AN UPDATED BIBLIOGRAPHY OF GRASP

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This document contains references related to GRASP (greedy randomized adaptive search procedure) that have either appeared in the literature or as technical reports. If you are aware of any uncited reference, incorrectly cited reference, or update to a cited reference, please contact Mauricio G. C. Resende at the address given at the end of this document.

REFERENCES

- [1] J.P. Hart and A.W. Shogan. Semi-greedy heuristics: An empirical study. *Operations Research Letters*, 6:107–114, 1987.
- [2] J.F. Bard and T.A. Feo. Operations sequencing in discrete parts manufacturing. *Management Science*, 35:249–255, 1989.
- [3] T.A. Feo and J.F. Bard. Flight scheduling and maintenance base planning. *Management Science*, 35:1415–1432, 1989.
- [4] T.A. Feo and J.F. Bard. The cutting path and tool selection problem in computer-aided process planning. *Journal of Manufacturing Systems*, 8:17–26, 1989.
- [5] T.A. Feo and M.G.C. Resende. A probabilistic heuristic for a computationally difficult set covering problem. Operations Research Letters, 8:67–71, 1989.
- [6] J.F. Bard and T.A. Feo. An algorithm for the manufacturing equipment selection problem. *IIE Transactions*, 23:83–92, 1991.
- [7] T.A. Feo, K. Venkatraman, and J.F. Bard. A GRASP for a difficult single machine scheduling problem. Computers & Operations Research, 18:635–643, 1991.
- [8] M. Laguna and J.L. González-Velarde. A search heuristic for just-in-time scheduling in parallel machines. *Journal of Intelligent Manufacturing*, 2:253–260, 1991.
- [9] J.G. Klincewicz. Avoiding local optima in the p-hub location problem using tabu search and grasp. Annals of Operations Research, 40:283–302, 1992.
- [10] P. De, J.B. Ghosj, and C.E. Wells. Solving a generalized model for con due date assignment and sequencing. *International Journal of Production Economics*, 34:179–185, 1994.
- [11] T.A. Feo, M.G.C. Resende, and S.H. Smith. A greedy randomized adaptive search procedure for maximum independent set. *Operations Research*, 42:860–878, 1994.
- [12] J.G. Klincewicz and A. Rajan. Using GRASP to solve the component grouping problem. Naval Research Logistics, 41:893–912, 1994.
- [13] M. Laguna, T.A. Feo, and H.C. Elrod. A greedy randomized adaptive search procedure for the two-partition problem. *Operations Research*, 42:677–687, 1994.
- [14] Y. Li, P.M. Pardalos, and M.G.C. Resende. A greedy randomized adaptive search procedure for the quadratic assignment problem. In P.M. Pardalos and H. Wolkowicz, editors, *Quadratic assignment and related problems*, volume 16 of *DIMACS Series on Discrete Mathematics and Theoretical Computer Science*, pages 237–261. American Mathematical Society, 1994.
- [15] T.A. Feo, J.F Bard, and S. Holland. Facility-wide planning and scheduling of printed wiring board assembly. *Operations Research*, 43:219–230, 1995.
- [16] T.A. Feo and J.L González-Velarde. The intermodal trailer assignment problem: Models, algorithms, and heuristics. *Transportation Science*, 29:330–341, 1995.
- [17] T.A. Feo and M.G.C. Resende. Greedy randomized adaptive search procedures. *Journal of Global Optimization*, 6:109–133, 1995.

Date: October 14, 2003.

AT&T Labs Research Technical Report TD-5SB7BK.

- [18] C.A. Hjorring. The vehicle routing problem and local search metaheuristics. PhD thesis, University of Auckland, Auckland, New Zealand, 1995.
- [19] G. Kontoravdis and J.F. Bard. A GRASP for the vehicle routing problem with time windows. ORSA Journal on Computing, 7:10–23, 1995.
- [20] P.M. Pardalos, L. Pitsoulis, T. Mavridou, and M.G.C. Resende. Parallel search for combinatorial optimization: Genetic algorithms, simulated annealing and GRASP. In A. Ferreira and J. Rolim, editors, Parallel Algorithms for Irregularly Structured Problems, Proceedings of the Second International Workshop—Irregular'95, volume 980 of Lecture Notes in Computer Science, pages 317–331. Springer-Verlag, 1995.
- [21] P.M. Pardalos, L.S. Pitsoulis, and M.G.C. Resende. A parallel GRASP implementation for the quadratic assignment problem. In A. Ferreira and J. Rolim, editors, *Parallel Algorithms for Irregularly Structured Problems – Irregular'94*, pages 115–130. Kluwer Academic Publishers, 1995.
- [22] M.F. Argüello, T.A. Feo, and O. Goldschmidt. Randomized methods for the number partitioning problem. Computers & Operations Research, 23(2):103–111, 1996.
- [23] J.F. Bard, T.A. Feo, and S. Holland. A GRASP for scheduling printed wiring board assembly. I.I.E. Trans., 28:155–165, 1996.
- [24] J.L. Bresina. Heuristic-biased stochastic sampling. In Proceedings of the AAAI-96, pages 271–278, 1996.
- [25] C. Carvalho de Souza, C. Bauzer Medeiros, and R. Scachetti Pereira. Integrating heuristics and spatial databases: a case study. Technical Report IC-96-18, Institute of Computing, Universidade Estadual de Campinas, Campinas, Brazil, 1996.
- [26] T.A. Feo, K. Sarathy, and J. McGahan. A GRASP for single machine scheduling with sequence dependent setup costs and linear delay penalties. *Computers & Operations Research*, 23:881–895, 1996.
- [27] J.B. Ghosh. Computational aspects of the maximum diversity problem. Operations Research Letters, 19:175–181, 1996.
- [28] J.L. González. GRASP. In A. Díaz, editor, Heuristic optimization and neural networks in operations management and engineering, pages 143–161. Editorial Paraninfo, Madrid, 1996.
- [29] P.M. Pardalos, L.S. Pitsoulis, and M.G.C. Resende. A parallel GRASP for MAX-SAT problems. Lecture Notes in Computer Science, 1184:575–585, 1996.
- [30] M.G.C. Resende and T.A. Feo. A GRASP for satisfiability. In D.S. Johnson and M.A. Trick, editors, Cliques, Coloring, and Satisfiability: The Second DIMACS Implementation Challenge, volume 26 of DIMACS Series on Discrete Mathematics and Theoretical Computer Science, pages 499–520. American Mathematical Society, 1996.
- [31] M.G.C. Resende, P.M. Pardalos, and Y. Li. Algorithm 754: Fortran subroutines for approximate solution of dense quadratic assignment problems using GRASP. ACM Transactions on Mathematical Software, 22:104–118, 1996.
- [32] J. Xu and S. Chiu. Solving a real-world field technician scheduling problem. In Proceedings of the International Conference on Management Science and the Economic Development of China, pages 240–248, July 1996.
- [33] M. Yagiura and T. Ibakari. Genetic and local search algorithms as robust and simple optimization tools. In Meta-heuristics: Theory and applications, pages 63–82. Kluwer Academic Publishers, 1996.
- [34] S. Areibi and A. Vannelli. A GRASP clustering technique for circuit partitioning. In J. Gu and P.M. Pardalos, editors, Satisfiability problems, volume 35 of DIMACS Series on Discrete Mathematics and Theoretical Computer Science, pages 711–724. American Mathematical Society, 1997.
- [35] M.F. Argüello, J.F. Bard, and G. Yu. A GRASP for aircraft routing in response to groundings and delays. *Journal of Combinatorial Optimization*, 1:211–228, 1997.
- [36] J.F. Bard. An analysis of a rail car unloading area for a consumer products manufacturer. *Journal of the Operational Research Society*, 48:873–883, 1997.
- [37] H. Delmaire, J.A. Díaz, E. Fernández, and M. Ortega. Comparing new heuristics for the pure integer capacitated plant location problem. Technical Report DR97/10, Department of Statistics and Operations Research, Universitat Politecnica de Catalunya, Barcelona, Spain, 1997.
- [38] K. Holmqvist, A. Migdalas, and P.M. Pardalos. Greedy randomized adaptive search for a location problem with economies of scale. In I.M. Bomze et al., editor, *Developments in Global Optimization*, pages 301– 313. Kluwer Academic Publishers, 1997.
- [39] E.M. Macambira and C.C. de Souza. A GRASP for the maximum clique problem with weighted edges. In Proceedings of the XXIX Brazilian Symposium on Operations Research, page 70, October 1997.
- [40] E.M. Macambira and C.C. de Souza. The edge-weighted clique problem: valid inequalities, facets and polyhedral computations. Technical Report IC-97-14, Instituto de Computação, Universidade Estadual de Campinas, Campinas, Brazil, 1997.

