|         |           |       |                        |       |       |                |              |       |                     |       |       |                        | (     | Opti  | mal                         |       |       |                        |                |                   |   |         |                        |   |          |                            |  |                |
|---------|-----------|-------|------------------------|-------|-------|----------------|--------------|-------|---------------------|-------|-------|------------------------|-------|-------|-----------------------------|-------|-------|------------------------|----------------|-------------------|---|---------|------------------------|---|----------|----------------------------|--|----------------|
|         |           |       | $\Gamma^{\mathrm{LP}}$ |       |       | $\Gamma^{\mu}$ |              |       | $\Gamma^{\epsilon}$ |       |       | $h^{\rm SEQ}_{\Omega}$ |       |       | $h_{\Omega}^{\mathrm{LMC}}$ |       |       | $h^{\rm PhO}_{\Omega}$ |                | $h_{\Omega}^{SI}$ | $_{2}^{\mathrm{EQ}},h_{5}^{\mathrm{L}}$ | MC<br>2 | $h_{\varsigma}^{ m L}$ | $_{2}^{\mathrm{MC}},h_{2}^{\mathrm{l}}$ | PhO<br>Ω | $h_{\Omega}^{\mathrm{SI}}$ | $^{\mathrm{EQ}},h_{\mathfrak{L}}^{\mathrm{F}}$ | hO<br>Of       |
| #       | %         | •     | h                      | Total |       | h              | Total        |       | h                   | Total |       |                        | Total |       | h                           | Total |       |                        | Total          | •                 |   | Total   |                        | h                                       | Total    | •                          | h  | Total          |
| KS      | 30        | 0.024 | 0.192                  | 4.171 | 0.024 | 0.191          | 4.167        | 0.024 | 0.191               | 4.165 | 0.025 | 0.077                  | 4.054 | 0.024 | 0.046                       | 4.031 | 0.024 | 0.155                  | 4.133<br>4.128 | 0.024             | 0.087                                   | 4.062   | 0.024                  | 0.149                                   | 4.128    | 0.025                      | 0.2  | 4.179          |
|         |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 4.127<br>4.129 |                   |   |         |                        |   |          |                            |  |                |
|         | 100       | 0.026 | 0.189                  | 4.166 | 0.024 | 0.19           | 4.167        | 0.023 | 0.198               | 4.177 | 0.025 | 0.077                  | 4.045 | 0.027 | 0.047                       | 4.027 | 0.026 | 0.151                  | 4.121<br>1.711 | 0.027             | 0.087                                   | 4.07    | 0.026                  | 0.147                                   | 4.13     | 0.027                      | 0.195  | 4.171          |
| STS     | 30        | 0.01  | 0.076                  | 1.726 | 0.01  | 0.076          | 1.726        | 0.011 | 0.076               | 1.727 | 0.011 | 0.034                  | 1.682 | 0.011 | 0.018                       | 1.671 | 0.01  | 0.057                  | 1.709          | 0.009             | 0.037                                   | 1.688   | 0.009                  | 0.061                                   | 1.714    | 0.01                       | 0.076  | 1.73           |
| )EP     | 70        | 0.011 | 0.074                  | 1.726 | 0.012 | 0.074          | 1.725        | 0.01  | 0.079               | 1.729 | 0.009 | 0.035                  | 1.683 | 0.008 | 0.017                       | 1.671 | 0.009 | 0.056                  | 1.708<br>1.706 | 0.008             | 0.036                                   | 1.688   | 0.008                  | 0.06                                    | 1.713    | 0.01                       | 0.073  | 1.726          |
|         |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.708          |                   |   |         |                        |   |          |                            |  | 1.724          |
| 0       | 30        | 0.007 | 0.039                  | 1.307 | 0.009 | 0.039          | 1.305        | 0.006 | 0.039               | 1.307 | 0.009 | 0.024                  | 1.295 | 0.006 | 0.015                       | 1.286 | 0.009 | 0.025                  | 1.294          | 0.007             | 0.026                                   | 1.299   | 0.009                  | 0.029                                   | 1.299    | 0.008                      | 0.036  | 1.306          |
| Ξ       | 70        | 0.009 | 0.038                  | 1.305 | 0.009 | 0.038          | 1.307        | 0.008 | 0.039               | 1.304 | 0.008 | 0.023                  | 1.293 | 0.008 | 0.015                       | 1.288 | 0.009 | 0.025                  | 1.295<br>1.293 | 0.008             | 0.026                                   | 1.298   | 0.007                  | 0.028                                   | 1.297    | 0.008 $0.008$              | 0.035  | 1.301          |
| Die     |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.296          |                   |   |         |                        |   |          |                            |  |                |
