

Out[9705]:

[Show Code](#)

FAILED QUERIES

optimize joins before

| benchmark | query | mean_duration | std_dev |
|-----------|-------|---------------|---------|
|-----------|-------|---------------|---------|

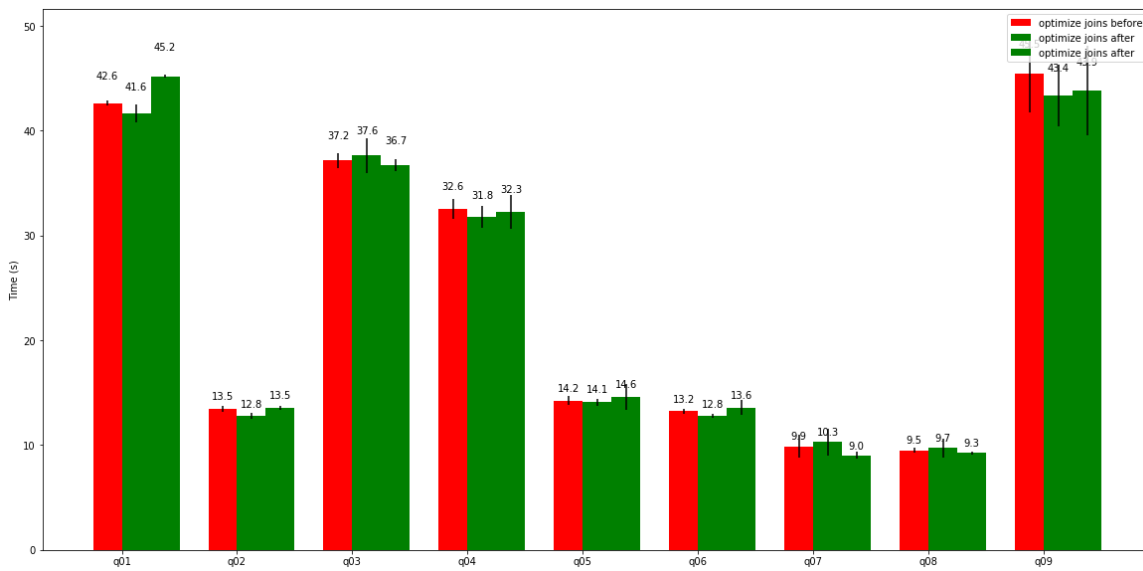
optimize joins after

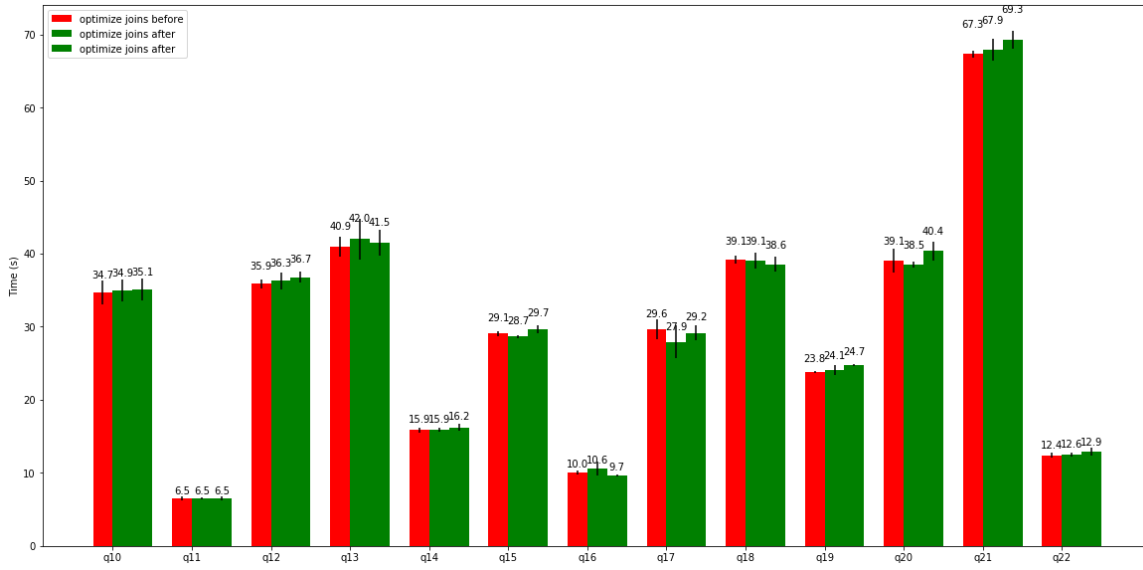
| benchmark | query | mean_duration | std_dev |
|-----------|-------|---------------|---------|
|-----------|-------|---------------|---------|

optimize joins after

| benchmark | query | mean_duration | std_dev |
|-----------|-------|---------------|---------|
|-----------|-------|---------------|---------|

TPC-H Comparison (DURATION)

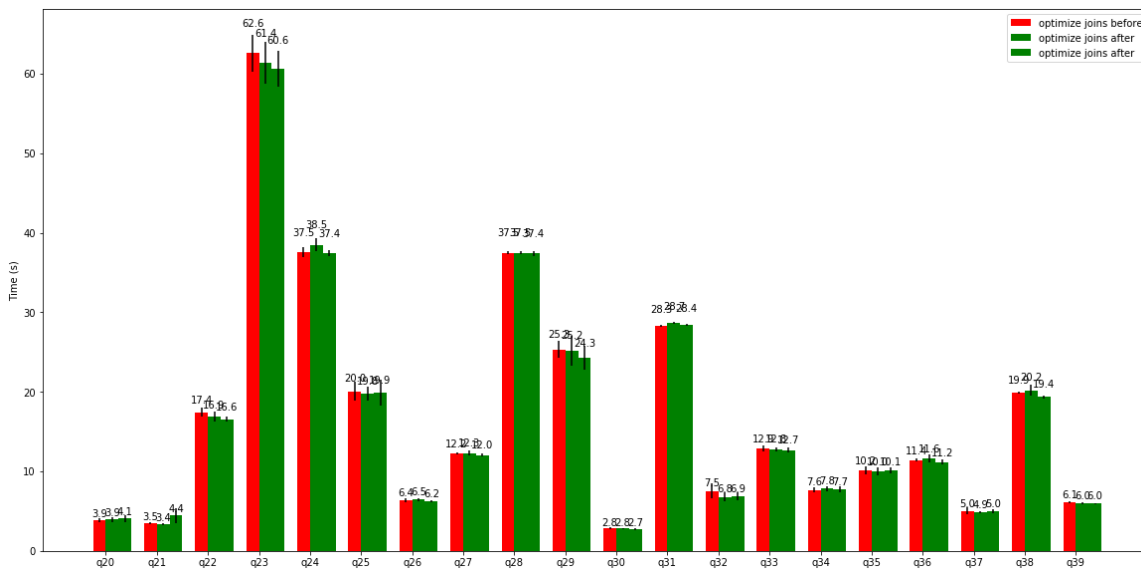
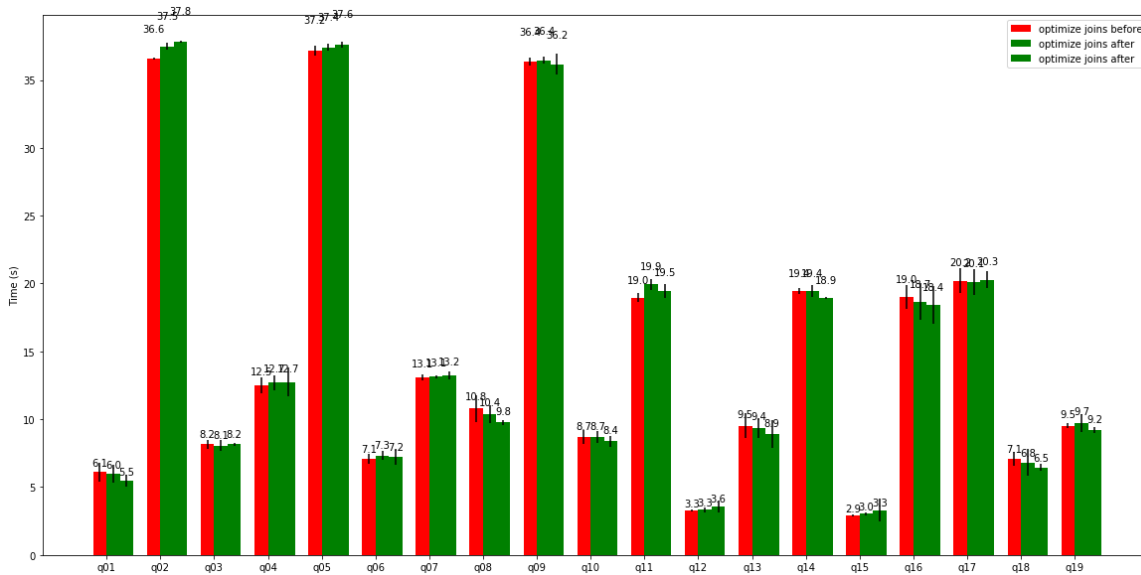