- [41] R. Martí and M. Laguna. Heuristics and meta-heuristics for 2-layer straight line crossing minimization. Technical report, Department of Statistics and Operations Research, University of Valencia, 46100 Burjassot, Valencia, Spain, 1997. To appear in Discrete Applied Mathematics.
- [42] J. Mockus, E. Eddy, A. Mockus, L. Mockus, and G.V. Reklaitis. *Bayesian discrete and global optimization*. Kluwer Academic Publishers, 1997.
- [43] P.M. Pardalos, L.S. Pitsoulis, and M.G.C. Resende. Algorithm 769: Fortran subroutines for approximate solution of sparse quadratic assignment problems using GRASP. ACM Transactions on Mathematical Software, 23:196–208, 1997.
- [44] P.M. Pardalos, K.G. Ramakrishnan, M.G.C. Resende, and Y. Li. Implementation of a variance reduction based lower bound in a branch and bound algorithm for the quadratic assignment problem. SIAM Journal on Optimization, 7:280–294, 1997.
- [45] F. Poppe, M. Pickavet, P. Arijs, and P. Demeester. Design techniques for SDH mesh-restorable networks. In Proceedings of the European Conference on Networks and Optical Communications (NOC'97), Volume 2: Core and ATM Networks, pages 94–101, 1997.
- [46] M.G.C. Resende, L.S. Pitsoulis, and P.M. Pardalos. Approximate solution of weighted MAX-SAT problems using GRASP. In J. Gu and P.M. Pardalos, editors, *Satisfiability problems*, volume 35 of *DIMACS Series on Discrete Mathematics and Theoretical Computer Science*, pages 393–405. American Mathematical Society, 1997.
- [47] M.G.C. Resende and C.C. Ribeiro. A GRASP for graph planarization. Networks, 29:173-189, 1997.
- [48] M.G.C. Resende and O. Ulular. SMART: A tool for AT&T Worldnet access design Location of Cascade 9000 concentrators. Technical report, AT&T Labs Research, Florham Park, NJ 07932 USA, 1997.
- [49] A.C.F. Alvim. Parallelization strategies for the metaheuristic GRASP. Master's thesis, Department of Computer Science, Catholic University of Rio de Janeiro, Rio de Janeiro, RJ 22453-900 Brazil, April 1998.
- [50] A.C.F. Alvim and C.C. Ribeiro. Load balancing in the parallelization of the metaheuristic GRASP. Technical report, Department of Computer Science, Catholic University of Rio de Janeiro, Rio de Janeiro, RJ 22453-900 Brazil. 1998.
- [51] A.A. Andreatta and C.C. Ribeiro. An object-oriented framework for local search heuristics. In *Proceedings of the 26th TOOLS USA '98 Technology of Object-Oriented Languages and Systems*, pages 33–45. IEEE Computer Society, 1998.
- [52] R.G.I. Arakaki. O problema de roteamento de veículos e algumas metaheurísticas. Master's thesis, Instituto Nacional de Pasquisas Espaciais, Brazil, September 1998.
- [53] J.B. Atkinson. A greedy randomised search heuristic for time-constrained vehicle scheduling and the incorporation of a learning strategy. *Journal of the Operational Research Society*, 49:700–708, 1998.
- [54] J.F. Bard, L. Huang, P. Jaillet, and M. Dror. A decomposition approach to the inventory routing problem with satellite facilities. *Transportation Science*, 32:189–203, 1998.
- [55] R. Demirer and B. Eksioglu. Subset selection in multiple linear regression: a new mathematical programming approach. Technical Report School of business working paper no. 284, School of business, University of Kansas, Lawrence, Kansas, USA, 1998.
- [56] A.S. Deshpande and E. Triantaphyllou. A greedy randomized adaptive search procedure (GRASP) for inferring logical clauses from examples in polynomial time and some extensions. *Mathematical and Com*puter Modelling, 27:75–99, 1998.
- [57] X. Gandibleux, D. Vancoppenolle, and D. Tuyttens. A first making use of GRASP for solving MOCO problems. Technical report, University of Valenciennes, France, 1998.
- [58] P. Hansen and N. Mladenović. An introduction to variable neighborhood search. In S. Voss, S. Martello, I. H. Osman, and C. Roucairol, editors, *Meta-heuristics, Advances and trends in local search paradigms* for optimization, pages 433–458. Kluwer Academic Publishers, 1998.
- [59] K. Holmqvist, A. Migdalas, and P.M. Pardalos. A GRASP algorithm for the single source uncapacitated minimum concave-cost network flow problem. In P.M. Pardalos and D.-Z. Du, editors, *Network design:* Connectivity and facilities location, volume 40 of DIMACS Series on Discrete Mathematics and Theoretical Computer Science, pages 131–142. American Mathematical Society, 1998.
- [60] H. Juillé and J.B. Pollack. A sampling-based heuristic for tree search applied to grammar induction. In Proceedings of the Fifteenth National Conference on Artificial Intelligence, July 26-30 1998.
- [61] H. R. Lourenço and D. Serra. Adaptive approach heuristics for the generalized assignment problem. Technical Report 288, Department of Economics and Business, Universitat Pompeu Fabra, Barcelona, Spain, 1998.
- [62] N. Krasnogor, D.A. Pelta, W. Russo, and G. Terrazas. A GRASP approach to the protein structure prediction problem. Technical report, LIFIA Lab, University of La Plata, La Plata, Argentina, 1998.

