

# Subject Systems Data

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## 1 Introduction

In this document, we report the data extracted from the subject systems used to compare the performance of GA, CP, and GA+CP in our work [2]. Specifically, the systems concern an Ignition Control System (ICS) [5], a Cruise Control System (CCS) [1], an Unmanned Air Vehicle (UAV) [6], a Generic Avionics Platform (GAP) [3], and the Herschel-Planck Satellite System (HPSS) [4].

## 2 Systems Data

This section reports the data for each case study. The definitions of the task properties are introduced in our work [2].

### 2.1 ICS Data

```
1      tq = 150;
2      c = 3;
3
4      J = {
5          #<id:"j0", priority:500, deadline:15, period:-1, min_interarrival_time:30,
6             max_interarrival_time:150, duration:9>#,
7          #<id:"j1", priority:400, deadline:20, period:-1, min_interarrival_time:30,
8             max_interarrival_time:150, duration:9>#,
9          #<id:"j2", priority:300, deadline:20, period:-1, min_interarrival_time:30,
10             max_interarrival_time:150, duration:5>#,
11          #<id:"j3", priority:200, deadline:25, period:80, min_interarrival_time:-1,
12             max_interarrival_time:-1, duration:5>#,
13          #<id:"j4", priority:100, deadline:40, period:80, min_interarrival_time:-1,
14             max_interarrival_time:-1, duration:7>#,
15          #<id:"j5", priority:100, deadline:40, period:80, min_interarrival_time:-1,
16             max_interarrival_time:-1, duration:7>#
17      };
18
19      TS = {};
20
21      DS = {<<"j0">, <<"j2">,
22             <<"j1">, <<"j3">,
23             <<"j4">, <<"j5">};
```

## 2.2 CCS Data

```
1      tq = 250;
2      c = 2;
3
4      J = {
5          #<id:"j0", priority:45, deadline:5, period:-1, min_interarrival_time:33,
6             max_interarrival_time:250, duration:2>#,
7          #<id:"j1", priority:35, deadline:7, period:-1, min_interarrival_time:33,
8             max_interarrival_time:250, duration:5>#,
9          #<id:"j2", priority:25, deadline:10, period:-1, min_interarrival_time:33,
10             max_interarrival_time:250, duration:7>#,
11          #<id:"j3", priority:10, deadline:20, period:125, min_interarrival_time:-1,
12             max_interarrival_time:-1, duration:3>#,
13          #<id:"j4", priority:11, deadline:80, period:125, min_interarrival_time:-1,
14             max_interarrival_time:-1, duration:3>#,
15          #<id:"j5", priority:40, deadline:20, period:125, min_interarrival_time:-1,
16             max_interarrival_time:-1, duration:2>#,
17          #<id:"j6", priority:20, deadline:80, period:125, min_interarrival_time:-1,
18             max_interarrival_time:-1, duration:4>#,
19          #<id:"j7", priority:30, deadline:20, period:125, min_interarrival_time:-1,
20             max_interarrival_time:-1, duration:2>#,
21          #<id:"j8", priority:31, deadline:80, period:125, min_interarrival_time:-1,
22             max_interarrival_time:-1, duration:4>#,
23          #<id:"j9", priority:32, deadline:80, period:125, min_interarrival_time:-1,
24             max_interarrival_time:-1, duration:3>#,
25          #<id:"j10", priority:33, deadline:80, period:125, min_interarrival_time:-1,
26             max_interarrival_time:-1, duration:2>#
27      };
28
29      TS = {<<"j1">, <"j2">>,
30           <<"j1">, <"j4">>,
31           <<"j1">, <"j5">>,
32           <<"j6">, <"j7">>,
33           <<"j6">, <"j8">>,
34           <<"j8">, <"j9">>};
35
36      DS = {<<"j0">, <"j4">>,
37           <<"j1">, <"j3">>,
38           <<"j2">, <"j9">>};
```

