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Topic : EDA (Asssignment Number-07)

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import pearsonr
```

Load the dataset

In [2]:
```
file_path = "ipl.xlsx"
df = pd.read_excel(file_path, sheet_name="IPL_Dataset")
df.head()
```

Out[2]:

	Jersey No	Player	Matches	Inns	Not Out	Runs	Highest Score	Avg	Balls faced	Strike rate	100	50
0	1	KL Rahul	14	14	2	670	132*	55.83	518	129.34	1	5
1	2	Shikhar Dhawan	17	17	3	618	106*	44.14	427	144.73	2	4
2	3	David Warner	16	16	2	548	85*	39.14	407	134.64	0	4
3	4	Shreyas Iyer	17	17	2	519	88*	34.60	421	123.27	0	3
4	5	Ishan Kishan	14	13	4	516	99	57.33	354	145.76	0	4

Q1: Maximum matches played by a player

In [89]:
```
max_matches = df.loc[df['Matches'].idxmax(), ['Player', 'Matches']]
#print(max_matches)
max_matches
```

Out[89]:
```
Player     Shikhar Dhawan
Matches                17
Name: 1, dtype: object
```

Q1: What is the maximum number of matches played by an individual player in a season? Print the player name along with the number of matched played.

In [3]:
```
# Sort players by number of matches played in descending order
all_players_matches_sorted = df[["Player", "Matches"]].sort_values(by="Matches",
```

```
# Display the result
print(all_players_matches_sorted)
```

```
            Player  Matches
3      Shreyas Iyer       17
1    Shikhar Dhawan       17
67    Kagiso Rabada       17
19   Marcus Stoinis       17
114     T Natarajan       16
..              ...      ...
124  Mitchell Marsh        1
97    Mohammad Nabi        1
109      Andrew Tye        1
118     Nikhil Naik        1
98      Rinku Singh        1

[133 rows x 2 columns]
```

Q2: Top 2 players with max average and at least 2 half-centuries

In [9]:
```
# Clean column names by stripping extra spaces
df.columns = df.columns.astype(str).str.strip()

# Filter players with at least 2 half-centuries
filtered_df = df[df['50'] >= 2]

# Sort by batting average in descending order and get the top 2 players
top_players = filtered_df.sort_values(by='Avg', ascending=False).head(2)

# Display the result
print(top_players[['Player', 'Avg', '50']])
```

```
            Player    Avg  50
36  Wriddhiman Saha  71.33   2
4      Ishan Kishan  57.33   4
```

Q3. Create 2 new columns based on Player name. First column will have first name and second column will have last name.Eg: for the player Shikhar Dhawan, Shikhar will be the first name and Dhawan will be the last name.

In [11]:
```
# Split the Player name into first and last name
df[['First Name', 'Last Name']] = df['Player'].str.split(n=1, expand=True)

# Display the updated DataFrame with new columns
print(df[['Player', 'First Name', 'Last Name']].head())
```

```
          Player First Name Last Name
0        KL Rahul         KL     Rahul
1  Shikhar Dhawan    Shikhar    Dhawan
2    David Warner      David    Warner
3    Shreyas Iyer    Shreyas      Iyer
4    Ishan Kishan      Ishan    Kishan
```

Q4. Create a new column (Cleaned_Highest_score) based on Highest score variable. Remove the Asterik(*) mark and

convert the data type into INT.

In [27]:
```
# Remove asterisk (*) and convert to integer
df['Cleaned_Highest_score'] = df['Highest Score'].astype(str).str.replace('*', '

# Display the updated DataFrame with the new column
print(df[['Player', 'Highest Score', 'Cleaned_Highest_score']].head())
```

```
           Player Highest Score  Cleaned_Highest_score
0        KL Rahul          132*                    132
1  Shikhar Dhawan          106*                    106
2    David Warner           85*                     85
3    Shreyas Iyer           88*                     88
4    Ishan Kishan            99                     99
```

Q5. Print the total number of centuries scored in the entire season.

In [13]:
```
# Calculate the total number of centuries
total_centuries = df['100'].sum()

# Print the result
print(f"Total number of centuries scored in the season: {total_centuries}")
```

```
Total number of centuries scored in the season: 5
```

Q6. Print all the player names whose strike rate is less than the average strike rate of all players in entire season.Print the player name, his strike rate and average strike rate.

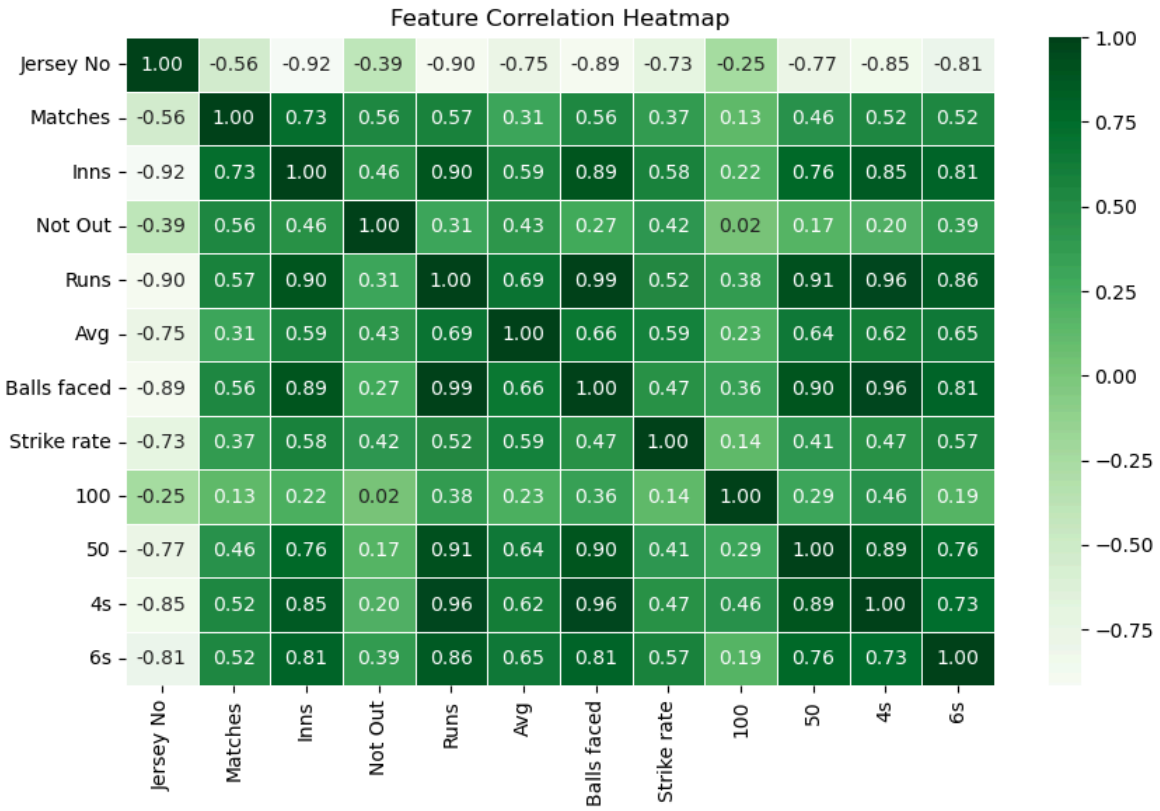
In [15]:
```
# Calculate the average strike rate of all players
average_strike_rate = df['Strike rate'].mean()