- [63] M. Locatelli. A class of heuristic methods for the maximization of the l₁-norm over parallelotopes. Technical report, Dipartimento di Sistemi ed Informatica, Universitá di Firenze, Firenze, Italy, 1998.
- [64] E.M. Macambira and C.N. Meneses. A GRASP algorithm for the maximum weighted edge subgraph problem. Technical report, Department of Statistics and Computation, University of Ceará, Fortaleza, CE 60740-000 Brazil, 1998.
- [65] S.L. Martins, C.C. Ribeiro, and M.C. Souza. A parallel GRASP for the Steiner problem in graphs. In A. Ferreira and J. Rolim, editors, Proceedings of IRREGULAR'98 – 5th International Symposium on Solving Irregularly Structured Problems in Parallel, volume 1457 of Lecture Notes in Computer Science, pages 285–297. Springer-Verlag, 1998.
- [66] R.A. Murphey, P.M. Pardalos, and L.S. Pitsoulis. A greedy randomized adaptive search procedure for the multitarget multisensor tracking problem. In P.M. Pardalos and D.-Z. Du, editors, *Network design: Con*nectivity and facilities location, volume 40 of *DIMACS Series on Discrete Mathematics and Theoretical* Computer Science, pages 277–301. American Mathematical Society, 1998.
- [67] R.A. Murphey, P.M. Pardalos, and L.S. Pitsoulis. A parallel GRASP for the data association multidimensional assignment problem. In P.M. Pardalos, editor, *Parallel Processing of Discrete Problems*, volume 106 of *The IMA Volumes in Mathematics and its Applications*, pages 159–180. Springer-Verlag, 1998.
- [68] T. Mavridou, P.M. Pardalos, L.S. Pitsoulis, and M.G.C. Resende. A GRASP for the biquadratic assignment problem. European Journal of Operational Research, 105:613–621, 1998.
- [69] P.M. Pardalos, M.G.C. Resende, and J. Rappe. An exact parallel algorithm for the maximum clique problem. In R. De Leone et al., editor, *High performance algorithms and software in nonlinear optimization*, pages 279–300. Kluwer Academic Publishers, 1998.
- [70] E.L. Pasiliao. A greedy randomized adaptive search procedure for the multi-criteria radio link frequency assignment problem. Technical report, Department of ISE, University of Florida, Gainesville, FL 32611-6595, 1998.
- [71] M.C. Rangel, N.M.M. de Abreu, P.O. Boaventura Netto, and M.C.S. Boeres. A modified local search for GRASP in the quadratic assignment problem. Technical report, Production Engineering Program, COPPE, Federal University of Rio de Janeiro, Rio de Janeiro, RJ Brazil, 1998.
- [72] M.G.C. Resende. Computing approximate solutions of the maximum covering problem using GRASP. Journal of Heuristics, 4:161–171, 1998.
- [73] M.G.C. Resende, T.A. Feo, and S.H. Smith. Algorithm 787: Fortran subroutines for approximate solution of maximum independent set problems using GRASP. ACM Transactions on Mathematical Software, 24:386–394, 1998.
- [74] R.Z. Ríos-Mercado and J.F. Bard. Heuristics for the flow line problem with setup costs. European Journal of Operational Research, pages 76–98, 1998.
- [75] L.I.D. Rivera. Evaluation of parallel implementations of heuristics for the course scheduling problem. Master's thesis, Instituto Tecnologico y de Estudios Superiores de Monterrey, Monterrey, Mexico, 1998.
- [76] T.L. Urban. Solution procedures for the dynamic facility layout problem. Annals of Operations Research, pages 323–342, 1998.
- [77] J. Abello, P.M. Pardalos, and M.G.C. Resende. On maximum clique problems in very large graphs. In J. Abello and J. Vitter, editors, *External memory algorithms and visualization*, volume 50 of *DIMACS Series on Discrete Mathematics and Theoretical Computer Science*, pages 119–130. American Mathematical Society, 1999.
- [78] M.S. Akturk and K. KiliÇ. Generating short-term observations for space mission projects. J. of Intelligent Manufacturing, 10:387–404, 1999.
- [79] S.M. Areibi. GRASP: An effective constructive technique for VLSI circuit partitioning. In *Proc. IEEE Canadian Conference on Electrical & Computer Engineering (CCECE'99)*, volume 1, pages 462–467, May 1999.
- [80] E. Burke and G. Kendall. Applying ant algorithms and no fit polygon to the nesting problem. In N. Foo, editor, Proceedings of the 12th Joint Australian Conference in Artificial Intelligence, volume 1747 of Lecture Notes in Artificial Intelligence, pages 453–464. Springer-Verlag, 1999.
- [81] H. Delmaire, J.A. Díaz, E. Fernández, and M. Ortega. Reactive GRASP and tabu search based heuristics for the single source capacitated plant location problem. *INFOR*, 37:194–225, 1999.
- [82] J.C.Z. Diaz, J.S. Velázquez, and J.F. Solis. Un modelo tipo GRASP para la paralelización de algoritmos en computadoras MIMD: Aplicación al algoritmo de Jarmenson. Technical report, Universidad Autónoma del Estado de Morelos, Facultad de Ciencias, Cuernavaca, Morelos, Mexico, 1999.
- [83] E. Fernández and R. Martí. GRASP for seam drawing in mosaicking of aerial photographic maps. *Journal of Heuristics*, 5:181–197, 1999.

