

## Research Report

### **“1082 Benchmark Problems related to Resource Leveling Optimization: Best solutions obtained from the Application of different Evolutionary Intelligence Algorithms”**

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#### **About this report**

This research report contains the best scores obtained after extensive experimentation on 1082 benchmark problems related to resource leveling optimization on projects. The work proposes the use of these problems as benchmark problems for resource leveling experimentation.

Two of these problems correspond to real world projects with a big or even huge number of activities and high complexity. The rest of the problems have been taken from the PSP Lib (<http://webserver.wi.tum.de/psplib/main.html>) where they have been used in the past for resource scheduling optimization problems.

#### **Benchmark Problems**

The PSP-Lib medium size problems used in this study can be downloaded freely from the web and concern 480 problems of 90 activities with different degree of complexity (critical / non-critical, etc), and 600 problems of 120 activities with similar characteristics. Two real-world projects are also contained in this report:

The first one concerns a specific shipbuilding project of a 50000 DWT ship, which consists of 1178 different activities with several interrelations among them. The project lasted 208 days ( $T=208$ ) and the duration of the activities ranges between 1 and 40 days, according to the plan. In total, 21 different kinds of resources were involved in the ship construction.

The second real world project concerns the construction of a boiler for a power plant, consisting of 46 activities of variable duration ranging from 40 to 159 days each and with a total of  $T=314$  days. Eleven (11) different types of resources are involved in this project, while there are several time interval based interrelations among activities.

## Methodologies Tested

The solutions were obtained using different resource leveling evaluation functions and a number of different intelligent methodologies, such as genetic algorithms (called standard GA approach, or GA), hybrid genetic algorithm (called HGA approach), hybrid ant colony optimization (called HACO-GA approach), etc. More information on the exact evolutionary methodology used for obtaining the results presented here, can be found in the references given above.

## Resource Leveling Evaluation Functions

Let  $A = \{1, 2, \dots, n\}$  be the set of the project's activities to be scheduled, where activities 1 and  $n$  are dummy activities that represent the starting and ending phase, respectively. Duration and resource requirements for these activities equal to zero. The duration of each activity  $i \in A$  is denoted by  $d_i$ .  $T$  denotes the total duration of the project. Also  $T$  is computed by CPM method, where the project network is designed as A.O.N. (Activity On Node). Precedence relations among the activities in  $A$  exist. These relations indicate which activities should be completed before a specific activity can start. The underlying assumption is that the type of relationships among activities is finish-to-start with zero lag. Each activity  $i$  requires  $r_i$  units of  $k$  ( $k=1, \dots, K$ ) resource types per time period. If a type of resource is used in resource leveling process, then  $c_k=1$  else  $c_k=0$ .

$$r(i) = \sum_{k \in \{1, \dots, K\}} \sum_{i \in \{1, 2, \dots, n\}} c_k r_{ki}$$

For the profile evaluation in the resource leveling problem, is used one or, are blended more than one of the following seven objectives:

- The minimization of the maximum resource usage for the project (denoted as *min Gf*)

$$G_f = \max \{F(t), t = 1, 2, \dots, T\} \quad (1)$$

- The difference between actual and desirable resource usage (denoted as *min RLI*)

$$RLI = \sum_{q=1}^T \left( \left| \sum_{i=1}^n r_{iq} - \sum_{i=1}^n \frac{r_i d_i}{T} \right| \right) \quad (2)$$

- The minimization of the standard deviation (denoted as *min StD*)

$$StD = \left( \frac{1}{T-1} \sqrt{\sum_{i=1}^n \sum_{t=1}^T (r_i(t) - \bar{r})^2} \right) \quad (3)$$

- The minimization of the squared resource usage (denoted as *min R<sup>2</sup>*)

$$R^2 = \sum_{i=1}^n \sum_{t=1}^T r_i^2(t) \quad (4)$$

- The minimum uniform resource use from period to period (denoted as *min Step*)

$$Step = \sum_{t=1}^T |F(t) - F(t-1)| \quad (5)$$

- The relation of the selected resource histogram variation to an ideal one (*min RIC*)

$$RIC = \sum_{t=1}^T \frac{(T \cdot R^2)}{(F^2(t))} \quad (6)$$

- The minimum entropy (denoted as *min EV*)

$$EV = \sum_{i=1}^n \left[ \left( \frac{r_i}{\sum_{i=1}^n r_i} \right) \cdot \ln \left( \frac{r_i}{\sum_{i=1}^n r_i} \right) \right] \quad (7)$$

## Experimentation and Results

Each project has been processed repeatedly several times with each evolutionary methodology and resource profile evaluation function (from 10 to 50 times for each different experimental setting) and the best solution obtained per setting has been recorded for each problem. Results are represented in Tables I-XVII. In addition, all the resulting profiles have been kept separately (as an immediate proof of the result obtained) and have been uploaded in separate zip files below this report in the website of the Management and Decision Engineering Laboratory (MDE-Lab) of the Department of Financial and Management Engineering, University of the Aegean, Chios, Greece. In total, more than 100,000 different experiments have been conducted in the last couple of years on the subject of resource leveling.

Results will be updated often, when improved solutions appear in literature, or are being obtained during additional experimentation from students of the MDE-Lab. All undergraduate or postgraduate students of the University of the Aegean that have contributed to this report while elaborating their diploma thesis are greatly acknowledged.

### FOR CITING THIS WORK PLEASE USE THE FOLLOWING REFERENCES:

- C. Kiriklidis and G. Dounias (2015): Research Report: “1082 Benchmark Problems related to Resource Leveling Optimization: Best solutions obtained from the Application of different Evolutionary Intelligence Algorithms”, MDE-Lab, Dept. of Financial and Management Engineering, University of the Aegean, Chios, Greece, available on-line from <http://labs.fme.aegean.gr/decision> (**best scores**)
- Kyriklidis, C., Vassiliadis, V., Kirytopoulos, K. and Dounias, G., "Hybrid nature-inspired intelligence for the resource leveling problem", *Operational Research Journal* (Springer), Vol. 14, No. 3, pp. 387-407, 2014 (**theory and experiments**)
- Kyriklidis, C. and Dounias, G., "Application of Evolutionary Algorithms in Project Management", *Proceedings of Artificial Intelligence Applications and Innovation 2014*, Rhodes, Sept 2014, L. Iliadis et al. (Eds.): AIAI 2014, IFIP AICT 436 (Springer Lecture Notes Series), pp. 335–343, 2014 (**more on theory and experiments**)

**Table I:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the  $G_f$  resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	$G_f$	Project	$G_f$	Project	$G_f$	Project	$G_f$
j901_1	57	j906_1	85	j9011_1	137	j9016_1	201
j901_2	38	j906_2	97	j9011_2	123	j9016_2	208
j901_3	57	j906_3	127	j9011_3	163	j9016_3	230
j901_4	53	j906_4	113	j9011_4	164	j9016_4	242
j901_5	46	j906_5	128	j9011_5	154	j9016_5	229
j901_6	58	j906_6	91	j9011_6	180	j9016_6	285
j901_7	50	j906_7	107	j9011_7	143	j9016_7	210
j901_8	58	j906_8	138	j9011_8	165	j9016_8	228
j901_9	62	j906_9	118	j9011_9	151	j9016_9	247
j901_10	52	j906_10	99	j9011_10	140	j9016_10	194
j902_1	45	j907_1	110	j9012_1	165	j9017_1	58
j902_2	36	j907_2	108	j9012_2	159	j9017_2	47
j902_3	53	j907_3	114	j9012_3	145	j9017_3	55
j902_4	65	j907_4	78	j9012_4	195	j9017_4	43
j902_5	42	j907_5	102	j9012_5	154	j9017_5	37
j902_6	58	j907_6	86	j9012_6	153	j9017_6	51
j902_7	51	j907_7	92	j9012_7	185	j9017_7	51
j902_8	56	j907_8	144	j9012_8	150	j9017_8	47
j902_9	56	j907_9	103	j9012_9	183	j9017_9	54
j902_10	45	j907_10	100	j9012_10	152	j9017_10	52
j903_1	45	j908_1	95	j9013_1	178	j9018_1	49
j903_2	43	j908_2	92	j9013_2	219	j9018_2	45
j903_3	55	j908_3	119	j9013_3	213	j9018_3	50
j903_4	41	j908_4	112	j9013_4	208	j9018_4	52
j903_5	56	j908_5	141	j9013_5	188	j9018_5	45
j903_6	56	j908_6	134	j9013_6	219	j9018_6	49
j903_7	39	j908_7	123	j9013_7	189	j9018_7	47
j903_8	45	j908_8	121	j9013_8	266	j9018_8	54
j903_9	59	j908_9	99	j9013_9	196	j9018_9	53
j903_10	59	j908_10	98	j9013_10	215	j9018_10	43
j904_1	52	j909_1	145	j9014_1	180	j9019_1	45
j904_2	46	j909_2	150	j9014_2	197	j9019_2	48
j904_3	64	j909_3	174	j9014_3	187	j9019_3	46
j904_4	50	j909_4	166	j9014_4	192	j9019_4	55
j904_5	43	j909_5	135	j9014_5	204	j9019_5	53
j904_6	52	j909_6	148	j9014_6	231	j9019_6	32
j904_7	58	j909_7	155	j9014_7	202	j9019_7	65
j904_8	44	j909_8	146	j9014_8	224	j9019_8	50
j904_9	49	j909_9	165	j9014_9	180	j9019_9	39
j904_10	60	j909_10	165	j9014_10	206	j9019_10	56
j905_1	108	j9010_1	153	j9015_1	189	j9020_1	55
j905_2	90	j9010_2	147	j9015_2	204	j9020_2	55
j905_3	126	j9010_3	128	j9015_3	186	j9020_3	45
j905_4	101	j9010_4	132	j9015_4	180	j9020_4	53
j905_5	127	j9010_5	169	j9015_5	178	j9020_5	52
j905_6	104	j9010_6	126	j9015_6	281	j9020_6	54
j905_7	105	j9010_7	161	j9015_7	191	j9020_7	46
j905_8	102	j9010_8	142	j9015_8	199	j9020_8	51
j905_9	103	j9010_9	148	j9015_9	233	j9020_9	48
j905_10	102	j9010_10	151	j9015_10	198	j9020_10	43

**Table II:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the  $G_f$  resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	$G_f$	Project	$G_f$	Project	$G_f$	Project	$G_f$
j9021_1	105	j9026_1	154	j9031_1	189	j9036_1	44
j9021_2	92	j9026_2	154	j9031_2	228	j9036_2	35
j9021_3	102	j9026_3	148	j9031_3	155	j9036_3	49
j9021_4	92	j9026_4	142	j9031_4	190	j9036_4	42
j9021_5	113	j9026_5	134	j9031_5	200	j9036_5	42
j9021_6	98	j9026_6	124	j9031_6	202	j9036_6	51
j9021_7	92	j9026_7	137	j9031_7	175	j9036_7	42
j9021_8	96	j9026_8	163	j9031_8	182	j9036_8	47
j9021_9	103	j9026_9	133	j9031_9	230	j9036_9	42
j9021_10	101	j9026_10	137	j9031_10	154	j9036_10	41
j9022_1	78	j9027_1	120	j9032_1	199	j9037_1	92
j9022_2	82	j9027_2	181	j9032_2	212	j9037_2	100
j9022_3	106	j9027_3	139	j9032_3	169	j9037_3	70
j9022_4	95	j9027_4	166	j9032_4	179	j9037_4	101
j9022_5	85	j9027_5	128	j9032_5	174	j9037_5	86
j9022_6	111	j9027_6	159	j9032_6	181	j9037_6	98
j9022_7	92	j9027_7	164	j9032_7	203	j9037_7	80
j9022_8	95	j9027_8	156	j9032_8	191	j9037_8	100
j9022_9	95	j9027_9	181	j9032_9	182	j9037_9	86
j9022_10	105	j9027_10	127	j9032_10	174	j9037_10	99
j9023_1	102	j9028_1	163	j9033_1	45	j9038_1	106
j9023_2	103	j9028_2	154	j9033_2	39	j9038_2	94
j9023_3	82	j9028_3	131	j9033_3	36	j9038_3	94
j9023_4	97	j9028_4	158	j9033_4	43	j9038_4	87
j9023_5	84	j9028_5	154	j9033_5	44	j9038_5	96
j9023_6	86	j9028_6	139	j9033_6	47	j9038_6	97
j9023_7	105	j9028_7	135	j9033_7	43	j9038_7	89
j9023_8	89	j9028_8	121	j9033_8	38	j9038_8	99
j9023_9	79	j9028_9	94	j9033_9	45	j9038_9	89
j9023_10	93	j9028_10	160	j9033_10	47	j9038_10	77
j9024_1	98	j9029_1	170	j9034_1	50	j9039_1	79
j9024_2	90	j9029_2	202	j9034_2	47	j9039_2	84
j9024_3	110	j9029_3	180	j9034_3	46	j9039_3	113
j9024_4	95	j9029_4	183	j9034_4	53	j9039_4	105
j9024_5	108	j9029_5	169	j9034_5	52	j9039_5	107
j9024_6	100	j9029_6	210	j9034_6	45	j9039_6	101
j9024_7	95	j9029_7	172	j9034_7	48	j9039_7	112
j9024_8	102	j9029_8	185	j9034_8	51	j9039_8	109
j9024_9	121	j9029_9	208	j9034_9	45	j9039_9	98
j9024_10	96	j9029_10	204	j9034_10	42	j9039_10	91
j9025_1	126	j9030_1	166	j9035_1	44	j9040_1	78
j9025_2	176	j9030_2	208	j9035_2	50	j9040_2	85
j9025_3	143	j9030_3	169	j9035_3	46	j9040_3	93
j9025_4	129	j9030_4	168	j9035_4	52	j9040_4	71
j9025_5	166	j9030_5	176	j9035_5	41	j9040_5	80
j9025_6	169	j9030_6	187	j9035_6	54	j9040_6	95
j9025_7	173	j9030_7	203	j9035_7	49	j9040_7	100
j9025_8	133	j9030_8	213	j9035_8	43	j9040_8	98
j9025_9	132	j9030_9	204	j9035_9	58	j9040_9	95
j9025_10	125	j9030_10	164	j9035_10	46	j9040_10	107

