-1%	-5%
file:	ruby-nopack	-3%	-2%	-7%	-9%	-15%	-23%	-3%	13%	-12%
	ruby-pack	43%	54%	25%	-2%	-11%	11%	-9%	-1%	20%
	bsd-nopack	3%	11%	1%	-14%	23%	-10%	-7%	-16%	12%
	bsd-pack	34%	34%	29%	1%	-21%	1%	-1%	-24%	5%

Nopack .I. Pack		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-f6	364%	338%	135%	1%	-7%	-19%	122%	29%	-21%
	ruby-f7	545%	577%	556%	-14%	7%	-1%	3%	-13%	0%
	bsd-f6	160%	154%	99%	29%	3%	247%	2%	5%	329%
	bsd-f7	304%	245%	266%	14%	-9%	81%	-7%	4%	116%
svn:	ruby-f6	202%	203%	213%	-5%	5%	7%	-6%	4%	-5%
	ruby-f7	396%	358%	345%	-10%	14%	4%	-6%	13%	-16%
	bsd-f6	83%	72%	81%	-14%	0%	3%	-19%	3%	1%
	bsd-f7	114%	137%	188%	-19%	5%	24%	-4%	6%	3%
file:	ruby-f6	153%	158%	158%	-7%	-11%	-10%	1%	19%	-20%
	ruby-f7	274%	306%	248%	1%	-6%	30%	-6%	4%	9%
	bsd-f6	77%	106%	79%	-3%	22%	0%	-1%	3%	12%
	bsd-f7	130%	147%	130%	15%	-21%	12%	5%	-6%	5%

Export trunk

RA ./ ra_serf		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
svn:	ruby-nopack-f6	25%	42%	71%	15%	7%	381%	189%	13%	350%
	ruby-nopack-f7	21%	32%	92%	45%	0%	298%	53%	-13%	426%
	ruby-pack-f6	-19%	-2%	127%	8%	20%	538%	23%	-9%	442%
	ruby-pack-f7	-7%	-11%	30%	52%	7%	315%	39%	14%	342%
	bsd-nopack-f6	51%	77%	94%	185%	16%	597%	152%	11%	605%
	bsd-nopack-f7	55%	65%	142%	120%	12%	308%	170%	24%	430%
	bsd-pack-f6	6%	20%	76%	91%	13%	108%	99%	8%	67%
	bsd-pack-f7	-17%	13%	90%	55%	28%	180%	177%	27%	152%
file:	ruby-nopack-f6	29%	16%	64%	5%	-16%	286%	120%	-27%	257%
	ruby-nopack-f7	23%	9%	36%	2%	-23%	140%	25%	-28%	296%
	ruby-pack-f6	-29%	-32%	81%	-3%	-19%	329%	0%	-32%	263%
	ruby-pack-f7	-29%	-35%	-28%	19%	-32%	213%	14%	-14%	331%
	bsd-nopack-f6	40%	22%	67%	162%	-25%	484%	131%	-10%	430%
	bsd-nopack-f7	56%	30%	73%	77%	-8%	262%	135%	-11%	377%
	bsd-pack-f6	-5%	-1%	51%	99%	-10%	67%	122%	-11%	39%
	bsd-pack-f7	-12%	-7%	8%	78%	-21%	124%	164%	-20%	131%

Client CPU		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack-f6	3%	3%	2%	50%	60%	13%	24%	54%	15%
	ruby-nopack-f7	3%	3%	3%	47%	56%	15%	38%	63%	11%
	ruby-pack-f6	14%	12%	5%	49%	57%	10%	52%	68%	12%
	ruby-pack-f7	19%	21%	17%	39%	62%	16%	40%	53%	11%
	bsd-nopack-f6	5%	5%	4%	18%	47%	9%	21%	50%	8%
	bsd-nopack-f7	5%	5%	4%	24%	49%	13%	19%	43%	10%
	bsd-pack-f6	13%	12%	8%	24%	49%	28%	21%	51%	34%
	bsd-pack-f7	18%	17%	14%	26%	44%	21%	18%	44%	21%
svn:	ruby-nopack-f6	4%	4%	4%	54%	64%	61%	64%	59%	63%
	ruby-nopack-f7	4%	4%	5%	65%	56%	59%	57%	53%	60%
	ruby-pack-f6	11%	13%	12%	52%	65%	62%	58%	62%	61%
	ruby-pack-f7	18%	19%	21%	60%	62%	61%	55%	61%	51%
	bsd-nopack-f6	8%	8%	8%	54%	55%	54%	52%	55%	55%
	bsd-nopack-f7	7%	8%	9%	51%	53%	46%	54%	53%	50%
	bsd-pack-f6	14%	14%	13%	46%	54%	54%	42%	55%	54%
	bsd-pack-f7	16%	18%	25%	42%	55%	54%	49%	54%	50%
file:	ruby-nopack-f6	7%	6%	7%	84%	82%	79%	78%	60%	79%
	ruby-nopack-f7	7%	6%	7%	76%	74%	63%	80%	72%	72%
	ruby-pack-f6	16%	15%	15%	76%	75%	70%	80%	73%	64%
	ruby-pack-f7	22%	23%	21%	76%	68%	80%	72%	74%	79%
	bsd-nopack-f6	11%	9%	11%	71%	53%	68%	70%	66%	60%
	bsd-nopack-f7	11%	10%	11%	63%	67%	65%	68%	59%	70%
	bsd-pack-f6	19%	17%	19%	71%	65%	70%	72%	69%	69%
	bsd-pack-f7	25%	23%	24%	73%	53%	72%	74%	54%	73%

