solution codes:

```java
/**
 * This program counts the length of the name you input.
 * It counts the occurrence of every character in the name.
 * And it also transforms the name into Binary, Hexadecimal, Octal and
HexaTridecimal codes
 * regarding the first character of first name.
 *
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 * @assignment Assignment #2
 * @date 18 Feb 2020
 * 3 hours
 */

import java.util.Scanner;

import static java.lang.Character.*;

public class NameAnalysisCode {
    private final static Scanner in = new Scanner(System.in);
    private final static String FIRST = "first", MIDDLE = "middle", LAST =
"last";
    // name[0]:first name; name[1]:middle name; name[2]:last name
    private static String[] name = new String[3];
    // len[i]=name[i].length();
    private static int[] len = new int[3];

    /**
     * @description: This function prints the parameter as input and returns
the name with the output.
     * Output type is string.
     * The name should begin with a capital letter.
     * And all the other letters should be lowercase.
     * If the input is invalid, this function will print "Input ERROR!" and
ask the user to input again.
     */
    private static String getStr(String input) {
        while (true) {
            System.out.print(input);
            String res = in.nextLine();
            boolean isValid = true;
            if (!isUpperCase(res.charAt(0))) {
                isValid = false;
            } else {
                for (int i = 1; i < res.length(); i++) {
                    if (!isLowerCase(res.charAt(i))) {
                        isValid = false;
                        break;
                    }
                }
            }
            if (!isValid) {
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```
                System.out.println("Input ERROR!");
            } else {
                return res;
            }
        }
    }

    /**
     * @description: This function judges whether the input is "Y" or "N".
     * Output type is boolean, Y for true and N for false.
     * If the input is invalid, this function will print "Wrong unit
selection." and ask the user to input again.
     */
    private static boolean getSelection(String input) {
        while (true) {
            System.out.print(input);
            String res = in.nextLine();
            if (res.equals("Y")) {
                return true;
            } else if (res.equals("N")) {
                return false;
            } else {
                System.out.println("Wrong unit selection.");
            }
        }
    }

    /**
     * @description: The function converts an integer to Octal integer and
returns it as string.
     */
    private static String toOct(int num) {
        StringBuilder res = new StringBuilder();
        while (num != 0) {
            res.append(num & 7);  // num&7 equals to num%8;
            num >>= 3;            // num>>=3 equals to num=num/8;
        }
        return res.reverse().toString();
    }

    /**
     * @description: This function prints every character of your name in the
base of the parameter "base".
     */
    private static void print(int base) {
        System.out.print("Your full name in ");
        if (base == 2) {
            System.out.print("Binary ");
        } else if (base == 8) {
            System.out.print("Octal ");
        } else if (base == 16) {
            System.out.print("Hexadecimal ");
        } else {
```

```
            System.out.print("HexaTridecimal ");
        }
        System.out.print("codes: ");
        for (String s : name) {
            for (char c : s.toCharArray()) {
                if (base == 8)
                    System.out.print(toOct(c) + " ");
                else
                    System.out.print(Integer.toString(c, base) + " ");
            }
        }
        System.out.println();
    }

    /**
     * @description: This function returns "character" if the parameter is
one, otherwise "characters".
     */
    private static String characterStyle(int cnt) {
        if (cnt == 1) {
            return "character";
        }
        return "characters";
    }

    /**
     * @description: This function prints the name and its number of
alphabets.
     */
    private static void printNameCnt(String name, int cnt) {
        if (cnt > 0) {
            System.out.printf("Your %s name has %d %s.\n", name, cnt,
characterStyle(cnt));
        }
    }

    /**
     * @description: This function prints the names and their number of
alphabets.
     */
    private static void printNameCnt(String name1, String name2, int cnt) {
        System.out.printf("Your %s and %s names have %d %s each.\n", name1,
name2, cnt, characterStyle(cnt));
    }

    public static void main(String[] args) {
        do {
            // this array counts times of occurrence of every letter
            int[] charCnt = new int[26];
            name[0] = getStr("Please, type in your first name: ");
            if (getSelection("Do you have a middle name? [Y/N]: ")) {
                name[1] = getStr("Please type in your middle name: ");
            } else {
```

```
                name[1] = ""; // initialize
            }
            name[2] = getStr("Please, type in your last name: ");
            System.out.print("Your full name ");
            for (int i = 0; i < 3; i++) {
                if (name[i].length() != 0) {
                    System.out.print(name[i] + " ");
                }
                len[i] = name[i].length();
                for (char c : name[i].toUpperCase().toCharArray()) {
                    charCnt[c - 'A']++;
                }
            }
            System.out.println("has " + (len[0] + len[1] + len[2]) + "
characters.");
            if (len[0] == len[1] && len[1] == len[2]) {
                System.out.printf("Your first, middle and last names have %d
characters each.\n", len[0]);
            } else if (len[0] == len[1]) {
                printNameCnt(FIRST, MIDDLE, len[0]);
                printNameCnt(LAST, len[2]);
            } else if (len[0] == len[2]) {
                printNameCnt(FIRST, LAST, len[0]);
                printNameCnt(MIDDLE, len[1]);
            } else if (len[1] == len[2]) {
                printNameCnt(FIRST, len[0]);
                printNameCnt(MIDDLE, LAST, len[1]);
            } else {
                printNameCnt(FIRST, len[0]);
                printNameCnt(MIDDLE, len[1]);
                printNameCnt(LAST, len[2]);
            }
            for (int i = 0; i < 26; i++) {
                if (charCnt[i] != 0) {
                    System.out.printf("%c:%d\n", i + 'A', charCnt[i]);
                }
            }
            char firstCharacter = name[0].charAt(0);
            if (firstCharacter >= 'A' && firstCharacter <= 'G') {
                print(2);
            } else if (firstCharacter >= 'H' && firstCharacter <= 'N') {
                print(16);
            } else if (firstCharacter >= 'O' && firstCharacter <= 'S') {
                print(8);
            } else {
                print(36);
            }
        } while (getSelection("Do you want to continue with another (such as
your friend's) name? [Y/N]: "));
    }
}
```

Output:

```
Please, type in your first name: 1
Input ERROR!
Please, type in your first name: !
Input ERROR!
Please, type in your first name: AD
Input ERROR!
Please, type in your first name: sd
Input ERROR!
Please, type in your first name: Digong
Do you have a middle name? [Y/N]: R
Wrong unit selection.
Do you have a middle name? [Y/N]: N
Please, type in your last name: Jiang
Your full name Digong Jiang has 11 characters.
Your first name has 6 characters.
Your last name has 5 characters.
A:1
D:1
G:3
I:2
J:1
N:2
O:1
Your full name in Binary codes: 1000100 1101001 1100111 1101111 1101110 1100111 1001010 1101001 1100001 1101110 1100111
```

```
Do you want to continue with another (such as your friend's) name? [Y/N]: Y
Please, type in your first name: Zuquan
Do you have a middle name? [Y/N]: N
Please, type in your last name: Song
Your full name Zuquan Song has 10 characters.
Your first name has 6 characters.
Your last name has 4 characters.
A:1
G:1
N:2
O:1
Q:1
S:1
U:2
Z:1
Your full name in HexaTridecimal codes: 2i 39 35 39 2p 32 2b 33 32 2v
```

```
Do you want to continue with another (such as your friend’s) name? [Y/N]: Y
Please, type in your first name: John
Do you have a middle name? [Y/N]: Y
Please type in your middle name: Fitzgerald
Please, type in your last name: Kennedy
Your full name John Fitzgerald Kennedy has 21 characters.
Your first name has 4 characters.
Your middle name has 10 characters.
Your last name has 7 characters.
A:1
D:2
E:3
F:1
G:1
H:1
I:1
J:1
K:1
L:1
N:3
O:1
R:1
T:1
Y:1
Z:1
Your full name in Hexadecimal codes: 4a 6f 68 6e 46 69 74 7a 67 65 72 61 6c 64 4b 65 6e 6e 65 64 79
```

```
Do you want to continue with another (such as your friend’s) name? [Y/N]: Y
Please, type in your first name: Richard
Do you have a middle name? [Y/N]: Y
Please type in your middle name: Milhous
Please, type in your last name: Nixon
Your full name Richard Milhous Nixon has 19 characters.
Your first and middle names have 7 characters each.
Your last name has 5 characters.
A:1
C:1
D:1
H:2
I:3
L:1
M:1
N:2
O:2
R:2
S:1
U:1
X:1
Your full name in Octal codes: 122 151 143 150 141 162 144 115 151 154 150 157 165 163 116 151 170 157 156
Do you want to continue with another (such as your friend’s) name? [Y/N]: Q
Wrong unit selection.
Do you want to continue with another (such as your friend’s) name? [Y/N]: N

Process finished with exit code 0
```