Distributed Algorithms

Report

All the tests and examples were run on the following machine:

**System 1 Tests**

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments: All messages are delivered, which is to be expected as the number of messages is low

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

2: [{39151, 30563}, {39151, 11292}, {39151, 14082}, {39151, 14618}, {39151, 23931}]

3: [{32436, 58037}, {32436, 41957}, {32436, 38980}, {32436, 32353}, {32436, 57720}]

1: [{42113, 33197}, {42113, 12928}, {42113, 15399}, {42113, 15478}, {42113, 25086}]

0: [{58037, 55129}, {58037, 38224}, {58037, 36138}, {58037, 30622}, {58037, 54819}]

4: [{57895, 20128}, {57895, 7212}, {57895, 11722}, {57895, 12844}, {57895, 16520}]

Comments: Not all messages are delivered, which is to be expected as the number of messages is really high and the timeout is short.

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

7: [{28493, 13900}, {28493, 7236}, {28493, 10266}, {28493, 5142}, {28493, 12575}, {28493, 3735}, {28493, 6666}, {28493, 28484}, {28493, 4801}, {28493, 7737}]

9: [{7745, 9195}, {7745, 5260}, {7745, 4695}, {7745, 3713}, {7745, 8874}, {7745, 2343}, {7745, 3527}, {7745, 24783}, {7745, 3526}, {7745, 3969}]

8: [{4817, 13644}, {4817, 7081}, {4817, 10130}, {4817, 5099}, {4817, 12421}, {4817, 3547}, {4817, 6410}, {4817, 28330}, {4817, 4666}, {4817, 7509}]

6: [{6681, 8118}, {6681, 5152}, {6681, 3974}, {6681, 3039}, {6681, 8047}, {6681, 2235}, {6681, 3354}, {6681, 23956}, {6681, 3353}, {6681, 3295}]

3: [{5143, 11190}, {5143, 5630}, {5143, 7090}, {5143, 4616}, {5143, 10339}, {5143, 2713}, {5143, 3957}, {5143, 26247}, {5143, 3608}, {5143, 4873}]

1: [{7244, 13914}, {7244, 7244}, {7244, 10281}, {7244, 5143}, {7244, 12584}, {7244, 3735}, {7244, 6680}, {7244, 28492}, {7244, 4816}, {7244, 7745}]

0: [{13914, 12352}, {13914, 6217}, {13914, 9137}, {13914, 4981}, {13914, 11557}, {13914, 3295}, {13914, 5119}, {13914, 27465}, {13914, 3672}, {13914, 6328}]

5: [{3735, 7870}, {3735, 4615}, {3735, 1972}, {3735, 1429}, {3735, 7715}, {3735, 1698}, {3735, 1129}, {3735, 20196}, {3735, 1129}, {3735, 1685}]

4: [{12584, 13906}, {12584, 7240}, {12584, 10272}, {12584, 5142}, {12584, 12580}, {12584, 3735}, {12584, 6673}, {12584, 28488}, {12584, 4808}, {12584, 7740}]

2: [{10281, 13909}, {10281, 7242}, {10281, 10277}, {10281, 5143}, {10281, 12582}, {10281, 3735}, {10281, 6676}, {10281, 28490}, {10281, 4813}, {10281, 7743}]

Comments: Same as test 2

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000|

| 1: [{35878, 18867}, {35878, 31046}, {35878, 11476}, {35878, 6884}, {35878, 10618}]

| 3: [{28147, 14099}, {28147, 19541}, {28147, 16206}, {28147, 24598}, {28147, 13043}]

| 0: [{23959, 20507}, {23959, 9342}, {23959, 15391}, {23959, 7542}, {23959, 10815}]

| 4: [{32530, 19060}, {32530, 16295}, {32530, 12151}, {32530, 8877}, {32530, 31391}]

| 2: [{34391, 15820}, {34391, 6635}, {34391, 34391}, {34391, 13234}, {34391, 7825}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

|

| 7: [{17659, 11573}, {17659, 9309}, {17659, 11769}, {17659, 8013}, {17659, 6328}, {17659, 5658}, {17659, 4283}, {17659, 6928}, {17659, 3645}, {17659, 5296}]

| 5: [{17553, 8340}, {17553, 15000}, {17553, 7927}, {17553, 11086}, {17553, 8149}, {17553, 10080}, {17553, 3673}, {17553, 2633}, {17553, 6575}, {17553, 1429}]

| 2: [{30627, 7935}, {30627, 4044}, {30627, 20190}, {30627, 5424}, {30627, 1281}, {30627, 8822}, {30627, 1599}, {30627, 4218}, {30627, 5371}, {30627, 5576}]

| 9: [{19586, 9673}, {19586, 6892}, {19586, 12383}, {19586, 8291}, {19586, 6191}, {19586, 4068}, {19586, 3294}, {19586, 3777}, {19586, 2565}, {19586, 4487}]

| 6: [{18612, 9610}, {18612, 11494}, {18612, 7718}, {18612, 8339}, {18612, 6151}, {18612, 5394}, {18612, 3254}, {18612, 5192}, {18612, 3406}, {18612, 4154}]

| 3: [{25354, 11252}, {25354, 5873}, {25354, 14586}, {25354, 15453}, {25354, 7649}, {25354, 6536}, {25354, 5242}, {25354, 6328}, {25354, 2832}, {25354, 3453}]

| 1: [{24170, 11741}, {24170, 13875}, {24170, 5176}, {24170, 9629}, {24170, 5793}, {24170, 7258}, {24170, 4853}, {24170, 5486}, {24170, 2167}, {24170, 4321}]

| 0: [{22905, 9080}, {22905, 6915}, {22905, 5440}, {22905, 4596}, {22905, 5505}, {22905, 3870}, {22905, 1376}, {22905, 3389}, {22905, 1982}, {22905, 1705}]

| 4: [{17516, 7416}, {17516, 6790}, {17516, 5290}, {17516, 5805}, {17516, 5923}, {17516, 4187}, {17516, 2864}, {17516, 3926}, {17516, 2951}, {17516, 1541}]

| 8: [{18132, 9424}, {18132, 10176}, {18132, 14126}, {18132, 12604}, {18132, 7733}, {18132, 3950}, {18132, 5042}, {18132, 2327}, {18132, 10998}, {18132, 746}]