# Filter players with strike rate less than the average
low_strike_rate_players = df[df['Strike rate'] < average_strike_rate]

# Display the result
print("Players with strike rate less than the average strike rate:")
print(low_strike_rate_players[['Player', 'Strike rate']])
print(f"\nAverage Strike Rate of all players: {average_strike_rate:.2f}")
```

```
Players with strike rate less than the average strike rate:
                  Player  Strike rate
51        Ajinkya Rahane       105.60
55         Glenn Maxwell       101.88
58         Vijay Shankar       101.04
61         Josh Philippe       101.29
62       Gurkeerat Singh        88.75
65          Kedar Jadhav        93.93
70      Yashasvi Jaiswal        90.90
71         Shreyas Gopal        94.87
77          Murali Vijay        74.41
79          Chris Jordan        93.54
80         Navdeep Saini       100.00
82     Kamlesh Nagarkoti        70.96
84         Harshal Patel        87.50
85         Jimmy Neesham       105.55
86            Tom Banton        90.00
89     Prabhsimran Singh       100.00
92         Kuldeep Yadav        61.90
94             Moeen Ali        75.00
95        Sandeep Sharma        80.00
96        Shardul Thakur        57.14
98           Rinku Singh       100.00
99           Shivam Mavi        71.42
100  Varun Chakaravarthy        66.66
101       Jaydev Unadkat        69.23
102        Ankit Rajpoot        90.00
104       Shahbaz Nadeem        87.50
105         Pravin Dubey        53.84
107        Deepak Chahar        58.33
108         Ravi Bishnoi        58.33
109           Andrew Tye       100.00
111         Kartik Tyagi        66.66
112       Murugan Ashwin       100.00
114          T Natarajan        60.00
115      Prasidh Krishna        50.00
116         Rahul Chahar        50.00
117       Mohammad Shami        66.66
118          Nikhil Naik        33.33
119     Mujeeb Ur Rahman        33.33
120           Dale Steyn        50.00
121          Varun Aaron        10.00
122        Shahbaz Ahmed       100.00
123     Yuzvendra Chahal        33.33
124       Mitchell Marsh         0.00
125          Umesh Yadav         0.00
126    Bhuvneshwar Kumar         0.00
127     Sheldon Cottrell         0.00
128        Khaleel Ahmed         0.00
129       Arshdeep Singh         0.00
130          Daniel Sams         0.00
131    Shreevats Goswami         0.00
132          Trent Boult         0.00

Average Strike Rate of all players: 107.36
```

Q7. Please check the correlation between the features and create a heat map.

In [35]:
```
# Select only numerical columns for correlation analysis
numeric_df = df.select_dtypes(include=['number'])


# Compute the correlation matrix
correlation_matrix = numeric_df.corr()

print("Correlation Matrix:")
print(correlation_matrix.round(2))
# Plot the heatmap with a green color scheme
plt.figure(figsize=(10, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='Greens', fmt=".2f", linewidths
plt.title("Feature Correlation Heatmap")
plt.show()
```

```
Correlation Matrix:
             Jersey No  Matches  Inns  Not Out  Runs   Avg  Balls faced  \
Jersey No         1.00    -0.56 -0.92    -0.39 -0.90 -0.75        -0.89
Matches          -0.56     1.00  0.73     0.56  0.57  0.31         0.56
Inns             -0.92     0.73  1.00     0.46  0.90  0.59         0.89
Not Out          -0.39     0.56  0.46     1.00  0.31  0.43         0.27
Runs             -0.90     0.57  0.90     0.31  1.00  0.69         0.99
Avg              -0.75     0.31  0.59     0.43  0.69  1.00         0.66
Balls faced      -0.89     0.56  0.89     0.27  0.99  0.66         1.00
Strike rate      -0.73     0.37  0.58     0.42  0.52  0.59         0.47
100              -0.25     0.13  0.22     0.02  0.38  0.23         0.36
50               -0.77     0.46  0.76     0.17  0.91  0.64         0.90
4s               -0.85     0.52  0.85     0.20  0.96  0.62         0.96
6s               -0.81     0.52  0.81     0.39  0.86  0.65         0.81

             Strike rate   100    50    4s    6s
Jersey No          -0.73 -0.25 -0.77 -0.85 -0.81
Matches             0.37  0.13  0.46  0.52  0.52
Inns                0.58  0.22  0.76  0.85  0.81
Not Out             0.42  0.02  0.17  0.20  0.39
Runs                0.52  0.38  0.91  0.96  0.86
Avg                 0.59  0.23  0.64  0.62  0.65
Balls faced         0.47  0.36  0.90  0.96  0.81
Strike rate         1.00  0.14  0.41  0.47  0.57
100                 0.14  1.00  0.29  0.46  0.19
50                  0.41  0.29  1.00  0.89  0.76
4s                  0.47  0.46  0.89  1.00  0.73
6s                  0.57  0.19  0.76  0.73  1.00
```



Q. 8 Check the list of players who has an average greater than 50 as well strike rate above 120. Print player name, average and strike rate.

In [37]:
```
# Filter players with an average > 50 and strike rate > 120
filtered_players = df[(df['Avg'] > 50) & (df['Strike rate'] > 120)]

