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Кафедра Вычислительной Техники

Дисциплина: Низкоуровневое программирование

Лабораторная работа №3

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Задание

9.1.16 Assignment: Scalar Product

A scalar product of two vectors $(a_1, a_2, \ldots, a_n)$ and $(b_1, b_2, \ldots, b_n)$ is the sum

$$\sum_{i=1}^{n} a_i b_i = a_1 b_1 + a_2 b_2 + \cdots + a_n b_n$$

For example, the scalar product of vectors (1, 2, 3) and (4, 5, 6) is

$$1 \cdot 4 + 2 \cdot 5 + 3 \cdot 6 = 4 + 10 + 18 = 32$$

The solution should consist of

- Two global arrays of `int` of the same size.
- A function to compute the scalar product of two given arrays.
- A `main` function which calls the product computations and outputs its results.

9.1.17 Assignment: Prime Number Checker

You have to write a function to test the number for primarity. The interesting thing is that the number will be of the type `unsigned long` and that it will be read from `stdin`.

- You have to write a function `int is_prime( unsigned long n )`, which checks whether `n` is a prime number or not. If it is the case, the function will return 1; otherwise 0.
- The `main` function will read an `unsigned long` number and call `is_prime` function on it. Then, depending on its result, it will output either `yes` or `no`.

Read `man scanf` and use `scanf` function with the format specifier `%lu`.
Remember, `is_prime` accepts `unsigned long`, which is not the same thing as `unsigned int`!

Выполнение

```c
// scalar.c

#include <stdio.h>

int a[] = {1, 2, 3, 4, 5};
int b[] = {5, 4, 3, 2, 1};

long scalarProduct(int a[], int b[], int length) {
   long result = 0;

   size_t i;
   for (i = 0; i < length; ++i) {
       result += a[i] * b[i];
   }

   return result;
}

int main() {
   a[1] = 31;
   printf("Scalar product: %ld\n", scalarProduct(a, b, 5));
   return 0;
}
```

```c
// primes.c

#include <stdio.h>
#include <math.h>

int is_prime(unsigned long n) {
   unsigned long limit, i;

   if (n < 2) {
       return 0;
   }

   limit = floor(sqrt(n));
   for (i = 2; i <= limit; ++i) {
       if (n % i == 0) {
           return 0;
       }
   }

   return 1;
}

int main() {
   unsigned long n;

   if (scanf("%lu", &n) != 1) {
       return 1;
   }

   if (is_prime(n)) {
       printf("yes\n");
   } else {
       printf("no\n");
   }

   return 0;
}
```

Вывод

В ходе выполнения данной лабораторной работы были азы программирования на языке C.