Comments:

**System 2 Tests**

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments: The results are the same as for system1, because there is only one extra component and the redirection takes negligible time for this case

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000}]

0: [{133079, 44684}, {133079, 33811}, {133079, 40707}, {133079, 34407}, {133079, 29632}]

2: [{197232, 38540}, {197232, 28074}, {197232, 36248}, {197232, 28956}, {197232, 25732}]

4: [{161770, 25452}, {161770, 19506}, {161770, 20372}, {161770, 17425}, {161770, 17444}]

3: [{154284, 36133}, {154284, 26971}, {154284, 34832}, {154284, 27423}, {154284, 23480}]

1: [{190887, 38540}, {190887, 28040}, {190887, 36064}, {190887, 28957}, {190887, 25412}]

Comments: The results are the same as for system1, but because we introduce another component and therefore it takes time to redirect the messages

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

8: [{24465, 11605}, {24465, 13848}, {24465, 10568}, {24465, 9698}, {24465, 10280}, {24465, 9287}, {24465, 13345}, {24465, 9948}, {24465, 12334}, {24465, 22135}]

9: [{32592, 11236}, {32592, 13438}, {32592, 10049}, {32592, 9698}, {32592, 10178}, {32592, 9242}, {32592, 12953}, {32592, 9724}, {32592, 12226}, {32592, 21634}]

7: [{25103, 7696}, {25103, 9885}, {25103, 7833}, {25103, 7584}, {25103, 6539}, {25103, 6643}, {25103, 8425}, {25103, 7152}, {25103, 7953}, {25103, 15938}]

1: [{30634, 7139}, {30634, 8953}, {30634, 7254}, {30634, 6869}, {30634, 6049}, {30634, 6269}, {30634, 7360}, {30634, 6781}, {30634, 7359}, {30634, 14552}]

5: [{29445, 6175}, {29445, 7762}, {29445, 6077}, {29445, 5681}, {29445, 4934}, {29445, 4920}, {29445, 5178}, {29445, 5619}, {29445, 6493}, {29445, 10200}]

0: [{28659, 7563}, {28659, 9744}, {28659, 7733}, {28659, 7476}, {28659, 6500}, {28659, 6531}, {28659, 8246}, {28659, 7138}, {28659, 7808}, {28659, 15760}]

6: [{34046, 8452}, {34046, 10643}, {34046, 8377}, {34046, 8200}, {34046, 6786}, {34046, 7114}, {34046, 9482}, {34046, 7430}, {34046, 8821}, {34046, 16929}]

4: [{38884, 4820}, {38884, 6083}, {38884, 4202}, {38884, 3911}, {38884, 4037}, {38884, 3778}, {38884, 3633}, {38884, 4378}, {38884, 5012}, {38884, 7108}]

2: [{44018, 3902}, {44018, 4982}, {44018, 3680}, {44018, 3393}, {44018, 3175}, {44018, 2897}, {44018, 2999}, {44018, 3453}, {44018, 4113}, {44018, 5092}]

3: [{45024, 3554}, {45024, 4242}, {45024, 3329}, {45024, 2986}, {45024, 2689}, {45024, 2340}, {45024, 2742}, {45024, 3015}, {45024, 3705}, {45024, 4030}]

Comments: Same for test2

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

|

| 0: [{91770, 37697}, {91770, 31424}, {91770, 28441}, {91770, 28404}, {91770, 33967}]

| 1: [{117549, 25438}, {117549, 30850}, {117549, 20095}, {117549, 22506}, {117549, 27403}]

| 4: [{104738, 28063}, {104738, 28177}, {104738, 21544}, {104738, 22311}, {104738, 32163}]

| 2: [{125187, 17698}, {125187, 19020}, {125187, 19039}, {125187, 15493}, {125187, 23729}]

| 3: [{88776, 25231}, {88776, 27116}, {88776, 20823}, {88776, 20481}, {88776, 27604}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

|

| 8: [{33843, 3315}, {33843, 3046}, {33843, 1}, {33843, 1}, {33843, 0}, {33843, 0}, {33843, 0}, {33843, 0}, {33843, 0}, {33843, 0}]

| 7: [{41267, 1890}, {41267, 704}, {41267, 0}, {41267, 0}, {41267, 0}, {41267, 0}, {41267, 0}, {41267, 0}, {41267, 0}, {41267, 0}]

| 4: [{34901, 5462}, {34901, 5305}, {34901, 2050}, {34901, 1515}, {34901, 1}, {34901, 896}, {34901, 259}, {34901, 522}, {34901, 1}, {34901, 0}]

| 3: [{26210, 6504}, {26210, 6213}, {26210, 3044}, {26210, 2508}, {26210, 657}, {26210, 1065}, {26210, 1298}, {26210, 1066}, {26210, 705}, {26210, 833}]

| 9: [{27768, 5082}, {27768, 4560}, {27768, 1591}, {27768, 199}, {27768, 0}, {27768, 0}, {27768, 0}, {27768, 0}, {27768, 0}, {27768, 0}]

