# Design: Hotel Reservation System

You are tasked with designing a hotel reservation system for a large hotel chain, similar to Marriott International, which operates 5,000 hotels with 1 million rooms worldwide. The system should handle reservations made via a website or mobile application and support payment, overbooking, and dynamic pricing.

Key Features:

1. Show hotel and room details to customers.
2. Reserve a hotel room for a specific date range.
3. Admin functionality to add, remove, or update hotel and room information.
4. Support dynamic room pricing based on expected occupancy rates.
5. Allow up to 10% overbooking to account for possible cancellations.

Non-Functional Requirements:

* **High Concurrency:** Ensure the system can handle a large number of simultaneous booking attempts during peak times.
* **Moderate Latency:** Aim for low-latency responses but allow up to a few seconds of delay for booking confirmations.

**Scenarios to Address in Design:**

1. **Room Reservation with Dynamic Pricing:**
   * How will you design the system to handle dynamically changing room prices depending on expected hotel occupancy? How do you ensure the system provides accurate pricing at the time of booking?
2. **Concurrency Control:**
   * Multiple users may try to reserve the same room or room type at the same time. How will your system prevent double booking and handle this concurrency challenge?
3. **Overbooking:**
   * The system should allow up to 10% overbooking. How will you implement and track this overbooking limit without exceeding actual capacity?
4. **Idempotency of Reservations:**
   * How will you ensure that if a user tries to reserve the same room multiple times (e.g., by accidentally clicking "Reserve" more than once), they do not double-book the room? How will you handle idempotency in the reservation API?
5. **Handling Cancellations:**
   * What mechanisms will you implement to manage reservation cancellations, including updating room availability and processing refunds if needed?
6. **Database Scalability:**
   * If the system needs to handle high loads similar to platforms like Expedia or Booking.com, how would you scale the database to ensure performance?

**Additional Design Considerations:**

* How will you ensure data consistency across services if using a microservice architecture, especially in cases where inventory and reservations span multiple databases?
* What is your approach to managing peaks in user traffic, such as during holiday seasons or special events?