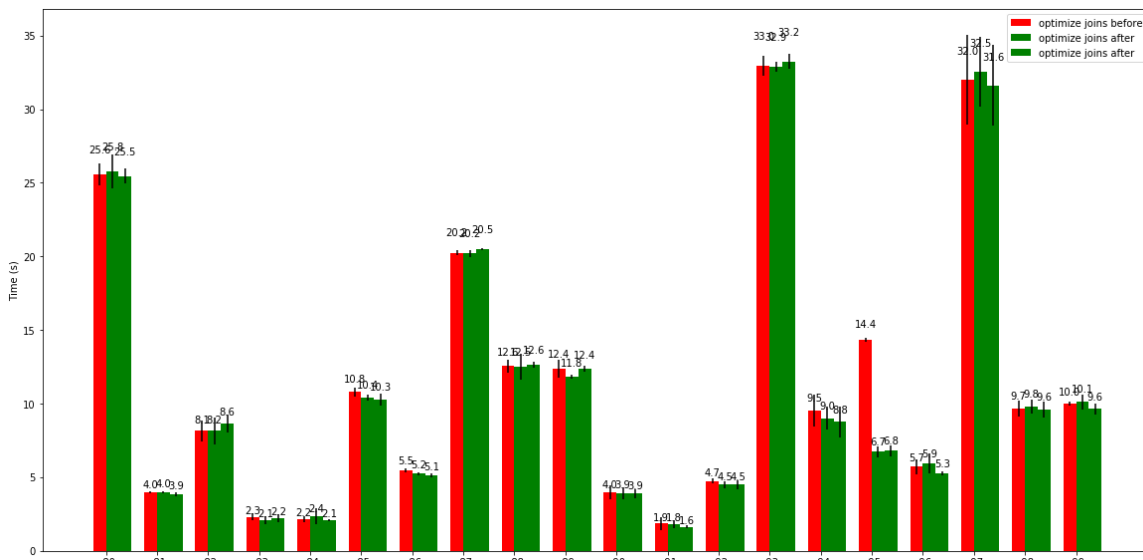
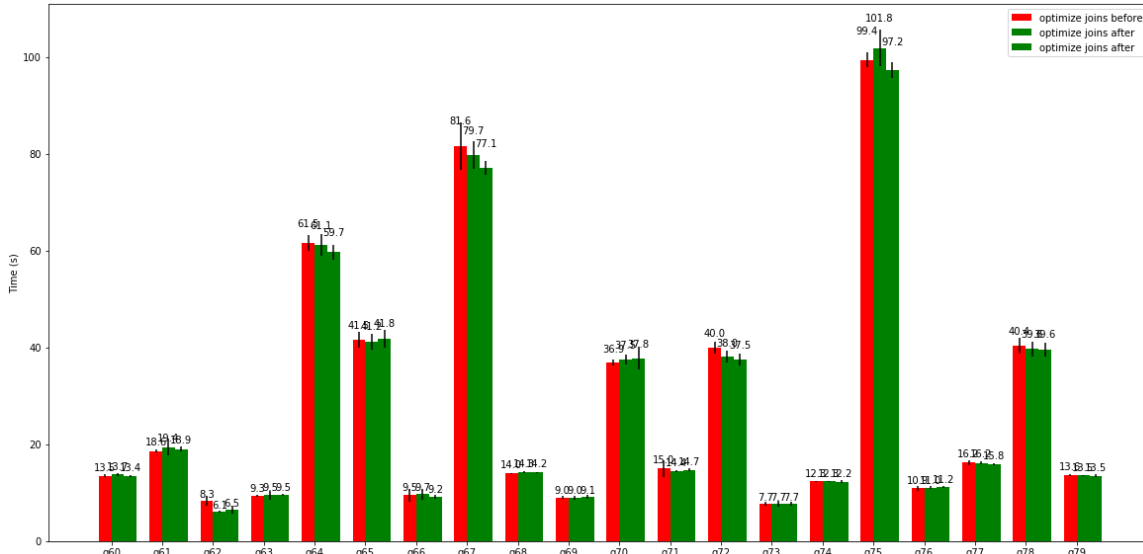
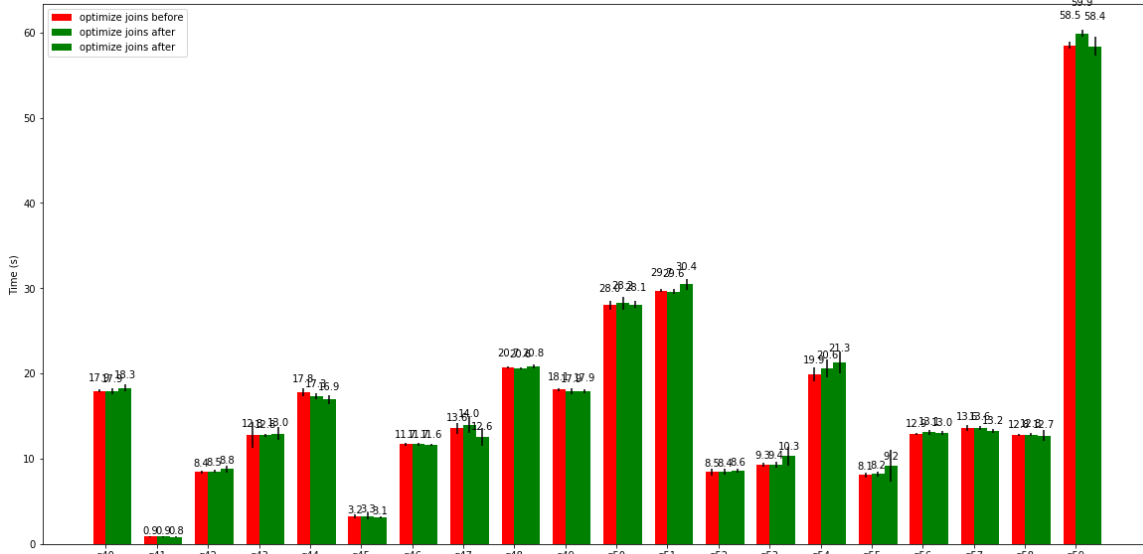