| 6: [{43723, 1639}, {43723, 703}, {43723, 0}, {43723, 0}, {43723, 0}, {43723, 0}, {43723, 0}, {43723, 0}, {43723, 0}, {43723, 0}]

| 2: [{33918, 5137}, {33918, 5021}, {33918, 1879}, {33918, 605}, {33918, 1}, {33918, 451}, {33918, 1}, {33918, 92}, {33918, 1}, {33918, 1}]

| 1: [{28702, 6082}, {28702, 7691}, {28702, 2992}, {28702, 1987}, {28702, 902}, {28702, 1365}, {28702, 789}, {28702, 1243}, {28702, 916}, {28702, 41}]

| 0: [{28904, 14186}, {28904, 8346}, {28904, 2433}, {28904, 2173}, {28904, 4281}, {28904, 2266}, {28904, 3201}, {28904, 779}, {28904, 1277}, {28904, 1847}]

| 5: [{33793, 4252}, {33793, 3900}, {33793, 407}, {33793, 199}, {33793, 1}, {33793, 1}, {33793, 1}, {33793, 0}, {33793, 0}, {33793, 0}]

Comments:

**System 3 Tests**

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments: The results are the same as for system2, which is to be expected at this values

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

4: [{476406, 3351}, {476406, 5413}, {476406, 5101}, {476406, 3713}, {476406, 7939}]

1: [{475810, 2236}, {475810, 3138}, {475810, 4436}, {475810, 2498}, {475810, 6133}]

2: [{408411, 1595}, {408411, 2061}, {408411, 3982}, {408411, 1300}, {408411, 4591}]

0: [{427664, 4921}, {427664, 8207}, {427664, 7189}, {427664, 5511}, {427664, 9849}]

3: [{710972, 2606}, {710972, 3794}, {710972, 4697}, {710972, 2907}, {710972, 6703}]

Comments: The rate of received messages is even lower because we introduce another component to redirect more messages, therefore slowing the message rate

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

8: [{214117, 484}, {214117, 332}, {214117, 326}, {214117, 306}, {214117, 315}, {214117, 110}, {214117, 142}, {214117, 364}, {214117, 299}, {214117, 317}]

1: [{188125, 1132}, {188125, 740}, {188125, 699}, {188125, 446}, {188125, 603}, {188125, 451}, {188125, 578}, {188125, 831}, {188125, 651}, {188125, 661}]

2: [{174687, 791}, {174687, 532}, {174687, 567}, {174687, 425}, {174687, 505}, {174687, 256}, {174687, 352}, {174687, 618}, {174687, 491}, {174687, 512}]

4: [{189808, 819}, {189808, 548}, {189808, 575}, {189808, 427}, {189808, 515}, {189808, 263}, {189808, 361}, {189808, 619}, {189808, 502}, {189808, 520}]

5: [{151733, 997}, {151733, 655}, {151733, 662}, {151733, 436}, {151733, 536}, {151733, 364}, {151733, 480}, {151733, 745}, {151733, 579}, {151733, 595}]

9: [{156926, 780}, {156926, 524}, {156926, 561}, {156926, 423}, {156926, 503}, {156926, 251}, {156926, 346}, {156926, 617}, {156926, 485}, {156926, 506}]

7: [{174386, 726}, {174386, 478}, {174386, 484}, {174386, 407}, {174386, 452}, {174386, 208}, {174386, 284}, {174386, 530}, {174386, 417}, {174386, 432}]

3: [{169335, 308}, {169335, 218}, {169335, 214}, {169335, 170}, {169335, 196}, {169335, 67}, {169335, 80}, {169335, 204}, {169335, 195}, {169335, 207}]

6: [{198569, 247}, {198569, 179}, {198569, 174}, {198569, 118}, {198569, 151}, {198569, 51}, {198569, 57}, {198569, 145}, {198569, 151}, {198569, 164}]

0: [{230283, 10}, {230283, 9}, {230283, 9}, {230283, 10}, {230283, 9}, {230283, 9}, {230283, 10}, {230283, 9}, {230283, 8}, {230283, 9}]

Comments: Same as test 2

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

|

| 3: [{200961, 10610}, {200961, 14418}, {200961, 13013}, {200961, 12666}, {200961, 13013}]

| 4: [{282910, 17800}, {282910, 16759}, {282910, 15087}, {282910, 14475}, {282910, 18648}]

| 1: [{227954, 18314}, {227954, 20711}, {227954, 16239}, {227954, 15969}, {227954, 19157}]

| 0: [{233122, 11912}, {233122, 14043}, {233122, 7720}, {233122, 11230}, {233122, 12328}]

| 2: [{204326, 5807}, {204326, 10838}, {204326, 11646}, {204326, 6272}, {204326, 8743}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000

Output:

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

| 3: [{67119, 1}, {67119, 0}, {67119, 0}, {67119, 0}, {67119, 0}, {67119, 0}, {67119, 0}, {67119, 0}, {67119, 0}, {67119, 0}]

| 0: [{68962, 1154}, {68962, 5}, {68962, 1}, {68962, 1}, {68962, 1}, {68962, 1}, {68962, 1}, {68962, 1}, {68962, 1}, {68962, 1}]

| 2: [{75469, 1}, {75469, 0}, {75469, 0}, {75469, 0}, {75469, 0}, {75469, 0}, {75469, 0}, {75469, 0}, {75469, 0}, {75469, 0}]

| 4: [{78427, 1}, {78427, 0}, {78427, 0}, {78427, 0}, {78427, 0}, {78427, 0}, {78427, 0}, {78427, 0}, {78427, 0}, {78427, 0}]

| 6: [{103948, 1}, {103948, 0}, {103948, 0}, {103948, 0}, {103948, 0}, {103948, 0}, {103948, 0}, {103948, 0}, {103948, 0}, {103948, 0}]

