OCL Expressions

1. Unique Offerings

Context: Lesson
Invariant: UniqueOfferings
Description: Ensures that no two lessons with the same schedule and location are available simultaneously.
OCL Expression:

self.isAvailable = true implies

  not Lesson.allInstances()->exists(otherLesson : Lesson |

    otherLesson.startTime = self.startTime and

    otherLesson.endTime = self.endTime and

    otherLesson.startDate = self.startDate and

    otherLesson.locationName = self.locationName)

2. Underaged Client Bookings

Context: Client
Invariant: Underaged
Description: Ensures that underaged clients are accompanied by guardians for their bookings.
OCL Expression:

self.getAge() < 18 implies

  self.bookings->forAll(booking |

    AccompaniedMinor.allInstances()->exists(accompanied |

      accompanied.minorId = self.userId and

      accompanied.bookingId = booking.bookingId))

3. Instructor City Associations

Context: Lesson
Invariant: cityAssociations
Description: Ensures that instructors are assigned lessons only in cities they are available to teach.
OCL Expression:

self.instructor <> null implies

  self.instructor.availableCities->includes(self.locationCity)

4. No Multiple Bookings

Context: Client
Invariant: NoMultipleBookings
Description: Prevents clients from booking multiple lessons with overlapping schedules.
OCL Expression:

self.bookings->forAll(booking1, booking2 : Booking |

  booking1 <> booking2 implies

    (booking1.day <> booking2.day and

     booking1.startTime <> booking2.startTime and

     booking1.endTime <> booking2.endTime))

5. Lesson Capacity

Context: Lesson
Invariant: MaxCapacity
Description: Ensures that group lessons do not exceed the maximum number of clients allowed.
OCL Expression:

not self.isPrivate implies

  self.bookings->size() <= self.maxCapacity

6. Valid Cancellation

Context: Booking
Invariant: ValidCancellation
Description: Ensures that bookings can only be canceled before the lesson's start time.
OCL Expression:

self.cancelDate <= self.lesson.startDate and

self.cancelDate <= self.lesson.startTime

7. Role-Specific Operations

Context: User
Invariant: RolePermissions
Description: Ensures that specific operations are restricted to users with the appropriate roles.
OCL Expression:

(self.oclIsTypeOf(Admin) implies self.canUpdateLessons = true) and

(self.oclIsTypeOf(Instructor) implies self.canSelectLessons = true)

8. Lesson Duration

Context: Lesson
Invariant: ValidDuration
Description: Ensures that lessons have a valid duration within a predefined range.
OCL Expression:

self.endTime - self.startTime >= 30 and

self.endTime - self.startTime <= 180

9. Unique Usernames

Context: User
Invariant: UniqueUsername
Description: Ensures that no two users in the system share the same username.
OCL Expression: User.allInstances()->forAll(otherUser |

  otherUser <> self implies otherUser.username <> self.username)