Quality of the measured data

- Reliability of individual data points is poor due to the client writing to the same storage that we read from
- Data for svn: and file: looks consistent but http: is quite erratic
- No specific outliers have been marked

Impact of the repository format

- Cold caches: Packed f7 repositories provide 30..60% better performance, 100% with advanced settings
- Hot caches: too much variation, typ. -20% .. +20% (probably dominated by client, see client CPU load)

## Export trunk

### **Impact of packing**

- Cold caches: Packed repos are 2x .. 7x as fast
- Hot caches: too much variation and unreliable http: data, typ. -20% .. +20% (probably dominated by client, see client CPU load)

### **Impact on RA layer**

- Not much difference between ra\_svn and ra\_local, with a slight advantage of ra\_svn
- ra\_serf seems to have a relative weakness in default config from hot caches
- ra\_serf has a major issue with "fast" config

### **Impact of caching and advanced settings**

- No significant impact apart from the ra\_serf issue. Mostly client-limited.

Null-export trunk

Elapsed Time		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack-f6	131.3	133.1	180.2	5.7	4.7	29.2	5.6	1.5	25.1
	ruby-nopack-f7	136.0	132.8	137.3	6.4	5.2	29.5	6.4	1.4	41.3
	ruby-pack-f6	26.4	25.4	64.1	5.6	4.6	44.9	5.4	1.8	41.1
	ruby-pack-f7	18.1	17.3	26.4	5.4	4.7	22.9	5.6	1.7	33.1
	bsd-nopack-f6	1148.0	1202.8	1495.4	64.8	54.5	177.4	64.8	54.6	143.9
	bsd-nopack-f7	1152.6	1135.8	1259.7	78.1	61.0	191.9	77.2	61.0	141.0
	bsd-pack-f6	419.9	414.3	750.7	63.7	55.3	104.8	64.0	55.0	145.1
	bsd-pack-f7	277.1	265.4	384.7	68.3	56.3	238.3	68.6	56.6	269.1
svn:	ruby-nopack-f6	101.4	101.5	98.4	4.1	4.2	2.4	4.0	2.1	0.2
	ruby-nopack-f7	103.4	104.0	76.3	4.4	4.5	2.9	4.4	2.2	0.2
	ruby-pack-f6	30.9	31.3	28.9	4.2	4.4	2.4	4.2	2.3	0.2
	ruby-pack-f7	20.5	20.1	14.7	4.4	4.5	3.5	4.4	2.3	0.2
	bsd-nopack-f6	705.4	729.0	672.0	57.7	57.9	28.6	57.6	58.0	19.9
	bsd-nopack-f7	727.7	717.6	530.7	60.4	61.2	34.1	60.5	61.2	25.5
	bsd-pack-f6	397.7	389.8	363.0	61.4	60.1	30.7	60.8	59.8	20.9
	bsd-pack-f7	284.9	287.1	179.7	61.9	61.7	45.9	61.7	61.4	36.2
file:	ruby-nopack-f6	98.5	100.8	102.7	2.0	2.2	2.3	2.0	2.2	2.3
	ruby-nopack-f7	98.8	97.0	101.8	2.3	2.5	2.6	2.4	2.5	2.6
	ruby-pack-f6	38.5	28.5	29.7	2.2	2.3	2.4	2.2	2.3	2.4
	ruby-pack-f7	18.6	18.9	22.2	2.3	2.4	2.6	2.3	2.4	2.5
	bsd-nopack-f6	676.4	673.4	672.7	24.9	25.4	25.7	24.8	25.7	25.6
	bsd-nopack-f7	691.2	687.5	687.4	28.3	28.0	28.3	27.5	28.4	28.2
	bsd-pack-f6	363.4	361.8	365.5	28.1	27.3	28.9	28.1	27.4	29.0
	bsd-pack-f7	251.0	254.9	255.4	28.8	28.8	29.2	28.8	28.8	29.3

