



시스템프로그래밍기초 실습 10주차



실습 과제 1) sort_word

Redirection을 통해 파일 내용을 scanf의 입력값으로 준다.

받은 내용은 scanf를 통해 띄어쓰기 및 줄바꿈 문자를 기준으로 단어 단위로 나뉜다.

나뉜 단어들을 알파벳 순으로 sorting하는 프로그램을 구현하라.

실습 과제 1.1) sort.h

```
C sort.h × C sort.c C error.c C main.c C swap.c
1  #include <stdio.h>
2  #include <stdlib.h>
3  #include <string.h>
4
5  #define MAXWORD 50      /* max word size ,*/
6  #define N        300   /* array size of w[] */
7
8  void error_exit_calloc_failed(void);
9  void error_exit_too_many_words(void);
10 void error_exit_word_too_long(void);
11 void sort_words(char *w[], int n);
12 void swap(char **p, char **q);
13 void wrt_words(char *w[], int n);
```

실습 과제 1.2) main.c

```
C sort.h  C sort.c  C error.c  C main.c  C swap.c  C wrt.c
1  /* Sort words lexicographically. */
2  #include "sort.h"
3
4  int main(void)
5  {
6      char word[MAXWORD]; /* work space */
7      char *w[N];         /* an array of pointers */
8      int n;              /* number of words to be sorted */
9      int i;
10
11     for (i = 0; scanf("%s", word) == 1; i++) {
12         if (i >= N)
13             error_exit_too_many_words();
14         if (strlen(word) >= MAXWORD)
15             error_exit_word_too_long();
16         w[i] = calloc(strlen(word) + 1, sizeof(char));
17         if (w[i] == NULL)
18             error_exit_calloc_failed();
19         strcpy(w[i], word);
20     }
21
22     n = i;
23     sort_words(w, n);
24     wrt_words(w, n);
25
26     return 0;
27 }
```

실습 과제 1.3) wrt.c

```
t.c  C error.c  C main.c  C swap.c  C wrt.c x
1  #include "sort.h"
2
3  void wrt_words(char *w[] , int n)
4  {
5      int i;
6      for (i = 0; i < n; i++)
7          printf("%s\n", w[i]);
8  }
```

실습 과제 1.4) error.c

```
sort.h  sort.c  error.c x  main.c  swap.c  wrt.c  in
1  #include "sort.h"
2
3  void error_exit_calloc_failed(void)
4  {
5      printf("%s" ,
6          "ERROR: The call to calloc failed to\n"
7          "          allocate the requested memory - bye!\n");
8      exit(1);
9  }
10
11 void error_exit_too_many_words(void)
12 {
13     printf("ERROR: At most %d words can be sorted - bye!\n", N);
14     exit(1);
15 }
16
17 void error_exit_word_too_long(void)
18 {
19     printf("%s%d%s" ,
20         "ERROR: A word with more than ", MAXWORD, "\n"
21         "          characters was found - bye!\n");
22     exit(1);
23 }
```

실습 과제 1.5) sort.c

C sort.c ✕

C error.c

C sort_ex.c

C swap_ex.c

C main.c

C swap.c

```
1  #include "sort.h"
2  void sort_words(char *w[], int n) /* n elements are to be sorted */
3  {
4      int i, j;
5      for (i = 0; i < n; i++)
6          for (j = i + 1; j < n; j++)
7              if (strcmp(w[i], w[j]) > 0)
8                  swap(&w[i], &w[j]);
9  }
```

실습 과제 1.6) swap.c

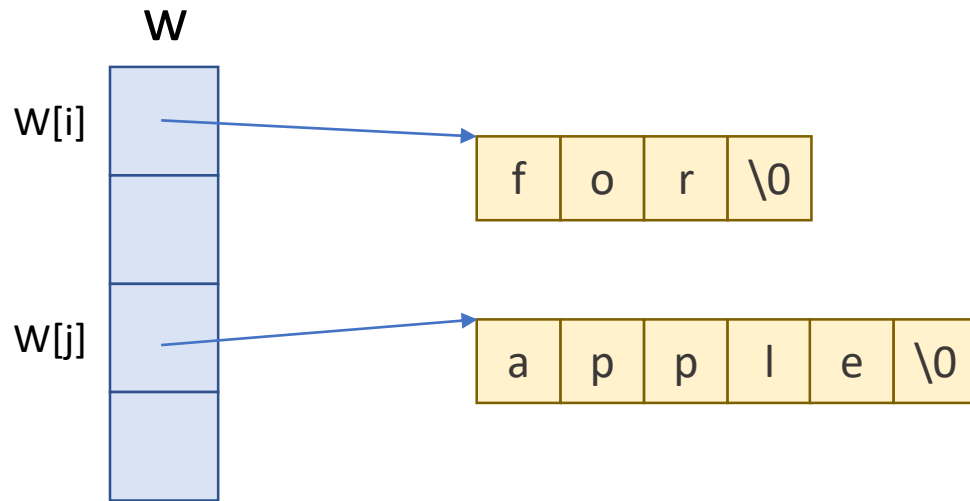
```
C sort.c  C error.c  C sort_ex.c  C swap_ex.c x
1  #include "sort.h"
2
3  void swap_original(char **p, char **q) {
4      char *tmp;
5
6      tmp = *p;
7      *p = *q;
8      *q = tmp;
9  }
10
11  void swap(char **p, char **q)
12  {
13      // TO BE IMPLEMENTED
14  }
```