# Display the result
print("Players with an average greater than 50 and a strike rate above 120:")
print(filtered_players[['Player', 'Avg', 'Strike rate']])
```

```
Players with an average greater than 50 and a strike rate above 120:
              Player     Avg  Strike rate
0          KL Rahul   55.83       129.34
4      Ishan Kishan   57.33       145.76
31   Kieron Pollard   53.60       191.42
36  Wriddhiman Saha   71.33       139.86
37  Ruturaj Gaikwad   51.00       120.71
57     Deepak Hooda  101.00       142.25
60       Tom Curran   83.00       133.87
```

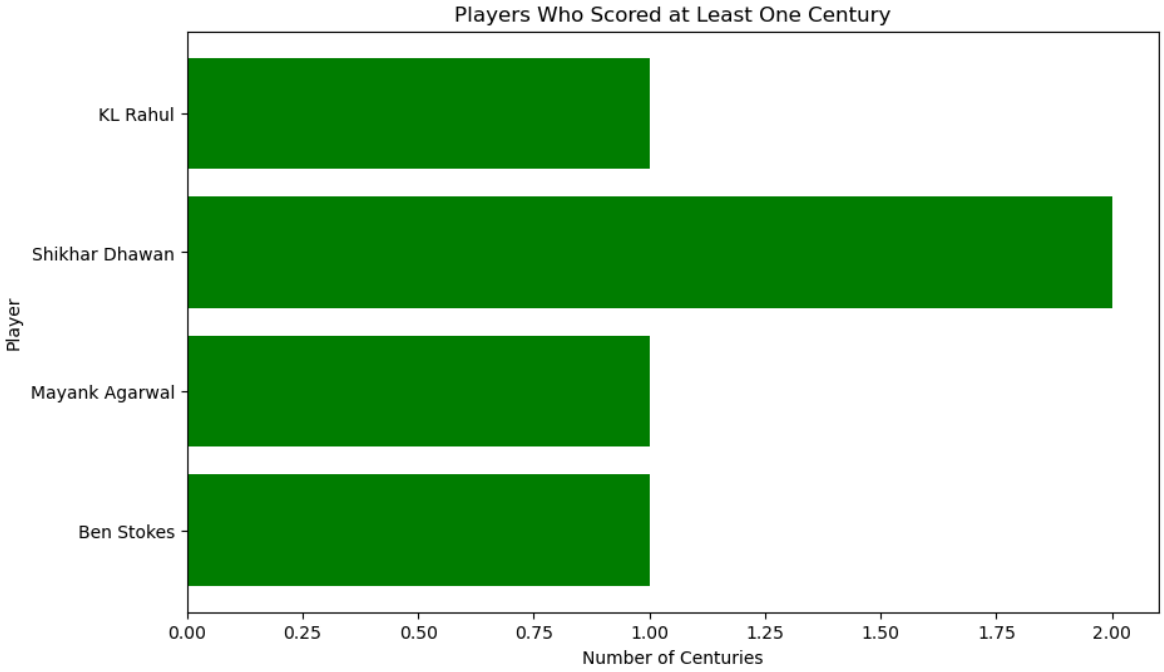
Q9. Please check the list of players who has an average greater than 40 and balls faced above 100. Print player name, average and balls faced.

In [39]:
```
# Filter players with an average > 40 and balls faced > 100
filtered_players = df[(df['Avg'] > 40) & (df['Balls faced'] > 100)]

# Display the result
print("Players with an average greater than 40 and balls faced above 100:")
print(filtered_players[['Player', 'Avg', 'Balls faced']])
```

```
Players with an average greater than 40 and balls faced above 100:
            Player    Avg  Balls faced
0          KL Rahul  55.83          518
1    Shikhar Dhawan  44.14          427
4      Ishan Kishan  57.33          354
8       Virat Kohli  42.36          384
9      ABD Villiers  45.40          286
10    Faf Duplessis  40.81          319
14      Eoin Morgan  41.80          302
24  Kane Williamson  45.28          237
27      Chris Gayle  41.14          210
28       Ben Stokes  40.71          200
31   Kieron Pollard  53.60          140
32    Rahul Tewatia  42.50          183
33  Ravindra Jadeja  46.40          135
36  Wriddhiman Saha  71.33          153
37  Ruturaj Gaikwad  51.00          169
```

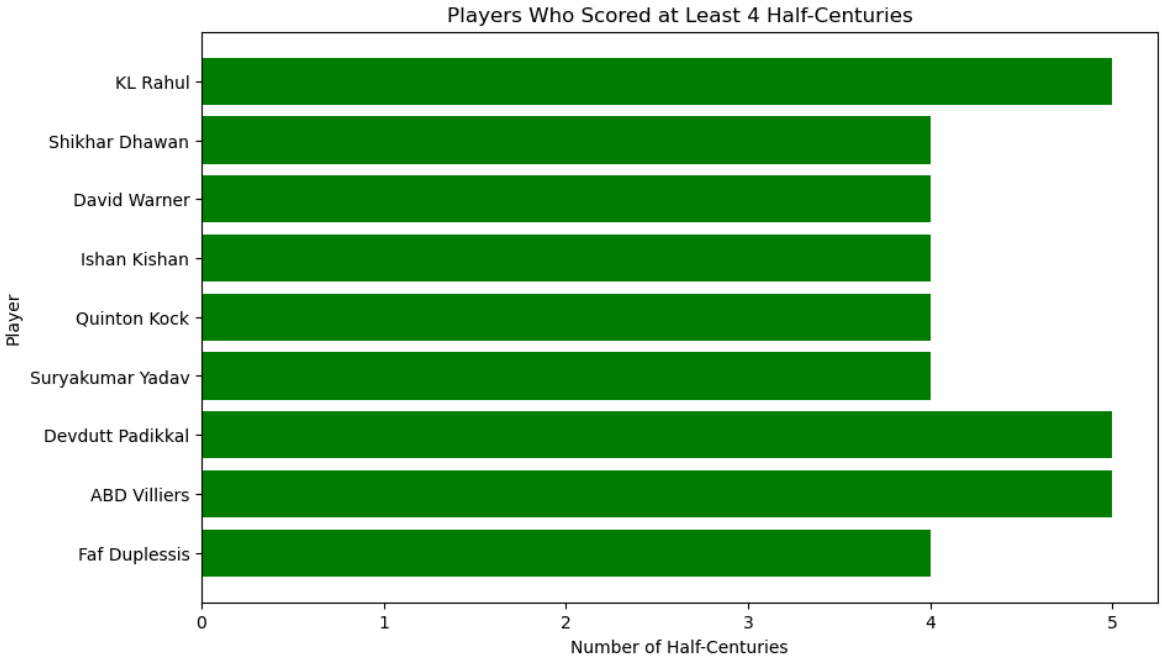
Q10. Players who scored atleast one century in this season. Create visualization.

In [41]:
```
# Ensure correct column name usage
century_column = [col for col in df.columns if str(col).strip() == "100"][0]  #

# Filter players who scored at least one century
century_scorers = df[df[century_column] >= 1]

plt.figure(figsize=(10, 6))
plt.barh(century_scorers["Player"], century_scorers[century_column], color="gree
plt.xlabel("Number of Centuries")
plt.ylabel("Player")
plt.title("Players Who Scored at Least One Century")
plt.gca().invert_yaxis()  # Invert y-axis for better readability
plt.show()
```



Q11. Players who scored atleast 4 half centuries in this season.

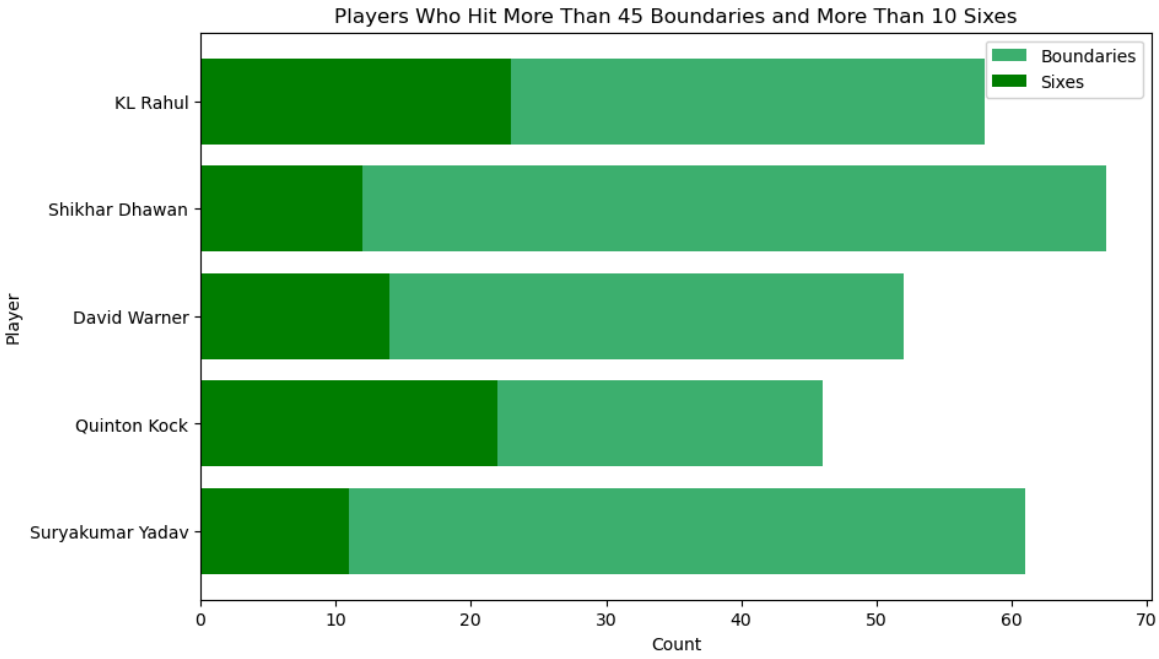
In [43]:
```
# Ensure correct column name usage
half_century_column = [col for col in df.columns if str(col).strip() == "50"][0]

# Filter players who scored at least 4 half-centuries
half_century_scorers = df[df[half_century_column] >= 4]

# Plot the data for half-centuries
plt.figure(figsize=(10, 6))
plt.barh(half_century_scorers["Player"], half_century_scorers[half_century_colum
plt.xlabel("Number of Half-Centuries")
plt.ylabel("Player")
plt.title("Players Who Scored at Least 4 Half-Centuries")
plt.gca().invert_yaxis()  # Invert y-axis for better readability
plt.show()
```



Q12. Check the list of players who hit more than 45 boundaries and more than 10 sixes in this season.

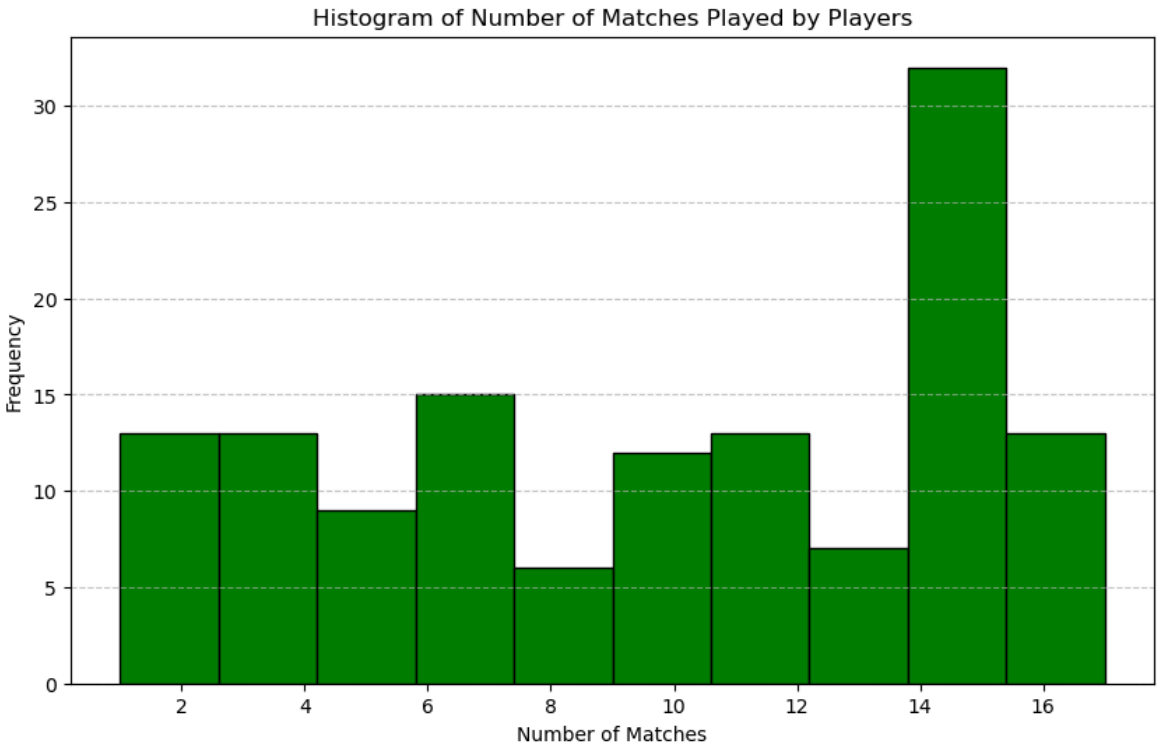
In [45]:
```
# Ensure correct column name usage
boundaries_column = [col for col in df.columns if str(col).strip() == "4s"][0]
sixes_column = [col for col in df.columns if str(col).strip() == "6s"][0]  # Fin

