

| Using Tabu List (no communication) | | |
|------------------------------------|------------|----------|
| time | iterations | restarts |
| 110 | 743 | 3 |
| 100 | 768 | 3 |
| 50 | 518 | 2 |
| 20 | 88 | 0 |
| 20 | 202 | 1 |
| 30 | 233 | 1 |
| 20 | 197 | 0 |
| 10 | 112 | 0 |
| 20 | 86 | 0 |
| 40 | 229 | 1 |
| 10 | 88 | 0 |
| 20 | 88 | 0 |
| 20 | 89 | 0 |
| 100 | 970 | 4 |
| 30 | 173 | 0 |
| 40 | 401 | 2 |
| 20 | 169 | 0 |
| 30 | 173 | 0 |
| 30 | 196 | 0 |
| 170 | 1543 | 7 |
| 90 | 576 | 2 |
| 60 | 602 | 3 |
| 60 | 570 | 2 |
| 60 | 547 | 2 |
| 10 | 86 | 0 |
| 10 | 138 | 0 |
| 20 | 142 | 0 |
| 10 | 87 | 0 |
| 50 | 487 | 2 |
| 20 | 167 | 0 |
| 43 | 349 | 1 |
| 38 | 334 | 2 |

| Without Tabu List (no communication) | | |
|--------------------------------------|------------|----------|
| time | iterations | restarts |
| 70 | 685 | 3 |
| 50 | 432 | 2 |
| 50 | 400 | 1 |
| 90 | 801 | 4 |
| 50 | 371 | 1 |
| 60 | 603 | 3 |
| 110 | 1118 | 5 |
| 30 | 286 | 1 |
| 40 | 378 | 1 |
| 30 | 315 | 1 |
| 30 | 259 | 1 |
| 50 | 431 | 2 |
| 20 | 204 | 1 |
| 130 | 1290 | 6 |
| 100 | 961 | 4 |
| 60 | 604 | 3 |
| 20 | 263 | 1 |
| 20 | 194 | 0 |
| 10 | 112 | 0 |
| 30 | 290 | 1 |
| 20 | 166 | 0 |
| 40 | 343 | 1 |
| 10 | 114 | 0 |
| 140 | 1200 | 5 |
| 30 | 259 | 1 |
| 20 | 203 | 1 |
| 40 | 260 | 1 |
| 10 | 88 | 0 |
| 20 | 202 | 1 |
| 40 | 259 | 1 |
| 47 | 436 | 2 |
| 35 | 330 | 2 |

Table GRP 1: No communication (40 cores) Golomb Ruler 8-34

Caption:

Eps = 4
Norm = 8
tabu size = 15

mean

Standard Deviation

| Using Tabu List (communication 1-1) | | |
|-------------------------------------|------------|----------|
| time | iterations | restarts |
| 40 | 431 | 2 |
| 30 | 199 | 0 |
| 30 | 140 | 0 |
| 30 | 316 | 1 |
| 80 | 569 | 2 |
| 60 | 340 | 1 |
| 40 | 202 | 1 |
| 30 | 140 | 0 |
| 30 | 113 | 0 |
| 160 | 1202 | 6 |
| 90 | 570 | 2 |
| 60 | 430 | 2 |
| 30 | 262 | 1 |
| 50 | 395 | 1 |
| 30 | 143 | 0 |
| 40 | 337 | 1 |
| 30 | 263 | 1 |
| 40 | 312 | 1 |
| 20 | 193 | 0 |
| 20 | 120 | 0 |
| 30 | 286 | 1 |
| 30 | 112 | 0 |
| 20 | 174 | 0 |
| 10 | 89 | 0 |
| 80 | 573 | 2 |
| 20 | 60 | 0 |
| 30 | 289 | 1 |
| 70 | 460 | 2 |
| 10 | 4 | 0 |
| 90 | 543 | 2 |
| 44 | 309 | 1 |
| 31 | 233 | 1 |

| Using Tabu List (communication 1-n) | | |
|-------------------------------------|------------|----------|
| time | iterations | restarts |
| 20 | 87 | 0 |
| 10 | 30 | 0 |
| 20 | 113 | 0 |
| 80 | 543 | 2 |
| 70 | 403 | 2 |
| 10 | 57 | 0 |
| 70 | 460 | 2 |
| 40 | 203 | 1 |
| 10 | 121 | 0 |
| 10 | 62 | 0 |
| 80 | 594 | 2 |
| 40 | 203 | 1 |
| 30 | 203 | 1 |
| 10 | 87 | 0 |
| 70 | 342 | 1 |
| 90 | 630 | 3 |
| 40 | 368 | 1 |
| 10 | 3 | 0 |
| 80 | 632 | 3 |
| 60 | 488 | 2 |
| 20 | 203 | 1 |
| 10 | 30 | 0 |
| 70 | 492 | 2 |
| 40 | 170 | 0 |
| 80 | 570 | 2 |
| 40 | 261 | 1 |
| 100 | 768 | 3 |
| 10 | 60 | 0 |
| 50 | 289 | 1 |
| 10 | 3 | 0 |
| 43 | 283 | 1 |
| 30 | 225 | 1 |

Table GRP 2: Communication (40 cores) Golomb Ruler 8-34

Caption:

Eps = 4
Norm = 8
tabu size = 40

| mean |
|--------------------|
| Standard Deviation |
| sender solver |
| receiver solver |

| Sequential (without tabu list) | | |
|--------------------------------|---------------|-----------|
| time | iterations | restarts |
| 80 | 1232 | 6 |
| 950 | 15915 | 79 |
| 400 | 6803 | 34 |
| 600 | 10316 | 51 |
| 880 | 14802 | 74 |
| 2050 | 33658 | 168 |
| 2580 | 43742 | 218 |
| 200 | 3313 | 16 |
| 690 | 10887 | 54 |
| 1640 | 26832 | 134 |
| 1040 | 17171 | 85 |
| 210 | 3486 | 17 |
| 240 | 4082 | 20 |
| 100 | 1717 | 8 |
| 130 | 2483 | 12 |
| 1040 | 18059 | 90 |
| 1720 | 28799 | 143 |
| 1070 | 18138 | 90 |
| 1290 | 21230 | 106 |
| 40 | 740 | 3 |
| 460 | 7604 | 38 |
| 100 | 1741 | 8 |
| 940 | 15030 | 75 |
| 110 | 1887 | 9 |
| 1760 | 28857 | 144 |
| 420 | 7172 | 35 |
| 1440 | 25339 | 126 |
| 780 | 13258 | 66 |
| 220 | 3857 | 19 |
| 670 | 11030 | 55 |
| 795 | 13,306 | 66 |
| 668 | 11,154 | 56 |

| Sequential (with tabu list) | | |
|-----------------------------|---------------|-----------|
| time | iterations | restarts |
| 1090 | 17140 | 85 |
| 10 | 233 | 1 |
| 240 | 3860 | 19 |
| 2190 | 36030 | 180 |
| 2350 | 37203 | 186 |
| 700 | 11366 | 56 |
| 150 | 2634 | 13 |
| 740 | 11461 | 57 |
| 870 | 13795 | 68 |
| 80 | 1260 | 6 |
| 50 | 994 | 4 |
| 450 | 7202 | 36 |
| 970 | 15796 | 78 |
| 510 | 8142 | 40 |
| 100 | 1547 | 7 |
| 1230 | 20487 | 102 |
| 500 | 8287 | 41 |
| 560 | 9311 | 46 |
| 860 | 14089 | 70 |
| 70 | 1345 | 6 |
| 510 | 8343 | 41 |
| 450 | 7342 | 36 |
| 80 | 1401 | 7 |
| 260 | 4340 | 21 |
| 1960 | 31257 | 156 |
| 260 | 4086 | 20 |
| 1340 | 21514 | 107 |
| 250 | 3942 | 19 |
| 30 | 546 | 2 |
| 1070 | 17399 | 86 |
| 664 | 10,745 | 53 |
| 639 | 10,260 | 51 |

Table GRP 3: Sequential (1 core) Golomb Ruler 8-34

Caption:

mean

Standard Deviation

Eps = 4

Norm = 8

tabu size = 15

| Using Tabu List (no communication) | | |
|------------------------------------|---------------|-----------|
| time | iterations | restarts |
| 4,740 | 20,069 | 13 |
| 13,990 | 56,986 | 37 |
| 7,980 | 33,958 | 22 |
| 6,810 | 28,162 | 18 |
| 9,300 | 37,336 | 24 |
| 21,410 | 89,951 | 59 |
| 3,340 | 13,506 | 9 |
| 3,190 | 13,458 | 8 |
| 1,230 | 4,449 | 2 |
| 2,320 | 9,792 | 6 |
| 5,520 | 23,529 | 15 |
| 4,330 | 17,268 | 11 |
| 3,170 | 12,892 | 8 |
| 1,050 | 3,734 | 2 |
| 8,090 | 34,830 | 23 |
| 5,310 | 21,741 | 14 |
| 2,950 | 12,597 | 8 |
| 620 | 2,892 | 1 |
| 11,370 | 48,732 | 32 |
| 2,790 | 11,731 | 7 |
| 2,400 | 9,733 | 6 |
| 2,110 | 8,268 | 5 |
| 11,010 | 47,398 | 31 |
| 1,560 | 6,140 | 4 |
| 3,270 | 13,937 | 9 |
| 640 | 2,355 | 1 |
| 990 | 3,698 | 2 |
| 480 | 1,768 | 1 |
| 3,120 | 12,896 | 8 |
| 2,600 | 11,322 | 7 |
| 4,923 | 20,504 | 13 |
| 4,687 | 19,743 | 13 |

| Without Tabu List (no communication) | | |
|--------------------------------------|---------------|-----------|
| time | iterations | restarts |
| 5,360 | 21,072 | 14 |
| 1,700 | 7,295 | 4 |
| 6,590 | 27,135 | 18 |
| 900 | 3,466 | 2 |
| 5,710 | 24,439 | 16 |
| 4,000 | 16,161 | 10 |
| 4,760 | 21,600 | 14 |
| 1,480 | 5,834 | 3 |
| 15,100 | 63,697 | 42 |
| 12,840 | 54,234 | 36 |
| 4,270 | 19,252 | 12 |
| 7,360 | 32,230 | 21 |
| 7,330 | 32,695 | 21 |
| 2,370 | 10,163 | 6 |
| 6,890 | 29,354 | 19 |
| 1,080 | 4,570 | 3 |
| 10,340 | 44,978 | 29 |
| 13,190 | 56,969 | 37 |
| 8,370 | 36,197 | 24 |
| 3,260 | 14,755 | 9 |
| 970 | 4,450 | 2 |
| 920 | 4,247 | 2 |
| 4,250 | 17,070 | 11 |
| 3,630 | 15,300 | 10 |
| 8,690 | 36,498 | 24 |
| 2,000 | 7,965 | 5 |
| 3,760 | 15,501 | 10 |
| 7,390 | 29,296 | 19 |
| 3,370 | 14,731 | 9 |
| 1,430 | 6,169 | 4 |
| 5,310 | 22,577 | 15 |
| 3,863 | 16,488 | 11 |

Table GRP 4: No communication (40 cores) Golomb Ruler 10-55

Caption:

Eps = 4
Norm = 8
tabu size = 15

mean

Standard Deviation

| Using Tabu List (communication 1-1) | | |
|-------------------------------------|------------|----------|
| time | iterations | restarts |
| 1,370 | 5,957 | 3 |
| 440 | 1,613 | 1 |
| 6,440 | 26,337 | 17 |
| 590 | 2,402 | 1 |
| 310 | 1,258 | 0 |
| 1,790 | 7,891 | 5 |
| 2,880 | 11,075 | 7 |
| 1,700 | 6,537 | 4 |
| 260 | 797 | 0 |
| 550 | 2,409 | 1 |
| 5,750 | 21,993 | 14 |
| 6,800 | 26,270 | 17 |
| 9,100 | 35,963 | 23 |
| 1,070 | 4,018 | 2 |
| 3,010 | 11,320 | 7 |
| 4,590 | 17,455 | 11 |
| 10,120 | 40,753 | 27 |
| 3,620 | 14,283 | 9 |
| 3,080 | 12,199 | 8 |
| 430 | 1,674 | 1 |
| 9,580 | 39,655 | 26 |
| 3,060 | 11,673 | 7 |
| 7,210 | 28,998 | 19 |
| 1,310 | 5,008 | 3 |
| 6,620 | 27,298 | 18 |
| 8,850 | 35,597 | 23 |
| 2,480 | 10,118 | 6 |
| 9,170 | 32,662 | 21 |
| 1,460 | 5,952 | 3 |
| 3,460 | 13,935 | 9 |
| 3,903 | 15,437 | 10 |
| 3,225 | 12,789 | 9 |

| Using Tabu List (communication 1-n) | | |
|-------------------------------------|------------|----------|
| time | iterations | restarts |
| 8,180 | 35,159 | 23 |
| 7,920 | 33,205 | 22 |
| 1,350 | 5,190 | 3 |
| 3,030 | 11,119 | 7 |
| 3,460 | 15,232 | 10 |
| 630 | 2,326 | 1 |
| 9,300 | 36,107 | 24 |
| 1,680 | 6,760 | 4 |
| 170 | 757 | 0 |
| 5,520 | 21,400 | 14 |
| 210 | 758 | 0 |
| 1,100 | 4,314 | 2 |
| 8,150 | 32,458 | 21 |
| 1,510 | 5,813 | 3 |
| 460 | 1,897 | 1 |
| 2,230 | 8,359 | 5 |
| 3,650 | 14,376 | 9 |
| 1,240 | 4,771 | 3 |
| 580 | 2,432 | 1 |
| 460 | 1,743 | 1 |
| 5,560 | 22,256 | 14 |
| 1,470 | 5,451 | 3 |
| 960 | 3,858 | 2 |
| 1,280 | 5,100 | 3 |
| 4,800 | 20,616 | 13 |
| 3,760 | 14,826 | 9 |
| 1,620 | 6,434 | 4 |
| 1,370 | 5,199 | 3 |
| 7,910 | 29,852 | 19 |
| 5,290 | 20,388 | 13 |
| 3,162 | 12,605 | 8 |
| 2,824 | 11,405 | 8 |

Table GRP 5: Communication (40 cores) Golomb Ruler 10-55

Caption:

Eps = 4
Norm = 8
tabu size = 40

| mean |
|--------------------|
| Standard Deviation |
| sender solver |
| receiver solver |

| Sequential (without tabu list) | | | Sequential (with tabu list) | | |
|--------------------------------|----------------|------------|-----------------------------|----------------|------------|
| time | iterations | restarts | time | iterations | restarts |
| 11,540 | 85,707 | 57 | 17,720 | 117,993 | 78 |
| 106,120 | 759,399 | 506 | 146,880 | 993,766 | 662 |
| 58,220 | 411,362 | 274 | 63,660 | 428,626 | 285 |
| 49,070 | 342,733 | 228 | 10,090 | 67,926 | 45 |
| 20,200 | 146,027 | 97 | 75,560 | 514,704 | 343 |
| 47,620 | 327,598 | 218 | 53,700 | 372,893 | 248 |
| 55,600 | 372,135 | 248 | 147,140 | 1,011,234 | 674 |
| 90,620 | 610,539 | 407 | 57,570 | 400,503 | 267 |
| 7,650 | 52,896 | 35 | 44,530 | 295,743 | 197 |
| 145,150 | 966,493 | 644 | 40,970 | 277,320 | 184 |
| 33,210 | 224,551 | 149 | 410 | 2,791 | 1 |
| 96,990 | 662,726 | 441 | 40,840 | 271,494 | 180 |
| 47,300 | 318,721 | 212 | 57,140 | 382,793 | 255 |
| 15,960 | 108,936 | 72 | 38,570 | 256,086 | 170 |
| 18,560 | 130,505 | 87 | 134,890 | 894,727 | 596 |
| 7,480 | 50,949 | 33 | 91,410 | 608,716 | 405 |
| 68,200 | 471,494 | 314 | 57,340 | 389,626 | 259 |
| 92,600 | 620,422 | 413 | 105,230 | 728,128 | 485 |
| 22,950 | 156,637 | 104 | 114,190 | 790,798 | 527 |
| 45,450 | 306,110 | 204 | 110,290 | 758,168 | 505 |
| 34,570 | 188,025 | 125 | 23,310 | 157,930 | 105 |
| 112,110 | 768,339 | 512 | 14,320 | 88,766 | 59 |
| 142,360 | 965,061 | 643 | 151,240 | 1,007,429 | 671 |
| 142,300 | 960,895 | 640 | 88,750 | 600,499 | 400 |
| 78,720 | 528,396 | 352 | 39,030 | 257,327 | 171 |
| 56,810 | 389,701 | 259 | 51,060 | 221,101 | 147 |
| 12,120 | 82,335 | 54 | 37,810 | 198,660 | 132 |
| 58,860 | 387,600 | 258 | 24,270 | 156,268 | 104 |
| 208,790 | 1,417,178 | 944 | 5,610 | 32,591 | 21 |
| 106,150 | 729,103 | 486 | 193,370 | 1,122,786 | 748 |
| 66,443 | 451,419 | 301 | 67,897 | 446,913 | 297 |
| 49,569 | 336,859 | 225 | 50,024 | 328,912 | 219 |

Table GRP 6: Sequential (1 core) Golomb Ruler 10-55

Caption:

mean

Standard Deviation

Eps = 4

Norm = 8

tabu size = 15

| Using Tabu List (no communication) | | |
|------------------------------------|----------------|-----------|
| time | iterations | restarts |
| 32170 | 58451 | 19 |
| 86650 | 156935 | 52 |
| 161460 | 293271 | 97 |
| 220280 | 398176 | 132 |
| 74050 | 136241 | 45 |
| 66420 | 119174 | 39 |
| 179500 | 327108 | 109 |
| 117350 | 212795 | 70 |
| 103960 | 192214 | 64 |
| 9800 | 17999 | 5 |
| 25290 | 45418 | 15 |
| 108060 | 201626 | 67 |
| 119020 | 219628 | 73 |
| 18550 | 34456 | 11 |
| 210190 | 384418 | 128 |
| 53520 | 100043 | 33 |
| 127630 | 230691 | 76 |
| 52620 | 96214 | 32 |
| 214640 | 383587 | 127 |
| 28080 | 50999 | 16 |
| 79130 | 146484 | 48 |
| 55850 | 103242 | 34 |
| 91340 | 167080 | 55 |
| 7270 | 12421 | 4 |
| 184280 | 338482 | 112 |
| 1620 | 2999 | 0 |
| 12520 | 22971 | 7 |
| 3640 | 6928 | 2 |
| 34220 | 64652 | 21 |
| 71590 | 132829 | 44 |
| 85,023 | 155,251 | 51 |
| 67,223 | 121,929 | 41 |

