

## Project 12 – Control tower (1)

A control tower manages the air traffic of an airport. The airport has one runway for landing/take-off and one parking area for airplanes. The runway can be occupied by one airplane at a time, whereas the parking area can contain one or more of them simultaneously. The parking area have infinite capacity.

Whenever an airplane reaches the airport area, it goes through the following steps:

1. the airplane queues for landing until it receives the ok from the control tower (assume that airplanes always have enough fuel to remain in the air for an arbitrary time);
2. the airplane performs the landing operation, which takes a time  $t_l$ ;
3. the airplane remains in the parking area for a time  $t_p$ ;
4. the airplane queues for take-off until it receives the ok from the control tower;
5. the airplane takes-off in a time  $t_o$  and leaves the system.

When the runway is unoccupied, the control tower serves one airplane according to the following policy:

1. serve an airplane queued for landing;
2. if the landing queue is empty, serve an airplane in the take-off queue.

Consider the following workload: airplane interarrival times are IID RVs (to be described later), the values  $t_l$ ,  $t_o$  and  $t_p$  are IID RV (to be described later).

Model the system described above and study the waiting time in both landing and take-off queues with a varying workload. Study how the number of airplanes in the parking area varies in relation with  $t_l$ ,  $t_p$ . More in detail, at least the following scenarios must be evaluated:

- Constant interarrival times, constant service times.
- Exponential distribution of all the above RVs, with the same means as the previous case.

In all cases, it is up to the team to calibrate the scenarios so that meaningful results are obtained.

Project deliverables:

- a) Documentation (according to the standards set during the lectures)
  - b) Simulator code
  - c) Presentation (up to 10 slides maximum)
- no pages, some graphs  
brief and concise*