Hotel Bookings Problem

A simple hotel booking system keeps track of the rooms in a hotel. A guest can book a room for individual nights and the booking system maintains the state of these bookings.

- Guests are identified by their surname which, for the purposes of this exercise, can be considered unique.
- Rooms are identified by a unique number taken from an arbitrary, potentially non-sequential set of numbers. For example, a hotel might have four rooms {101, 102, 201, 203}.
- The booking system may be used by a number of hotel staff at once, so your implementation must be thread-safe.
- There is no need to write an interactive harness or command-line interface. Simply call your code from a main method or unit test to demonstrate it works.
- There is no need to implement a persistent store.

Part 1

Implement the following interface to provide the functionality for the booking manager. Try to keep your code simple and handle errors in a sensible fashion.

```java
public interface BookingManager {
  /**
    * Return true if there is no booking for the given room on the date,
    * otherwise false
    */
  public boolean isRoomAvailable(Integer room, Date date);

  /**
    * Add a booking for the given guest in the given room on the given
    * date. If the room is not available, throw a suitable Exception.
    */
  public void addBooking(String guest, Integer room, Date date);
}
```

Example usage

Assuming a hotel with four rooms, {101, 102, 201, 203}:

```java
BookingManager bm = // create your manager here;
Date today = new SimpleDateFormat("yyyy-MM-dd").parse("2012-03-28");
System.out.println(bm.isRoomAvailable(101, today)); // outputs true
bm.addBooking("Smith", 101, today);
System.out.println(bm.isRoomAvailable(101, today)); // outputs false
bm.addBooking("Jones", 101, today); // throws an exception
```

Part 2

Good news! The hotel staff love your system. However, they find it rather tedious to check the availability of each room separately. Add the method below to your BookingManager interface and implement:

```java
  /**
    * Return a list of all the available room numbers for the given date
    */
  public Iterable<Integer> getAvailableRooms(Date date);
```