F6 .I. F7		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack	-3%	0%	31%	-11%	-10%	-1%	-13%	7%	-39%
	ruby-pack	46%	47%	143%	3%	-3%	97%	-2%	9%	24%
	bsd-nopack	0%	6%	19%	-17%	-11%	-8%	-16%	-11%	2%
	bsd-pack	52%	56%	95%	-7%	-2%	-56%	-7%	-3%	-46%
svn:	ruby-nopack	-2%	-2%	29%	-7%	-7%	-18%	-8%	-1%	0%
	ruby-pack	51%	56%	97%	-3%	-3%	-30%	-5%	0%	0%
	bsd-nopack	-3%	2%	27%	-5%	-5%	-16%	-5%	-5%	-22%
	bsd-pack	40%	36%	102%	-1%	-3%	-33%	-1%	-3%	-42%
file:	ruby-nopack	0%	4%	1%	-13%	-11%	-10%	-14%	-9%	-12%
	ruby-pack	107%	51%	34%	-8%	-5%	-6%	-7%	-5%	-6%
	bsd-nopack	-2%	-2%	-2%	-12%	-9%	-9%	-10%	-10%	-9%
	bsd-pack	45%	42%	43%	-3%	-5%	-1%	-2%	-5%	-1%

Nopack .I. Pack		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-f6	397%	424%	181%	1%	2%	-35%	2%	-19%	-39%
	ruby-f7	652%	668%	420%	18%	11%	29%	15%	-17%	25%
	bsd-f6	173%	190%	99%	2%	-1%	69%	1%	-1%	-1%
	bsd-f7	316%	328%	227%	14%	8%	-19%	13%	8%	-48%
svn:	ruby-f6	228%	224%	240%	-4%	-3%	-2%	-3%	-8%	0%
	ruby-f7	405%	417%	419%	1%	0%	-17%	0%	-7%	0%
	bsd-f6	77%	87%	85%	-6%	-4%	-7%	-5%	-3%	-5%
	bsd-f7	155%	150%	195%	-2%	-1%	-26%	-2%	0%	-30%
file:	ruby-f6	155%	254%	245%	-5%	-3%	-3%	-6%	-3%	-5%
	ruby-f7	430%	414%	359%	0%	3%	1%	1%	1%	2%
	bsd-f6	86%	86%	84%	-11%	-7%	-11%	-12%	-6%	-12%
	bsd-f7	175%	170%	169%	-2%	-3%	-3%	-4%	-2%	-4%

Null-export trunk

RA <i>.I. ra_serf</i>		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
svn:	ruby-nopack-f6	30%	31%	83%	39%	11%	1115%	37%	-30%	11383%
	ruby-nopack-f7	32%	28%	80%	45%	15%	912%	46%	-36%	18835%
	ruby-pack-f6	-14%	-19%	122%	32%	5%	1735%	31%	-21%	18771%
	ruby-pack-f7	-12%	-14%	80%	24%	5%	551%	27%	-28%	15078%
	bsd-nopack-f6	63%	65%	123%	12%	-6%	520%	12%	-6%	622%
	bsd-nopack-f7	58%	58%	137%	29%	0%	463%	28%	0%	454%
	bsd-pack-f6	6%	6%	107%	4%	-8%	241%	5%	-8%	595%
	bsd-pack-f7	-3%	-8%	114%	10%	-9%	419%	11%	-8%	644%
file:	ruby-nopack-f6	33%	32%	76%	178%	108%	1147%	174%	-34%	993%
	ruby-nopack-f7	38%	37%	35%	173%	107%	1040%	171%	-44%	1485%
	ruby-pack-f6	-31%	-11%	115%	160%	99%	1771%	151%	-21%	1613%
	ruby-pack-f7	-3%	-8%	19%	132%	94%	793%	139%	-32%	1201%
	bsd-nopack-f6	70%	79%	122%	160%	114%	591%	161%	113%	462%
	bsd-nopack-f7	67%	65%	83%	176%	118%	578%	181%	115%	400%
	bsd-pack-f6	16%	15%	105%	127%	102%	262%	128%	101%	400%
	bsd-pack-f7	10%	4%	51%	137%	96%	717%	138%	97%	818%