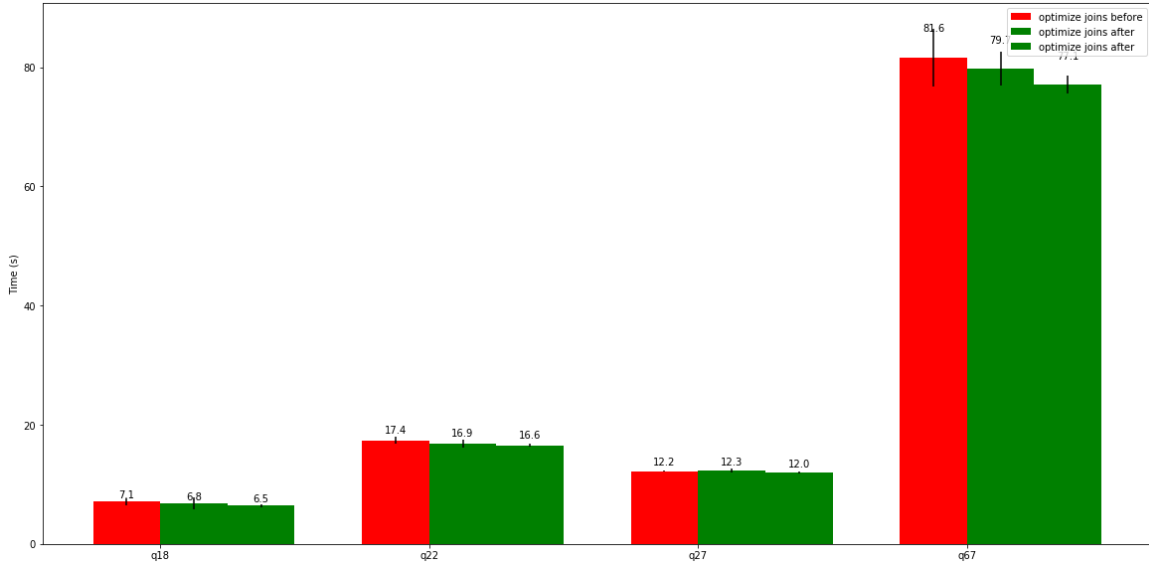
| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 0 | presto/tpch: q01 | 42.622833 | 0.249925 | 45.206667 | 0.114603 | 45.206667 | 0.114603 |
| 1 | presto/tpch: q02 | 13.479833 | 0.281877 | 13.549167 | 0.179066 | 13.549167 | 0.179066 |
| 2 | presto/tpch: q03 | 37.161667 | 0.732937 | 36.730000 | 0.564764 | 36.730000 | 0.564764 |
| 3 | presto/tpch: q04 | 32.554500 | 0.957807 | 32.267333 | 1.611557 | 32.267333 | 1.611557 |
| 4 | presto/tpch: q05 | 14.225833 | 0.421788 | 14.570167 | 1.241349 | 14.570167 | 1.241349 |
| 5 | presto/tpch: q06 | 13.247333 | 0.258873 | 13.590667 | 0.728801 | 13.590667 | 0.728801 |
| 6 | presto/tpch: q07 | 9.891167 | 1.087881 | 9.016333 | 0.322618 | 9.016333 | 0.322618 |
| 7 | presto/tpch: q08 | 9.500500 | 0.240777 | 9.256167 | 0.132338 | 9.256167 | 0.132338 |
| 8 | presto/tpch: q09 | 45.461333 | 3.681000 | 43.852333 | 4.286104 | 43.852333 | 4.286104 |
| 9 | presto/tpch: q10 | 34.653167 | 1.639496 | 35.104167 | 1.465750 | 35.104167 | 1.465750 |
| 10 | presto/tpch: q11 | 6.538500 | 0.257984 | 6.494500 | 0.218902 | 6.494500 | 0.218902 |
| 11 | presto/tpch: q12 | 35.861833 | 0.606971 | 36.738167 | 0.747405 | 36.738167 | 0.747405 |
| 12 | presto/tpch: q13 | 40.946333 | 1.358984 | 41.510000 | 1.815585 | 41.510000 | 1.815585 |
| 13 | presto/tpch: q14 | 15.878500 | 0.342226 | 16.227333 | 0.472396 | 16.227333 | 0.472396 |
| 14 | presto/tpch: q15 | 29.059833 | 0.317096 | 29.674833 | 0.501645 | 29.674833 | 0.501645 |
| 15 | presto/tpch: q16 | 10.031333 | 0.323243 | 9.682333 | 0.127558 | 9.682333 | 0.127558 |
| 16 | presto/tpch: q17 | 29.640667 | 1.378404 | 29.168500 | 1.026407 | 29.168500 | 1.026407 |
| 17 | presto/tpch: q18 | 39.129500 | 0.554518 | 38.566500 | 1.078967 | 38.566500 | 1.078967 |
| 18 | presto/tpch: q19 | 23.765667 | 0.158423 | 24.725500 | 0.157221 | 24.725500 | 0.157221 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 19 | presto/tpch: q20 | 39.080333 | 1.601798 | 40.364833 | 1.325210 | 40.364833 | 1.325210 |
| 20 | presto/tpch: q21 | 67.305333 | 0.505848 | 69.263833 | 1.217612 | 69.263833 | 1.217612 |
| 21 | presto/tpch: q22 | 12.426500 | 0.293476 | 12.886667 | 0.545762 | 12.886667 | 0.545762 |

TPC-DS Comparison (DURATION)







| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 0 | presto/tpcds: q01 | 6.116500 | 0.679651 | 5.498667 | 0.441816 | 5.498667 | 0.441816 |
| 1 | presto/tpcds: q02 | 36.596500 | 0.071682 | 37.806833 | 0.079098 | 37.806833 | 0.079098 |
| 2 | presto/tpcds: q03 | 8.157333 | 0.339204 | 8.165500 | 0.121689 | 8.165500 | 0.121689 |
| 3 | presto/tpcds: q04 | 12.501167 | 0.595333 | 12.738667 | 1.047171 | 12.738667 | 1.047171 |
| 4 | presto/tpcds: q05 | 37.165833 | 0.347710 | 37.606167 | 0.229943 | 37.606167 | 0.229943 |
| 5 | presto/tpcds: q06 | 7.085500 | 0.342457 | 7.195833 | 0.586749 | 7.195833 | 0.586749 |
| 6 | presto/tpcds: q07 | 13.087833 | 0.220055 | 13.234500 | 0.307354 | 13.234500 | 0.307354 |
| 7 | presto/tpcds: q08 | 10.785333 | 1.015152 | 9.755333 | 0.185395 | 9.755333 | 0.185395 |
| 8 | presto/tpcds: q09 | 36.352333 | 0.320469 | 36.169000 | 0.759376 | 36.169000 | 0.759376 |
| 9 | presto/tpcds: q10 | 8.670333 | 0.511927 | 8.399500 | 0.401614 | 8.399500 | 0.401614 |
| 10 | presto/tpcds: q11 | 18.967167 | 0.332293 | 19.468500 | 0.520826 | 19.468500 | 0.520826 |
| 11 | presto/tpcds: q12 | 3.273167 | 0.066994 | 3.600833 | 0.443346 | 3.600833 | 0.443346 |
| 12 | presto/tpcds: q13 | 9.525000 | 0.916076 | 8.890500 | 1.016421 | 8.890500 | 1.016421 |
| 13 | presto/tpcds: q14 | 19.433500 | 0.216603 | 18.948667 | 0.092543 | 18.948667 | 0.092543 |
| 14 | presto/tpcds: q15 | 2.909500 | 0.096172 | 3.308833 | 0.834855 | 3.308833 | 0.834855 |
| 15 | presto/tpcds: q16 | 19.026500 | 0.892646 | 18.412167 | 1.382108 | 18.412167 | 1.382108 |
| 16 | presto/tpcds: q17 | 20.207000 | 0.930374 | 20.261167 | 0.622083 | 20.261167 | 0.622083 |
| 17 | presto/tpcds: q18 | 7.093000 | 0.531788 | 6.452333 | 0.236093 | 6.452333 | 0.236093 |
| 18 | presto/tpcds: q19 | 9.527833 | 0.194187 | 9.206333 | 0.229564 | 9.206333 | 0.229564 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 19 | presto/tpcds: q20 | 3.868667 | 0.285340 | 4.061833 | 0.456644 | 4.061833 | 0.456644 |
| 20 | presto/tpcds: q21 | 3.497500 | 0.135848 | 4.425667 | 0.960985 | 4.425667 | 0.960985 |
| 21 | presto/tpcds: q22 | 17.403833 | 0.554748 | 16.574167 | 0.315470 | 16.574167 | 0.315470 |
| 22 | presto/tpcds: q23 | 62.581000 | 2.294678 | 60.592000 | 2.265327 | 60.592000 | 2.265327 |
| 23 | presto/tpcds: q24 | 37.534167 | 0.611931 | 37.442000 | 0.386098 | 37.442000 | 0.386098 |
| 24 | presto/tpcds: q25 | 20.047500 | 1.197005 | 19.906167 | 1.597207 | 19.906167 | 1.597207 |
| 25 | presto/tpcds: q26 | 6.364000 | 0.261405 | 6.237167 | 0.149307 | 6.237167 | 0.149307 |
| 26 | presto/tpcds: q27 | 12.225500 | 0.125154 | 12.031167 | 0.178761 | 12.031167 | 0.178761 |
| 27 | presto/tpcds: q28 | 37.451667 | 0.185973 | 37.408500 | 0.302590 | 37.408500 | 0.302590 |
| 28 | presto/tpcds: q29 | 25.333833 | 1.038785 | 24.290500 | 1.495680 | 24.290500 | 1.495680 |
| 29 | presto/tpcds: q30 | 2.825333 | 0.116574 | 2.732667 | 0.091088 | 2.732667 | 0.091088 |
| 30 | presto/tpcds: q31 | 28.285000 | 0.092445 | 28.385333 | 0.118755 | 28.385333 | 0.118755 |
| 31 | presto/tpcds: q32 | 7.549333 | 0.944894 | 6.880833 | 0.549740 | 6.880833 | 0.549740 |
| 32 | presto/tpcds: q33 | 12.857500 | 0.361700 | 12.691167 | 0.320596 | 12.691167 | 0.320596 |
| 33 | presto/tpcds: q34 | 7.640833 | 0.304315 | 7.711167 | 0.394252 | 7.711167 | 0.394252 |
| 34 | presto/tpcds: q35 | 10.157000 | 0.498143 | 10.113667 | 0.423461 | 10.113667 | 0.423461 |
| 35 | presto/tpcds: q36 | 11.385833 | 0.181664 | 11.181667 | 0.288666 | 11.181667 | 0.288666 |
| 36 | presto/tpcds: q37 | 5.035167 | 0.397835 | 4.991833 | 0.270675 | 4.991833 | 0.270675 |
| 37 | presto/tpcds: q38 | 19.893667 | 0.181069 | 19.350000 | 0.164325 | 19.350000 | 0.164325 |