| Ϋ́R     | 30<br>50  |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.496<br>1.495 |                   |   |         |                        |   |          |                            |  |                |
| ā       | 70        | 0.007 | 0.067                  | 1.513 | 0.009 | 0.066          | 1.514        | 0.008 | 0.071               | 1.519 | 0.006 | 0.03                   | 1.549 | 0.008 | 0.017                       | 1.468 | 0.009 | 0.048                  | 1.499          | 0.007             | 0.033                                   | 1.482   | 0.01                   | 0.05                                    | 1.5      | 0.007                      | 0.063  | 1.515          |
|         | 10        | 0.011 | 0.125                  | 1.692 | 0.009 | 0.125          | 1.689        | 0.011 | 0.125               | 1.689 | 0.01  | 0.025                  | 1.591 | 0.01  | 0.018                       | 1.596 | 0.011 | 0.108                  | 1.673          | 0.011             | 0.029                                   | 1.597   | 0.011                  | 0.112                                   | 1.68     | 0.01                       | 0.123  | 1.691          |
|         |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.675<br>1.676 |                   |   |         |                        |   |          | 0.011                      |  | 1.694<br>1.692 |
| ا ت     | 70<br>100 |       | 0.125                  |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.675<br>1.676 |                   |   |         |                        |   |          | 0.012                      |  |                |
| $\neg$  | 10        | 0.01  | 0.029                  | 1.153 | 0.007 | 0.029          | 1.152        | 0.007 | 0.029               | 1.151 | 0.006 | 0.017                  | 1.149 | 0.009 | 0.013                       | 1.145 | 0.006 | 0.025                  | 1.152          | 0.009             | 0.019                                   | 1.147   | 0.007                  | 0.024                                   | 1.154    | 0.008                      | 0.031  | 1.159          |
| K.      | 50        | 0.007 | 0.029                  | 1.154 | 0.007 | 0.029          | 1.155        | 0.007 | 0.03                | 1.154 | 0.009 | 0.018                  | 1.147 | 0.008 | 0.014                       | 1.144 | 0.008 | 0.024                  | 1.152<br>1.151 | 0.008             | 0.019                                   | 1.149   | 0.008                  | 0.024                                   | 1.155    | 0.009                      | 0.031  | 1.16           |
|         |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.155<br>1.157 |                   |   |         |                        |   |          |                            |  |                |
| CS      |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.918<br>1.914 |                   |   |         |                        |   |          |                            |  |                |
| IST     | 50        | 0.013 | 0.054                  | 1.931 | 0.013 | 0.054          | 1.93         | 0.011 | 0.054               | 1.931 | 0.013 | 0.035                  | 1.915 | 0.012 | 0.024                       | 1.912 | 0.011 | 0.034                  | 1.915          | 0.01              | 0.04                                    | 1.921   | 0.012                  | 0.036                                   | 1.919    | 0.012                      | 0.052  | 1.932          |
|         | 100       | 0.011 | 0.053                  | 1.929 | 0.012 | 0.052          | 1.93         | 0.011 | 0.056               | 1.933 | 0.013 | 0.035                  | 1.921 | 0.008 | 0.024                       | 1.912 | 0.012 | 0.033                  | 1.919<br>1.917 | 0.014             | 0.039                                   | 1.918   | 0.012                  | 0.036                                   | 1.917    | 0.015                      | 0.051  | 1.93           |
| 1IC     |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.203<br>1.203 |                   |   |         |                        |   |          |                            |  |                |
| MICONIC | 50        | 0.009 | 0.036                  | 1.21  | 0.008 | 0.037          | 1.213        | 0.007 | 0.038               | 1.214 | 0.008 | 0.021                  | 1.199 | 0.009 | 0.015                       | 1.196 | 0.008 | 0.025                  | 1.205<br>1.203 | 0.009             | 0.026                                   | 1.204   | 0.008                  | 0.027                                   | 1.204    | 0.008                      | 0.037  | 1.216          |
| Σ       | 100       | 0.008 | 0.037                  | 1.213 | 0.006 | 0.036          | 1.211        | 0.011 | 0.039               | 1.213 | 0.009 | 0.021                  | 1.199 | 0.01  | 0.015                       | 1.197 | 0.006 | 0.026                  | 1.206          | 0.01              | 0.025                                   | 1.204   | 0.01                   | 0.026                                   | 1.208    | 0.002                      | 0.037  | 1.216          |