- [84] C. Fleurent and F. Glover. Improved constructive multistart strategies for the quadratic assignment problem using adaptive memory. *INFORMS Journal on Computing*, 11:198–204, 1999.
- [85] M.J.N. Gomes and J.B.C. da Silva. An experimental evaluation of the GRASP metaheuristic applied to the uncapacitated location problem. Technical Report 004/99, Department of Statistics and Computation, State University of Ceará, Fortaleza, Ceará, Brazil, 1999.
- [86] V.I. Iorvik, E. Triantaphyllou, T.W. Liao, and S.M. Waly. Predicting muscle fatique via electromyography: a comparative study. In *Proceedings of the 25th International Conference on Computers and Industrial Engineering*, pages 277–280, March 1999.
- [87] M. Laguna and R. Martí. GRASP and path relinking for 2-layer straight line crossing minimization. IN-FORMS Journal on Computing, 11:44–52, 1999.
- [88] S.L. Martins. Parallelization strategies for metaheuristics in distributed memory environments. PhD thesis, Department of Computer Sciences, Catholic University of Rio de Janeiro, Rio de Janeiro, Brazil, 1999.
- [89] S.L. Martins, P.M. Pardalos, M.G.C. Resende, and C.C. Ribeiro. Greedy randomized adaptive search procedures for the steiner problem in graphs. In P.M. Pardalos, S. Rajasekaran, and J. Rolim, editors, Randomization methods in algorithmic design, volume 43 of DIMACS Series on Discrete Mathematics and Theoretical Computer Science, pages 133–145. American Mathematical Society, 1999.
- [90] C.A.S. Oliveira and F.C. Gomes. Two metaheuristics for channel allocation in mobile telephony. Technical report, Artificial Intelligence Laboratory, Universidade Federal do Ceará, Fortaleza, Brazil, August 1999.
- [91] P.M. Pardalos, T. Qian, and M.G.C. Resende. A greedy randomized adaptive search procedure for the feedback vertex set problem. *Journal of Combinatorial Optimization*, 2:399–412, 1999.
- [92] L.S. Pitsoulis. *Algorithms for nonlinear assignment problems*. PhD thesis, Department of Industrial and Systems Engineering, University of Florida, 1999.
- [93] L.I.P. Resende and M.G.C. Resende. A GRASP for frame relay PVC routing. In Proc. of the Third Metaheuristics International Conference, pages 397–402, July 1999.
- [94] C.C. Ribeiro and M.G.C. Resende. Algorithm 797: Fortran subroutines for approximate solution of graph planarization problems using GRASP. ACM Transactions on Mathematical Software, 25:341–352, 1999.
- [95] C.M.D. Silveira. GRASP A heuristic for solving combinatorial optimization problems. Technical report, Institute of Informatics, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil, 1999.
- [96] R.K. Ahuja, J.B. Orlin, and A. Tiwari. A greedy genetic algorithm for the quadratic assignment problem. Computers and Operations Research, 27:917–934, 2000.
- [97] R.M. Aiex, M.G.C. Resende, P.M. Pardalos, and G. Toraldo. GRASP with path relinking for the threeindex assignment problem. Technical report, AT&T Labs Research, Florham Park, NJ 07733, 2000. To appear in INFORMS J. on Computing.
- [98] S. Areibi and A. Vannelli. Efficient hybrid search techniques for circuit partitioning. In IEEE 4th World Multiconference on Circuits, Systems, Communications & Computers, July 2000.
- [99] M. Armony, J.G. Klincewicz, H. Luss, and M.B. Rosenwein. Design of stacked self-healing rings using a genetic algorithm. *Journal of Heuristics*, 6:85–105, 2000.
- [100] J. Bautista, R. Suárez, M. Mateo, and R. Companys. Local search heuristics for the assembly line balancing problem with incompatibilities between tasks. In *Proceedings of the IEEE ICRA-00*, volume 3, pages 2404–2409, April 2000.
- [101] D.C. Brown. Algorithmic methods in genetic mapping. PhD thesis, Cornell University, Ithaca, NY, USA, 2000
- [102] D.G. Brown, T.J. Vision, and S.D. Tanksley. Selecting mapping: A discrete optimization approach to select a population subset for use in a high-density genetic mapping project. *Genetics*, 155:407–420, 2000.
- [103] M.S. Fiorenzo Catalano and F. Malucelli. Parallel randomized heuristics for the set covering problem. Technical report, Transportation and traffic engineering section, Delft U. of Technology, 2600 AG Delft, The Netherlands, 2000. To appear in International J. of Computer Research.
- [104] B. Gendron, J.-Y. Potvin, and P. Soriano. Diversification strategies in local search for a nonbifurcated network loading problem. Technical Report CRT-2000-42, Centre de recherche sur les transports, University of Montreal, Montreal, Canada, 2000.
- [105] S. Abdinnour-Helm and S.W. Hadley. Tabu search based heuristics for multi-floor facility layout. *International Journal of Production Research*, 38:365–383, 2000.
- [106] H. Jin-Kao, P. Galinier, and M. Habib. Métaheuristiques pour l'optimisation combinatoire et l'affectation sous contraintes. Revue d'Intelligence Artificielle, 13(2):283–324, 2000.
- [107] B. Li, F. Chen, and L. Yin. Server replication and its placement for reliable multicast. In *Proceedings of the IEEE ICCCN-00*, pages 396–401, October 2000.
- [108] X. Liu, P.M. Pardalos, S. Rajasekaran, and M.G.C. Resende. A GRASP for frequency assignment in mobile radio networks. In S. Rajasekaran, P.M. Pardalos, and F.Hsu, editors, Mobile Networks and Computing,