**Table III:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the  $G_f$  resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9041\_1 έως j9048\_10)

Project	$G_f$	Project	$G_f$	Project	$G_f$
j9041_1	122	j9044_1	140	j9047_1	174
j9041_2	131	j9044_2	142	j9047_2	171
j9041_3	125	j9044_3	125	j9047_3	183
j9041_4	147	j9044_4	138	j9047_4	174
j9041_5	117	j9044_5	152	j9047_5	175
j9041_6	142	j9044_6	134	j9047_6	180
j9041_7	125	j9044_7	115	j9047_7	186
j9041_8	135	j9044_8	124	j9047_8	154
j9041_9	151	j9044_9	126	j9047_9	176
j9041_10	124	j9044_10	136	j9047_10	194
j9042_1	120	j9045_1	173	j9048_1	216
j9042_2	145	j9045_2	183	j9048_2	167
j9042_3	134	j9045_3	141	j9048_3	180
j9042_4	111	j9045_4	196	j9048_4	180
j9042_5	108	j9045_5	173	j9048_5	203
j9042_6	119	j9045_6	170	j9048_6	166
j9042_7	142	j9045_7	202	j9048_7	171
j9042_8	108	j9045_8	171	j9048_8	180
j9042_9	126	j9045_9	176	j9048_9	169
j9042_10	151	j9045_10	200	j9048_10	180
j9043_1	123	j9046_1	165		
j9043_2	127	j9046_2	156		
j9043_3	120	j9046_3	161		
j9043_4	135	j9046_4	194		
j9043_5	144	j9046_5	185		
j9043_6	113	j9046_6	199		
j9043_7	140	j9046_7	176		
j9043_8	129	j9046_8	183		
j9043_9	139	j9046_9	229		
j9043_10	146	j9046_10	155		

**Table IV:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	StD	Project	StD	Project	StD	Project	StD
j901_1	10,5831	j906_1	18,5183	j9011_1	20,1507	j9016_1	45,7559
j901_2	7,9458	j906_2	20,5679	j9011_2	19,7324	j9016_2	34,8251
j901_3	13,6071	j906_3	31,5386	j9011_3	34,4067	j9016_3	48,3784
j901_4	12,6695	j906_4	22,5803	j9011_4	30,5033	j9016_4	59,1324
j901_5	10,4648	j906_5	23,9454	j9011_5	31,9929	j9016_5	47,4778
j901_6	13,9444	j906_6	18,7649	j9011_6	41,5975	j9016_6	71,7725
j901_7	11,3426	j906_7	17,2740	j9011_7	33,0713	j9016_7	41,2600
j901_8	15,5474	j906_8	32,2267	j9011_8	39,0256	j9016_8	44,6874
j901_9	17,3777	j906_9	28,6268	j9011_9	28,9352	j9016_9	49,0877
j901_10	11,2312	j906_10	19,5804	j9011_10	28,7036	j9016_10	39,0464
j902_1	8,6380	j907_1	28,6926	j9012_1	27,9272	j9017_1	11,3061
j902_2	7,1417	j907_2	20,2119	j9012_2	31,6956	j9017_2	9,1023
j902_3	10,3514	j907_3	21,7824	j9012_3	33,5865	j9017_3	12,5075
j902_4	13,0831	j907_4	14,1501	j9012_4	50,3041	j9017_4	8,0266
j902_5	7,0540	j907_5	24,7012	j9012_5	32,2330	j9017_5	7,5257
j902_6	10,8521	j907_6	19,0919	j9012_6	30,6035	j9017_6	10,6767
j902_7	9,0928	j907_7	18,8714	j9012_7	42,5577	j9017_7	11,1804
j902_8	11,5600	j907_8	36,7393	j9012_8	29,5762	j9017_8	9,0044
j902_9	12,5397	j907_9	16,3213	j9012_9	38,6184	j9017_9	8,9026
j902_10	7,7955	j907_10	22,7164	j9012_10	32,6527	j9017_10	11,1870
j903_1	7,6582	j908_1	13,3155	j9013_1	33,9272	j9018_1	10,6823
j903_2	8,3406	j908_2	20,1015	j9013_2	50,5057	j9018_2	9,5599
j903_3	11,5880	j908_3	29,2961	j9013_3	40,6272	j9018_3	9,0405
j903_4	6,4124	j908_4	24,2011	j9013_4	43,0727	j9018_4	9,8418
j903_5	13,4072	j908_5	33,7201	j9013_5	36,8926	j9018_5	10,8979
j903_6	12,9100	j908_6	30,7310	j9013_6	42,7273	j9018_6	9,9872
j903_7	6,2049	j908_7	26,3758	j9013_7	37,8390	j9018_7	8,1720
j903_8	10,8018	j908_8	25,0030	j9013_8	59,9331	j9018_8	13,1968
j903_9	10,9796	j908_9	17,3397	j9013_9	45,1838	j9018_9	10,3180
j903_10	12,8316	j908_10	22,4677	j9013_10	42,6807	j9018_10	9,3903
j904_1	11,6013	j909_1	30,2903	j9014_1	32,8276	j9019_1	7,7099
j904_2	9,8149	j909_2	33,6709	j9014_2	39,1479	j9019_2	9,7478
j904_3	13,5856	j909_3	41,8007	j9014_3	34,0224	j9019_3	10,3086
j904_4	8,3680	j909_4	38,6530	j9014_4	38,2475	j9019_4	10,9190
j904_5	7,9939	j909_5	21,2058	j9014_5	41,9944	j9019_5	9,2325
j904_6	10,5037	j909_6	30,8287	j9014_6	47,6096	j9019_6	6,9288
j904_7	10,5879	j909_7	32,0104	j9014_7	39,2982	j9019_7	13,2518
j904_8	9,6946	j909_8	30,5306	j9014_8	50,0752	j9019_8	13,0734
j904_9	11,3098	j909_9	32,8251	j9014_9	35,5122	j9019_9	6,4768
j904_10	13,6689	j909_10	30,6178	j9014_10	46,2445	j9019_10	14,6658
j905_1	19,4241	j9010_1	30,6984	j9015_1	37,1739	j9020_1	12,2917
j905_2	19,6751	j9010_2	27,5290	j9015_2	44,7736	j9020_2	12,7065
j905_3	27,7770	j9010_3	28,3813	j9015_3	31,6978	j9020_3	6,9088
j905_4	18,9999	j9010_4	26,0886	j9015_4	33,8066	j9020_4	11,8027
j905_5	31,5159	j9010_5	35,2001	j9015_5	29,8857	j9020_5	9,5054
j905_6	23,2020	j9010_6	23,8426	j9015_6	61,4064	j9020_6	13,1419
j905_7	23,6047	j9010_7	33,9226	j9015_7	34,8082	j9020_7	8,7862
j905_8	21,0907	j9010_8	33,1907	j9015_8	36,5423	j9020_8	10,3008
j905_9	17,4471	j9010_9	22,5164	j9015_9	58,3107	j9020_9	11,5411
j905_10	19,7951	j9010_10	34,8563	j9015_10	41,5606	j9020_10	8,9740

**Table V:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	StD	Project	StD	Project	StD	Project	StD
j9021_1	16,9502	j9026_1	36,7161	j9031_1	32,9174	j9036_1	8,7047
j9021_2	18,6798	j9026_2	35,3796	j9031_2	47,7641	j9036_2	6,9127
j9021_3	21,5761	j9026_3	29,2483	j9031_3	33,5667	j9036_3	8,7951
j9021_4	20,1325	j9026_4	25,7506	j9031_4	31,4830	j9036_4	7,6309
j9021_5	25,1451	j9026_5	21,9609	j9031_5	39,2609	j9036_5	9,0779
j9021_6	23,0938	j9026_6	24,9080	j9031_6	35,9792	j9036_6	11,0641
j9021_7	21,3891	j9026_7	25,8013	j9031_7	40,1660	j9036_7	11,3432
j9021_8	20,5685	j9026_8	39,1424	j9031_8	33,7235	j9036_8	9,8497
j9021_9	23,6316	j9026_9	26,3585	j9031_9	45,3455	j9036_9	8,9624
j9021_10	21,0325	j9026_10	24,5319	j9031_10	24,9698	j9036_10	8,2072
j9022_1	18,3453	j9027_1	21,8220	j9032_1	37,7731	j9037_1	19,0298
j9022_2	15,5866	j9027_2	44,0490	j9032_2	48,9139	j9037_2	14,5326
j9022_3	25,4159	j9027_3	28,9269	j9032_3	30,5955	j9037_3	11,9001
j9022_4	19,1220	j9027_4	39,0604	j9032_4	34,4155	j9037_4	25,0866
j9022_5	16,7498	j9027_5	26,6397	j9032_5	31,4194	j9037_5	17,1086
j9022_6	24,0486	j9027_6	36,9411	j9032_6	42,9257	j9037_6	21,2983
j9022_7	17,2242	j9027_7	39,9460	j9032_7	41,0203	j9037_7	16,1544
j9022_8	22,6156	j9027_8	33,0451	j9032_8	42,6480	j9037_8	20,6646
j9022_9	21,6309	j9027_9	50,4472	j9032_9	37,6340	j9037_9	14,4384
j9022_10	16,8269	j9027_10	26,2552	j9032_10	36,2707	j9037_10	22,5156
j9023_1	23,0646	j9028_1	38,5944	j9033_1	6,6703	j9038_1	25,2017
j9023_2	23,6256	j9028_2	34,9813	j9033_2	8,7255	j9038_2	19,3231
j9023_3	19,6740	j9028_3	23,3903	j9033_3	5,9216	j9038_3	15,0206
j9023_4	13,7280	j9028_4	31,9719	j9033_4	7,9464	j9038_4	18,0963
j9023_5	12,8732	j9028_5	30,2924	j9033_5	9,0280	j9038_5	20,2552
j9023_6	15,5141	j9028_6	25,8199	j9033_6	9,6314	j9038_6	23,6583
j9023_7	25,0939	j9028_7	27,7210	j9033_7	8,3228	j9038_7	17,5967
j9023_8	19,0817	j9028_8	23,0944	j9033_8	5,1275	j9038_8	19,1827
j9023_9	18,0207	j9028_9	18,5263	j9033_9	9,9998	j9038_9	20,0842
j9023_10	17,6992	j9028_10	35,2584	j9033_10	11,2560	j9038_10	15,1577
j9024_1	21,6736	j9029_1	37,8155	j9034_1	9,9185	j9039_1	14,0502
j9024_2	18,2516	j9029_2	43,6754	j9034_2	8,8697	j9039_2	18,0259
j9024_3	26,0167	j9029_3	34,2821	j9034_3	9,5840	j9039_3	23,1198
j9024_4	12,5742	j9029_4	31,7171	j9034_4	10,5304	j9039_4	18,2216
j9024_5	23,2385	j9029_5	35,7079	j9034_5	9,0445	j9039_5	24,0756
j9024_6	19,3609	j9029_6	47,5680	j9034_6	10,0572	j9039_6	21,5990
j9024_7	15,7788	j9029_7	23,6144	j9034_7	9,2107	j9039_7	25,4457
j9024_8	24,5863	j9029_8	38,5908	j9034_8	11,7546	j9039_8	26,1517
j9024_9	25,3153	j9029_9	45,3335	j9034_9	11,0992	j9039_9	21,3506
j9024_10	21,0853	j9029_10	47,9552	j9034_10	7,3052	j9039_10	19,0015
j9025_1	24,8401	j9030_1	33,0556	j9035_1	8,3010	j9040_1	15,8577
j9025_2	35,2041	j9030_2	44,7810	j9035_2	10,3998	j9040_2	17,3376
j9025_3	27,8007	j9030_3	34,0273	j9035_3	7,8159	j9040_3	16,2828
j9025_4	29,0494	j9030_4	27,8796	j9035_4	11,9856	j9040_4	16,9620
j9025_5	32,6343	j9030_5	30,4413	j9035_5	8,5752	j9040_5	15,1725
j9025_6	39,5283	j9030_6	35,2153	j9035_6	10,3420	j9040_6	17,4781
j9025_7	42,7861	j9030_7	42,3241	j9035_7	10,7066	j9040_7	20,7709
j9025_8	25,4623	j9030_8	48,8105	j9035_8	8,8439	j9040_8	23,0668
j9025_9	25,1879	j9030_9	42,9562	j9035_9	14,5363	j9040_9	21,9738
j9025_10	26,8590	j9030_10	28,4823	j9035_10	7,4384	j9040_10	22,5976



