Crew assignment (use cases)

statement

An airline wants to implement a computer system to control the assignment of crews to the different flights it operates. Each crew is made up of a pilot and a co-pilot.
The chosen criterion aims to ensure that the crew assigned to each flight is the most appropriate given the professional skills of the pilot and the characteristics of the flight.

The system must allow crew members to consult which flights are assigned to them, as well as the particular characteristics of any flight (whether it is assigned to them or not), such as the date, origin, destination (being the origin and destination two airports between which the company operates and from which information on the orographic and technical conditions they present is stored in the system), and forecast weather and visibility conditions.

The data of the crew members (name, employee number and date of birth), crews (number of previous flights, flight hours and observations) and flights are entered by the company's administrative staff.

To assess the ability of each pilot in different flight conditions, the company has a simulator in which these conditions can be recreated. These in turn are represented in the simulator as combinations of parameters that are grouped into three types: visibility, meteorology and relief. Each parameter has a name that uniquely identifies it, and in each scenario (see next paragraph) it acquires a numerical value that represents the difficulty of piloting with respect to it and a factor of its relative weight in the simulation as a whole.

Visibility parameters represent conditions that affect visibility: amount of sunlight, existence of fog, possible glare from lightning, etc. Those of meteorology represent the incidence of phenomena of this type such as rain, wind, turbulence, etc... and also have a value that represents the frequency with which they affect the simulation. The relief parameters represent the different orographic conditions of the simulated route. Examples of parameters are therefore: “FOG”, “RAIN”, “MOUNTAINOUS RELIEF”, etc.

There are a series of standardized combinations of these parameters, called scenarios, and each pilot must perform at least one simulation in each of the scenarios annually. Although the simulator does not belong to the system, it defines a set of scenarios that coincide with those of the simulator. The result of the simulator test is a numerical value that is also stored in the system, along with the date, and that is unique for each pilot in each scenario, eliminating previous results in the same scenario. This information is periodically updated by the company's administrative staff. The system must allow the pilots to consult which are the standard scenarios and their evaluation in them.

The company also has some employees called flight operators whose mission consists, first of all, in analyzing the characteristics of each flight stored in the system and, comparing it with the simulation scenarios (for this they must be able to know through the system what parameters make up the each scenario), decide which scenario is closest to the expected flight conditions (this decision is made by the flight operator due to the impossibility of automatically matching flights with scenarios in the system, due to the variability of weather and visibility conditions). Once this has been decided, they must assign, within the system, a crew to each flight, with the criterion that the pilot of each flight is the one with the highest score in the scenario chosen for it.