**Case Study 1: Online Shopping Cart**

**Description:**

In this case study, the objective was to create a simple billing system for an online shopping cart. The program takes the price of three items as user input, computes the total price using arithmetic operators, and applies a 10% discount if the total exceeds $500. Comparison operators were used to check whether the discount condition is met.

**Python Code:**

python

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# Case Study 1: Online Shopping Cart

# Taking input for item prices

item1 = float(input("Enter the price of item 1: "))

item2 = float(input("Enter the price of item 2: "))

item3 = float(input("Enter the price of item 3: "))

# Calculating total price

total = item1 + item2 + item3

# Checking if discount applies

if total > 500:

discount = total \* 0.10

final\_price = total - discount

else:

final\_price = total

# Displaying the result

print(f"Total price after discount (if applicable): ${final\_price:.2f}")

**Case Study 2: Grading System**

**Description:**

The grading system automates the process of evaluating a student's academic performance. The user inputs marks for five subjects, and the program calculates the average percentage. Using conditional statements (if-elif-else), it assigns grades based on the average score.

**Python Code:**

python

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# Case Study 2: Grading System

# Taking input for marks

marks = []

for i in range(1, 6):

mark = float(input(f"Enter marks for subject {i}: "))

marks.append(mark)

# Calculating average

average = sum(marks) / 5

# Determining grade

if average >= 90:

grade = "A+"

elif average >= 80:

grade = "A"

elif average >= 70:

grade = "B"

elif average >= 60:

grade = "C"

else:

grade = "Fail"

# Displaying grade

print(f"Average: {average:.2f}%")

print(f"Grade: {grade}")

**Case Study 7: Electricity Bill Calculator**

**Description:**

This program calculates the electricity bill based on the number of units consumed, using tiered rates:

* Up to 100 units: $0.5/unit
* 101–300 units: $0.75/unit
* Above 300 units: $1/unit

The logic determines the correct rate to apply based on the consumption bracket.

**Python Code:**

python

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# Case Study 7: Electricity Bill Calculator

units = int(input("Enter electricity units consumed: "))

if units <= 100:

bill = units \* 0.5

elif units <= 300:

bill = (100 \* 0.5) + (units - 100) \* 0.75

else:

bill = (100 \* 0.5) + (200 \* 0.75) + (units - 300) \* 1.0

print(f"Total bill amount: ${bill:.2f}")

**Case Study 12: Leap Year Checker**

**Description:**

This case study helps determine whether a given year is a leap year. A year is a leap year if:

* It is divisible by 4 **and** not divisible by 100, **or**
* It is divisible by 400

The program uses logical and modulus operators to validate the leap year condition.

**Python Code:**

python

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# Case Study 12: Leap Year Checker

year = int(input("Enter a year: "))

# Leap year condition

if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):

print(f"{year} is a leap year.")

else:

print(f"{year} is not a leap year.")

**Case Study 13: Age Group Classifier**

**Description:**

The age group classifier categorizes a person based on their age into one of the following:

* 0–12: Child
* 13–19: Teenager
* 20–59: Adult
* 60 and above: Senior Citizen

This helps in applications such as ticketing systems, demographic studies, and targeted services.

**Python Code:**

python

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# Case Study 13: Age Group Classifier

age = int(input("Enter the age of the visitor: "))

if age >= 0 and age <= 12:

category = "Child"

elif age <= 19:

category = "Teenager"

elif age <= 59:

category = "Adult"

else:

category = "Senior Citizen"

print(f"The visitor is categorized as: {category}")