

Once upon a time, the flights map



In Airlines-Manager 2, one of the features that has evolved the most since the creation of the mobile app is the flights map. Romain invites us in his developer world to tell us the whole story.

“The flights map, what a long adventure!”

When we began the development of Airlines-Manager 2 Mobile in 2013, the map was very basic.

At the beginning it was just a simple trick, when the player was connected, we took a screenshot of a map image with routes drawn on it. This screenshot was quite heavy for a mobile, so we could only do it once, when the user logged in. But the problem was the impossibility to refresh the map since it would mean the app should stop each time a new route was created, time during which the screenshot would be refreshed.



And that's not all! At that time, each aircraft was an isolated object. Somewhat like buttons. Let's say a player has 500 aircraft, it was as if **500 buttons** were displayed on the map! It was unmanageable in the long term; the system was too heavy, big airlines couldn't log in.

A step-by-step evolution

The first step was to stop taking screenshots and finding another way to display routes. Indeed, at the beginning, each player's route was calculated as a unique element -like aircraft- and it was too heavy for mobile phones.

Today, routes are grouped as a single object. In reality, it is a 3D object, that enables to take into account all routes at once and not one by one as it was before. This solution allowed us to remove the screenshot system from the map.

The next step was to find a solution to display aircraft. After several days of work and research, we had come to a quite smart solution.

Rather than displaying buttons (widget* is the precise term), we used "Particles".

But instead of letting these particles live their lives randomly, we wrote their movements with a powerful algorithm so they follow a very precise path.

As the system was much more lighter, we could improve the quality of the map with clearer routes. Before, we didn't have this degree of clarity well under control, it was a huge leap forward!

Thus we started from something static and heavy to come to a light, flexible system of better quality and without any discomfort for the user.

Particles: a thought based on experience

Over time, and because we had received so many requests for improving the map, we took a long moment to think about new techniques. We knew the solution was difficult to implement (to implement a particle system), but it really seemed worthwhile.



To explain what a particle is, we could say this is a very simple object. A shape with a position, a color and an image. We could take advantage of the optimizations of phone processors that enable to calculate much faster a big quantity of particles.

Usually, a phone displays elements in several layers. Thanks to the particle system, elements are all displayed within a same layer.

That's why the display is much faster.

At the time of the first flights map, the display could take 3 or 4 seconds, the time required to calculate the map and take the screenshot. In addition, at that time the map was stored on the phone for future use... but it was never used again! (Laughing)

By removing this screenshot system, we could save 1 or 2 seconds! Now, the display is almost immediate.

In the end, particles, that was a different methodology which turned out to be less complex than we would have expected at first. Adding and removing aircraft today is not a problem at all.

A feature that used to be important

By the way, as a point of interest, the option which enables to hide aircraft from the map dates from the time when there wasn't this optimization yet. When we "hid" aircraft (via the settings menu), there was a real performance gain.

Today, this mainly allows to have a clearer map. Now, it is more a matter of display quality than performance. With this new system, whether there is 50 or 5,000 aircraft doesn't change anything much.

Lighter = new feature!

The real-time flight's details is a feature we could implement thanks to this optimization. This enables us to precisely display the details of a flight. For this feature, we followed the example of the many flight tracking softwares well-known by aeronautics enthusiasts (FlightRadar, FlightAware etc.).



As a result, we had to update our servers and our algorithms to make this new feature possible. The previous optimization improvements were so big that we could make this little infringement for a significant improvement.

A long journey with challenges to overcome

The evolution of the map was carried out over a long period. The first version of the app was released in 2014, and it's since mid-2015 that we have begun to review the system by removing screenshots. Particles were introduced in 2016.

Since, we have kept optimizing our flights map, especially via improvements on our servers (the number of servers to run Airlines-Manager **has been multiplied by 9** since 2015)

More recently, we have carried out a new optimization of the flights map. Indeed, the display of the map for players owning many (many) routes gave us a hard time! In fact, a 3D object is composed of triangles, and the 3D engine is limited to **65,000 triangles for one 3D object**. The problem for airlines owning many routes was that this limit was exceeded. Therefore, we had to find a solution: we created a second object of routes.

Some players have two objects to display all their routes. Without this, the game engine couldn't display them all.

We could have kept the original solution, but players take too much space, they own big airlines! They are too strong! (Laughing)

And yet, we made only two objects. But as our players expand their airlines more and more, maybe we will have to add other route objects! But... I'm in no great hurry. (Laughing)

“Now we can also view the profile of other airlines. The route display of other players uses the same technique than the flights map, routes are simply less clearly displayed for optimization reasons.”

The approach that led us to make the flights map evolve is the same we try hard to apply to the whole game.

**Widgets: Elements adapted to an interface such as buttons, menus, images...*