- volume 52 of DIMACS Series on Discrete Mathematics and Theoretical Computer Science, pages 195–201. American Mathematical Society, 2000.
- [109] S.L. Martins, M.G.C. Resende, C.C. Ribeiro, and P.M. Pardalos. A parallel grasp for the steiner tree problem in graphs using a hybrid local search strategy. *Journal of Global Optimization*, 17:267–283, 2000.
- [110] I.H. Osman, B. Al-Ayoubi, M. Barake, and M. Hasan. A greedy random adaptive search procedure for the weighted maximal planar graph problem. Technical report, School of Business and Center for Advanced Mathematical Sciences, American University of Beirut, Beirut, Lebanon, 2000.
- [111] M. Prais. Parameter variation in GRASP procedures. PhD thesis, Department of Computer Sciences, Catholic University of Rio de Janeiro, Rio de Janeiro, Brazil, 2000.
- [112] M. Prais and C.C. Ribeiro. Reactive GRASP: An application to a matrix decomposition problem in TDMA traffic assignment. INFORMS Journal on Computing, 12:164–176, 2000.
- [113] M. Prais and C.C. Ribeiro. Parameter variation in GRASP procedures. *Investigación Operativa*, 9:1–20, 2000.
- [114] M.C. Rangel, N.M.M. Abreu, and P.O. Boaventura Netto. GRASP in the QAP: An acceptation bound for initial solutions. *Pesquisa Operacional*, 20:45–58, 2000.
- [115] M.G.C. Resende, L.S. Pitsoulis, and P.M. Pardalos. Fortran subroutines for computing approximate solutions of MAX-SAT problems using GRASP. Discrete Applied Mathematics, 100:95–113, 2000.
- [116] D. Sosnowska. Optimization of a simplified fleet assignment problem with metaheuristics: Simulated annealing and GRASP. In P.M. Pardalos, editor, Approximation and complexity in numerical optimization. Kluwer Academic Publishers, 2000.
- [117] A. Srinivasan, K.G. Ramakrishnan, K. Kumaram, M. Aravamudam, and S. Naqvi. Optimal design of signaling networks for Internet telephony. In *IEEE INFOCOM* 2000, March 2000.
- [118] T.L. Urban, W.-C. Chiang, and R.A. Russel. The integrated machine allocation and layout problem. *International Journal of Production Research*, 38:2911–2930, 2000.
- [119] J. Yen, M. Carlsson, M. Chang, J.M. Garcia, and H. Nguyen. Constraint solving for inkjet print mask design. *Journal of Imaging Science and Technology*, 44:391–397, 2000.
- [120] R.K. Ahuja, J.B. Orlin, and D. Sharma. Multi-exchange neighborhood search structures for the capacitated minimum spanning tree problem. *Mathematical Programming*, 91:71–97, 2001.
- [121] M.S. Akturk and D. Ozdemir. A new dominance rule to minimize total weighted tardiness with unequal release dates. European Journal of Operational Research, 135:394–412, 2001.
- [122] R. Alvarez-Valdes, A. Parajon, and J.M. Tamarit. A computational study of heuristic algorithms for twodimensional cutting stock problems. In *Proceedings of MIC'2001*, pages 7–11, July 16-20 2001.
- [123] S. Areibi, M. Moussa, and H. Abdullah. A comparison of genetic/memetic algorithms and other heuristic search techniques. In *Proceedings of IC-AI 2001*, July 25 2001.
- [124] E. Arráiz, A. Martínez, O. Meza, and M. Ortega. GRASP and tabu search algorithms for computing the forwarding index in a graph. In *Proceedings of MIC'2001*, pages 367–370, July 16-20 2001.
- [125] L. Bahiense, G.C. Oliveira, and M. Pereira. A mixed integer disjunctive model for transmission network expansion. *IEEE Transactions on Power Systems*, 16:560–565, 2001.
- [126] S. Binato, G.C. Oliveira, and J.L. Araújo. A greedy randomized adaptive search procedure for transmission expansion planning. *IEEE Transactions on Power Systems*, 16:247–253, 2001.
- [127] M. Brunato and R. Battiti. A multistart randomized greedy algorithm for traffic grooming on mesh logical topologies. Technical report, Department of Mathematics, University of Trento, Trento, Italy, 2001.
- [128] S.A. Canuto, M.G.C. Resende, and C.C. Ribeiro. Local search with perturbation for the prize-collecting Steiner tree problems in graphs. *Networks*, 38:50–58, 2001.
- [129] P. Chardaire, G.P. McKeown, and J.A. Maki. Application of GRASP to the multiconstraint knapsack problem. In E.J.W. Boers et al., editor, *EvoWorkshop 2001*, pages 30–39. Springer-Verlag Berlin Heidelberg, 2001.
- [130] L.M. Christofoletti and V.A. Armentano. Estratégias de reinício de busca local baseadas em memória para programação de tarefas em uma máquina. In *Proceedings of te XXXIII Brazilan Symposium on Operations* Research, pages 1381–1389, November 6–9 2001.
- [131] X. Delorme, X. Gandibleux, and J. Rodriguez. GRASP for set packing problems. In Proceedings of the Operational Research Peripatetic Post-Graduate Programme (ORP3), September 26-29 2001.
- [132] X. Delorme, J. Rodriguez, and X. Gandibleux. Heuristics for railway infrastructure saturation. In Christos Zaroliagis, editor, *Electronic Notes in Theoretical Computer Science*, volume 50. Elsevier, 2001.
- [133] T. Ferreira de Noronha. Algoritmos e estratégias de solução para o problema do gerenciamento de sondas de produção terrestre na bacia petrolífera potiguar. Revista Electrônica de Iniciação Científica, 1, 2001.

