Case #1: The robot simply needs to deliver 1 unit of product 1 to the picking station, no complications

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 1
Products: 1
Orders: 1

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(2,1))).
init(object(highway,2),value(at,pair(2,2))).

init(object(pickingStation,1),value(at,pair(1,1))).

init(object(robot,1),value(at,pair(2,2))).

init(object(shelf,1),value(at,pair(1,2))).

init(object(product,1),value(on,pair(1,1))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,1))).

	1	2
1	**PickingStation 1**	**Shelf 1** **Product 1**
2	**Highway**	**Highway** **Robot 1**

Case #2: The robot needs to deliver 1 unit of product 1 to the picking station, and must cross a highway with the shelf to fill the order

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 1
Products: 1
Orders: 1

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(2,1))).
init(object(highway,2),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).

init(object(robot,1),value(at,pair(1,2))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,1))).

	1	2
1	**PickingStation 1**	**Highway** **Robot 1**
2	**Highway**	**Shelf 1** **Product 1**

Case #3: The robot needs to deliver 1000 units of product 1 to the picking station, and must cross a highway with the shelf to fill the order.

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 1
Products: 1
Orders: 1

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(2,1))).
init(object(highway,2),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).

init(object(robot,1),value(at,pair(1,2))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,1000))).

	1	2
1	**PickingStation 1**	**Highway** **Robot 1**
2	**Highway**	**Shelf 1** **Product 1**

Case #4: The robot needs to deliver 1000 units of product 1 to the picking station, must cross a highway with the shelf to fill the order, and the robot starts on a picking station.

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 1
Products: 1
Orders: 1

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init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(2,1))).
init(object(highway,2),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).

init(object(robot,1),value(at,pair(1,1))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,1000))).
```

	1	2
1	**PickingStation 1** **Robot 1**	**Highway**
2	**Highway**	**Shelf 1** **Product 1**

Case #5: The robot needs to deliver 1000 units of product 1 to the picking station, must cross a highway with the shelf to fill the order, and the 1000 units are split across two separate orders of 500.

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 1
Products: 1
Orders: 2

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(2,1))).
init(object(highway,2),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).

init(object(robot,1),value(at,pair(1,2))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,500))).

init(object(order,2),value(pickingStation,1)).
init(object(order,2),value(line,pair(1,500))).

	1	2
1	**PickingStation 1**	**Highway** **Robot 1**
2	**Highway**	**Shelf 1** **Product 1**

Case #6: The robot needs to deliver 500 units of product 1 to the picking station, cross a highway with the shelf to fill the order, and a second robot is added requiring the solution to either keep the second robot in place or move it out of the way of the robot who picks up the shelf.

Grid: 4x4
Robots: 2
Shelf: 1
Picking Stations: 1
Products: 1
Orders: 1

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(2,1))).
init(object(highway,2),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).

init(object(robot,1),value(at,pair(1,2))).
init(object(robot,2),value(at,pair(2,1))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,500))).

	1	2
1	**PickingStation 1**	**Highway Robot 1**
2	**Highway Robot 2**	**Shelf 1 Product 1**

Case #7: The robot needs to deliver 500 units of product 1 to the picking station, and must choose the correct of the two picking stations to fill the order.

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 2
Products: 1
Orders: 1

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).
init(object(pickingStation,2),value(at,pair(2,1))).

init(object(robot,1),value(at,pair(1,2))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,500))).

	1	2
1	**PickingStation 1**	**Highway** **Robot 1**
2	**PickingStation 2**	**Shelf 1** **Product 1**

Case #8: The robot needs to deliver 500 units of product 1 to picking station 1 and 500 units of product 1 to picking station 2.

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 2
Products: 1
Orders: 2

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).
init(object(pickingStation,2),value(at,pair(2,1))).

init(object(robot,1),value(at,pair(1,2))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,500))).

init(object(order,2),value(pickingStation,2)).
init(object(order,2),value(line,pair(1,500))).

	1	2
1	**PickingStation 1**	**Highway** **Robot 1**
2	**PickingStation 2**	**Shelf 1** **Product 1**

Case #9: The robot needs to deliver 500 units of product 1 to the picking station, and must maneuver around 2 other robots to fulfill the order.

Grid: 4x4
Robots: 1
Shelf: 1
Picking Stations: 1
Products: 1
Orders: 1

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(highway,1),value(at,pair(1,2))).

init(object(pickingStation,1),value(at,pair(1,1))).
init(object(pickingStation,2),value(at,pair(2,1))).

init(object(robot,1),value(at,pair(1,2))).
init(object(robot,2),value(at,pair(1,1))).
init(object(robot,3),value(at,pair(2,1))).

init(object(shelf,1),value(at,pair(2,2))).

init(object(product,1),value(on,pair(1,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,500))).

init(object(order,2),value(pickingStation,2)).
init(object(order,2),value(line,pair(1,500))).

	1	2
1	**PickingStation 1** **Robot 2**	**Highway** **Robot 1**
2	**PickingStation 2** **Robot 3**	**Shelf 1** **Product 1**

Case #10: The robot needs to deliver 500 units of product 1 to the picking station, however the path is blocked by other shelves and the robot will have to pick up and move other shelves in order to bring the correct shelf to the picking station.

Grid: 4x4
Robots: 1
Shelf: 3
Picking Stations: 1
Products: 1
Orders: 1

init(object(node,1),value(at,pair(1,1))).
init(object(node,2),value(at,pair(1,2))).
init(object(node,3),value(at,pair(2,1))).
init(object(node,4),value(at,pair(2,2))).

init(object(pickingStation,1),value(at,pair(1,1))).

init(object(robot,1),value(at,pair(1,1))).

init(object(shelf,1),value(at,pair(2,1))).
init(object(shelf,2),value(at,pair(2,2))).
init(object(shelf,3),value(at,pair(1,2))).

init(object(product,1),value(on,pair(2,1000))).

init(object(order,1),value(pickingStation,1)).
init(object(order,1),value(line,pair(1,500))).

	1	2
1	**PickingStation 1** **Robot 1**	**Shelf 3**
2	**Shelf 1**	**Shelf 2** **Product 1**