Chapter 02 Assignments (Medium difficulty)

Here are some medium Java 17 programming assignments that focus on structural programming:

1. Write a program that reads in a list of integers from the user and then prints out the second-largest value in the list. The algorithm must be O(n*log(n))
2. Write a program that prompts the user to enter a string and then prints out the number of vowels in the string.
3. Write a program that reads in a list of integers from the user and then prints out the mode (i.e., most frequently occurring value) in the list.
4. Write a program that reads in a list of integers from the user and then prints out the kth smallest value in the list.
5. Write a program that prompts the user to enter a string and then prints out whether the string is a palindrome (i.e., reads the same forwards and backwards).
6. Write a program that reads in a list of integers from the user and then prints out the sum of the squares of the odd values in the list.
7. Write a program that reads in two lists of integers from the user and then prints out the intersection of the two lists (i.e., the values that are present in both lists).
8. Write a program that prompts the user to enter a number and then prints out its prime factorization. Prime factorization of a number is the representation of a composite number as a product of its prime factors. A prime factor is a prime number that can divide the number without leaving a remainder. For example, the prime factorization of the number 60 is as follows:
    - Divide 60 by 2, and we get 30. Divide 30 by 2 again, and we get 15.
    - Divide 15 by 3, and we get 5.
    - Since 5 is a prime number, we cannot divide it any further.
    - The prime factors used to divide 60 are 2, 2, 3, and 5.
    - Therefore, the prime factorization of 60 is 2 x 2 x 3 x 5, or simply 2^2 x 3 x 5.
9. Write a program that reads in a list of strings from the user and then prints out the longest common prefix of the strings. The longest common prefix of a set of strings is the longest string that is a prefix of all the strings in the set. For example, the longest common prefix of the strings `apple`, `app`, and `apartment` is `ap`.
10. Write a program that reads in a list of integers from the user and then prints out the number of unique values in the list.