실습 과제 1) sort_word 결과

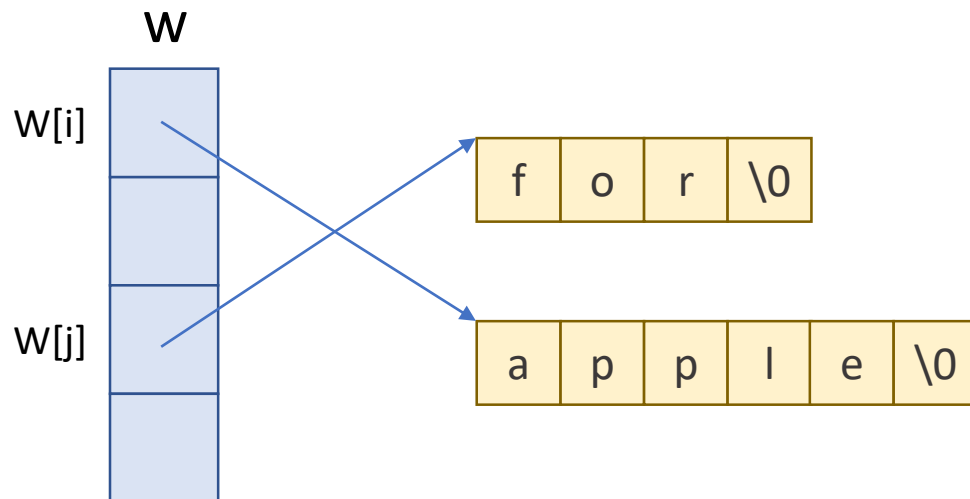
```
A  
a  
all  
alphabet  
and  
apple  
come  
for  
get  
is  
it  
of,  
or  
pie  
slice  
taste  
try.  
which
```

swap_original()

