

1A) My program is meant to emulate a simple air traffic control system at an airport. The user interacts with the system to make planes both takeoff and land. There are 3 areas in the system: Taxi, Runway, and Air. The gate is adjacent to taxi and airspace is adjacent to air. Departing planes start at the gate and arriving planes start in the airspace.

Before being able to move, clearance must first be given. Departing planes go through four stages: Gate\_Taxi, Taxi\_Runway, Takeoff and Ascend. Arriving planes also have four stages: Descend, Land, Runway\_Taxi, Taxi\_Gate. The program does not allow planes to occupy the same space or clear a space that is occupied or cleared for another plane. If there are two planes moving in opposite directions, one will have to change direction and return to either the gate or the air so that the other plane can continue to the other end.

1B)

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Starting From Gate
V Not clear
^ Not clear

Taxi: Free

V Not clear
^ Not clear

Runway: Free

V Not clear
^ Not clear

Air: Free

V Not clear
^ Not clear

Airspace

Select Mode and Action
First Letter C for Clear, M for Move
Letters 2 and 3 as follows
RT for Runway_Taxi
TR for Taxi_Runway
LD for Land
TO for Takeoff
TG for Taxi_Gate
GT for Gate_Taxi
AS for Ascend
DE for Descend
CDE
*** Success ***

Starting From Gate

V Not clear
^ Not clear

Taxi: Free

V Not clear
^ Not clear

Runway: Free

V Not clear
^ Not clear

Air: Clear_For_Arrival

V Not clear
^ Clear

Airspace

Select Mode and Action
First Letter C for Clear, M for Move
Letters 2 and 3 as follows
RT for Runway_Taxi
TR for Taxi_Runway
LD for Land
TO for Takeoff
TG for Taxi_Gate
GT for Gate_Taxi
AS for Ascend
DE for Descend
MDE
*** Success ***
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This run displays a plane arriving at the airport. First, the user clears the plane for descent (“CDE”) before actually descending (“MDE”).

Next, the user clears the plane to land (“CLD”) and then gets it to land (“MLD”).

This pattern continues throughout the run, with the plane eventually arriving at the gate.

The arrows (V and ^) point in the direction that is relevant to the piece of text next to them. E.g. “V Not Clear” means that it is not clear for the plane to move in the direction of departure in that area.

```
Starting From Gate
V Not clear
^ Not clear

Taxi: Free

V Not clear
^ Not clear

Runway: Free

V Not clear
^ Not clear

Air: Occupied

V Not clear
^ Not clear

Airspace

Select Mode and Action
First Letter C for Clear, M for Move
Letters 2 and 3 as follows
RT for Runway_Taxi
TR for Taxi_Runway
LD for Land
TO for Takeoff
TG for Taxi_Gate
GT for Gate_Taxi
AS for Ascend
DE for Descend
CLD
*** Success ***

Starting From Gate

V Not clear
^ Not clear

Taxi: Free

V Not clear
^ Not clear

Runway: Clear_For_Arrival

V Not clear
^ Clear

Air: Occupied_Arrival

V Not clear
^ Not clear

Airspace

Select Mode and Action
First Letter C for Clear, M for Move
Letters 2 and 3 as follows
RT for Runway_Taxi
TR for Taxi_Runway
LD for Land
TO for Takeoff
TG for Taxi_Gate
GT for Gate_Taxi
AS for Ascend
DE for Descend
MLD
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*** Success ***	First Letter C for Clear, M for Move	
Starting From Gate	Letters 2 and 3 as follows	Select Mode and Action
V Not clear	RT for Runway_Taxi	First Letter C for Clear, M for Move
^ Not clear	TR for Taxi_Runway	Letters 2 and 3 as follows
	LD for Land	RT for Runway_Taxi
Taxi: Free	TO for Takeoff	TR for Taxi_Runway
	TG for Taxi_Gate	LD for Land
V Not clear	GT for Gate_Taxi	TO for Takeoff
^ Not clear	AS for Ascend	TG for Taxi_Gate
	DE for Descend	GT for Gate_Taxi
Runway: Occupied	MRT	AS for Ascend
	*** Success ***	DE for Descend
V Not clear	Starting From Gate	MTG
^ Not clear		*** Success ***
Air: Free	V Not clear	Starting From Gate
	^ Not clear	
V Not clear	Taxi: Occupied	V Not clear
^ Not clear		^ Not clear
Airspace	V Not clear	Taxi: Free
	^ Not clear	
Select Mode and Action	Runway: Free	V Not clear
First Letter C for Clear, M for Move		^ Not clear
Letters 2 and 3 as follows	V Not clear	Runway: Free
RT for Runway_Taxi	^ Not clear	
TR for Taxi_Runway	Air: Free	V Not clear
LD for Land		^ Not clear
TO for Takeoff	V Not clear	Air: Free
TG for Taxi_Gate	^ Not clear	
GT for Gate_Taxi		V Not clear
AS for Ascend	Airspace	^ Not clear
DE for Descend		
CRT		
*** Success ***	Select Mode and Action	Airspace
Starting From Gate	First Letter C for Clear, M for Move	
V Not clear	Letters 2 and 3 as follows	Select Mode and Action
^ Not clear	RT for Runway_Taxi	First Letter C for Clear, M for Move
	TR for Taxi_Runway	Letters 2 and 3 as follows
Taxi: Clear_For_Arrival	LD for Land	RT for Runway_Taxi
	TO for Takeoff	TR for Taxi_Runway
V Not clear	TG for Taxi_Gate	LD for Land
^ Clear	GT for Gate_Taxi	TO for Takeoff
	AS for Ascend	TG for Taxi_Gate
Runway: Occupied_Arrival	DE for Descend	GT for Gate_Taxi
	CTG	AS for Ascend
V Not clear	*** Success ***	DE for Descend
^ Not clear		
Air: Free	Starting From Gate	
	V Not clear	
V Not clear	^ Clear	
^ Not clear		
Airspace	Taxi: Occupied_Arrival	
	V Not clear	
	^ Not clear	
	Runway: Free	
	V Not clear	
	^ Not clear	
	Air: Free	
	V Not clear	
	^ Not clear	
	Airspace	

## Run 2:

In the following run, I display that you can have two planes travelling in opposite directions. However, they cannot progress unless one of them changes directions. It also shows how occupied spaces block movement. In addition to this, it shows that you can't give clearance unless a plane is in a space that can immediately move into the cleared area.

Starting From Gate	Starting From Gate	Starting From Gate
V Not clear ^ Not clear	V Clear ^ Not clear	V Not clear ^ Not clear
Taxi: Free	Taxi: Clear_For_Departure	Taxi: Occupied
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Runway: Free	Runway: Free	Runway: Free
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Air: Free	Air: Free	Air: Clear_For_Arrival
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Clear
Airspace	Airspace	Airspace
Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend CRT *** Route not Allowed ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend CDE *** Success ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend MDE *** Success ***
Starting From Gate	Starting From Gate	Starting From Gate
V Not clear ^ Not clear	V Clear ^ Not clear	V Not clear ^ Not clear
Taxi: Free	Taxi: Clear_For_Departure	Taxi: Occupied
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Runway: Free	Runway: Free	Runway: Free
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Air: Free	Air: Clear_For_Arrival	Air: Occupied
V Not clear ^ Not clear	V Not clear ^ Clear	V Not clear ^ Not clear
Airspace	Airspace	Airspace
Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend CGT *** Success ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend MGT *** Success ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend CTR *** Success ***

Starting From Gate	Starting From Gate	Starting From Gate
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Taxi: Occupied_Departure	Taxi: Free	Taxi: Free
V Clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Runway: Clear_For_Departure	Runway: Occupied	Runway: Occupied
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Air: Occupied	Air: Occupied	Air: Free
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Airspace	Airspace	Airspace
Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend MTR *** Success ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend CAS *** Success ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend CTO *** Success ***
Starting From Gate	Starting From Gate	Starting From Gate
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Taxi: Free	Taxi: Free	Taxi: Free
V Not clear ^ Not clear	V Not clear ^ Not clear	V Not clear ^ Not clear
Runway: Occupied	Runway: Occupied	Runway: Occupied_Departure
V Not clear ^ Not clear	V Not clear ^ Not clear	V Clear ^ Not clear
Air: Occupied	Air: Occupied_Departure	Air: Clear_For_Departure
V Not clear ^ Not clear	V Clear ^ Not clear	V Not clear ^ Not clear
Airspace	Airspace	Airspace
Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend CTO *** Route not Allowed ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend MAS *** Success ***	Select Mode and Action First Letter C for Clear, M for Move Letters 2 and 3 as follows RT for Runway_Taxi TR for Taxi_Runway LD for Land TO for Takeoff TG for Taxi_Gate GT for Gate_Taxi AS for Ascend DE for Descend MTO *** Success ***

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Starting From Gate

V Not clear
^ Not clear

Taxi: Free

V Not clear
^ Not clear

Runway: Free

V Not clear
^ Not clear

Air: Occupied

V Not clear
^ Not clear

Airspace

Select Mode and Action
First Letter C for Clear, M for Move
Letters 2 and 3 as follows
RT for Runway_Taxi
TR for Taxi_Runway
LD for Land
TO for Takeoff
TG for Taxi_Gate
GT for Gate_Taxi
AS for Ascend
DE for Descend
CAS
*** Success ***

Starting From Gate

V Not clear
^ Not clear

Taxi: Free

V Not clear
^ Not clear

Runway: Free

V Not clear
^ Not clear

Air: Occupied_Departure

V Clear
^ Not clear

Airspace

Select Mode and Action
First Letter C for Clear, M for Move
Letters 2 and 3 as follows
RT for Runway_Taxi
TR for Taxi_Runway
LD for Land
TO for Takeoff
TG for Taxi_Gate
GT for Gate_Taxi
AS for Ascend
DE for Descend
MAS
*** Success ***

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Starting From Gate

V Not clear
^ Not clear

Taxi: Free

V Not clear
^ Not clear

Runway: Free

V Not clear
^ Not clear

Air: Free

V Not clear
^ Not clear

Airspace

Select Mode and Action
First Letter C for Clear, M for Move
Letters 2 and 3 as follows
RT for Runway_Taxi
TR for Taxi_Runway
LD for Land
TO for Takeoff
TG for Taxi_Gate
GT for Gate_Taxi
AS for Ascend
DE for Descend

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