# Filter players who hit more than 45 boundaries and more than 10 sixes
boundary_six_hitters = df[(df[boundaries_column] > 45) & (df[sixes_column] > 10)
# Plot the data for boundaries and sixes
plt.figure(figsize=(10, 6))
plt.barh(boundary_six_hitters["Player"], boundary_six_hitters[boundaries_column]
plt.barh(boundary_six_hitters["Player"], boundary_six_hitters[sixes_column], col
plt.xlabel("Count")
plt.ylabel("Player")
plt.title("Players Who Hit More Than 45 Boundaries and More Than 10 Sixes")
plt.legend()
```

```
plt.gca().invert_yaxis()
plt.show()
```



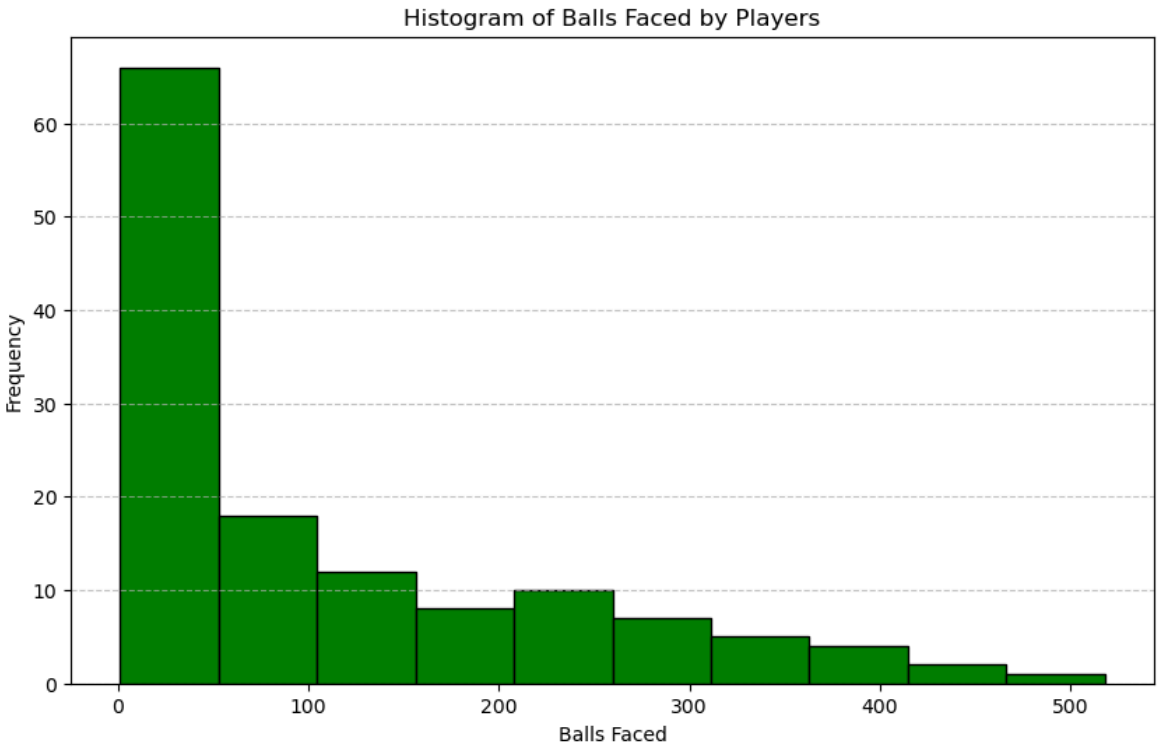
Q13. Plot a histogram of number of matches played in a season by players.

In [47]:
```
# Ensure correct column name usage
matches_column = [col for col in df.columns if str(col).strip() == "Matches"][0]