- [134] P. Festa, P.M. Pardalos, and M.G.C. Resende. Algorithm 815: FORTRAN subroutines for computing approximate solution to feedback set problems using GRASP. ACM Transactions on Mathematical Software, 27:456–464, 2001.
- [135] P. Festa and G. Raiconi. GRASP in switching input optimal control synthesis. In *Proceedings of MIC'2001*, pages 381–385, July 16-20 2001.
- [136] J.A. Díaz García. Algorithmic approach for the single source capacitated plant location problem. PhD thesis, Departamento d'Estadística i Investigació Operativa, Univarsitat Politécnica de Catalunya, Barcelona, Spain, 2001.
- [137] J.M. García, S. Lozano, K. Smith, and F. Guerrero. A comparison of GRASP and an exact method for solving a production and delivery scheduling problem. In *First International Workshop on Hybrid Intelligent Systems (HIS'01)*, Adelaide, Australia, December 2001.
- [138] A.M. Gomes and J.F. Oliveira. A GRASP approach to the nesting problem. In *Proceedings of MIC'2001*, pages 47–52, July 16-20 2001.
- [139] P.L. Hammer and D.J. Rader, Jr. Maximally disjoint solutions of the set covering problem. *Journal of Heuristics*, 7:131–144, 2001.
- [140] K. Kumaran, A. Srinivasan, Q. Wang, S. Lanning, and K.G. Ramakrishnan. Efficient algorithms for location and sizing problems in network design. In *Global Telecommunications Conference*, 2001 (GLOBE-COM '01), volume 4, pages 2586–2590. IEEE, 2001.
- [141] M. Laguna and R. Martí. A GRASP for coloring sparse graphs. Computational Optimization and Applications, 19:165–178, 2001.
- [142] H. Ramalhinho Lourenço, J.P. Paixão, and R. Portugal. Multiobjective metaheuristics for the bus-driver scheduling problem. *Transportation Sciences*, 35:331–343, 2001.
- [143] R. Martí. Arc crossing minimization in graphs with GRASP. IIE Transactions, 33:913–919, 2001.
- [144] R. Martí and V. Estruch. Incremental bipartite drawing problem. Computers and Operations Research, 28:1287–1298, 2001.
- [145] M.C. Medeiros, M.G.C. Resende, and A. Veiga. Piecewise linear time series estimation with GRASP. Computational Optimization and Applications, 19:127–144, 2001.
- [146] R.L. Milidiú, A.A. Pessoa, V. Braconi, E.S. Laber, and Rey P.A. Um algoritmo GRASP para o problema de transporte de derivados de petróleo em oleodutos. In *Proceedings of te XXXIII Brazilan Symposium on Operations Research*, pages 237–246, November 6–9 2001.
- [147] L. Motta, L.S. Ochi, and C. Martinhon. (GRASP) metaheuristics to the generalized covering tour problem. In *Proceedings of MIC'2001*, pages 387–391, July 16-20 2001.
- [148] A. Myslek. Greedy randomised adaptive search procedures (GRASP) for topological design of mpls networks. In Proceedings of the 8th Polish Teletraffic Symposium, 2001.
- [149] T. Neto and J.P. Pedroso. GRASP for linear integer programming. In *Proceedings of MIC'2001*, pages 377–380, July 16-20 2001.
- [150] L.S. Pitsoulis, P.M. Pardalos, and D.W. Hearn. Approximate solutions to the turbine balancing problem. European J. of Operational Research, 130:147–155, 2001.
- [151] M.G.C. Resende. Greedy randomized adaptive search procedures (GRASP). In C.A. Floudas and P.M. Pardalos, editors, *Encyclopedia of Optimization*, volume 2, pages 373–382. Kluwer Academic Publishers, 2001
- [152] A.J. Robertson. A set of greedy randomized adaptive local search procedure (GRASP) implementations for the multidimensional assignment problem. *Computational Optimization and Applications*, 19:145–164, 2001.
- [153] H.E. Romeijn and D.R. Morales. Generating experimental data for the generalized assignment problem. Operations Research, 49:866–878, 2001.
- [154] D. Serra and R. Colomé. Consumer choice in competitive location models: Formulations and heuristics. Papers in Regional Science, 80:439–464, 2001.
- [155] E. Piñana, I. Plana, V. Campos, and R. Martí. GRASP and path relinking for the matrix bandwidth minimization. Technical report, Depto. de Estadistica e Investigación Operativa, Facultad de Matemáticas, Universitat de Valencia, Valencia, Spain, 2001. To appear on European Journal of Operational Research.
- [156] C.E.C. Vieira and P.R.L. Gondim. Uma Nova Estratégia para Aplicação do GRASP ao problema de alocação de canal. Technical Report 070/DE9/01, Departamento de Engenharia de Sistemas, Instituto Militar de Engenharia, Rio de Janeiro, Brazil, 2001.
- [157] J. Xu and S. Chiu. Effective heuristic procedure for a field technician scheduling problem. *Journal of Heuristics*, 7:495–509, 2001.
- [158] J. Abello, M.G.C. Resende, and S. Sudarsky. Massive quasi-clique detection. Lecture Notes in Computer Science, 2286:598–612, 2002.

