Министерство образования Республики Беларусь

Учреждение образования «Белорусский государственный университет

информатики и радиоэлектроники»

Факультет компьютерных систем и сетей

Кафедра Информатики

Дисциплина «Метрология, стандартизация и сертификация (в инормационных технологиях)»

**ОТЧЕТ**

к лабораторной работе №1

на тему:

**«Метрики размера программ»**

БГУИР 6-05-0612-02

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|  |
| (дата, подпись преподавателя) |

Минск 2025

Листинг 1 – Исходный код программы

def factorial(n: Int): Int = {

if (n <= 1) 1

else n \* factorial(n - 1)

}

def isPrime(n: Int): Boolean = {

if (n <= 1) false

else if (n == 2) true

else !(2 to Math.sqrt(n).toInt).exists(x => n % x == 0)

}

def findPrimesInRange(start: Int, end: Int): List[Int] = {

(start to end).filter(isPrime).toList

}

def sumList(numbers: List[Int]): Int = {

numbers.foldLeft(0)(\_ + \_)

}

def findMax(numbers: List[Int]): Int = {

numbers.foldLeft(Int.MinValue)((max, num) => if (num > max) num else max)

}

def findMin(numbers: List[Int]): Int = {

numbers.foldLeft(Int.MaxValue)((min, num) => if (num < min) num else min)

}

def reverseList[T](list: List[T]): List[T] = {

list.foldLeft(List.empty[T])((acc, item) => item :: acc)

}

def isPalindrome(str: String): Boolean = {

val cleanedStr = str.replaceAll("\\s", "").toLowerCase

cleanedStr == cleanedStr.reverse

}

def fibonacci(n: Int): Int = {

def fibHelper(n: Int, a: Int, b: Int): Int = {

if (n == 0) a

else fibHelper(n - 1, b, a + b)

}

fibHelper(n, 0, 1)

}

def listToString(numbers: List[Int]): String = {

numbers.mkString("[", ", ", "]")

}

def main(args: Array[String]): Unit = {

val number = 5

println(s"Factorial of $number: ${factorial(number)}")

val primeCheck = 13

println(s"Is $primeCheck a prime number? ${isPrime(primeCheck)}")

val primesInRange = findPrimesInRange(10, 50)

println(s"Prime numbers in the range from 10 to 50: ${listToString(primesInRange)}")

val numbers = List(3, 1, 4, 1, 5, 9, 2, 6, 5)

println(s"Sum of numbers in the list: ${sumList(numbers)}")

println(s"Maximum number in the list: ${findMax(numbers)}")

println(s"Minimum number in the list: ${findMin(numbers)}")

println(s"Reversed list: ${listToString(reverseList(numbers))}")

val palindromeCheck = "A man a plan a canal Panama"

println(s"Is the string '$palindromeCheck' a palindrome? ${isPalindrome(palindromeCheck)}")

val fibNumber = 10

println(s"Fibonacci number at position $fibNumber: ${fibonacci(fibNumber)}")

