**Test cases**

Consider the sprint task #50 **Test Constrained-3 algorithm**. Some of the test cases for this task are as follows:

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| Test case  # | Scenario | Input(s) | Expected output |
| 1 | The environment has one region and the region has (1-[openSpaces/3]) agents | Environment object | Return correct target list and agent path. |
| 2 | The environment has one region and the region has one open space and one agent | Environment object | Return value is null |
| 3 | The environment has more than one region and each region has (1-[openSpaces/3]) agents | Environment object | Return correct target list and agent path. |
| 4 | The environment has more than one region and each region has one open space and one agent | Environment object | Return value is null |

Consider the sprint task #53 **Test Constrained-4 algorithm**. Some of the test cases for this task are as follows:

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| Test case  # | Scenario | Input(s) | Expected output |
| 1 | The environment has one region and the region has (1-[openSpaces/4]) agents | Environment object | Return correct target list and agent path. |
| 2 | The environment has one region and the region has one open space and one agent | Environment object | Return value is null |
| 3 | The environment has more than one region and each region has (1-[openSpaces/4]) agents | Environment object | Return correct target list and agent path. |
| 4 | The environment has more than one region and each region has one open space and one agent | Environment object | Return value is null |

Consider the sprint task #56 **Test file validation for Constrained-3 algorithm and Constrained-4 algorithm**. Some of the test cases for this task are as follows:

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| Test case  # | Scenario | Input(s) | Expected output |
| 1 | For Constrained-3 algorithm, file has one region and no agents in the region | File | Error Message |
| 2 | For Constrained-3 algorithm, file has one region (one open space) and one agent in the region | File | Load file successfully |
| 3 | For Constrained-3 algorithm, file has multiple regions. Some regions have more than [openSpaces/3] agents and some regions have no more than [openSpaces/3] agents | File | Error Message |
| 4 | For Constrained-3 algorithm, file has multiple regions. Each region has 1-[openSpaces/3] agents | File | Load file successfully |
| 5 | For Constrained-4 algorithm, file has one region and no agents in the region | File | Error Message |
| 6 | For Constrained-4 algorithm, file has one region and one agent in the region | File | Load file successfully |
| 7 | For Constrained-4 algorithm, file has multiple regions. Some regions have more than [openSpaces/4] agents and some regions have no more than [openSpaces/4] agents | File | Error Message |
| 8 | For Constrained-4 algorithm, file has multiple regions. Each region has 1-[openSpaces/4] agents | File | Load file successfully |

Consider the sprint task #58 **Test Constrained-3 algorithm and Constrained-4 in block view**. Some of the test cases for this task are as follows:

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| Test case  # | Scenario | Input(s) | Expected output |
| 1 | For Constrained-3 algorithm, load file successfully and start to run one step | 1 | If the algorithm doesn’t stop, agents in each region move one step. Else, agents in each region will stop. |
| 2 | For Constrained-3 algorithm, load file successfully and start to run N (>1) step | N | If the algorithm doesn’t stop, agents in each region move N steps.  If the algorithm stops at M (M<N) step, agents in each region move M steps |
| 3 | For Constrained-4 algorithm, load file successfully and start to run one step | 1 | If the algorithm doesn’t stop, agents in each region move one step. Else, agents in each region will stop. |
| 4 | For Constrained-4 algorithm, load file successfully and start to run N (>1) step | N | If the algorithm doesn’t stop, agents in each region move N steps.  If the algorithm stops at M (M<N) step, agents in each region move M steps |

Consider the sprint task #64 **Test Constrained-3 algorithm and Constrained-4 algorithm in graph view**. Some of the test cases for this task are as follows:

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| Test case  # | Scenario | Input(s) | Expected output |
| 1 | For Constrained-3 algorithm, load file successfully, choose one region to show graph and run one step | 1 | If the algorithm doesn’t stop, agents in each region move one step. Else, agents in each region will stop. Target list and each agent’s current target will show in graph. |
| 2 | For Constrained-3 algorithm, load file successfully, choose one region to show graph and start to run N (>1) step | N | If the algorithm doesn’t stop, agents in each region move N steps.  If the algorithm stops at M (M<N) step, agents in each region move M steps. Target list and each agent’s current target will show in graph. |
| 3 | For Constrained-4 algorithm, load file successfully, choose one region to show graph and start to run one step | 1 | If the algorithm doesn’t stop, agents in each region move one step. Else, agents in each region will stop. Target list and each agent’s current target will show in graph. |
| 4 | For Constrained-4 algorithm, load file successfully, choose one region to show graph and start to run N (>1) step | N | If the algorithm doesn’t stop, agents in each region move N steps.  If the algorithm stops at M (M<N) step, agents in each region move M steps. Target list and each agent’s current target will show in graph. |