CS202: PROGRAMMING PARADIGMS & PRAGMATICS

Semester II, 2022 – 2023

Lab 7: Perl Programming Exercise

- **Introduction**
  - **Binary Number System (Base 2):**
    - The binary number system only consists of two digits, 0s and 1s. The base of this number system is 2.
    - Example: 5 in Base 10 = 101 in Base 2,
    - Example: 10 in Base 2 = 2 in Base 10
  - **Octal Number System (Base 8):**
    - The octal number system consists of 8 digits ranging from 0 to 7
    - Example: 15 in Base 10 = 17 in Base 8
    - Example: 15 in Base 8 = 13 in Base 10
  - **Decimal Number System (Base 10):**
    - The decimal number system consists of 10 digits ranging from 0 to 9
  - **Hexadecimal Number System (Base 16):**
    - The hexadecimal number system consists of 16 digits with 0 to 9 digits and alphabets A to F. It is also known as alphanumeric code as it consists of both number and alphabets.
    - Example: 18 in Base 10 = 12 in Base 16
    - Example: 1A in Base 16 = 26 in Base 10
  - **Palindrome:**
    - A word, phrase, number, or other sequence of characters which reads the same backward as forward, such as madam or 12321.

- **Exercise 1: Convert a number from Base A to B (`ConvertBase`)**
  - Given two positive integers **A** and **B** and a string **S** of size **N,** denoting a number in base **A**, the task is to convert the given string **S** from base **A** to base **B**.

    ```
    ConvertBase(string S, int A, int B)
    ```

    - Sample output: 585 (10) = 1001001001 (2)

- **Exercise 2: Double-Base Palindromes (with base 2 and 10 only)(`DBPalindrome`)**
  - **Example:** The decimal number, 585 = 10010010012 (binary), is palindromic in both bases 2 and 10

- Write a program to find all numbers less than n, which are palindromic in base 10 and base 2.
    - Sample output: 585 (10) = 1001001001 (2) *(For all numbers less than n, one per line)*
- *Note 1: Any string containing just one letter is by default a palindrome*
- *Note 2: A palindromic number, in either base, may not include leading zeros.*

- **Exercise 3: Smallest Possible Number (`SmallestNumber`)**
    - Given a number **K** of length **N** digits, the task is to find the smallest possible number that can be formed from K of N digits by swapping the digits any number of times.
    - **Example:** K = 325343273113434 (N = 15), Output = 112233333344457

- **Submitting your work:**
    - All source files and class files as one tar-gzipped archive.
        - When unzipped, it should create a directory with your ID. Example: **2008CSB1001** (NO OTHER FORMAT IS ACCEPTABLE!!! Case sensitive!!!)
    - Source files should include the following: (Case-Sensitive file names!!)
        - `ConvertBase.pl` [15 Points]
        - `DBPalindrome.pl` [10 Points]
        - `SmallestNumber.pl` [5 Points]
    - ***Negative marks for any problems/errors in running your programs***
    - Submit/Upload it to Google Classroom