}

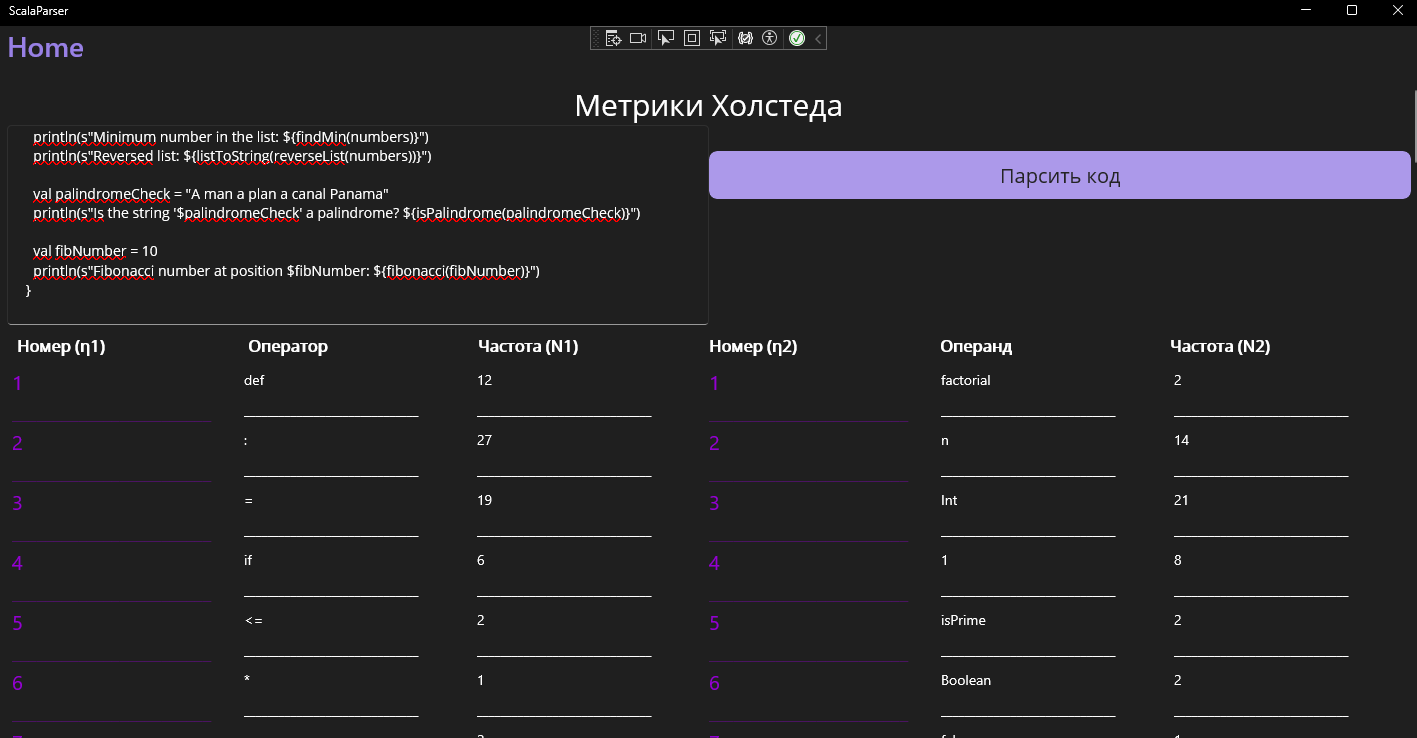


Рисунок 1 – результат работы программы

Таблица 1 – самостоятельно вручную рассчитанные метрики

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *#* | Операторы | *f1j* | *I* | Операнды | *f2i* |
| 1. | : | 27 | 1. | factorial | 2 |
| 2. | = | 19 | 2. | n | 14 |
| 3. | def | 12 | 3. | Int | 21 |
| 4. | if | 6 | 4. | 1 | 8 |
| 5. | <= | 2 | 5. | isPrime | 2 |
| 6. | \* | 1 | 6. | Boolean | 2 |
| 7. | - | 2 | 7. | false | 1 |
| 8. | == | 4 | 8. | 2 | 3 |
| 9. | . | 16 | 9. | true | 1 |
| 10. | => | 4 | 10. | to | 2 |
| 11. | , | 22 | 11. | Math | 1 |
| 12. | + | 2 | 12. | sqrt | 1 |
| 13. | > | 1 | 13. | tolnt | 1 |
| 14. | < | 1 | 14. | exists | 1 |
| 15. | :: | 1 | 15. | x | 2 |
| 16. | val | 7 | 16. | 0 | 4 |
| 17. | \_ | 2 | 17. | findPrimeslnRange | 2 |
| 18. |  |  | 18. | start | 2 |
| 19. |  |  | 19. | end | 2 |
| 20. |  |  | 20. | List | 9 |
| 21. |  |  | 21. | filter | 1 |
| 22. |  |  | 22. | toList | 1 |
| 23. |  |  | 23. | sumList | 1 |
| 24. |  |  | 24. | numbers | 9 |
| 25. |  |  | 25. | foldLeft | 4 |
| 26. |  |  | 26. | findMax | 1 |
| 27. |  |  | 27. | MinValue | 1 |
| 28 |  |  | 28. | max | 3 |
| 29. |  |  | 29. | num | 6 |
| 30. |  |  | 30. | findMin | 1 |
| 31. |  |  | 31. | MaxValue | 1 |
| 32. |  |  | 32. | min | 3 |
| 33. |  |  | 33. | reverseList | 1 |
| 34. |  |  | 34. | T | 4 |
| 35. |  |  | 35. | list | 2 |
|  |  |  | 36. | empty | 1 |
|  |  |  | ­­37. | acc | 2 |
|  |  |  | 38. | item | 2 |
|  |  |  | 39. | isPalindrome | 1 |
|  |  |  | 40. | str | 2 |
|  |  |  | 41. | String | 3 |
|  |  |  | 42. | cleanedStr | 3 |
|  |  |  | 43. | replaceAll | 1 |