|         | 30        | 0.008 | 0.025                  | 1.291 | 0.007 | 0.026          | 1.292        | 0.007 | 0.025               | 1.29  | 0.01  | 0.014                  | 1.282 | 0.009 | 0.013                       | 1.283 | 0.006 | 0.02                   | 1.287<br>1.287 | 0.008             | 0.017                                   | 1.283   | 0.008                  | 0.021                                   | 1.287    | 0.008                      | 0.024  | 1.289          |
|         |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.286<br>1.287 |                   |   |         |                        |   |          |                            | 0.024  |                |
| 22      | 100       | 0.008 | 0.025                  | 1.291 | 0.004 | 0.025          | 1.293        | 0.007 | 0.028               | 1.296 | 0.008 | 0.014                  | 1.283 | 0.01  | 0.012                       | 1.283 | 0.01  | 0.02                   | 1.285          | 0.01              | 0.017                                   | 1.288   | 0.008                  | 0.022                                   | 1.29     | 0.009                      |  |                |
| LITE    | 30        | 0.005 | 0.029                  | 1.108 | 0.007 | 0.029          | 1.109        | 0.005 | 0.029               | 1.107 | 0.007 | 0.016                  | 1.1   | 0.007 | 0.012                       | 1.098 | 0.007 | 0.022                  | 1.107          | 0.006             | 0.02                                    | 1.101   | 0.007                  | 0.022                                   | 1.106    | 0.006                      | 0.028  | 1.109          |
| TEL     |           |       | 0.029                  | 1.11  | 0.006 | 0.029          | 1.11<br>1.11 | 0.009 | 0.031               | 1.113 | 0.008 | 0.017                  | 1.101 | 0.007 | 0.012                       | 1.095 | 0.008 | 0.021                  | 1.105<br>1.105 | 0.009             | 0.02                                    | 1.105   | 0.007                  | 0.022                                   | 1.105    | 0.006                      | 0.028  | 1.11           |
| -       |           |       | 0.028                  |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.102<br>2.721 |                   |   |         |                        |   |          |                            |  |                |
| BAN     | 30        | 0.013 | 0.584                  | 3.031 | 0.012 | 0.583          | 3.029        | 0.013 | 0.666               | 3.11  | 0.015 | 0.084                  | 2.533 | 0.012 | 0.029                       | 2.472 | 0.012 | 0.271                  | 2.72<br>2.717  | 0.014             | 0.135                                   | 2.58    | 0.012                  | 0.293                                   | 2.739    | 0.014                      | 0.556  | 3.006          |
| ΣĶ      | 70        | 0.012 | 0.512                  | 2.964 | 0.013 | 0.512          | 2.955        | 0.013 | 0.66                | 3.111 | 0.011 | 0.082                  | 2.527 | 0.013 | 0.029                       | 2.473 | 0.013 | 0.259                  | 2.709          | 0.012             | 0.126                                   | 2.57    | 0.012                  | 0.278                                   | 2.728    | 0.015                      | 0.48   | 2.933          |
| S       |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 2.706<br>1.378 |                   |   |         |                        |   |          |                            |  |                |
| ZENO    | 30        | 0.007 | 0.047                  | 1.4   | 0.007 | 0.046          | 1.399        | 0.005 | 0.047               | 1.401 | 0.007 | 0.027                  | 1.38  | 0.005 | 0.015                       | 1.368 | 0.007 | 0.027                  | 1.382<br>1.379 | 0.007             | 0.03                                    | 1.383   | 0.006                  | 0.031                                   | 1.384    | 0.008                      | 0.043  | 1.396          |
|         | 70        | 0.009 | 0.046                  | 1.401 | 0.008 | 0.046          | 1.399        | 0.006 | 0.047               | 1.399 | 0.008 | 0.027                  | 1.38  | 0.008 | 0.015                       | 1.368 | 0.009 | 0.027                  | 1.38           | 0.007             | 0.03                                    | 1.382   | 0.008                  | 0.031                                   | 1.385    | 0.007                      | 0.042  | 1.396          |
|         |           |       |                        |       |       |                |              |       |                     |       |       |                        |       |       |                             |       |       |                        | 1.381          |                   |   | -       |                        |   |          |                            |  |                |
| A       | ď         | 0.01  | 0.106                  | 1./92 | 0.01  | 0.106          | 1./92        | 0.01  | 0.116               | 1.802 | 0.01  | 0.034                  | 1.724 | 0.01  | 0.02                        | 1./1  | 0.01  | 0.067                  | 1.755          | 0.01              | 0.041                                   | 1./29   | 0.01                   | 0.07                                    | 1./39    | 0.01                       | 0.103  | 1./91          |

Table 1: Times spent on Python layer (Py), Fast-Downward preprocess (FD) and actual LP-solving (LP), on optimal dataset.

