Rajarata University of Sri Lanka

Department of Computing

ICT 1402 – Principles of Program Design and Programming

Tutorial 08

1. Build and run all programs presented in lecture note 9. Briefly describe the theory/ concept you learned from these programs separately.

2. Swap two values stored in two different variables.

3. Check whether an entered number is negative, positive or zero.

4. Check whether an entered year is leap year or not.

5. Write a program that takes an integer keyed in from the terminal and extracts and displays each digit of the integer in English. So, if the user types in 932, the program should display nine three two. Remember to display "zero" if the user types in just a 0.

6. Input marks of five subjects Physics, Chemistry, Biology, Mathematics and Computer. Calculate percentage and grade according to following:
    a. Percentage >= 90% : Grade A
    b. Percentage >= 80% : Grade B
    c. Percentage >= 70% : Grade C
    d. Percentage >= 60% : Grade D
    e. Percentage >= 40% : Grade E
    f. Percentage < 40% : Grade F

7. Input basic salary of an employee and calculate its Gross salary according to following: (note: HRA and DA are allowances)
    a. Basic Salary <= 10000 : HRA = 20%, DA = 80%
    b. Basic Salary <= 20000 : HRA = 25%, DA = 90%
    c. Basic Salary > 20000 : HRA = 30%, DA = 95%

8. Write a program that acts as a simple "printing" calculator. The program should allow the user to type in expressions of the form number operator: The following operators should be recognized by the program: + - * / S E
    The S operator tells the program to set the "accumulator" to the typed-in number.
    The E operator tells the program that execution is to end.
    The arithmetic operations are performed on the contents of the accumulator with the number that was keyed in acting as the second operand. The following is a "sample run" showing how the program should operate:

Begin Calculations
10 S *Set Accumulator to 10*
= 10.000000 *Contents of Accumulator*
2 / *Divide by 2*
= 5.000000 *Contents of Accumulator*
55 - *Subtract 55*
-50.000000
100.25 S *Set Accumulator to 100.25*
= 100.250000
4 * *Multiply by 4*
= 401.000000
0 E *End of program*
= 401.000000
End of Calculations.

Make certain that the program detects division by zero and also checks for unknown operators.

9. Input electricity unit charges and calculate total electricity bill according to the given condition:
    a. For first 50 units Rs. 0.50/unit
    b. For next 100 units Rs. 0.75/unit
    c. For next 100 units Rs. 1.20/unit
    d. For unit above 250 Rs. 1.50/unit
    e. An additional surcharge of 20% is added to the bill

10. An envelope manufacturing company hires people to make envelopes. They provide all the raw material needed and pay at the following rates. Write a program to input the number of envelopes made and to calculate and print the amount due

Envelopes	Rate
1-1000	75 cents
1001-1500	1 rupee
1501-2000	1 rupee and 15 cents
2001-	1 rupee and 25 cents

11. Find the number of separate Notes and coins required to represent a given monetary value. E,g, 2700 required 1 → 2000 note, 1→ 500 note and 2→100 notes.

12. Display Age, Birthday, and Gender using a given National Identity Card number.

13. Write a program to find the largest of three numbers.

14. Write a program to check if a character is a vowel or consonant using switch.

15. Display each digit of an integer in English using switch.

16. Check if a triangle is equilateral, isosceles, or scalene using a compound condition.

17. A hospital charges its patients based on the type of service provided.
    a. Consultation Fee: Rs. 500
    b. Diagnostic Test: Rs. 1000
    c. Surgery: Rs. 5000
    d. Emergency Service Fee: Rs. 2000

    Write a program to calculate the total bill based on the type of service and any applicable emergency fees.

18. A tax calculation system works as follows:
    a. Income < Rs. 5,00,000: No Tax
    b. Income Rs. 5,00,000 – Rs. 10,00,000: 10% Tax
    c. Income Rs. 10,00,000 – Rs. 20,00,000: 20% Tax
    d. Income > Rs. 20,00,000: 30% Tax

    Write a program to calculate the tax payable for a given income.