**Table VI:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9041\_1 έως j9048\_10)

Project	StD	Project	StD
j9041_1	22,1821	j9046_1	33,8015
j9041_2	24,8070	j9046_2	33,2892
j9041_3	25,0520	j9046_3	33,0778
j9041_4	29,2133	j9046_4	39,8006
j9041_5	19,9815	j9046_5	40,2393
j9041_6	28,0040	j9046_6	47,5957
j9041_7	25,4229	j9046_7	28,2162
j9041_8	26,0558	j9046_8	27,9326
j9041_9	32,2531	j9046_9	53,8087
j9041_10	25,0617	j9046_10	28,3696
j9042_1	21,9311	j9047_1	30,8101
j9042_2	29,7847	j9047_2	34,1850
j9042_3	28,6324	j9047_3	35,8080
j9042_4	19,8758	j9047_4	25,9257
j9042_5	23,1732	j9047_5	27,5711
j9042_6	19,9805	j9047_6	35,6044
j9042_7	25,3475	j9047_7	45,4216
j9042_8	17,3743	j9047_8	22,6649
j9042_9	20,3352	j9047_9	38,7025
j9042_10	33,7867	j9047_10	41,5752
j9043_1	23,2771	j9048_1	52,1528
j9043_2	23,4544	j9048_2	33,4713
j9043_3	23,4338	j9048_3	36,2956
j9043_4	26,9179	j9048_4	37,5595
j9043_5	30,7164	j9048_5	47,1154
j9043_6	21,1958	j9048_6	35,1581
j9043_7	26,2406	j9048_7	38,1368
j9043_8	26,5698	j9048_8	38,2436
j9043_9	29,5459	j9048_9	28,6667
j9043_10	30,2708	j9048_10	36,5168
j9044_1	25,4134		
j9044_2	31,1153		
j9044_3	27,0360		
j9044_4	27,4248		
j9044_5	33,4215		
j9044_6	31,2385		
j9044_7	21,1012		
j9044_8	25,8885		
j9044_9	20,7288		
j9044_10	27,6290		
j9045_1	31,1192		
j9045_2	37,4852		
j9045_3	26,1453		
j9045_4	42,5340		
j9045_5	28,9625		
j9045_6	36,3732		
j9045_7	45,2948		
j9045_8	34,6358		
j9045_9	33,8094		
j9045_10	44,3391		

**Table VII:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the Step resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	Step	Project	Step	Project	Step	Project	Step
j901_1	228	j906_1	447	j9011_1	748	j9016_1	920
j901_2	243	j906_2	571	j9011_2	770	j9016_2	867
j901_3	221	j906_3	549	j9011_3	675	j9016_3	857
j901_4	239	j906_4	615	j9011_4	732	j9016_4	838
j901_5	238	j906_5	454	j9011_5	672	j9016_5	861
j901_6	181	j906_6	579	j9011_6	625	j9016_6	859
j901_7	256	j906_7	475	j9011_7	801	j9016_7	857
j901_8	302	j906_8	473	j9011_8	757	j9016_8	921
j901_9	246	j906_9	439	j9011_9	825	j9016_9	800
j901_10	334*	j906_10	558	j9011_10	771	j9016_10	763
j902_1	284	j907_1	480	j9012_1	672	j9017_1	268
j902_2	319	j907_2	564	j9012_2	736	j9017_2	236
j902_3	243	j907_3	503	j9012_3	835	j9017_3	273
j902_4	244	j907_4	515	j9012_4	699	j9017_4	284
j902_5	243	j907_5	489	j9012_5	749	j9017_5	329
j902_6	242	j907_6	558	j9012_6	746	j9017_6	272
j902_7	284	j907_7	582	j9012_7	676	j9017_7	254
j902_8	246	j907_8	439	j9012_8	655	j9017_8	324
j902_9	249	j907_9	567	j9012_9	731	j9017_9	257
j902_10	252	j907_10	536	j9012_10	717	j9017_10	273
j903_1	242	j908_1	589	j9013_1	858	j9018_1	311
j903_2	231	j908_2	487	j9013_2	888	j9018_2	274
j903_3	223	j908_3	566	j9013_3	946	j9018_3	287
j903_4	274	j908_4	477	j9013_4	984	j9018_4	316
j903_5	232	j908_5	520	j9013_5	969	j9018_5	277*
j903_6	212	j908_6	510	j9013_6	871	j9018_6	278
j903_7	252	j908_7	529	j9013_7	971	j9018_7	246
j903_8	254	j908_8	481	j9013_8	864	j9018_8	269
j903_9	211	j908_9	557	j9013_9	923	j9018_9	254
j903_10	211	j908_10	577	j9013_10	806	j9018_10	284
j904_1	277	j909_1	778	j9014_1	964	j9019_1	287
j904_2	300*	j909_2	735	j9014_2	774	j9019_2	243
j904_3	258	j909_3	627	j9014_3	1018	j9019_3	260
j904_4	271	j909_4	689	j9014_4	921	j9019_4	261
j904_5	273	j909_5	692	j9014_5	858	j9019_5	252
j904_6	259	j909_6	705	j9014_6	803	j9019_6	335
j904_7	255	j909_7	624	j9014_7	1025	j9019_7	241
j904_8	236	j909_8	610	j9014_8	940	j9019_8	262
j904_9	244	j909_9	720	j9014_9	1127	j9019_9	329
j904_10	250	j909_10	692	j9014_10	884	j9019_10	263
j905_1	482	j9010_1	720	j9015_1	928	j9020_1	261
j905_2	577	j9010_2	673	j9015_2	757	j9020_2	219
j905_3	461	j9010_3	783	j9015_3	902	j9020_3	237
j905_4	577	j9010_4	793	j9015_4	1068	j9020_4	279
j905_5	626	j9010_5	668	j9015_5	880	j9020_5	267
j905_6	496	j9010_6	676	j9015_6	868	j9020_6	274
j905_7	533	j9010_7	792	j9015_7	851	j9020_7	279
j905_8	481	j9010_8	644	j9015_8	929	j9020_8	254
j905_9	655	j9010_9	729	j9015_9	935	j9020_9	246
j905_10	444	j9010_10	633	j9015_10	951	j9020_10	268

**Table VIII:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the Step resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	Step	Project	Step	Project	Step	Project	Step
j9021_1	507	j9026_1	748	j9031_1	856	j9036_1	316
j9021_2	533	j9026_2	828	j9031_2	855	j9036_2	339
j9021_3	586	j9026_3	778	j9031_3	1036	j9036_3	280
j9021_4	631	j9026_4	749	j9031_4	934	j9036_4	242
j9021_5	533	j9026_5	713	j9031_5	982	j9036_5	276
j9021_6	557	j9026_6	873	j9031_6	907	j9036_6	278
j9021_7	601	j9026_7	629	j9031_7	1011	j9036_7	234
j9021_8	478	j9026_8	743	j9031_8	939	j9036_8	264
j9021_9	511	j9026_9	758	j9031_9	871	j9036_9	284
j9021_10	546	j9026_10	825	j9031_10	983	j9036_10	280
j9022_1	591	j9027_1	730	j9032_1	960	j9037_1	463
j9022_2	569	j9027_2	809	j9032_2	895	j9037_2	484
j9022_3	544	j9027_3	760	j9032_3	982	j9037_3	606
j9022_4	603	j9027_4	642	j9032_4	933	j9037_4	486
j9022_5	569	j9027_5	854	j9032_5	912	j9037_5	595
j9022_6	528	j9027_6	788	j9032_6	915	j9037_6	531
j9022_7	488	j9027_7	633	j9032_7	946	j9037_7	599
j9022_8	599	j9027_8	717	j9032_8	973	j9037_8	552
j9022_9	511	j9027_9	737	j9032_9	1033	j9037_9	605
j9022_10	390	j9027_10	837	j9032_10	997	j9037_10	577
j9023_1	569	j9028_1	732	j9033_1	240	j9038_1	468
j9023_2	508	j9028_2	668	j9033_2	301	j9038_2	600
j9023_3	592	j9028_3	641	j9033_3	262	j9038_3	591
j9023_4	507	j9028_4	741	j9033_4	280	j9038_4	571
j9023_5	497	j9028_5	820	j9033_5	284	j9038_5	478
j9023_6	511	j9028_6	797	j9033_6	311	j9038_6	536
j9023_7	548	j9028_7	791	j9033_7	263	j9038_7	602
j9023_8	520	j9028_8	720	j9033_8	264	j9038_8	552
j9023_9	665	j9028_9	751	j9033_9	244	j9038_9	626
j9023_10	469	j9028_10	650	j9033_10	318	j9038_10	605
j9024_1	527	j9029_1	1019	j9034_1	270	j9039_1	569
j9024_2	478	j9029_2	875	j9034_2	281	j9039_2	642
j9024_3	482	j9029_3	960	j9034_3	239	j9039_3	542
j9024_4	550	j9029_4	877	j9034_4	236	j9039_4	576
j9024_5	518	j9029_5	1030	j9034_5	272	j9039_5	600
j9024_6	526	j9029_6	907	j9034_6	275	j9039_6	518
j9024_7	552	j9029_7	948	j9034_7	290	j9039_7	573
j9024_8	492	j9029_8	959	j9034_8	258	j9039_8	546
j9024_9	526	j9029_9	928	j9034_9	303	j9039_9	536
j9024_10	541	j9029_10	877	j9034_10	295	j9039_10	606
j9025_1	746	j9030_1	909	j9035_1	276	j9040_1	549
j9025_2	783	j9030_2	868	j9035_2	292	j9040_2	557
j9025_3	733	j9030_3	935	j9035_3	276	j9040_3	525
j9025_4	825	j9030_4	1095	j9035_4	247	j9040_4	590
j9025_5	671	j9030_5	909	j9035_5	269	j9040_5	540
j9025_6	622	j9030_6	1012	j9035_6	238	j9040_6	566
j9025_7	759	j9030_7	918	j9035_7	266	j9040_7	481
j9025_8	830	j9030_8	915	j9035_8	268	j9040_8	480
j9025_9	628	j9030_9	919	j9035_9	260	j9040_9	531
j9025_10	735	j9030_10	843	j9035_10	258	j9040_10	619

**Table IX:** Best scores obtained after repeated experiments with the hybrid genetic algorithm approach (HGA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9041\_1 έως j9048\_10)

Project	Step	Project	Step
j9041_1	730	j9046_1	1108
j9041_2	803	j9046_2	942
j9041_3	834	j9046_3	1013
j9041_4	656	j9046_4	940
j9041_5	662	j9046_5	972
j9041_6	677	j9046_6	999
j9041_7	908	j9046_7	850
j9041_8	931	j9046_8	883
j9041_9	722	j9046_9	848
j9041_10	785	j9046_10	1120
j9042_1	913	j9047_1	959
j9042_2	829	j9047_2	1019
j9042_3	731	j9047_3	1125
j9042_4	737	j9047_4	988
j9042_5	874	j9047_5	1019
j9042_6	795	j9047_6	1158
j9042_7	671	j9047_7	966
j9042_8	840	j9047_8	980
j9042_9	754	j9047_9	953
j9042_10	763	j9047_10	860
j9043_1	753	j9048_1	911
j9043_2	793	j9048_2	943
j9043_3	851	j9048_3	1004
j9043_4	773	j9048_4	1004
j9043_5	894	j9048_5	869
j9043_6	892	j9048_6	1054
j9043_7	839	j9048_7	1062
j9043_8	834	j9048_8	794
j9043_9	801	j9048_9	946
j9043_10	781	j9048_10	1071
j9044_1	856		
j9044_2	683		
j9044_3	887		
j9044_4	620		
j9044_5	756		
j9044_6	710		
j9044_7	807		
j9044_8	703		
j9044_9	860		
j9044_10	744		
j9045_1	892		
j9045_2	1033		
j9045_3	1010		
j9045_4	917		
j9045_5	969		
j9045_6	1108		
j9045_7	948		
j9045_8	962		
j9045_9	985		
j9045_10	921		

