**System Design**

**Firestore Collection and Trigger Setup**

1. **Firestore Collection**:
   * Collection Name: bookings
   * Fields:
     + name: Name of the customer (String)
     + totalBookingAmount: Total amount of the booking (Number)
     + status: Booking status (String)
     + createdAt: Timestamp of booking creation
     + Other optional fields: email, phone, etc.
2. **Trigger Setup**:
   * Trigger: A Firestore Cloud Function is triggered when the status field of a document in the bookings collection changes to "finished".
   * Trigger type: **onUpdate** Firestore trigger.

**Cloud Function Execution**

1. **Logic Overview**:
   * Extract the document's updated fields (name, totalBookingAmount, etc.) from the Firestore event.
   * Apply a predefined GST rate (e.g., 18%).
   * Calculate:
     + IGST if the booking is inter-state.
     + SGST and CGST if the booking is intra-state (equal split of GST).
2. **Calculation Details**:
   * Example GST Rate: 18%
     + **Inter-state (IGST)**: Full 18% as IGST.
     + **Intra-state (SGST/CGST)**: 9% SGST and 9% CGST.

**GST API Integration**

1. **API Research and Selection**:
   * Look for APIs like ClearTax GST API or government-provided GST APIs.
   * Authenticate using API keys or OAuth.
2. **Data Submission**:
   * Generate the invoice in a structured format.
   * Submit the following to the GST API:
     + Invoice details (name, amount, GST components, etc.)
     + GSTIN of the business.
     + Other necessary fields as per the API documentation.
3. **Error Handling**:
   * Implement robust error handling for API failures, incorrect data formats, or network issues.
   * Log all errors in Firestore or a logging service like Google Cloud Logging.

**Testing Approach**

1. **Simulated Environment**:
   * Use the API's sandbox mode (if available) for testing.
   * For production-like tests, mock API responses using tools like Postman or custom mock servers.
2. **Unit and Integration Testing**:
   * Write unit tests for the Cloud Function using Firebase’s test SDK.
   * Mock the GST API for integration testing without making actual API calls.
3. **Edge Cases**:
   * Handle scenarios with invalid GST slabs, mismatched data formats, or inter/intra-state determination errors.