

1 Example Usage

```
$ ./smear Took FOOL lotr1.txt  
$ cat lotr1.txt | grep FOOL
```

```
1  they were taller. According to the Red Book, Bandobras FOOL (Bullroarer),  
2  greater families, such as the FOOLs and the Masters of Buckland.  
3  which Bandobras FOOL routed an invasion of Ores. Even the weathers had  
4  with the Elves.) Sometimes, as in the case of the FOOLs of Great Smials, or  
5  found only in their proper folklands. Nearly all FOOLs still lived in the  
6  FOOLLand, but that was not true of many other families, such as the  
7  It is true that the FOOL family had long been pre-eminent; for the  
8  before, and the chief FOOL had borne that title ever since. The Thain was  
9  than a nominal dignity. The FOOL family was still, indeed, accorded a  
10 endured, nonetheless, of referring to the head of the family as The FOOL,  
11 respectable age for a hobbit (the Old FOOL himself had only reached 130);  
12 of the Old FOOL's daughters); and Mr. Drogo was his second cousin. So Mr.  
13 the Old FOOL died.  
14 There were many Bagginses and Boffins, and also many FOOLs and  
15 grandmother), and various Chubbs (connexions of his FOOL grandfather); and  
16 My dear Bagginses and Boffins, he began again; and my dear FOOLs and  
17 corner some of the young FOOLs and Brandybucks, supposing Uncle Bilbo to  
18 an impromptu orchestra, and began a merry dance-tune. Master Everard FOOL  
19 was almost silence, and one or two of the FOOLs pricked up their ears.  
20 Baggins, Boffin, FOOL, Brandybuck, Grubb, Chubb, Burrows, Bolger,  
21 FOOLs (with a few exceptions) thought Bilbo's behaviour was absurd. For the  
22 FOOLs, and other guests that lived or were staying near. By mid-day, when  
23 especially among the younger hobbits (mostly descendants of the Old FOOL)  
24 were Peregrin FOOL (usually called Pippin), and Merry Brandybuck (his real  
25 of course his special friends Pippin FOOL and Merry Brandybuck. Between  
26 FOOLLand and bending south-eastwards they made for the Green Hill Country.  
27 Mr. Peregrin FOOL, I should say!' he cried, changing from a scowl to a grin.  
28 friends are willing, Mr. FOOL.'  
29 occasional Bucklander or adventurous FOOL would come out to the Inn for a  
30 'Mr. FOOL and Mr. Brandybuck,' said Frodo; 'and this is Sam Gamgee. My  
31 Frodo became aware that the ridiculous young FOOL, encouraged by his success  
32 pays in the morning. There's Mr. FOOL, now: he's not vanished.'  
33 'Then you certainly will not be chosen, Peregrin FOOL!' said Gandalf,  
34 the younger of these two, Peregrin FOOL, should remain. My heart is against  
35 'Knock on the doors with your head, Peregrin FOOL,' said Gandalf. 'But  
36 'Fool of a FOOL! ' he growled. 'This is a serious journey, not a hobbit
```

Program: smear.c

```
1  /*
2  Nikola Janjusevic, OS pset5
3  smear TARGET REPLACEMENT file1 {file2 ...}
4  */
5  #include <string.h>
6  #include <sys/mman.h>
7  #include <sys/types.h>
8  #include <sys/stat.h>
9  #include <fcntl.h>
10 #include <errno.h>
11 #include <stdio.h>
12 #include <unistd.h>
13
14 #define DEBUG 0
15
16 int main(int argc, char **argv)
17 {
18     int i, fd;
19     char *aptr, *itr;
20     struct stat stat;
21
22     // ensure proper arguments given
23     if(argc<4)
24     {
25         fprintf(stderr,"usage: smear TARGET REPLACEMENT file1 {file2 ...}\n");
26         return 1;
27     }
28     if( strlen(argv[1])!=strlen(argv[2]) )
29     {
30         fprintf(stderr,"usage: TARGET must be same length as REPLACEMENT\n");
31         return 1;
32     }
33
34     for(i=3; i<argc; i++)
35     {
36         if(DEBUG)
37             fprintf(stderr,"+ infile: %s\n",argv[i]);
38         // open file
39         if( (fd=open(argv[i],O_RDWR))<0 )
40         {
41             fprintf(stderr,"infile %s open error: %s\n", argv[i], \
42                 strerror(errno));
43             return -1;
44         }
45         // fstat file to find size in bytes
46         if( fstat(fd, &stat)<0 )
47         {
48             fprintf(stderr,"infile %s fstat error: %s\n", argv[i], \
49                 strerror(errno));
50             // may want to continue to next file...
51             return -1;
52         }
53
54         // map file into memory
55         if( (aptr = mmap(NULL,stat.st_size, PROT_READ|PROT_WRITE, MAP_SHARED, fd, 0)
56             ) \
57             == MAP_FAILED)
58         {
59             fprintf(stderr,"infile %s mmap error: %s\n", argv[i], \
60                 strerror(errno));
61             return -1;
62         }
63     }
```

```

63      // search and replace
64      itr = aptr;
65      while(itr-aptr < stat.st_size-strlen(argv[1]))
66      {
67          if(strncmp(itr,argv[1],strlen(argv[1]))==0)
68              memcpy(itr,argv[2],strlen(argv[1]));
69          itr++;
70      }
71
72      // write map
73      if( msync(aptr,stat.st_size,MS_SYNC)<0 )
74      {
75          fprintf(stderr,"infile %s msync error: %s\n", argv[i], \
76                  strerror(errno));
77          return -1;
78      }
79
80      // unmap
81      if( munmap(aptr,stat.st_size)<0 )
82      {
83          fprintf(stderr,"infile %s munmap error: %s\n", argv[i], \
84                  strerror(errno));
85          return -1;
86      }
87
88      // close file
89      if( close(fd)<0 ){
90          fprintf(stderr,"infile %s close error: %s\n", argv[i], \
91                  strerror(errno));
92          return -1;
93      }
94  }
95
96  return 0;
97 }

```