| Without Tabu List (no communication) | | |
|--------------------------------------|----------------|-----------|
| time | iterations | restarts |
| 273700 | 508450 | 169 |
| 30790 | 56778 | 18 |
| 103280 | 192006 | 64 |
| 53230 | 95905 | 31 |
| 41540 | 78212 | 26 |
| 58890 | 104483 | 34 |
| 90190 | 167372 | 55 |
| 133910 | 248677 | 82 |
| 82350 | 152068 | 50 |
| 150320 | 273317 | 91 |
| 1430 | 2785 | 0 |
| 95300 | 173065 | 57 |
| 173490 | 311376 | 103 |
| 51820 | 95176 | 31 |
| 21590 | 40349 | 13 |
| 40000 | 73144 | 24 |
| 123830 | 232758 | 77 |
| 82010 | 149688 | 49 |
| 60880 | 113789 | 37 |
| 98000 | 181972 | 60 |
| 56980 | 104485 | 34 |
| 129980 | 236088 | 78 |
| 98100 | 180725 | 60 |
| 78750 | 146276 | 48 |
| 166690 | 302689 | 100 |
| 82660 | 151445 | 50 |
| 92160 | 164589 | 54 |
| 142440 | 263995 | 87 |
| 54130 | 98081 | 32 |
| 24350 | 43139 | 14 |
| 89,760 | 164,763 | 54 |
| 55,859 | 102,931 | 34 |

Table GRP 7: No communication (40 cores) Golomb Ruler 11-72

Caption:

Eps = 4
 Norm = 8
 tabu size = 15

| mean |
|--------------------|
| Standard Deviation |

| Using Tabu List (communication 1-1) | | |
|-------------------------------------|------------|----------|
| time | iterations | restarts |
| 58150 | 104687 | 34 |
| 211410 | 387838 | 129 |
| 5580 | 10135 | 3 |
| 81170 | 151964 | 50 |
| 44770 | 80806 | 26 |
| 92430 | 163137 | 54 |
| 62460 | 111108 | 37 |
| 48680 | 87420 | 29 |
| 50410 | 89278 | 29 |
| 192780 | 356580 | 118 |
| 84510 | 158490 | 52 |
| 174050 | 321314 | 107 |
| 62130 | 110587 | 36 |
| 116400 | 209895 | 69 |
| 69700 | 127352 | 42 |
| 78790 | 143793 | 47 |
| 53510 | 100957 | 33 |
| 42740 | 76143 | 25 |
| 73150 | 131271 | 43 |
| 38160 | 72321 | 24 |
| 12310 | 22243 | 7 |
| 96690 | 179268 | 59 |
| 190280 | 350380 | 116 |
| 78940 | 143379 | 47 |
| 98090 | 180525 | 60 |
| 159820 | 295856 | 98 |
| 96030 | 175445 | 58 |
| 78610 | 141931 | 47 |
| 24700 | 44064 | 14 |
| 86470 | 158172 | 52 |
| 85,431 | 156,211 | 52 |
| 52,610 | 97,330 | 32 |

| Using Tabu List (communication 1-n) | | |
|-------------------------------------|------------|----------|
| time | iterations | restarts |
| 170270 | 312109 | 104 |
| 62810 | 111833 | 37 |
| 14140 | 26681 | 8 |
| 53730 | 97756 | 32 |
| 16230 | 28758 | 9 |
| 24030 | 42519 | 14 |
| 39870 | 74069 | 24 |
| 59800 | 107992 | 35 |
| 16660 | 30007 | 10 |
| 79380 | 146171 | 48 |
| 95520 | 175044 | 58 |
| 118760 | 217352 | 72 |
| 21140 | 37044 | 12 |
| 19580 | 34345 | 11 |
| 124340 | 224683 | 74 |
| 85260 | 152680 | 50 |
| 10690 | 19041 | 6 |
| 75000 | 136039 | 45 |
| 26580 | 46451 | 15 |
| 154340 | 287165 | 95 |
| 7170 | 12523 | 4 |
| 44110 | 81521 | 27 |
| 90380 | 168320 | 56 |
| 32580 | 59889 | 19 |
| 47430 | 83487 | 27 |
| 114890 | 215689 | 71 |
| 47620 | 85957 | 28 |
| 13730 | 24413 | 8 |
| 77170 | 144113 | 48 |
| 67510 | 125686 | 41 |
| 60,357 | 110,311 | 36 |
| 43,951 | 81,296 | 27 |

Table GRP 8: Communication (40 cores) Golomb Ruler 11-72

Caption:

Eps = 4
Norm = 8
tabu size = 40

| mean |
|--------------------|
| Standard Deviation |
| sender solver |
| receiver solver |

