Waste Collection Optimization Project

Planning and Reasoning

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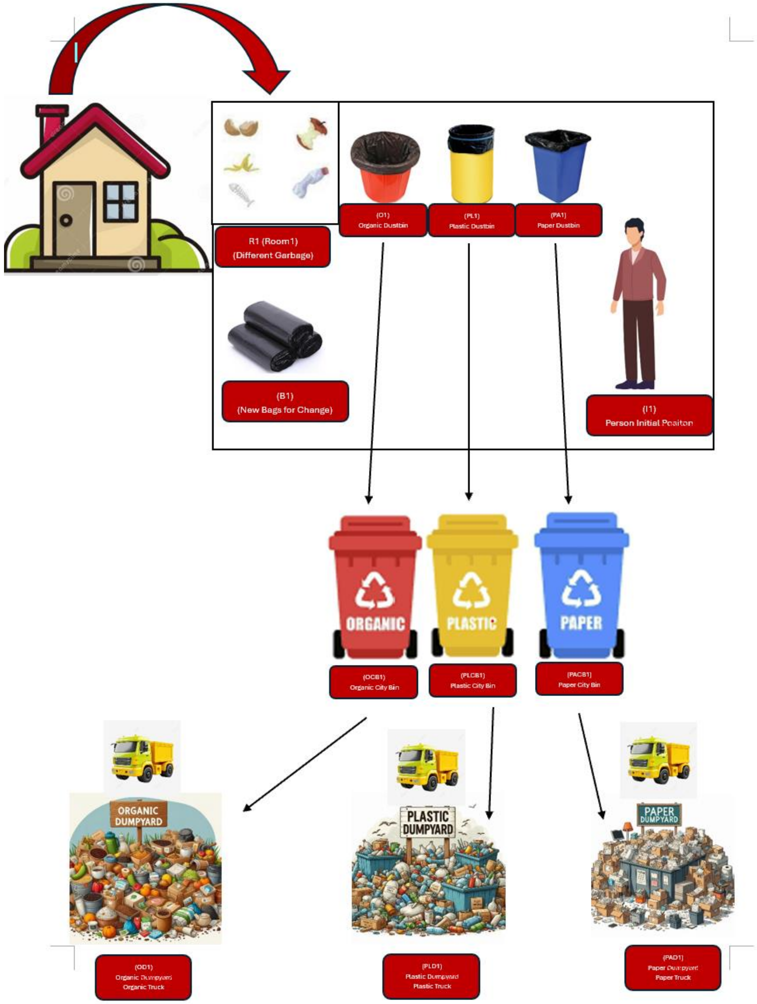
General Problem

- Begin at the initial position (I1).
- Move to room (R1) to collect one piece of garbage.
- Carry the garbage to the respective dustbin (O1, PL1, PA1).
- Continue collecting and disposing of garbage until all is collected or dustbins are full.
- When a dustbin is full, replace the bag, retrieve a new bag from B1, and dispose of the old bag at city bins (OCB1, PLC1, PAC1).
- Trucks from respective dumpyards (OD1, PLD1, PAD1) collect waste from all city bins and transport it back to dumpyards.

General Problem



Different Problems

Problem No.	Person	Rooms	Garbage	Dustbin	Dustbin Limit	City Bins	Trucks	Truck Limit	Dump yard	Matric
Problem 1	1 (Person For Room 1)	1	1 (Organic)	1 (Organic)	2 (Half, Full)	1 (Organic)	1 (Organic)	1 (CityBin 1)	1 (Organic)	Total cost only
Problem 2	1 (Person For Room 1)	1	2 (Organic)	1 (Organic)	2 (Half, Full)	1 (Organic)	1 (Organic)	1 (CityBin 1)	1 (Organic)	Total cost only
Problem 3	1 (Person For Room 1)	1	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (Half, Full)	1 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	1 (CityBin 1)	1 (Organic, Plastic, Paper)	Total cost only
Problem 4	2 (Persons For Room 1, Room 2)	2	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (Half, Full)	1 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	1 (CityBin 1)	1 (Organic, Plastic, Paper)	Total cost only
Problem 5	2 (Persons For Room 1, Room 2)	2	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (Half, Full)	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (CityBin 1, City Bin 2)	1 (Organic, Plastic, Paper)	Total cost only
Problem 6	2 (Persons For Room 1, Room 2)	2	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (Half, Full)	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (CityBin 1, City Bin 2)	1 (Organic, Plastic, Paper)	Distance cost calculation
Problem 7	3 (Persons For Room 1, Room 2, Room 3)	3	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (Half, Full)	2 (Organic, Plastic, Paper)	1 (Organic, Plastic, Paper)	2 (CityBin 1, City Bin 2)	1 (Organic, Plastic, Paper)	Distance cost calculation

Domain

Domain is different on the basis of metrics:

- Total Cost Only
- Distance Cost Calculation

Domain (Continue)

Objects:

- DustBin
- Location
- Bags
- Room
- Human
- HumanCarry
- garbageSubstance
- CityBin
- Truck
- Quantity
- Dumpyard

Domain (Continue)

Predicates:

- is_loc ?obj - object ?loc - location
- have_garbage ?garbage - garbageSubstance
- garbage_in_bin ?garbage - garbageSubstance ?bin - DustBin
- bin_full ?bin - DustBin
- bin_half ?bin - DustBin
- bin_clear ?bin - DustBin
- have_newBag ?bag - newBag
- have_oldBag ?bag - oldBag
- related ?thing_1 ?thing_2 - object
- person_hands_full ?person_capacity - HumanCarry
- person_hands_empty ?person_capacity - HumanCarry
- old_bag_dumb ?cityBin - CityBin ?q - quantity
- collected_cityBins_garbage ?cityBin - Citybin ?truck - Truck
- disposed_cityBins_garbage ?truck - Truck
- deposited_bin_garbage ?bin - DustBin
- plus1 ?q1 ?q2 - quantity
- Truck_capacity ?truck - Truck ?q - quantity
- between ?obj - object ?q_less_one ?q - quantity

Domain (Continue)

Actions:

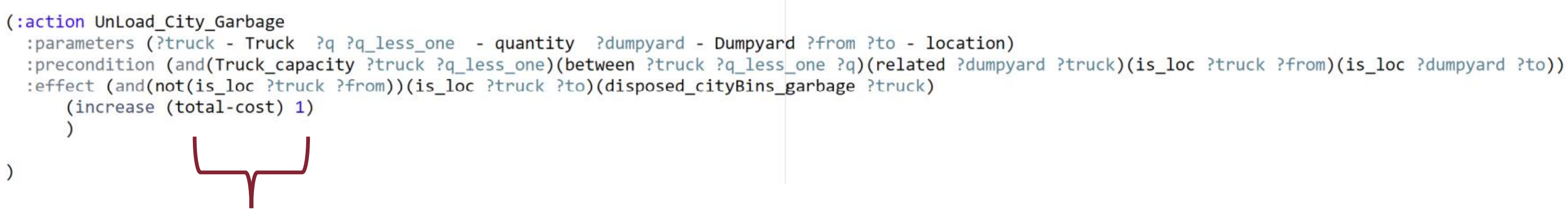
- Move_To_Bin
- Move
- Move_To_Room
- Fill_Bin_Partially
- Fill_Bin_Completely
- Get_New_Bag
- Move_To_Bin_To_Change_Bag
- Detach_Old_Bag
- Move_Person_To_CityBin
- Load_City_Garbage
- UnLoad_City_Garbage

Metrics

In this project, I am using 2 different metrics.

- **Total Cost Only:**

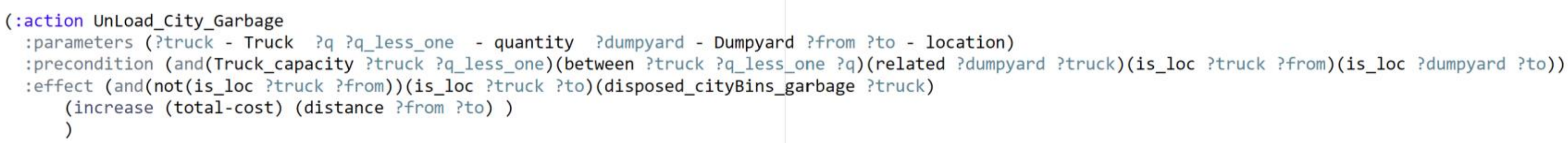
Cost=1 (for every action), Minimize total cost



```
(:action UnLoad_City_Garbage
  :parameters (?truck - Truck  ?q ?q_less_one  - quantity  ?dumpyard - Dumpyard ?from ?to - location)
  :precondition (and(Truck_capacity ?truck ?q_less_one)(between ?truck ?q_less_one ?q)(related ?dumpyard ?truck)(is_loc ?truck ?from)(is_loc ?dumpyard ?to))
  :effect (and(not(is_loc ?truck ?from))(is_loc ?truck ?to)(disposed_cityBins_garbage ?truck)
      (increase (total-cost) 1)
      )
)
```

- **Distance Cost Calculation:**

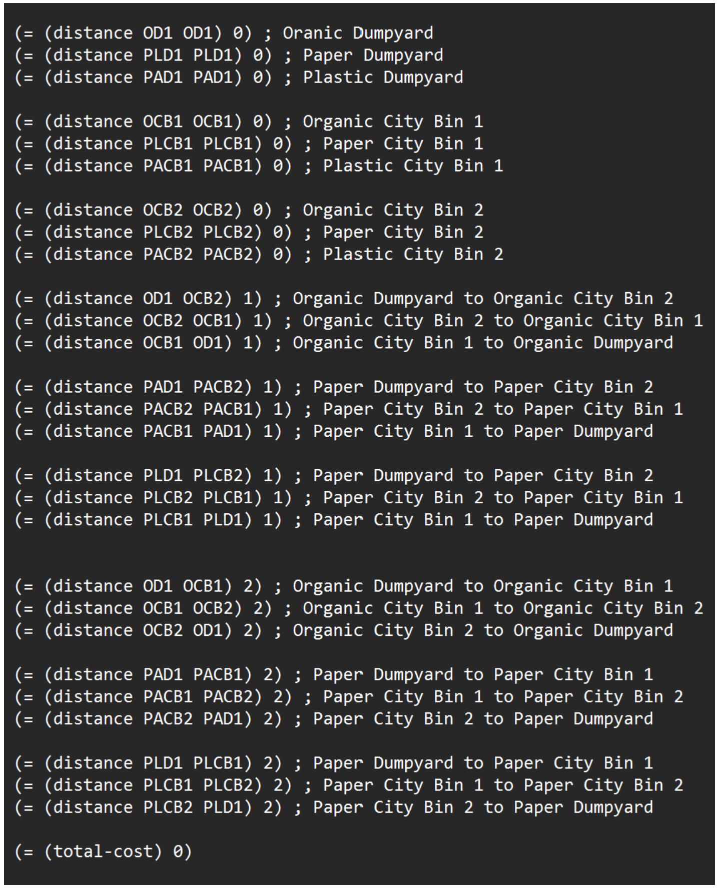
Cost (Depend upon diatance), Minimze total cost



```
(:action UnLoad_City_Garbage
  :parameters (?truck - Truck  ?q ?q_less_one  - quantity  ?dumpyard - Dumpyard ?from ?to - location)
  :precondition (and(Truck_capacity ?truck ?q_less_one)(between ?truck ?q_less_one ?q)(related ?dumpyard ?truck)(is_loc ?truck ?from)(is_loc ?dumpyard ?to))
  :effect (and(not(is_loc ?truck ?from))(is_loc ?truck ?to)(disposed_cityBins_garbage ?truck)
      (increase (total-cost) (distance ?from ?to) )
      )
```

Distance Cost Calculation (Problem File)

Cost (Depend upon diatance), Minimze total cost



```
(= (distance OD1 OD1) 0) ; Oranic Dumpyard
(= (distance PLD1 PLD1) 0) ; Paper Dumpyard
(= (distance PAD1 PAD1) 0) ; Plastic Dumpyard

(= (distance OCB1 OCB1) 0) ; Organic City Bin 1
(= (distance PLCB1 PLCB1) 0) ; Paper City Bin 1
(= (distance PACB1 PACB1) 0) ; Plastic City Bin 1

(= (distance OCB2 OCB2) 0) ; Organic City Bin 2
(= (distance PLCB2 PLCB2) 0) ; Paper City Bin 2
(= (distance PACB2 PACB2) 0) ; Plastic City Bin 2

(= (distance OD1 OCB2) 1) ; Organic Dumpyard to Organic City Bin 2
(= (distance OCB2 OCB1) 1) ; Organic City Bin 2 to Organic City Bin 1
(= (distance OCB1 OD1) 1) ; Organic City Bin 1 to Organic Dumpyard

(= (distance PAD1 PACB2) 1) ; Paper Dumpyard to Paper City Bin 2
(= (distance PACB2 PACB1) 1) ; Paper City Bin 2 to Paper City Bin 1
(= (distance PACB1 PAD1) 1) ; Paper City Bin 1 to Paper Dumpyard

(= (distance PLD1 PLCB2) 1) ; Paper Dumpyard to Paper City Bin 2
(= (distance PLCB2 PLCB1) 1) ; Paper City Bin 2 to Paper City Bin 1
(= (distance PLCB1 PLD1) 1) ; Paper City Bin 1 to Paper Dumpyard


(= (distance OD1 OCB1) 2) ; Organic Dumpyard to Organic City Bin 1
(= (distance OCB1 OCB2) 2) ; Organic City Bin 1 to Organic City Bin 2
(= (distance OCB2 OD1) 2) ; Organic City Bin 2 to Organic Dumpyard

(= (distance PAD1 PACB1) 2) ; Paper Dumpyard to Paper City Bin 1
(= (distance PACB1 PACB2) 2) ; Paper City Bin 1 to Paper City Bin 2
(= (distance PACB2 PAD1) 2) ; Paper City Bin 2 to Paper Dumpyard

(= (distance PLD1 PLCB1) 2) ; Paper Dumpyard to Paper City Bin 1
(= (distance PLCB1 PLCB2) 2) ; Paper City Bin 1 to Paper City Bin 2
(= (distance PLCB2 PLD1) 2) ; Paper City Bin 2 to Paper Dumpyard

(= (total-cost) 0)
```

Planner

Description:

Fast Downward is a PDDL automated planning system that supports classical planning.

Functionality:

Fast Downward operates by translating PDDL descriptions into a graph-search problem. In this process, nodes represent states visited by the planner. It incrementally builds this graph in a forward manner while being guided by a heuristic function. This guidance helps the planner explore only those nodes whose associated states are reachable from the initial state, thus efficiently moving towards achieving the specified goals.

Operating System Compatibility: Fast Downward is compatible with various operating systems, including Linux, macOS, and Windows.

Planner (Continue)

Command:

The general command for running Fast Downward typically follows this format:

```
./fast-downward.py <domain_file> <problem_file> [options]
```

Here,

./fast-downward.py: Command to execute the Fast Downward planner.

<domain_file>: The PDDL file describing the domain.

<problem_file>: The PDDL file describing the problem instance.

[options]: Optional arguments that can be provided to customize the planning process, such as search algorithm selection, heuristic options, etc.

Fast Downward official documentation: https://www.fast-downward.org/

Search Algorithm:

Introduction to A*:

- A* is a widely used pathfinding and graph traversal algorithm.
- It is known for its efficiency in finding the shortest path from a start node to a goal node.
- A* combines the benefits of Dijkstra's algorithm and Greedy Best-First-Search by using a heuristic to prioritize nodes.

Node Expansion:

Continuously expand the node with the lowest estimated cost

$$\boxed{f = g + h}$$

Where,

- g: Cost from the start node to the current node.
- h: Heuristic estimate of the cost from the current node to the goal.

Optimal:

- Optimal if h admissible and consistent.
- If h admissible and reopening is used.

Fast Downward Search Algorithms: https://www.fast-downward.org/Doc/SearchAlgorithm

Note: Generally, in Fast Downward, A* uses reopening. There is no method to set reopening to false in A* (Fast Downward), unlike other search algorithms in fast Downward.

Heuristics:

- **Optimal Heuristic**
  - **Hmax:** Admissible = Yes, Consistent = Yes.
  - **Blind:** Admissible = Yes, Consistent = Yes.

- **Non Optimal Heuristic**
  - **Hff:** Admissible = No, Consistent = No.
  - **Hadd:** Admissible = No, Consistent = No.

Fast Downward Heuristic: https://www.fast-downward.org/Doc/Evaluator

Evalution:

- Plan Length step (s)
- Execution Time (seconds)
- Generated States (s)
- Plan cost (If plan found)

Result:

Blind (A*)

Problems	Plan Length step(s)	Execution Time (s)	Generated States state(s)	Cost
Problem 1	10	0.0144413	131	10
Problem 2	13	0.00993063	221	13
Problem 3	37	0.0444688	63665	37
Problem 4	68	85.7429	357852046	68
Problem 5	71	1771.61	737084364	71
Problem 6	71	1724.42	737597113	71
Problem 7	N/A	N/A	N/A	N/A
Average	**45**	**596.9736235**	**305432923**	**45**

Note: In problem 7 (N/A) means it is not executable, because of too much complexity planer stop automatically after some hours.

Result:

Hmax (A*)

Problems	Plan Length step(s)	Execution Time (s)	Generated States state(s)	Cost
Problem 1	10	0.0112963	101	10
Problem 2	13	0.0112921	191	13
Problem 3	37	0.132519	63287	37
Problem 4	68	371.912	357826248	68
Problem 5	71	1983.53	1464807292	71
Problem 6	71	2029.85	1463257888	71
Problem 7	N/A	N/A	N/A	N/A
Average	**45**	**730.9078512**	**547659167.8**	**45**

Note: In problem 7 (N/A) means it is not executable, because of too much complexity planer stop automatically after some hours.

Result:

Hadd (A*)

Problems	Plan Length step(s)	Execution Time (s)	Generated States state(s)	Cost
Problem 1	10	0.0135257	35	10
Problem 2	13	0.015098	45	13
Problem 3	37	0.0190317	1915	37
Problem 4	73	0.323451	51102	73
Problem 5	73	1.51126	736376	73
Problem 6	73	1.5884	745842	82
Problem 7	109	113.18	84381407	118
Average	**55.42857143**	**16.6643952**	**12273817.4**	**58**

Note: hadd executed problem 7.

Result:

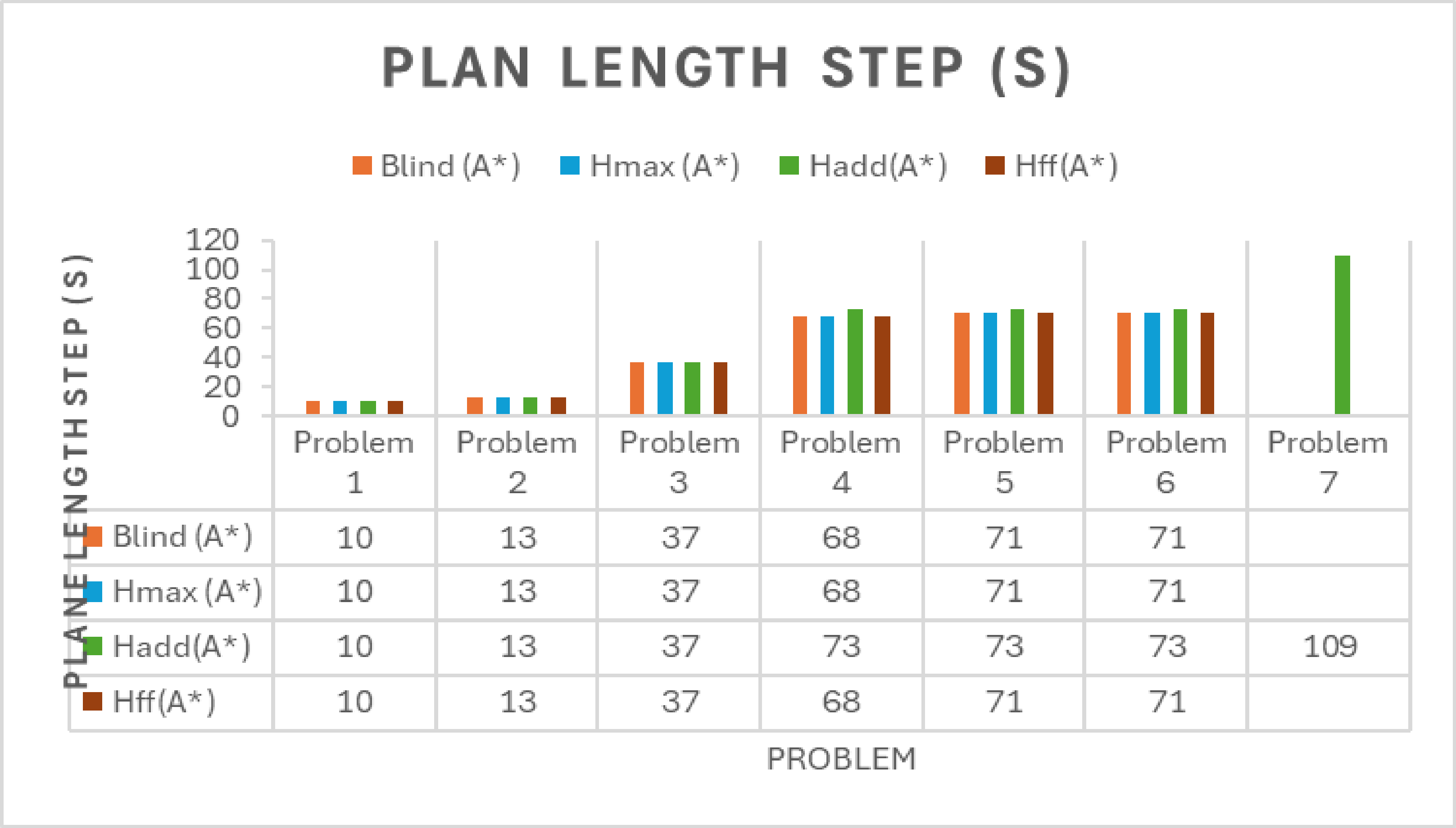
Hff (A*)

Problems	Plan Length step(s)	Execution Time (s)	Generated States state(s)	Cost
Problem 1	10	0.01217	41	10
Problem 2	13	0.0117666	74	13
Problem 3	37	0.114012	40070	37
Problem 4	68	343.166	163833816	68
Problem 5	71	1274.42	461517473	71
Problem 6	71	1036	398109938	71
Problem 7	N/A	N/A	N/A	N/A
Average	**45**	**442.2873248**	**170583568.7**	**45**

Note: In problem 7 (N/A) means it is not executable, because of too much complexity planer stop automatically after some hours.

Result:

Plan Length Step(s)

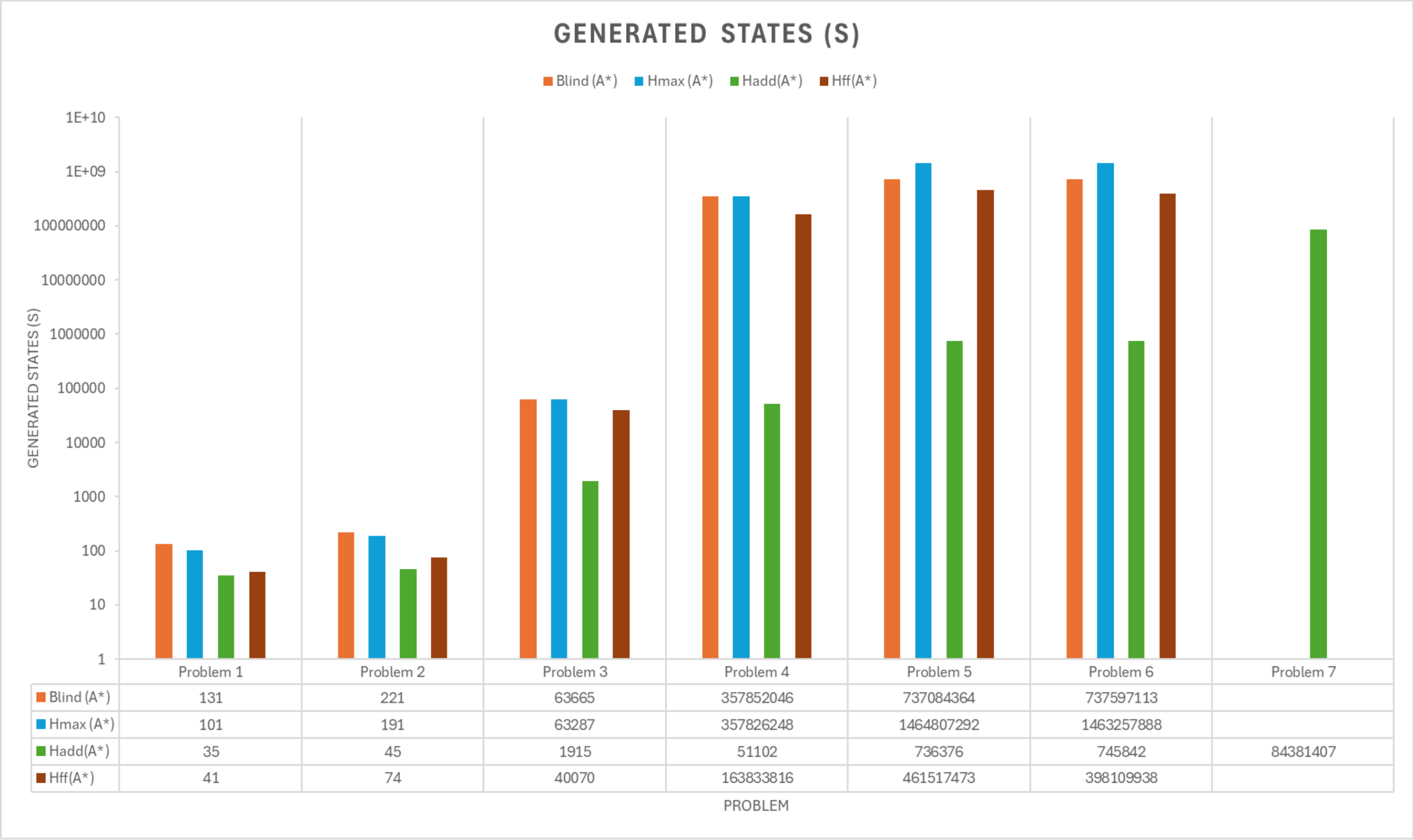


PLAN LENGTH STEP (S)

	Problem 1	Problem 2	Problem 3	Problem 4	Problem 5	Problem 6	Problem 7
🟧 Blind (A*)	10	13	37	68	71	71	
🟦 Hmax (A*)	10	13	37	68	71	71	
🟩 Hadd(A*)	10	13	37	73	73	73	109
🟫 Hff(A*)	10	13	37	68	71	71	

Result:

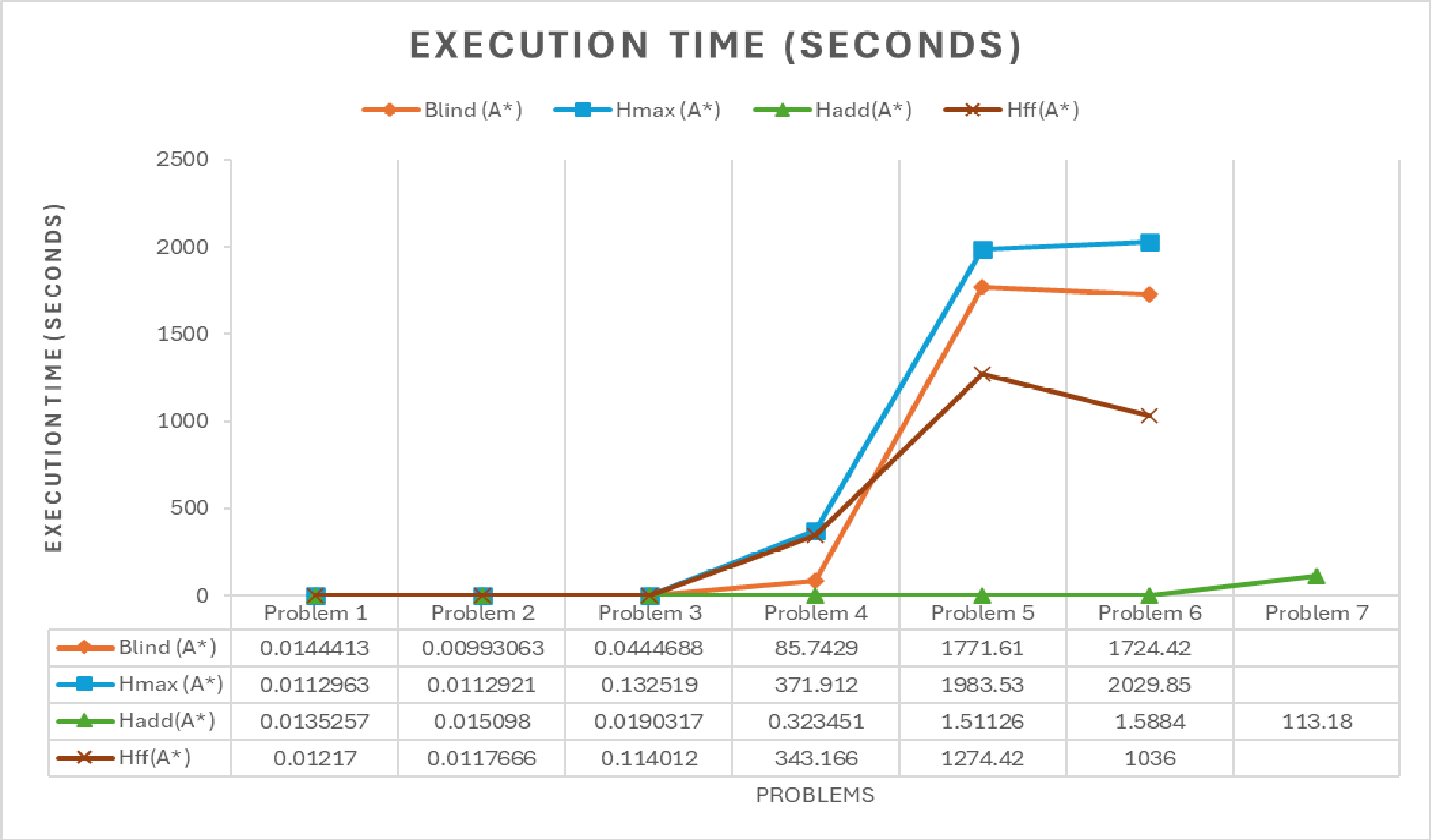
Generated States (s)



	Problem 1	Problem 2	Problem 3	Problem 4	Problem 5	Problem 6	Problem 7
🟧 Blind (A*)	131	221	63665	357852046	737084364	737597113	
🟦 Hmax (A*)	101	191	63287	357826248	1464807292	1463257888	
🟩 Hadd(A*)	35	45	1915	51102	736376	745842	84381407
🟫 Hff(A*)	41	74	40070	163833816	461517473	398109938	

Result:

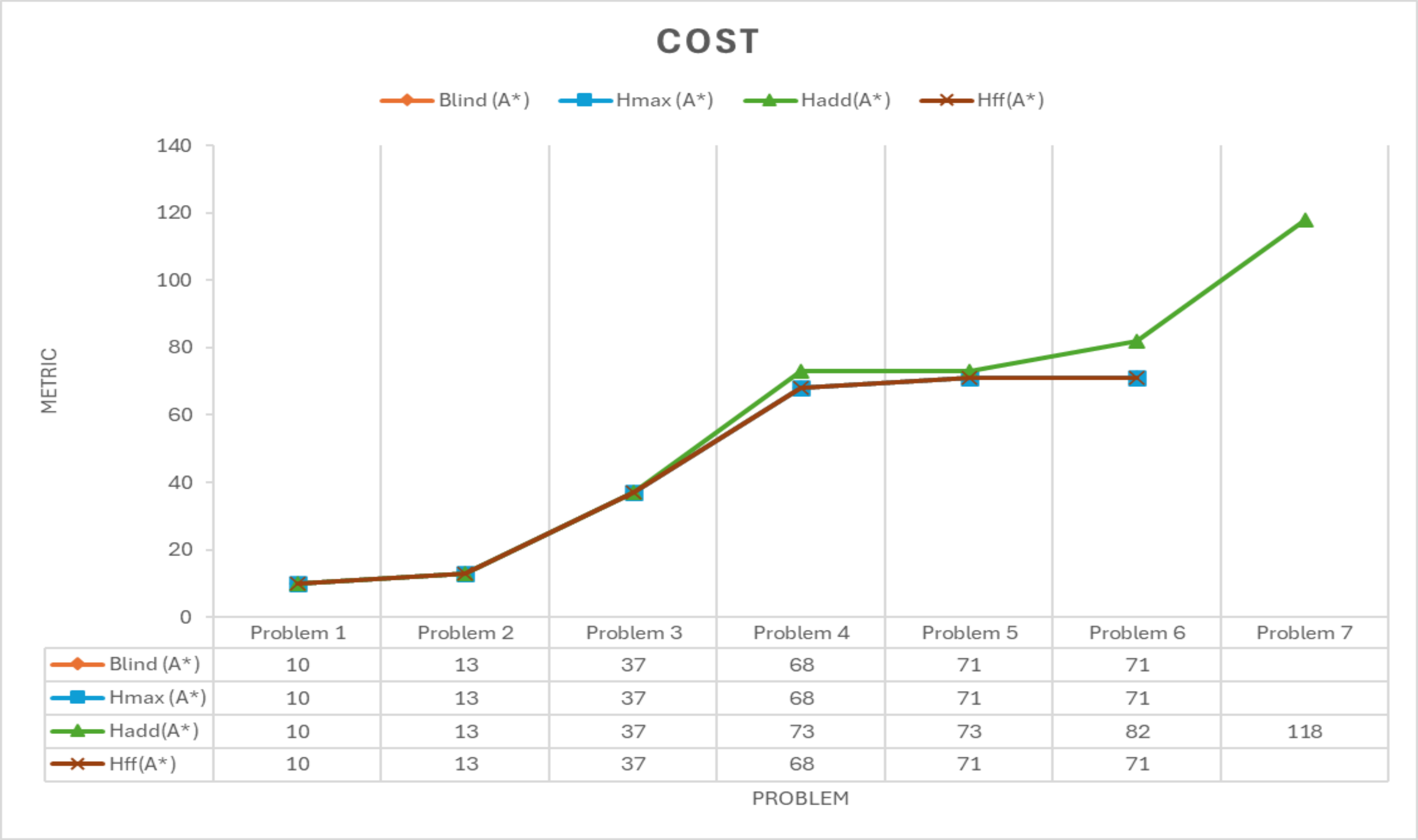
Execution Time (Seconds)



	Problem 1	Problem 2	Problem 3	Problem 4	Problem 5	Problem 6	Problem 7
Blind (A*)	0.0144413	0.00993063	0.0444688	85.7429	1771.61	1724.42	
Hmax (A*)	0.0112963	0.0112921	0.132519	371.912	1983.53	2029.85	
Hadd(A*)	0.0135257	0.015098	0.0190317	0.323451	1.51126	1.5884	113.18
Hff(A*)	0.01217	0.0117666	0.114012	343.166	1274.42	1036	

Result:

Cost

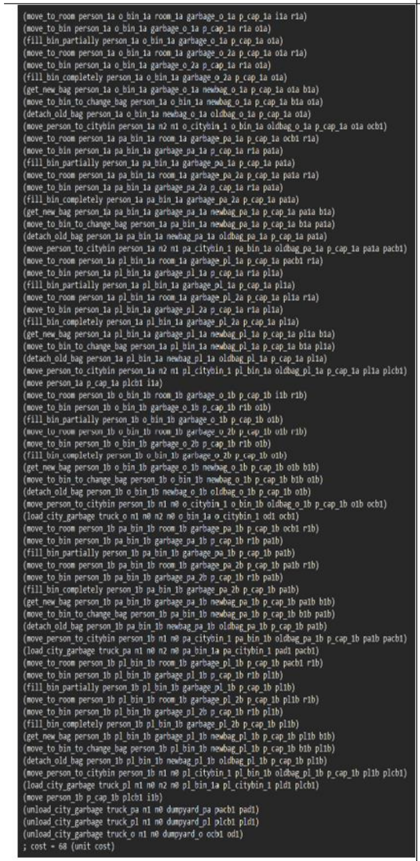


	Problem 1	Problem 2	Problem 3	Problem 4	Problem 5	Problem 6	Problem 7
Blind (A*)	10	13	37	68	71	71	
Hmax (A*)	10	13	37	68	71	71	
Hadd(A*)	10	13	37	73	73	82	118
Hff(A*)	10	13	37	68	71	71	

Problem 4

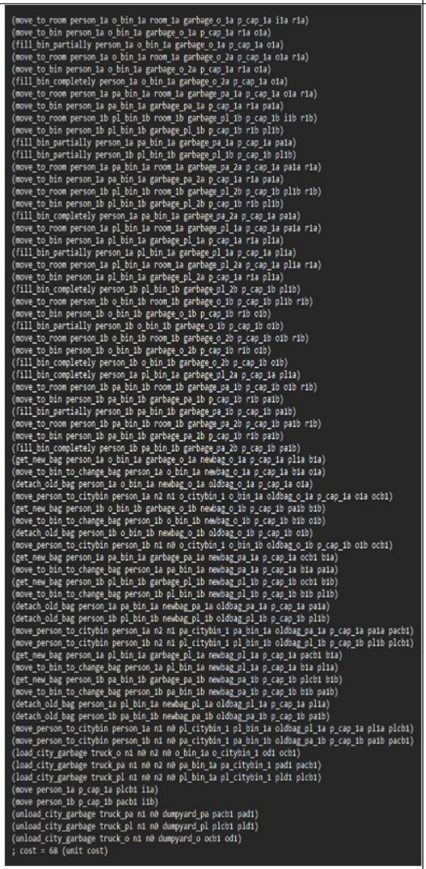
Person = 2, **Rooms** = 2, **Garbage** = 2 (Organic, Plastic, Paper), **Dustbin** = 1 (Organic, Plastic, Paper), **City Bins** = 1 (Organic, Plastic, Paper), **Trucks** = 1 (Organic, Plastic, Paper), **Truck Limit** = 1 (City Bin 1), **Dump yard** = 1 (Organic, Plastic, Paper), **Matric** = Total cost only

Blind



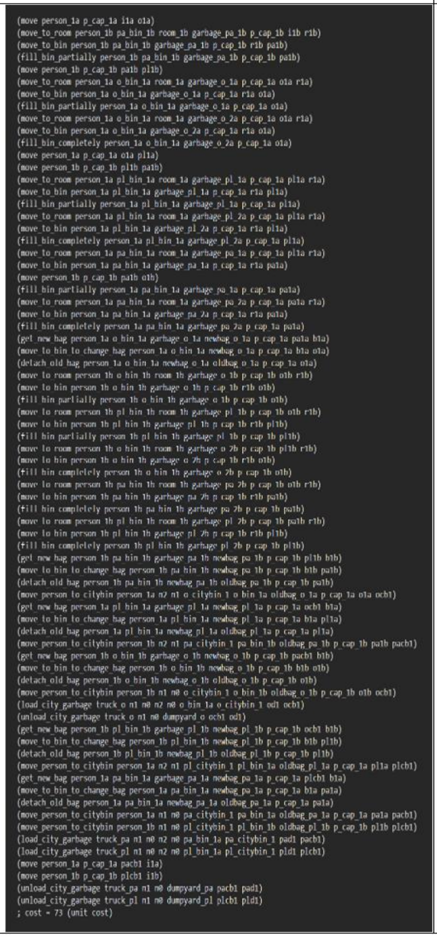
```
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a i1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n2 n1 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a ocb1 r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pa1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n2 n1 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pacb1 r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pl1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1a n2 n1 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(move person_1a p_cap_1a plcb1 i1a)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b o1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_1 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb1)
(load_city_garbage truck_o n1 n0 n2 n0 o_bin_1a o_citybin_1 od1 ocb1)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b ocb1 r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1b n1 n0 pa_citybin_1 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb1)
(load_city_garbage truck_pa n1 n0 n2 n0 pa_bin_1a pa_citybin_1 pad1 pacb1)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b pacb1 r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_1 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb1)
(load_city_garbage truck_pl n1 n0 n2 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(move person_1b p_cap_1b plcb1 i1b)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
; cost = 68 (unit cost)
```

Hmax



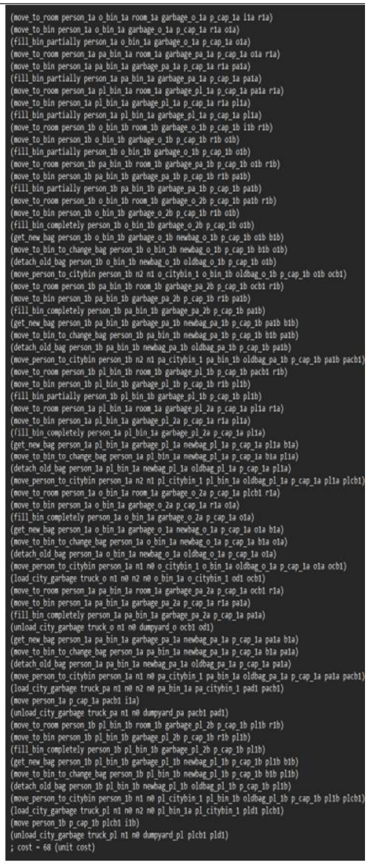
```
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a i1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a o1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b i1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pa1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pa1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b pl1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b o1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a pl1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n2 n1 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_1 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb1)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a ocb1 b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b ocb1 b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1a n2 n1 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(move_person_to_citybin person_1b n2 n1 pl_citybin_1 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb1)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pacb1 b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b plcb1 b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(move_person_to_citybin person_1b n1 n0 pa_citybin_1 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb1)
(load_city_garbage truck_o n1 n0 n2 n0 o_bin_1a o_citybin_1 od1 ocb1)
(load_city_garbage truck_pa n1 n0 n2 n0 pa_bin_1a pa_citybin_1 pad1 pacb1)
(load_city_garbage truck_pl n1 n0 n2 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(move person_1a p_cap_1a plcb1 i1a)
(move person_1b p_cap_1b pacb1 i1b)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
; cost = 68 (unit cost)
```

Hadd



```
(move person_1a p_cap_1a i1a o1a)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b i1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move person_1b p_cap_1b pa1b pl1b)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(move person_1a p_cap_1a o1a pl1a)
(move person_1b p_cap_1b pl1b pa1b)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a pl1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(move person_1b p_cap_1b pa1b o1b)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pa1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b o1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b o1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1a n2 n1 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a ocb1 b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1b n2 n1 pa_citybin_1 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb1)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b pacb1 b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_1 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb1)
(load_city_garbage truck_o n1 n0 n2 n0 o_bin_1a o_citybin_1 od1 ocb1)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b ocb1 b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1a n2 n1 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a plcb1 b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(move_person_to_citybin person_1b n1 n0 pl_citybin_1 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb1)
(load_city_garbage truck_pa n1 n0 n2 n0 pa_bin_1a pa_citybin_1 pad1 pacb1)
(load_city_garbage truck_pl n1 n0 n2 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(move person_1a p_cap_1a pacb1 i1a)
(move person_1b p_cap_1b plcb1 i1b)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
; cost = 73 (unit cost)
```

Hff

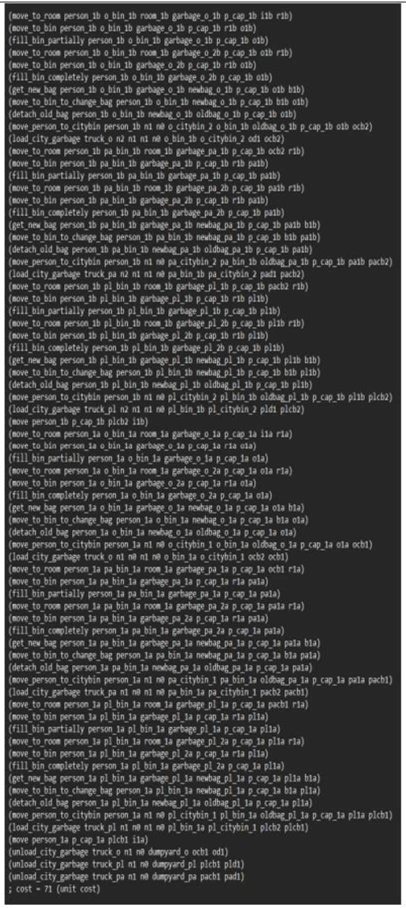


```
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a i1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a o1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pa1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n2 n1 o_citybin_1 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb1)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b ocb1 r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1b n2 n1 pa_citybin_1 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb1)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b pacb1 r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pl1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1a n2 n1 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a plcb1 r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(load_city_garbage truck_o n1 n0 n2 n0 o_bin_1a o_citybin_1 od1 ocb1)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a ocb1 r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(load_city_garbage truck_pa n1 n0 n2 n0 pa_bin_1a pa_citybin_1 pad1 pacb1)
(move person_1a p_cap_1a pacb1 i1a)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_1 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb1)
(load_city_garbage truck_pl n1 n0 n2 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(move person_1b p_cap_1b plcb1 i1b)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
; cost = 68 (unit cost)
```

Problem 5

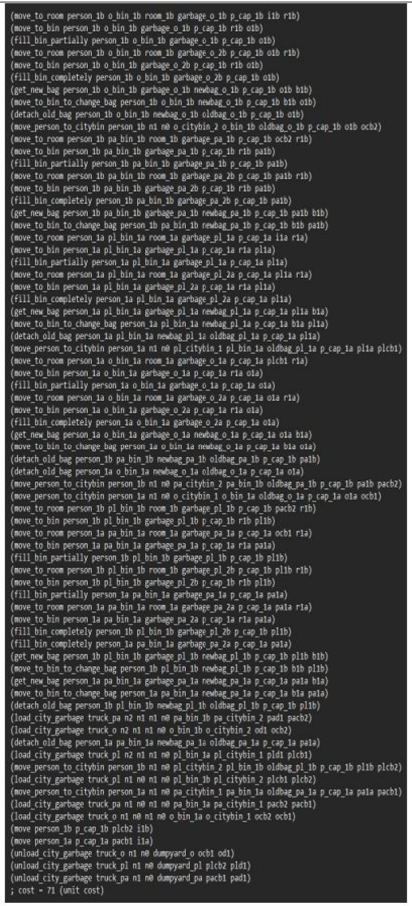
Person = 2, **Rooms** = 2, **Garbage** = 2 (Organic, Plastic, Paper), **Dustbin** = 1 (Organic, Plastic, Paper), **City Bins** = 2 (Organic, Plastic, Paper), **Trucks** = 1 (Organic, Plastic, Paper), **Truck Limit** = 2 (City Bin 1, City Bin 2), **Dump yard** = 1 (Organic, Plastic, Paper), **Matric** = Total cost only

Blind



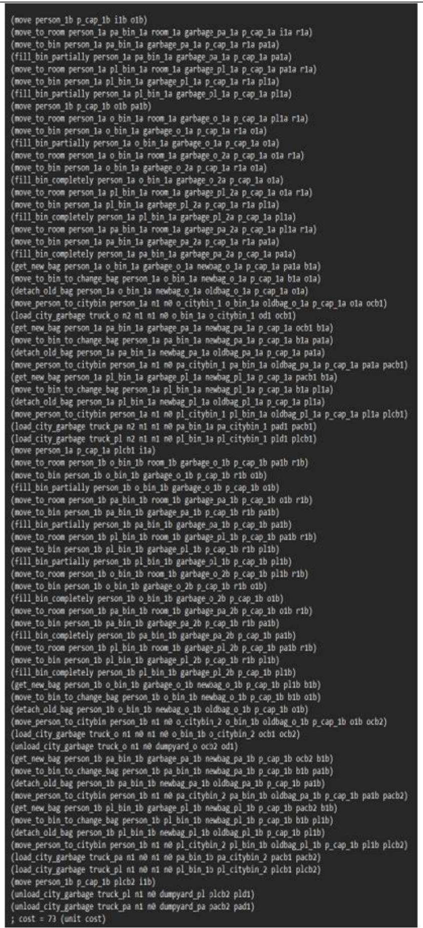
```
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b o1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2)
(load_city_garbage truck_o n2 n1 n1 n0 o_bin_1b o_citybin_2 od1 ocb2)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b ocb2 r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2)
(load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1b pa_citybin_2 pad1 pacb2)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b pacb2 r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2)
(load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1b pl_citybin_2 pld1 plcb2)
(move person_1b p_cap_1b plcb2 i1b)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a i1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1a o_citybin_1 ocb2 ocb1)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a ocb1 r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pa1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1a pa_citybin_1 pacb2 pacb1)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pacb1 r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pl1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1a pl_citybin_1 plcb2 plcb1)
(move person_1a p_cap_1a plcb1 i1a)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
; cost = 71 (unit cost)
```

Hmax



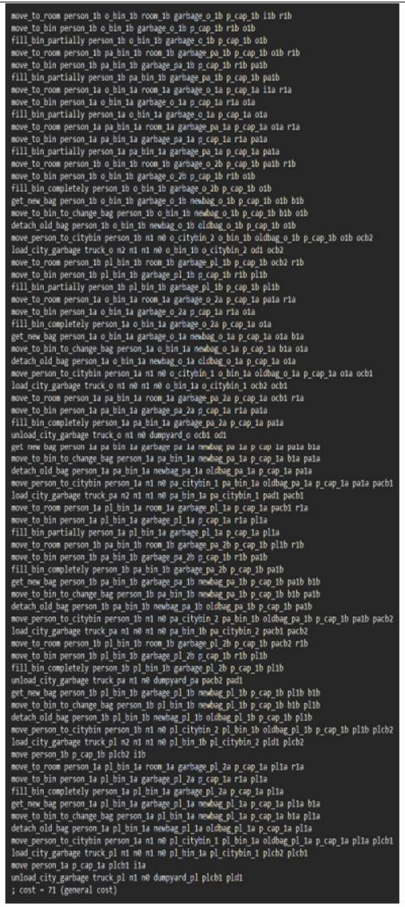
```
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b o1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b ocb2 r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a i1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pl1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a plcb1 r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b pacb2 r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a ocb1 r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pa1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1b pa_citybin_2 pad1 pacb2)
(load_city_garbage truck_o n2 n1 n1 n0 o_bin_1b o_citybin_2 od1 ocb2)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1b pl_citybin_2 plcb1 plcb2)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1a pa_citybin_1 pacb2 pacb1)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1a o_citybin_1 ocb2 ocb1)
(move person_1b p_cap_1b plcb2 i1b)
(move person_1a p_cap_1a pacb1 i1a)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb2 pld1)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
; cost = 71 (unit cost)
```

Hadd



```
(move person_1b p_cap_1b i1b o1b)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a i1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pa1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move person_1b p_cap_1b o1b pa1b)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a pl1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a o1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(load_city_garbage truck_o n2 n1 n1 n0 o_bin_1a o_citybin_1 od1 ocb1)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a ocb1 b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pacb1 b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1a pa_citybin_1 pad1 pacb1)
(load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(move person_1a p_cap_1a plcb1 i1a)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b pa1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b pa1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1b o_citybin_2 ocb1 ocb2)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb2 od1)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b ocb2 b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pacb2 b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1b pa_citybin_2 pacb1 pacb2)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1b pl_citybin_2 plcb1 plcb2)
(move person_1b p_cap_1b plcb2 i1b)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb2 pld1)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb2 pad1)
; cost = 73 (unit cost)
```

Hff

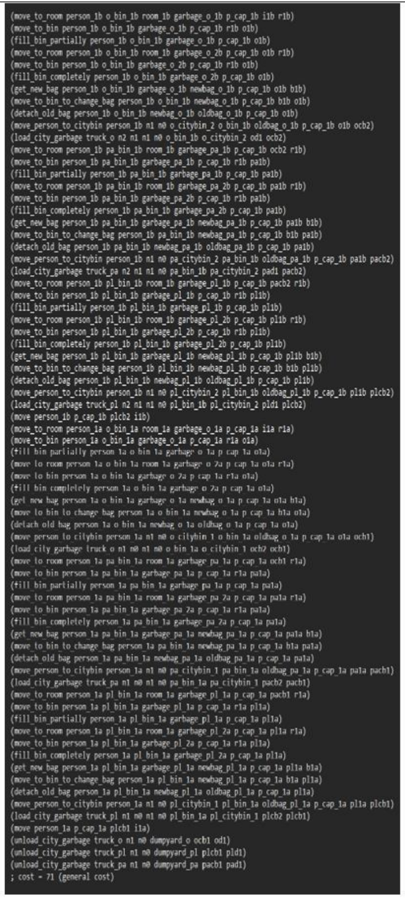


```
move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b
move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b
fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b
move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b o1b r1b
move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b
fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b
move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a i1a r1a
move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a
fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a
move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a o1a r1a
move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a
fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a
move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b pa1b r1b
move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b
fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b
get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b
move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b
detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b
move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2
load_city_garbage truck_o n2 n1 n1 n0 o_bin_1b o_citybin_2 od1 ocb2
move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b ocb2 r1b
move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b
fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b
move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a pa1a r1a
move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a
fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a
get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a
move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a
detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a
move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1
load_city_garbage truck_o n1 n0 n1 n0 o_bin_1a o_citybin_1 ocb2 ocb1
move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a ocb1 r1a
move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a
fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a
unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1
get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a
move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a
detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a
move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1
load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1a pa_citybin_1 pad1 pacb1
move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pacb1 r1a
move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a
fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a
move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b pl1b r1b
move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b
fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b
get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b
move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b
detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b
move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2
load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1b pa_citybin_2 pacb1 pacb2
move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pacb2 r1b
move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b
fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b
unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb2 pad1
get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b
move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b
detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b
move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2
load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1b pl_citybin_2 pld1 plcb2
move person_1b p_cap_1b plcb2 i1b
move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a
move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a
fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a
get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pl1a b1a
move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a
detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a
move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1
load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1a pl_citybin_1 plcb2 plcb1
move person_1a p_cap_1a plcb1 i1a
unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1
; cost = 71 (general cost)
```

Problem 6

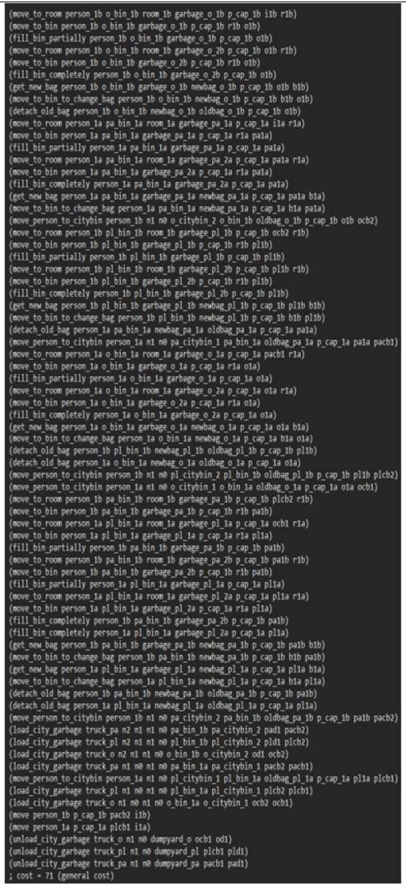
Person = 2, **Rooms** = 2, **Garbage** = 2 (Organic, Plastic, Paper), **Dustbin** = 1 (Organic, Plastic, Paper), **City Bins** = 2 (Organic, Plastic, Paper), **Trucks** = 1 (Organic, Plastic, Paper), **Truck Limit** = 2 (City Bin 1, City Bin 2), **Dump yard** = 1 (Organic, Plastic, Paper), **Matric** = Distance cost calculation

Blind



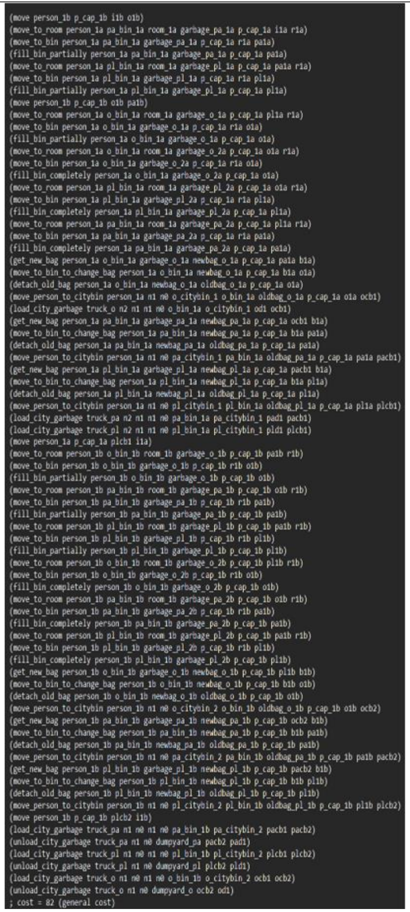
```
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b o1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2)
(load_city_garbage truck_o n2 n1 n1 n0 o_bin_1b o_citybin_2 od1 ocb2)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b ocb2 r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2)
(load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1b pa_citybin_2 pad1 pacb2)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b pacb2 r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2)
(load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1b pl_citybin_2 pld1 plcb2)
(move person_1b p_cap_1b plcb2 i1b)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a i1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1a o_citybin_1 ocb2 ocb1)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a ocb1 r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pa1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1a pa_citybin_1 pacb2 pacb1)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pacb1 r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pl1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1a pl_citybin_1 plcb2 plcb1)
(move person_1a p_cap_1a plcb1 i1a)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
; cost = 71 (general cost)
```

Hmax



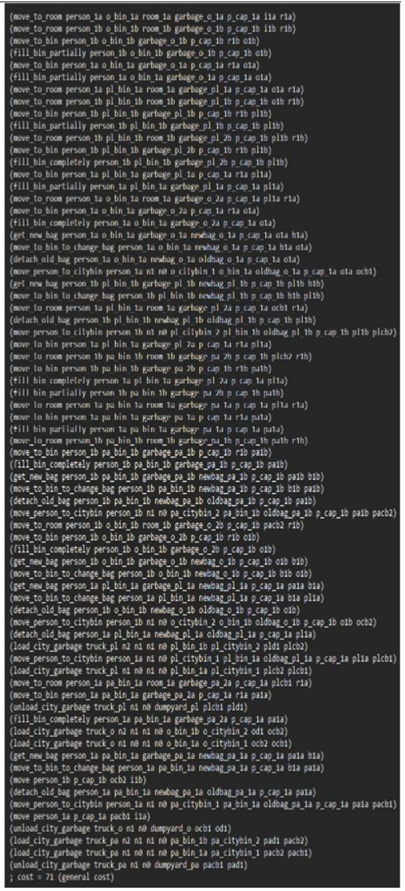
```
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b o1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a i1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pa1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b ocb2 r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a pacb1 r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b plcb2 r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a ocb1 r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pl1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2)
(load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1b pa_citybin_2 pad1 pacb2)
(load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1b pl_citybin_2 pld1 plcb2)
(load_city_garbage truck_o n2 n1 n1 n0 o_bin_1b o_citybin_2 od1 ocb2)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1a pa_citybin_1 pacb2 pacb1)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1a pl_citybin_1 plcb2 plcb1)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1a o_citybin_1 ocb2 ocb1)
(move person_1b p_cap_1b pacb2 i1b)
(move person_1a p_cap_1a plcb1 i1a)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
; cost = 71 (general cost)
```

Hadd



```
(move person_1b p_cap_1b i1b o1b)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a i1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a pa1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move person_1b p_cap_1b o1b pa1b)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a pl1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a o1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(load_city_garbage truck_o n2 n1 n1 n0 o_bin_1a o_citybin_1 od1 ocb1)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a ocb1 b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pacb1 b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1a pa_citybin_1 pad1 pacb1)
(load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(move person_1a p_cap_1a plcb1 i1a)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b pa1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b pa1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pa1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b ocb2 b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pacb2 b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2)
(move person_1b p_cap_1b plcb2 i1b)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1b pa_citybin_2 pacb1 pacb2)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb2 pad1)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1b pl_citybin_2 plcb1 plcb2)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb2 pld1)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1b o_citybin_2 ocb1 ocb2)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb2 od1)
; cost = 82 (general cost)
```

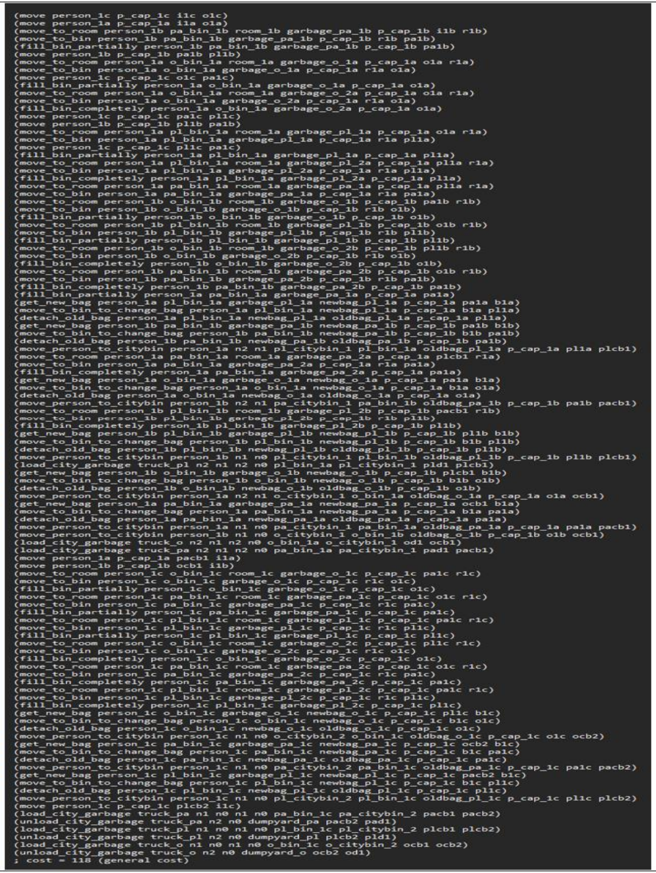
Hff



```
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a i1a r1a)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b i1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a o1a r1a)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b o1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a o1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1a n1 n0 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a ocb1 r1a)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_2 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb2)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b plcb2 r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a pl1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b pa1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1b n1 n0 pa_citybin_2 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb2)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b pacb2 r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b o1b b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1b n1 n0 o_citybin_2 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb2)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(load_city_garbage truck_pl n2 n1 n1 n0 pl_bin_1b pl_citybin_2 pld1 plcb2)
(move_person_to_citybin person_1a n1 n0 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1a pl_citybin_1 plcb2 plcb1)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a plcb1 r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(unload_city_garbage truck_pl n1 n0 dumpyard_pl plcb1 pld1)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(load_city_garbage truck_o n2 n1 n1 n0 o_bin_1b o_citybin_2 od1 ocb2)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1a o_citybin_1 ocb2 ocb1)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(move person_1b p_cap_1b ocb2 i1b)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(move person_1a p_cap_1a pacb1 i1a)
(unload_city_garbage truck_o n1 n0 dumpyard_o ocb1 od1)
(load_city_garbage truck_pa n2 n1 n1 n0 pa_bin_1b pa_citybin_2 pad1 pacb2)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1a pa_citybin_1 pacb2 pacb1)
(unload_city_garbage truck_pa n1 n0 dumpyard_pa pacb1 pad1)
; cost = 71 (general cost)
```

Problem 7

Person = 3, **Rooms** = 3, **Garbage** = 2 (Organic, Plastic, Paper), **Dustbin** = 1 (Organic, Plastic, Paper), **City Bins** = 2 (Organic, Plastic, Paper), **Trucks** = 1 (Organic, Plastic, Paper), **Truck Limit** = 2 (City Bin 1, City Bin 2), **Dump yard** = 1 (Organic, Plastic, Paper), **Matric** = Distance cost calculation

Blind	Hmax	Hadd	Hff
Not Executable (Take too much time and then terminate automatically)	Not Executable (Take too much time and then terminate automatically)		Not Executable (Take too much time and then terminate automatically)