|  |  |  | 44. | “\\s” | 1 |
|  |  |  | 45. | “” | 1 |
|  |  |  | 46. | toLowerCase | 1 |
|  |  |  | 47. | reverse | 1 |
|  |  |  | 48. | fibonacci | 1 |
|  |  |  | 49. | fibHelper | 3 |
|  |  |  | 50. | a | 3 |
|  |  |  | 51. | b | 3 |
|  |  |  | 52. | listToString | 1 |
|  |  |  | 53. | mkString | 1 |
|  |  |  | 54. | “[“ | 1 |
|  |  |  | 55. | “,” | 1 |
|  |  |  | 56. | “Minimum number in the list: ” | 1 |
|  |  |  | 57. | “]” | 1 |
|  |  |  | 58. | main | 1 |
|  |  |  | 59. | args | 1 |
|  |  |  | 60. | Array | 1 |
|  |  |  | 61. | Unit | 1 |
|  |  |  | 62. | number | 1 |
|  |  |  | 63. | 5 | 1 |
|  |  |  | 64. | Println | 1 |
|  |  |  | 65. | S | 9 |
|  |  |  | 66. | “Factorial of $number:” | 1 |
|  |  |  | 67. | primeCheck | 1 |
|  |  |  | 68. | 13 | 1 |
|  |  |  | 69. | “Is $primeCheck a prime number” | 1 |
|  |  |  | 70. | primeslnRange | 1 |
|  |  |  | 71. | 10 | 2 |
|  |  |  | 72. | 50 | 1 |
|  |  |  | 73. | “Prime numbers in the range from 10 to 50:” | 1 |
|  |  |  | 74. | 3 | 1 |
|  |  |  | 75. | 4 | 1 |
|  |  |  | 76. | 9 | 1 |
|  |  |  | 77. | 6 | 1 |
|  |  |  | 78. | “Sum of numbers in the list:” | 1 |
|  |  |  | 79. | “Maximum number in the list:” | 1 |
|  |  |  | 80. | “Reversed list:” | 1 |
|  |  |  | 81. | palindromeCheck | 1 |
|  |  |  | 82. | “A man a plan a canal Panama” | 1 |
|  |  |  | 83. | “Is the string a palindrome?” | 1 |
|  |  |  | 84. | fibNumber | 1 |
|  |  |  | 85. | “Fibonacci number at position” | 1 |
|  | n1 = 17 | N1 = 129 |  | n2 = 85 | N2 = 202 |

Словарь программы: n1 + n2 = 17 + 85 = 102

Длина программы: N1 + N2 = 129 + 202 = 331

Объем программы: V = 2208.57