Explanation of various scenarios

**A1A2B3B4**

This is a simple example where there is basically one choice of task allocation.

18 states

Goal state is named *A7.B6.1f.2f.3f.4f*

Tasks 1,2,3,4

Regions 5,6,7,8 oriented as follows

6 7

5 8

Task 1 in Region 5, Task 2 in Region 7, Task 3 in Region 6, Task 4 in Region 6

Robot A starts in Region 5, Robot B starts in Region 8

**4Tasks2Robots\_rn**

This is the example from the ACC paper, but with the region avoidance requirements removed.

56 states

Goal state is named *7*

Tasks 1,2,3,4

**4Tasks2RobotsABSTRACT\_rn**

Abstraction of 4tasks2robots (single digit numbering) where all finish events are hidden.

16 states

Goal state is named *7*

**4Tasks4Regions\_rn**

This is the example from the ACC paper.

638 states

Goal state is named *476*

Tasks 1,2,3,4

Regions 5,6,7,8 oriented as follows

6 7

5 8

Task 1 in Region 5, Task 2 in Region 7, Task 3 in Region 6, Task 4 in Region 6

Robot A starts in Region 5, Robot B starts in Region 8

**4Ttasks4regions\_rn2**

Same as above, but with 2-digit numbering

**4tasks4regionsABSTRACT\_rn**

Abstraction of 4tasks4regions\_rn (single digit numbering) where all entry events are hidden and all finish events for task 2 and task 4 are hidden (all start events and finish events for task 1 and task 3 remain).

53 states

Goal state is named *39*

**8tasks4regions\_rn**

Same flavor as ACC paper example, just 8 tasks instead of 4.

25215 states

Goal state is named *24441*

Tasks 1,2,3,4,9,10,11,12

Regions 5,6,7,8 oriented as follows

6 7

5 8

Task 1 in Region 5, Task 2 in Region 7, Task 3 in Region 6, Task 4 in Region 6, Task 9 in Region 5, Task 10 in Region 8, Task 11 in Region 7, Task 12 in Region 6,

Robot A starts in Region 5, Robot B starts in Region 8

**8tasks4regions\_rn2**

Same flavor as ACC paper example, just 8 tasks instead of 4

25215 states

Goal state is named *24441*

Tasks 01,02,03,04,05,06,07,08

Regions 09,10,11,12 oriented as follows

10 11

09 12

Task 01 in Region 09, Task 02 in Region 11, Task 03 in Region 10, Task 04 in Region 10, Task 05 in Region 09, Task 06 in Region 12, Task 07 in Region 11, Task 08 in Region 10,

Robot A starts in Region 09, Robot B starts in Region 12

**4tasks9regions\_rn**

Same flavor as ACC paper example, just 9 regions instead of 4.

3476 states

Goal state is named *2634*

Tasks 1,2,3,4

Regions 5,6,7,8,9,10,11,12,13 oriented as follows

7 8 13

6 9 12

5 10 11

Task 1 in Region 5, Task 2 in Region 13, Task 3 in Region 9, Task 4 in Region 7

Robot A starts in Region 5, Robot B starts in Region 11

**4tasks9regions\_rn2**

Same as above, but with 2-digit numbering

**6tasks9regions\_rn**

Same flavor as ACC paper example, just 9 regions instead of 4 and 6 tasks instead of 4. Employs 2-digit numbering.

26114 states

Goal state is named *26114*

Tasks 1,2,3,4,5,6

Regions 7,8,9,10,11,12,13,14,15 oriented as follows

9 10 15

8 11 14

7 12 13

Task 1 in Region 7, Task 2 in Region 15, Task 3 in Region 11, Task 4 in Region 9, Task 5 in Region 11, Task 6 in Region 13

Robot A starts in Region 7, Robot B starts in Region 13

**6tasks9regions3robots\_rn**

Similar to 6tasks9regions, but with a third robot added. In 6tasks9regions3robotsABSTRACT, all events but start events are abstracted away. In 6tasks9regions3robotsIncremental, the supervisory control is split between 4 different supervisors.

Tasks 01,02,03,04,05,06

Regions 07,08,09,10,11,12,13,14,15 oriented as follows

09 10 15

08 11 14

07 12 13

Task 1 in Region 7, Task 2 in Region 15, Task 3 in Region 11, Task 4 in Region 9, Task 5 in Region 11, Task 6 in Region 13

Robot A starts in Region 7, Robot B starts in Region 13, Robot C starts in Region 15

**6tasks3robots\_rn**

Employs 3 robots to perform 6 tasks, there is no requirement on region avoidance.

