

DESIGN AN AUTOMATED AIR TRAFFIC CONTROLLER

You are to write a programming logic that will automate the tasks of an Air Traffic Controller. You will be given with a predefined information of Flights. Runways and conditions for landing and take off. With which you have to compute the correct runway for incoming and outgoing flights.

Terminologies:

- Touchdown : Moment at which the flight touches the ground.
- Time to halt : Time taken after touchdown to become fully stopped
- Time to takeoff
- Taxing - Moving the plane to the desinated stop (for landing) or runway (for takeoff)



FLIGHTS - ZOHO ADVANCE PROGRAMMING ROUND

Flights: The data given here represents the time for a flight to come to halt in the runway after touchdown. It is always assumed that the touchdown speed and take off speed is 200 Km/ph.



Type	Max Weight (Tonnes)	Time to halt/take off
ATR	12	30 Secs
AirBus	20	40 Secs
Boeing	40	50 Secs
Cargo	100	60 Secs

FLIGHTS TIME AND WEIGHT EXAMPLE

The Time to halt decreases with decreases in weight. We can assume the weight follows and the time decreases 10% of each of the three weights ranges.

❖ $> 75 \%$

❖ $> 50 \% < 75 \%$

❖ $< 50 \%$



Example:

- ATR takes 30 secs to halt/takeoff with 9+ tonnes ($> 75\%$)
- ATR takes 27 secs (10% of 30 secs) to halt/takeoff with 6+ tonnes to 9 tonnes ($> 50 \% < 75\%$)
- ATR takes 24 secs (20% of 30 secs) to halt/takeoff with less than 6 tonnes ($< 50\%$)

RUNWAY - ZOHO ADVANCE PROGRAMMING ROUND



The data given here represents the maximum time a flight can run with its maximum capacity in a runway after touchdown.

It is always adviced to allot a runway to any aircraft which has atleast 10 sec extra time than the incoming aircraft time to halt

Runway	Time to halt/takeoff
Runway 1	40 secs
Runway 2	60 secs
Runway 3	80 secs
Runway 4	90 secs

Example:

- ATR at its full capacity can land/take off in any runway
- AirBus at its full capacity can land/take off in any of 2, 3 and 4 runway
- AirBus at >50% (time to halt is 32 secs) capacity can land/take off in any runway

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TASK OF AIR TRAFFIC CONTROLLER

Following are the operations that should be available for a Air traffic controller

- ✓ Take Off request
- ✓ Landing request
- ✓ Emergency Landing request

Take Off and Landing Request :

- ✓ Get the type of flight and its weight
- ✓ Compute correct runway for the flight
- ✓ If there is no runway available, ask to retry after 30 secs or add to queue
- ✓ Assign the runway for the flight and mark the runway as engaged
- ✓ Free the runway after takeoff is done based on runway time



AIR TRAFFIC CONTROLLER - ZOHO ADVANCE PROGRAMMING ROUND

There will be multiple request in short time, each request should be handled separately or in a queue if possible. After providing the solution, it will be 15 secs wait time before the process is initiated.

Example:



If you have assigned RUNWAY 1 for ATR, it will be 60 secs waiting time in total 15 secs (waiting time) + 45 secs (Runway time) and the next flight will be assigned for RUNWAY 1 only after 60 secs.

Emergency Landing:

Emergency landing will be necessary whenever there is issue in flight. Whenever there is emergency landing request the longest available or applicable runway must be made free after handling the current request or if it is free it should be landed straight away. The waiting time should be minimal.

TEST CASES

- The following are the list of cases that need to be tested with your program. The order of request is in the order specified in test cases. Some points to be remembered during programming your logic are
 - ✓ Landing is always higher priority than takeoff
 - ✓ The shorter run ways are allocated first
 - ✓ If there are more than 4 requests, the next request should be put in hold for 1 minute. After fetching applicable runway details
 - ✓ The request should not be put to wait for more than 3 times.
 - ✓ Emergency Landing should be always put in longest available runway.



TEST CASES

1. Handle 2 take off and 2 landing request for 2 cargo and 2 ATR
2. Handle 4 landing request of ATR flights of different weight
3. Handle landing request for 2 cargos, 1 ATR and 1 Airbus
4. Handling landing request of 1 Boeing , 1 ATR, 1 Cargo(<50%)
5. Handle multiple request and show waiting and queued flight details.
6. Emergency landing of different flights with different capacity
7. Show the runway status any time (Engaged or Free)



SAMPLE INPUT - 1

The program should be interactive and process the output based on input



love2code

-----Sample Input - 1-----

Request:

1. Take off request
2. Landing request
3. Emergency landing request

What is you request : 2

Plane types:

1. ATR
2. Airbus
3. Boeing
4. Cargo

Select Type of Plane : 2

Plane Weight:

1. > 15 tonnes
2. 10-15 tonnes
3. < 10 tonnes

Select the weight of
plane: 3

SAMPLE OUTPUT - 1

-----Sample Output - 1 -----

- Landing approved for AIRBUS with < 10 tonnes of weight in Runway 1
- Touch down will happen in 15 secs
- The plane will stop after 35secs of touchdown
- Runway 1 will be ready for next request in 1 minute



love2code

SAMPLE INPUT - 2

The program should be interactive and process the output based on input



love2code

-----Sample Input - 2-----

Request:

1. Take off request
2. Landing request
3. Emergency landing request

What is you request : 3

Plane types:

1. ATR
2. Airbus
3. Boeing
4. Cargo

Select Type of Plane : 4

Plane Weight:

1. > 75 tonnes
2. 50-75 tonnes
3. < 50 tonnes

Select the weight of
plane: 2

SAMPLE OUTPUT - 2

-----Sample Output - 2 -----

- Landing approved for CARGO with 50-75 tonnes of weight in Runway 3
- Touch down will happen in 15 secs
- The plane will stop after 69secs of touchdown
- Runway 3 will be ready for next request in 1 minute 9 secs