## 2.3 UAV Data

```
1      tq = 125;
2      c = 3;
3
4      J = {
5          #<id:"j0", priority:13, deadline:25, period:-1, min_interarrival_time:20,
6             max_interarrival_time:125, duration:1>#,
7          #<id:"j1", priority:14, deadline:25, period:-1, min_interarrival_time:20,
8             max_interarrival_time:125, duration:1>#,
9          #<id:"j2", priority:15, deadline:25, period:-1, min_interarrival_time:20,
10             max_interarrival_time:125, duration:1>#,
11          #<id:"j3", priority:16, deadline:25, period:-1, min_interarrival_time:20,
12             max_interarrival_time:125, duration:1>#,
13          #<id:"j4", priority:1, deadline:100, period:100, min_interarrival_time:-1,
14             max_interarrival_time:-1, duration:1>#,
15          #<id:"j5", priority:7, deadline:25, period:10, min_interarrival_time:-1,
16             max_interarrival_time:-1, duration:1>#,
17          #<id:"j6", priority:5, deadline:25, period:25, min_interarrival_time:-1,
18             max_interarrival_time:-1, duration:1>#,
19          #<id:"j7", priority:6, deadline:35, period:10, min_interarrival_time:-1,
20             max_interarrival_time:-1, duration:2>#,
21          #<id:"j8", priority:2, deadline:70, period:125, min_interarrival_time:-1,
22             max_interarrival_time:-1, duration:2>#,
23          #<id:"j9", priority:4, deadline:30, period:30, min_interarrival_time:-1,
24             max_interarrival_time:-1, duration:1>#,
25          #<id:"j10", priority:11, deadline:8, period:125, min_interarrival_time:-1,
26             max_interarrival_time:-1, duration:5>#,
27          #<id:"j11", priority:10, deadline:15, period:10, min_interarrival_time:-1,
28             max_interarrival_time:-1, duration:1>#,
29          #<id:"j12", priority:12, deadline:7, period:50, min_interarrival_time:-1,
```

```

30     max_interarrival_time:-1, duration:2>#,
31     #<id:"j13", priority:9, deadline:15, period:125, min_interarrival_time:-1,
32     max_interarrival_time:-1, duration:7>#,
33     #<id:"j14", priority:8, deadline:8, period:10, min_interarrival_time:-1,
34     max_interarrival_time:-1, duration:1>#,
35     #<id:"j15", priority:3, deadline:35, period:50, min_interarrival_time:-1,
36     max_interarrival_time:-1, duration:4>#,
37 };
38
39 TS = {};
40
41 DS = {<<"j0">, <"j6">>,
42     <<"j1">, <"j2">>,
43     <<"j2">, <"j9">>,
44     <<"j3">, <"j10">>};