**Table X:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Gfresource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	Gf	Project	Gf	Project	Gf	Project	Gf
j901_1	61	j906_1	89	j9011_1	129	j9016_1	200
j901_2	42	j906_2	97	j9011_2	123	j9016_2	201
j901_3	58	j906_3	125	j9011_3	162	j9016_3	231
j901_4	55	j906_4	109	j9011_4	167	j9016_4	239
j901_5	48	j906_5	129	j9011_5	154	j9016_5	227
j901_6	60	j906_6	86	j9011_6	184	j9016_6	300
j901_7	50	j906_7	104	j9011_7	142	j9016_7	209
j901_8	59	j906_8	136	j9011_8	167	j9016_8	220
j901_9	65	j906_9	117	j9011_9	153	j9016_9	250
j901_10	54	j906_10	101	j9011_10	139	j9016_10	201
j902_1	44	j907_1	106	j9012_1	153	j9017_1	57
j902_2	37	j907_2	103	j9012_2	152	j9017_2	47
j902_3	54	j907_3	110	j9012_3	148	j9017_3	56
j902_4	65	j907_4	77	j9012_4	192	j9017_4	42
j902_5	42	j907_5	108	j9012_5	149	j9017_5	37
j902_6	58	j907_6	84	j9012_6	154	j9017_6	51
j902_7	50	j907_7	93	j9012_7	178	j9017_7	51
j902_8	57	j907_8	146	j9012_8	151	j9017_8	44
j902_9	60	j907_9	103	j9012_9	182	j9017_9	54
j902_10	44	j907_10	103	j9012_10	150	j9017_10	54
j903_1	44	j908_1	92	j9013_1	177	j9018_1	49
j903_2	42	j908_2	91	j9013_2	218	j9018_2	46
j903_3	57	j908_3	117	j9013_3	202	j9018_3	51
j903_4	39	j908_4	113	j9013_4	207	j9018_4	50
j903_5	54	j908_5	137	j9013_5	195	j9018_5	47
j903_6	56	j908_6	126	j9013_6	217	j9018_6	50
j903_7	40	j908_7	120	j9013_7	183	j9018_7	47
j903_8	46	j908_8	122	j9013_8	274	j9018_8	53
j903_9	59	j908_9	104	j9013_9	199	j9018_9	51
j903_10	60	j908_10	90	j9013_10	216	j9018_10	44
j904_1	49	j909_1	149	j9014_1	186	j9019_1	44
j904_2	48	j909_2	155	j9014_2	191	j9019_2	48
j904_3	62	j909_3	181	j9014_3	186	j9019_3	47
j904_4	47	j909_4	160	j9014_4	193	j9019_4	55
j904_5	48	j909_5	137	j9014_5	198	j9019_5	51
j904_6	53	j909_6	145	j9014_6	236	j9019_6	32
j904_7	56	j909_7	167	j9014_7	204	j9019_7	65
j904_8	45	j909_8	147	j9014_8	218	j9019_8	48
j904_9	48	j909_9	161	j9014_9	168	j9019_9	40
j904_10	56	j909_10	157	j9014_10	197	j9019_10	52
j905_1	104	j9010_1	152	j9015_1	190	j9020_1	54
j905_2	94	j9010_2	149	j9015_2	212	j9020_2	53
j905_3	128	j9010_3	123	j9015_3	184	j9020_3	47
j905_4	103	j9010_4	137	j9015_4	178	j9020_4	53
j905_5	130	j9010_5	167	j9015_5	175	j9020_5	53
j905_6	99	j9010_6	132	j9015_6	282	j9020_6	54
j905_7	110	j9010_7	158	j9015_7	187	j9020_7	47
j905_8	103	j9010_8	146	j9015_8	199	j9020_8	51
j905_9	111	j9010_9	143	j9015_9	241	j9020_9	47
j905_10	108	j9010_10	156	j9015_10	198	j9020_10	43

**Table XI:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Gf resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	Gf	Project	Gf	Project	Gf	Project	Gf
j9021_1	104	j9026_1	151	j9031_1	189	j9036_1	44
j9021_2	93	j9026_2	151	j9031_2	235	j9036_2	35
j9021_3	103	j9026_3	141	j9031_3	155	j9036_3	50
j9021_4	92	j9026_4	145	j9031_4	189	j9036_4	42
j9021_5	116	j9026_5	135	j9031_5	208	j9036_5	42
j9021_6	101	j9026_6	122	j9031_6	198	j9036_6	49
j9021_7	96	j9026_7	134	j9031_7	189	j9036_7	43
j9021_8	96	j9026_8	172	j9031_8	187	j9036_8	46
j9021_9	104	j9026_9	131	j9031_9	235	j9036_9	42
j9021_10	103	j9026_10	130	j9031_10	153	j9036_10	40
j9022_1	84	j9027_1	117	j9032_1	197	j9037_1	93
j9022_2	85	j9027_2	176	j9032_2	207	j9037_2	92
j9022_3	106	j9027_3	136	j9032_3	169	j9037_3	71
j9022_4	96	j9027_4	166	j9032_4	180	j9037_4	109
j9022_5	84	j9027_5	130	j9032_5	187	j9037_5	87
j9022_6	112	j9027_6	166	j9032_6	185	j9037_6	96
j9022_7	88	j9027_7	170	j9032_7	193	j9037_7	82
j9022_8	90	j9027_8	154	j9032_8	191	j9037_8	100
j9022_9	96	j9027_9	185	j9032_9	183	j9037_9	85
j9022_10	105	j9027_10	128	j9032_10	168	j9037_10	99
j9023_1	99	j9028_1	161	j9033_1	44	j9038_1	109
j9023_2	105	j9028_2	161	j9033_2	39	j9038_2	95
j9023_3	81	j9028_3	132	j9033_3	37	j9038_3	92
j9023_4	96	j9028_4	158	j9033_4	43	j9038_4	91
j9023_5	84	j9028_5	147	j9033_5	42	j9038_5	96
j9023_6	87	j9028_6	134	j9033_6	47	j9038_6	98
j9023_7	105	j9028_7	137	j9033_7	43	j9038_7	90
j9023_8	87	j9028_8	121	j9033_8	36	j9038_8	98
j9023_9	76	j9028_9	95	j9033_9	45	j9038_9	90
j9023_10	93	j9028_10	156	j9033_10	47	j9038_10	76
j9024_1	97	j9029_1	165	j9034_1	51	j9039_1	83
j9024_2	93	j9029_2	203	j9034_2	46	j9039_2	85
j9024_3	111	j9029_3	181	j9034_3	47	j9039_3	113
j9024_4	92	j9029_4	188	j9034_4	53	j9039_4	103
j9024_5	107	j9029_5	174	j9034_5	51	j9039_5	106
j9024_6	101	j9029_6	217	j9034_6	46	j9039_6	97
j9024_7	96	j9029_7	164	j9034_7	46	j9039_7	111
j9024_8	100	j9029_8	188	j9034_8	50	j9039_8	114
j9024_9	122	j9029_9	204	j9034_9	45	j9039_9	101
j9024_10	94	j9029_10	196	j9034_10	41	j9039_10	88
j9025_1	128	j9030_1	166	j9035_1	43	j9040_1	79
j9025_2	173	j9030_2	201	j9035_2	52	j9040_2	82
j9025_3	141	j9030_3	163	j9035_3	44	j9040_3	95
j9025_4	129	j9030_4	167	j9035_4	51	j9040_4	73
j9025_5	169	j9030_5	178	j9035_5	39	j9040_5	80
j9025_6	164	j9030_6	188	j9035_6	53	j9040_6	94
j9025_7	174	j9030_7	202	j9035_7	50	j9040_7	99
j9025_8	133	j9030_8	214	j9035_8	43	j9040_8	99
j9025_9	132	j9030_9	204	j9035_9	58	j9040_9	93
j9025_10	131	j9030_10	159	j9035_10	46	j9040_10	107

**Table XII:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Gfresource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9041\_1 έως j9048\_10)

Project	Gf	Project	Gf
j9041_1	124	j9046_1	171
j9041_2	129	j9046_2	157
j9041_3	125	j9046_3	166
j9041_4	143	j9046_4	197
j9041_5	117	j9046_5	184
j9041_6	144	j9046_6	196
j9041_7	126	j9046_7	173
j9041_8	136	j9046_8	187
j9041_9	154	j9046_9	232
j9041_10	123	j9046_10	151
j9042_1	115	j9047_1	177
j9042_2	145	j9047_2	167
j9042_3	139	j9047_3	182
j9042_4	104	j9047_4	169
j9042_5	107	j9047_5	179
j9042_6	122	j9047_6	182
j9042_7	145	j9047_7	190
j9042_8	107	j9047_8	154
j9042_9	133	j9047_9	174
j9042_10	148	j9047_10	198
j9043_1	123	j9048_1	218
j9043_2	129	j9048_2	168
j9043_3	121	j9048_3	170
j9043_4	135	j9048_4	186
j9043_5	139	j9048_5	216
j9043_6	113	j9048_6	161
j9043_7	140	j9048_7	170
j9043_8	125	j9048_8	179
j9043_9	140	j9048_9	163
j9043_10	144	j9048_10	178
j9044_1	139		
j9044_2	142		
j9044_3	127		
j9044_4	138		
j9044_5	150		
j9044_6	131		
j9044_7	120		
j9044_8	126		
j9044_9	121		
j9044_10	135		
j9045_1	169		
j9045_2	181		
j9045_3	139		
j9045_4	195		
j9045_5	171		
j9045_6	163		
j9045_7	206		
j9045_8	171		
j9045_9	170		
j9045_10	195		

**Table XIII:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	StD	Project	StD	Project	StD	Project	StD
j901_1	9,5378	j906_1	18,3084	j9011_1	21,1238	j9016_1	43,6941
j901_2	7,4931	j906_2	21,1728	j9011_2	20,1662	j9016_2	37,2028
j901_3	13,5003	j906_3	29,8747	j9011_3	32,2700	j9016_3	51,0057
j901_4	12,1604	j906_4	24,1189	j9011_4	30,3557	j9016_4	56,2726
j901_5	11,2022	j906_5	27,8785	j9011_5	32,2614	j9016_5	47,6028
j901_6	14,9280	j906_6	19,6384	j9011_6	40,3515	j9016_6	74,4356
j901_7	11,4613	j906_7	16,2285	j9011_7	33,1869	j9016_7	40,1031
j901_8	14,8351	j906_8	34,1074	j9011_8	36,6971	j9016_8	45,6870
j901_9	16,9910	j906_9	28,2389	j9011_9	32,0935	j9016_9	50,4290
j901_10	11,8841	j906_10	19,8996	j9011_10	28,4099	j9016_10	39,7732
j902_1	8,4046	j907_1	27,3492	j9012_1	28,7211	j9017_1	12,1403
j902_2	7,1417	j907_2	20,3417	j9012_2	29,5347	j9017_2	10,3381
j902_3	10,3187	j907_3	21,8102	j9012_3	35,6006	j9017_3	13,0426
j902_4	13,1351	j907_4	14,0366	j9012_4	52,1869	j9017_4	6,5806
j902_5	7,4578	j907_5	21,5298	j9012_5	31,9117	j9017_5	7,3716
j902_6	11,1441	j907_6	19,9592	j9012_6	31,4444	j9017_6	11,2887
j902_7	8,5149	j907_7	19,6319	j9012_7	43,6421	j9017_7	11,2818
j902_8	12,2526	j907_8	38,8157	j9012_8	27,4709	j9017_8	7,5418
j902_9	13,4541	j907_9	17,7831	j9012_9	40,3920	j9017_9	9,9118
j902_10	6,9216	j907_10	23,1181	j9012_10	29,8118	j9017_10	10,6689
j903_1	8,0404	j908_1	15,6103	j9013_1	32,9503	j9018_1	9,7268
j903_2	8,2374	j908_2	19,2736	j9013_2	48,4837	j9018_2	9,8579
j903_3	11,6323	j908_3	29,7536	j9013_3	41,4834	j9018_3	9,6196
j903_4	6,5901	j908_4	24,4881	j9013_4	40,3659	j9018_4	9,5979
j903_5	13,2195	j908_5	33,5378	j9013_5	32,6247	j9018_5	10,9432
j903_6	14,2320	j908_6	31,4922	j9013_6	43,6421	j9018_6	10,7879
j903_7	6,8498	j908_7	26,6176	j9013_7	37,0442	j9018_7	8,5475
j903_8	10,9414	j908_8	27,0575	j9013_8	63,5204	j9018_8	13,0461
j903_9	10,8621	j908_9	16,3401	j9013_9	40,5943	j9018_9	10,3341
j903_10	13,4963	j908_10	22,4124	j9013_10	43,1518	j9018_10	9,1666
j904_1	10,1126	j909_1	30,5492	j9014_1	35,0129	j9019_1	8,5518
j904_2	8,3972	j909_2	30,8974	j9014_2	39,7517	j9019_2	9,9362
j904_3	13,3618	j909_3	43,8647	j9014_3	34,5350	j9019_3	9,6646
j904_4	8,2543	j909_4	40,7791	j9014_4	36,2561	j9019_4	10,0650
j904_5	7,8561	j909_5	20,5056	j9014_5	42,1256	j9019_5	8,9807
j904_6	11,4331	j909_6	31,0238	j9014_6	44,4184	j9019_6	7,3359
j904_7	10,7528	j909_7	32,4579	j9014_7	41,9183	j9019_7	13,6903
j904_8	9,1868	j909_8	31,4146	j9014_8	47,9075	j9019_8	12,2030
j904_9	11,6107	j909_9	33,2434	j9014_9	37,2450	j9019_9	7,2525
j904_10	12,3846	j909_10	30,8903	j9014_10	46,7021	j9019_10	13,5168
j905_1	18,2294	j9010_1	32,3159	j9015_1	37,1247	j9020_1	12,0639
j905_2	17,5278	j9010_2	28,0557	j9015_2	47,1837	j9020_2	13,1124
j905_3	28,6538	j9010_3	24,8038	j9015_3	31,3867	j9020_3	8,4137
j905_4	19,0259	j9010_4	27,0585	j9015_4	37,5966	j9020_4	11,9582
j905_5	29,9730	j9010_5	37,6306	j9015_5	27,4425	j9020_5	9,5090
j905_6	22,9449	j9010_6	24,0647	j9015_6	61,9173	j9020_6	13,0665
j905_7	23,6952	j9010_7	32,6775	j9015_7	35,9767	j9020_7	9,0669
j905_8	21,7282	j9010_8	30,4289	j9015_8	40,9824	j9020_8	10,3515
j905_9	18,2779	j9010_9	27,9642	j9015_9	55,9880	j9020_9	11,1078
j905_10	21,2028	j9010_10	32,5380	j9015_10	38,2134	j9020_10	8,5019



