Firebird 5 Performance Tests: 5.0 is up to 4x faster than 2.5!

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Tests

- Simple Insert Update Delete Test (5.0, 4.0, 3.0, 2.5)

- TPCC-like test (5.0, 4.0, 3.0, 2.5)

- Real-world testing for specific customer (5.0, 4.0)

Simple Insert Update Delete test

- https://ib-aid.com/en/simple-insert-update-delete-test-for-firebird/

- One-thread (1 core) execution of the following commands:
  - Create database. Create table with integer, date, varchar columns
  - Insert 1 million records, Commit
  - Update 1 million records, Commit
  - Delete 1 million records, Commit

- Database size at the end of test: 3.6Gb

- Results of the test depend on CPU and disk speed

Performance Test Results Interpretation

- Conservative Estimate: The test results represent a lower bound of the system's actual performance capabilities.

- High-Speed Limitation: For extremely fast storage devices, the test may not fully reflect performance improvements.

- High scores indicate that real-world performance could potentially exceed the measured results.

- Low scores accurately reflect poor disk performance.
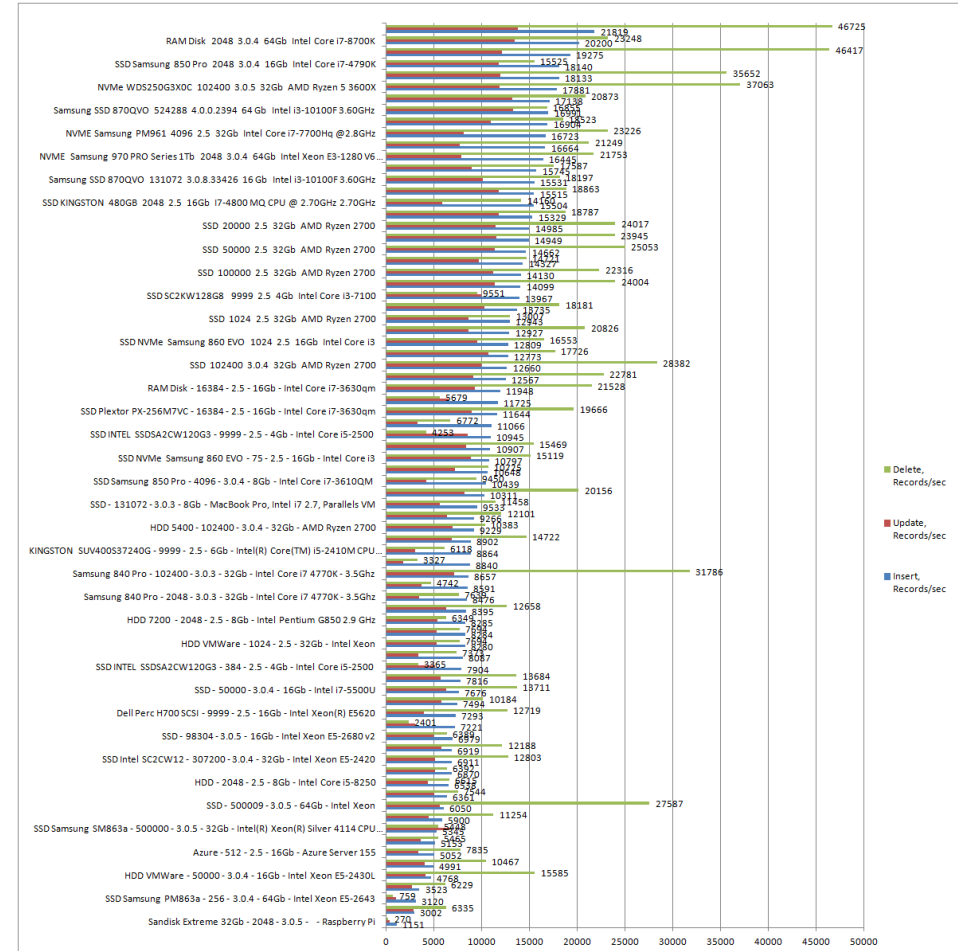
What we have tested

- Test Machine 1: 32Gb, SSD SATA Samsung 860 Pro, 3.6Ghz (Xeon), 8 cores, Windows 10

- Test Machine 2: 32Gb, SSD INTEL, Core i5 2.9Ghz, 6 cores, Windows 10

- Firebird 5: SuperServer. Page Buffers 250K (file cache is on)

- Firebird 4: SuperServer, Page Buffers 250K (file cache is on)

- Firebird 3: SuperServer, Page Buffers 250K (file cache is on)

- Firebird 2.5: SuperClassic, PageBuffers 1024 (file cache is on)

- Other parameters from Configuration Calculator for Firebird
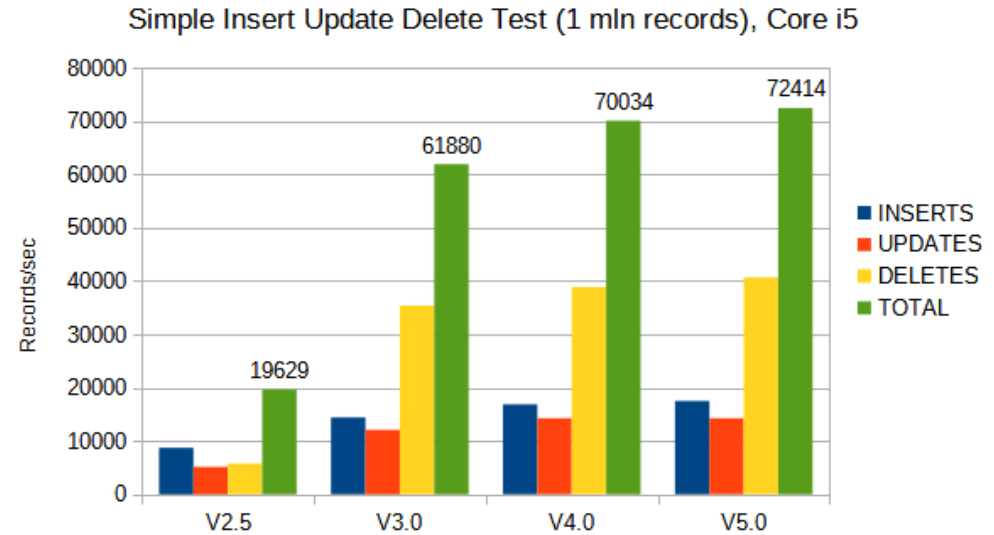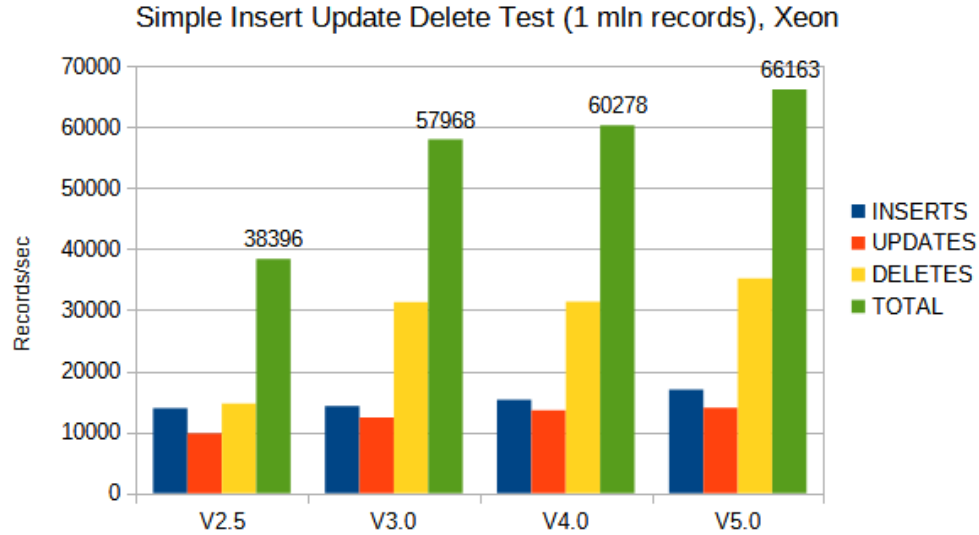
Test results of Simple IUD Test

Xeon 3.6, 32Gb RAM, SSD SATA Samsung 860 pro			
	INSERTS	UPDATES	DELETES	TOTAL
V2.5	13888	9803	14705	38396
V3.0	14285	12386	31297	57968
V4.0	15313	13575	31390	60278
V5.0	16980	14029	35154	66163
Core 5 2.9Ghz, 32Gb RAM, SSD Intel 260Gb				
	INSERTS	UPDATES	DELETES	TOTAL
V2.5	8727	5132	5770	19629
V3.0	14447	12082	35351	61880
V4.0	16890	14271	38873	70034
V5.0	17488	14277	40649	72414

Test results of Simple IUD Test

Simple Insert Update Delete Test (1 mln records), Xeon

Simple Insert Update Delete Test (1 mln records), Core i5

Summary for Simple IUD Test:

1) The single thread performance gradually increases for every version due to improvements in caching, internal processing and IO optimization

2) Result of 2.5 SuperClassic is low. Unfortunately, SuperClassic or Classic is the only choice for highload applications in 2.5 for those who did not yet migrate

TPCC-like test

- Sumulates 64 parallel connections which create orders in the typical ORDER-ORDERLINE-PRODUCT scheme

- Multi-thread test (uses many CPU cores)

TPCC-like results

	Run1	Run2	Run3	Run4	Average
2.5	18647	18635	18593	18244	**18529,75**
3.0	52395	54848	60326	51849	**54854,5**
4.0	61323	61809	56253	67653	**61759,5**
5.0	74213	68482	72239	73605	**72134,75**
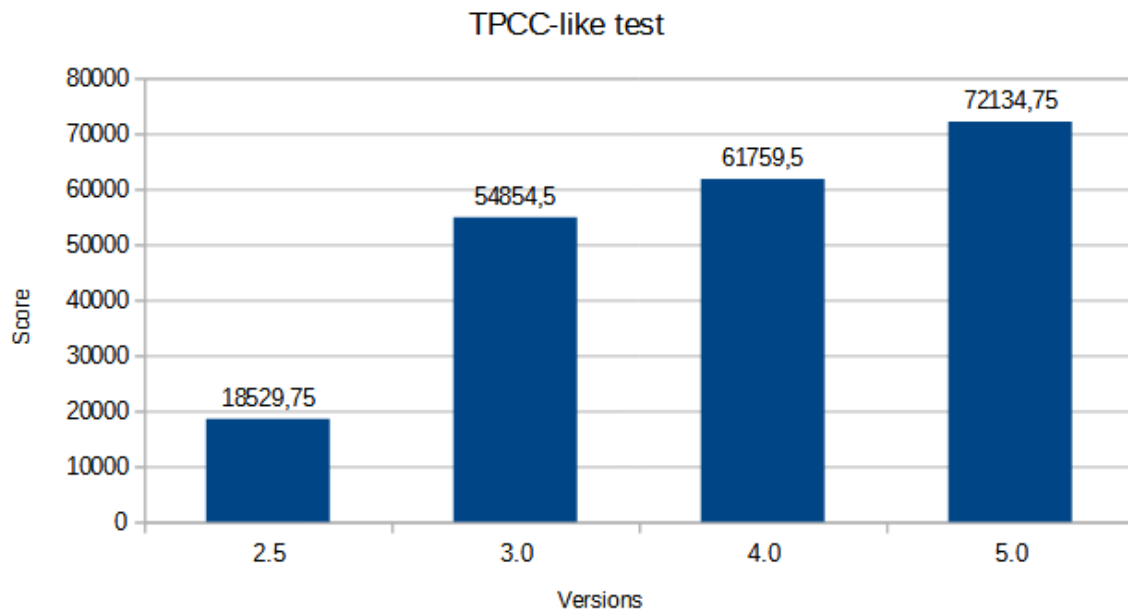
TPCC-like test

Summary for tpcc-like test:

- Test shows noticeable improvement in scalability from 3.0 to 4.0 to 5.0, and big improvement in comparison with 2.5 which suffers from its old architecture

- 5.0 better utilizes CPUs, betters scales, and shows significantly better results even in comparison with 4.0
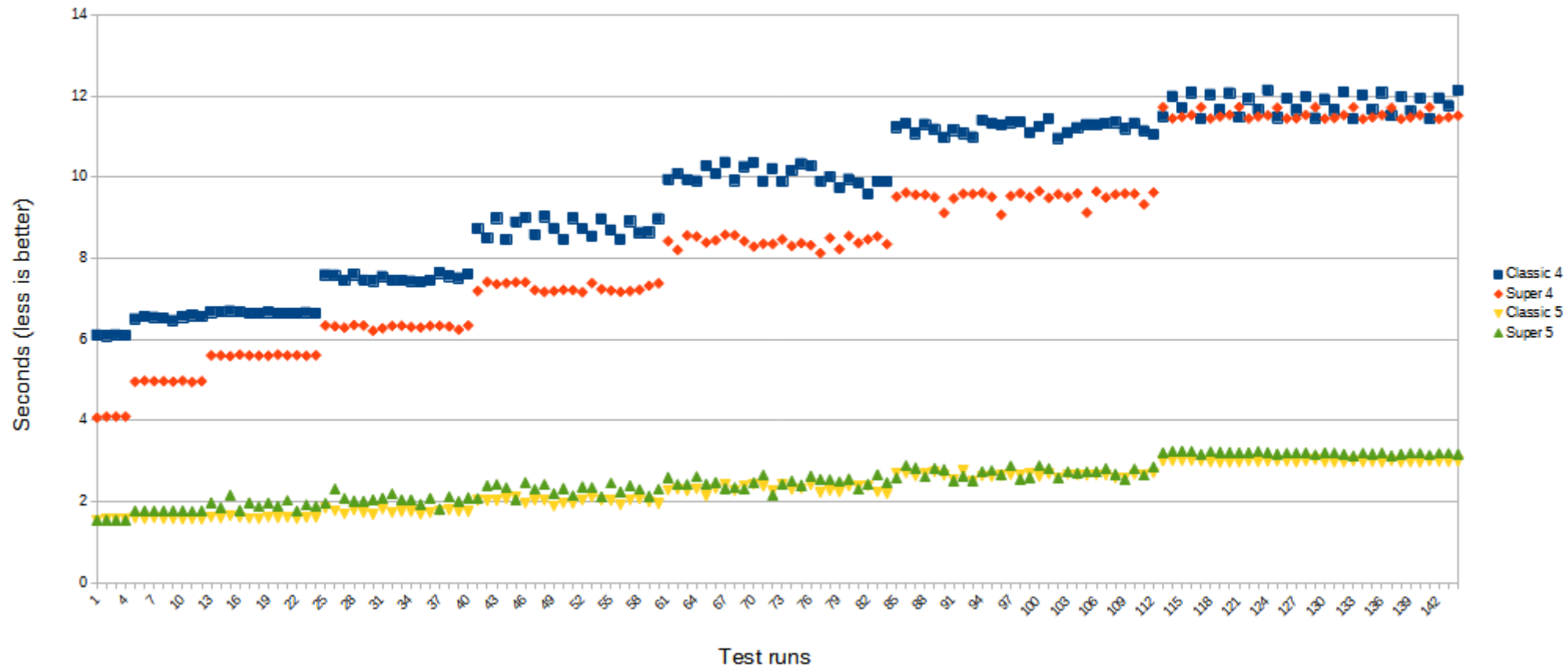
Real-world test

- Test was made on real-world database for customer under NDA to estimate effect of migration
- The query to be tested reads several hundreds thousands of records (data for 1 month)
- Query is executed in 8 groups, from 4 to 32 parallel queries (in parallel connections) to estimate degradation effect
- Tested: 4.0 SuperClassic (currently used), 4.0 SuperServer, 5.0 SuperServer. 5.0 SuperClassic
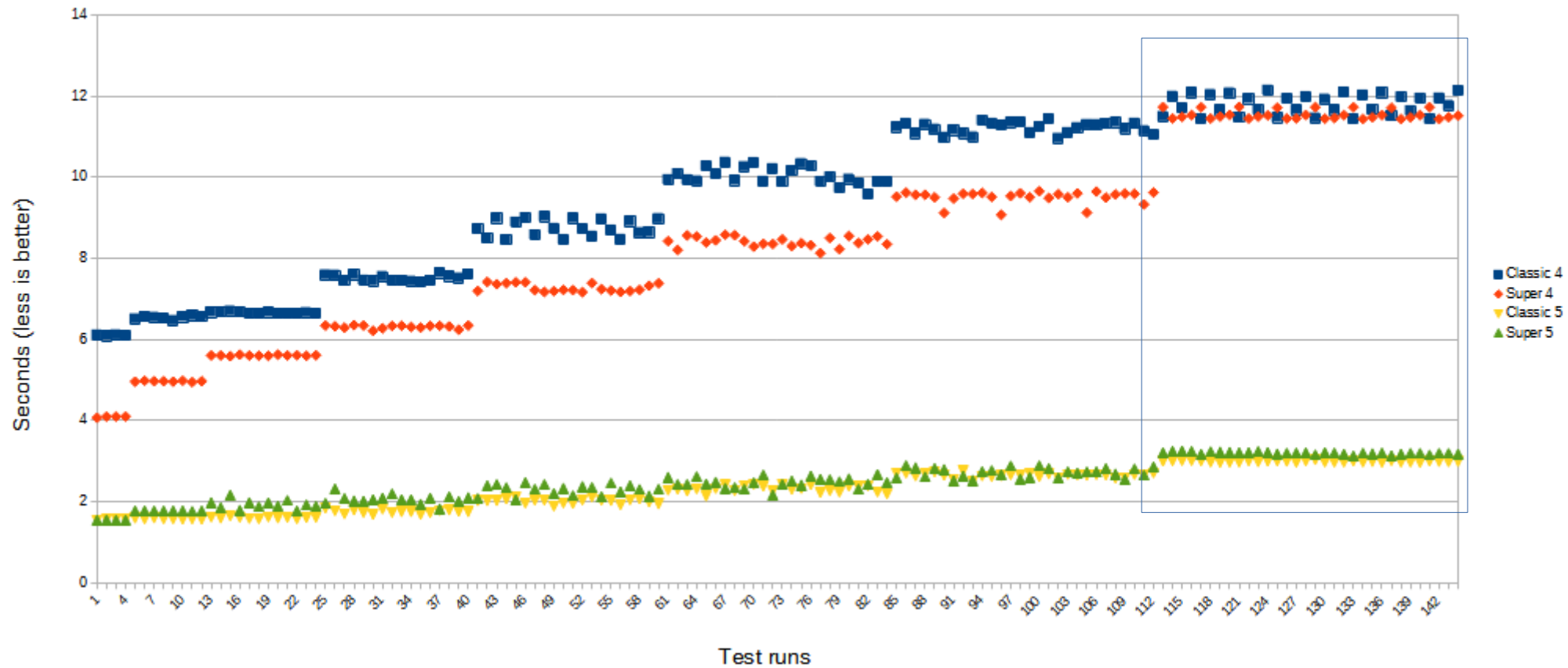
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Example of query (modified real names and params)

select MSD.MSD_MES_ID
from MSD
left join MS on MS.MES_ID = MSD.MSD_MES_ID
left join ME on ME.MED_ID = MSD.MSD_MED_ID
left join MC on MCA.MCA_ID = ME.MED_MCA_ID
left join MT on MT.MET_ID = MT.MED_MET_ID
left join ML on MEL_ID = MED_MEL_ID_P
where MES_ID in (select distinct MS.MES_ID
  from MSS MSS
  where ((upper(MSS.MES_NM) = 'FLAG1') and
      ((MS.MES_SDATE >= '01-May-2024') and
      (MS.MES_SDATE <= '31-May-2024'))) and
      (MS.MES_ISAR = 0))
```

Performance degradation for massive parallel executions

Seconds (less is better)

Test runs

Classic 4
Super 4
Classic 5
Super 5

Performance degradation for massive parallel executions

Seconds (less is better)

Test runs

Classic 4
Super 4
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Super 5

Summary for real-world test:

1) Degradation of performance in v5 is way less than in v4

2) v5 is ~4x faster than v4 for this specific query, with the same plan!

3) In v5, there is no reason from performance point of view to use Classic or SuperClassic in specific scenarious, SuperServer is generally better

Summary (Final)

- Firebird 5 demonstrates improvements in all tests we made,
    - Both single thread and multi-thread
    - in some tests up to 4x time faster in comparison with 2.5,
    - 20-40% faster with 3.0 and 4.0
- In real-world applications, improvements can be up to 4 times, but usually we see +30%

https://www.youtube.com/watch?v=w-Ng5muAAcg
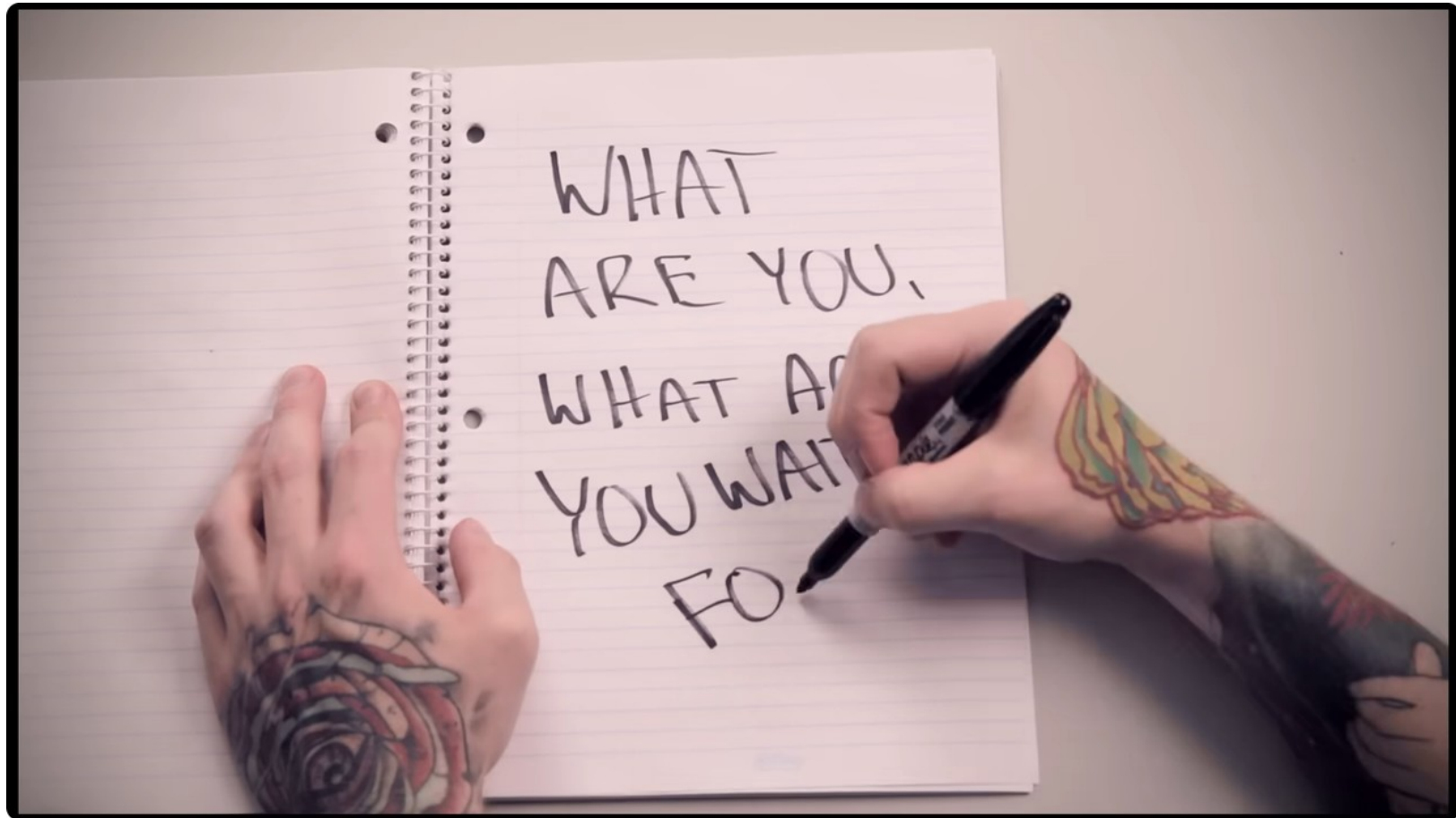
Nickelback - What Are You Waiting For? (Lyric Video)