

```

vip% cat tree.c
#include <stdio.h>
#include <ctype.h>
#include <string.h>
#include <stdlib.h>
#define MAXWORD 100

struct tnode {
    char *word;
    int count;
    struct tnode *left;
    struct tnode *right;
};

struct tnode *addtree(struct tnode *, char *);
void treeprint(struct tnode *);
struct tnode *talloc(void);
int getword(char *, int);
char *strdup1(char *);

/* word frequency count */
void main(void)
{
    struct tnode *root;
    char word[MAXWORD];
    root = NULL;
    while (getword(word, MAXWORD) != EOF)
        if (isalpha(word[0]))
            root = addtree(root, word);
    treeprint(root);
    exit(0);
}

/* addtree: add a node with w, at or below p */
struct tnode *addtree(struct tnode *p, char *w)
{
    int cond;
    if (p == NULL) {
        p = talloc();
        p -> word = strdup1(w);
        p -> count = 1;
        p -> left = p -> right = NULL;
    }
    else if ((cond = strcmp(w, p -> word)) == 0)
        (p -> count)++;
    else if (cond < 0)
        p -> left = addtree(p -> left, w);
    else
        p -> right = addtree(p -> right, w);
    return p;
}

}

/* treeprint: in-order print of tree p */
void treeprint(struct tnode *p)
{
    if (p != NULL) {
        treeprint(p -> left);
        printf("%4d %s\n", p -> count, p -> word);
        treeprint(p -> right);
    }
}

/* talloc: make a tnode */
struct tnode *talloc(void)
{
    return (struct tnode *)
        malloc(sizeof(struct tnode));
}

/* getword: get next word or character from input */
int getword(char *word, int lim)
{
    int c;
    char *w = word;
    while (isspace(c = getchar()))
        if ('c' != EOF)
            *w++ = c;
    if (isalpha(c)) {
        *w = '\0';
        return c;
    }
    for ( ; --lim > 0; w++)
        if (isalpha(*w = getchar())) {
            ungetc(*w, stdin);
            break;
        }
    *w = '\0';
    return word[0];
}

/* strdup1: make duplicate of s. (strdup builtin) */
char *strdup1(char *s)
{
    char *p;
    p = (char *) malloc(strlen(s)+1);
    if (p != NULL)
        strcpy(p, s);
    return p;
}

```

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vip% lint -m -u tree.c
function returns value which is always ignored
strcpy printf ungetc
vip% cc -o tree tree.c
vip% tree <tree.c
2 EOF
3 MAXWORD
5 NULL
3 a
1 add
6 addtree
1 at
1 below
1 break
1 builtin
6 c
13 char
1 character
3 cond
5 count
1 ctype
1 d
1 define
1 duplicate
3 else
1 exit
1 for
1 frequency
1 from
1 get
2 getchar
4 getword
4 h
9 if
1 in
4 include
1 input
7 int
1 is
3 isalpha
1 isspace
5 left
2 lim
1 main
2 make
2 malloc
1 n
1 next

1 node
2 of
2 or
1 order
27 p
1 print
1 printf
5 return
5 right
5 root
5 s
1 sizeof
1 stdin
1 stdio
1 stdlib
1 strcmp
1 strcpy
1 strdup
4 strdup1
1 string
1 strlen
14 struct
4 talloc
15 tnode
1 tree
6 treeprint
1 ungetc
6 void
13 w
2 while
1 with
13 word

```