983 states

Goal state is named *983*

Tasks 1,2,3,4,5,6

**6tasks3robots\_rn2**

Same as above, but with 2-digit numbering

**6tasks3robotsABSTRACT\_rn**

Abstraction of 6tasks3robots (single digit numbering) where all finish events are hidden.

125 states

Goal state is named *100*

**6tasks3robotsABSTRACT\_rn2**

Same as above, but with 2-digit numbering

**10tasks3robots\_rn**

Employs 3 robots to perform 10 tasks, there is no requirement on region avoidance. Employs 2-digit numbering.

63875 states

Goal state is named

Tasks 1,2,3,4,5,6,7,8,9,10

**10tasks9regions\_rn**

Same flavor as example from ACC paper. In 10tasks9regionsABSTRACT, all events but start events are abstracted away. In 10tasks9regionsIncremental and 10tasks9regionsModular, the supervisory control is split between 6 different supervisors.

Tasks 01,02,03,04,05,06,07,08,09,10

Regions 11,12,13,14,15,16,17,18,19 oriented as follows

13 14 19

12 15 18

11 16 17

Task 01 in Region 11, Task 02 in Region 19, Task 03 in Region 13, Task 04 in Region 13, Task 05 in Region 12, Task 06 in Region 17, Task 07 in Region 18, Task 08 in Region 14, Task 09 in Region 15, Task 10 in Region 19

Robot A starts in Region 11, Robot B starts in Region 17

**4TasksNoRegions1robot\_rn**

21 states

Tasks 1,2,3,4

**4TasksNoRegions1robotABSTRACT\_rn**

Abstraction of 4TasksNoRegions\_rn with all finish events hidden.

9 states

**4Tasks4Regions1robot\_rn**

84 states

Tasks 1,2,3,4

Regions 5,6,7,8 oriented as follows

6 7

5 8

Task 1 in Region 5, Task 2 in Region 7, Task 3 in Region 6, Task 4 in Region 6

Robot A starts in Region 5, Robot B starts in Region 8

**4Tasks4Regions1robotABSTRACT\_rn**

Abstraction of 4Tasks4Regions1robot\_rn with all finish and entry events hidden.

9 states

**8TasksNoRegions1robot\_rn**

297 states

Tasks 1,2,3,4,5,6,7,8

**8TasksNoRegions1robotABSTRACT\_rn**

Abstraction of 8TasksNoRegions1robot\_rn with all finish events hidden.

81 states

**8Tasks4Regions1robot\_rn**

1188 states

Tasks 01,02,03,04,05,06,07,08

Regions 09,10,11,12 oriented as follows

10 11

09 12

Task 01 in Region 09, Task 02 in Region 11, Task 03 in Region 10, Task 04 in Region 10, Task 05 in Region 9, Task 06 in Region 12, Task 07 in Region 11, Task 08 in Region 10

Robot A starts in Region 09

**8Tasks4Regions1robotABSTRACT\_rn**

Abstraction of 8Tasks4Regions1robot\_rn with all finish and entry events hidden.

81 states

**8Tasks9Regions1robot\_rn**

2673 states

Tasks 01,02,03,04,05,06,07,08

Regions 09,10,11,12,13,14,15,16,17 oriented as follows

11 12 17

10 13 16

09 14 15

Task 01 in Region 09, Task 02 in Region 17, Task 03 in Region 11, Task 04 in Region 11, Task 05 in Region 10, Task 06 in Region 15, Task 07 in Region 16, Task 08 in Region 12

Robot A starts in Region 09

**8Tasks9Regions1robotABSTRACT\_rn**

Abstraction of 8Tasks9Regions1robot\_rn with all finish and entry events hidden.

81 states

**16TasksNoRegions1robot\_rn**

41553 states

Tasks 01,02,03,04,05,06,07,08,09,10,11,12,13,14,15,16

**16TasksNoRegions1robotABSTRACT\_rn**

Abstraction of 16TasksNoRegions1robot\_rn with all finish events hidden.

6561 states

**All file names appended with “rn” have had their states renumbered to begin from 1 and to increment sequentially.**