СТАНДАРТНАЯ БИБЛИОТЕКА СИ

Тема 3. Раздел 1. Строки

string.h

- Функции для работы с Нуль-терминированная строками или C-строками
- Различными функциями работы с памятью

Нуль-терминированная строка (C-строка)

- Это способ представления строк в памяти компьютера, при котором конец строки отмечает специальный *нуль-символ* (код ASCII 0x00)

- При использовании однобайтных кодировок (ASCII) объём памяти, требуемый для представления строки из N символов, равен N + 1 байт

Константы

- ***NULL*** - значение, которое гарантированное не является валидным адресом объекта в памяти

- ***size_t*** - беззнаковое целое, имеющее тот же тип, что и результат оператора sizeof.

Работа со строками. Копирование

char *strcpy(har *strDestination, const char *strSource)

- Copies the C string pointed by *source* into the array pointed by *destination*, including the terminating null character.

Return Value

Each of these functions returns the destination string. No return value is reserved to indicate an error.

```
#include <stdio.h>
#include <string.h>

 int main ()
 {
     char str1[]="Sample string";
     char str2[40]; char str3[40];
     strcpy (str2,str1);
     strcpy (str3,"copy successful");
    printf ("str1: %s\nstr2: %s\nstr3: %s\n",str1,str2,str3);
    return 0;
}
```

Работа со строками. Копирование

char *strncpy(char *strDest,

const char *strSource,

size_t count);

- Copies the first *count* characters of *source* to *destination*. The strncpy function copies the initial count characters of strSource to strDest and returns strDest. If count is less than or equal to the length of strSource, a null character is not appended automatically to the copied string. If count is greater than the length of strSource, the destination string is padded with null characters up to length count. The behavior of strncpy is undefined if the source and destination strings overlap.

Работа со строками. Сложение

char * strcat (char * destination, const char * source)

- Appends a copy of the *source* string to the *destination* string. The terminating null character in *destination* is overwritten by the first character of *source*, and a new null-character is appended at the end of the new string formed by the concatenation of both in *destination*.

Return Value

destination is returned.

```
#include <stdio.h>
#include <string.h>
int main ()
{
 char str[80];
 strcpy (str,"these ");
 strcat (str,"strings ");
 strcat (str,"are ");
 strcat (str,"concatenated.");
 puts (str);
 return 0;
 }
```

Работа со строками. Сложение

char * strncat (char * destination,

char * source,

size_t num);

- - Appends the first *num* characters of *source* to *destination*, plus a terminating null-character. If the length of the C string in *source* is less than *num*, only the content up to the terminating null-character is copied.

Return Value

destination is returned.

Работа со строками. Сравнение

int strcmp (const char * str1, const char * str2)

int strncmp (const char * str1, const char * str2, size_t num);

- Compares the C string *str1* to the C string *str2*.

This function starts comparing the first character of each string. If they are equal to each other, it continues with the following pairs until the characters differ or until a terminanting null-character is reached.

Return Value

Returns an integral value indicating the relationship between the strings:
A zero value indicates that both strings are equal.
A value greater than zero indicates that the first character that does not match has a greater value in *str1* than in *str2*; And a value less than zero indicates the opposite.

Работа со строками. Сравнение

```
#include <stdio.h>
 #include <string.h>
 int main ()
 {
  char str[][5] = { "R2D2" , "C3PO" , "R2A6" };
  int n;
  puts ("Looking for R2 astromech droids...");
  for (n=0 ; n<3 ; n++)
      if (strncmp (str[n],"R2xx",2) == 0)
    {
       printf ("found %s\n",str[n]);
    }
  return 0;
}
```

Работа со строками. Длинна

size_t strlen (const char * str);

- Returns the length of *str*.

  The length of a C string is determined by the terminating null-character: A C string is as long as the amount of characters between the beginning of the string and the terminating null character.

Работа со строками. Поиск

char * strchr (char * str, int character);

- Returns a pointer to the first occurrence of *character* in the C string *str*.

Return Value

A pointer to the first occurrence of *character* in *str*.
If the *value* is not found, the function returns a null pointer.

```
int main ()
{
 char str[] = "This is a sample string";
 char * pch;
 printf ("Looking for the 's' character in \"%s\"...\n",str);
 pch=strchr(str,'s');
 while (pch!=NULL)
 {
  printf ("found at %d\n",pch-str+1);
  pch=strchr(pch+1,'s');
 }
 return 0; }
```

Работа со строками. Поиск

char * strstr (char * str1, const char * str2);

- Returns a pointer to the first occurrence of *str2* in *str1*, or a null pointer if *str2* is not part of *str1*.The matching process does not include the terminating null-characters.

Return Value

A pointer to the first occurrence in *str1* of any of the entire sequence of characters specified in *str2*, or a null pointer if the sequence is not present in *str1*.

```
int main ()
{
 char str[] ="This is a simple string";
 char * pch;
 pch = strstr (str,"simple");
 strncpy (pch,"sample",6);
 puts (str);
 return 0;
 }
```

Работа со строками.

char * strtok (char * str, const char * delimiters);

- A sequence of calls to this function split *str* into tokens, which are sequences of contiguous characters separated by any of the characters that are part of *delimiters*.

Return Value

A pointer to the last token found in string.
A null pointer is returned if there are no tokens left to retrieve.

```
int main ()
{
 char str[] ="- This, a sample string.";
 char * pch;
 printf ("Splitting string \"%s\" into tokens:\n",str);
 pch = strtok (str," ,.-");
 while (pch != NULL)
 {
   printf ("%s\n",pch);
   pch = strtok (NULL, " ,.-");
 }
return 0;
}
```

Практическое задание

«Записная книжка»

В файле хранятся данные о людях (ФИО, номер телефона). Программа должна выполнять следующие функции.

1. Считывать файл при запуске
2. Выводить список все персон в различнх форматах (Иванов И.И., Иванов И., Иванов Иван, Иванов Иван Иванович)
3. Сортировать персон в алфавитном порядке
4. Выводить только тех персон, кто является абонентом МТС (911)
5. Добавлять персон
6. Удалять персон