|                                      | Sub-Optimal                             |   |   |  |   |  |   |   |   |   |   |   |   |   |   |   |   |   |  |   |   |   |  |   |   |   |   |
|--------------------------------------|---|---|---|--|---|--|---|---|---|---|---|---|---|---|---|---|---|---|--|---|---|---|--|---|---|---|---|
|                                      | $\Gamma^{	ext{LP}}$                     |   |   | $\Gamma^{\mu}$                           |   |  | $\Gamma^{\epsilon}$   |   |   |   | $h_{\Omega}^{ m SEQ}$   |   | $h_{\Omega}^{\mathrm{LMC}}$               |   | h   |   | $h^{\rm PhO}_{\Omega}$                    |   | $h_{\Omega}^{\mathrm{SEQ}}, h_{\Omega}^{\mathrm{LMC}}$ |   | MC<br>2                                   | $h_{\Omega}^{\mathrm{LMC}}, h$                                  |  | PhO<br>Ω                                  | $h_{\Omega}^{\mathrm{SEQ}}, h_{\Omega}^{\mathrm{I}}$            |   | PhO<br>Ω                                  |
| #   %                                | Py                                      | h   | Total                                     | Py                                       | h   | Total  | Py  | h                                       | Total                                     | Py  | h   | Total                                     | Py  | h   | Total                                     | Py  | h   | Total                                     | Py   | h   | Total                                     | Py  | h  | Total                                     | Py  | h   | Total                                     |
| 30<br>50<br>70<br>100                | 0.024<br>0.024<br>0.025<br>0.024        | 0.191<br>0.19<br>0.19<br>0.19             | 4.163<br>4.164<br>4.165<br>4.176          | 0.024<br>0.027<br>0.025<br>0.029         | 0.191<br>0.19<br>0.19<br>0.19             | 4.164<br>4.167<br>4.166<br>4.165<br>4.167          | $\begin{array}{c} 0.024 \\ 0.025 \\ 0.025 \\ 0.025 \end{array}$ | 0.193<br>0.194<br>0.196<br>0.197        | 4.164<br>4.169<br>4.167<br>4.172          | $\begin{array}{c} 0.026 \\ 0.024 \\ 0.024 \\ 0.024 \end{array}$ | $\begin{array}{c} 0.076 \\ 0.076 \\ 0.077 \\ 0.078 \end{array}$ | 4.051<br>4.05<br>4.054<br>4.059           | 0.026<br>0.026<br>0.025<br>0.028          | 0.046<br>0.047<br>0.047<br>0.047          | 4.027<br>4.034<br>4.033<br>4.033          | $0.026 \\ 0.024 \\ 0.026 \\ 0.024$        | 0.155<br>0.153<br>0.151<br>0.15           | 4.128<br>4.129<br>4.126<br>4.124          | 0.023<br>0.025<br>0.026<br>0.026                       | $\begin{array}{c} 0.086 \\ 0.086 \\ 0.087 \\ 0.086 \end{array}$ | 4.06<br>4.063<br>4.067<br>4.064           | $\begin{array}{c} 0.025 \\ 0.026 \\ 0.024 \\ 0.024 \end{array}$ | 0.149 $0.147$ $0.149$ $0.148$            | 4.128<br>4.126<br>4.125<br>4.123          | $\begin{array}{c} 0.024 \\ 0.024 \\ 0.026 \\ 0.024 \end{array}$ | 0.199<br>0.197<br>0.196<br>0.194          | 4.178<br>4.178<br>4.175<br>4.176          |
| 30<br>50<br>70<br>100                | 0.009<br>0.01<br>0.009<br>0.007         | 0.075<br>0.075<br>0.074<br>0.074<br>0.039 | 1.724<br>1.724<br>1.723<br>1.724<br>1.305 | 0.008<br>0.01<br>0.01<br>0.011<br>0.007  | 0.076<br>0.075<br>0.074<br>0.076<br>0.039 | 1.724<br>1.726<br>1.723<br>1.727<br>1.307          | 0.011<br>0.011<br>0.009<br>0.011<br>0.008                       | 0.078<br>0.079<br>0.08<br>0.08<br>0.039 | 1.726<br>1.73<br>1.732<br>1.735<br>1.305  | 0.009<br>0.009<br>0.008<br>0.008<br>0.009                       | 0.035<br>0.035<br>0.035<br>0.034<br>0.023                       | 1.685<br>1.683<br>1.687<br>1.686<br>1.291 | 0.01<br>0.011<br>0.009<br>0.01<br>0.007   | 0.017<br>0.018<br>0.018<br>0.018<br>0.015 | 