# Plot histogram for number of matches played
plt.figure(figsize=(10, 6))
plt.hist(df[matches_column], bins=10, color="green", edgecolor="black",)
plt.xlabel("Number of Matches")
plt.ylabel("Frequency")
plt.title("Histogram of Number of Matches Played by Players")
plt.grid(axis="y", linestyle="--", alpha=0.7)
plt.show()
```



Q14. Plot the histogram of balls faced by players.

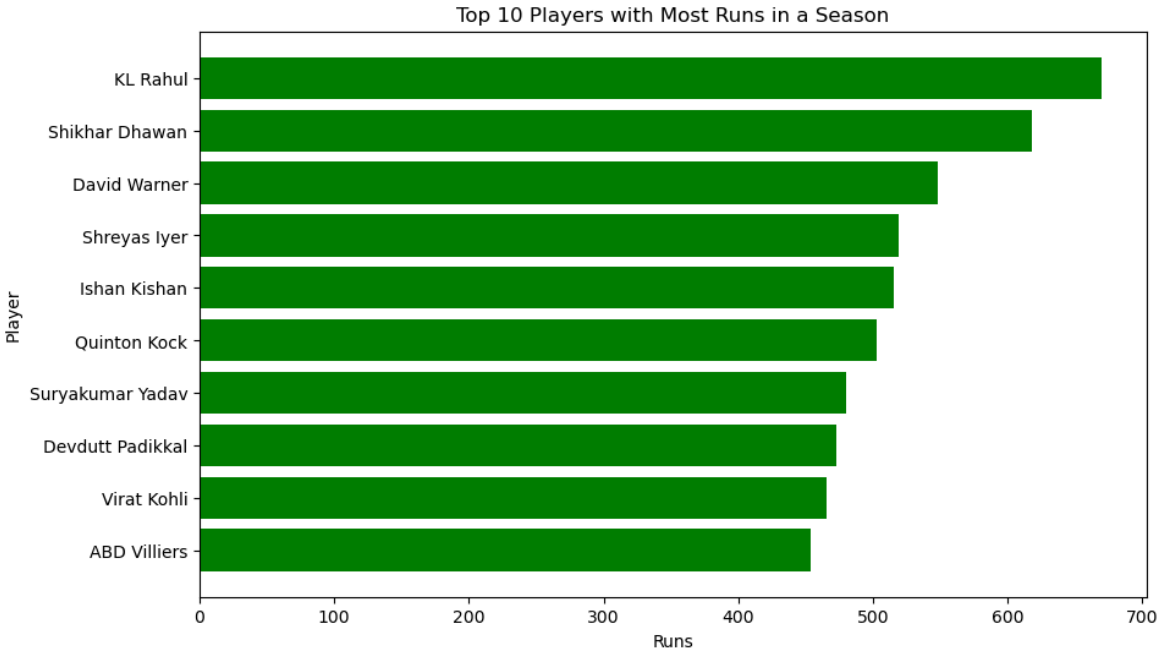
In [49]:
```
# Identify the correct column for balls faced
balls_faced_column = [col for col in df.columns if "Ball" in str(col)].pop()  #

# Plot histogram for balls faced by players
plt.figure(figsize=(10, 6))
plt.hist(df[balls_faced_column], bins=10, color="green", edgecolor="black",)
plt.xlabel("Balls Faced")
plt.ylabel("Frequency")
plt.title("Histogram of Balls Faced by Players")
plt.grid(axis="y", linestyle="--", alpha=0.7)
plt.show()
```



Q15. Top 10 players with most runs in a season.

In [51]:
```
# Identify the correct column for runs
runs_column = [col for col in df.columns if "Run" in str(col)].pop()  # Adjust f

# Get top 10 players with most runs in a season
top_scorers = df.nlargest(10, runs_column)

# Plot the data
plt.figure(figsize=(10, 6))
plt.barh(top_scorers["Player"], top_scorers[runs_column], color="green")
plt.xlabel("Runs")
plt.ylabel("Player")
plt.title("Top 10 Players with Most Runs in a Season")
plt.gca().invert_yaxis()
plt.show
```

Out[51]:
```
<function matplotlib.pyplot.show(close=None, block=None)>
```



Q16. Print the players who played the match but didn't get the batting.

In [53]:
```
# Identify the correct columns for matches played and balls faced
matches_column = [col for col in df.columns if "Match" in str(col)].pop()  # Adj
balls_faced_column = [col for col in df.columns if "Ball" in str(col)].pop()  #

# Ensure 'Balls Faced' column has valid numeric values
df[balls_faced_column] = pd.to_numeric(df[balls_faced_column], errors='coerce')

# Filter players who played matches but didn't get to bat (balls faced is NaN or
players_no_batting = df[(df[matches_column] > 0) & (df[balls_faced_column].isna(

# Print the players
print("Players who played but didn't get to bat:")
print(players_no_batting["Player"].to_string(index=False))
```

```
Players who played but didn't get to bat:
Series([], )
```

Q17. Create a new column to show the percentage of total runs scored in 4s and 6s. Then print the top 5 players with maximum percentage.

In [55]:
```
# Identify the correct columns for runs, fours, and sixes
runs_column = [col for col in df.columns if "Run" in str(col)].pop()
fours_column = [col for col in df.columns if "4s" in str(col)].pop()
sixes_column = [col for col in df.columns if "6s" in str(col)].pop()

# Calculate the total runs scored from fours and sixes
df["Boundary Runs"] = (df[fours_column] * 4) + (df[sixes_column] * 6)

# Calculate the percentage of total runs from boundaries
df["Boundary Percentage"] = (df["Boundary Runs"] / df[runs_column]) * 100

# Handle cases where total runs are zero to avoid division errors
df["Boundary Percentage"] = df["Boundary Percentage"].fillna(0)
```

```
# Get top 5 players with the highest boundary percentage
top_5_players = df.nlargest(5, "Boundary Percentage")

# Print the result
print("Top 5 players with the highest percentage of runs from boundaries:")
print(top_5_players[["Player", "Boundary Percentage"]].to_string(index=False))
```

```
Top 5 players with the highest percentage of runs from boundaries:
       Player  Boundary Percentage
   Andrew Tye           100.000000
Andre Russell            76.923077
 Chris Morris            76.470588
Hardik Pandya            73.309609
 Sunil Narine            72.727273
```

Q18. Print the players with top 5 Not out percentages (Not Out percentage can be calculated as number of Not outs divided by Innings).

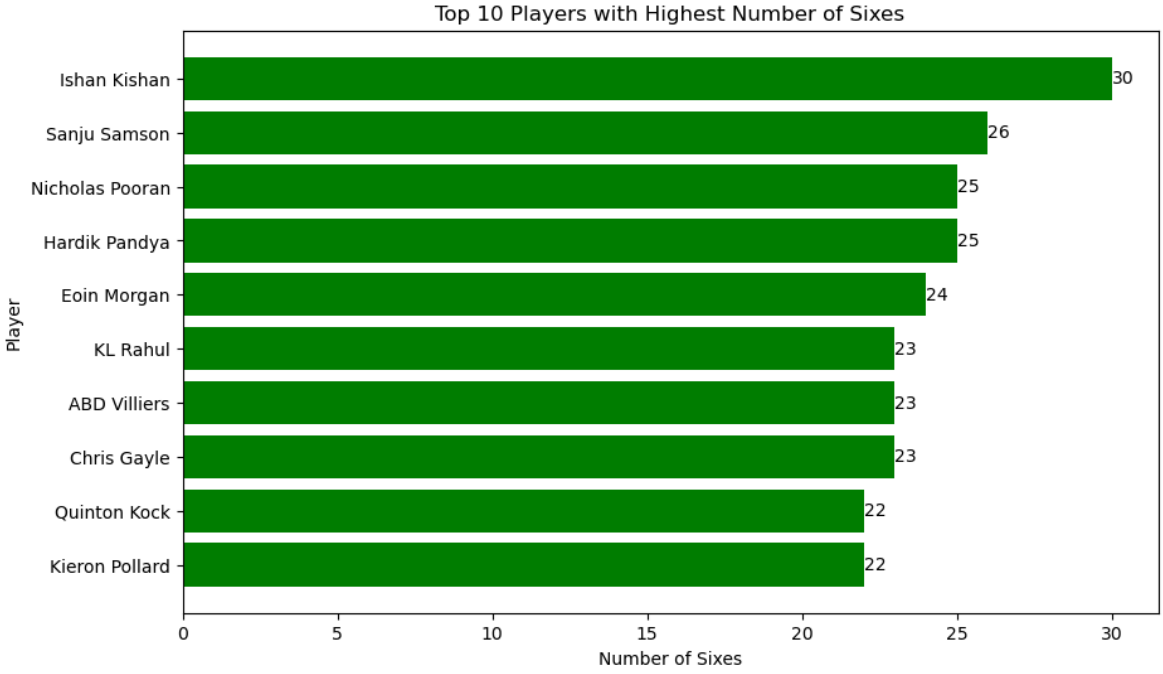
In [65]:
```
# Identify the correct columns for Not Outs and Innings
not_outs_column = next((col for col in df.columns if "Not Out" in str(col)), Non
innings_column = next((col for col in df.columns if "Inns" in str(col)), None)