*Before
swapping*

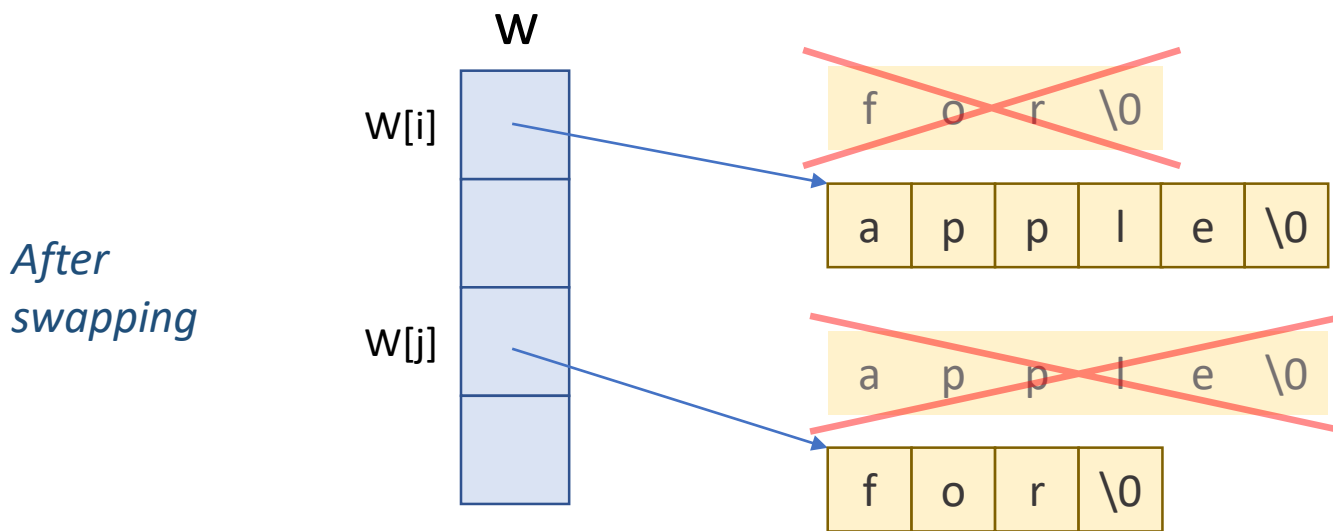
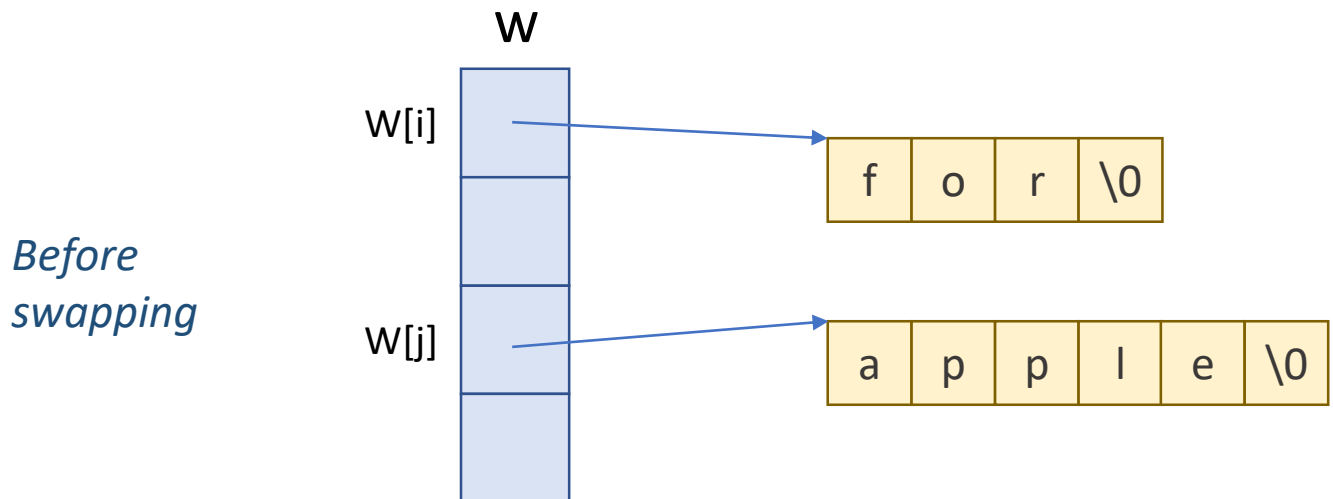


*After
swapping*



swap() (to be implemented)

realloc을 사용하여, 데이터 공간을 재할당 하는 방식으로 swap 한다.



realloc (stdlib.h)

attempts to **resize the memory block** pointed to by ptr that was previously allocated with a call to malloc or calloc.

```
void *realloc(void *ptr, size_t size)
```

- Parameters
 - **ptr** : This is the pointer to a memory block previously allocated with malloc, calloc or realloc to be reallocated. If this is NULL, a new block is allocated and a pointer to it is returned by the function.
 - **size** : This is the new size for the memory block, in bytes. If it is 0 and ptr points to an existing block of memory, the memory block pointed by ptr is deallocated and a NULL pointer is returned.
- Return Value

This function returns a pointer to the newly allocated memory, or NULL if the request fails.



script_week10

```
echo -e "A is for apple or alphabet pie\nwhich all get a slice of, come taste  
it and try." > input
```

```
gcc -o sort_word sort.h main.c sort.c swap.c wrt.c error.c
```

```
./sort_word < input
```

과제 제출 방법

1. 모든 파일은 **sys_10_학번.tar.gz**으로 압축하여 제출한다.
2. 메일 제목은 **[시프기]_10_이름_학번**으로 한다.
3. 제출 파일들을 빈 디렉토리에 넣고 그 디렉토리 안으로 이동한 후,
다음과 같이 압축 명령어를 사용한다.(폴더가 아닌 파일들만 압축한다.)

```
$ tar -zcvf sys_10_학번.tar.gz *
```

제출 파일

- | | |
|------------|------------------|
| 1. sort.h | 5. sort.c |
| 2. main.c | 6. swap.c |
| 3. error.c | 7. script_week10 |
| 4. wrt.c | |



감사합니다.