Client CPU		Cold			Hot OS			Hot SVN		
		slow	medium	fast	slow	medium	fast	slow	medium	fast
http:	ruby-nopack-f6	0%	0%	0%	6%	5%	1%	6%	22%	1%
	ruby-nopack-f7	0%	0%	0%	4%	8%	1%	5%	21%	1%
	ruby-pack-f6	1%	2%	1%	6%	5%	1%	7%	20%	1%
	ruby-pack-f7	2%	2%	2%	7%	6%	1%	6%	17%	1%
	bsd-nopack-f6	0%	0%	0%	7%	9%	3%	7%	8%	3%
	bsd-nopack-f7	0%	0%	0%	6%	7%	3%	6%	8%	4%
	bsd-pack-f6	1%	1%	1%	7%	8%	4%	7%	8%	3%
	bsd-pack-f7	2%	2%	2%	7%	8%	2%	7%	7%	2%
svn:	ruby-nopack-f6	0%	0%	0%	0%	1%	5%	1%	3%	43%
	ruby-nopack-f7	0%	0%	0%	1%	0%	3%	1%	2%	43%
	ruby-pack-f6	0%	0%	0%	1%	1%	4%	1%	3%	29%
	ruby-pack-f7	0%	0%	1%	1%	1%	3%	1%	1%	28%
	bsd-nopack-f6	0%	0%	0%	1%	1%	4%	1%	1%	5%
	bsd-nopack-f7	0%	0%	0%	1%	1%	4%	1%	1%	5%
	bsd-pack-f6	0%	0%	0%	1%	1%	4%	1%	1%	6%
	bsd-pack-f7	0%	0%	1%	1%	1%	3%	1%	1%	3%
file:	ruby-nopack-f6	3%	3%	3%	98%	99%	98%	98%	97%	99%
	ruby-nopack-f7	3%	4%	3%	99%	99%	101%	99%	99%	98%
	ruby-pack-f6	6%	9%	10%	100%	101%	101%	100%	100%	100%
	ruby-pack-f7	14%	14%	13%	100%	100%	100%	100%	100%	99%
	bsd-nopack-f6	5%	5%	5%	99%	99%	99%	99%	99%	99%
	bsd-nopack-f7	5%	5%	5%	99%	99%	99%	99%	99%	99%
	bsd-pack-f6	9%	8%	9%	100%	100%	100%	100%	100%	100%
	bsd-pack-f7	13%	12%	13%	100%	100%	100%	100%	100%	100%

Quality of the measured data

- Median data is pretty consistent for file: and svn: with a single outlier
- ra\_serf anomaly for "fast" config is not a temporary effect and measurements fluctuate greatly
- Client CPU load >100% is an artifact of picking the median for CPU and elapsed time independently

Impact of the repository format

- Cold caches: Packed f7 repositories provide 40..50% better performance, 100% with advanced settings
- Hot caches: <10% penalty for packed repos, typ. 10% for non-packed; see below for more

Impact of packing

- Cold caches: Packed repos are 2x .. 7x as fast
- Hot caches, except for advanced options: +/-0 penalty for f7, 5..10% for non-packed

## Null-export trunk

### Impact on RA layer

- ra\_serf is fastest RA when fed from hot and complete (large enough) SVN caches but w/o advanced options
- ra\_serf with advanced cache options has a severe regression (up to 100x) over other RAs and configs
- file: is faster for cached data unless SVN caches are hot and network compression is off

### Impact of caching and advanced settings

- Cache size only matters when running from hot SVN caches
- 1GB covers only 2/3 of the BSD data resulting in different relative number for BSD and RUBY (much smaller)
- Block-read gives an additional 50% speedup reading cold data; penalty is 30% when reading from OS cache
- ra\_serf anomaly for “fast” config is not explained by RA layer, cache size or options alone
- ra\_svn on hot SVN caches benefits (factor 10) from n/w compression off, revprop caching and zero copy code

Dump

<b>Elapsed Time</b>	0	0	0	0	0	0
	0	0	0	0	0	0
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!

<b>F6 ./ F7</b>	0	0	0	0	0	0
	0	0	0	0	0	0
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!

<b>Nopack ./ Pack</b>	0	0	0	0	0	0
	0	0	0	0	0	0
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!

<b>Client CPU</b>	0	0	0	0	0	0
	0	0	0	0	0	0
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!

**Quality of the measured data**

Impact of the repository format

Impact of packing

Impact on RA layer

Impact of caching and advanced settings