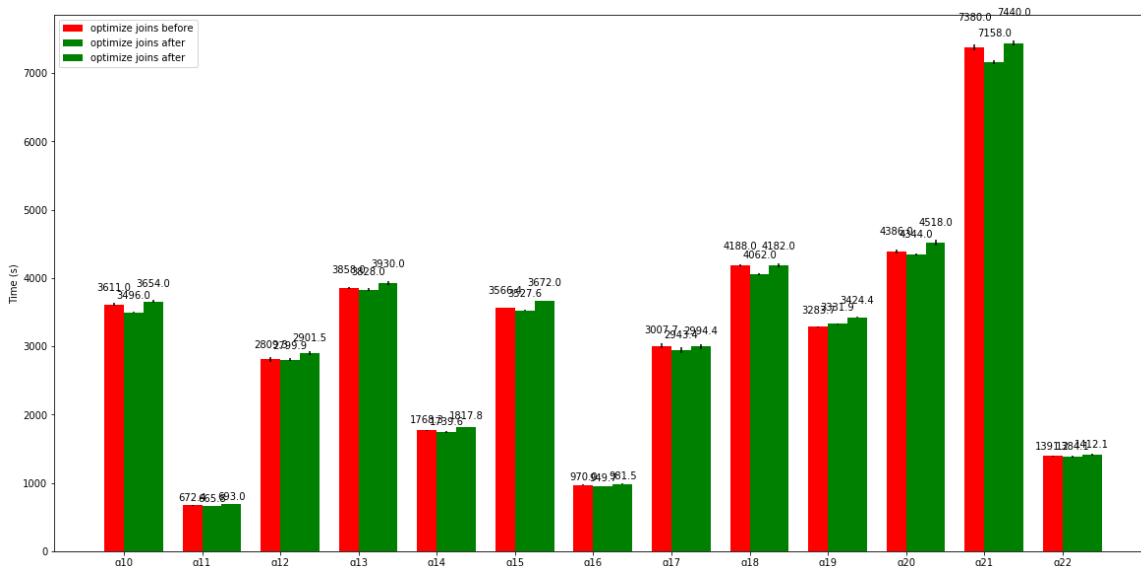
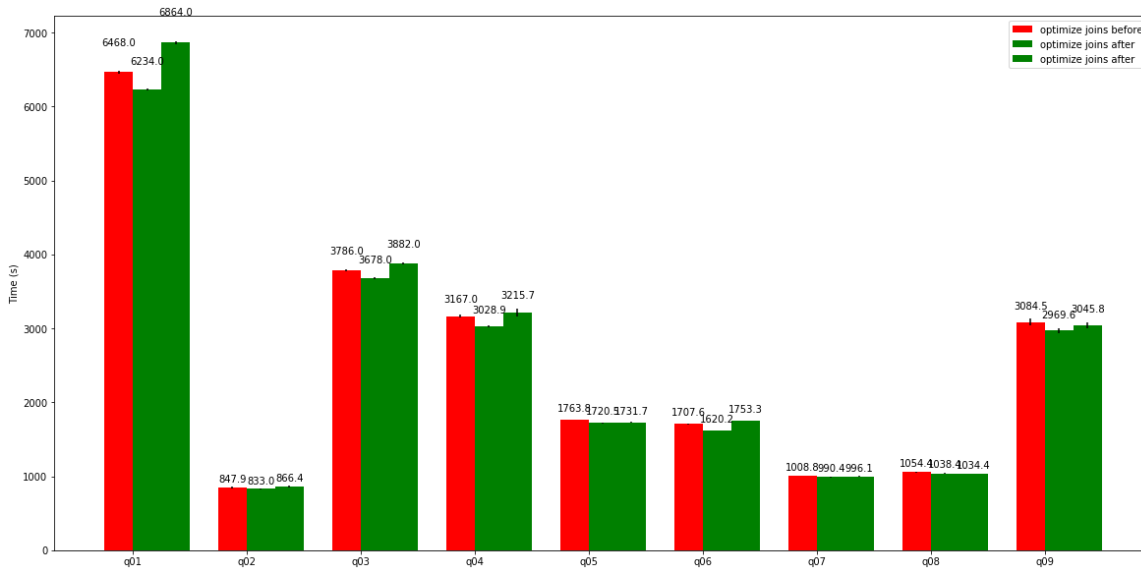
| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 38 | presto/tpcds: q39 | 6.107167 | 0.137003 | 5.959000 | 0.083078 | 5.959000 | 0.083078 |
| 39 | presto/tpcds: q40 | 17.949500 | 0.172699 | 18.306833 | 0.406029 | 18.306833 | 0.406029 |
| 40 | presto/tpcds: q41 | 0.885000 | 0.078154 | 0.836667 | 0.049029 | 0.836667 | 0.049029 |
| 41 | presto/tpcds: q42 | 8.424500 | 0.139738 | 8.810000 | 0.390340 | 8.810000 | 0.390340 |
| 42 | presto/tpcds: q43 | 12.832000 | 1.527138 | 12.953000 | 0.772383 | 12.953000 | 0.772383 |
| 43 | presto/tpcds: q44 | 17.816667 | 0.482712 | 16.949000 | 0.496354 | 16.949000 | 0.496354 |
| 44 | presto/tpcds: q45 | 3.248000 | 0.249585 | 3.098000 | 0.139478 | 3.098000 | 0.139478 |
| 45 | presto/tpcds: q46 | 11.690500 | 0.208832 | 11.629667 | 0.094163 | 11.629667 | 0.094163 |
| 46 | presto/tpcds: q47 | 13.560333 | 0.640657 | 12.571167 | 1.061734 | 12.571167 | 1.061734 |
| 47 | presto/tpcds: q48 | 20.735000 | 0.129194 | 20.804667 | 0.207189 | 20.804667 | 0.207189 |
| 48 | presto/tpcds: q49 | 18.096833 | 0.156617 | 17.928333 | 0.210422 | 17.928333 | 0.210422 |
| 49 | presto/tpcds: q50 | 28.000333 | 0.523182 | 28.089833 | 0.392134 | 28.089833 | 0.392134 |
| 50 | presto/tpcds: q51 | 29.731500 | 0.172022 | 30.448333 | 0.636851 | 30.448333 | 0.636851 |
| 51 | presto/tpcds: q52 | 8.464000 | 0.409719 | 8.599667 | 0.266568 | 8.599667 | 0.266568 |
| 52 | presto/tpcds: q53 | 9.285167 | 0.239820 | 10.288500 | 1.161904 | 10.288500 | 1.161904 |
| 53 | presto/tpcds: q54 | 19.926833 | 0.820423 | 21.342333 | 1.292372 | 21.342333 | 1.292372 |
| 54 | presto/tpcds: q55 | 8.074667 | 0.284109 | 9.198333 | 1.882506 | 9.198333 | 1.882506 |
| 55 | presto/tpcds: q56 | 12.919500 | 0.116625 | 13.010000 | 0.191052 | 13.010000 | 0.191052 |
| 56 | presto/tpcds: q57 | 13.605167 | 0.311146 | 13.221500 | 0.232786 | 13.221500 | 0.232786 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 57 | presto/tpcds: q58 | 12.781333 | 0.088991 | 12.708167 | 0.649693 | 12.708167 | 0.649693 |
| 58 | presto/tpcds: q59 | 58.500333 | 0.420206 | 58.394500 | 1.075477 | 58.394500 | 1.075477 |
| 59 | presto/tpcds: q60 | 13.512333 | 0.248420 | 13.381167 | 0.249539 | 13.381167 | 0.249539 |
| 60 | presto/tpcds: q61 | 18.573333 | 0.353104 | 18.931500 | 0.508530 | 18.931500 | 0.508530 |
| 61 | presto/tpcds: q62 | 8.314167 | 0.939429 | 6.474500 | 0.772143 | 6.474500 | 0.772143 |
| 62 | presto/tpcds: q63 | 9.298333 | 0.219468 | 9.527833 | 0.128548 | 9.527833 | 0.128548 |
| 63 | presto/tpcds: q64 | 61.496833 | 1.661779 | 59.653000 | 1.487809 | 59.653000 | 1.487809 |
| 64 | presto/tpcds: q65 | 41.512667 | 1.623836 | 41.806667 | 1.847449 | 41.806667 | 1.847449 |
| 65 | presto/tpcds: q66 | 9.483667 | 1.335253 | 9.161000 | 0.421414 | 9.161000 | 0.421414 |
| 66 | presto/tpcds: q67 | 81.583667 | 4.853248 | 77.095167 | 1.472203 | 77.095167 | 1.472203 |
| 67 | presto/tpcds: q68 | 13.983500 | 0.098632 | 14.157500 | 0.179218 | 14.157500 | 0.179218 |
| 68 | presto/tpcds: q69 | 9.004167 | 0.300921 | 9.078833 | 0.407352 | 9.078833 | 0.407352 |
| 69 | presto/tpcds: q70 | 36.864667 | 0.599138 | 37.787500 | 2.291972 | 37.787500 | 2.291972 |
| 70 | presto/tpcds: q71 | 14.972500 | 1.774907 | 14.714833 | 0.307626 | 14.714833 | 0.307626 |
| 71 | presto/tpcds: q72 | 39.958667 | 1.280286 | 37.460667 | 1.217652 | 37.460667 | 1.217652 |
| 72 | presto/tpcds: q73 | 7.713167 | 0.482477 | 7.672667 | 0.415659 | 7.672667 | 0.415659 |
| 73 | presto/tpcds: q74 | 12.303333 | 0.148266 | 12.234333 | 0.286468 | 12.234333 | 0.286468 |
| 74 | presto/tpcds: q75 | 99.392000 | 1.558292 | 97.221667 | 1.632947 | 97.221667 | 1.632947 |
| 75 | presto/tpcds: q76 | 10.876333 | 0.453834 | 11.226000 | 0.249801 | 11.226000 | 0.249801 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 76 | presto/tpcds: q77 | 16.218833 | 0.460075 | 15.840833 | 0.135714 | 15.840833 | 0.135714 |
| 77 | presto/tpcds: q78 | 40.353500 | 1.708139 | 39.616167 | 1.434987 | 39.616167 | 1.434987 |
| 78 | presto/tpcds: q79 | 13.625667 | 0.153200 | 13.507167 | 0.250343 | 13.507167 | 0.250343 |
| 79 | presto/tpcds: q80 | 25.600000 | 0.741090 | 25.461833 | 0.531052 | 25.461833 | 0.531052 |
| 80 | presto/tpcds: q81 | 3.977833 | 0.077324 | 3.864167 | 0.130587 | 3.864167 | 0.130587 |
| 81 | presto/tpcds: q82 | 8.146000 | 0.728784 | 8.643500 | 0.628028 | 8.643500 | 0.628028 |
| 82 | presto/tpcds: q83 | 2.292500 | 0.232337 | 2.243000 | 0.260098 | 2.243000 | 0.260098 |
| 83 | presto/tpcds: q84 | 2.151167 | 0.194166 | 2.064833 | 0.077036 | 2.064833 | 0.077036 |
| 84 | presto/tpcds: q85 | 10.804500 | 0.303232 | 10.261667 | 0.407298 | 10.261667 | 0.407298 |
| 85 | presto/tpcds: q86 | 5.484667 | 0.129006 | 5.131667 | 0.115164 | 5.131667 | 0.115164 |
| 86 | presto/tpcds: q87 | 20.248833 | 0.153607 | 20.484167 | 0.071968 | 20.484167 | 0.071968 |
| 87 | presto/tpcds: q88 | 12.550000 | 0.440878 | 12.624333 | 0.210290 | 12.624333 | 0.210290 |
| 88 | presto/tpcds: q89 | 12.366333 | 0.613064 | 12.360333 | 0.224747 | 12.360333 | 0.224747 |
| 89 | presto/tpcds: q90 | 3.972167 | 0.493131 | 3.884833 | 0.320998 | 3.884833 | 0.320998 |
| 90 | presto/tpcds: q91 | 1.854833 | 0.439260 | 1.629667 | 0.115991 | 1.629667 | 0.115991 |
| 91 | presto/tpcds: q92 | 4.741500 | 0.182357 | 4.490167 | 0.326654 | 4.490167 | 0.326654 |
| 92 | presto/tpcds: q93 | 32.960667 | 0.696744 | 33.235000 | 0.499791 | 33.235000 | 0.499791 |
| 93 | presto/tpcds: q94 | 9.530333 | 1.077824 | 8.758500 | 1.072006 | 8.758500 | 1.072006 |
| 94 | presto/tpcds: q95 | 14.350833 | 0.145673 | 6.808000 | 0.368144 | 6.808000 | 0.368144 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 95 | presto/tpcds: q96 | 5.716833 | 0.511483 | 5.274667 | 0.143492 | 5.274667 | 0.143492 |
| 96 | presto/tpcds: q97 | 31.982167 | 3.056924 | 31.602333 | 2.740650 | 31.602333 | 2.740650 |
| 97 | presto/tpcds: q98 | 9.675333 | 0.534891 | 9.615167 | 0.549345 | 9.615167 | 0.549345 |
| 98 | presto/tpcds: q99 | 9.977500 | 0.141246 | 9.632833 | 0.396696 | 9.632833 | 0.396696 |

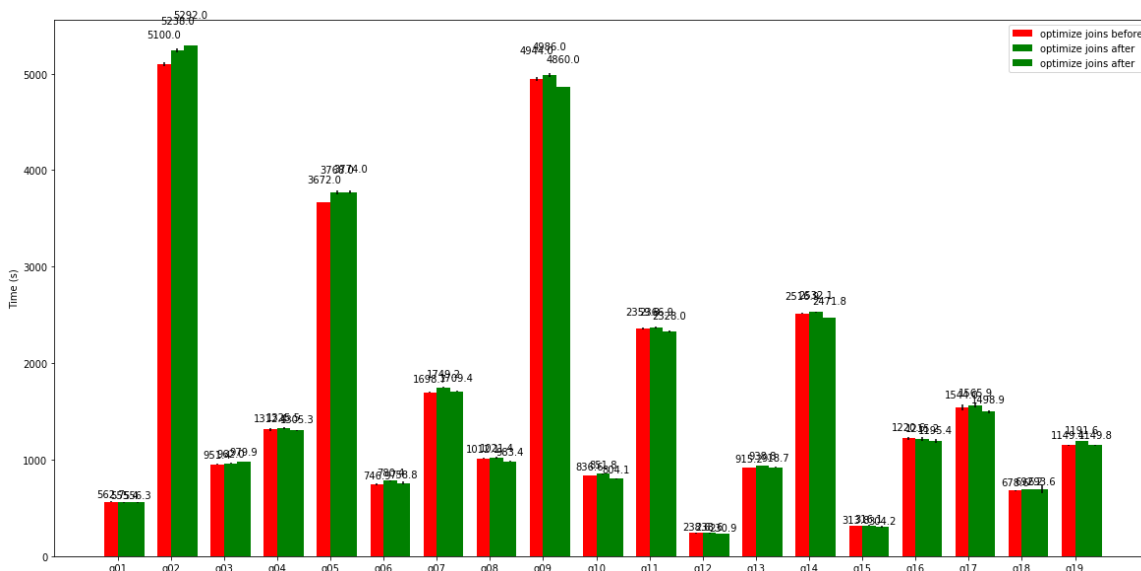
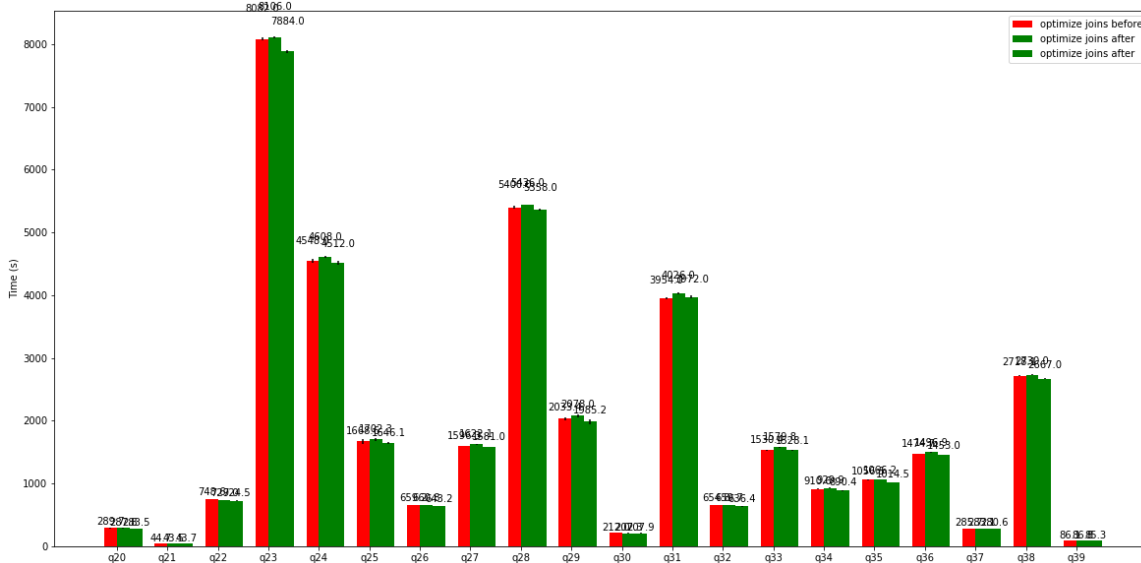
TPC-H Comparison (CPU)

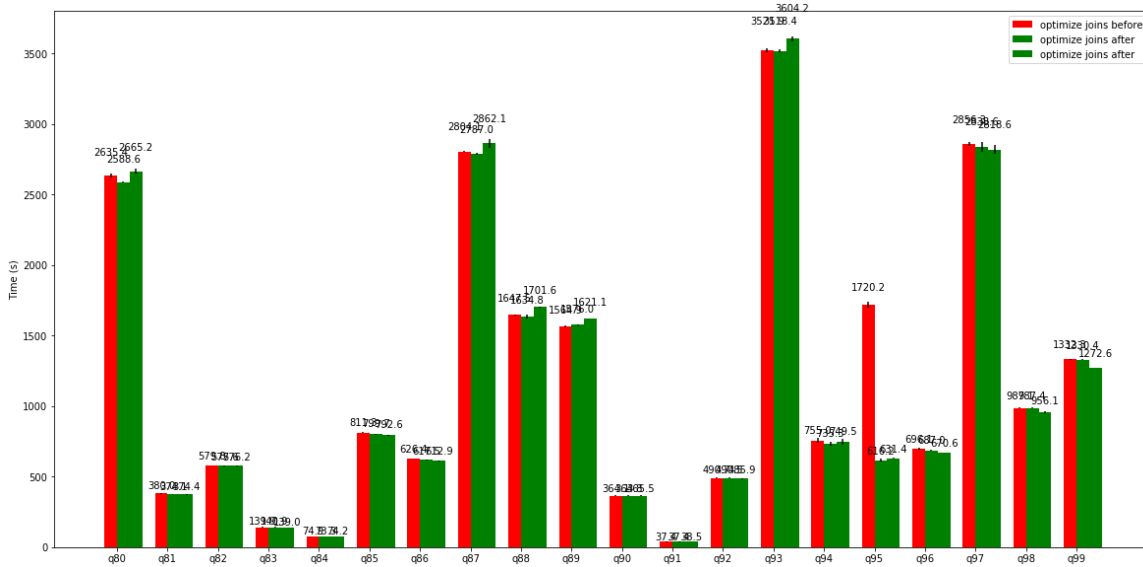
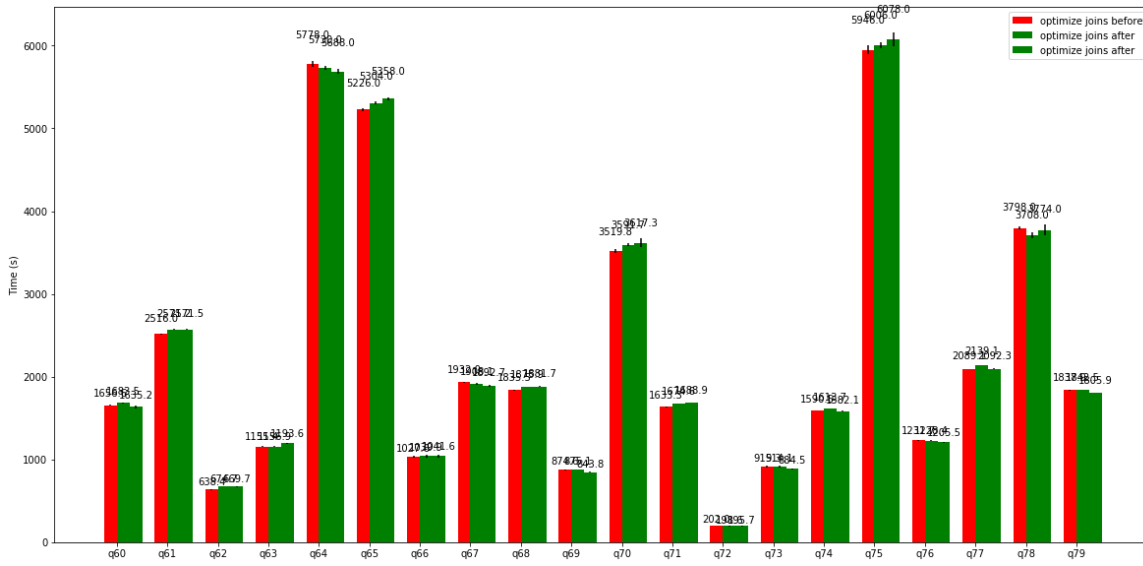
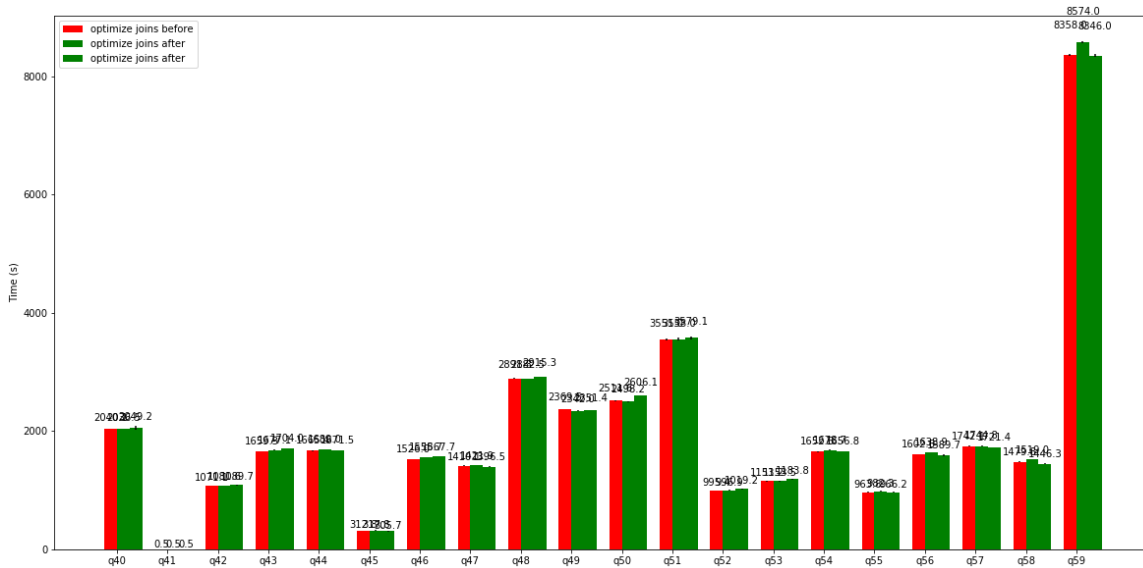


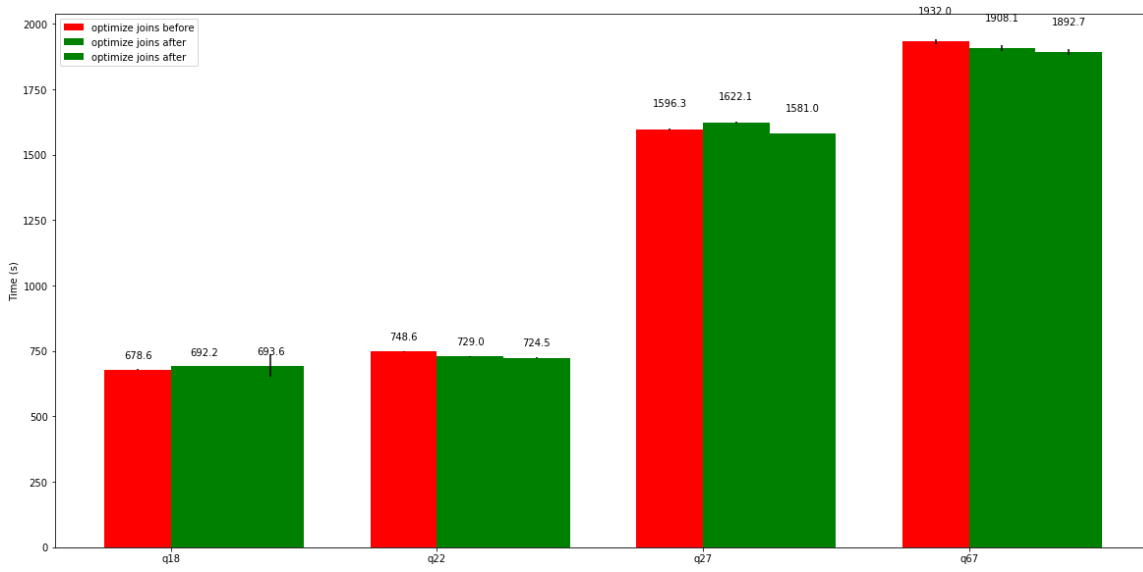
| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 0 | presto/tpch: q01 | 6468.0 | 18.590320 | 6864.0 | 18.590320 | 6864.0 | 18.590320 |
| 1 | presto/tpch: q02 | 847.9 | 7.133863 | 866.4 | 12.255285 | 866.4 | 12.255285 |
| 2 | presto/tpch: q03 | 3786.0 | 14.696938 | 3882.0 | 14.696938 | 3882.0 | 14.696938 |
| 3 | presto/tpch: q04 | 3167.0 | 21.745068 | 3215.7 | 50.629122 | 3215.7 | 50.629122 |
| 4 | presto/tpch: q05 | 1763.8 | 2.779928 | 1731.7 | 4.005496 | 1731.7 | 4.005496 |
| 5 | presto/tpch: q06 | 1707.6 | 2.078461 | 1753.3 | 3.295451 | 1753.3 | 3.295451 |
| 6 | presto/tpch: q07 | 1008.8 | 3.730952 | 996.1 | 5.412208 | 996.1 | 5.412208 |
| 7 | presto/tpch: q08 | 1054.4 | 2.234278 | 1034.4 | 2.573713 | 1034.4 | 2.573713 |
| 8 | presto/tpch: q09 | 3084.5 | 47.096624 | 3045.8 | 42.196114 | 3045.8 | 42.196114 |
| 9 | presto/tpch: q10 | 3611.0 | 19.470593 | 3654.0 | 19.718012 | 3654.0 | 19.718012 |
| 10 | presto/tpch: q11 | 672.4 | 5.800690 | 693.0 | 2.573713 | 693.0 | 2.573713 |
| 11 | presto/tpch: q12 | 2809.3 | 35.483123 | 2901.5 | 33.467776 | 2901.5 | 33.467776 |
| 12 | presto/tpch: q13 | 3858.0 | 14.696938 | 3930.0 | 27.099815 | 3930.0 | 27.099815 |
| 13 | presto/tpch: q14 | 1768.3 | 3.969383 | 1817.8 | 4.168453 | 1817.8 | 4.168453 |
| 14 | presto/tpch: q15 | 3566.4 | 2.987976 | 3672.0 | 0.000000 | 3672.0 | 0.000000 |
| 15 | presto/tpch: q16 | 970.0 | 8.856184 | 981.5 | 5.372150 | 981.5 | 5.372150 |
| 16 | presto/tpch: q17 | 3007.7 | 42.132505 | 2994.4 | 35.040548 | 2994.4 | 35.040548 |
| 17 | presto/tpch: q18 | 4188.0 | 18.590320 | 4182.0 | 27.099815 | 4182.0 | 27.099815 |
| 18 | presto/tpch: q19 | 3283.7 | 9.228434 | 3424.4 | 11.145582 | 3424.4 | 11.145582 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 19 | presto/tpch: q20 | 4386.0 | 27.099815 | 4518.0 | 37.757119 | 4518.0 | 37.757119 |
| 20 | presto/tpch: q21 | 7380.0 | 39.436024 | 7440.0 | 37.180640 | 7440.0 | 37.180640 |
| 21 | presto/tpch: q22 | 1391.2 | 5.923512 | 1412.1 | 13.000769 | 1412.1 | 13.000769 |

TPC-DS Comparison (CPU)







| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optim joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|---------------------------|
| 0 | presto/tpcds: q01 | 562.700000 | 4.333590 | 556.300000 | 4.806246 | 556.300000 | 4.806246 |
| 1 | presto/tpcds: q02 | 5100.000000 | 18.590320 | 5292.000000 | 0.000000 | 5292.000000 | 0.000000 |
| 2 | presto/tpcds: q03 | 951.400000 | 3.973915 | 979.900000 | 0.883176 | 979.900000 | 0.883176 |
| 3 | presto/tpcds: q04 | 1312.400000 | 12.849903 | 1305.300000 | 5.612486 | 1305.300000 | 5.612486 |
| 4 | presto/tpcds: q05 | 3672.000000 | 0.000000 | 3774.000000 | 14.696938 | 3774.000000 | 14.696938 |
| 5 | presto/tpcds: q06 | 746.900000 | 7.954621 | 758.800000 | 12.731693 | 758.800000 | 12.731693 |
| 6 | presto/tpcds: q07 | 1698.700000 | 1.389964 | 1709.400000 | 3.851234 | 1709.400000 | 3.851234 |
| 7 | presto/tpcds: q08 | 1012.100000 | 7.001428 | 983.400000 | 3.659508 | 983.400000 | 3.659508 |
| 8 | presto/tpcds: q09 | 4944.000000 | 18.590320 | 4860.000000 | 0.000000 | 4860.000000 | 0.000000 |
| 9 | presto/tpcds: q10 | 836.600000 | 3.051557 | 804.100000 | 5.222643 | 804.100000 | 5.222643 |
| 10 | presto/tpcds: q11 | 2359.800000 | 12.823728 | 2328.000000 | 11.553701 | 2328.000000 | 11.553701 |
| 11 | presto/tpcds: q12 | 238.600000 | 2.135416 | 230.900000 | 1.913113 | 230.900000 | 1.913113 |
| 12 | presto/tpcds: q13 | 915.200000 | 2.201817 | 918.700000 | 4.700213 | 918.700000 | 4.700213 |
| 13 | presto/tpcds: q14 | 2516.900000 | 6.609992 | 2471.800000 | 2.266274 | 2471.800000 | 2.266274 |
| 14 | presto/tpcds: q15 | 313.800000 | 3.436277 | 304.200000 | 8.085543 | 304.200000 | 8.085543 |
| 15 | presto/tpcds: q16 | 1220.600000 | 11.889491 | 1195.400000 | 21.140672 | 1195.400000 | 21.140672 |
| 16 | presto/tpcds: q17 | 1544.000000 | 29.598108 | 1498.900000 | 16.034338 | 1498.900000 | 16.034338 |
| 17 | presto/tpcds: q18 | 678.600000 | 2.339231 | 693.600000 | 42.351671 | 693.600000 | 42.351671 |
| 18 | presto/tpcds: q19 | 1149.400000 | 3.098387 | 1149.800000 | 2.234278 | 1149.800000 | 2.234278 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 19 | presto/tpcds: q20 | 289.700000 | 4.005496 | 283.500000 | 3.451956 | 283.500000 | 3.451956 |
| 20 | presto/tpcds: q21 | 44.706667 | 0.412149 | 43.716667 | 0.498986 | 43.716667 | 0.498986 |
| 21 | presto/tpcds: q22 | 748.600000 | 1.846077 | 724.500000 | 1.809972 | 724.500000 | 1.809972 |
| 22 | presto/tpcds: q23 | 8082.000000 | 19.718012 | 7884.000000 | 22.768399 | 7884.000000 | 22.768399 |
| 23 | presto/tpcds: q24 | 4548.000000 | 29.393877 | 4512.000000 | 29.393877 | 4512.000000 | 29.393877 |
| 24 | presto/tpcds: q25 | 1668.600000 | 32.832667 | 1646.100000 | 19.078679 | 1646.100000 | 19.078679 |
| 25 | presto/tpcds: q26 | 659.200000 | 2.619924 | 643.200000 | 1.368211 | 643.200000 | 1.368211 |
| 26 | presto/tpcds: q27 | 1596.300000 | 2.957702 | 1581.000000 | 1.517893 | 1581.000000 | 1.517893 |
| 27 | presto/tpcds: q28 | 5400.000000 | 22.768399 | 5358.000000 | 14.696938 | 5358.000000 | 14.696938 |
| 28 | presto/tpcds: q29 | 2033.400000 | 23.343008 | 1985.200000 | 36.472236 | 1985.200000 | 36.472236 |
| 29 | presto/tpcds: q30 | 212.000000 | 2.101428 | 207.900000 | 1.809972 | 207.900000 | 1.809972 |
| 30 | presto/tpcds: q31 | 3954.000000 | 14.696938 | 3972.000000 | 18.590320 | 3972.000000 | 18.590320 |
| 31 | presto/tpcds: q32 | 654.800000 | 1.766352 | 636.400000 | 4.387254 | 636.400000 | 4.387254 |
| 32 | presto/tpcds: q33 | 1530.400000 | 6.993711 | 1528.100000 | 6.111955 | 1528.100000 | 6.111955 |
| 33 | presto/tpcds: q34 | 910.600000 | 7.003999 | 890.400000 | 7.896328 | 890.400000 | 7.896328 |
| 34 | presto/tpcds: q35 | 1056.500000 | 3.465833 | 1014.500000 | 3.802631 | 1014.500000 | 3.802631 |
| 35 | presto/tpcds: q36 | 1474.700000 | 2.352020 | 1453.000000 | 4.869497 | 1453.000000 | 4.869497 |
| 36 | presto/tpcds: q37 | 285.700000 | 1.033441 | 280.600000 | 1.766352 | 280.600000 | 1.766352 |
| 37 | presto/tpcds: q38 | 2718.100000 | 6.813810 | 2667.000000 | 9.785704 | 2667.000000 | 9.785704 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optimize joins after std.dev |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|
| 38 | presto/tpcds: q39 | 86.100000 | 0.501996 | 85.300000 | 0.701427 | 85.300000 | 0.701427 |
| 39 | presto/tpcds: q40 | 2040.100000 | 4.249706 | 2049.200000 | 30.023191 | 2049.200000 | 30.023191 |
| 40 | presto/tpcds: q41 | 0.461833 | 0.040912 | 0.461333 | 0.017592 | 0.461333 | 0.017592 |
| 41 | presto/tpcds: q42 | 1071.100000 | 2.997999 | 1089.700000 | 6.653420 | 1089.700000 | 6.653420 |
| 42 | presto/tpcds: q43 | 1659.300000 | 3.077012 | 1704.000000 | 4.225636 | 1704.000000 | 4.225636 |
| 43 | presto/tpcds: q44 | 1665.400000 | 7.266361 | 1671.500000 | 4.607385 | 1671.500000 | 4.607385 |
| 44 | presto/tpcds: q45 | 312.800000 | 2.592296 | 305.700000 | 4.826179 | 305.700000 | 4.826179 |
| 45 | presto/tpcds: q46 | 1526.000000 | 3.613309 | 1567.700000 | 2.160555 | 1567.700000 | 2.160555 |
| 46 | presto/tpcds: q47 | 1410.100000 | 6.609992 | 1396.500000 | 9.598125 | 1396.500000 | 9.598125 |
| 47 | presto/tpcds: q48 | 2891.300000 | 3.628223 | 2915.300000 | 5.822371 | 2915.300000 | 5.822371 |
| 48 | presto/tpcds: q49 | 2369.500000 | 2.747362 | 2351.400000 | 7.179972 | 2351.400000 | 7.179972 |
| 49 | presto/tpcds: q50 | 2511.600000 | 7.179972 | 2606.100000 | 3.146427 | 2606.100000 | 3.146427 |
| 50 | presto/tpcds: q51 | 3551.000000 | 13.769532 | 3579.100000 | 25.329430 | 3579.100000 | 25.329430 |
| 51 | presto/tpcds: q52 | 995.400000 | 2.545584 | 1019.200000 | 5.700526 | 1019.200000 | 5.700526 |
| 52 | presto/tpcds: q53 | 1153.200000 | 6.659730 | 1183.800000 | 7.730459 | 1183.800000 | 7.730459 |
| 53 | presto/tpcds: q54 | 1652.600000 | 5.971934 | 1656.800000 | 7.024528 | 1656.800000 | 7.024528 |
| 54 | presto/tpcds: q55 | 963.800000 | 6.243076 | 966.200000 | 3.973915 | 966.200000 | 3.973915 |
| 55 | presto/tpcds: q56 | 1602.600000 | 2.276840 | 1589.700000 | 18.999263 | 1589.700000 | 18.999263 |
| 56 | presto/tpcds: q57 | 1742.100000 | 8.449142 | 1721.400000 | 5.034282 | 1721.400000 | 5.034282 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optim joins ; std.de |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|----------------------|
| 57 | presto/tpcds: q58 | 1479.800000 | 4.354308 | 1446.300000 | 6.785573 | 1446.300000 | 6.785573 |
| 58 | presto/tpcds: q59 | 8358.000000 | 14.696938 | 8346.000000 | 27.099815 | 8346.000000 | 27.099815 |
| 59 | presto/tpcds: q60 | 1656.600000 | 4.174207 | 1635.200000 | 20.121630 | 1635.200000 | 20.121630 |
| 60 | presto/tpcds: q61 | 2516.000000 | 3.121538 | 2571.500000 | 7.052659 | 2571.500000 | 7.052659 |
| 61 | presto/tpcds: q62 | 638.400000 | 5.717342 | 669.700000 | 6.845436 | 669.700000 | 6.845436 |
| 62 | presto/tpcds: q63 | 1155.400000 | 2.536139 | 1193.600000 | 2.647263 | 1193.600000 | 2.647263 |
| 63 | presto/tpcds: q64 | 5778.000000 | 37.757119 | 5688.000000 | 32.199379 | 5688.000000 | 32.199379 |
| 64 | presto/tpcds: q65 | 5226.000000 | 14.696938 | 5358.000000 | 14.696938 | 5358.000000 | 14.696938 |
| 65 | presto/tpcds: q66 | 1027.600000 | 11.350418 | 1041.600000 | 17.640408 | 1041.600000 | 17.640408 |
| 66 | presto/tpcds: q67 | 1932.000000 | 8.468294 | 1892.700000 | 10.362818 | 1892.700000 | 10.362818 |
| 67 | presto/tpcds: q68 | 1835.500000 | 5.465162 | 1881.700000 | 2.471437 | 1881.700000 | 2.471437 |
| 68 | presto/tpcds: q69 | 874.600000 | 3.279024 | 843.800000 | 6.055741 | 843.800000 | 6.055741 |
| 69 | presto/tpcds: q70 | 3519.800000 | 19.224984 | 3617.300000 | 50.974464 | 3617.300000 | 50.974464 |
| 70 | presto/tpcds: q71 | 1633.300000 | 2.721029 | 1688.900000 | 3.115766 | 1688.900000 | 3.115766 |
| 71 | presto/tpcds: q72 | 202.000000 | 3.711603 | 195.700000 | 5.595355 | 195.700000 | 5.595355 |
| 72 | presto/tpcds: q73 | 915.300000 | 10.059622 | 884.500000 | 10.241680 | 884.500000 | 10.241680 |
| 73 | presto/tpcds: q74 | 1590.500000 | 4.076763 | 1582.100000 | 5.932622 | 1582.100000 | 5.932622 |
| 74 | presto/tpcds: q75 | 5946.000000 | 52.990565 | 6078.000000 | 80.229670 | 6078.000000 | 80.229670 |
| 75 | presto/tpcds: q76 | 1231.700000 | 7.762216 | 1205.500000 | 6.052768 | 1205.500000 | 6.052768 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optim joins ; std.de |
|----|-------------------|----------------------------|-------------------------------|---------------------------|------------------------------|---------------------------|----------------------|
| 76 | presto/tpcds: q77 | 2089.100000 | 2.321207 | 2092.300000 | 5.595355 | 2092.300000 | 5.595355 |
| 77 | presto/tpcds: q78 | 3798.000000 | 19.718012 | 3774.000000 | 62.006451 | 3774.000000 | 62.006451 |
| 78 | presto/tpcds: q79 | 1837.900000 | 9.259590 | 1805.900000 | 2.442130 | 1805.900000 | 2.442130 |
| 79 | presto/tpcds: q80 | 2635.400000 | 12.560892 | 2665.200000 | 17.685248 | 2665.200000 | 17.685248 |
| 80 | presto/tpcds: q81 | 380.000000 | 2.674322 | 374.400000 | 1.897367 | 374.400000 | 1.897367 |
| 81 | presto/tpcds: q82 | 579.800000 | 2.592296 | 576.200000 | 4.468557 | 576.200000 | 4.468557 |
| 82 | presto/tpcds: q83 | 139.900000 | 3.092572 | 139.000000 | 1.050714 | 139.000000 | 1.050714 |
| 83 | presto/tpcds: q84 | 74.900000 | 0.451664 | 74.200000 | 0.309839 | 74.200000 | 0.309839 |
| 84 | presto/tpcds: q85 | 811.300000 | 4.909990 | 792.600000 | 4.616492 | 792.600000 | 4.616492 |
| 85 | presto/tpcds: q86 | 626.400000 | 1.819890 | 612.900000 | 2.676565 | 612.900000 | 2.676565 |
| 86 | presto/tpcds: q87 | 2804.100000 | 4.751000 | 2862.100000 | 28.756008 | 2862.100000 | 28.756008 |
| 87 | presto/tpcds: q88 | 1647.500000 | 3.687275 | 1701.600000 | 5.353130 | 1701.600000 | 5.353130 |
| 88 | presto/tpcds: q89 | 1564.900000 | 7.273789 | 1621.100000 | 2.382436 | 1621.100000 | 2.382436 |
| 89 | presto/tpcds: q90 | 364.100000 | 2.773446 | 365.500000 | 4.806246 | 365.500000 | 4.806246 |
| 90 | presto/tpcds: q91 | 37.441667 | 0.731421 | 38.508333 | 0.797607 | 38.508333 | 0.797607 |
| 91 | presto/tpcds: q92 | 490.700000 | 2.058155 | 485.900000 | 4.266615 | 485.900000 | 4.266615 |
| 92 | presto/tpcds: q93 | 3521.900000 | 13.032114 | 3604.200000 | 15.819987 | 3604.200000 | 15.819987 |
| 93 | presto/tpcds: q94 | 755.000000 | 18.511402 | 749.500000 | 21.299296 | 749.500000 | 21.299296 |
| 94 | presto/tpcds: q95 | 1720.200000 | 20.236996 | 631.400000 | 4.734554 | 631.400000 | 4.734554 |

| | query | optimize joins before mean | optimize joins before std.dev | optimize joins after mean | optimize joins after std.dev | optimize joins after mean | optim joins ; std.de |
|-----------|----------------------|----------------------------------|--|---------------------------------|------------------------------------|---------------------------------|----------------------------|
| 95 | presto/tpcds: q96 | 696.100000 | 6.555303 | 670.600000 | 2.674322 | 670.600000 | 2.6743 |
| 96 | presto/tpcds: q97 | 2856.300000 | 15.115952 | 2818.600000 | 29.823481 | 2818.600000 | 29.823 |
| 97 | presto/tpcds: q98 | 987.100000 | 4.865799 | 956.100000 | 7.187489 | 956.100000 | 7.1874 |
| 98 | presto/tpcds: q99 | 1332.300000 | 2.538503 | 1272.600000 | 1.258571 | 1272.600000 | 1.2585 |