## A Closed instances and new upper bounds

In Tab. 6 we list all previously open instances (wrt. [7]) and their optimal makespan. Thereby, the first column indicates the investigated test set where we use the notation from [7], *e.g.*, test set 50-60 contains instances with 50 real activities and 60% of the activities are interruptible. All the instances in Tab. 6 were closed by model `cumucal` with `alt` search.

Table 6: Closed instances

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 50-60 | Instance | 3 | 4 | 38 | | | | | | |
| | Makespan | 193 | 213 | inf | | | | | | |
| 50-80 | Instance | 3 | 4 | 5 | 10 | 19 | 36 | | | |
| | Makespan | 178 | 187 | 188 | 108 | 213 | 221 | | | |
| 100-60 | Instance | 1 | 4 | 5 | 6 | 7 | 8 | 10 | 12 | 13 | 14 |
| | Makespan | inf | 312 | 288 | 361 | 289 | 417 | 457 | 296 | 158 | 270 |
| | Instance | 16 | 19 | 20 | 27 | 32 | 33 | 34 | 36 | 37 | 38 |
| | Makespan | 163 | 256 | 250 | 243 | 351 | 424 | 430 | 411 | 487 | 607 |
| | Instance | 41 | 46 | 48 | 50 | 62 | 65 | 67 | 68 | 69 | 70 |
| | Makespan | 521 | 361 | 564 | 369 | 660 | 529 | 363 | 640 | 689 | 475 |
| | Instance | 71 | 73 | 74 | 78 | 79 | 85 | 87 | | | |
| | Makespan | 780 | inf | 323 | 510 | 625 | 649 | 500 | | | |
| 100-80 | Instance | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 14 |
| | Makespan | 303 | 327 | 369 | 283 | 389 | 433 | 352 | 298 | 190 | 275 |
| | Instance | 16 | 19 | 27 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
| | Makespan | 190 | 240 | 277 | 478 | 395 | 359 | 514 | inf | 470 | 415 |
| | Instance | 43 | 44 | 45 | 46 | 48 | 49 | 50 | 61 | 62 | 63 |
| | Makespan | 463 | 733 | 496 | 326 | 570 | 268 | 309 | 804 | 696 | inf |
| | Instance | 65 | 67 | 69 | 70 | 71 | 73 | 74 | 78 | 79 | 87 |
| | Makespan | 527 | 421 | inf | 449 | 753 | 565 | 339 | 557 | 557 | 491 |

In Tab. 7 we list all instances that could not be solved to optimality with any of the presented CP models but where the upper bound from [7] could be improved. Upper bounds that are marked by $^*$ were obtained by using table constraints instead of element constraints in the models.

Table 7: New upper bounds

| | | | | | |
|---|---|---|---|---|---|
| 100-60 | Instance | 2 | 3 | 9 | 40 |
| | UB | 478 | 462 | $318^*$ | $575^*$ |
| 100-80 | Instance | 1 | 2 | 9 | 40 |
| | UB | $422^*$ | 609 | $400^*$ | $535^*$ |

In total 86 instances of 95 open instances are closed and 8 further upper bounds are improved.