| 8: [{97025, 1}, {97025, 0}, {97025, 0}, {97025, 0}, {97025, 0}, {97025, 0}, {97025, 0}, {97025, 0}, {97025, 0}, {97025, 0}]

| 5: [{80061, 1}, {80061, 0}, {80061, 0}, {80061, 0}, {80061, 0}, {80061, 0}, {80061, 0}, {80061, 0}, {80061, 0}, {80061, 0}]

| 9: [{83039, 1}, {83039, 0}, {83039, 0}, {83039, 0}, {83039, 0}, {83039, 0}, {83039, 0}, {83039, 0}, {83039, 0}, {83039, 0}]

| 7: [{96110, 1}, {96110, 0}, {96110, 0}, {96110, 0}, {96110, 0}, {96110, 0}, {96110, 0}, {96110, 0}, {96110, 0}, {96110, 0}]

| 1: [{105524, 0}, {105524, 1}, {105524, 0}, {105524, 0}, {105524, 0}, {105524, 0}, {105524, 0}, {105524, 0}, {105524, 0}, {105524, 0}]

Comments:

**System 4 Tests**

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 0

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

0: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

4: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

2: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

1: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

3: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

Comments: The output is to be expected for send\_percentage = 0

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 0

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 0

1: [{393883, 30}, {393883, 34}, {393883, 42}, {393883, 32}, {393883, 37}]

0: [{384258, 26}, {384258, 28}, {384258, 24}, {384258, 30}, {384258, 23}]

3: [{385510, 31}, {385510, 34}, {385510, 29}, {385510, 33}, {385510, 40}]

2: [{379909, 27}, {379909, 40}, {379909, 39}, {379909, 31}, {379909, 32}]

4: [{492291, 16}, {492291, 23}, {492291, 20}, {492291, 22}, {492291, 21}]

Comments: The output should be the same as in test 1 send\_percentage = 0, but because there is a higher amount of messages send it might be that the random function has a bug which makes it biased.

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 0

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 0

4: [{159809, 15}, {159809, 17}, {159809, 15}, {159809, 14}, {159809, 17}, {159809, 7}, {159809, 14}, {159809, 7}, {159809, 8}, {159809, 15}]

6: [{109868, 8}, {109868, 11}, {109868, 11}, {109868, 9}, {109868, 12}, {109868, 5}, {109868, 14}, {109868, 10}, {109868, 15}, {109868, 16}]

5: [{88701, 5}, {88701, 11}, {88701, 17}, {88701, 6}, {88701, 9}, {88701, 9}, {88701, 7}, {88701, 11}, {88701, 7}, {88701, 7}]

7: [{100374, 9}, {100374, 12}, {100374, 9}, {100374, 10}, {100374, 13}, {100374, 10}, {100374, 12}, {100374, 6}, {100374, 10}, {100374, 9}]

3: [{109008, 14}, {109008, 12}, {109008, 13}, {109008, 14}, {109008, 20}, {109008, 9}, {109008, 14}, {109008, 5}, {109008, 8}, {109008, 15}]

8: [{107059, 13}, {107059, 19}, {107059, 10}, {107059, 12}, {107059, 15}, {107059, 13}, {107059, 5}, {107059, 4}, {107059, 3}, {107059, 7}]

9: [{130694, 16}, {130694, 10}, {130694, 13}, {130694, 11}, {130694, 6}, {130694, 11}, {130694, 11}, {130694, 5}, {130694, 12}, {130694, 10}]

0: [{115475, 11}, {115475, 9}, {115475, 5}, {115475, 11}, {115475, 11}, {115475, 4}, {115475, 13}, {115475, 14}, {115475, 13}, {115475, 15}]

2: [{116492, 13}, {116492, 13}, {116492, 3}, {116492, 8}, {116492, 14}, {116492, 10}, {116492, 7}, {116492, 12}, {116492, 14}, {116492, 16}]

1: [{135021, 10}, {135021, 18}, {135021, 13}, {135021, 9}, {135021, 13}, {135021, 6}, {135021, 10}, {135021, 5}, {135021, 12}, {135021, 7}]

Comments: Same as for test 2

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

0: [{1000, 499}, {1000, 489}, {1000, 506}, {1000, 479}, {1000, 525}]

1: [{1000, 521}, {1000, 525}, {1000, 535}, {1000, 508}, {1000, 518}]

2: [{1000, 481}, {1000, 476}, {1000, 492}, {1000, 527}, {1000, 481}]

4: [{1000, 532}, {1000, 516}, {1000, 489}, {1000, 486}, {1000, 500}]

3: [{1000, 489}, {1000, 500}, {1000, 487}, {1000, 497}, {1000, 502}]

Comments: To be expected, the number of received messages is 50%

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50

1: [{482323, 4027}, {482323, 4451}, {482323, 5166}, {482323, 3560}, {482323, 4176}]

3: [{437848, 6875}, {437848, 5935}, {437848, 6663}, {437848, 5458}, {437848, 5732}]

0: [{350852, 7263}, {350852, 5889}, {350852, 6826}, {350852, 5600}, {350852, 5974}]

2: [{514788, 4675}, {514788, 4621}, {514788, 5621}, {514788, 3760}, {514788, 4356}]

4: [{556451, 2796}, {556451, 3775}, {556451, 3981}, {556451, 2737}, {556451, 3587}]

Comments: If we compare this result with the previous system we can see that only 50% of the messages have been received

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50

8: [{141249, 1000}, {141249, 439}, {141249, 518}, {141249, 987}, {141249, 1060}, {141249, 688}, {141249, 534}, {141249, 88}, {141249, 425}, {141249, 1059}]

