Program Documentation

Title

Number System Converter

Purpose

The program allows users to convert numbers between different number systems (binary, octal, decimal, hexadecimal). It supports both direct conversions (e.g., decimal → binary) and cross conversions (e.g., binary → hexadecimal).

Key Features

Convert Binary ↔ Decimal

Convert Octal ↔ Decimal

Convert Hexadecimal ↔ Decimal

Convert between non-decimal systems (e.g., Binary ↔ Octal, Binary ↔ Hexadecimal, Octal ↔ Hexadecimal).

Error handling for invalid inputs (invalid digits for a given base).

Menu-driven interface for interactive use.

Technologies Used

Language: C++

Data Structures:

unordered\_map for digit–value mapping in hexadecimal.

string for user input and manipulation.

Algorithms:

Number base conversion using repeated division and modulus.

Reversing strings for correct digit placement.

Classes

NumberConverter:

toDecimal() → Converts any base (2, 8, 10, 16) number to decimal.

fromDecimal() → Converts a decimal number to binary, octal, or hexadecimal.

Contains maps for hexadecimal conversion.

User Interface

Command-line menu.

User selects an option (1–12 or 0 to exit).

Program prompts for input, performs conversion, and outputs result.