1.668<br>1.671<br>1.673<br>1.677<br>1.287 | 0.008<br>0.009<br>0.011<br>0.01<br>0.008  | 0.057<br>0.056<br>0.056<br>0.056<br>0.025 | 1.71<br>1.708<br>1.709<br>1.708<br>1.295  | 0.01<br>0.01<br>0.011<br>0.01<br>0.008                 | 0.036<br>0.036<br>0.036<br>0.036<br>0.026                       | 1.686<br>1.688<br>1.689<br>1.688<br>1.296 | 0.009<br>0.008<br>0.008<br>0.012<br>0.008                       | 0.06<br>0.06<br>0.06<br>0.06<br>0.029    | 1.714<br>1.711<br>1.714<br>1.718<br>1.299 | 0.01<br>0.01<br>0.009<br>0.009<br>0.008                         | 0.075<br>0.074<br>0.073<br>0.073<br>0.036 | 1.727<br>1.726<br>1.726<br>1.725<br>1.304 |
| 30<br>50<br>70<br>100<br>10<br>30    | 0.008<br>0.008<br>0.01<br>0.007<br>0.01 | 0.038<br>0.037<br>0.037<br>0.07<br>0.069  | 1.304<br>1.305<br>1.304<br>1.519<br>1.517 | 0.008<br>0.009<br>0.005<br>0.007<br>0.01 | 0.038<br>0.038<br>0.038<br>0.07<br>0.068  | 1.306<br>1.303<br>1.305<br>1.303<br>1.516<br>1.517 | 0.008<br>0.007<br>0.008<br>0.008<br>0.007                       | 0.04<br>0.04<br>0.04<br>0.07<br>0.071   | 1.307<br>1.307<br>1.305<br>1.516<br>1.518 | 0.009<br>0.008<br>0.006<br>0.006<br>0.009                       | 0.024<br>0.023<br>0.023<br>0.03<br>0.029                        | 1.294<br>1.294<br>1.294<br>1.476<br>1.478 | 0.009<br>0.007<br>0.006<br>0.007<br>0.009 | 0.015<br>0.015<br>0.015<br>0.016<br>0.017 | 1.288<br>1.289<br>1.289<br>1.468<br>1.467 | 0.008<br>0.008<br>0.005<br>0.009<br>0.008 | 0.025<br>0.025<br>0.025<br>0.048<br>0.048 | 1.296<br>1.297<br>1.295<br>1.496<br>1.497 | 0.006<br>0.01<br>0.008<br>0.009<br>0.01                | 0.026<br>0.026<br>0.026<br>0.034<br>0.034                       | 1.297<br>1.299<br>1.297<br>1.482<br>1.485 | 0.009<br>0.008<br>0.009<br>0.008<br>0.007                       | 0.029<br>0.028<br>0.029<br>0.051<br>0.05 | 1.301<br>1.3<br>1.302<br>1.5<br>1.5       | 0.008<br>0.006<br>0.011<br>0.006<br>0.008                       | 0.036<br>0.035<br>0.035<br>0.065<br>0.065 | 1.304<br>1.304<br>1.306<br>1.514<br>1.515 |
| ≥ 50<br>70<br>100<br>□ 10<br>□ 30    | 0.006<br>0.009<br>0.009<br>0.011        | 0.066<br>0.066<br>0.125<br>0.125          | 1.514<br>1.513<br>1.69<br>1.69            | 0.008<br>0.007<br>0.01<br>0.011          | 0.066<br>0.066<br>0.124<br>0.125          | 1.516<br>1.514<br>1.513<br>1.69<br>1.691           | 0.007<br>0.009<br>0.009<br>0.011                                | 0.072<br>0.071<br>0.125<br>0.126        | 1.52<br>1.516<br>1.692<br>1.694           | 0.007<br>0.008<br>0.011<br>0.01                                 | 0.03<br>0.029<br>0.025<br>0.026                                 | 1.481<br>1.482<br>1.593<br>1.593          | 0.008<br>0.011<br>0.011<br>0.011          | 0.017<br>0.017<br>0.017<br>0.018          | 1.468<br>1.471<br>1.586<br>1.587          | 0.009<br>0.008<br>0.01<br>0.01            | 0.047<br>0.047<br>0.108<br>0.107          | 1.498<br>1.498<br>1.677<br>1.674          | 0.006<br>0.008<br>0.01<br>0.009                        | 0.034<br>0.034<br>0.028<br>0.028                                | 1.483<br>1.484<br>1.595<br>1.595          | 0.006<br>0.01<br>0.01<br>0.012                                  | 0.049<br>0.048<br>0.112<br>0.112         | 1.5<br>1.5<br>1.682<br>1.684              | 0.008<br>0.009<br>0.009<br>0.01                                 | 0.063<br>0.063<br>0.123<br>0.123          | 1.514<br>1.516<br>1.693<br>1.691          |
| ≿ 30                                 | 0.011<br>0.01<br>0.008<br>0.007         | 0.123<br>0.123<br>0.029<br>0.029          | 1.69<br>1.693<br>1.153<br>1.154           | 0.01<br>0.012<br>0.008<br>0.006          | 0.123<br>0.123<br>0.029<br>0.029          | 1.69<br>1.692<br>1.694<br>1.155<br>1.154           | 0.01<br>0.013<br>0.008<br>0.009                                 | 0.128<br>0.131<br>0.029<br>0.029        | 1.695<br>1.7<br>1.153<br>1.154            | 0.011<br>0.011<br>0.007<br>0.008                                | 0.026<br>0.027<br>0.017<br>0.017                                | 1.596<br>1.601<br>1.148<br>1.149          | 0.01<br>0.009<br>0.005<br>0.008           | 0.018<br>0.018<br>0.013<br>0.013          | 1.586<br>1.586<br>1.142<br>1.144          | 0.011<br>0.01<br>0.008<br>0.008           | 0.106<br>0.105<br>0.024<br>0.025          | 1.676<br>1.674<br>1.153<br>1.155          | 0.009<br>0.008<br>0.01<br>0.008                        | 0.029<br>0.03<br>0.019<br>0.019                                 | 1.598<br>1.6<br>1.149<br>1.15             | 0.012<br>0.009<br>0.007<br>0.009                                | 0.109<br>0.11<br>0.024<br>0.024          | 1.68<br>1.681<br>1.154<br>1.152           | 0.01<br>0.006<br>0.01   | 0.121<br>0.121<br>0.031<br>0.031          | 1.691<br>1.691<br>1.157<br>1.158          |
| S 10<br>30                           | 0.009<br>0.008<br>0.01<br>0.014         | 0.029<br>0.03<br>0.054<br>0.053           | 1.155<br>1.158<br>1.929<br>1.929          | 0.009<br>0.006<br>0.011<br>0.012         | 0.029<br>0.029<br>0.054<br>0.053          | 1.154<br>1.153<br>1.156<br>1.929<br>1.932          | 0.006<br>0.01<br>0.011<br>0.012                                 | 0.031<br>0.032<br>0.055<br>0.055        | 1.156<br>1.155<br>1.932<br>1.933          | 0.008<br>0.013<br>0.012<br>0.012                                | 0.018<br>0.018<br>0.035<br>0.036                                | 1.151<br>1.153<br>1.918<br>1.919          | 0.008<br>0.011<br>0.013<br>0.013          | 0.014<br>0.015<br>0.024<br>0.024          | 1.146<br>1.151<br>1.911<br>1.912          | 0.008<br>0.01<br>0.01<br>0.013            | 0.024<br>0.025<br>0.034<br>0.034          | 1.153<br>1.155<br>1.913<br>1.916          | 0.007<br>0.004<br>0.011<br>0.012                       | 0.02<br>0.02<br>0.039<br>0.04                                   | 1.15<br>1.153<br>1.919<br>1.92            | 0.008<br>0.008<br>0.012<br>0.011                                | 0.025<br>0.025<br>0.035<br>0.035         | 1.156<br>1.158<br>1.915<br>1.918          | 0.009<br>0.012<br>0.013   | 0.03 $0.031$ $0.052$ $0.052$              | 1.162<br>1.928<br>1.932                   |
| 50<br>70<br>100<br>21<br>30          | 0.011<br>0.011<br>0.01<br>0.009         | 0.054<br>0.052<br>0.036<br>0.036          | 1.933<br>1.934<br>1.211<br>1.211          | 0.012<br>0.013<br>0.007<br>0.009         | 0.054<br>0.053<br>0.037<br>0.037          | 1.933<br>1.934<br>1.933<br>1.211<br>1.214          | 0.012<br>0.014<br>0.007<br>0.007                                | 0.056<br>0.057<br>0.037<br>0.039        | 1.935<br>1.934<br>1.212<br>1.216          | 0.012<br>0.01<br>0.008<br>0.007                                 | 0.036<br>0.036<br>0.021<br>0.021                                | 1.918<br>1.916<br>1.199<br>1.2            | 0.012<br>0.012<br>0.007<br>0.009          | 0.024<br>0.024<br>0.015<br>0.015          | 1.906<br>1.909<br>1.193<br>1.196          | 0.012<br>0.011<br>0.007<br>0.009          | 0.034<br>0.035<br>0.025<br>0.025          | 1.917<br>1.924<br>1.203<br>1.203          | 0.013<br>0.01<br>0.009<br>0.006                        | 0.041<br>0.041<br>0.026<br>0.026                                | 1.921<br>1.921<br>1.204<br>1.205          | 0.011<br>0.01<br>0.007<br>0.005                                 | 0.036<br>0.037<br>0.026<br>0.026         | 1.918<br>1.923<br>1.206<br>1.204          | 0.012<br>0.012<br>0.009<br>0.007                                | 0.052<br>0.051<br>0.037<br>0.037          | 1.934<br>1.93<br>1.216<br>1.214           |
| ∑⊌ 50<br>70<br>100<br>10<br>2 30     | 0.006<br>0.008<br>0.007                 | 0.037<br>0.036<br>0.025                   | 1.212<br>1.212<br>1.29                    | 0.008<br>0.007<br>0.008                  | 0.036<br>0.037<br>0.025                   | 1.211<br>1.213<br>1.215<br>1.289<br>1.289          | 0.009<br>0.009<br>0.008   | 0.039<br>0.04<br>0.025                  | 1.217<br>1.218<br>1.29                    | 0.007<br>0.01<br>0.008  | 0.021<br>0.021<br>0.014   | 1.201<br>1.198<br>1.282                   | 0.008<br>0.006<br>0.008                   | $0.015 \\ 0.015 \\ 0.012$                 | 1.196<br>1.195<br>1.281                   | 0.006<br>0.009<br>0.009                   | 0.025<br>0.025<br>0.021                   | 1.203<br>1.203<br>1.288                   | 0.009<br>0.007<br>0.007                                | $0.026 \\ 0.026 \\ \hline 0.017$                                | 1.206<br>1.206<br>1.286                   | 0.009<br>0.01<br>0.008  | 0.026<br>0.027<br>0.021                  | 1.206<br>1.207<br>1.287                   | 0.006<br>0.01<br>0.008  | 0.037<br>0.036<br>0.024                   | 1.216<br>1.215<br>1.29                    |
| 50<br>70<br>100<br>100<br>100        | 0.009<br>0.007<br>0.008                 | 0.025<br>0.025<br>0.03                    | 1.292<br>1.292<br>1.108                   | 0.006<br>0.007<br>0.009                  | 0.025<br>0.025<br>0.029                   | 1.29<br>1.291<br>1.291<br>1.11<br>1.111            | 0.006<br>0.008<br>0.005   | 0.027<br>0.027<br>0.029                 | 1.292<br>1.29<br>1.106                    | 0.005<br>0.009<br>0.007   | 0.014<br>0.015<br>0.016   | 1.283<br>1.282<br>1.097                   | 0.007<br>0.006<br>0.007                   | $0.013 \\ 0.012 \\ \hline 0.012$          | 1.282<br>1.282<br>1.098                   | 0.007<br>0.006<br>0.006                   | 0.021<br>0.021<br>0.022                   | 1.288<br>1.289<br>1.105                   | 0.007<br>0.007<br>0.008                                | 0.017<br>0.017<br>0.019   | 1.285<br>1.285<br>1.103                   | 0.007<br>0.007<br>0.008   | $0.021 \\ 0.022 \\ 0.022$                | 1.287<br>1.291<br>1.105                   | 0.009<br>0.006<br>0.008   | 0.023 $0.023$ $0.028$                     | 1.291<br>1.291<br>1.109                   |
| 30 AN SATELL<br>100 SATELL<br>100 30 | 0.005<br>0.007<br>0.008<br>0.014        | 0.029<br>0.029<br>0.029<br>0.654          | 1.109<br>1.111<br>1.112<br>3.1            | 0.007<br>0.007<br>0.009<br>0.013         | 0.029<br>0.029<br>0.029<br>0.654          | 1.109<br>1.109<br>1.11<br>3.102                    | 0.008<br>0.007<br>0.005<br>0.014                                | 0.03<br>0.03<br>0.03<br>0.654           | 1.109<br>1.112<br>1.111<br>3.098          | 0.007<br>0.007<br>0.008<br>0.013                                | 0.016<br>0.017<br>0.016<br>0.086                                | 1.099<br>1.103<br>1.101<br>2.532          | 0.009<br>0.008<br>0.006<br>0.014          | 0.012<br>0.012<br>0.013<br>0.029          | 1.097<br>1.097<br>1.099<br>2.473          | 0.008<br>0.008<br>0.01<br>0.013           | 0.022<br>0.021<br>0.021<br>0.273          | 1.105<br>1.105<br>1.107<br>2.719          | 0.007<br>0.006<br>0.009<br>0.013                       | 0.019<br>0.019<br>0.019<br>0.15                                 | 1.1<br>1.104<br>1.103<br>2.596            | 0.009<br>0.006<br>0.007<br>0.014                                | 0.023<br>0.023<br>0.022<br>0.298         | 1.107<br>1.106<br>1.106<br>2.744          | 0.005<br>0.007<br>0.009<br>0.014                                | 0.027<br>0.027<br>0.028<br>0.623          | 1.11<br>1.108<br>1.113<br>3.073           |
| V 30<br>50<br>70<br>100              | 0.015<br>0.013<br>0.016                 | 0.542<br>0.519<br>0.502                   | 2.991<br>2.971<br>2.951                   | 0.012<br>0.012<br>0.015                  | 0.541<br>0.519<br>0.501                   | 3.023<br>2.989<br>2.967<br>2.951                   | $0.013 \\ 0.011 \\ 0.014$                                       | 0.678<br>0.668<br>0.672                 | 3.129<br>3.118<br>3.121                   | 0.013<br>0.013<br>0.013   | $0.083 \\ 0.082 \\ 0.084$                                       | 2.529<br>2.526<br>2.53                    | 0.011<br>0.013<br>0.014                   | $0.029 \\ 0.029 \\ 0.029$                 | 2.473<br>2.474<br>2.483                   | $0.012 \\ 0.014 \\ 0.015$                 | 0.267<br>0.262<br>0.253                   | 2.718<br>2.713<br>2.704                   | 0.014 $0.013$ $0.013$                                  | 0.129<br>0.127<br>0.129   | 2.574<br>2.574<br>2.575                   | 0.012<br>0.013<br>0.014   | 0.287 $0.28$ $0.271$                     | 2.737<br>2.734<br>2.718                   | 0.015<br>0.015<br>0.012   | 0.51<br>0.488<br>0.471                    | 2.962<br>2.943<br>2.923                   |
| 100                                  | 0.005<br>0.006<br>0.008<br>0.005        | 0.047<br>0.045<br>0.045<br>0.044          | 1.4<br>1.397<br>1.398<br>1.4              | 0.007<br>0.006<br>0.008<br>0.005         | 0.046<br>0.046<br>0.046<br>0.045          | 1.4<br>1.402<br>1.401<br>1.399                     | 0.006<br>0.007<br>0.008<br>0.008                                | 0.047<br>0.047<br>0.047<br>0.048        | 1.398<br>1.401<br>1.401<br>1.402          | 0.007<br>0.006<br>0.007<br>0.008                                | 0.027<br>0.026<br>0.026<br>0.026                                | 1.379<br>1.381<br>1.379<br>1.379          | 0.006<br>0.008<br>0.005<br>0.007          | 0.015<br>0.015<br>0.015<br>0.015          | 1.368<br>1.369<br>1.368<br>1.371          | 0.005<br>0.007<br>0.007<br>0.006          | 0.027<br>0.027<br>0.027<br>0.027          | 1.38<br>1.383<br>1.382<br>1.383           | 0.008<br>0.007<br>0.008<br>0.007                       | 0.03<br>0.03<br>0.03<br>0.029                                   | 1.381<br>1.382<br>1.384<br>1.384          | 0.007<br>0.008<br>0.005<br>0.008                                | 0.031<br>0.031<br>0.031<br>0.031         | 1.387<br>1.384<br>1.385<br>1.384          | 0.008<br>0.006<br>0.008<br>0.008                                | 0.043<br>0.043<br>0.042<br>0.042          | 1.398<br>1.398<br>1.396<br>1.398          |
| AVG                                  | 0.01                                    | 0.100                                     | 1./92                                     | 0.01                                     | 0.100                                     | 1.792  | 0.01  | 0.118                                   | 1.003                                     | 0.01  | 0.034   | 1./22                                     | 0.01                                      | 0.02                                      | 1./1                                      | 0.01                                      | 0.007                                     | 1.730                                     | 0.01   | 0.041   | 1./3                                      | 0.01  | 0.07                                     | 1./39                                     | 0.01  | 0.103                                     | 1./91                                     |

Table 2: Times spent on Python layer (Py), Fast-Downward preprocess (FD) and actual LP-solving (LP), on sub-optimal dataset.