19. A library imposes fines for late returns as follows:
    a. Up to 5 days: Rs. 5 per day
    b. 6 to 10 days: Rs. 10 per day
    c. More than 10 days: Rs. 15 per day

    Write a program to calculate the library fine for late returns.

20. A car rental service charges customers based on the car type and rental days:
    a. **Sedan:** Rs. 1000 per day
    b. **SUV:** Rs. 1500 per day
    c. **Luxury:** Rs. 3000 per day

    If the rental exceeds 7 days, a discount of 10% is applied. Calculate the total bill.

21. A telecom company offers the following data plans:
    a. 1 GB: Rs. 150
    b. 5 GB: Rs. 600
    c. 10 GB: Rs. 1000

    If the user opts for an additional 100 SMS pack, add Rs. 200 to the bill.
    Calculate the total bill.

Fortune Teller Program - Question:

You have been tasked with creating a Fortune Teller Program using C programming. The program should prompt the user to input their birth month and favourite colour and display a personalized fortune message based on the inputs provided.

Requirements:

1. Input:
    - Ask the user to enter their birth month as an integer (1 to 12).
    - Ask the user to enter their favourite colour as a character:
        - R for Red
        - B for Blue
        - G for Green
        - Y for Yellow
2. Output:
    - Provide a personalized fortune message based on the birth month using nested if-else:
        - If the birth month is between 1-3, display: *"You are destined for a journey full of new experiences."*
        - If the birth month is between 4-6, display: *"A surprise windfall will come your way soon."*
        - If the birth month is between 7-9, display: *"You will find success in a creative field."*
        - If the birth month is between 10-12, display: *"Your kindness will bring you great rewards."*
        - If the input is invalid, display: *"Invalid birth month."*

3. Favorite Color Fortune:
    - Use a switch statement to provide additional fortune messages based on the user's favorite color:
        - R or r: *"Your boldness will help you conquer your fears."*
        - B or b: *"You will find peace and harmony in the coming days."*
        - G or g: *"A great learning opportunity will soon arise."*
        - Y or y: *"Your positivity will inspire those around you."*
        - If the color is invalid, display: *"Unknown color choice. But you will still have a bright future!"*

Adventure Game

You are tasked with developing a text-based adventure game using C programming. The game should be based on decision-making using nested if-else statements.

Game Scenario:
The player finds themselves at the entrance of a mysterious cave and must make a series of choices. The outcome depends on the choices made by the player.

Gameplay Requirements:

1. Initial Choice:
    - Present the player with three options:
        - 1: Enter the cave.
        - 2: Walk around the cave.
        - 3: Go back home.
2. Entering the Cave:
    - If the player enters the cave, they will find a treasure chest and must decide:
        - 1: Open the chest (results in winning gold coins).
        - 2: Leave the chest (safe exit without treasure).
3. Walking Around the Cave:
    - If the player chooses to walk around, they will encounter a sleeping dragon and must decide:
        - 1: Sneak past the dragon (successful escape).
        - 2: Wake the dragon (results in losing the game).
4. Going Back Home:
    - If the player chooses to go back home, the game ends immediately with a message.
5. Invalid Inputs:
    - If the player enters an invalid choice, the program should display an error message and terminate.

Number Guessing Game

You are tasked with creating a Number Guessing Game using C programming. The game should generate a random number between 1 and 100, and the player must guess it. The program will provide feedback based on the player's guess.

Game Requirements:

1. Generate a Random Number:
    - Use the rand() function to generate a random number between 1 and 100.
2. Input from the Player:
    - Prompt the player to enter their guess.
3. Decision Making Logic:
    - If the guess is correct, display: "Congratulations! You guessed the correct number!".
    - If the guess is incorrect, use a switch statement to determine:
        - "Too High" if the guess is greater than the random number.
        - "Too Low" if the guess is less than the random number.
4. Provide a Hint:
    - If the guess is within 5 units of the correct number, display: "You were very close! Try again next time."
    - If the guess is far from the correct number, display: "Better luck next time!"
5. End the Game:
    - Display the correct number at the end of the game.