

プログラミング入門Ⅱ 演習報告書

課題番号：5

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課題 1

リスト

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

#define WORD_LENGTH 20

struct record {
    char word[WORD_LENGTH];
    int count;
    struct record *next;
};

int read_word(FILE *fp, char *word);
void add_word(char *word);

struct record *head = NULL;

int main(int argc, char *argv[])
{
    FILE *fp;
    char word[WORD_LENGTH];
    struct record *p;

    if (argc != 2) {
        printf("missing file argument\n");
        return 1;
    }

    fp = fopen(argv[1], "r");
    if (fp == NULL) {
        printf("can't open %s\n", argv[1]);
        return 1;
    }

    while (read_word(fp, word)) {
        add_word(word);
    }

    fclose(fp);

    for (p = head; p != NULL; p = p->next)
        printf("%s\t%d\n", p->word, p->count);

    return 0;
}

int read_word(FILE *fp, char *word)
{
    int c;
    int cur = 0;
    while(1)
    {
        c = fgetc(fp);
        if (isalnum(c) || c == '-' || c == '_')
        {
            word[cur++] = (char)c;
        }
        else
        {
            if (cur == 0 && c == EOF)
                return 0;
            word[cur] = '\0';
            return 1;
        }
    }
}
```

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```

void add_word(char *word)
{
    struct record *p = NULL, *q = NULL, *new = NULL;

    if (word[0] == '\0') return;

    for (p = head; p != NULL; p = p->next)
    {
        if (strcmp(word, p->word) == 0)
        {
            p->count++;
            break;
        }
    }
    if (p == NULL)
    {
        new = (struct record *)malloc(sizeof(struct record));
        if (new == NULL)
        {
            printf("out of memory\n");
            exit(1);
        }
        strcpy(new->word, word);
        new->count = 1;
        for (p = head; p != NULL; p = p->next)
        {
            // p->word, word, hoge
            if (strcmp(word, p->word) < 0)
                break;
            q = p;
        }

        new->next = p;

        if (q != NULL)
        {
            q->next = new;
        }
        else
        {
            if (head != NULL)
                new->next = head;
            head = new;
        }
    }
}

```

実行結果

ターミナルより”./ex5-1 ./prog2-ex5-data.txt”を実行し、正常な動作を確認した。

課題 2

リスト

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

#define WORD_LENGTH 20

struct record {
    char word[WORD_LENGTH];
    int count;
    struct record *next;
};

int read_word(FILE *fp, char *word);
void add_word(char *word);
int compare_by_freq(const void *s1, const void *s2);

struct record *head = NULL;

int main(int argc, char *argv[])
{
    FILE *fp;
    char word[WORD_LENGTH];
    struct record *p;
    int list_size = 0;
    struct record *sorted = NULL;
    int i = 0;

    if (argc != 2) {
        printf("missing file argument\n");
        return 1;
    }

    fp = fopen(argv[1], "r");
    if (fp == NULL) {
        printf("can't open %s\n", argv[1]);
        return 1;
    }

    while (read_word(fp, word)) {
        add_word(word);
    }

    fclose(fp);

    for (p = head; p != NULL; p = p->next)
        list_size++;

    sorted = (struct record*)malloc(sizeof(struct record) * list_size);
    if (sorted == NULL)
    {
        printf("couldn't allocate memory for sorted list.\n");
        return 1;
    }

    for (p = head; p != NULL; p = p->next)
        sorted[i++] = *p;

    qsort(sorted, list_size, sizeof(struct record), compare_by_freq);

    for (i = 0; i < list_size; i++)
        printf("%s\t%d\n", sorted[i].word, sorted[i].count);

    return 0;
}
```

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```

int read_word(FILE *fp, char *word)
{
    int c;
    int cur = 0;
    while(1)
    {
        c = fgetc(fp);
        if (isalnum(c) || c == '-' || c == '_')
        {
            word[cur++] = (char)c;
        }
        else
        {
            if (cur == 0 && c == EOF)
                return 0;
            word[cur] = '\0';
            return 1;
        }
    }
}

void add_word(char *word)
{
    struct record *p = NULL, *q = NULL, *new = NULL;

    if (word[0] == '\0') return;

    for (p = head; p != NULL; p = p->next)
    {
        if (strcmp(word, p->word) == 0)
        {
            p->count++;
            break;
        }
    }
    if (p == NULL)
    {
        new = (struct record *)malloc(sizeof(struct record));
        if (new == NULL)
        {
            printf("out of memory\n");
            exit(1);
        }
        strcpy(new->word, word);
        new->count = 1;
        for (p = head; p != NULL; p = p->next)
        {
            // p->word, word, hoge
            if (strcmp(word, p->word) < 0)
                break;
            q = p;
        }

        new->next = p;

        if (q != NULL)
            q->next = new;
        else
            head = new;
    }
}

int compare_by_freq(const void *s1, const void *s2)
{
    return ((struct record*)s2)->count - ((struct record*)s1)->count;
}

```

実行結果

ターミナルより”./ex5-2 ./prog2-ex5-data.txt”を実行し、正常な動作を確認した。