```

## 2.4 GAP Data

```

1     tq = 150;
2     c = 2;
3
4     J = {
5         #<id:"j0", priority:3, deadline:33, period:33, min_interarrival_time:-1,
6         max_interarrival_time:-1, duration:2>#,
7         #<id:"j1", priority:3, deadline:33, period:33, min_interarrival_time:-1,
8         max_interarrival_time:-1, duration:2>#,
9         #<id:"j2", priority:3, deadline:33, period:33, min_interarrival_time:-1,
10        max_interarrival_time:-1, duration:1>#,
11        #<id:"j3", priority:3, deadline:20, period:20, min_interarrival_time:-1,
12        max_interarrival_time:-1, duration:1>#,
13        #<id:"j4", priority:3, deadline:20, period:20, min_interarrival_time:-1,
14        max_interarrival_time:-1, duration:1>#,
15        #<id:"j5", priority:3, deadline:10, period:-1, min_interarrival_time:15,
16        max_interarrival_time:100, duration:1>#,
17        #<id:"j6", priority:3, deadline:50, period:-1, min_interarrival_time:15,
18        max_interarrival_time:100, duration:1>#,
19        #<id:"j7", priority:2, deadline:100, period:-1, min_interarrival_time:15,
20        max_interarrival_time:100, duration:2>#,
21        #<id:"j8", priority:3, deadline:5, period:-1, min_interarrival_time:15,
22        max_interarrival_time:100, duration:1>#,
23        #<id:"j9", priority:2, deadline:20, period:20, min_interarrival_time:-1,
24        max_interarrival_time:-1, duration:2>#,
25        #<id:"j10", priority:2, deadline:20, period:20, min_interarrival_time:-1,
26        max_interarrival_time:-1, duration:2>#,
27        #<id:"j11", priority:2, deadline:20, period:20, min_interarrival_time:-1,
28        max_interarrival_time:-1, duration:2>#,
29        #<id:"j12", priority:1, deadline:50, period:-1, min_interarrival_time:15,
30        max_interarrival_time:100, duration:1>#,
31        #<id:"j13", priority:1, deadline:50, period:-1, min_interarrival_time:15,
32        max_interarrival_time:100, duration:1>#,
33        #<id:"j14", priority:2, deadline:50, period:50, min_interarrival_time:-1,
34        max_interarrival_time:-1, duration:1>#,
35        #<id:"j15", priority:3, deadline:25, period:-1, min_interarrival_time:15,
36        max_interarrival_time:100, duration:1>#,
37        #<id:"j16", priority:1, deadline:100, period:100, min_interarrival_time:-1,
38        max_interarrival_time:-1, duration:2>#,
39        #<id:"j17", priority:2, deadline:100, period:-1, min_interarrival_time:15,
40        max_interarrival_time:100, duration:1>#,
41        #<id:"j18", priority:3, deadline:150, period:150, min_interarrival_time:-1,
42        max_interarrival_time:-1, duration:2>#,
43        #<id:"j19", priority:3, deadline:150, period:150, min_interarrival_time:-1,
44        max_interarrival_time:-1, duration:1>#,
45        #<id:"j20", priority:3, deadline:150, period:150, min_interarrival_time:-1,
46        max_interarrival_time:-1, duration:3>#,
47        #<id:"j21", priority:3, deadline:150, period:150, min_interarrival_time:-1,
48        max_interarrival_time:-1, duration:1>#,
49        #<id:"j22", priority:3, deadline:150, period:150, min_interarrival_time:-1,
50        max_interarrival_time:-1, duration:1>#,
51    };
52
53    TS = {<<"j0">, <"j1">>,
54        <<"j0">, <"j2">>,
55        <<"j0">, <"j3">>,

```

```

56     <<"j6">, <"j5">,
57     <<"j9">, <"j2">};
58
59 DS = {<<"j1">, <"j4">,
60     <<"j1">, <"j5">,
61     <<"j2">, <"j3">,
62     <<"j10">, <"j11">,
63     <<"j12">, <"j13">,
64     <<"j14">, <"j15">};