**Table XIV:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	StD	Project	StD	Project	StD	Project	StD
j9021_1	15,7193	j9026_1	35,4335	j9031_1	30,8195	j9036_1	8,2879
j9021_2	18,2667	j9026_2	33,5495	j9031_2	51,9239	j9036_2	6,8238
j9021_3	21,2393	j9026_3	28,2385	j9031_3	31,1185	j9036_3	9,2972
j9021_4	20,8044	j9026_4	24,5828	j9031_4	29,8560	j9036_4	7,2642
j9021_5	25,4310	j9026_5	24,6569	j9031_5	40,3518	j9036_5	8,7894
j9021_6	24,6995	j9026_6	24,6489	j9031_6	37,5769	j9036_6	10,3305
j9021_7	20,3165	j9026_7	25,0679	j9031_7	42,3381	j9036_7	11,2183
j9021_8	20,6032	j9026_8	39,0078	j9031_8	33,5400	j9036_8	10,0579
j9021_9	24,7981	j9026_9	25,6684	j9031_9	46,8780	j9036_9	7,8101
j9021_10	21,7736	j9026_10	25,3804	j9031_10	23,8982	j9036_10	8,0166
j9022_1	17,1832	j9027_1	23,2599	j9032_1	36,4161	j9037_1	18,7357
j9022_2	15,7273	j9027_2	40,8431	j9032_2	47,8995	j9037_2	17,0144
j9022_3	24,9408	j9027_3	28,5496	j9032_3	28,9693	j9037_3	12,5362
j9022_4	19,1143	j9027_4	40,8279	j9032_4	36,7980	j9037_4	24,7965
j9022_5	16,1150	j9027_5	25,6563	j9032_5	34,9882	j9037_5	16,8778
j9022_6	26,0196	j9027_6	37,0122	j9032_6	41,6278	j9037_6	21,5591
j9022_7	19,7262	j9027_7	40,0872	j9032_7	41,7547	j9037_7	16,4293
j9022_8	21,6465	j9027_8	29,9987	j9032_8	44,5376	j9037_8	20,4385
j9022_9	23,5416	j9027_9	48,1431	j9032_9	34,6566	j9037_9	15,3952
j9022_10	18,0842	j9027_10	25,0886	j9032_10	33,3034	j9037_10	22,9237
j9023_1	25,1051	j9028_1	38,3991	j9033_1	7,1024	j9038_1	26,6939
j9023_2	24,7713	j9028_2	35,0338	j9033_2	8,4498	j9038_2	19,2665
j9023_3	20,0192	j9028_3	25,6217	j9033_3	6,1992	j9038_3	16,6053
j9023_4	15,8979	j9028_4	31,4604	j9033_4	7,8119	j9038_4	19,2648
j9023_5	14,1420	j9028_5	30,2084	j9033_5	9,1631	j9038_5	20,2962
j9023_6	15,2640	j9028_6	27,0213	j9033_6	9,8703	j9038_6	23,7973
j9023_7	25,4980	j9028_7	28,3883	j9033_7	9,1417	j9038_7	17,3260
j9023_8	19,3431	j9028_8	25,6732	j9033_8	5,9372	j9038_8	19,7433
j9023_9	16,4913	j9028_9	16,1925	j9033_9	10,5851	j9038_9	18,6563
j9023_10	17,8516	j9028_10	34,1911	j9033_10	10,9627	j9038_10	15,4937
j9024_1	20,2802	j9029_1	37,3223	j9034_1	10,4210	j9039_1	14,7597
j9024_2	18,6765	j9029_2	44,1955	j9034_2	9,5186	j9039_2	18,9929
j9024_3	24,9414	j9029_3	34,0473	j9034_3	9,5891	j9039_3	24,1513
j9024_4	14,3626	j9029_4	31,9610	j9034_4	10,8816	j9039_4	18,2244
j9024_5	23,2590	j9029_5	34,0927	j9034_5	8,7847	j9039_5	23,7971
j9024_6	20,3992	j9029_6	48,7359	j9034_6	9,9413	j9039_6	20,7408
j9024_7	17,8291	j9029_7	22,8322	j9034_7	9,2559	j9039_7	24,5688
j9024_8	24,5615	j9029_8	39,9705	j9034_8	11,7954	j9039_8	26,6948
j9024_9	28,1731	j9029_9	45,1260	j9034_9	10,7707	j9039_9	20,7852
j9024_10	19,9396	j9029_10	48,9209	j9034_10	7,6358	j9039_10	19,2686
j9025_1	26,0284	j9030_1	32,0640	j9035_1	8,6837	j9040_1	16,1311
j9025_2	33,8910	j9030_2	44,6883	j9035_2	10,3330	j9040_2	17,4258
j9025_3	29,2554	j9030_3	33,0271	j9035_3	8,2292	j9040_3	16,6013
j9025_4	29,0472	j9030_4	31,9503	j9035_4	11,8652	j9040_4	15,4696
j9025_5	34,5695	j9030_5	31,0093	j9035_5	8,9446	j9040_5	15,5162
j9025_6	38,7830	j9030_6	34,8013	j9035_6	11,6703	j9040_6	16,5700
j9025_7	43,1566	j9030_7	42,1563	j9035_7	10,9797	j9040_7	20,7597
j9025_8	23,5714	j9030_8	49,7847	j9035_8	7,6765	j9040_8	22,4031
j9025_9	25,9956	j9030_9	41,2398	j9035_9	14,3962	j9040_9	22,0198
j9025_10	25,7558	j9030_10	25,8841	j9035_10	7,8045	j9040_10	21,7167

**Table XV:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9041\_1 έως j9048\_10)

Project	StD	Project	StD
j9041_1	21,1924	j9046_1	32,3060
j9041_2	24,2662	j9046_2	29,2019
j9041_3	24,8171	j9046_3	36,7234
j9041_4	28,5255	j9046_4	39,4538
j9041_5	16,5560	j9046_5	41,1946
j9041_6	30,5974	j9046_6	46,0372
j9041_7	24,4379	j9046_7	40,2051
j9041_8	25,2888	j9046_8	32,8609
j9041_9	33,4625	j9046_9	56,2176
j9041_10	25,9172	j9046_10	27,4485
j9042_1	20,9798	j9047_1	30,5764
j9042_2	31,0400	j9047_2	33,6219
j9042_3	27,6528	j9047_3	36,8370
j9042_4	19,3293	j9047_4	29,5832
j9042_5	22,1602	j9047_5	29,7802
j9042_6	19,8459	j9047_6	37,8723
j9042_7	28,1175	j9047_7	35,5627
j9042_8	18,4792	j9047_8	25,0164
j9042_9	19,7993	j9047_9	38,5993
j9042_10	36,3942	j9047_10	40,9126
j9043_1	23,7226	j9048_1	52,7965
j9043_2	24,3830	j9048_2	34,1079
j9043_3	22,9962	j9048_3	37,0282
j9043_4	27,8760	j9048_4	40,5277
j9043_5	28,0639	j9048_5	47,5667
j9043_6	22,9518	j9048_6	30,9808
j9043_7	26,7421	j9048_7	36,3731
j9043_8	26,6563	j9048_8	39,2672
j9043_9	28,6941	j9048_9	27,6419
j9043_10	29,1934	j9048_10	37,7658
j9044_1	26,1299		
j9044_2	28,7790		
j9044_3	23,5884		
j9044_4	28,6159		
j9044_5	34,3404		
j9044_6	28,3741		
j9044_7	19,0827		
j9044_8	24,2675		
j9044_9	20,8882		
j9044_10	27,1375		
j9045_1	33,7183		
j9045_2	36,0722		
j9045_3	24,9980		
j9045_4	41,3444		
j9045_5	32,1312		
j9045_6	36,5690		
j9045_7	45,7030		
j9045_8	31,8187		
j9045_9	34,1319		
j9045_10	42,3971		

**Table XVI:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Step resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	Step	Project	Step	Project	Step	Project	Step
j901_1	236	j906_1	441	j9011_1	720	j9016_1	897
j901_2	235	j906_2	589	j9011_2	809	j9016_2	865
j901_3	203	j906_3	593	j9011_3	655	j9016_3	897
j901_4	247	j906_4	617	j9011_4	718	j9016_4	870
j901_5	219	j906_5	460	j9011_5	694	j9016_5	855
j901_6	189	j906_6	597	j9011_6	641	j9016_6	842
j901_7	221	j906_7	486	j9011_7	767	j9016_7	830
j901_8	289	j906_8	500	j9011_8	819	j9016_8	896
j901_9	241	j906_9	449	j9011_9	859	j9016_9	758
j901_10	304	j906_10	478	j9011_10	715	j9016_10	787
j902_1	322	j907_1	494	j9012_1	676	j9017_1	275
j902_2	318	j907_2	576	j9012_2	716	j9017_2	236
j902_3	229	j907_3	523	j9012_3	813	j9017_3	264
j902_4	244	j907_4	481	j9012_4	667	j9017_4	278
j902_5	268	j907_5	513	j9012_5	754	j9017_5	327
j902_6	256	j907_6	543	j9012_6	720	j9017_6	274
j902_7	292	j907_7	567	j9012_7	720	j9017_7	256
j902_8	262	j907_8	455	j9012_8	737	j9017_8	314
j902_9	267	j907_9	565	j9012_9	679	j9017_9	281
j902_10	270	j907_10	560	j9012_10	719	j9017_10	297
j903_1	225	j908_1	543	j9013_1	818	j9018_1	315
j903_2	237	j908_2	489	j9013_2	933	j9018_2	313
j903_3	218	j908_3	563	j9013_3	956	j9018_3	305
j903_4	267	j908_4	475	j9013_4	1031	j9018_4	323
j903_5	226	j908_5	504	j9013_5	853	j9018_5	284
j903_6	222	j908_6	536	j9013_6	878	j9018_6	299
j903_7	284	j908_7	538	j9013_7	967	j9018_7	236
j903_8	248	j908_8	489	j9013_8	836	j9018_8	285
j903_9	213	j908_9	579	j9013_9	909	j9018_9	251
j903_10	209	j908_10	578	j9013_10	804	j9018_10	266
j904_1	299	j909_1	748	j9014_1	1050	j9019_1	266
j904_2	268	j909_2	727	j9014_2	851	j9019_2	259
j904_3	282	j909_3	611	j9014_3	966	j9019_3	281
j904_4	265	j909_4	698	j9014_4	951	j9019_4	271
j904_5	279	j909_5	708	j9014_5	866	j9019_5	237
j904_6	259	j909_6	655	j9014_6	805	j9019_6	337
j904_7	267	j909_7	708	j9014_7	1009	j9019_7	249
j904_8	252	j909_8	647	j9014_8	916	j9019_8	237
j904_9	252	j909_9	734	j9014_9	1177	j9019_9	324
j904_10	226	j909_10	690	j9014_10	892	j9019_10	257
j905_1	489	j9010_1	676	j9015_1	894	j9020_1	287
j905_2	583	j9010_2	809	j9015_2	777	j9020_2	228
j905_3	435	j9010_3	883	j9015_3	904	j9020_3	233
j905_4	576	j9010_4	819	j9015_4	1114	j9020_4	281
j905_5	606	j9010_5	686	j9015_5	925	j9020_5	285
j905_6	504	j9010_6	642	j9015_6	910	j9020_6	270
j905_7	494	j9010_7	801	j9015_7	927	j9020_7	273
j905_8	460	j9010_8	717	j9015_8	939	j9020_8	252
j905_9	630	j9010_9	720	j9015_9	964	j9020_9	263
j905_10	468	j9010_10	662	j9015_10	916	j9020_10	252

**Table XVII:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Step resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	Step	Project	Step	Project	Step	Project	Step
j9021_1	496	j9026_1	650	j9031_1	848	j9036_1	316
j9021_2	523	j9026_2	808	j9031_2	890	j9036_2	361
j9021_3	596	j9026_3	786	j9031_3	1020	j9036_3	278
j9021_4	631	j9026_4	783	j9031_4	964	j9036_4	256
j9021_5	541	j9026_5	689	j9031_5	918	j9036_5	282
j9021_6	605	j9026_6	836	j9031_6	891	j9036_6	274
j9021_7	543	j9026_7	657	j9031_7	1015	j9036_7	244
j9021_8	506	j9026_8	693	j9031_8	1015	j9036_8	278
j9021_9	484	j9026_9	773	j9031_9	857	j9036_9	288
j9021_10	575	j9026_10	823	j9031_10	1103	j9036_10	294
j9022_1	599	j9027_1	726	j9032_1	920	j9037_1	511
j9022_2	581	j9027_2	823	j9032_2	882	j9037_2	544
j9022_3	554	j9027_3	717	j9032_3	989	j9037_3	570
j9022_4	557	j9027_4	639	j9032_4	829	j9037_4	556
j9022_5	539	j9027_5	861	j9032_5	924	j9037_5	567
j9022_6	512	j9027_6	771	j9032_6	860	j9037_6	573
j9022_7	476	j9027_7	632	j9032_7	978	j9037_7	597
j9022_8	623	j9027_8	697	j9032_8	927	j9037_8	570
j9022_9	538	j9027_9	715	j9032_9	1064	j9037_9	565
j9022_10	468	j9027_10	855	j9032_10	971	j9037_10	563
j9023_1	588	j9028_1	671	j9033_1	231	j9038_1	470
j9023_2	515	j9028_2	703	j9033_2	319	j9038_2	626
j9023_3	610	j9028_3	713	j9033_3	270	j9038_3	555
j9023_4	589	j9028_4	724	j9033_4	276	j9038_4	587
j9023_5	496	j9028_5	866	j9033_5	308	j9038_5	503
j9023_6	470	j9028_6	753	j9033_6	295	j9038_6	530
j9023_7	537	j9028_7	806	j9033_7	274	j9038_7	601
j9023_8	578	j9028_8	762	j9033_8	270	j9038_8	546
j9023_9	707	j9028_9	757	j9033_9	238	j9038_9	601
j9023_10	495	j9028_10	680	j9033_10	330	j9038_10	661
j9024_1	536	j9029_1	1012	j9034_1	275	j9039_1	652
j9024_2	491	j9029_2	881	j9034_2	298	j9039_2	648
j9024_3	484	j9029_3	931	j9034_3	240	j9039_3	542
j9024_4	506	j9029_4	855	j9034_4	247	j9039_4	559
j9024_5	527	j9029_5	1090	j9034_5	263	j9039_5	568
j9024_6	533	j9029_6	925	j9034_6	287	j9039_6	570
j9024_7	586	j9029_7	966	j9034_7	266	j9039_7	614
j9024_8	516	j9029_8	945	j9034_8	262	j9039_8	502
j9024_9	469	j9029_9	924	j9034_9	287	j9039_9	518
j9024_10	551	j9029_10	822	j9034_10	309	j9039_10	576
j9025_1	736	j9030_1	1016	j9035_1	274	j9040_1	553
j9025_2	787	j9030_2	886	j9035_2	294	j9040_2	575
j9025_3	701	j9030_3	929	j9035_3	243	j9040_3	542
j9025_4	809	j9030_4	987	j9035_4	268	j9040_4	556
j9025_5	695	j9030_5	911	j9035_5	279	j9040_5	534
j9025_6	658	j9030_6	1067	j9035_6	234	j9040_6	595
j9025_7	738	j9030_7	900	j9035_7	276	j9040_7	521
j9025_8	772	j9030_8	914	j9035_8	280	j9040_8	520
j9025_9	586	j9030_9	867	j9035_9	247	j9040_9	541
j9025_10	757	j9030_10	895	j9035_10	274	j9040_10	574

**Table XVIII:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the StD resource profile evaluation function in the 90-activities projects of the PSP-Lib collection (j9041\_1 έως j9048\_10)

Project	Step	Project	Step
j9041_1	832	j9046_1	1096
j9041_2	851	j9046_2	932
j9041_3	851	j9046_3	1101
j9041_4	756	j9046_4	971
j9041_5	726	j9046_5	1068
j9041_6	675	j9046_6	983
j9041_7	914	j9046_7	944
j9041_8	929	j9046_8	983
j9041_9	785	j9046_9	878
j9041_10	809	j9046_10	1230
j9042_1	886	j9047_1	955
j9042_2	840	j9047_2	1057
j9042_3	734	j9047_3	1118
j9042_4	749	j9047_4	982
j9042_5	826	j9047_5	1003
j9042_6	807	j9047_6	1124
j9042_7	653	j9047_7	1024
j9042_8	879	j9047_8	1004
j9042_9	748	j9047_9	978
j9042_10	720	j9047_10	850
j9043_1	801	j9048_1	1019
j9043_2	773	j9048_2	1007
j9043_3	883	j9048_3	1056
j9043_4	865	j9048_4	1016
j9043_5	914	j9048_5	857
j9043_6	916	j9048_6	1116
j9043_7	837	j9048_7	1100
j9043_8	864	j9048_8	846
j9043_9	835	j9048_9	1006
j9043_10	811	j9048_10	1017
j9044_1	840		
j9044_2	729		
j9044_3	896		
j9044_4	678		
j9044_5	821		
j9044_6	756		
j9044_7	769		
j9044_8	782		
j9044_9	829		
j9044_10	792		
j9045_1	850		
j9045_2	993		
j9045_3	962		
j9045_4	897		
j9045_5	982		
j9045_6	1109		
j9045_7	994		
j9045_8	1012		
j9045_9	892		
j9045_10	896		

**Table XIX:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Gfresource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	Gf	Project	Gf	Project	Gf	Project	Gf
j1201_1	56	j1206_1	133	j12011_1	189	j12016_1	284
j1201_2	64	j1206_2	151	j12011_2	193	j12016_2	292
j1201_3	70	j1206_3	128	j12011_3	202	j12016_3	267
j1201_4	65	j1206_4	100	j12011_4	178	j12016_4	280
j1201_5	60	j1206_5	155	j12011_5	182	j12016_5	268
j1201_6	74	j1206_6	141	j12011_6	210	j12016_6	335
j1201_7	54	j1206_7	114	j12011_7	169	j12016_7	245
j1201_8	64	j1206_8	106	j12011_8	174	j12016_8	272
j1201_9	70	j1206_9	173	j12011_9		j12016_9	245
j1201_10	64	j1206_10	139	j12011_10		j12016_10	253
j1202_1	87	j1207_1	157	j12012_1	151	j12017_1	271
j1202_2	71	j1207_2	122	j12012_2	233	j12017_2	298
j1202_3	87	j1207_3	122	j12012_3	221	j12017_3	294
j1202_4	60	j1207_4	124	j12012_4	166	j12017_4	260
j1202_5	67	j1207_5	141	j12012_5	183	j12017_5	249
j1202_6	81	j1207_6	120	j12012_6	205	j12017_6	317
j1202_7	65	j1207_7	128	j12012_7	210	j12017_7	257
j1202_8	70	j1207_8	140	j12012_8	236	j12017_8	315
j1202_9	66	j1207_9	136	j12012_9	199	j12017_9	264
j1202_10	87	j1207_10	125	j12012_10	208	j12017_10	274
j1203_1	75	j1208_1	129	j12013_1	158	j12018_1	223
j1203_2	56	j1208_2	151	j12013_2	236	j12018_2	212
j1203_3	62	j1208_3	118	j12013_3	174	j12018_3	300
j1203_4	75	j1208_4	127	j12013_4	205	j12018_4	291
j1203_5	73	j1208_5	128	j12013_5	225	j12018_5	266
j1203_6	61	j1208_6	133	j12013_6	191	j12018_6	195
j1203_7	55	j1208_7	142	j12013_7	167	j12018_7	252
j1203_8	70	j1208_8	129	j12013_8	189	j12018_8	237
j1203_9	63	j1208_9	141	j12013_9	200	j12018_9	298
j1203_10	56	j1208_10	157	j12013_10	222	j12018_10	292
j1204_1	76	j1209_1	128	j12014_1	246	j12019_1	266
j1204_2	54	j1209_2	123	j12014_2	236	j12019_2	301
j1204_3	64	j1209_3	120	j12014_3	209	j12019_3	309
j1204_4	73	j1209_4	143	j12014_4	190	j12019_4	244
j1204_5	80	j1209_5	111	j12014_5	176	j12019_5	284
j1204_6	66	j1209_6	125	j12014_6	182	j12019_6	259
j1204_7	73	j1209_7	153	j12014_7	210	j12019_7	247
j1204_8	66	j1209_8	133	j12014_8	181	j12019_8	
j1204_9	67	j1209_9	120	j12014_9	162	j12019_9	
j1204_10	66	j1209_10	133	j12014_10	211	j12019_10	
j1205_1	60	j12010_1	112	j12015_1	209	j12020_1	261
j1205_2	75	j12010_2	132	j12015_2	261	j12020_2	237
j1205_3	75	j12010_3	130	j12015_3	187	j12020_3	305
j1205_4	60	j12010_4	122	j12015_4	227	j12020_4	256
j1205_5	69	j12010_5	121	j12015_5	192	j12020_5	294
j1205_6	77	j12010_6	139	j12015_6	187	j12020_6	249
j1205_7	67	j12010_7	138	j12015_7	214	j12020_7	244
j1205_8	74	j12010_8	110	j12015_8	154	j12020_8	217
j1205_9	56	j12010_9	145	j12015_9	172	j12020_9	300
j1205_10	61	j12010_10	185	j12015_10	200	j12020_10	283

**Table XX:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Gf resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	Gf	Project	Gf	Project	Gf	Project	Gf
j12021_1	63	j12026_1	128	j12031_1	172	j12036_1	
j12021_2	61	j12026_2	101	j12031_2	213	j12036_2	
j12021_3	58	j12026_3	123	j12031_3	199	j12036_3	
j12021_4	60	j12026_4	117	j12031_4	147	j12036_4	
j12021_5	54	j12026_5	140	j12031_5	183	j12036_5	
j12021_6	62	j12026_6	94	j12031_6	181	j12036_6	
j12021_7	71	j12026_7	126	j12031_7	164	j12036_7	
j12021_8	48	j12026_8	100	j12031_8	194	j12036_8	
j12021_9	61	j12026_9	107	j12031_9	185	j12036_9	
j12021_10	62	j12026_10	99	j12031_10	180	j12036_10	
j12022_1	65	j12027_1	165	j12032_1	180	j12037_1	
j12022_2	68	j12027_2	123	j12032_2	158	j12037_2	
j12022_3	76	j12027_3	114	j12032_3	200	j12037_3	
j12022_4	75	j12027_4	121	j12032_4	149	j12037_4	
j12022_5	65	j12027_5	112	j12032_5	177	j12037_5	
j12022_6	68	j12027_6	137	j12032_6	175	j12037_6	
j12022_7	49	j12027_7	106	j12032_7	178	j12037_7	
j12022_8	74	j12027_8	123	j12032_8	202	j12037_8	
j12022_9	69	j12027_9	123	j12032_9	203	j12037_9	
j12022_10	68	j12027_10	117	j12032_10	183	j12037_10	
j12023_1	58	j12028_1	129	j12033_1	152	j12038_1	
j12023_2	52	j12028_2	110	j12033_2	182	j12038_2	
j12023_3	55	j12028_3	103	j12033_3	193	j12038_3	
j12023_4	51	j12028_4	115	j12033_4	161	j12038_4	
j12023_5	57	j12028_5	103	j12033_5	168	j12038_5	
j12023_6	61	j12028_6	124	j12033_6	140	j12038_6	
j12023_7	56	j12028_7	132	j12033_7	213	j12038_7	
j12023_8	55	j12028_8	123	j12033_8	191	j12038_8	
j12023_9	56	j12028_9	123	j12033_9	179	j12038_9	
j12023_10	66	j12028_10	102	j12033_10	192	j12038_10	
j12024_1	62	j12029_1	115	j12034_1	239	j12039_1	
j12024_2	59	j12029_2	124	j12034_2	179	j12039_2	
j12024_3	68	j12029_3	165	j12034_3	190	j12039_3	
j12024_4	55	j12029_4	146	j12034_4	186	j12039_4	
j12024_5	57	j12029_5	126	j12034_5	170	j12039_5	
j12024_6	60	j12029_6	130	j12034_6	190	j12039_6	
j12024_7	57	j12029_7	120	j12034_7	157	j12039_7	
j12024_8	62	j12029_8	134	j12034_8		j12039_8	
j12024_9	66	j12029_9	110	j12034_9		j12039_9	
j12024_10	63	j12029_10	106	j12034_10		j12039_10	
j12025_1	67	j12030_1	124	j12035_1		j12040_1	
j12025_2	59	j12030_2	103	j12035_2		j12040_2	
j12025_3	59	j12030_3	109	j12035_3		j12040_3	
j12025_4	55	j12030_4	132	j12035_4		j12040_4	
j12025_5	55	j12030_5	128	j12035_5		j12040_5	
j12025_6	62	j12030_6	147	j12035_6		j12040_6	
j12025_7	62	j12030_7	138	j12035_7		j12040_7	
j12025_8	74	j12030_8	144	j12035_8		j12040_8	
j12025_9	59	j12030_9	124	j12035_9		j12040_9	
j12025_10	62	j12030_10	130	j12035_10		j12040_10	

