

50.021 Artificial Intelligence

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Homework 7

1 Logistic Problem: PDDL Domain File

Predicates:

- truck ?t: Represents a truck with identifier ?t.
- package ?p: Represents a package with identifier ?p.
- at-truck ?t ?loc: Indicates that truck ?t is at location ?loc.
- at-package ?p ?loc: Indicates that package ?p is at location ?loc.

Actions:

- drive: Moves a truck from one location to another.
- load: Loads a package onto a truck.
- unload: Unloads a package from a truck.

Please look at the attached 'logistics.pddl' file for the implementation.

2 Logistic Problem: PDDL Problem File

(a)

Objects:

- Locations: changi, tampines, bedok.
- Entities: truck1, package1.

Initial State (:init):

- Truck truck1 is at location tampines.
- Package package1 is at location bedok.

Goal State (:goal): The goal is to have package1 at location changi.

Please look at the attached 'logistics-2.pddl' file for the implementation.

(b)

The solution is as follows:

Please look at the attached 'Plan_Task2.txt' file for the solution.

Found Plan (output)

(drive tampines bedok truck1)

(load package1 bedok truck1)

(drive bedok changi truck1)

(unload package1 changi truck1)

```
(:action drive
:parameters (tampines bedok truck1)
:precondition
  (and
    (truck truck1)
    (at-truck truck1 tampines)
  )
:effect
  (and
    (at-truck truck1 bedok)
    (not
      (at-truck truck1 tampines)
    )
  )
)
```

Found Plan (output)

(drive tampines bedok truck1)

(load package1 bedok truck1)

(drive bedok changi truck1)

(unload package1 changi truck1)

```
(:action load
:parameters (package1 bedok truck1)
:precondition
  (and
    (package package1)
    (truck truck1)
    (at-package package1 bedok)
    (at-truck truck1 bedok)
  )
:effect
  (and
    (not
      (at-package package1 bedok)
    )
    (at-package package1 truck1)
  )
)
```

Found Plan (output)

(drive tampines bedok truck1)

(load package1 bedok truck1)

(drive bedok changi truck1)

(unload package1 changi truck1)

```
(:action drive
:parameters (bedok changi truck1)
:precondition
  (and
    (truck truck1)
    (at-truck truck1 bedok)
  )
:effect
  (and
    (at-truck truck1 changi)
    (not
      (at-truck truck1 bedok)
    )
  )
)
```

Found Plan (output)

(drive tampines bedok truck1)

(load package1 bedok truck1)

(drive bedok changi truck1)

(unload package1 changi truck1)

```
(:action unload
:parameters (package1 changi truck1)
:precondition
  (and
    (package package1)
    (truck truck1)
    (at-truck truck1 changi)
    (at-package package1 truck1)
  )
:effect
  (and
    (at-package package1 changi)
    (not
      (at-package package1 truck1)
    )
  )
)
```

3 Logistic Problem II: PDDL Problem File

(a)

The domain file stays the same for this task.

The problem file is modified to:

Objects:

- Locations: changi, tampines, bedok.
- Entities: truck1, package1, package2.

Initial State (:init):

- Truck truck1 is at location tampines.
- Package package1 is at location bedok.
- Package package2 is at location changi.

Goal State (:goal): The goal is to have package1 at location changi and package2 at location bedok.

Please look at the attached 'logistics(task3).pddl' and 'logistics(task3)-2.pddl' files for the implementation.

(b)

Please look at the attached 'Plan_Task3.txt' file for the solution. The solution is as follows:

```
(:action drive
  :parameters (tampines bedok truck1)
  :precondition
    (and
      (truck truck1)
      (at-truck truck1 tampines)
    )
  :effect
    (and
      (at-truck truck1 bedok)
      (not
        (at-truck truck1 tampines)
      )
    )
)
```

```
(:action load
:parameters (package1 bedok truck1)
:precondition
  (and
    (package package1)
    (truck truck1)
    (at-package package1 bedok)
    (at-truck truck1 bedok)
  )
:effect
  (and
    (not
      (at-package package1 bedok)
    )
    (at-package package1 truck1)
  )
)
```

```
(:action drive
:parameters (bedok changi truck1)
:precondition
  (and
    (truck truck1)
    (at-truck truck1 bedok)
  )
:effect
  (and
    (at-truck truck1 changi)
    (not
      (at-truck truck1 bedok)
    )
  )
)
```

```
(:action unload
:parameters (package1 changi truck1)
:precondition
  (and
    (package package1)
    (truck truck1)
    (at-truck truck1 changi)
    (at-package package1 truck1)
  )
:effect
  (and
    (at-package package1 changi)
    (not
      (at-package package1 truck1)
    )
  )
)
```

```

(:action load
 :parameters (package2 changi truck1)
 :precondition
  (and
    (package package2)
    (truck truck1)
    (at-package package2 changi)
    (at-truck truck1 changi)
  )
 :effect
  (and
    (not
      (at-package package2 changi)
    )
    (at-package package2 truck1)
  )
 )

```

```

(:action drive
 :parameters (changi bedok truck1)
 :precondition
  (and
    (truck truck1)
    (at-truck truck1 changi)
  )
 :effect
  (and
    (at-truck truck1 bedok)
    (not
      (at-truck truck1 changi)
    )
  )
 )

```

```

(:action unload
 :parameters (package2 bedok truck1)
 :precondition
  (and
    (package package2)
    (truck truck1)
    (at-truck truck1 bedok)
    (at-package package2 truck1)
  )
 :effect
  (and
    (at-package package2 bedok)
    (not
      (at-package package2 truck1)
    )
  )
 )

```