6: [{158627, 1801}, {158627, 888}, {158627, 863}, {158627, 1833}, {158627, 1426}, {158627, 1455}, {158627, 965}, {158627, 705}, {158627, 749}, {158627, 1455}]

2: [{174209, 558}, {174209, 252}, {174209, 364}, {174209, 454}, {174209, 562}, {174209, 412}, {174209, 266}, {174209, 64}, {174209, 269}, {174209, 633}]

4: [{167391, 1000}, {167391, 418}, {167391, 535}, {167391, 998}, {167391, 1051}, {167391, 646}, {167391, 523}, {167391, 87}, {167391, 418}, {167391, 1031}]

1: [{157954, 2441}, {157954, 1003}, {157954, 1026}, {157954, 2099}, {157954, 1569}, {157954, 1847}, {157954, 1279}, {157954, 1273}, {157954, 832}, {157954, 1555}]

3: [{146328, 1043}, {146328, 478}, {146328, 558}, {146328, 1023}, {146328, 1046}, {146328, 762}, {146328, 536}, {146328, 105}, {146328, 422}, {146328, 1119}]

0: [{173182, 2382}, {173182, 1017}, {173182, 1026}, {173182, 2050}, {173182, 1529}, {173182, 1921}, {173182, 1276}, {173182, 1236}, {173182, 827}, {173182, 1567}]

5: [{146428, 1121}, {146428, 516}, {146428, 605}, {146428, 1300}, {146428, 1178}, {146428, 882}, {146428, 600}, {146428, 183}, {146428, 466}, {146428, 1173}]

7: [{145441, 1027}, {145441, 455}, {145441, 508}, {145441, 1054}, {145441, 1040}, {145441, 697}, {145441, 543}, {145441, 101}, {145441, 433}, {145441, 1050}]

9: [{229741, 1047}, {229741, 461}, {229741, 539}, {229741, 1126}, {229741, 1147}, {229741, 825}, {229741, 580}, {229741, 140}, {229741, 435}, {229741, 1102}]

Comments: Same as for test 2 send\_percentage = 50

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 100

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments: The results are identical to the previous system

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 100

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

4: [{191605, 1613}, {191605, 2437}, {191605, 2467}, {191605, 2876}, {191605, 2466}]

2: [{188441, 1977}, {188441, 2898}, {188441, 2962}, {188441, 3302}, {188441, 2914}]

3: [{158487, 1670}, {158487, 2484}, {158487, 2526}, {158487, 2915}, {158487, 2511}]

1: [{208811, 1120}, {208811, 1777}, {208811, 1873}, {208811, 2198}, {208811, 1876}]

0: [{175643, 103}, {175643, 90}, {175643, 90}, {175643, 302}, {175643, 102}]

Comments: There are less received messages compared to the previous system, although the send\_percentage = 100, this could be because the random time function takes more time to evaluate or because it is biased

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 100

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

9: [{59273, 63}, {59273, 63}, {59273, 1247}, {59273, 62}, {59273, 51}, {59273, 67}, {59273, 56}, {59273, 61}, {59273, 62}, {59273, 52}]

8: [{62434, 99}, {62434, 99}, {62434, 1486}, {62434, 84}, {62434, 64}, {62434, 228}, {62434, 85}, {62434, 97}, {62434, 98}, {62434, 65}]

6: [{62476, 98}, {62476, 98}, {62476, 1485}, {62476, 83}, {62476, 64}, {62476, 226}, {62476, 84}, {62476, 96}, {62476, 97}, {62476, 65}]

0: [{53015, 144}, {53015, 143}, {53015, 1547}, {53015, 118}, {53015, 74}, {53015, 298}, {53015, 121}, {53015, 142}, {53015, 143}, {53015, 75}]

7: [{60344, 90}, {60344, 90}, {60344, 1448}, {60344, 78}, {60344, 62}, {60344, 195}, {60344, 77}, {60344, 87}, {60344, 89}, {60344, 63}]

3: [{64629, 99}, {64629, 99}, {64629, 1486}, {64629, 84}, {64629, 65}, {64629, 228}, {64629, 85}, {64629, 97}, {64629, 98}, {64629, 65}]

4: [{74077, 119}, {74077, 119}, {74077, 1518}, {74077, 99}, {74077, 68}, {74077, 263}, {74077, 98}, {74077, 116}, {74077, 119}, {74077, 69}]

2: [{79495, 141}, {79495, 141}, {79495, 1546}, {79495, 116}, {79495, 73}, {79495, 295}, {79495, 119}, {79495, 139}, {79495, 140}, {79495, 74}]

1: [{76740, 89}, {76740, 89}, {76740, 1443}, {76740, 78}, {76740, 63}, {76740, 193}, {76740, 77}, {76740, 86}, {76740, 88}, {76740, 63}]

5: [{78448, 12}, {78448, 12}, {78448, 12}, {78448, 12}, {78448, 12}, {78448, 11}, {78448, 11}, {78448, 11}, {78448, 11}, {78448, 12}]

Comments: Same as for test2 send\_percentage = 100

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 0

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000, send\_percentage: 0

|

| 0: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 1: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 2: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 3: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 4: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 0

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 0

|

| 0: [{415615, 0}, {415615, 0}, {415615, 0}, {415615, 0}, {415615, 0}]

| 2: [{355529, 0}, {355529, 0}, {355529, 0}, {355529, 0}, {355529, 0}]

| 4: [{404413, 0}, {404413, 0}, {404413, 0}, {404413, 0}, {404413, 0}]

| 1: [{381507, 0}, {381507, 0}, {381507, 0}, {381507, 0}, {381507, 0}]

| 3: [{399625, 0}, {399625, 0}, {399625, 0}, {399625, 0}, {399625, 0}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 0

Output:

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 0

|

| 2: [{99963, 0}, {99963, 0}, {99963, 0}, {99963, 0}, {99963, 0}, {99963, 0}, {99963, 0}, {99963, 0}, {99963, 0}, {99963, 0}]

| 6: [{104209, 0}, {104209, 0}, {104209, 0}, {104209, 0}, {104209, 0}, {104209, 0}, {104209, 0}, {104209, 0}, {104209, 0}, {104209, 0}]

| 9: [{88139, 0}, {88139, 0}, {88139, 0}, {88139, 0}, {88139, 0}, {88139, 0}, {88139, 0}, {88139, 0}, {88139, 0}, {88139, 0}]

| 1: [{134481, 0}, {134481, 0}, {134481, 0}, {134481, 0}, {134481, 0}, {134481, 0}, {134481, 0}, {134481, 0}, {134481, 0}, {134481, 0}]

| 3: [{91642, 0}, {91642, 0}, {91642, 0}, {91642, 0}, {91642, 0}, {91642, 0}, {91642, 0}, {91642, 0}, {91642, 0}, {91642, 0}]

| 0: [{111327, 0}, {111327, 0}, {111327, 0}, {111327, 0}, {111327, 0}, {111327, 0}, {111327, 0}, {111327, 0}, {111327, 0}, {111327, 0}]

| 4: [{94190, 0}, {94190, 0}, {94190, 0}, {94190, 0}, {94190, 0}, {94190, 0}, {94190, 0}, {94190, 0}, {94190, 0}, {94190, 0}]

| 7: [{100130, 0}, {100130, 0}, {100130, 0}, {100130, 0}, {100130, 0}, {100130, 0}, {100130, 0}, {100130, 0}, {100130, 0}, {100130, 0}]

| 5: [{99652, 0}, {99652, 0}, {99652, 0}, {99652, 0}, {99652, 0}, {99652, 0}, {99652, 0}, {99652, 0}, {99652, 0}, {99652, 0}]

| 8: [{122740, 0}, {122740, 0}, {122740, 0}, {122740, 0}, {122740, 0}, {122740, 0}, {122740, 0}, {122740, 0}, {122740, 0}, {122740, 0}]

Comments:

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 50

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000, send\_percentage: 50

|

| 0: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 3: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 2: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 4: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 1: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50

|

| 3: [{337737, 0}, {337737, 0}, {337737, 0}, {337737, 0}, {337737, 0}]

| 2: [{376422, 0}, {376422, 0}, {376422, 0}, {376422, 0}, {376422, 0}]

| 1: [{411879, 0}, {411879, 0}, {411879, 0}, {411879, 0}, {411879, 0}]

| 0: [{413430, 0}, {413430, 0}, {413430, 0}, {413430, 0}, {413430, 0}]

| 4: [{341043, 0}, {341043, 0}, {341043, 0}, {341043, 0}, {341043, 0}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50

|

| 8: [{139534, 0}, {139534, 0}, {139534, 0}, {139534, 0}, {139534, 0}, {139534, 0}, {139534, 0}, {139534, 0}, {139534, 0}, {139534, 0}]

| 9: [{86586, 0}, {86586, 0}, {86586, 0}, {86586, 0}, {86586, 0}, {86586, 0}, {86586, 0}, {86586, 0}, {86586, 0}, {86586, 0}]

| 0: [{92650, 0}, {92650, 0}, {92650, 0}, {92650, 0}, {92650, 0}, {92650, 0}, {92650, 0}, {92650, 0}, {92650, 0}, {92650, 0}]

| 2: [{101962, 0}, {101962, 0}, {101962, 0}, {101962, 0}, {101962, 0}, {101962, 0}, {101962, 0}, {101962, 0}, {101962, 0}, {101962, 0}]

| 7: [{103950, 0}, {103950, 0}, {103950, 0}, {103950, 0}, {103950, 0}, {103950, 0}, {103950, 0}, {103950, 0}, {103950, 0}, {103950, 0}]

| 6: [{78299, 0}, {78299, 0}, {78299, 0}, {78299, 0}, {78299, 0}, {78299, 0}, {78299, 0}, {78299, 0}, {78299, 0}, {78299, 0}]

| 3: [{121419, 0}, {121419, 0}, {121419, 0}, {121419, 0}, {121419, 0}, {121419, 0}, {121419, 0}, {121419, 0}, {121419, 0}, {121419, 0}]

| 5: [{104595, 0}, {104595, 0}, {104595, 0}, {104595, 0}, {104595, 0}, {104595, 0}, {104595, 0}, {104595, 0}, {104595, 0}, {104595, 0}]

| 4: [{84661, 0}, {84661, 0}, {84661, 0}, {84661, 0}, {84661, 0}, {84661, 0}, {84661, 0}, {84661, 0}, {84661, 0}, {84661, 0}]

| 1: [{97339, 0}, {97339, 0}, {97339, 0}, {97339, 0}, {97339, 0}, {97339, 0}, {97339, 0}, {97339, 0}, {97339, 0}, {97339, 0}]

Comments:

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 100

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

3: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

1: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

0: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

4: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

2: [{1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}, {1000, 1000}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 100

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 100

|

| 3: [{419076, 0}, {419076, 0}, {419076, 0}, {419076, 0}, {419076, 0}]

| 0: [{327571, 0}, {327571, 0}, {327571, 0}, {327571, 0}, {327571, 0}]

| 1: [{339866, 0}, {339866, 0}, {339866, 0}, {339866, 0}, {339866, 0}]

| 2: [{424726, 0}, {424726, 0}, {424726, 0}, {424726, 0}, {424726, 0}]

| 4: [{410330, 0}, {410330, 0}, {410330, 0}, {410330, 0}, {410330, 0}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 100

Output:

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 100

|

| 0: [{110625, 0}, {110625, 0}, {110625, 0}, {110625, 0}, {110625, 0}, {110625, 0}, {110625, 0}, {110625, 0}, {110625, 0}, {110625, 0}]

| 6: [{114465, 0}, {114465, 0}, {114465, 0}, {114465, 0}, {114465, 0}, {114465, 0}, {114465, 0}, {114465, 0}, {114465, 0}, {114465, 0}]

| 7: [{123790, 0}, {123790, 0}, {123790, 0}, {123790, 0}, {123790, 0}, {123790, 0}, {123790, 0}, {123790, 0}, {123790, 0}, {123790, 0}]

| 3: [{119877, 0}, {119877, 0}, {119877, 0}, {119877, 0}, {119877, 0}, {119877, 0}, {119877, 0}, {119877, 0}, {119877, 0}, {119877, 0}]

| 1: [{104932, 0}, {104932, 0}, {104932, 0}, {104932, 0}, {104932, 0}, {104932, 0}, {104932, 0}, {104932, 0}, {104932, 0}, {104932, 0}]

| 8: [{112170, 0}, {112170, 0}, {112170, 0}, {112170, 0}, {112170, 0}, {112170, 0}, {112170, 0}, {112170, 0}, {112170, 0}, {112170, 0}]

| 5: [{89850, 0}, {89850, 0}, {89850, 0}, {89850, 0}, {89850, 0}, {89850, 0}, {89850, 0}, {89850, 0}, {89850, 0}, {89850, 0}]

| 2: [{106202, 0}, {106202, 0}, {106202, 0}, {106202, 0}, {106202, 0}, {106202, 0}, {106202, 0}, {106202, 0}, {106202, 0}, {106202, 0}]

| 4: [{107961, 0}, {107961, 0}, {107961, 0}, {107961, 0}, {107961, 0}, {107961, 0}, {107961, 0}, {107961, 0}, {107961, 0}, {107961, 0}]

| 9: [{130484, 0}, {130484, 0}, {130484, 0}, {130484, 0}, {130484, 0}, {130484, 0}, {130484, 0}, {130484, 0}, {130484, 0}, {130484, 0}]

Comments:

**System 5 Tests**

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

1: [{1000, 519}, {1000, 524}, {1000, 469}, {1000, 0}, {1000, 482}]

2: [{1000, 525}, {1000, 510}, {1000, 524}, {1000, 0}, {1000, 501}]

0: [{1000, 490}, {1000, 478}, {1000, 500}, {1000, 0}, {1000, 533}]

4: [{1000, 512}, {1000, 506}, {1000, 510}, {1000, 0}, {1000, 479}]

Comments: We can see that peer3 crashed and can’t display it’s state and also that the nr of received message for peer3 is 0 because no message has been sent in 5 miliseconds.

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

1: [{161506, 3945}, {161506, 4202}, {161506, 3265}, {161506, 0}, {161506, 6976}]

4: [{166389, 7331}, {166389, 6101}, {166389, 5339}, {166389, 0}, {166389, 9560}]

2: [{249511, 5280}, {249511, 5179}, {249511, 4345}, {249511, 0}, {249511, 8403}]

0: [{170958, 3605}, {170958, 4093}, {170958, 3163}, {170958, 0}, {170958, 6785}]

Comments: We can see that peer3 crashed and can’t display it’s state and also that the nr of received message for peer3 is 0 because no message has been sent in 5 miliseconds.

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

7: [{141404, 661}, {141404, 964}, {141404, 903}, {141404, 53}, {141404, 312}, {141404, 541}, {141404, 723}, {141404, 885}, {141404, 313}, {141404, 846}]

5: [{231044, 638}, {231044, 776}, {231044, 584}, {231044, 58}, {231044, 257}, {231044, 480}, {231044, 594}, {231044, 559}, {231044, 240}, {231044, 540}]

1: [{235446, 445}, {235446, 288}, {235446, 210}, {235446, 59}, {235446, 115}, {235446, 270}, {235446, 361}, {235446, 213}, {235446, 146}, {235446, 251}]

4: [{133157, 615}, {133157, 770}, {133157, 583}, {133157, 58}, {133157, 272}, {133157, 492}, {133157, 586}, {133157, 574}, {133157, 251}, {133157, 569}]

8: [{201557, 723}, {201557, 1089}, {201557, 1039}, {201557, 51}, {201557, 375}, {201557, 605}, {201557, 777}, {201557, 965}, {201557, 349}, {201557, 1162}]

0: [{290268, 544}, {290268, 610}, {290268, 362}, {290268, 61}, {290268, 199}, {290268, 370}, {290268, 487}, {290268, 386}, {290268, 196}, {290268, 366}]

9: [{194973, 701}, {194973, 967}, {194973, 848}, {194973, 52}, {194973, 336}, {194973, 575}, {194973, 745}, {194973, 889}, {194973, 295}, {194973, 847}]

2: [{187178, 532}, {187178, 569}, {187178, 415}, {187178, 52}, {187178, 179}, {187178, 355}, {187178, 507}, {187178, 383}, {187178, 223}, {187178, 370}]

6: [{226488, 574}, {226488, 719}, {226488, 425}, {226488, 67}, {226488, 227}, {226488, 398}, {226488, 505}, {226488, 431}, {226488, 234}, {226488, 433}]

