Project Description

Despite the significant technological leaps made by the airline industry, Airplane turn around time - the “time taken to unload a plane after its arrival at the gate and to prepare it for departure again” - has increased steadily since the mid-1970s. One of the main contributing factors to this rise is the manner in which passengers board a flight. Currently the industry employs 3 ways of doing so: **random, outside-in & back-to-front.**

The **random** method, also known as a free seating policy, allows economy class passengers to pick any seat of their choice upon entering the aircraft, regardless of the information on their boarding tickets. It is based on a first-come-first-serve approach employed by Ryanair and US Airways, just to name a few.

In the **outside-in** method, also referred to as WMA (window, middle aisle) by many researchers, passengers sitting next to the window are ushered into the aircraft first, followed by those sitting in the middle seat. Finally, those who are to sit by the aisle enter the aircraft. In this method, passengers are divided into 3 group according to their allocated seat type: Window seats, Middle seats, Aisle seats.

The **back-to-front** method, as the name implies, allows all passengers sitting in the last one-third of rows to board first, followed by those sitting in the middle third of rows, and finally those in the front one-third of rows. For example, in a flight with 30 rows, passengers sitting in rows 20-30 enter first, while those sitting in rows 1-10 enter last. In this method, passengers are divided into 3 group according to the row position of their allocated seat:

Back Section, Middle Section, Front Section. Although this is the most common method employed by airlines, both simulations and real-life experiments have proven this method to be the worst.

The primary objective of this project is to identify the optimal boarding strategy for a typical 180-seat, single-aisle aircraft based on the aforementioned 3 boarding methods. Our models will be implemented on Javascript as 3 independent agent based discrete event simulations. Additionally, by ranking the 3 models, we intend to find out if the back-to-front method is indeed the slowest. With the ability to instantaneously track, store and update the results of multiple simulations, each of our models will capture 3 parameters: current simulation run time, total time taken to complete N runs and the average time per run. Comparison between models would be accomplished using statistical analysis on the mean and variance of the boarding times, gathered from a large number of simulation runs.

Our models are unique in their consideration of 2 key parameters: luggage constraints and time differences in moving from the aisle to the 3 different types of seats (window, middle, aisle). Parameters will be estimated from research papers based on real-life observations. Hence, we hope our models would, to a considerable extent, portray reality.