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# PERSPECTIVES IN MODERN PROJECT SCHEDULING

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# PERSPECTIVES IN MODERN PROJECT SCHEDULING

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# Contents

List of Figures	vii
List of Tables	xi
Contributing Authors	xv
Preface	xxi
Part I Models	
1	
A Practical and Accurate Alternative to PERT <i>Bajis Dodin</i>	3
2	
Proactive-reactive project scheduling - Trade-offs and procedures <i>Stijn Van de Vonder, Erik Demeulemeester, Roel Leus, Willy Herroelen</i>	25
3	
Resource constrained project scheduling models under random disturbances <i>Dimitri Golenko-Ginzburg, Aharon Gonik, Anna Baron</i>	53
4	
Due dates and RCPSP <i>Francisco Ballestín, Vicente Valls, Sacramento Quintanilla</i>	79
5	
RCPS with variable intensity activities and feeding precedence constraints <i>Tamás Kis</i>	105
6	
Modelling setup times in Project Scheduling <i>Marek Mika, Grzegorz Waligóra, and Jan Weglarz</i>	131
Part II Algorithms	
7	
Lower bounds for Resource Constrained Project Scheduling Problem <i>Emmanuel Néron, Christian Artigues, Philippe Baptiste, Jacques Carlier, Jean Damay, Sophie Demassej and Philippe Laborie</i>	167

8	Justification Technique Generalizations	205
	<i>Vicente Valls, Francisco Ballestín, Sacramento Quintanilla</i>	
9	A Metaheuristic Approach to the Resource Constrained Project Scheduling with Variable Activity Durations and Convex Cost Functions	225
	<i>Koji Nonobe and Toshihide Ibaraki</i>	
10	A Hybrid Genetic Algorithm Based on Intelligent Encoding for Project Scheduling	249
	<i>Javier Alcaraz and Concepción Maroto</i>	
11	Population Learning Algorithm for the Resource-Constrained Project Scheduling	275
	<i>Piotr Jędrzejowicz, Ewa Ratajczak</i>	
12	Resource Constrained Project Scheduling: A Hybrid Neural Approach	297
	<i>Selcuk Colak, Anurag Agarwal, Selcuk S. Erenguc</i>	
Part III Applications		
13	Selection and Scheduling of Pharmaceutical Research Projects	321
	<i>Rainer Kolisch and Konrad Meyer</i>	
14	Grid Multicriteria Job Scheduling with Resource Reservation and Prediction Mechanisms	345
	<i>Krzysztof Kurowski, Jarek Nabrzyski, Ariel Oleksiak, Jan Weglarz</i>	
15	Resource-constrained project scheduling with time windows	375
	<i>Klaus Neumann, Christoph Schwindt, Jürgen Zimmermann</i>	
16	CP-based decision support for project driven manufacturing	409
	<i>Zbigniew A. Banaszak</i>	

# List of Figures

1.1	Probability density function of T for a SAN with 40 nodes and 100 activities with un-identical exponential distributions.	12
1.2	Standard extreme value density function where $g(t) = \exp[-t - e^{-t}]$ .	13
1.3	Cumulative distributions for the estimates of PERT, simulation and extreme value.	17
2.1	Problem Instance	32
2.2	Minimum makespan schedule	33
2.3	Minimum makespan schedule	35
2.4	Resource flow network	35
2.5	RFDFFF schedule	36
2.6	VADE schedule	38
2.7	The input schedule for step 4	41
2.8	STC schedule	43
2.9	Projected schedule generated by the fix flow reactive procedure at time instant 5	44
2.10	Fix flow reactive schedule	45
2.11	WET projected schedule at time instant 5	45
2.12	Realized schedule generated by the WET procedure	46
2.13	Realized schedule obtained by the RCPSP procedure	46
2.14	Realized schedule obtained by the ABP procedure	47
4.1	Due_Dates( $I, \alpha, \beta, pc$ ) function.	84
4.2	Generate_Instance( $I, a, b, \epsilon, nsol$ ).	85
4.3	Schedules before and after DJ	90
5.1	A fragment of $N_{x,z}$ .	119
6.1	Setups treated as activities - an example.	134
6.2	Activity and class setups.	135
6.3	Separable and inseparable setups.	136
6.4	A sample project.	149

6.5	A schedule for the sample project with precedence-dependent setups.	149
6.6	A schedule for the sample project with precedence-independent setups.	150
6.7	A schedule for the sample project with partially precedence-dependent setups.	151
6.8	A sample project no. 2.	152
6.9	A schedule for unconstrained project no. 2.	152
6.10	A schedule for project no. 2 with setups and $R_1 = 4$ .	153
6.11	A schedule for project no. 2 with setups and $R_1 = 8$ .	153
6.12	Undivided setup for a multiunit resource.	155
6.13	Divided setup for a multiunit resource.	156
6.14	An example of the synchronous setup.	157
6.15	An example of the synchronous setup.	157
6.16	An example of the asynchronous setup.	158
7.1	Graph for preemptive relaxation of $\pi$ -machine problem	174
7.2	Graph for semi-preemptive relaxation of $\pi$ -machine problem	175
7.3	Example of JPPS for a 2-machine problem	175
7.4	A schedule for $R = 8$ , $P_2 = 3$ , $P_3 = 12$ and $P_8 = 2$	179
7.5	Example of feasible schedules for redundant resources, $R = 5$	181
7.6	Work of an activity through $[t_1, t_2]$ .	182
8.1	Schedule justified once to the right and is optimal.	209
8.2	Schedule S is right and left justified yet it is not optimal. Schedule S' is optimal.	209
8.3	Example for part 1.	211
8.4	Example for part 2.	212
8.5	Example for part 3.	213
9.1	An optimal schedule of the example	230
9.2	The event-on-node project network of the example	231
9.3	An optimal schedule of PSP/conv( $P_\sigma$ ), where $\sigma = (2^s, 1^s, 1^c, 4^s, 2^c, 4^c, 3^s, 3^c, 5^s, 5^c)$	234
9.4	An optimal schedule of PSP/conv( $P''_\sigma$ ), where $\sigma'' = (4^s, 4^c, 1^s, 3^s, 1^c, 2^s, 2^c, 3^c, 5^s, 5^c)$	237
9.5	A directed graph $G$ defined in LEFTSHIFT	241
10.1	Activity List Representation	252
10.2	Activity List with Scheduling Mode Representation	253
10.3	New Encoding	255
10.4	Project Example	255



10.5	Different Solutions. A and B: Activity list with scheduling mode representation. C and D: Hartmann's extended representation	255
10.6	Schedules for solutions given in Figure 10.5	256
10.7	Solution with the new encoding	256
10.8	Schedule for Solution represented in Figure 10.7	257
10.9	Extended Two-Point Forward-Backward Crossover Example	260
10.10	Extended Mutation Operator Example	261
10.11	Example of application of the local search procedure	262
11.1	General idea of the population learning algorithm.	280
11.2	Pseudocode of the PLA procedure.	282
11.3	Pseudocode of the Crossover, Mutation and LSA procedures.	283
11.4	Pseudocode of the EPTA procedure.	284
11.5	Pseudocode of the LSA-MRCPSP procedure.	285
11.6	Setting value of the multiplier $p$ (single run)	286
11.7	Setting value of the multiplier $p$ (two runs)	287
12.1	Example RCPS Problem	303
12.2	AugNN Representation of the Example Problem	304
13.1	Drug Research and Development Process	322
13.2	Multi-Project Network	325
13.3	Example of the List-Based Shift Method	336
14.1	Most common Grid scenario: resource reservation is not supported by resources.	349
14.2	Resource reservations when advance and timed reservations are used.	351
14.3	Grid resource management using resource reservation and performance prediction mechanisms	353
14.4	Detailed view of GRMS	360
14.5	Example job description with time reservations	362
14.6	Algorithm MCT (Abramson et al (2002))	365
14.7	Multicriteria MCT algorithm	366
14.8	Comparison of job completion times for matchmaking, MCT, and multi-criteria MCT algorithms	368
16.1	Decision making as a problem of balancing the consumer's requirements with the producer's capability.	411
16.2	Model of production system	415
16.3	Model of production order.	416
16.4	Decision variables distribution a) B follows A, b) A follows B.	417

16.5	Decomposition of $CSP = ((X, D), C)$ into loosely and strongly coupled as well as dependent subproblems.	419
16.6	The possible decomposition of the $CSP$ problem into the two loosely coupled subproblems $CSP_1^*$ , $CSP_2^*$ , and decomposition of the $CSP_1^*$ into the two dependent subproblems $CSP_1^{\wedge}$ and $CSP_1^{\vee}$ .	420
16.7	Alternative way of the $CSP$ problem decomposition.	421
16.8	AND/OR-like graph representation of the $CSP$ possible decompositions.	421
16.9	Searching tree encompassed by backtrackings.	422
16.10	Searching tree for $CSP$ decomposed into the set of elementary problems.	425
16.11	Branch and bound method approach to pruning strategy selection.	426
16.12	The workshop layout	429
16.13	The possible orders of production flow subproblems resolution.	430
16.14	Decomposition of the production flow planning problem.	430
16.15	Stages of the CP-based programming methodology.	431
16.16	The tree of possible ways of a $CSP$ programming.	431

# List of Tables

1.1	Simulation of SAN's where each consists of one path.	10
1.2	Simulation results of completely parallel activity networks.	11
1.3	Three estimates for $\mu_t$ and $\sigma_T$ .: PERT, simulation, and new procedure for various stochastic activity networks (different network structures and different underlying PDF's).	18
1.4	Number of dominating paths determined by the new procedure.	19
1.5	Three estimates of F(t): PERT, simulation and extreme value.	20
2.1	Data for the problem instance	32
2.2	Values for the RFDFP heuristic	36
2.3	Values for the VADE heuristic	38
2.4	The longest path lengths from $i$ to $j$	40
2.5	Computational steps of the STC procedure	42
4.1	Average total tardiness and ranking with priority rules.	86
4.2	Average total tardiness and ranking with sampling procedures.	87
4.3	Average total tardiness.	88
4.4	Average total tardiness with Hartmann algorithm changing the initial solutions.	88
4.5	Average total tardiness with and without double justification and the improvement.	90
4.6	Effect of DJ on randomly generated schedules.	91
4.7	Average total tardiness with Hartmann(2) with justification by eligibles.	94
4.8	Number of feasible solutions and ranking.	95
4.9	Average deviation in percentage with respect to the best solution known.	96
4.10	Algorithm comparison with and without double justification.	97
4.11	Average deviation in percentage with respect to the best solution known.	98
4.12	Number of feasible solutions and ranking.	98
4.13	Average percentage deviation from the best known solution.	99

4.14	Algorithm comparison.	100
4.15	Justification by eligibles versus justification by extremes.	100
4.16	Number of feasible solutions.	101
4.17	Algorithms comparison.	101
5.1	Average $ub/lb$ values for algorithm $B^+$ (first row), and $B^-$ (second row), respectively, in each class $(n, r, s)$ .	124
5.2	Average $ub^+/ub^-$ (first row), and $lb^+/lb^-$ (second row).	125
5.3	Averages of CPU time, search-tree nodes, Flow Cover, Gomory's fractional and $(S_1, S_2)$ cuts for algorithm $B^+$ .	126
5.4	Average CPU time (first row) and search-tree nodes (second row) for algorithm $B^-$ .	127
6.1	Notation for the PSP.	143
6.2	Additional parameters for the RCPSP.	143
6.3	Parameters of the MRCPSP.	145
6.4	Parameters of the sample project no. 2.	151
7.1	Notation	169
7.2	Instance of identical parallel machine problem	173
7.3	Instance of identical parallel machine problem	174
7.4	An Example of Redundant Resources	180
8.1	Justification by extremes and by eligibles on randomly generated schedules.	217
8.2	Justification by eligibles with rule 2.	218
8.3	Random schedules with and without double justification.	219
8.4	State-of-the-art heuristic algorithms.	219
9.1	Computational results for the RCPSP to minimize the weighted earliness-tardiness cost	243
9.2	Effectiveness of the shift operation	244
9.3	Impacts of activity crashing	245
9.4	Impacts of relaxing temporal constraints	246
10.1	Performance of the new encoding and genetic operators	264
10.2	Performance of the LSP	265
10.3	Performance of the RRP. J30 set	265
10.4	Performance of the RRP. J60 set	266
10.5	Performance of the RRP. J120 set	267
10.6	Comparison of heuristics. Average deviation from optimal makespan. J30 PSPLIB	268
10.7	Comparison of heuristics. Average deviation (%) from critical path lower bound. J60 PSPLIB	269
10.8	Comparison of heuristics. Average deviation from critical path lower bound. J120 PSPLIB	269

10.9	Dominance of heuristics.	270
11.1	Population learning algorithm design elements.	279
11.2	Experiment results, RCPSP (30 activities), single PLA run, relative deviation from the optimal solution.	287
11.3	Experiment results, RCPSP (30 activities), two PLA runs, relative deviation from the optimal solution.	288
11.4	Experiment results, RCPSP (60 activities), relative deviation from the critical path lower bound.	288
11.5	Experiment results, RCPSP (90 activities), relative deviation from the critical path lower bound.	289
11.6	Experiment results, RCPSP (120 activities), relative deviation from the critical path lower bound.	289
11.7	Average relative deviation from the critical path lower bound - the best results presented in Hartmann and Kolisch (2005) as compared with the PLA performance.	290
11.8	Experiment results, MRCPSP (10 activities), relative deviation from the optimal solution.	290
11.9	Experiment results, MRCPSP (12 activities), relative deviation from the optimal solution.	291
11.10	Experiment results, MRCPSP (14 activities), relative deviation from the optimal solution.	291
11.11	Experiment results, MRCPSP (16 activities), relative deviation from the optimal solution.	291
11.12	Experiment results, MRCPSP (18 activities), relative deviation from the optimal solution.	292
11.13	Experiment results, MRCPSP (20 activities), relative deviation from the optimal solution.	292
11.14	Experiment results, MRCPSP (30 activities), relative deviation from the best known solution.	293
11.15	Average relative deviation from the optimal or best known solution for Simulated Annealing algorithm proposed in Jozefowska et al (2001) as compared with the PLA performance.	293
12.1	Percent Average Deviations from the Optimum Solution: Comparative Results for the J30 Problems	311
12.2	Percent Average Deviations from the Critical-Path-Based Lower Bound: Comparative Results for the J60 Problems	312
12.3	Percent Average Deviations from the Critical-Path-Based Lower Bound: Comparative Results for the J120 Problems	313
13.1	Resources	327

13.2	Example of the Mode Generation	329
13.3	Sets and Parameters	330
13.4	Probabilities of the Request for Sections and Conditional Probabilities of the Request for Subsections of the Disease Groups Department	337
13.5	Distributions for the Generation of the Resource Demand	338
13.6	Results for the Sequential Method	339
13.7	Results of the Concurrent Method for Varying $\theta$	340
13.8	Results of the Concurrent Method for Varying Project, Activity, and Mode Selection Rules	341
13.9	Impact of the Maximum Duration Factor (MDF)	341
13.10	Impact of the Crash Ratio (CR)	342
13.11	Impact of the Standard Deviation (SD)	342
14.1	Criteria	356
15.1	Factory pick-up of new cars: application and model	401
15.2	Batch scheduling: application and model	403
16.1	The state space size reduction influenced by constraints.	427
16.2	The state space reduction pruning strategies based on the step by step constraints propagation.	428
16.3	Specification of production orders	432
16.4	Specification of the operations and their operation times in production order $B_1$	433
16.5	Results of computer based experiments	434

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# Preface

Project scheduling, generally speaking, concerns problems of allocating scarce resources over time to perform a given set of activities in a way taking into account a given performance measure (or measures). The resources are meant here as arbitrary means which activities compete for. Thus, project scheduling problems appear in a large spectrum of real-life situations, and, consequently, they have been intensively studied for over forty years.

In 1999, the multi-author monograph: J. Węglarz (ed.) *Project Scheduling - Recent Models, Algorithms and Applications*, was published by Kluwer. Since that time several valuable books have appeared in the field, being however of a rather methodological than state-of-the-art character. Thus, we decided to accept the proposal to edit a new book, continuing, in a conceptual sense, the previously cited one.

Although already ancient projects like building the pyramids in Egypt or the Maya temples in Central America definitely required solving non-trivial resource allocation problems, the first general methods like PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method) were developed (or documented) in the late fifties. Since that time a lot of research has been done in this area including optimization techniques as well as other decision support tools helping to define goals, calculate costs, manage risk and motivate people involved in the realization of the project. Many software packages have been developed as well.

The aim of this book is to present the perspectives of this dynamically developing research area. The content is divided in three parts. In Part I a survey of new models of the project management process are proposed. They include an alternative to the well known PERT technique, consideration of disturbances during the project realization, introduction of new constraints like due dates or setup times, as well as a general discussion on classification of resources.

In Part II new algorithms developed to solve the strongly NP-hard resource constrained project scheduling problem efficiently with acceptable accuracy are presented. New lower bounds for the RCPSp are proposed, followed by smart justification technique and a series of metaheuristics. Finally, a neural network approach is introduced.

Part III is devoted to new areas of applications of the project management models and algorithms, like pharmaceutical research, grid computing, factory pick-up of new cars, batch scheduling in process industries and make-to order (project driven) manufacturing.

The monograph is addressed primarily to researchers (including PhD. and graduate students), educators, and professionals in the field of: operations management, business administration, system analysis, and applied mathematics. However, specialists in other disciplines like civil, computer and industrial engineering in which resource management problems are of vital importance, can also benefit from it.

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