Process Documentation; Automation of Number System Conversions

1. Introduction

   This project focuses on automating the conversion of numbers between various number systems, including Decimal, Binary, Octal, and Hexadecimal. The system is designed to simplify the process of switching between these number systems using a digital application.

2. Objectives

   The main objectives of this project are:

   • To create an automated tool for converting numbers between Decimal, Binary, Octal, and Hexadecimal systems.

   • To enhance students' understanding of digital logic through practical implementation.

   • To implement the solution on a mobile-friendly framework (React Native) that supports both Android and iOS platforms.

   • To ensure the project is well-documented for ease of replication and maintenance.

3. Methodology

   The process followed in the project included:

- Problem Analysis: Understanding number system conversions and identifying the operations required.
- System Design: Designing algorithms for the conversions (Decimal « Binary, Decimal « Octal, Decimal « Hexadecimal).
- Implementation: Using HTML, CSS, and JavaScript for prototype development; React Native for mobile deployment.
- Testing: Verifying conversion accuracy with different test cases.
- Deployment: Preparing the app for both Android and iOS environments through React Native.

4. Team Roles

   Each group member was assigned a role to ensure smooth execution:

   - Project Manager: Oversaw the project timeline and deliverables.
   - Lead Developer Designed and implemented the core algorithms in JavaScript.
   - UI/UX Designer: Created simple user-friendly interfaces using HTML/CSS.
   - Documentation Lead: Prepared the process and program documentation in PDF format.
   - Tester: Verified system functionality and ensured accuracy in conversions.

5. Conversion processes

   Decimal-> Hexadecimal

   Divide the decimal number by 16

   Record the remainder

   Update the number to the quotient

   Repeat until quotient is 0

   The Hexadecimal value is the remainders used in reverse order.

   Decimal->Octal

   Divide the decimal number by 8

   Record the remainder

   Update the number to the quotient

   Repeat until the quotient is 0

   The Octal value is the remainders used in reverse order

   Decimal -> Binary

   Divide the decimal number by 2

   Record the remainder

   Update the number to the quotient

   Repeat until the quotient is 0

   The binary value is the remainders used in reverse order.

   Binary -> Hexadecimal

   Group the binary digits into set of 4 (starting from the right)

   Convert each group to its Hexadecimal equivalent

   Combine the results

   Binary -> Octal

   Group the Binary into sets of 3 (Starting from the right)

   Convert each group to its Octal equivalent.

   Combine the results

   Binary -> Decimal

   Multiply each binary digit by 2 raised to its position index (starting from 0)

   Sum all the results

   The total is the decimal value

6. Conclusion

   This project demonstrates a practical application of digital logic concepts by automating number system conversions. The process documentation ensures the project can be replicated and improved in the future. The use of React Native gurantees cross-platform deployment mamaking the solution widely accessible.