



Restore test, Firebird and InterBase

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Backup tests



- Were done at 2007 and 2008
- Found significant speed difference between protocols
- Fastest – Services Api
- Now – restore speed test comes



Test goals



- Compare protocols (speed)
- Compare difference between page sizes
- Database cache makes any affect?
- restore
 - creation of DB, metatada, data transfer, index creation
- Compare data load speed
- Compare index creation speed
 - performance related to PLAN SORT queries



Database



- Production backup
 - 1.6 gigabytes, page size 4k
 - database 3.9 gigabytes (with indices, 3.2 gigabytes without indices)
 - 63 tables
 - 53 indices

IBSurgeon InterBase/Firebird Database Information Tool v 1.1

T:\K.FDB

☒ Do not use Windows file cache

Page size: 4096. Database size: 3893.34 mb

Database format: ODS 11.1, Firebird 2.1

Pages	Count	%	mb
Summary, Total pages	996695	100	3893.34
Header	1	0	0.00
Write Ahead Log	1	0	0.00
Generator Pages	1	0	0.00
Unused (free)	31441	3	122.82
Bad Pages	0	0	0.00
Page Inventory Pages	30	0	0.12
Transaction Inventory Pages	1	0	0.00
Pointer Pages	897	0	3.50
Record Pages	769543	77	3006.03
Index Root Pages	96	0	0.38
Index Pages	194680	20	760.47
Blob Pages	4	0	0.02

Test computer



- MB Gigabyte MA770-US3 (AMD 770)
- AMD Phenom II X3 720
- 4GB RAM
- OS - Seagate ST3160815AS, 160Gb, SATA II
- Backup, TEMP - Hitachi HDT721064SLA360, 640Gb, SATA II
- DB - Seagate ST31500341AS, 1.5Tb, SATA II, (FW CC1H)
 - FS cluster sizer – 16к.



Operating systems



- Base
 - Windows XP 32bit Professional SP3
- 64 bit
 - Windows 7 Professional 64bit
- Linux
 - Suse 11.1 64 bit
- Windows and Linux are different !



Why desktop, not server?



- Restore is a single process
- Server and Desktop OS will give same results on the same hardware (for this test)
- Linux server produced not so better results than Windows Desktop – the best result on Linux is 8 minutes, and 11 on Windows.



Test itself



- full restore, difference between protocols
- restore -i (without indices), difference between protocols, without indices
- restore with page sizes 1024, 2048, 4096, 8192, 16384
- restore -i, with page sizes 4096, 8192, 16384
- Speed of indices creation
 - difference between full and -i
- How page size affects indices
 - difference between full and -i





- Backup format does not affect restore
- Firebird 2.0 and higher does not allow to create DB with page size less than 4096
- Each server was tested minimum 2 times
- Some measurements was used as "control". If there was difference between control measurements, test was repeated.
- Test results were not averaged
- Test aberration was not higher than 3%
- ! Difference between Classic and SuperServer was not discovered

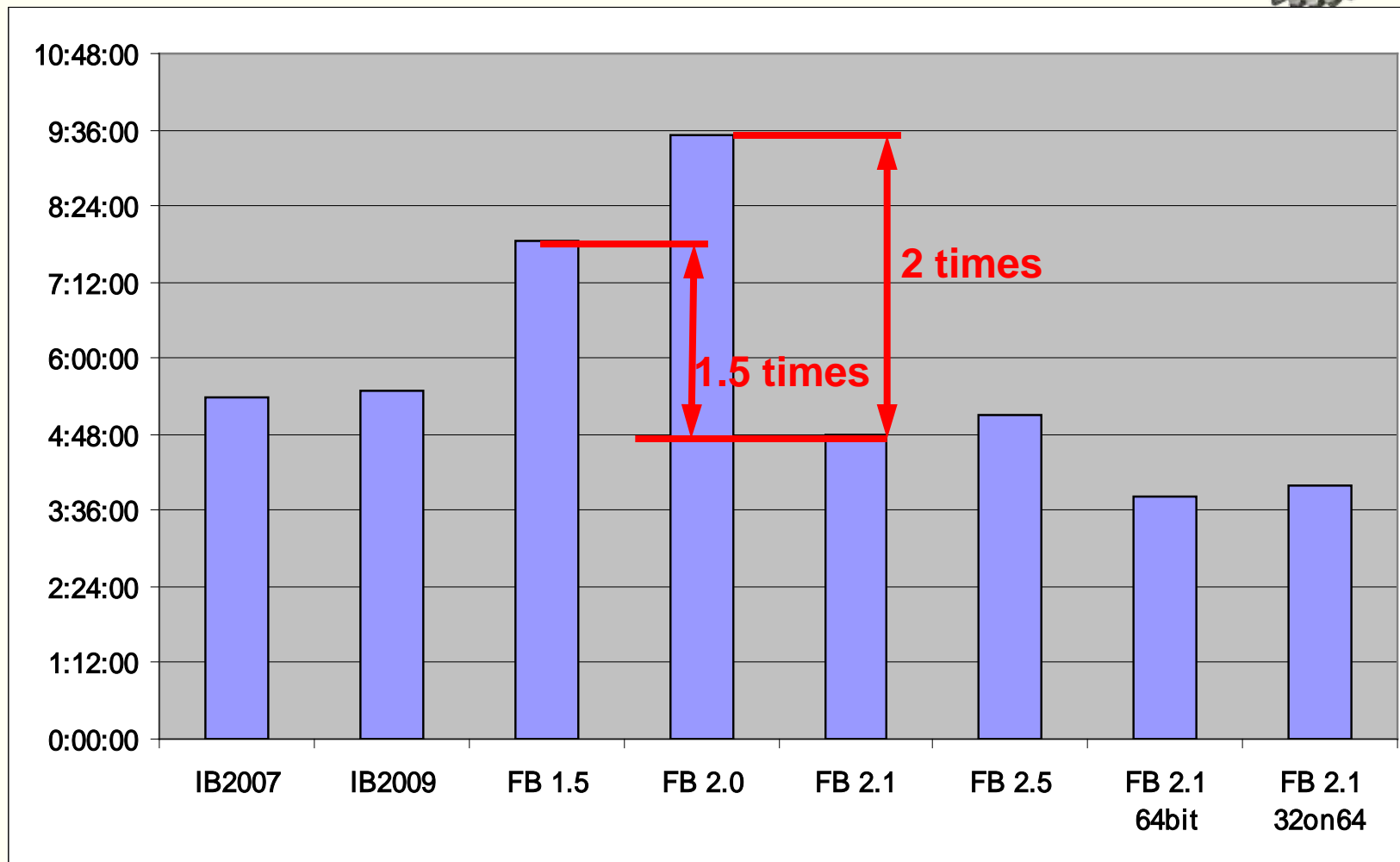




Windows, 32 bit



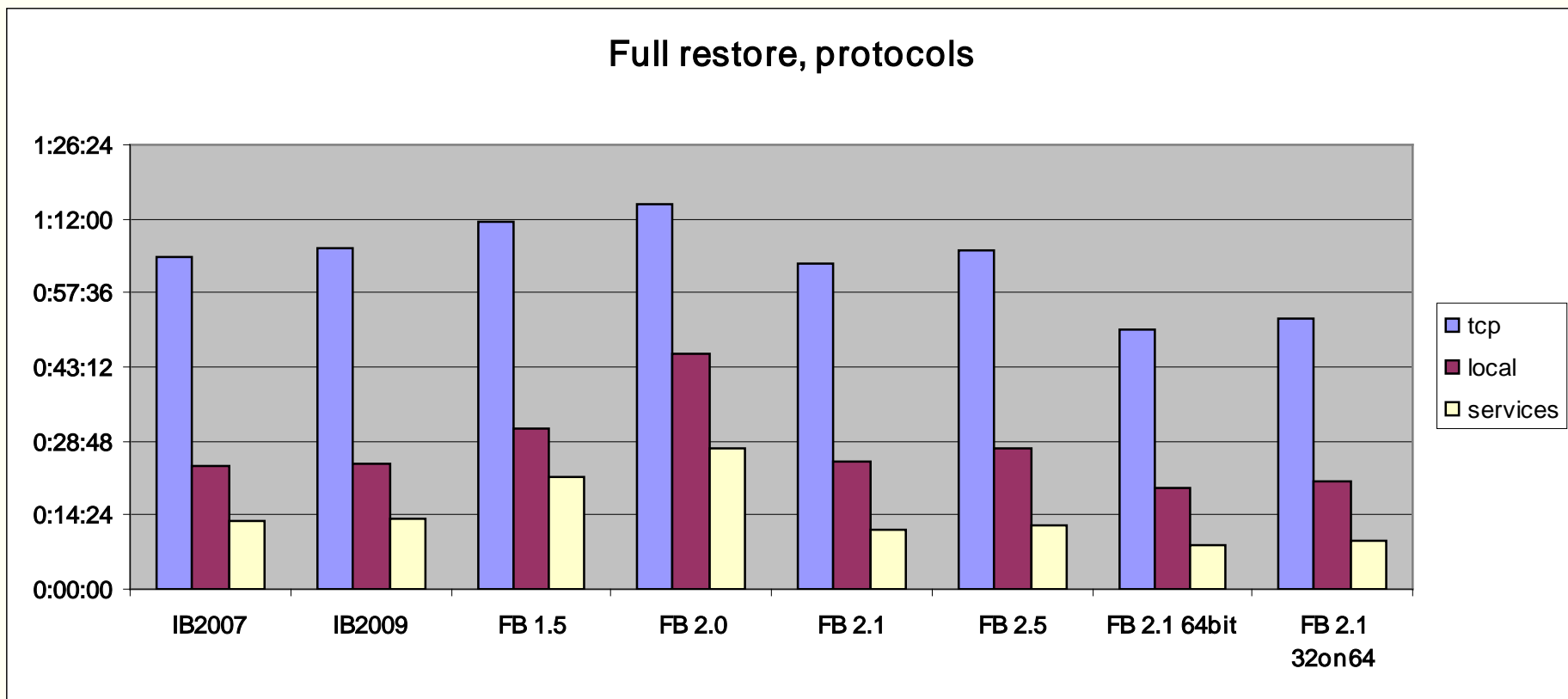
Total summary results



Total spent on test – ~100 hours



Full restore, protocols



tcp slower than se 5.7 times, local protocol lower than se 2.2 times.

Note: **FB 2.1 SE restore takes 12 minutes, tcp – 1 hour.**



Also discovered...



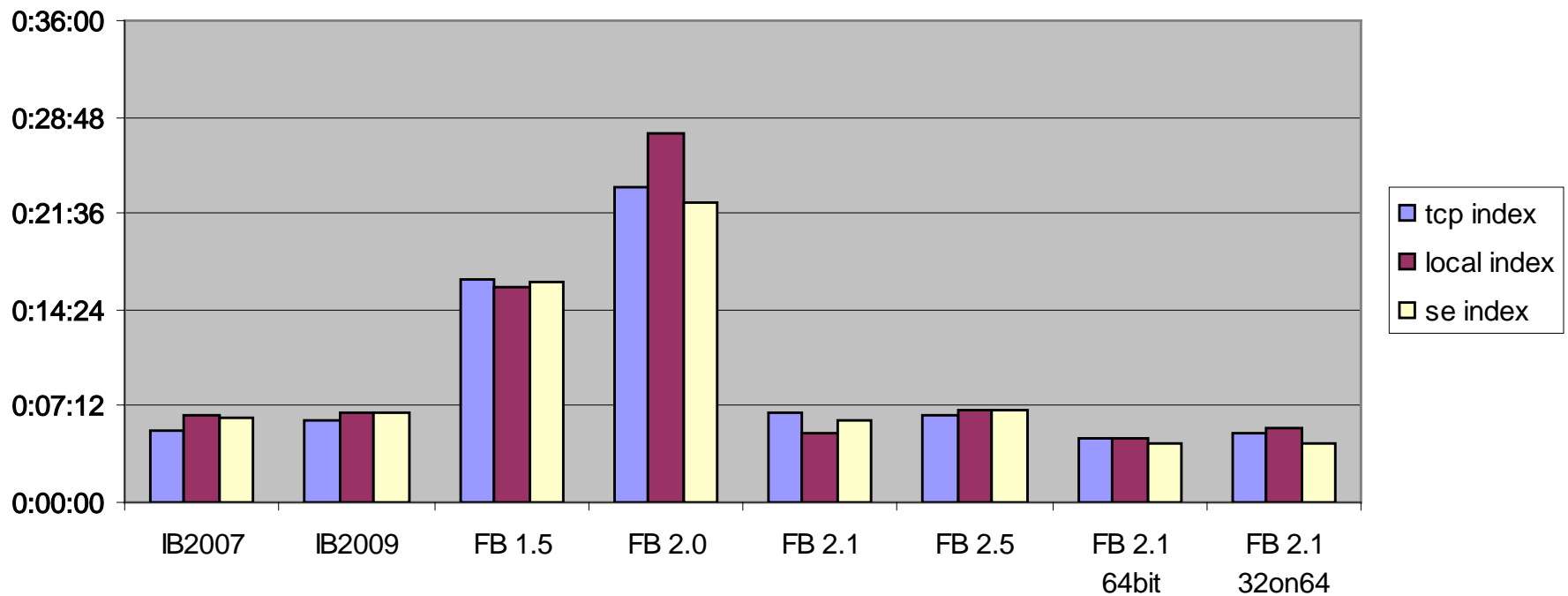
- Multicore processors: attaching gbak (tcp, local) to one core speeds up backup/restore by 40%
- Unfortunately, gbak affinity can be set manually or by special application only at runtime. So...



Creating indices



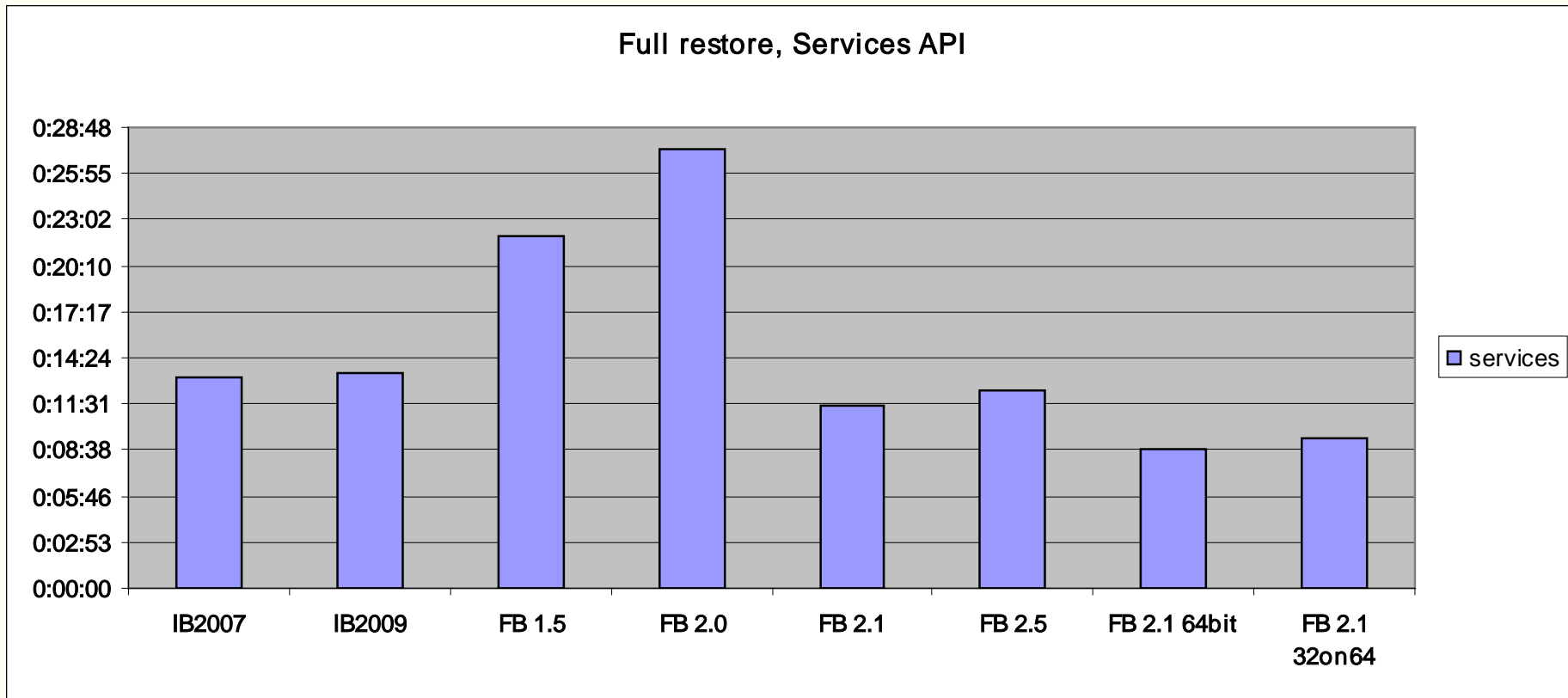
Creating indices, protocols



gbak nearly does not deal with server when creating indices



Full restore, Services API



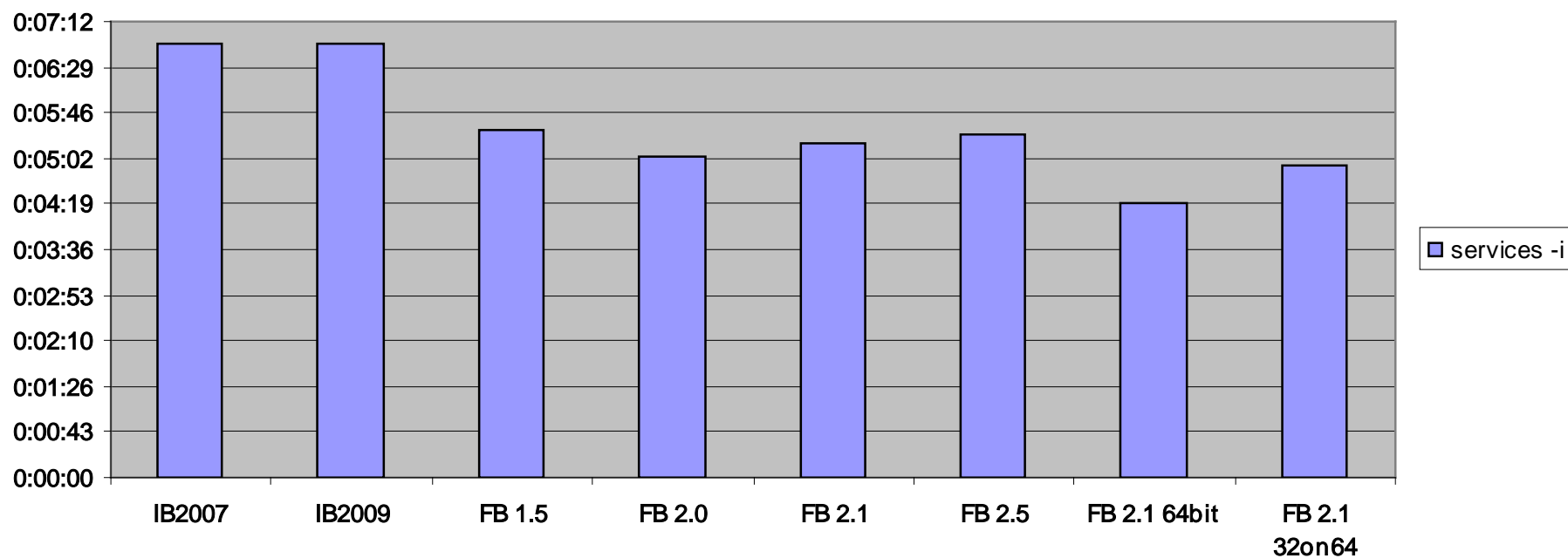
Why? See next slide ...



restore without indices



Without indices, Services API



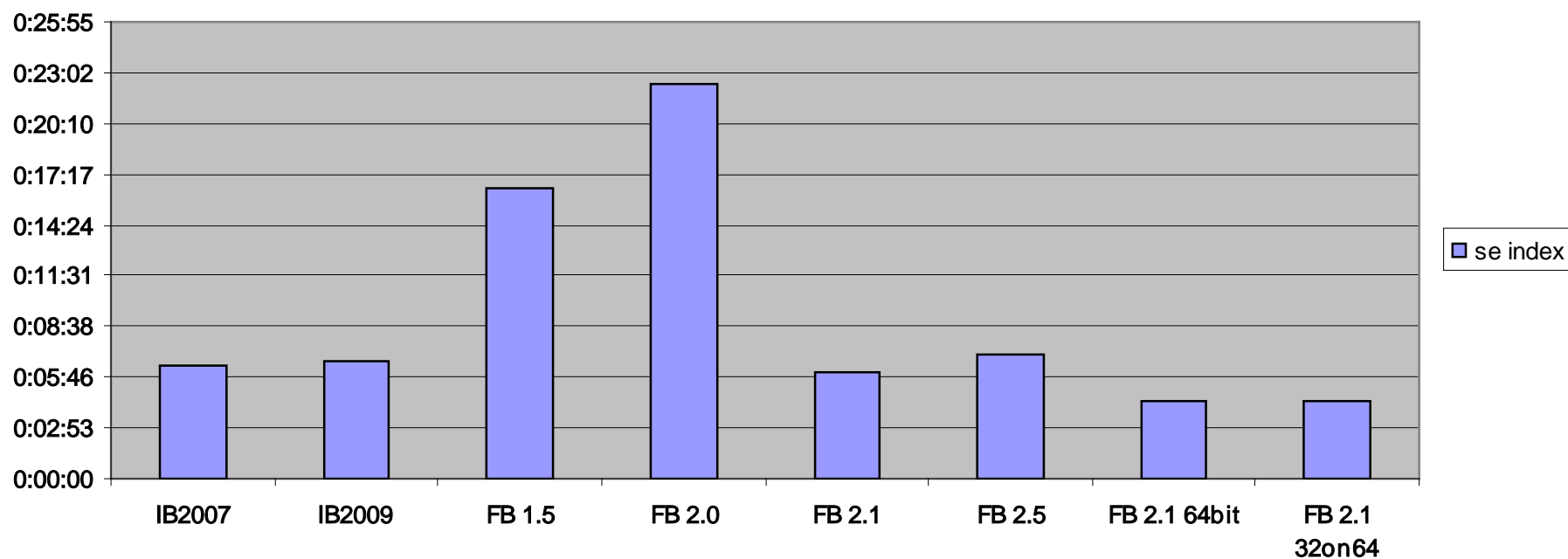
In fact, this is data populating test.
So, the source of the "total" difference is at...



Creating indices



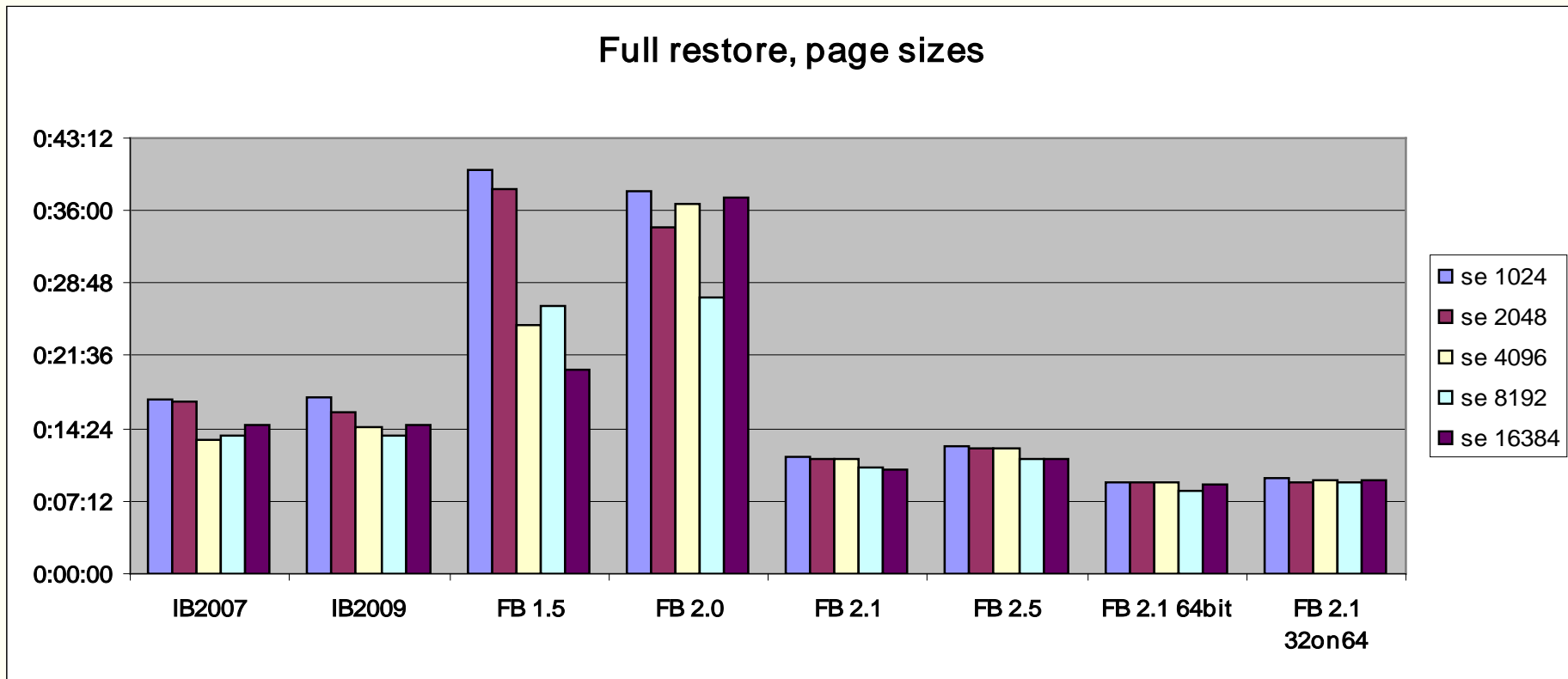
Creating indices, Services API



Speed of index creation is also speed of performing sort queries with (PLAN SORT)



Page size effect

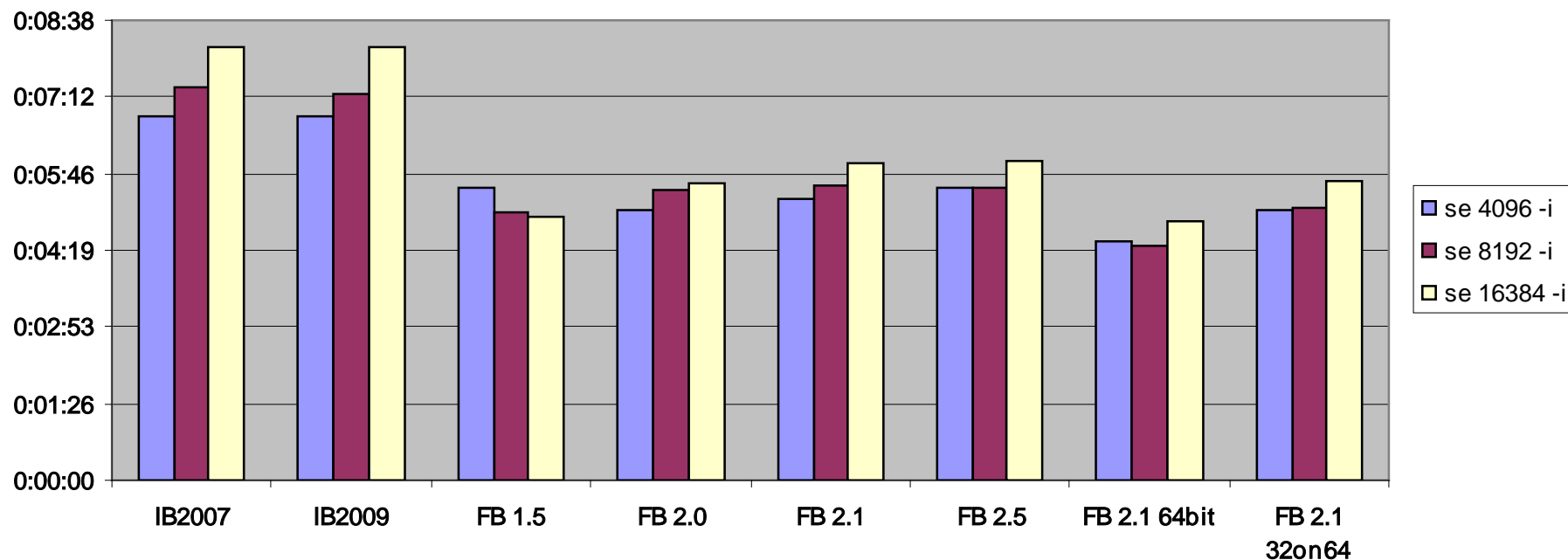


Firebird 2.0 have always instable index creation time
Firebird 2.x does not allow to use 1k and 2k page sizes





Restore without indices, page sizes



All (except FB 1.5) have 16k page slower

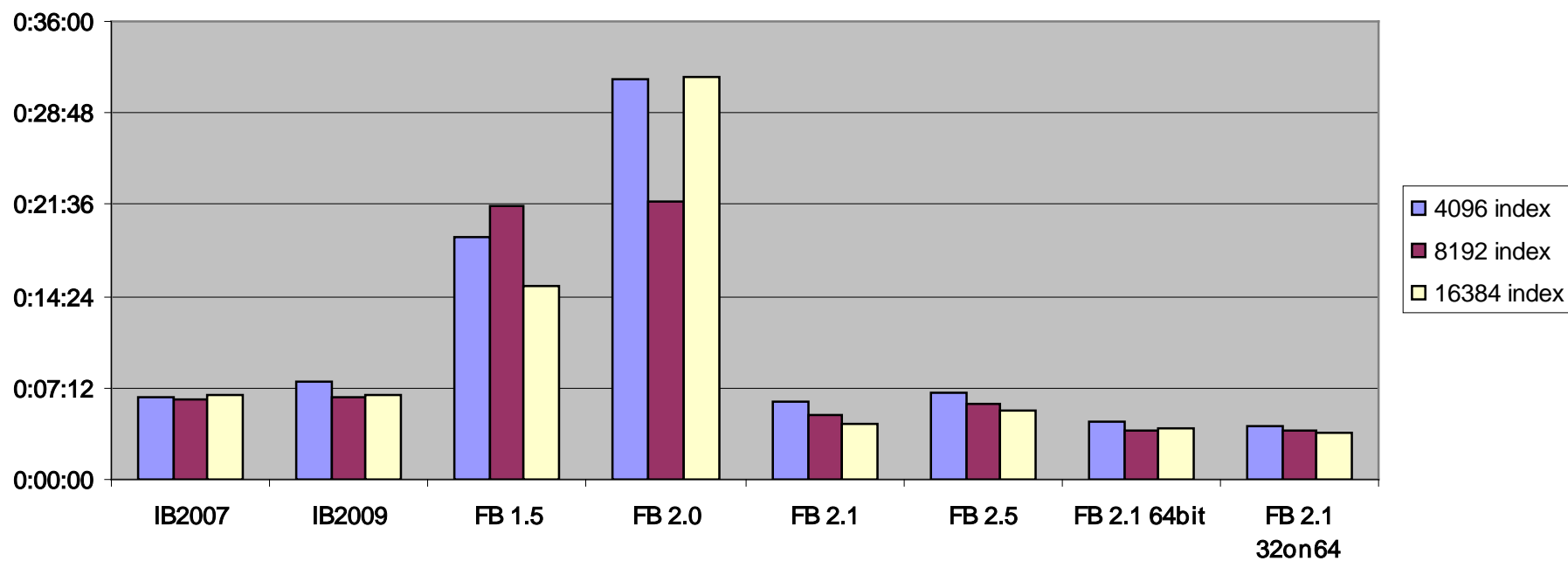
That difference is less sufficient than overall performance using bigger page size.

Stop using 1k pages – check `gstat -h`, and if any, upgrade page size (b/r).





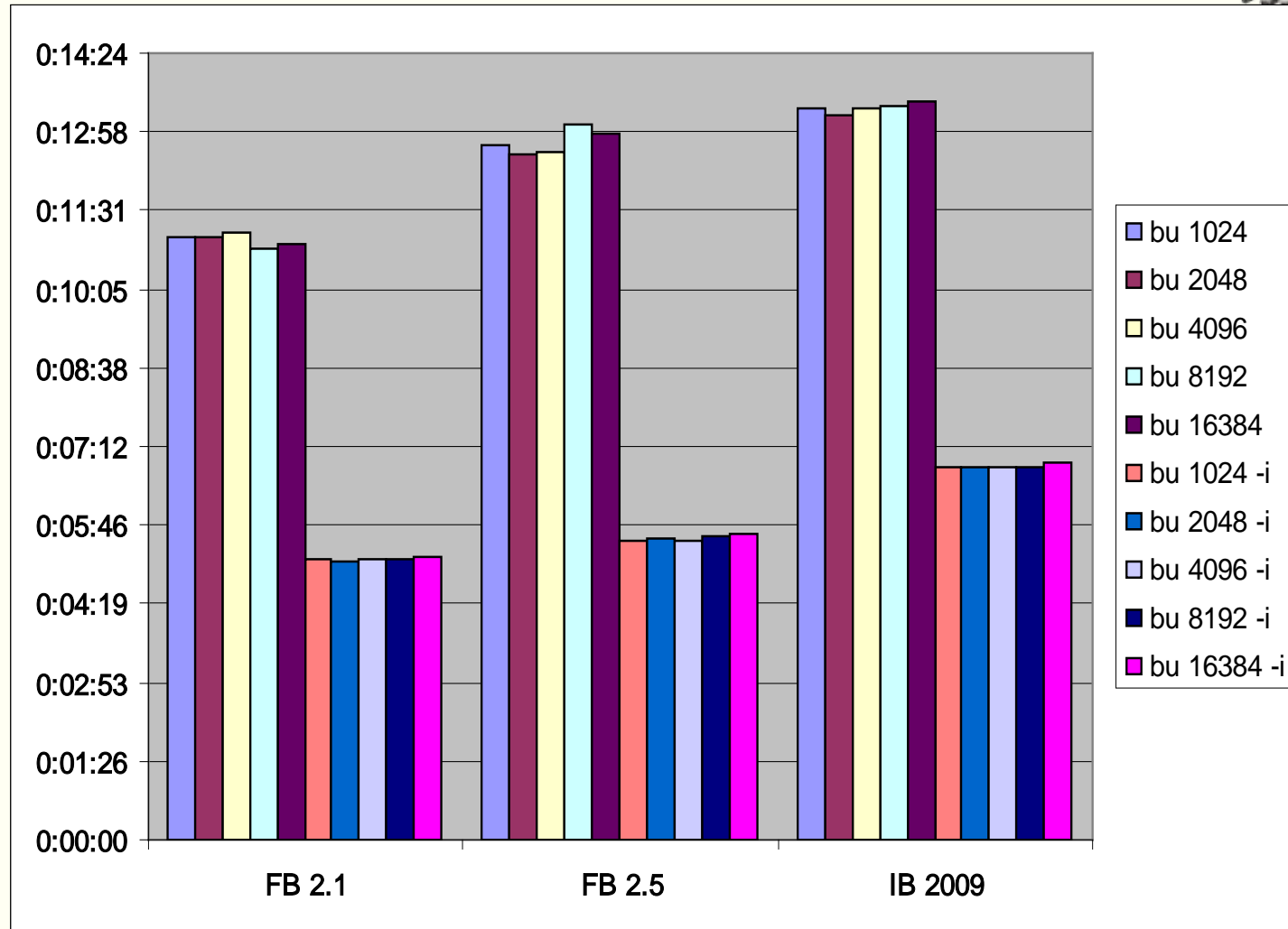
Creating indices, page sizes



The lesser page size, the better for indices
Difference is also not sufficient



Cache size



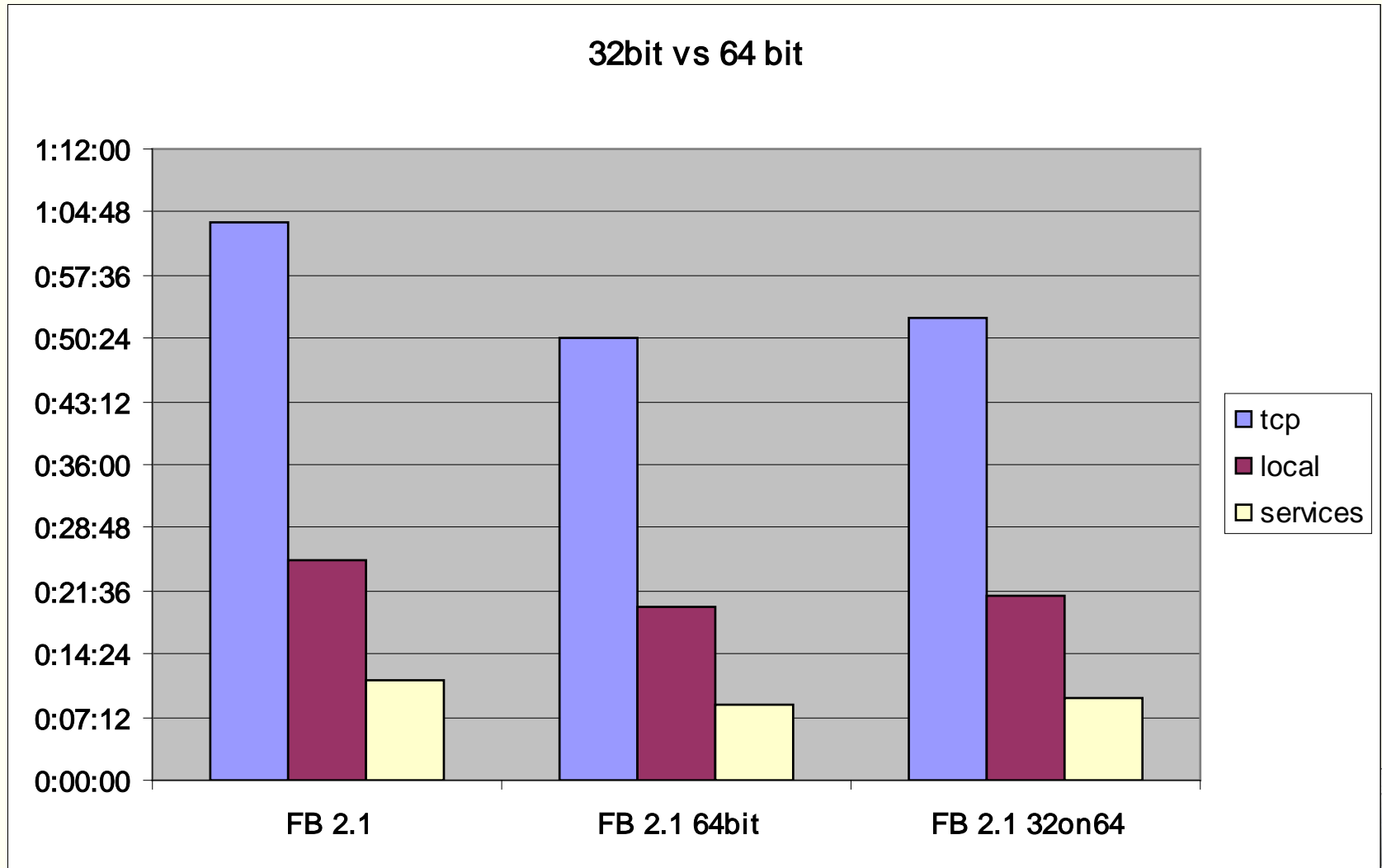
Does not affect restore (data population and index creation)



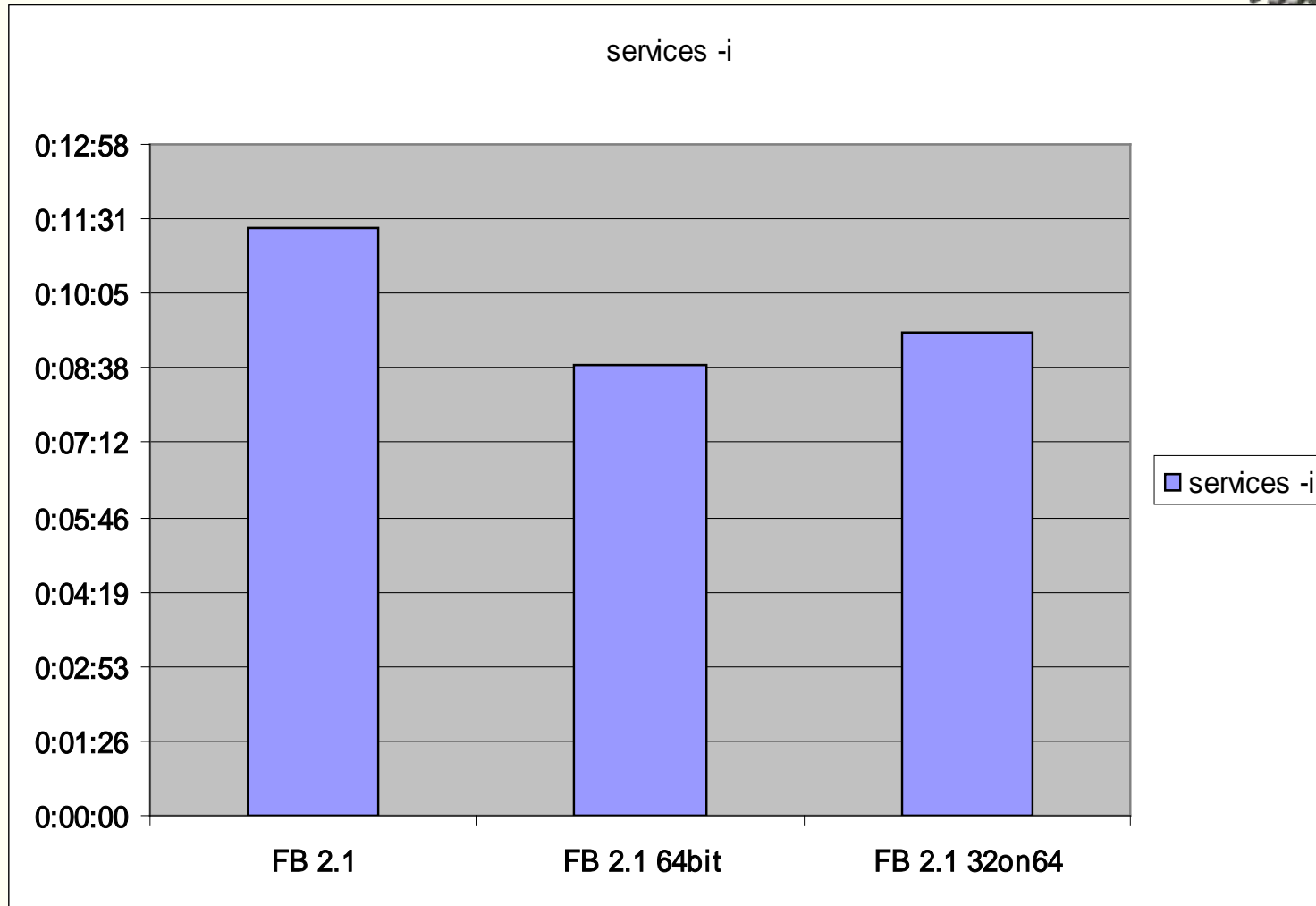


Windows 7, 64 bit

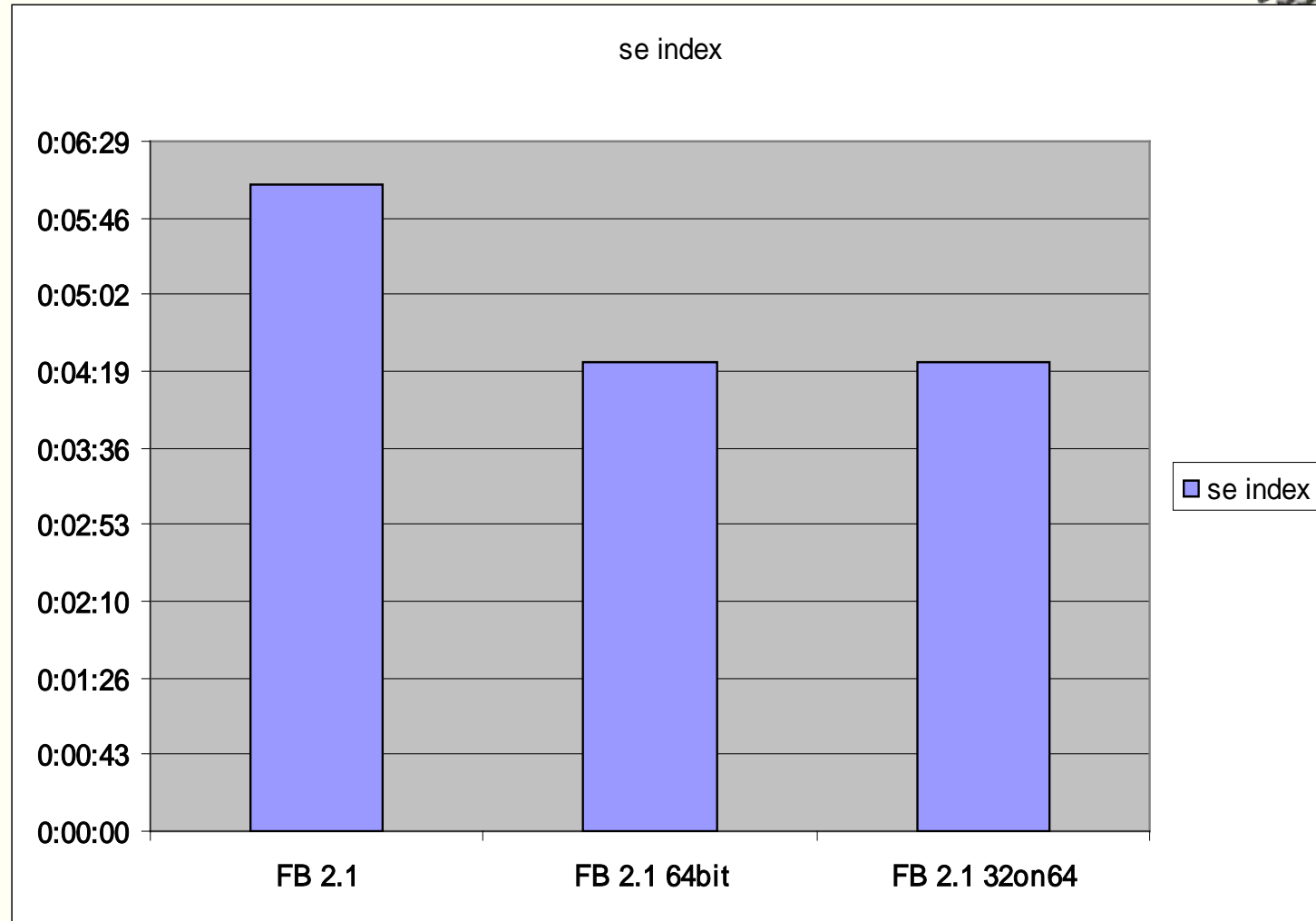




Restore without indices



Creating indices





- FB 2.1 32bit on WinXP 32 and Win7 64
 - 64bit OS is 14% faster than 32bit
 - data population is 3% faster
 - Creating indices is 22% faster
- Win 7 64bit, FB 2.1 32bit vs 64bit
 - 64-bit FB is ~6% faster
 - data population is 12% faster
 - index creation is 3-4% slower



Summary



- Services API is the fastest
use it for backup and restore
- Firebird 2.1 is the fastest (on Windows)
- InterBase 2007 and 2009 comparable to
Firebird 2.5
- Firebird 1.5 and 2.0 have something bad
with index creation on Windows
- 64 bits gives OS speed, not Firebird speed





Linux

Thanks to Ivan Pisarevsky



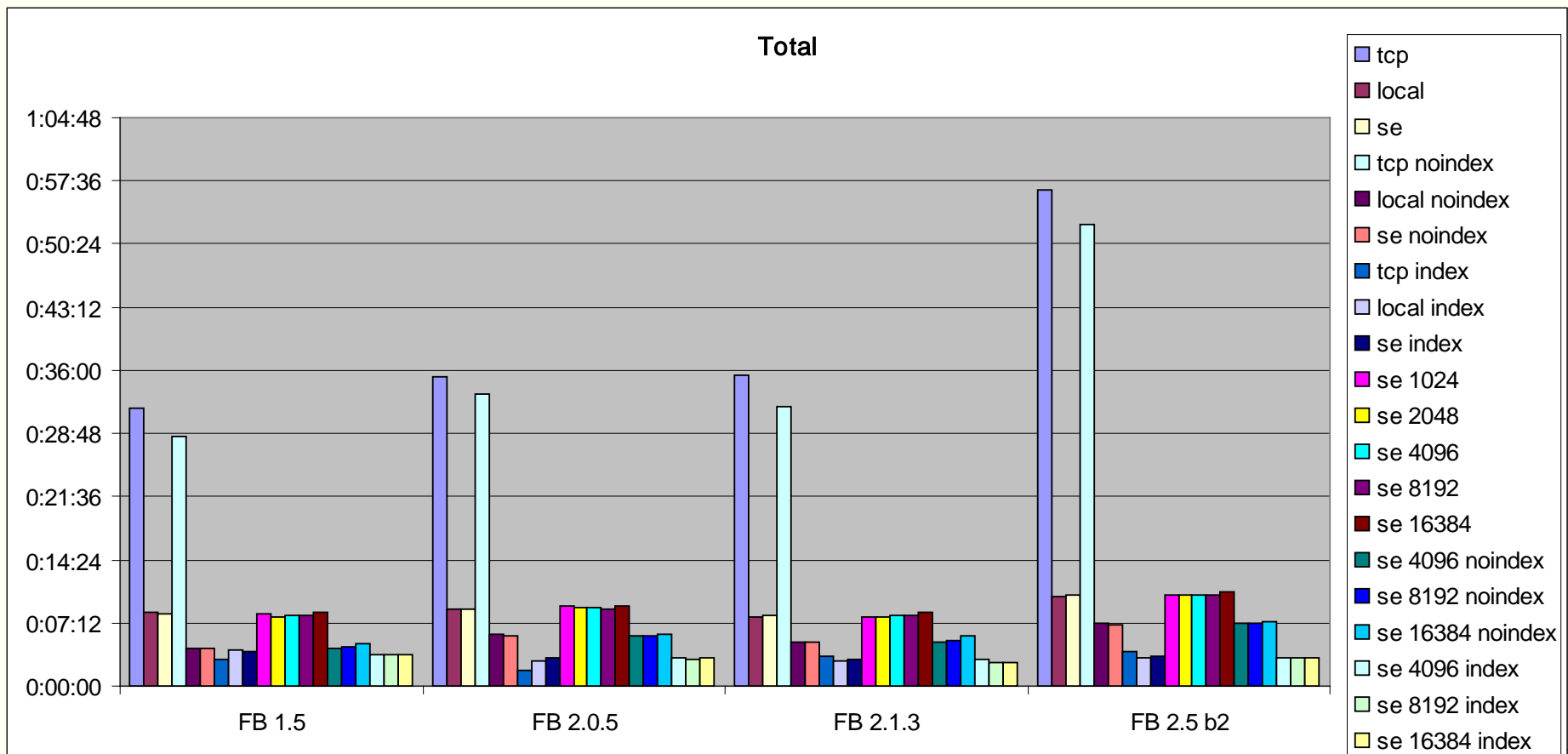
Same test on Linux



- Suse 11.1 64 bit
- one 4-core processor (Proliant DL180G6)
- RAID 10 - 3x2 SAS disks, 512mb controller RAM
- 3 logical disks
- 12 gigabytes RAM
- Tests were made also in "multiuser mode"



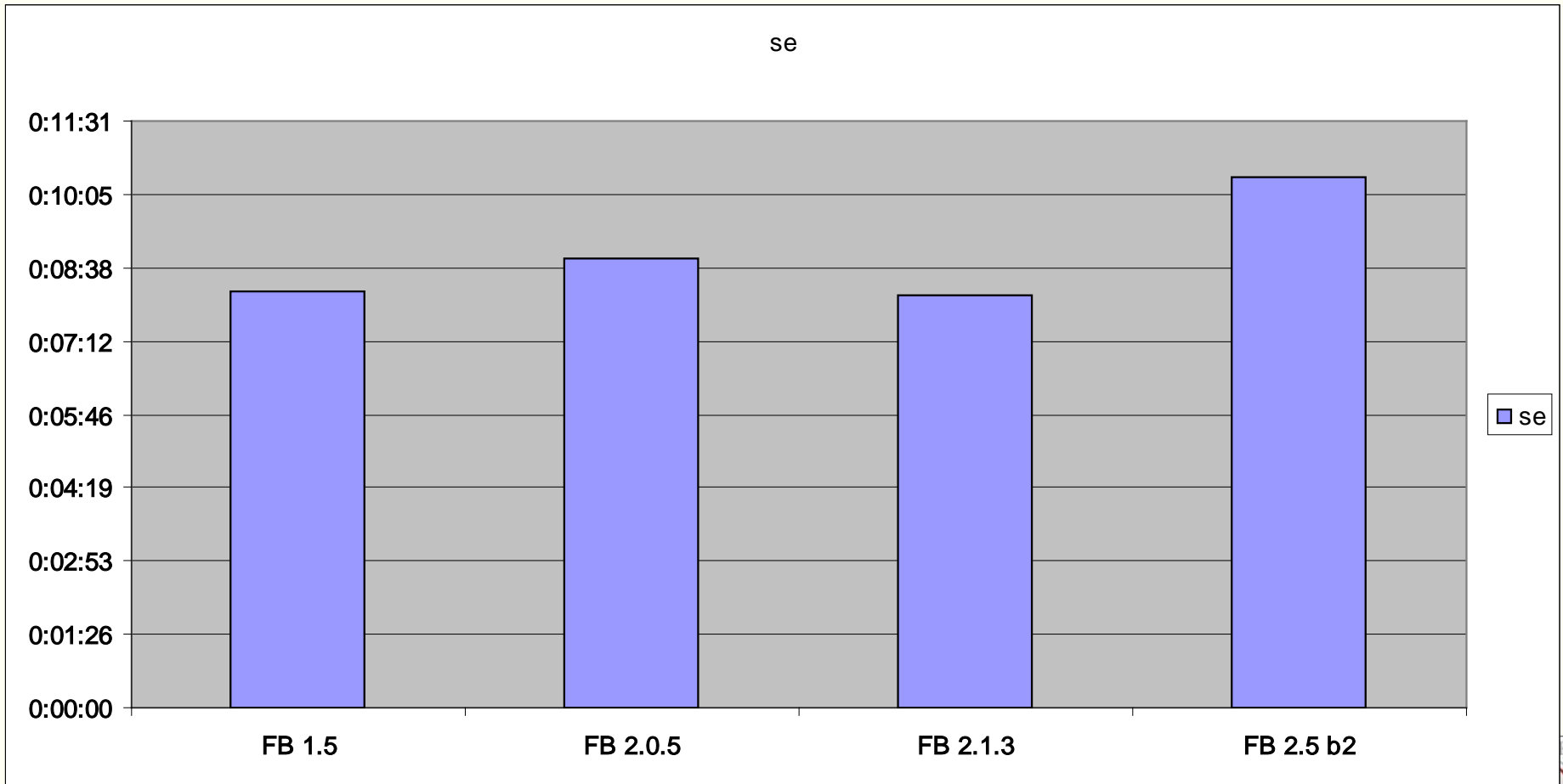
Total results



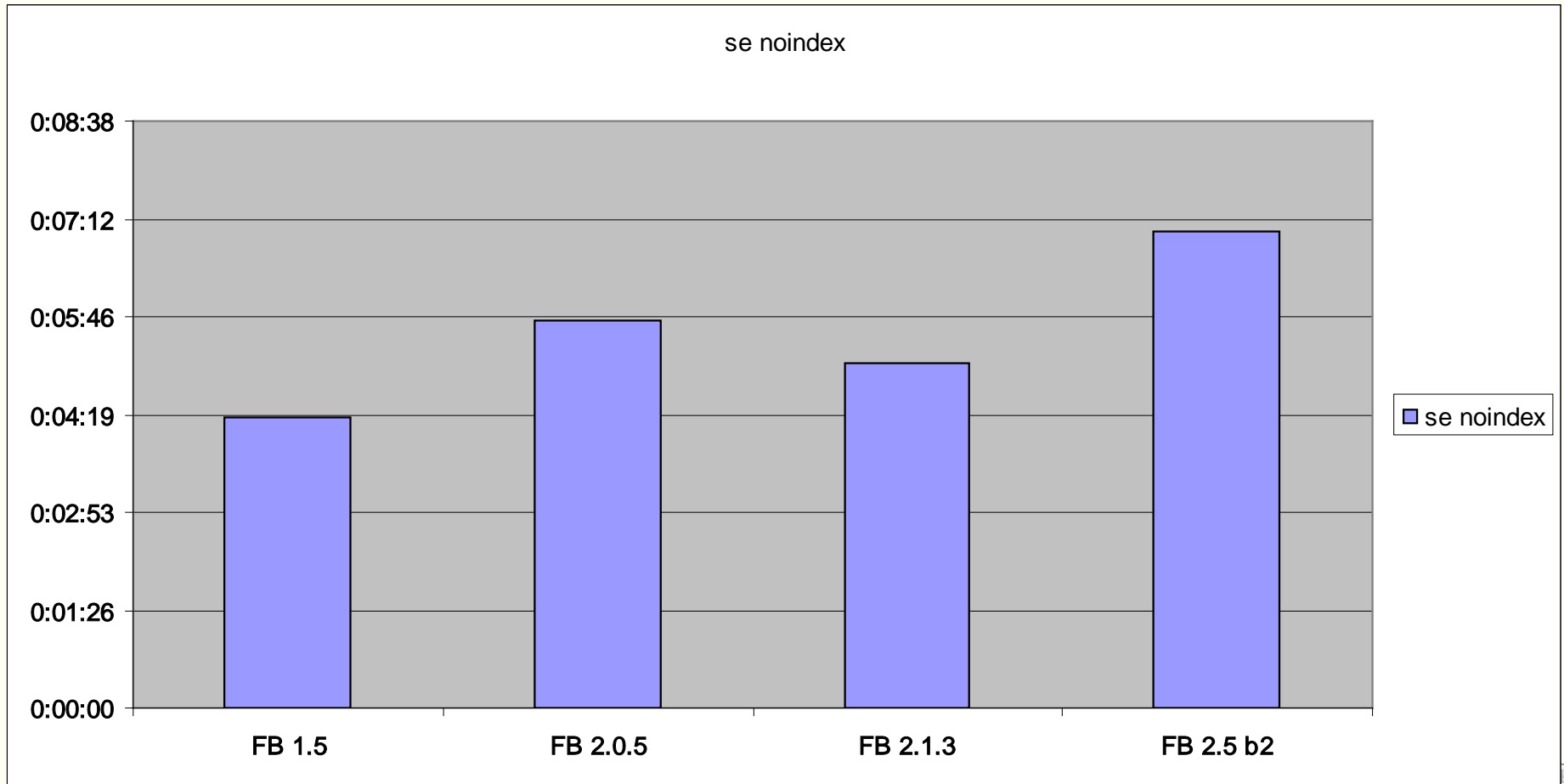
services api = local protocol, tcp is slower 4.4 times



Full restore



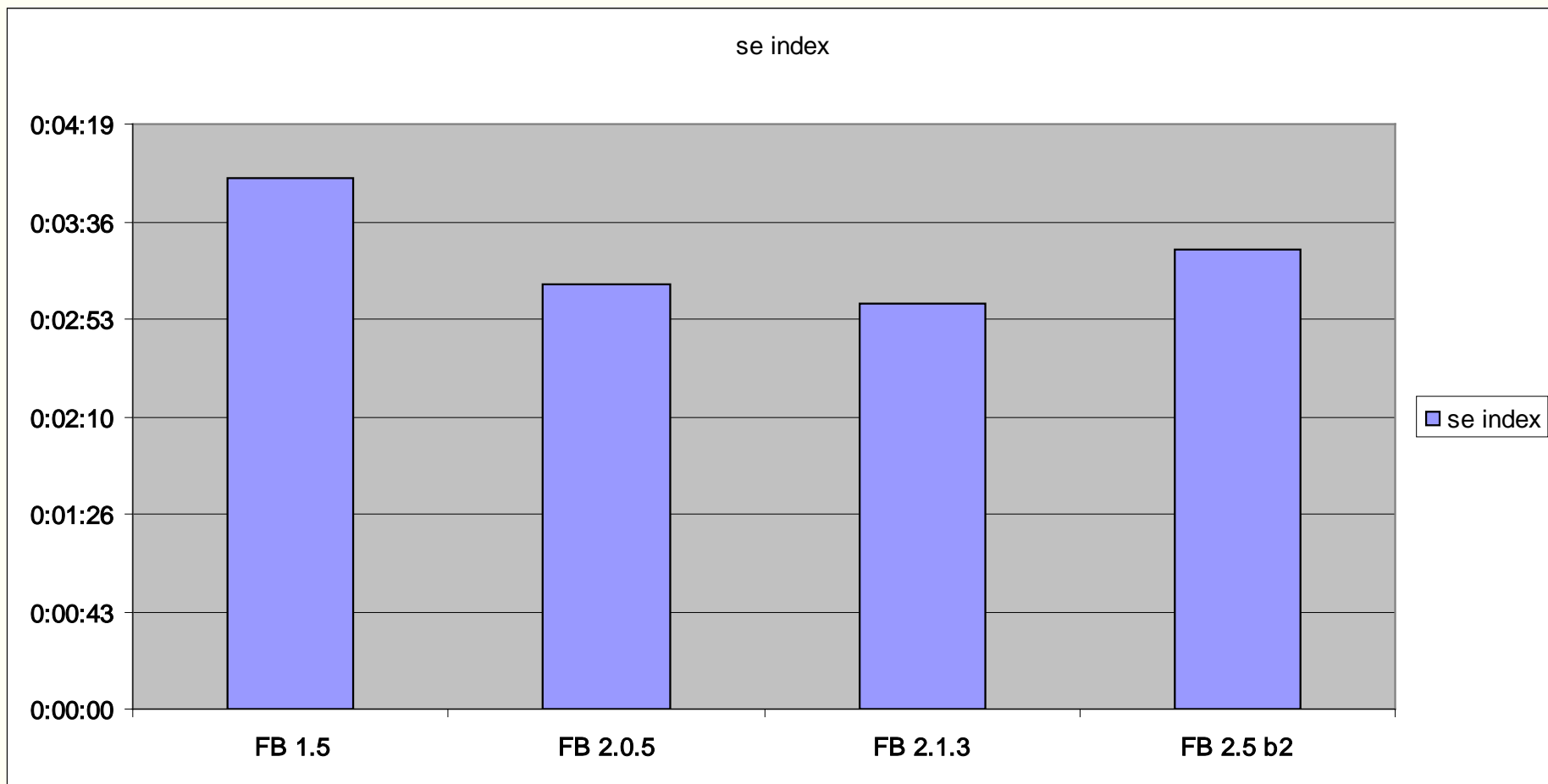
Only data



1.5 inserts data faster than all other (including 2.1)



Only indices



1.5 and 2.0 slower, as on Windows, but the difference is not big





- Questions and answers:
 - support@ibase.ru
 - support@ib-aid.com
- Thank you!