# Ensure both columns are found
if not_outs_column is None or innings_column is None:
    raise ValueError("Required columns for Not Outs or Innings not found in Data

# Convert to numeric (handles cases where columns might have strings)
df[not_outs_column] = pd.to_numeric(df[not_outs_column], errors='coerce')
df[innings_column] = pd.to_numeric(df[innings_column], errors='coerce')

# Calculate Not Out percentage, handling division by zero
df["Not Out Percentage"] = (df[not_outs_column] / df[innings_column].replace(0,

# Fill NaN values with 0 (if any)
df["Not Out Percentage"] = df["Not Out Percentage"].fillna(0)

# Get top 5 players with the highest Not Out percentage
top_5_not_outs = df.nlargest(5, "Not Out Percentage")

# Print the result
print("Top 5 players with the highest Not Out percentage:")
print(top_5_not_outs[["Player", "Not Out Percentage"]].to_string(index=False))
```

```
Top 5 players with the highest Not Out percentage:
         Player  Not Out Percentage
Gurkeerat Singh               100.0
Lockie Ferguson               100.0
    Imran Tahir               100.0
  Mohammad Nabi               100.0
   Pravin Dubey               100.0
```

Q19. Create visualization of top 10 players with highest number of sixes.

In [59]:
```
import matplotlib.pyplot as plt
```

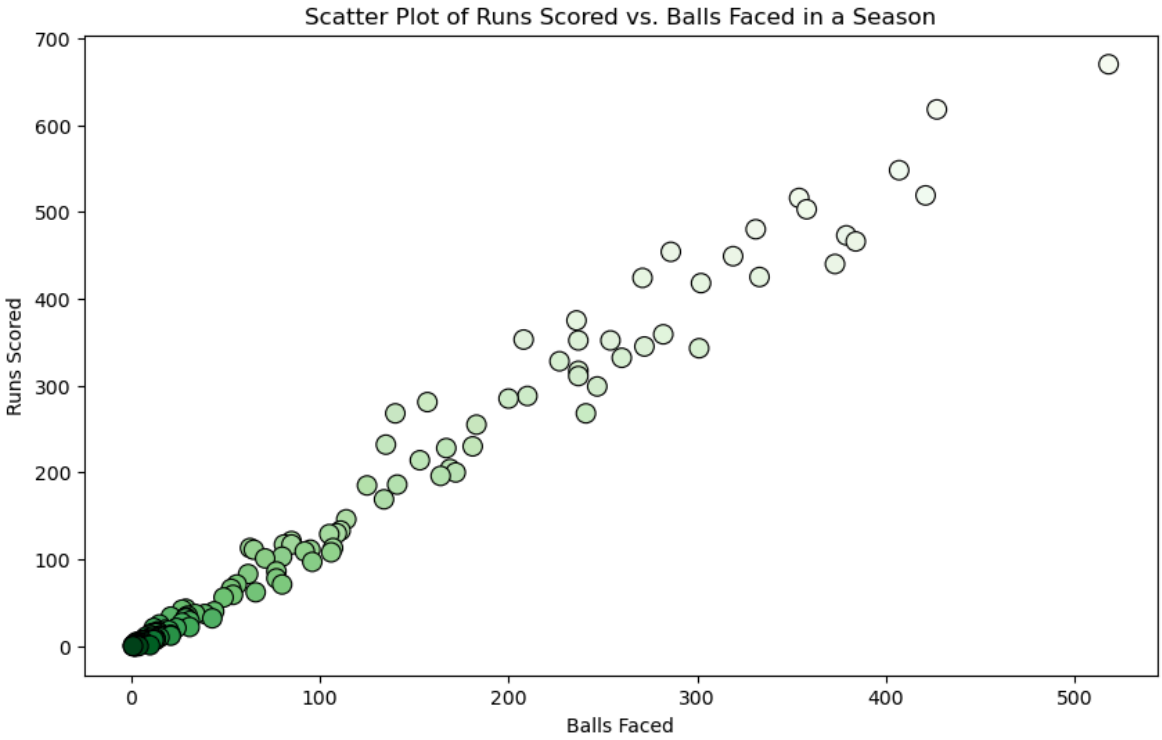
```
# Identify the correct column for sixes
sixes_column = next((col for col in df.columns if "6s" in str(col)), None)

# Ensure the column exists before proceeding
if sixes_column is None:
    print("Error: Column for Sixes not found. Please check the dataset.")
else:
    # Get top 10 players with the highest number of sixes
    top_10_six_hitters = df.nlargest(10, sixes_column)