**Table XXI:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Gf resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j9041\_1 έως j9060\_10)

Project	Gf	Project	Gf	Project	Gf	Project	Gf
j12041_1		j12046_1		j12051_1	163	j12056_1	213
j12041_2		j12046_2		j12051_2	166	j12056_2	218
j12041_3		j12046_3		j12051_3	170	j12056_3	217
j12041_4		j12046_4		j12051_4	164	j12056_4	222
j12041_5		j12046_5		j12051_5	170	j12056_5	
j12041_6		j12046_6		j12051_6	162	j12056_6	
j12041_7		j12046_7		j12051_7	161	j12056_7	
j12041_8		j12046_8		j12051_8	178	j12056_8	
j12041_9		j12046_9		j12051_9	156	j12056_9	
j12041_10		j12046_10		j12051_10	162	j12056_10	
j12042_1		j12047_1		j12052_1	140	j12057_1	213
j12042_2		j12047_2		j12052_2	157	j12057_2	211
j12042_3		j12047_3		j12052_3	147	j12057_3	218
j12042_4		j12047_4		j12052_4	161	j12057_4	207
j12042_5		j12047_5		j12052_5	151	j12057_5	249
j12042_6		j12047_6		j12052_6	168	j12057_6	212
j12042_7		j12047_7		j12052_7	170	j12057_7	189
j12042_8		j12047_8		j12052_8	138	j12057_8	255
j12042_9		j12047_9		j12052_9	174	j12057_9	203
j12042_10		j12047_10		j12052_10	160	j12057_10	179
j12043_1		j12048_1		j12053_1	148	j12058_1	178
j12043_2		j12048_2		j12053_2	165	j12058_2	219
j12043_3		j12048_3		j12053_3	146	j12058_3	253
j12043_4		j12048_4		j12053_4	154	j12058_4	218
j12043_5		j12048_5		j12053_5	159	j12058_5	231
j12043_6		j12048_6		j12053_6	163	j12058_6	236
j12043_7		j12048_7		j12053_7	148	j12058_7	217
j12043_8		j12048_8		j12053_8	168	j12058_8	229
j12043_9		j12048_9		j12053_9	140	j12058_9	242
j12043_10		j12048_10		j12053_10	155	j12058_10	193
j12044_1		j12049_1	109	j12054_1	150	j12059_1	244
j12044_2		j12049_2	114	j12054_2	126	j12059_2	217
j12044_3		j12049_3	125	j12054_3	161	j12059_3	194
j12044_4		j12049_4	128	j12054_4	144	j12059_4	182
j12044_5		j12049_5	118	j12054_5	203	j12059_5	228
j12044_6		j12049_6	96	j12054_6	182	j12059_6	211
j12044_7		j12049_7	120	j12054_7	152	j12059_7	233
j12044_8		j12049_8	103	j12054_8	183	j12059_8	220
j12044_9		j12049_9		j12054_9	155	j12059_9	184
j12044_10		j12049_10		j12054_10	162	j12059_10	186
j12045_1		j12050_1	112	j12055_1	178	j12060_1	186
j12045_2		j12050_2	117	j12055_2	175	j12060_2	248
j12045_3		j12050_3	99	j12055_3	132	j12060_3	234
j12045_4		j12050_4	121	j12055_4	195	j12060_4	206
j12045_5		j12050_5	108	j12055_5	171	j12060_5	208
j12045_6		j12050_6		j12055_6	165	j12060_6	207
j12045_7		j12050_7		j12055_7	164	j12060_7	260
j12045_8		j12050_8		j12055_8	172	j12060_8	224
j12045_9		j12050_9		j12055_9	163	j12060_9	236
j12045_10		j12050_10		j12055_10	161	j12060_10	254



**Table XXII:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the StD resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	StD	Project	StD	Project	StD	Project	StD
j1201_1	10,9157	j1206_1	32,2200	j12011_1		j12016_1	
j1201_2	17,0383	j1206_2	34,7166	j12011_2		j12016_2	
j1201_3	16,4539	j1206_3	29,7787	j12011_3		j12016_3	
j1201_4	13,5713	j1206_4	20,7871	j12011_4		j12016_4	
j1201_5	14,4043	j1206_5	36,5067	j12011_5		j12016_5	
j1201_6	18,7541	j1206_6	26,3551	j12011_6		j12016_6	
j1201_7	10,6163	j1206_7	26,1496	j12011_7		j12016_7	
j1201_8	15,6453	j1206_8	22,0088	j12011_8		j12016_8	
j1201_9	15,8142	j1206_9	45,3148	j12011_9		j12016_9	
j1201_10	13,4709	j1206_10	35,5540	j12011_10		j12016_10	
j1202_1	20,9890	j1207_1	38,6736	j12012_1		j12017_1	
j1202_2	19,4772	j1207_2	29,2222	j12012_2		j12017_2	
j1202_3	23,1296	j1207_3	28,9663	j12012_3		j12017_3	
j1202_4	13,1315	j1207_4	26,0618	j12012_4		j12017_4	
j1202_5	13,8908	j1207_5	29,9385	j12012_5		j12017_5	
j1202_6	18,7675	j1207_6	28,8429	j12012_6		j12017_6	
j1202_7	14,1830	j1207_7	33,0753	j12012_7		j12017_7	
j1202_8	15,6578	j1207_8	32,0088	j12012_8		j12017_8	
j1202_9	15,1857	j1207_9	33,7744	j12012_9		j12017_9	
j1202_10	25,6015	j1207_10	28,3013	j12012_10		j12017_10	
j1203_1	17,1886	j1208_1		j12013_1		j12018_1	
j1203_2	11,7105	j1208_2		j12013_2		j12018_2	
j1203_3	14,1837	j1208_3		j12013_3		j12018_3	
j1203_4	19,3151	j1208_4		j12013_4		j12018_4	
j1203_5	18,7301	j1208_5		j12013_5		j12018_5	
j1203_6	13,4951	j1208_6		j12013_6		j12018_6	
j1203_7	11,0068	j1208_7		j12013_7		j12018_7	
j1203_8	15,8900	j1208_8		j12013_8		j12018_8	
j1203_9	12,9978	j1208_9		j12013_9		j12018_9	
j1203_10	11,2190	j1208_10		j12013_10		j12018_10	
j1204_1	16,9007	j1209_1		j12014_1		j12019_1	
j1204_2	11,4446	j1209_2		j12014_2		j12019_2	
j1204_3	14,5039	j1209_3		j12014_3		j12019_3	
j1204_4	17,8264	j1209_4		j12014_4		j12019_4	
j1204_5	18,7388	j1209_5		j12014_5		j12019_5	
j1204_6	14,4094	j1209_6		j12014_6		j12019_6	
j1204_7		j1209_7		j12014_7		j12019_7	
j1204_8	15,8105	j1209_8		j12014_8		j12019_8	
j1204_9	14,7632	j1209_9		j12014_9		j12019_9	
j1204_10		j1209_10		j12014_10		j12019_10	
j1205_1	12,7670	j12010_1		j12015_1		j12020_1	
j1205_2	16,4939	j12010_2		j12015_2		j12020_2	
j1205_3	16,4001	j12010_3		j12015_3		j12020_3	
j1205_4	12,7165	j12010_4		j12015_4		j12020_4	
j1205_5	16,9377	j12010_5		j12015_5		j12020_5	
j1205_6	20,9281	j12010_6		j12015_6		j12020_6	
j1205_7		j12010_7		j12015_7		j12020_7	
j1205_8		j12010_8		j12015_8		j12020_8	
j1205_9		j12010_9		j12015_9		j12020_9	
j1205_10		j12010_10		j12015_10		j12020_10	

**Table XXIII:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the StD resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	StD	Project	StD	Project	StD	Project	StD
j12021_1		j12026_1		j12031_1		j12036_1	
j12021_2		j12026_2		j12031_2		j12036_2	
j12021_3		j12026_3		j12031_3		j12036_3	
j12021_4		j12026_4		j12031_4		j12036_4	
j12021_5		j12026_5		j12031_5		j12036_5	
j12021_6		j12026_6		j12031_6		j12036_6	
j12021_7		j12026_7		j12031_7		j12036_7	
j12021_8		j12026_8		j12031_8		j12036_8	
j12021_9		j12026_9		j12031_9		j12036_9	
j12021_10		j12026_10		j12031_10		j12036_10	
j12022_1		j12027_1		j12032_1		j12037_1	
j12022_2		j12027_2		j12032_2		j12037_2	
j12022_3		j12027_3		j12032_3		j12037_3	
j12022_4		j12027_4		j12032_4		j12037_4	
j12022_5		j12027_5		j12032_5		j12037_5	
j12022_6		j12027_6		j12032_6		j12037_6	
j12022_7		j12027_7		j12032_7		j12037_7	
j12022_8		j12027_8		j12032_8		j12037_8	
j12022_9		j12027_9		j12032_9		j12037_9	
j12022_10		j12027_10		j12032_10		j12037_10	
j12023_1		j12028_1		j12033_1		j12038_1	
j12023_2		j12028_2		j12033_2		j12038_2	
j12023_3		j12028_3		j12033_3		j12038_3	
j12023_4		j12028_4		j12033_4		j12038_4	
j12023_5		j12028_5		j12033_5		j12038_5	
j12023_6		j12028_6		j12033_6		j12038_6	
j12023_7		j12028_7		j12033_7		j12038_7	
j12023_8		j12028_8		j12033_8		j12038_8	
j12023_9		j12028_9		j12033_9		j12038_9	
j12023_10		j12028_10		j12033_10		j12038_10	
j12024_1		j12029_1		j12034_1		j12039_1	
j12024_2		j12029_2		j12034_2		j12039_2	
j12024_3		j12029_3		j12034_3		j12039_3	
j12024_4		j12029_4		j12034_4		j12039_4	
j12024_5		j12029_5		j12034_5		j12039_5	
j12024_6		j12029_6		j12034_6		j12039_6	
j12024_7		j12029_7		j12034_7		j12039_7	
j12024_8		j12029_8		j12034_8		j12039_8	
j12024_9		j12029_9		j12034_9		j12039_9	
j12024_10		j12029_10		j12034_10		j12039_10	
j12025_1		j12030_1		j12035_1		j12040_1	
j12025_2		j12030_2		j12035_2		j12040_2	
j12025_3		j12030_3		j12035_3		j12040_3	
j12025_4		j12030_4		j12035_4		j12040_4	
j12025_5		j12030_5		j12035_5		j12040_5	
j12025_6		j12030_6		j12035_6		j12040_6	
j12025_7		j12030_7		j12035_7		j12040_7	
j12025_8		j12030_8		j12035_8		j12040_8	
j12025_9		j12030_9		j12035_9		j12040_9	
j12025_10		j12030_10		j12035_10		j12040_10	

**Table XXIV:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the StD resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j9041\_1 έως j9060\_10)

Project	StD	Project	StD	Project	StD	Project	StD
j12041_1		j12046_1		j12051_1	35,5621	j12056_1	49,8439
j12041_2		j12046_2		j12051_2	27,7249	j12056_2	46,8700
j12041_3		j12046_3		j12051_3	34,6698	j12056_3	42,9557
j12041_4		j12046_4		j12051_4	30,3425	j12056_4	43,9127
j12041_5		j12046_5		j12051_5	38,2399	j12056_5	42,0157
j12041_6		j12046_6		j12051_6	34,0730	j12056_6	51,7182
j12041_7		j12046_7		j12051_7	30,7839	j12056_7	39,0037
j12041_8		j12046_8		j12051_8	37,1145	j12056_8	42,7514
j12041_9		j12046_9		j12051_9	30,8417	j12056_9	50,7146
j12041_10		j12046_10		j12051_10	31,5915	j12056_10	46,0737
j12042_1		j12047_1		j12052_1	23,2877	j12057_1	41,2285
j12042_2		j12047_2		j12052_2	32,8128	j12057_2	43,7607
j12042_3		j12047_3		j12052_3	28,0414	j12057_3	49,0127
j12042_4		j12047_4		j12052_4	35,6270	j12057_4	44,1156
j12042_5		j12047_5		j12052_5	31,1784	j12057_5	66,5319
j12042_6		j12047_6		j12052_6	39,9687	j12057_6	37,3751
j12042_7		j12047_7		j12052_7		j12057_7	37,4120
j12042_8		j12047_8		j12052_8		j12057_8	61,9248
j12042_9		j12047_9		j12052_9		j12057_9	43,9473
j12042_10		j12047_10		j12052_10		j12057_10	34,8718
j12043_1		j12048_1		j12053_1	33,3438	j12058_1	34,1798
j12043_2		j12048_2		j12053_2	35,1585	j12058_2	41,2445
j12043_3		j12048_3		j12053_3	31,2244	j12058_3	60,6130
j12043_4		j12048_4		j12053_4	35,9035	j12058_4	38,2870
j12043_5		j12048_5		j12053_5	32,6644	j12058_5	50,3197
j12043_6		j12048_6		j12053_6	32,0801	j12058_6	58,8177
j12043_7		j12048_7		j12053_7	26,6249	j12058_7	
j12043_8		j12048_8		j12053_8	38,5438	j12058_8	
j12043_9		j12048_9		j12053_9	32,5316	j12058_9	
j12043_10		j12048_10		j12053_10	30,3976	j12058_10	
j12044_1		j12049_1	21,4828	j12054_1	27,4313	j12059_1	65,6572
j12044_2		j12049_2	25,4881	j12054_2	26,8216	j12059_2	39,2469
j12044_3		j12049_3	29,7703	j12054_3	30,4246	j12059_3	42,3747
j12044_4		j12049_4	28,9828	j12054_4	29,7935	j12059_4	36,2031
j12044_5		j12049_5	29,1007	j12054_5	40,9574	j12059_5	49,4685
j12044_6		j12049_6	17,7981	j12054_6	44,8293	j12059_6	44,8789
j12044_7		j12049_7	25,7702	j12054_7	30,4678	j12059_7	40,6391
j12044_8		j12049_8	19,9087	j12054_8		j12059_8	
j12044_9		j12049_9	26,2638	j12054_9		j12059_9	
j12044_10		j12049_10	20,0596	j12054_10		j12059_10	
j12045_1		j12050_1	22,5968	j12055_1	35,0457	j12060_1	
j12045_2		j12050_2	20,6413	j12055_2	36,7728	j12060_2	
j12045_3		j12050_3	19,5042	j12055_3	24,3576	j12060_3	
j12045_4		j12050_4	24,2169	j12055_4	44,0097	j12060_4	
j12045_5		j12050_5	23,1664	j12055_5	38,7103	j12060_5	
j12045_6		j12050_6	24,8363	j12055_6	38,5465	j12060_6	
j12045_7		j12050_7	20,5560	j12055_7	37,0153	j12060_7	
j12045_8		j12050_8	19,0830	j12055_8	43,1047	j12060_8	
j12045_9		j12050_9		j12055_9	33,0489	j12060_9	
j12045_10		j12050_10		j12055_10	33,3107	j12060_10	

**Table XXV:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Step resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j901\_1 έως j9020\_10)

Project	Step	Project	Step	Project	Step	Project	Step
j1201_1		j1206_1		j12011_1		j12016_1	
j1201_2		j1206_2		j12011_2		j12016_2	
j1201_3		j1206_3		j12011_3		j12016_3	
j1201_4		j1206_4		j12011_4		j12016_4	
j1201_5		j1206_5		j12011_5		j12016_5	
j1201_6		j1206_6		j12011_6		j12016_6	
j1201_7		j1206_7		j12011_7		j12016_7	
j1201_8		j1206_8		j12011_8		j12016_8	
j1201_9		j1206_9		j12011_9		j12016_9	
j1201_10		j1206_10		j12011_10		j12016_10	
j1202_1		j1207_1		j12012_1		j12017_1	
j1202_2		j1207_2		j12012_2		j12017_2	
j1202_3		j1207_3		j12012_3		j12017_3	
j1202_4		j1207_4		j12012_4		j12017_4	
j1202_5		j1207_5		j12012_5		j12017_5	
j1202_6		j1207_6		j12012_6		j12017_6	
j1202_7		j1207_7		j12012_7		j12017_7	
j1202_8		j1207_8		j12012_8		j12017_8	
j1202_9		j1207_9		j12012_9		j12017_9	
j1202_10		j1207_10		j12012_10		j12017_10	
j1203_1		j1208_1		j12013_1		j12018_1	
j1203_2		j1208_2		j12013_2		j12018_2	
j1203_3		j1208_3		j12013_3		j12018_3	
j1203_4		j1208_4		j12013_4		j12018_4	
j1203_5		j1208_5		j12013_5		j12018_5	
j1203_6		j1208_6		j12013_6		j12018_6	
j1203_7		j1208_7		j12013_7		j12018_7	
j1203_8		j1208_8		j12013_8		j12018_8	
j1203_9		j1208_9		j12013_9		j12018_9	
j1203_10		j1208_10		j12013_10		j12018_10	
j1204_1		j1209_1		j12014_1		j12019_1	
j1204_2		j1209_2		j12014_2		j12019_2	
j1204_3		j1209_3		j12014_3		j12019_3	
j1204_4		j1209_4		j12014_4		j12019_4	
j1204_5		j1209_5		j12014_5		j12019_5	
j1204_6		j1209_6		j12014_6		j12019_6	
j1204_7		j1209_7		j12014_7		j12019_7	
j1204_8		j1209_8		j12014_8		j12019_8	
j1204_9		j1209_9		j12014_9		j12019_9	
j1204_10		j1209_10		j12014_10		j12019_10	
j1205_1		j12010_1		j12015_1		j12020_1	
j1205_2		j12010_2		j12015_2		j12020_2	
j1205_3		j12010_3		j12015_3		j12020_3	
j1205_4		j12010_4		j12015_4		j12020_4	
j1205_5		j12010_5		j12015_5		j12020_5	
j1205_6		j12010_6		j12015_6		j12020_6	
j1205_7		j12010_7		j12015_7		j12020_7	
j1205_8		j12010_8		j12015_8		j12020_8	
j1205_9		j12010_9		j12015_9		j12020_9	
j1205_10		j12010_10		j12015_10		j12020_10	

**Table XXVI:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Step resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j9021\_1 έως j9040\_10)

Project	Step	Project	Step	Project	Step	Project	Step
j12021_1		j12026_1		j12031_1		j12036_1	
j12021_2		j12026_2		j12031_2		j12036_2	
j12021_3		j12026_3		j12031_3		j12036_3	
j12021_4		j12026_4		j12031_4		j12036_4	
j12021_5		j12026_5		j12031_5		j12036_5	
j12021_6		j12026_6		j12031_6		j12036_6	
j12021_7		j12026_7		j12031_7		j12036_7	
j12021_8		j12026_8		j12031_8		j12036_8	
j12021_9		j12026_9		j12031_9		j12036_9	
j12021_10		j12026_10		j12031_10		j12036_10	
j12022_1		j12027_1		j12032_1		j12037_1	
j12022_2		j12027_2		j12032_2		j12037_2	
j12022_3		j12027_3		j12032_3		j12037_3	
j12022_4		j12027_4		j12032_4		j12037_4	
j12022_5		j12027_5		j12032_5		j12037_5	
j12022_6		j12027_6		j12032_6		j12037_6	
j12022_7		j12027_7		j12032_7		j12037_7	
j12022_8		j12027_8		j12032_8		j12037_8	
j12022_9		j12027_9		j12032_9		j12037_9	
j12022_10		j12027_10		j12032_10		j12037_10	
j12023_1		j12028_1		j12033_1		j12038_1	
j12023_2		j12028_2		j12033_2		j12038_2	
j12023_3		j12028_3		j12033_3		j12038_3	
j12023_4		j12028_4		j12033_4		j12038_4	
j12023_5		j12028_5		j12033_5		j12038_5	
j12023_6		j12028_6		j12033_6		j12038_6	
j12023_7		j12028_7		j12033_7		j12038_7	
j12023_8		j12028_8		j12033_8		j12038_8	
j12023_9		j12028_9		j12033_9		j12038_9	
j12023_10		j12028_10		j12033_10		j12038_10	
j12024_1		j12029_1		j12034_1		j12039_1	
j12024_2		j12029_2		j12034_2		j12039_2	
j12024_3		j12029_3		j12034_3		j12039_3	
j12024_4		j12029_4		j12034_4		j12039_4	
j12024_5		j12029_5		j12034_5		j12039_5	
j12024_6		j12029_6		j12034_6		j12039_6	
j12024_7		j12029_7		j12034_7		j12039_7	
j12024_8		j12029_8		j12034_8		j12039_8	
j12024_9		j12029_9		j12034_9		j12039_9	
j12024_10		j12029_10		j12034_10		j12039_10	
j12025_1		j12030_1		j12035_1		j12040_1	
j12025_2		j12030_2		j12035_2		j12040_2	
j12025_3		j12030_3		j12035_3		j12040_3	
j12025_4		j12030_4		j12035_4		j12040_4	
j12025_5		j12030_5		j12035_5		j12040_5	
j12025_6		j12030_6		j12035_6		j12040_6	
j12025_7		j12030_7		j12035_7		j12040_7	
j12025_8		j12030_8		j12035_8		j12040_8	
j12025_9		j12030_9		j12035_9		j12040_9	
j12025_10		j12030_10		j12035_10		j12040_10	

**Table XXIII:** Best scores obtained after repeated experiments with the standard genetic algorithm approach (GA) using the Step resource profile evaluation function in the 120-activities projects of the PSP-Lib collection (j9041\_1 έως j9060\_10)

Project	Step	Project	Step	Project	Step	Project	Step
j12041_1		j12046_1		j12051_1	945	j12056_1	1251
j12041_2		j12046_2		j12051_2	1015	j12056_2	1163
j12041_3		j12046_3		j12051_3	860	j12056_3	1266
j12041_4		j12046_4		j12051_4	965	j12056_4	1313
j12041_5		j12046_5		j12051_5	1013	j12056_5	1405
j12041_6		j12046_6		j12051_6	1052	j12056_6	1281
j12041_7		j12046_7		j12051_7	973	j12056_7	1444
j12041_8		j12046_8		j12051_8	976	j12056_8	1209
j12041_9		j12046_9		j12051_9	1146	j12056_9	
j12041_10		j12046_10		j12051_10	1090	j12056_10	
j12042_1		j12047_1		j12052_1	1098	j12057_1	1323
j12042_2		j12047_2		j12052_2	1073	j12057_2	1350
j12042_3		j12047_3		j12052_3	1174	j12057_3	1291
j12042_4		j12047_4		j12052_4	1154	j12057_4	1317
j12042_5		j12047_5		j12052_5	1035	j12057_5	1154
j12042_6		j12047_6		j12052_6	1007	j12057_6	1192
j12042_7		j12047_7		j12052_7	957	j12057_7	1500
j12042_8		j12047_8		j12052_8	1122	j12057_8	1171
j12042_9		j12047_9		j12052_9	982	j12057_9	1293
j12042_10		j12047_10		j12052_10	1036	j12057_10	1543
j12043_1		j12048_1		j12053_1	1257	j12058_1	1446
j12043_2		j12048_2		j12053_2	1095	j12058_2	1400
j12043_3		j12048_3		j12053_3	955	j12058_3	1204
j12043_4		j12048_4		j12053_4	1052	j12058_4	1254
j12043_5		j12048_5		j12053_5	937	j12058_5	1271
j12043_6		j12048_6		j12053_6	913	j12058_6	1282
j12043_7		j12048_7		j12053_7	1209	j12058_7	1389
j12043_8		j12048_8		j12053_8	1042	j12058_8	1348
j12043_9		j12048_9		j12053_9	1148	j12058_9	1361
j12043_10		j12048_10		j12053_10	1153	j12058_10	1196
j12044_1		j12049_1	735	j12054_1	1003	j12059_1	1277
j12044_2		j12049_2	709	j12054_2	1109	j12059_2	1153
j12044_3		j12049_3	714	j12054_3	1216	j12059_3	1454
j12044_4		j12049_4	689	j12054_4	1160	j12059_4	1421
j12044_5		j12049_5	688	j12054_5	1073	j12059_5	1293
j12044_6		j12049_6	792	j12054_6	1012	j12059_6	1320
j12044_7		j12049_7	714	j12054_7	912	j12059_7	1184
j12044_8		j12049_8	823	j12054_8	878	j12059_8	1254
j12044_9		j12049_9	703	j12054_9	945	j12059_9	1398
j12044_10		j12049_10	581	j12054_10	916	j12059_10	1212
j12045_1		j12050_1	794	j12055_1	1152	j12060_1	1342
j12045_2		j12050_2	771	j12055_2	962	j12060_2	1048
j12045_3		j12050_3	784	j12055_3	1130	j12060_3	1258
j12045_4		j12050_4	688	j12055_4	1073	j12060_4	1135
j12045_5		j12050_5	761	j12055_5	1103	j12060_5	1241
j12045_6		j12050_6	724	j12055_6	1017	j12060_6	1478
j12045_7		j12050_7	793	j12055_7	1036	j12060_7	1086
j12045_8		j12050_8		j12055_8	1109	j12060_8	1368
j12045_9		j12050_9		j12055_9	1025	j12060_9	1501
j12045_10		j12050_10		j12055_10	1101	j12060_10	1110