- [159] R.M. Aiex. Uma investigação experimental da distribuição de probabilidade de tempo de solução em heurísticas GRASP e sua aplicação na análise de implementações paralelas. PhD thesis, Department of Computer Science, Catholic University of Rio de Janeiro, Rio de Janeiro, Brazil, 2002.
- [160] R.M. Aiex, M.G.C. Resende, and C.C. Ribeiro. Probability distribution of solution time in GRASP: An experimental investigation. *Journal of Heuristics*, 8:343–373, 2002.
- [161] R. Alvarez-Valdés, A. Parajón, and J.M. Tamarit. A tabu search algorithm for large-scale guillotine (un)constrained two-dimensional cutting problems. *Computers & Operations Research*, 29:925–947, 2002.
- [162] A.A. Andreatta, S.E.R. Carvalho, and C.C. Ribeiro. A framework for the development of local search heuristics for combinatorial optimization problems. In S. Voss and D. Woodruff, editors, *Optimization Software Class Libraries*, pages 59–79. Kluwer Academic Publishers, 2002.
- [163] A. Andreatta and C.C. Ribeiro. Heuristics for the phylogeny problem. *Journal of Heuristics*, 8:429–447, 2002.
- [164] J.F. Bard, G. Kontoravdis, and G. Yu. A branch-and-cut procedure for the vehicle routing problem with time windows. *Transportation Science*, 36:250–269, 2002.
- [165] S. Binato, W.J. Hery, D. Loewenstern, and M.G.C. Resende. A greedy randomized adaptive search procedure for job shop scheduling. In C.C. Ribeiro and P. Hansen, editors, *Essays and surveys on metaheuristics*, pages 58–79. Kluwer Academic Publishers, 2002.
- [166] S. Binato and G.C. Oliveira. A Reactive GRASP for transmission network expansion planning. In C.C. Ribeiro and P. Hansen, editors, *Essays and surveys on metaheuristics*, pages 81–100. Kluwer Academic Publishers. 2002.
- [167] C. Binucci, W. Didimo, G. Liotta, and M. Nonato. Labeling heuristics for orthogonal drawings. In Proceedings of GD'98 Symposium on Graph Drawing, volume 2265 of Lecture Notes in Computer Science, pages 139–153. Springer-Verlag, 2002.
- [168] A.M. Campbell and M. Savelsbergh. Decision support for consumer direct grocery initiatives. Technical report, Department of Management Sciences, Tippie College of Business, University of Iowa, 2002. Submitted to *Transportation Science*.
- [169] J.D.B. Cano, R.J. Cabrera, and J.M.M. Vega. Procedimientos constructivos adaptivos (grasp) para el problema del empaquetado bidimensional. Revista Iberoamericana de Inteligencia Artificial. 15:26–33, 2002.
- [170] J.R. Cano, O. Cordón, F. Herrera, and L. Sánchez. A grasp algorithm for clustering. In Francisco J. Garijo, José Cristóbal Riquelme Santos, and Miguel Toro, editors, Advances in Artificial Intelligence - IBERAMIA 2002, 8th Ibero-American Conference on AI, Seville, Spain, November 12-15, 2002, Proceedings, volume 2527 of Lecture Notes in Computer Science, pages 214–223. Springer, 2002.
- [171] J.R. Cano, O. Cordón, F. Herrera, and L. Sánchez. A greedy randomized adaptive search procedure applied to the clustering problem as an initialization process using K-means as a local search procedure. *Journal* of Intelligent and Fuzzy Systems, 12:235–242, 2002.
- [172] C. Carreto and B. Baker. A GRASP interactive approach to the vehicle routing problem with backhauls. In C.C. Ribeiro and P. Hansen, editors, *Essays and surveys on metaheuristics*, pages 185–200. Kluwer Academic Publishers, 2002.
- [173] W.C. Chiang, P. Kouvelis, and T.L. Urban. Incorporating workflow interference in facility layout design: The quartic assignment problem. *Management Science*, 48(4):584–590, 2002.
- [174] L.M. Christofoletti. Métodos de reinício aplicados ao seqüenciamento em uma máquina com tempos de preparação e data de entrega. Master's thesis, Departamento de Engenaria de Sistemas, Universidade Estadual de Campinas, Brazil, April 2002.
- [175] B.P. Cooke, D. Kwon, D. Glotov, S. Schurr, D. Taylor, and T. Wittman. Mobility management in cellular telephony. Technical report, Institute of Mathematics and its Applications, University of Minnesota, USA, 2002.
- [176] A. Corberán, R. Martí, and J.M. Sanchís. A GRASP heuristic for the mixed Chinese postman problem. European Journal of Operational Research, 142:70–80, 2002.
- [177] P. Festa, P.M. Pardalos, M.G.C. Resende, and C.C. Ribeiro. Randomized heuristics for the max-cut problem. Optimization Methods and Software, 7:1033–1058, 2002.
- [178] H. Fraçois and O. Boëffard. The greedy algorithm and its application to the construction of a continuous speech database. In *Proceedings of LREC-2002*, volume 5, pages 1420–1426, May 29-31 2002.
- [179] B. Gendron, J.Y. Potvin, and P. Soriano. Diversification strategies in local search for a nonbifurcated network loading problem. *European Journal of Operational Research*, 142(2):231–241, 2002.
- [180] M. Hasan, I. Osman, and T. AlKhamis. A meta-heuristic procedure for the three dimension assignment problem. *International Journal of Applied Mathematics*, 8:365–380, 2002.
- [181] J. Karelahti. Solving the cutting stock problem in the steel industry. Master's thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, Helsinki, Finland, 2002.

- [182] J.G. Klincewicz. Enumeration and search procedures for a hub location problem with economies of scale. Annals of Operations Research, 110:107–122, 2002.
- [183] P. Mahey and C.C. Ribeiro. Modeling modern multimedia traffic. Annals of Operations Research, 110:107– 122, 2002.
- [184] M.C. Medeiros, A. Veiga, and M.G.C. Resende. A combinatorial approach to piecewise linear time analysis. *Journal of Computational and Graphical Statistics*, 11:236–258, 2002.
- [185] A. Myslek and P. Karaś. Heuristic methods for topological design of telecomminication networks. In Proceedings of PGTS 2002, 2002.
- [186] I.H. Osman, M. Hasan, and A. Abdullah. Linear programming based meta-heuristics for the weighted maximal planar graph. *Journal of the Operational Research Society*, 53:1142–1149, 2002.
- [187] G. Palubeckis and A. Tomkevicius. GRASP implementations for the unconstrained binary quadratic optimization problem. *Information Technology and Control*, 24:14–20, 2002.
- [188] L.S. Pitsoulis and M.G.C. Resende. Greedy randomized adaptive search procedures. In P.M. Pardalos and M.G.C. Resende, editors, *Handbook of Applied Optimization*, pages 178–183. Oxford University Press, 2002.
- [189] M.G.C. Resende and R.F. Werneck. A GRASP with path-relinking for the p-median problem. Technical Report TD-5E53XL, AT&T Labs Research, Florham Park, NJ 07932 USA, 2002.
- [190] C.C. Ribeiro, E. Uchoa, and R.F. Werneck. A hybrid GRASP with perturbations for the Steiner problem in graphs. INFORMS Journal on Computing, 14:228–246, 2002.
- [191] C.C. Ribeiro and I. Rosseti. A parallel GRASP for the 2-path network design problem. Lecture Notes in Computer Science, 2004:922–926, 2002.
- [192] A. Roli and M. Milano. Magma: A multiagent architecture for metaheuristics. Technical Report DEIS-LIA-02-007, DEIS, Università degli Studi di Bologna, Bologna, Italy, 2002.
- [193] F. Silva and D. Serra. Locating emergency services with priority rules: The priority queuing covering location problem. Technical Report 1, Research group in management logistics, Department of Economics and Business, Universitat Pompeu Fabra, Barcelona, Spain, 2002.
- [194] I. Vogel, M.-L. Flottes, and C. Landrault. Initialisation des circuits séquentiels avant test intégré et scan partiel. Technical report, Laboratoire d'Informatique, de Robotique et de Micro-électronique de Montpellier, Montpellier, France, 2002.
- [195] R.K. Ahuja, J.B. Orlin, and D. Sharma. A composite very large-scale neighborhood structure for the capacitated minimum spanning tree problem. *Operations Research Letters*, 31(3):185–194, 2003.
- [196] A.M. Álvarez, J. L. González, and K. De-Alba. Scatter search for a network design problem. Technical Report PISIS-2003-02, Universidad Autónoma de Nuevo León, Facultad de Ingeniería Mecánica y Eléctrica, División de Posgrado en Ingeniería de Sistemas, 2003.
- [197] E. Amaldi, A. Capone, F. Malucelli, and F. Signori. Optimization models and algorithms for downlink UMTS radio planning. In Wireless Communications and Networking, 2003 (WCNC 2003), volume 2, pages 827–831, March 2003.
- [198] E. Amaldi, A. Capone, and F. Malucelli. Planning UMTS base station location: Optimization models with power control and algorithms. *IEEE Transactions on Wireless Communications*, 2(5):939–952, 2003.
- [199] R.M. Aiex, S. Binato, and M.G.C. Resende. Parallel GRASP with path-relinking for job shop scheduling. Parallel Computing, 29:393–430, 2003.
- [200] M. Andronescu and B. Rastegari. Motif-GRASP and Motif-ILS: Two new stochastic local search algorithms for motif finding. Technical report, Computer Science Department, University of British Columbia, Vancouver, Canada, 2003.
- [201] B.M. Baker and C.A.C. Carreto. A visual interactive approach to vehicle routing. Computers and Operations Research, 30:321–337, 2003.
- [202] J. Bautista and J. Pereira. Procedimientos para la localización de áreas de aportación de residuos urbanos. In 27 Congreso Nacional de Estadística e Investigación Operativa, Lleida, Spain, April 2003.
- [203] C. Blum and A. Roli. Metaheuristics in combinatorial optimization: Overview and conceptual comparison. ACM COmputing Surveys, 35(3):268–308, 2003.
- [204] A.M. Campbell and M. Savelsbergh. Incentive schemes for consumer direct delivery. Technical report, Department of Management Sciences, Tippie College of Business, University of Iowa, 2003. Submitted to *Transportation Science*.
- [205] W. Chaovalitwongse, D. Kim, and P.M. Pardalos. GRASP with a new local search scheme for vehicle routing problems with time windows. J. of Combinatorial Optimization, 7:179–207, 2003.
- [206] C. Fried, W. Hordijk, S.J. Prohaska, C.R. Stradler, and P.F. Stradler. The footprint sorting problem. Technical report, Bioinformatics, Department of Computer Science, University of Leipzig, Germany, 2003.

- [207] Y. Marinakis and A. Migdalas. Expading neighborhood GRASP for the traveling salesman problem. Technical report, Technical University of Crete, Chania 73100, Greece, 2003.
- [208] T. Neto and J.P. Pedroso. GRASP for linear integer programming. In M.G.C. Resende and J.P. de Sousa, editors, *Metaheuristics: Computer decision-making*, pages 545–574. Kluwer Academic Publishers, 2003.
- [209] K. Ng and B. Trifonov. Automatic bounding volume hierarchy generation using stochastic search methods. In CPSC532D Mini-Workshop "Stochastic Search Algorithms", April 2003.
- [210] C.A. Oliveira, P.M. Pardalos, and M.G.C. Resende. GRASP with path-relinking for the QAP. In Toshihide Ibaraki and Yasunari Yoshitomi, editors, *Proceedings of the Fifth Metaheuristics International Conference* (MIC2003), pages 57–1 – 57–6, 2003.
- [211] J. Pacheco and O. Valencia. Design of hybrids for the minimum sum-of-squares clustering problem. Computational Statistics and Data Analysis, 43:235–248, 2003.
- [212] M.G.C. Resende and C.C. Ribeiro. Greedy randomized adaptive search procedures. In F. Glover and G. Kochenberger, editors, *Handbook of Metaheuristics*, pages 219–249. Kluwer Academic Publishers, 2003.
- [213] M.G.C. Resende and C.C. Ribeiro. GRASP and path-relinking: Recent advances and applications. In Toshihide Ibaraki and Yasunari Yoshitomi, editors, *Proceedings of the Fifth Metaheuristics International Conference (MIC2003)*, pages T6–1 – T6–6, 2003.
- [214] M.G.C. Resende and R.F. Werneck. A hybrid multistart heuristic for the uncapacitated facility location problem. Technical report, Internet and Network Systems Research Center, AT&T Labs Research, Florham Park, NJ, 2003. Submitted to European J. of Operational Research.
- [215] A.P. Reynolds, J.L. Dicks, I.N. Roberts, J.J. Wesselink, B. de la Iglesia, V. Robert, T. Boekhout, and V.J. Rayward-Smith. Algorithms for identification key generation and optimization with application to yeast identification. In *Applications of Evolutionary Computing*, volume 2611 of *Lecture Notes in Computer Science*, pages 107–118. Springer-Verlag, 2003.
- [216] C.C. Ribeiro and D.S. Vianna. A GRASP/VND heuristic for the phylogeny problem using a new neighborhood structure. Technical report, Department of Computer Science, Catholic U. of Rio de Janeiro, Rio de Janeiro, Brazil, 2003.
- [217] S. Rojanasoonthon, J.F. Bard, and S.D. Reddy. Algorithms for parallel machine scheduling: A case study of the tracking and data relay satellite system. *Journal of the Operational Research Society*, 54:806–821, 2003.
- [218] M.C. de Souza, C. Duhamel, and C.C. Ribeiro. A GRASP heuristic for the capacitated minimum spanning tree problem using a memory-based local search strategy. In M.G.C. Resende and J.P. de Sousa, editors, *Metaheuristics: Computer decision-making*, pages 627–658. Kluwer Academic Publishers, 2003.
- [219] M.J.F. Souza, N. Maculan, and L.S. Ochi. A GRASP-tabu search algorithm for school timetabling problems. In M.G.C. Resende and J.P. de Sousa, editors, *Metaheuristics: Computer decision-making*, pages 659–672. Kluwer Academic Publishers, 2003.
- [220] A. Viana, J.P. de Sousa, and M. Matos. Using GRASP to solve the unit commitment problem. Annals of Operations Research, 120:117–132, 2003.
- [221] E. Yilmaz, E. Triantaphyllou, J. Chen, and T.W. Liao. A heuristic for mining association rules in polynomial time. *Mathematical and Computer Modelling*, 37:219–233, 2003.

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