OCL cases study

To decrease the cost of flights your client from Woeing Airways has decided to replace the flight attendants with a flight attendant robot. The human resource department of Woeing has provided you with the robot description which can be find below. You are asked to model the description using **OCL**.

Your task:
Provide both informal and **OCL** invariants specifications of the properties that are present in the description below, but can't be modeled by the **UML** diagrams developed in previous tasks.

Please note that additionally to the **OCL** operations which you learned during the course you can use the following operations:

- union of two collections: $\text{collection}_1 \rightarrow \mathit{union}(\text{collection}_2)$
- intersection of two collections: $\text{collection}_1 \rightarrow \mathit{intersection}(\text{collection}_2)$

The main purpose of the flight attendant robot is to serve passengers. To guarantee the best quality of the customer service, passengers are requested to provide information about their age and known languages. Each passenger speaks at least one language.

There are three kinds of passengers; babies, children, and adults. It is known that: the age of a baby is less than 3 years, the age of a child is at least 3 years and less than 18 years, and the age of an adult is at least 18 years.

A part of the flight attendant robot is an audio interface. Each robot has exactly one audio interface. The robot uses the audio interface to communicate with passengers. The audio interface can recognize speech of a passenger and output speech to a passenger. Depending on the localization settings, the robot may speak different languages, but it always speaks at least one.

According to international flight regulations, every baby on board has to be babysit by at least one adult. Every child has to be watched either by an adult or by a robot (but not both). If a child is watched by a robot, they have to speak at least one common language.

Before passengers board the plane, the captain of the flight starts the flight attendant robot. After startup, the robot stays idle until it receives an order. A passenger can make a food order to the idle robot. We describe communication between the robot and the passenger during a food order in more detail below. After the delivery of the ordered food the robot returns to the idle state. A turbulence can occur unexpectedly during the flight. In such a case the robot receives the order from the captain to secure itself. In response to this order, the robot suspends the current task and secures itself. As soon as the turbulence is over, the captain orders to the robot to return to duty. The robot then resumes the suspended task, or remains in the idle state if the robot was in the idle state before the turbulence. After the passengers have left the airplane, the captain stops the idle robot.

Let us now consider the communication between the robot and a passenger during a food order: The communication starts from the passenger's food order. The robot checks the availability of the ordered food. The food availability check is an internal operation of the robot. If the food order can be satisfied then the robot notifies the passenger about it and delivers the dish. Otherwise, the robot tries to find an alternative and proposes it to the passenger. If the passenger likes the proposed alternative, he or she accepts it. Otherwise the passenger rejects it. In the latter case, the robot starts a new iteration by looking for another alternative. The robot continues to propose new alternatives until the passenger accepts the proposed dish. After acceptance of the dish, the robot delivers the dish.