    # Plot the data
    plt.figure(figsize=(10, 6))
    bars = plt.barh(top_10_six_hitters["Player"], top_10_six_hitters[sixes_colum
    plt.xlabel("Number of Sixes")
    plt.ylabel("Player")
    plt.title("Top 10 Players with Highest Number of Sixes")
    plt.gca().invert_yaxis()

    # Add labels on the bars
    for bar in bars:
        plt.text(bar.get_width(), bar.get_y() + bar.get_height()/2,
                 str(int(bar.get_width())), va='center', ha='left', fontsize=10)

    plt.show()
```



Q20. Scatter plot of runs scored by a player v/s balls faced in a season. Then find the relationship between these 2 variables.

In [61]:
```
# Load the Excel file
file_path = "ipl.xlsx"
df = pd.read_excel(file_path, sheet_name="IPL_Dataset")

# Scatter plot of Runs vs. Balls faced
plt.figure(figsize=(10, 6))
sns.scatterplot(x=df["Balls faced"], y=df["Runs"], hue=df["Player"], palette="Gr

# Labels and title
```

```
plt.xlabel("Balls Faced")
plt.ylabel("Runs Scored")
plt.title("Scatter Plot of Runs Scored vs. Balls Faced in a Season")
plt.legend([], [], frameon=False)  # Hide the legend for better visibility

# Show plot
plt.show()

# Compute Pearson correlation coefficient
correlation, p_value = pearsonr(df["Balls faced"], df["Runs"])

# Print correlation result
print(f"Pearson Correlation Coefficient: {correlation:.2f}")
if p_value < 0.05:
    print("There is a statistically significant positive correlation between run
else:
    print("The correlation is not statistically significant.")
```

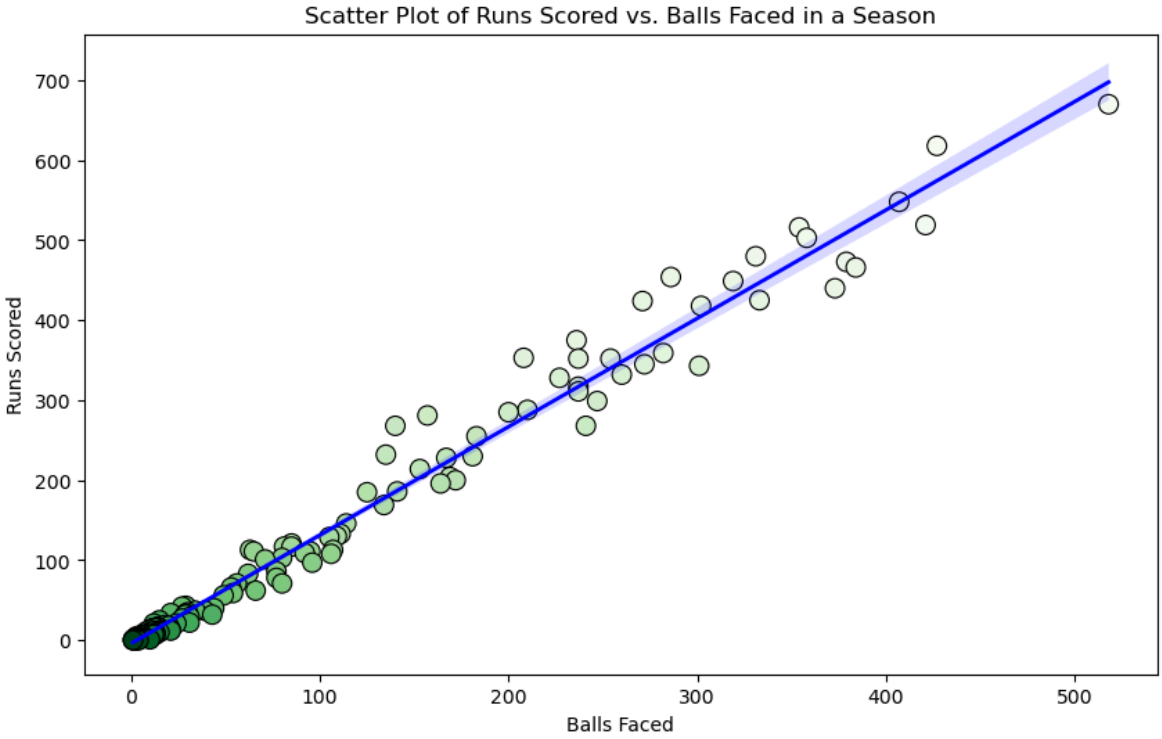



```
Pearson Correlation Coefficient: 0.99
There is a statistically significant positive correlation between runs scored and
balls faced.
```

Q20. Scatter plot of runs scored by a player v/s balls faced in a season with best fit line. Then find the relationship between these 2 variables.

In [63]:
```
# Load the Excel file
file_path = "ipl.xlsx"
df = pd.read_excel(file_path, sheet_name="IPL_Dataset")

# Ensure column names match exactly (check for leading/trailing spaces)
df.columns = df.columns.str.strip()

# Convert relevant columns to numeric (in case of any unexpected data types)
df["Balls faced"] = pd.to_numeric(df["Balls faced"], errors='coerce')
df["Runs"] = pd.to_numeric(df["Runs"], errors='coerce')
```

```
# Remove rows with NaN values in relevant columns
df = df.dropna(subset=["Balls faced", "Runs"])

# Scatter plot of Runs vs. Balls faced
plt.figure(figsize=(10, 6))
sns.scatterplot(x=df["Balls faced"], y=df["Runs"], hue=df["Player"], palette="Gr

# Best-fit regression line
sns.regplot(x=df["Balls faced"], y=df["Runs"], scatter=False, color="blue", line

# Labels and title
plt.xlabel("Balls Faced")
plt.ylabel("Runs Scored")
plt.title("Scatter Plot of Runs Scored vs. Balls Faced in a Season")

# Hide duplicate legend entries
plt.legend([], [], frameon=False)

# Show plot
plt.show()

# Compute Pearson correlation coefficient
correlation, p_value = pearsonr(df["Balls faced"], df["Runs"])

# Print correlation result
print(f"Pearson Correlation Coefficient: {correlation:.2f}")
if p_value < 0.05:
    print("There is a statistically significant positive correlation between run
else:
    print("The correlation is not statistically significant.")
```




```
Pearson Correlation Coefficient: 0.99
There is a statistically significant positive correlation between runs scored and
balls faced.
```

In [ ]: