

Планы выполнения запросов

Q1_with_LIKE.sql

```
Limit (cost=70219.60..70219.68 rows=30 width=120) (actual time=291.819..292.076 rows=30 loops=1)
  Buffers: shared hit=161563
  -> Sort (cost=70219.60..70219.80 rows=81 width=120) (actual time=291.818..292.073 rows=30 loops=1)
    Sort Key: (count(DISTINCT p.id)) DESC
    Sort Method: top-N heapsort Memory: 29kB
    Buffers: shared hit=161563
  -> GroupAggregate (cost=38910.44..70217.21 rows=81 width=120) (actual time=191.710..290.591 rows=9309 loops=1)
    Group Key: t1.tag, t2.tag
    Buffers: shared hit=161563
    -> Incremental Sort (cost=38910.44..67498.44 rows=181170 width=88) (actual time=191.697..278.321 rows=33637 loops=1)
      Sort Key: t1.tag, t2.tag, p.id
      Presorted Key: t1.tag
      Full-sort Groups: 251 Sort Method: quicksort Average Memory: 29kB Peak Memory: 29kB
      Pre-sorted Groups: 246 Sort Method: quicksort Average Memory: 133kB Peak Memory: 256kB
      Buffers: shared hit=161563
    -> Nested Loop (cost=35620.04..52282.65 rows=181170 width=88) (actual time=191.536..250.772 rows=33637 loops=1)
      Join Filter: (t1.tag < t2.tag)
      Rows Removed by Join Filter: 75188
      Buffers: shared hit=161563
      -> Gather Merge (cost=35620.02..42653.43 rows=60390 width=87) (actual time=191.516..211.882 rows=41551 loops=1)
        Workers Planned: 2
        Workers Launched: 2
        Buffers: shared hit=161563
      -> Sort (cost=34620.00..34682.90 rows=25162 width=87) (actual time=181.373..182.631 rows=13850 loops=3)
        Sort Key: t1.tag
        Sort Method: quicksort Memory: 1928kB
        Buffers: shared hit=161563
        Worker 0: Sort Method: quicksort Memory: 1843kB
        Worker 1: Sort Method: quicksort Memory: 1740kB
      -> Nested Loop (cost=1341.59..32780.79 rows=25162 width=87) (actual time=27.595..165.733 rows=13850 loops=3)
        Buffers: shared hit=161547
        -> Nested Loop Left Join (cost=1341.58..32179.64 rows=2796 width=55) (actual time=27.581..131.743 rows=7673 loops=3)
          Buffers: shared hit=161547
          -> Nested Loop Left Join (cost=1341.16..30669.17 rows=2796 width=55) (actual time=27.565..96.875 rows=7673 loops=3)
            Buffers: shared hit=83673
            -> Parallel Bitmap Heap Scan on posts p (cost=1340.74..17602.31 rows=2796 width=43) (actual time=27.546..54.461 rows=5611 loops=3)
              Recheck Cond: (((tags)::text ~ '%|postgresql|%'::text) AND (posttypeid = 1))
              Rows Removed by Index Recheck: 186
              Heap Blocks: exact=4802
              Buffers: shared hit=13564
              -> BitmapAnd (cost=1340.74..1340.74 rows=6710 width=0) (actual time=21.937..21.938 rows=0 loops=1)
                Buffers: shared hit=250
                -> Bitmap Index Scan on tags_trgm_idx (cost=0.00..199.08 rows=15753 width=0) (actual time=12.516..12.517 rows=17389 loops=1)
                  Index Cond: ((tags)::text ~ '%|postgresql|%'::text)
                  Buffers: shared hit=161
                  -> Bitmap Index Scan on idx_posts_posttypeid (cost=0.00..1138.06 rows=103685 width=0) (actual time=8.849..8.849 rows=103026 loops=1)
                    Index Cond: (posttypeid = 1)
                    Buffers: shared hit=89
                    -> Index Scan using idx_posts_parentid on posts a (cost=0.42..4.65 rows=2 width=16) (actual time=0.004..0.005 rows=1 loops=16832)
                      Index Cond: (parentid = p.id)
                      Buffers: shared hit=70109
                      -> Index Scan using pk_users on users u (cost=0.42..0.54 rows=1 width=8) (actual time=0.003..0.003 rows=1 loops=23020)
                        Index Cond: (id = a.owneruserid)
                        Buffers: shared hit=77874
                        -> Function Scan on unnest t1 (cost=0.01..0.13 rows=9 width=32) (actual time=0.003..0.004 rows=2 loops=23020)
                          Filter: (tag <> 'postgresql'::text)
                          Rows Removed by Filter: 1
                        -> Memoize (cost=0.02..0.14 rows=9 width=32) (actual time=0.000..0.001 rows=3 loops=41551)
                          Cache Key: p.tags
                          Cache Mode: binary
                          Hits: 33864 Misses: 7687 Evictions: 0 Overflows: 0 Memory Usage: 1677kB
                          -> Function Scan on unnest t2 (cost=0.01..0.13 rows=9 width=32) (actual time=0.001..0.001 rows=3 loops=7687)
                            Filter: (tag <> 'postgresql'::text)
                            Rows Removed by Filter: 1
Planning:
  Buffers: shared hit=33
Planning Time: 0.946 ms
Execution Time: 292.308 ms
(68 rows)
```

Q1_with_PostTags.sql

```
Limit (cost=34595.53..34595.61 rows=30 width=78) (actual time=330.343..330.420 rows=30 loops=1)
  Buffers: shared hit=431367
  -> Sort (cost=34595.53..34602.50 rows=2789 width=78) (actual time=330.342..330.417 rows=30 loops=1)
    Sort Key: (count(DISTINCT q.id)) DESC
    Sort Method: top-N heapsort Memory: 30kB
    Buffers: shared hit=431367
    -> GroupAggregate (cost=34097.69..34513.16 rows=2789 width=78) (actual time=298.536..328.899 rows=9309 loops=1)
      Group Key: t1.tagname, t2.tagname
      Buffers: shared hit=431367
      -> Gather Merge (cost=34097.69..34422.52 rows=2789 width=46) (actual time=298.518..317.508 rows=33637 loops=1)
        Workers Planned: 2
        Workers Launched: 2
        Buffers: shared hit=431367
        -> Sort (cost=33097.67..33100.57 rows=1162 width=46) (actual time=288.391..289.011 rows=11212 loops=3)
          Sort Key: t1.tagname, t2.tagname, q.id
          Sort Method: quicksort Memory: 1254kB
          Buffers: shared hit=431367
          Worker 0: Sort Method: quicksort Memory: 1130kB
          Worker 1: Sort Method: quicksort Memory: 1187kB
          -> Hash Join (cost=3034.88..33038.51 rows=1162 width=46) (actual time=44.104..256.157 rows=11212 loops=3)
            Hash Cond: (pt2.tagid = t2.id)
            Buffers: shared hit=431343
            -> Hash Join (cost=2997.93..32998.50 rows=1162 width=39) (actual time=43.819..253.833 rows=11212 loops=3)
              Hash Cond: (pt1.tagid = t1.id)
              Buffers: shared hit=431280
              -> Nested Loop Left Join (cost=2960.99..32958.50 rows=1162 width=32) (actual time=43.598..246.543 rows=11212 loops=3)
                Buffers: shared hit=431253
                -> Nested Loop Left Join (cost=2960.57..32330.76 rows=1162 width=32) (actual time=43.584..198.207 rows=11212 loops=3)
                  Buffers: shared hit=313791
                  -> Nested Loop (cost=2960.15..30366.50 rows=1162 width=20) (actual time=43.573..155.045 rows=7918 loops=3)
                    Join Filter: (q.id = pt2.postid)
                    Buffers: shared hit=213544
                    -> Nested Loop (cost=2959.73..28841.97 rows=3249 width=24) (actual time=43.559..121.165 rows=9950 loops=3)
                      Buffers: shared hit=123918
                      -> Merge Join (cost=2959.31..9429.88 rows=20928 width=12) (actual time=43.532..94.253 rows=9950 loops=3)
                        Merge Cond: (pt1.postid = pt.postid)
                        Buffers: shared hit=4516
                        -> Parallel Index Only Scan using idx_posttags_postid_tagid on posttags pt1 (cost=0.42..5905.05 rows=108837 width=8) (actual time=0.023..32.293 rows=87143 loops=3)
                          Filter: (tagid <> 10)
                          Rows Removed by Filter: 5611
                          Heap Fetches: 0
                          Buffers: shared hit=767
                          -> Sort (cost=2958.88..2998.80 rows=15967 width=4) (actual time=43.497..47.012 rows=21714 loops=3)
                            Sort Key: pt.postid
                            Sort Method: quicksort Memory: 769kB
                            Buffers: shared hit=3749
                            Worker 0: Sort Method: quicksort Memory: 769kB
                            Worker 1: Sort Method: quicksort Memory: 769kB
                            -> HashAggregate (cost=1684.49..1844.16 rows=15967 width=4) (actual time=33.109..37.595 rows=16832 loops=3)
                              Group Key: pt.postid
                              Batches: 1 Memory Usage: 1553kB
                              Buffers: shared hit=3749
                              Worker 0: Batches: 1 Memory Usage: 1553kB
                              Worker 1: Batches: 1 Memory Usage: 1553kB
                              -> Bitmap Heap Scan on posttags pt (cost=196.62..1641.85 rows=17058 width=4) (actual time=4.051..22.228 rows=16832 loops=3)
                                Recheck Cond: (tagid = 10)
                                Heap Blocks: exact=1232
                                Buffers: shared hit=3749
                                -> Bitmap Index Scan on idx_posttags_tagid (cost=0.00..192.36 rows=17058 width=0) (actual time=3.948..3.949 rows=16832 loops=3)
                                  Index Cond: (tagid = 10)
                                  Buffers: shared hit=53
                                  -> Index Scan using pk_posts on posts q (cost=0.42..0.93 rows=1 width=12) (actual time=0.002..0.002 rows=1 loops=29850)
                                    Index Cond: (id = pt1.postid)
                                    Filter: (posttypeid = 1)
                                    Buffers: shared hit=119402
                                    -> Index Only Scan using idx_posttags_postid_tagid on posttags pt2 (cost=0.42..0.46 rows=1 width=8) (actual time=0.002..0.002 rows=1 loops=29850)
                                      Index Cond: ((postid = pt1.postid) AND (tagid > pt1.tagid))
                                      Filter: (tagid <> 10)
                                      Rows Removed by Filter: 0
                                      Heap Fetches: 0
                                      Buffers: shared hit=89626
                                      -> Index Scan using idx_posts_parentid on posts a (cost=0.42..1.67 rows=2 width=16) (actual time=0.003..0.004 rows=1 loops=23755)
                                        Index Cond: (parentid = q.id)
                                        Buffers: shared hit=100247
                                        -> Index Scan using pk_users on users u (cost=0.42..0.54 rows=1 width=8) (actual time=0.003..0.003 rows=1 loops=33637)
                                          Index Cond: (id = a.owneruserid)
                                          Buffers: shared hit=117462
                                          -> Hash (cost=21.42..21.42 rows=1242 width=15) (actual time=0.211..0.211 rows=1242 loops=3)
                                            Buckets: 2048 Batches: 1 Memory Usage: 76kB
                                            Buffers: shared hit=27
                                            -> Seq Scan on tags t1 (cost=0.00..21.42 rows=1242 width=15) (actual time=0.002..0.078 rows=1242 loops=3)
                                              Buffers: shared hit=27
                                              -> Hash (cost=21.42..21.42 rows=1242 width=15) (actual time=0.255..0.255 rows=1242 loops=3)
                                                Buckets: 2048 Batches: 1 Memory Usage: 76kB
                                                Buffers: shared hit=27
                                                -> Seq Scan on tags t2 (cost=0.00..21.42 rows=1242 width=15) (actual time=0.012..0.110 rows=1242 loops=3)
                                                  Buffers: shared hit=27

Planning:
  Buffers: shared hit=156
  Planning Time: 10.709 ms
  Execution Time: 330.619 ms
(91 rows)
```

Q2.sql

QUERY PLAN

```
-----
Limit (cost=1.55..3485.70 rows=30 width=22) (actual time=0.068..16.615 rows=16 loops=1)
  Buffers: shared hit=23680
  -> Nested Loop Left Join (cost=1.55..62600.02 rows=539 width=22) (actual time=0.067..16.610 rows=16 loops=1)
    Buffers: shared hit=23680
    -> Nested Loop (cost=1.13..60897.63 rows=539 width=16) (actual time=0.060..16.531 rows=16 loops=1)
      Buffers: shared hit=23616
      -> Nested Loop (cost=0.71..57319.71 rows=7693 width=16) (actual time=0.053..16.248 rows=134 loops=1)
        Buffers: shared hit=23213
        -> Index Scan using idx_posts_score on posts a (cost=0.42..26929.19 rows=7693 width=12) (actual time=0.014..7.145 rows=7862 loops=1)
          Index Cond: (score < 0)
          Buffers: shared hit=7355
        -> Index Scan using idx_posts_acceptedanswerid on posts q (cost=0.29..3.94 rows=1 width=8) (actual time=0.001..0.001 rows=0 loops=7862)
          Index Cond: (acceptedanswerid = a.id)
          Buffers: shared hit=15858
      -> Index Only Scan using idx_posttags_postid_tagid on posttags pt (cost=0.42..0.46 rows=1 width=4) (actual time=0.002..0.002 rows=0 loops=134)
        Index Cond: ((postid = q.id) AND (tagid = 10))
        Heap Fetches: 0
        Buffers: shared hit=403
    -> Index Scan using pk_users on users u (cost=0.42..3.16 rows=1 width=14) (actual time=0.004..0.004 rows=1 loops=16)
      Index Cond: (id = a.owneruserid)
      Buffers: shared hit=64

Planning:
  Buffers: shared hit=40
Planning Time: 0.481 ms
Execution Time: 16.654 ms
(25 rows)
```