```

## 2.5 HPSS Data

```

1   tq = 175;
2   c = 1;
3
4   J = {
5       #<id:"j0", priority:33, deadline:15, period:60, min_interarrival_time:-1,
6         max_interarrival_time:-1, duration:1>#,
7       #<id:"j1", priority:32, deadline:5, period:-1, min_interarrival_time:45,
8         max_interarrival_time:125, duration:5>#,
9       #<id:"j2", priority:31, deadline:15, period:60, min_interarrival_time:-1,
10        max_interarrival_time:-1, duration:6>#,
11      #<id:"j3", priority:30, deadline:5, period:-1, min_interarrival_time:45,
12        max_interarrival_time:125, duration:5>#,
13      #<id:"j4", priority:29, deadline:5, period:-1, min_interarrival_time:45,
14        max_interarrival_time:125, duration:4>#,
15      #<id:"j5", priority:28, deadline:15, period:60, min_interarrival_time:-1,
16        max_interarrival_time:-1, duration:3>#,
17      #<id:"j6", priority:27, deadline:15, period:60, min_interarrival_time:-1,
18        max_interarrival_time:-1, duration:4>#,
19      #<id:"j7", priority:26, deadline:15, period:60, min_interarrival_time:-1,
20        max_interarrival_time:-1, duration:5>#,
21      #<id:"j8", priority:25, deadline:10, period:-1, min_interarrival_time:45,
22        max_interarrival_time:125, duration:5>#,
23      #<id:"j9", priority:24, deadline:15, period:60, min_interarrival_time:-1,
24        max_interarrival_time:-1, duration:2>#,
25      #<id:"j10", priority:23, deadline:15, period:60, min_interarrival_time:-1,
26        max_interarrival_time:-1, duration:5>#,
27      #<id:"j11", priority:22, deadline:15, period:-1, min_interarrival_time:45,
28        max_interarrival_time:125, duration:5>#,
29      #<id:"j12", priority:21, deadline:46, period:-1, min_interarrival_time:45,
30        max_interarrival_time:125, duration:5>#,
31      #<id:"j13", priority:20, deadline:46, period:-1, min_interarrival_time:45,
32        max_interarrival_time:125, duration:1>#,
33      #<id:"j14", priority:19, deadline:46, period:-1, min_interarrival_time:45,
34        max_interarrival_time:125, duration:1>#,
35      #<id:"j15", priority:18, deadline:60, period:60, min_interarrival_time:-1,
36        max_interarrival_time:-1, duration:1>#,
37      #<id:"j16", priority:17, deadline:12, period:-1, min_interarrival_time:45,
38        max_interarrival_time:125, duration:1>#,
39      #<id:"j17", priority:16, deadline:70, period:60, min_interarrival_time:-1,
40        max_interarrival_time:-1, duration:1>#,
41      #<id:"j18", priority:15, deadline:70, period:60, min_interarrival_time:-1,
42        max_interarrival_time:-1, duration:1>#,
43      #<id:"j19", priority:14, deadline:70, period:60, min_interarrival_time:-1,
44        max_interarrival_time:-1, duration:1>#,
45      #<id:"j20", priority:12, deadline:70, period:60, min_interarrival_time:-1,
46        max_interarrival_time:-1, duration:1>#,
47      #<id:"j21", priority:11, deadline:70, period:60, min_interarrival_time:-1,
48        max_interarrival_time:-1, duration:1>#,
49      #<id:"j22", priority:10, deadline:70, period:60, min_interarrival_time:-1,
50        max_interarrival_time:-1, duration:1>#,
51      #<id:"j23", priority:9, deadline:70, period:60, min_interarrival_time:-1,
52        max_interarrival_time:-1, duration:1>#,
53      #<id:"j24", priority:8, deadline:70, period:60, min_interarrival_time:-1,
54        max_interarrival_time:-1, duration:1>#,
55      #<id:"j25", priority:7, deadline:70, period:60, min_interarrival_time:-1,
56        max_interarrival_time:-1, duration:1>#,
57      #<id:"j26", priority:6, deadline:70, period:60, min_interarrival_time:-1,
58        max_interarrival_time:-1, duration:1>#,
59      #<id:"j27", priority:5, deadline:70, period:60, min_interarrival_time:-1,
60        max_interarrival_time:-1, duration:1>#,
61      #<id:"j28", priority:4, deadline:70, period:60, min_interarrival_time:-1,

```

```

62     max_interarrival_time:-1,    duration:1>#,
63     #<id:"j29", priority:3,    deadline:70,    period:60,    min_interarrival_time:-1,
64     max_interarrival_time:-1,    duration:1>#,
65     #<id:"j30", priority:2,    deadline:70,    period:60,    min_interarrival_time:-1,
66     max_interarrival_time:-1,    duration:1>#,
67     #<id:"j31", priority:1,    deadline:70,    period:60,    min_interarrival_time:-1,
68     max_interarrival_time:-1,    duration:1>#
69 };
70
71 TS = {};
72
73 DS = {<<"j1">, <"j6">>,
74     <<"j2">, <"j7">>,
75     <<"j4">, <"j9">>,
76     <<"j7">, <"j10">>,
77     <<"j11">, <"j14">>};

```

## References

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