CNET Mid Exam

# Section H

### **Question1 : Simplified Blackjack Game (TCP Client-Server)**

Implement a simplified version of Blackjack using a TCP client-server model. The server acts as the dealer, managing the deck and game logic. The client represents a player trying to beat the dealer by getting a hand value as close to 21 as possible without going over.

#### **Game Rules:**

1. The server deals two cards (both face up) to the client (player) and two cards to itself (one face up, one face down).
2. The player can choose to "Hit" (request another card) or "Stand" (keep their current hand).
3. If the player’s hand exceeds 21, they "Bust," and the server (dealer) wins.
4. Once the player stands, the dealer reveals their hidden card and continues to draw cards until their hand totals at least 17.
5. The player wins if their hand is closer to 21 than the dealer's without busting. The dealer wins if they have a higher hand or if the player busts.
6. If both have the same hand value, it’s a draw.

#### **Specifications:**

1. **Server Requirements:**
   * The server should maintain the deck, shuffle it, and deal cards.
   * The server keeps track of the game state (cards in each hand, current scores).
   * The server must handle game actions (Hit and Stand) based on client messages.
   * The server should respond to the client with their updated hand and, at the end, announce the winner.
2. **Client Requirements:**
   * The client connects to the server, receives the initial cards, and displays the hand to the player.
   * The client allows the player to send commands to the server to "Hit" or "Stand."
   * The client displays the final result to the player (win, lose, or draw).
3. **Additional Requirements:**
   * Implement error handling for invalid inputs and unexpected disconnections.
   * Use clear communication messages between client and server to manage the game state effectively.

#### **Basic Gameplay**

1. **Initial Deal**:
   * The game begins with the server (dealer) dealing two cards to the client (player) and two cards to itself.
   * The player can see both their own cards and one of the dealer's cards (the other dealer card is hidden).
   * Each card has a value:
     + **Numbered cards** (2-10) are worth their face value.
     + **Face cards** (Jack, Queen, King) are worth 10 points each.
     + **Aces** are worth either 1 or 11, depending on what benefits the player’s score.
2. **Player Actions**:
   * After receiving the initial two cards, the player has two options:
     + **Hit**: Request an additional card from the dealer to try to increase the score.
     + **Stand**: Keep the current hand without requesting more cards, signaling that the player’s turn is over.
   * The player can continue to "Hit" until they either:
     + Reach or exceed 21 points, in which case they "bust" (lose automatically).
     + Decide to "Stand," ending their turn.
3. **Scoring**:
   * The goal is to reach as close to 21 points as possible without exceeding it.
   * If the player exceeds 21 points at any point, they bust, and the dealer wins.
   * The player must decide when to "Stand" to avoid busting.
4. **Dealer's Turn**:
   * Once the player chooses to "Stand," it’s the dealer’s turn.
   * The dealer reveals its hidden card and must follow specific rules:
     + The dealer draws additional cards ("Hits") until its hand totals at least 17 points.
     + The dealer "Stands" once it reaches 17 or more points.
     + If the dealer exceeds 21 points, the dealer busts, and the player wins automatically.
5. **Winning Conditions**:
   * The winner is determined after both the player and dealer have completed their turns:
     + If the player busts (goes over 21), the dealer wins immediately.
     + If the dealer busts, the player wins automatically.
     + If neither busts, the higher score wins.
     + If both have the same score, it’s a draw (tie).

#### **Example Interaction:**

1. **Client connects to the server.**
2. **Server** deals two cards to the client and two cards to itself. It sends the client their initial hand and one of the dealer’s cards.
3. **Client** receives the hand and displays it. The player chooses to "Hit" or "Stand."
4. If the client chooses "Hit," the **Server** deals another card and updates the score. If the client busts, the server ends the game and announces the dealer as the winner.
5. If the client chooses "Stand," the server plays its hand based on Blackjack rules.
6. **Server** sends the final hands and the result (win, lose, or draw) to the client.

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### **Question 2: Static IP Routing**

Create the following topology and implement static routing

