Meal ordering system (MOS)

MOS is used by an airline catering company (AIR-FOOD) to determine the **quantity** for **every type of meal** and **other special requests (if any)** that need to be prepared and loaded onto the aircraft served by the company. For each flight, MOS produces an output called "Meal Schedule Report" (MSR), which contains the following information.

- Number of first-class meals
- Number of business-class meals
- Number of economy-class meals
- Number of meals for crew members
- Number of meals for pilots
- Number of child meals
- Number of bundles of flowers

1 Program logic

Given a flight, following information is needed by MOS, to generate MSR.

(1) Aircraft model (AM) of the flight. Different aircraft models have different configurations. In our system, we assume that there are five models in the system's database, which are listed in Table 1. In the first column of Table 1, the first three digits together mean the series of the model, where "747" represents Boeing and "000" represents AirBus. And the last three digits means the sub-model under a particular series.

Table 1: Aircraft models

Aircraft model	# of first class seats	# of business class seats	# of economic class seats	# of crew members	# of pilots
747200	0	20	150	10	2
747300	5	25	200	12	3
747400	10	30	240	14	3
000200	0	35	210	13	2
000300	10	40	215	14	3

It can be seen that the seat numbers of first class, business class and economic class, as well as the default numbers of crew and pilots are decided by the given AM.

(2) Whether there is a change in the number of crew members. If yes, the new number (>0) must be given, and this new number will be used instead of the default number of crew members for the relevant aircraft model.

(3) Whether there is a change in the number of pilots. If yes, the new number (>0) must be given, and this new number will be used instead of the default number of pilots for the relevant aircraft model.

(4) The number of child passengers (≥ 0).

(5) The number of requested bundles of flowers (≥ 0).

2 System assumptions

Apart from the above information, our system has following assumptions:

(1) Each flight provides two meals.

(2) Child passengers do not occupy any seat.

(3) Each flight is assumed to be fully booked by adult passengers. So the number of seats is equal to the number of adult passengers on board.

Under the above assumptions, the number of meals for each class is twice of the number of seats in that class, the number of child meals is twice of the corresponding number of child passengers, but the number of bundles of flowers is equal to (not twice of) the corresponding number of requests.

3 Example

Now, let us consider a complete example. Suppose we want to generate an MSR for flight CA101, flying from Hong Kong to Beijing on June 1, 2013 (Saturday). The required input information is as follows.

- The assigned aircraft model is 747200.
- There is a change in the number of crew members and the new number is 12.
- There is a change in the number of pilots and the new number is 3.
- The number of child passengers is 4.
- The number of requested flowers is 2.

Based on Table 1, we know that there are 0 first-class seats, 20 business-class seats and 150 economic-class seats; while the original number of crew members is 10 and the original number of pilots is 2. After the change, the number of crew members and the number of pilots become 12 and 3, respectively. Also, there are 4 child passengers and 2 requests for flowers. With this information, MOS generates MSR for this flight shown in Figure 1.

Flight	Information
(CA101, 01/06/2013)	Flight number: CA101; Departure date: June 1, 2013 (Sat)
Meal type	**Quantity**
Number of first-class meals	0*2 = 0
Number of business-class meals	20*2 = 40
Number of economic-class meals	150*2 = 300
Number of meals for crew members	12*2 = 24
Number of meals for pilots	3*2 = 6
Number of child meals	4*2 = 8
Number of bundles of flowers	2*1 = 2

Figure 1: MSR