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(move person_1c p_cap_1c i1c o1c)
(move person_1a p_cap_1a i1a o1a)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_1b p_cap_1b i1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_1b p_cap_1b r1b pa1b)
(fill_bin_partially person_1b pa_bin_1b garbage_pa_1b p_cap_1b pa1b)
(move person_1b p_cap_1b pa1b pl1b)
(move_to_room person_1a o_bin_1a room_1a garbage_o_1a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_1a p_cap_1a r1a o1a)
(move person_1c p_cap_1c o1c pa1c)
(fill_bin_partially person_1a o_bin_1a garbage_o_1a p_cap_1a o1a)
(move_to_room person_1a o_bin_1a room_1a garbage_o_2a p_cap_1a o1a r1a)
(move_to_bin person_1a o_bin_1a garbage_o_2a p_cap_1a r1a o1a)
(fill_bin_completely person_1a o_bin_1a garbage_o_2a p_cap_1a o1a)
(move person_1c p_cap_1c pa1c pl1c)
(move person_1b p_cap_1b pl1b pa1b)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_1a p_cap_1a o1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_1a p_cap_1a r1a pl1a)
(move person_1c p_cap_1c pl1c pa1c)
(fill_bin_partially person_1a pl_bin_1a garbage_pl_1a p_cap_1a pl1a)
(move_to_room person_1a pl_bin_1a room_1a garbage_pl_2a p_cap_1a pl1a r1a)
(move_to_bin person_1a pl_bin_1a garbage_pl_2a p_cap_1a r1a pl1a)
(fill_bin_completely person_1a pl_bin_1a garbage_pl_2a p_cap_1a pl1a)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_1a p_cap_1a pl1a r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_1a p_cap_1a r1a pa1a)
(move_to_room person_1b o_bin_1b room_1b garbage_o_1b p_cap_1b pa1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_1b p_cap_1b r1b o1b)
(fill_bin_partially person_1b o_bin_1b garbage_o_1b p_cap_1b o1b)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_1b p_cap_1b o1b r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_1b p_cap_1b r1b pl1b)
(fill_bin_partially person_1b pl_bin_1b garbage_pl_1b p_cap_1b pl1b)
(move_to_room person_1b o_bin_1b room_1b garbage_o_2b p_cap_1b pl1b r1b)
(move_to_bin person_1b o_bin_1b garbage_o_2b p_cap_1b r1b o1b)
(fill_bin_completely person_1b o_bin_1b garbage_o_2b p_cap_1b o1b)
(move_to_room person_1b pa_bin_1b room_1b garbage_pa_2b p_cap_1b o1b r1b)
(move_to_bin person_1b pa_bin_1b garbage_pa_2b p_cap_1b r1b pa1b)
(fill_bin_completely person_1b pa_bin_1b garbage_pa_2b p_cap_1b pa1b)
(fill_bin_partially person_1a pa_bin_1a garbage_pa_1a p_cap_1a pa1a)
(get_new_bag person_1a pl_bin_1a garbage_pl_1a newbag_pl_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a pl_bin_1a newbag_pl_1a p_cap_1a b1a pl1a)
(detach_old_bag person_1a pl_bin_1a newbag_pl_1a oldbag_pl_1a p_cap_1a pl1a)
(get_new_bag person_1b pa_bin_1b garbage_pa_1b newbag_pa_1b p_cap_1b pa1b b1b)
(move_to_bin_to_change_bag person_1b pa_bin_1b newbag_pa_1b p_cap_1b b1b pa1b)
(detach_old_bag person_1b pa_bin_1b newbag_pa_1b oldbag_pa_1b p_cap_1b pa1b)
(move_person_to_citybin person_1a n2 n1 pl_citybin_1 pl_bin_1a oldbag_pl_1a p_cap_1a pl1a plcb1)
(move_to_room person_1a pa_bin_1a room_1a garbage_pa_2a p_cap_1a plcb1 r1a)
(move_to_bin person_1a pa_bin_1a garbage_pa_2a p_cap_1a r1a pa1a)
(fill_bin_completely person_1a pa_bin_1a garbage_pa_2a p_cap_1a pa1a)
(get_new_bag person_1a o_bin_1a garbage_o_1a newbag_o_1a p_cap_1a pa1a b1a)
(move_to_bin_to_change_bag person_1a o_bin_1a newbag_o_1a p_cap_1a b1a o1a)
(detach_old_bag person_1a o_bin_1a newbag_o_1a oldbag_o_1a p_cap_1a o1a)
(move_person_to_citybin person_1b n2 n1 pa_citybin_1 pa_bin_1b oldbag_pa_1b p_cap_1b pa1b pacb1)
(move_to_room person_1b pl_bin_1b room_1b garbage_pl_2b p_cap_1b pacb1 r1b)
(move_to_bin person_1b pl_bin_1b garbage_pl_2b p_cap_1b r1b pl1b)
(fill_bin_completely person_1b pl_bin_1b garbage_pl_2b p_cap_1b pl1b)
(get_new_bag person_1b pl_bin_1b garbage_pl_1b newbag_pl_1b p_cap_1b pl1b b1b)
(move_to_bin_to_change_bag person_1b pl_bin_1b newbag_pl_1b p_cap_1b b1b pl1b)
(detach_old_bag person_1b pl_bin_1b newbag_pl_1b oldbag_pl_1b p_cap_1b pl1b)
(move_person_to_citybin person_1b n1 n0 pl_citybin_1 pl_bin_1b oldbag_pl_1b p_cap_1b pl1b plcb1)
(load_city_garbage truck_pl n2 n1 n2 n0 pl_bin_1a pl_citybin_1 pld1 plcb1)
(get_new_bag person_1b o_bin_1b garbage_o_1b newbag_o_1b p_cap_1b plcb1 b1b)
(move_to_bin_to_change_bag person_1b o_bin_1b newbag_o_1b p_cap_1b b1b o1b)
(detach_old_bag person_1b o_bin_1b newbag_o_1b oldbag_o_1b p_cap_1b o1b)
(move_person_to_citybin person_1a n2 n1 o_citybin_1 o_bin_1a oldbag_o_1a p_cap_1a o1a ocb1)
(get_new_bag person_1a pa_bin_1a garbage_pa_1a newbag_pa_1a p_cap_1a ocb1 b1a)
(move_to_bin_to_change_bag person_1a pa_bin_1a newbag_pa_1a p_cap_1a b1a pa1a)
(detach_old_bag person_1a pa_bin_1a newbag_pa_1a oldbag_pa_1a p_cap_1a pa1a)
(move_person_to_citybin person_1a n1 n0 pa_citybin_1 pa_bin_1a oldbag_pa_1a p_cap_1a pa1a pacb1)
(move_person_to_citybin person_1b n1 n0 o_citybin_1 o_bin_1b oldbag_o_1b p_cap_1b o1b ocb1)
(load_city_garbage truck_o n2 n1 n2 n0 o_bin_1a o_citybin_1 od1 ocb1)
(load_city_garbage truck_pa n2 n1 n2 n0 pa_bin_1a pa_citybin_1 pad1 pacb1)
(move person_1a p_cap_1a pacb1 i1a)
(move person_1b p_cap_1b ocb1 i1b)
(move_to_room person_1c o_bin_1c room_1c garbage_o_1c p_cap_1c pa1c r1c)
(move_to_bin person_1c o_bin_1c garbage_o_1c p_cap_1c r1c o1c)
(fill_bin_partially person_1c o_bin_1c garbage_o_1c p_cap_1c o1c)
(move_to_room person_1c pa_bin_1c room_1c garbage_pa_1c p_cap_1c o1c r1c)
(move_to_bin person_1c pa_bin_1c garbage_pa_1c p_cap_1c r1c pa1c)
(fill_bin_partially person_1c pa_bin_1c garbage_pa_1c p_cap_1c pa1c)
(move_to_room person_1c pl_bin_1c room_1c garbage_pl_1c p_cap_1c pa1c r1c)
(move_to_bin person_1c pl_bin_1c garbage_pl_1c p_cap_1c r1c pl1c)
(fill_bin_partially person_1c pl_bin_1c garbage_pl_1c p_cap_1c pl1c)
(move_to_room person_1c o_bin_1c room_1c garbage_o_2c p_cap_1c pl1c r1c)
(move_to_bin person_1c o_bin_1c garbage_o_2c p_cap_1c r1c o1c)
(fill_bin_completely person_1c o_bin_1c garbage_o_2c p_cap_1c o1c)
(move_to_room person_1c pa_bin_1c room_1c garbage_pa_2c p_cap_1c o1c r1c)
(move_to_bin person_1c pa_bin_1c garbage_pa_2c p_cap_1c r1c pa1c)
(fill_bin_completely person_1c pa_bin_1c garbage_pa_2c p_cap_1c pa1c)
(move_to_room person_1c pl_bin_1c room_1c garbage_pl_2c p_cap_1c pa1c r1c)
(move_to_bin person_1c pl_bin_1c garbage_pl_2c p_cap_1c r1c pl1c)
(fill_bin_completely person_1c pl_bin_1c garbage_pl_2c p_cap_1c pl1c)
(get_new_bag person_1c o_bin_1c garbage_o_1c newbag_o_1c p_cap_1c pl1c b1c)
(move_to_bin_to_change_bag person_1c o_bin_1c newbag_o_1c p_cap_1c b1c o1c)
(detach_old_bag person_1c o_bin_1c newbag_o_1c oldbag_o_1c p_cap_1c o1c)
(move_person_to_citybin person_1c n1 n0 o_citybin_2 o_bin_1c oldbag_o_1c p_cap_1c o1c ocb2)
(get_new_bag person_1c pa_bin_1c garbage_pa_1c newbag_pa_1c p_cap_1c ocb2 b1c)
(move_to_bin_to_change_bag person_1c pa_bin_1c newbag_pa_1c p_cap_1c b1c pa1c)
(detach_old_bag person_1c pa_bin_1c newbag_pa_1c oldbag_pa_1c p_cap_1c pa1c)
(move_person_to_citybin person_1c n1 n0 pa_citybin_2 pa_bin_1c oldbag_pa_1c p_cap_1c pa1c pacb2)
(get_new_bag person_1c pl_bin_1c garbage_pl_1c newbag_pl_1c p_cap_1c pacb2 b1c)
(move_to_bin_to_change_bag person_1c pl_bin_1c newbag_pl_1c p_cap_1c b1c pl1c)
(detach_old_bag person_1c pl_bin_1c newbag_pl_1c oldbag_pl_1c p_cap_1c pl1c)
(move_person_to_citybin person_1c n1 n0 pl_citybin_2 pl_bin_1c oldbag_pl_1c p_cap_1c pl1c plcb2)
(move person_1c p_cap_1c plcb2 i1c)
(load_city_garbage truck_pa n1 n0 n1 n0 pa_bin_1c pa_citybin_2 pacb1 pacb2)
(unload_city_garbage truck_pa n2 n0 dumpyard_pa pacb2 pad1)
(load_city_garbage truck_pl n1 n0 n1 n0 pl_bin_1c pl_citybin_2 plcb1 plcb2)
(unload_city_garbage truck_pl n2 n0 dumpyard_pl plcb2 pld1)
(load_city_garbage truck_o n1 n0 n1 n0 o_bin_1c o_citybin_2 ocb1 ocb2)
(unload_city_garbage truck_o n2 n0 dumpyard_o ocb2 od1)
; cost = 118 (general cost)
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THANK YOU FOR YOUR KIND ATTENTION