Comments: Same as test 1

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 50

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000, send\_percentage: 50

| 0: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 1: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 2: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

| 4: [{1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}, {1000, 0}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50

|

| 2: [{495741, 0}, {495741, 0}, {495741, 0}, {495741, 0}, {495741, 0}]

| 0: [{469569, 0}, {469569, 0}, {469569, 0}, {469569, 0}, {469569, 0}]

| 1: [{500539, 0}, {500539, 0}, {500539, 0}, {500539, 0}, {500539, 0}]

| 4: [{511090, 0}, {511090, 0}, {511090, 0}, {511090, 0}, {511090, 0}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50

| 2: [{107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}]

| 0: [{116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}]

| 4: [{90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}]

| 6: [{120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}]

| 5: [{142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}]

| 8: [{105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}]

| 9: [{104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}]

| 7: [{109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}]

| 1: [{97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}]

Comments:

**System 6 Tests**

Test 1 Local - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000

0: [{1000, 860}, {1000, 848}, {1000, 856}, {1000, 0}, {1000, 851}]

2: [{1000, 868}, {1000, 854}, {1000, 841}, {1000, 0}, {1000, 869}]

1: [{1000, 868}, {1000, 850}, {1000, 851}, {1000, 0}, {1000, 865}]

4: [{1000, 868}, {1000, 865}, {1000, 839}, {1000, 0}, {1000, 864}]

Comments: We can see that by having a send\_percentage = 50 we have improved our send rate to 85% by creating the new erb component.

Test 2 Local - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

4: [{140402, 3837}, {140402, 4323}, {140402, 4413}, {140402, 0}, {140402, 6628}]

1: [{174690, 1751}, {174690, 901}, {174690, 2526}, {174690, 0}, {174690, 2498}]

0: [{148727, 1962}, {148727, 1008}, {148727, 2829}, {148727, 0}, {148727, 2919}]

2: [{184709, 1902}, {184709, 990}, {184709, 2808}, {184709, 0}, {184709, 2880}]

Comments: Same as test1

Test 3 Local - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000

1: [{68215, 233}, {68215, 553}, {68215, 550}, {68215, 9}, {68215, 563}, {68215, 263}, {68215, 268}, {68215, 395}, {68215, 520}, {68215, 666}]

7: [{64553, 182}, {64553, 485}, {64553, 477}, {64553, 10}, {64553, 477}, {64553, 240}, {64553, 212}, {64553, 289}, {64553, 465}, {64553, 620}]

8: [{66232, 88}, {66232, 298}, {66232, 311}, {66232, 7}, {66232, 290}, {66232, 83}, {66232, 102}, {66232, 147}, {66232, 325}, {66232, 323}]

4: [{72869, 204}, {72869, 484}, {72869, 511}, {72869, 11}, {72869, 460}, {72869, 256}, {72869, 238}, {72869, 311}, {72869, 480}, {72869, 619}]

6: [{65513, 129}, {65513, 425}, {65513, 447}, {65513, 10}, {65513, 396}, {65513, 201}, {65513, 197}, {65513, 235}, {65513, 410}, {65513, 533}]

2: [{68243, 107}, {68243, 351}, {68243, 348}, {68243, 9}, {68243, 351}, {68243, 142}, {68243, 141}, {68243, 183}, {68243, 402}, {68243, 441}]

0: [{64860, 117}, {64860, 350}, {64860, 365}, {64860, 7}, {64860, 363}, {64860, 136}, {64860, 144}, {64860, 155}, {64860, 393}, {64860, 431}]

9: [{68102, 19}, {68102, 25}, {68102, 19}, {68102, 5}, {68102, 20}, {68102, 20}, {68102, 21}, {68102, 20}, {68102, 228}, {68102, 39}]

5: [{82767, 62}, {82767, 162}, {82767, 141}, {82767, 9}, {82767, 140}, {82767, 64}, {82767, 65}, {82767, 68}, {82767, 310}, {82767, 164}]

Comments: Same as test1

Test 1 Docker - nr\_of\_peers = 5, max\_broadcasts = 1000, timeout = 3000, send\_percentage = 50

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 1000, timeout: 3000, send\_percentage: 50

| 0: [{1000, 855}, {1000, 864}, {1000, 860}, {1000, 0}, {1000, 862}]

| 1: [{1000, 842}, {1000, 870}, {1000, 868}, {1000, 0}, {1000, 835}]

| 2: [{1000, 863}, {1000, 864}, {1000, 849}, {1000, 0}, {1000, 857}]

| 4: [{1000, 873}, {1000, 869}, {1000, 859}, {1000, 0}, {1000, 845}]

Comments:

Test 2 Docker - nr\_of\_peers = 5, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

| Starting on docker with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50|

| 2: [{360683, 1}, {360683, 2}, {360683, 2}, {360683, 0}, {360683, 88}]

| 0: [{334387, 1984}, {334387, 2568}, {334387, 1281}, {334387, 0}, {334387, 1403}]

| 1: [{364392, 2949}, {364392, 3693}, {364392, 2594}, {364392, 0}, {364392, 3055}]

| 4: [{351717, 2320}, {351717, 3647}, {351717, 1865}, {351717, 0}, {351717, 2778}]

Comments:

Test 3 Docker - nr\_of\_peers = 10, max\_broadcasts = 10\_000\_000, timeout = 3000, send\_percentage = 50

Output:

Starting local with nr\_of\_peers: 5, max\_broadcasts: 10000000, timeout: 3000

| Starting on docker with nr\_of\_peers: 10, max\_broadcasts: 10000000, timeout: 3000, send\_percentage: 50

| 1: [{97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}, {97499, 0}]

| 0: [{116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}, {116050, 0}]

| 7: [{109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}, {109091, 0}]

| 4: [{90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}, {90061, 0}]

| 6: [{120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}, {120345, 0}]

| 5: [{142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}, {142533, 0}]

| 2: [{107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}, {107812, 0}]

| 8: [{105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}, {105850, 0}]

| 9: [{104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}, {104797, 0}]

Comments: