```c
 1: // $Id: voidstar.c,v 1.21 2012-03-08 18:56:47-08 - - $
 2:
 3: //
 4: // Simple example of void* processing in C.
 5: // The function process takes an array and a function and
 6: // processes the array according to the rules given by a
 7: // function.
 8: //
 9:
10: #include <ctype.h>
11: #include <math.h>
12: #include <stdio.h>
13: #include <stdlib.h>
14: #include <string.h>
15:
16: //
17: // Process an array by applying a function to each element.
18: //
19: void process (void *base,    // of the array
20:               size_t nelem, // number of elements
21:               size_t size,  // size of one element
22:               void (*function) (void *)) {
23:    for (size_t index = 0; index < nelem; ++index) {
24:       void *element = (char *) base + index * size;
25:       function (element);
26:    }
27: }
28:
29: //
30: // Array of strings with two processing functions.
31: //
32: char *strings[] = {
33:    "hello", "world", "foo", "bar", "baz", "qux",
34:    "this", "is", "a", "test",
35: };
36:
37: void strdupthem (void *string) {
38:    char **chars = (char **) string;
39:    *chars = strdup (*chars);
40: }
41:
42: void capitalize (void *string) {
43:    for (char *chars = * (char **) string; *chars != '\0'; ++chars) {
44:       // LINTED (assignment of 32-bit integer to 8-bit integer)
45:       *chars = toupper (*chars);
46:    }
47: }
48:
49: void printstr (void *string) {
50:    (void) printf (" %s", * (char **) string);
51: }
52:
```

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53:
54: //
55: // Array of doubles with two processing functions.
56: //
57:
58: double numbers[] = {6.02e23, 49, 287, -99, -472, 0, 6e-22, 10e1000};
59:
60: void exponent (void *number) {
61:     double *value = (double *) number;
62:     *value = log10 (*value);
63: }
64:
65: void printnum (void *number) {
66:     (void) printf (" %.5g", * (double *) number);
67: }
68:
69: //
70: // Main function to exercise them.
71: //
72:
73: int main (void) {
74:
75:     size_t stringdim = sizeof strings / sizeof *strings;
76:     process (strings, stringdim, sizeof *strings, printstr);
77:     (void) printf ("\n");
78:     process (strings, stringdim, sizeof *strings, strdupthem);
79:     process (strings, stringdim, sizeof *strings, capitalize);
80:     process (strings, stringdim, sizeof *strings, printstr);
81:     (void) printf ("\n");
82:
83:     size_t numberdim = sizeof numbers / sizeof *numbers;
84:     process (numbers, numberdim, sizeof *numbers, printnum);
85:     (void) printf ("\n");
86:     process (numbers, numberdim, sizeof *numbers, exponent);
87:     process (numbers, numberdim, sizeof *numbers, printnum);
88:     (void) printf ("\n");
89:
90:     return EXIT_SUCCESS;
91: }
92:
93: //TEST// runprog -x voidstar.lis voidstar
94: //TEST// mkpspdf Listing.ps voidstar.c voidstar.c.log voidstar.lis
95:
```

```
1: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@ mkc: starting voidstar.c
2: voidstar.c: $Id: voidstar.c,v 1.21 2012-03-08 18:56:47-08 - - $
3: gcc -g -O0 -Wall -Wextra -std=gnu99 voidstar.c -o voidstar -lm
4: lint -Xa -fd -m -u -x -errchk=%all voidstar.c
5: rm -f voidstar.o
6: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@ mkc: finished voidstar.c
```

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 1:
 2: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
 3: log: voidstar.log
 4: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
 5:
 6:       1   Script  : /afs/cats.ucsc.edu/courses/cmps012b-wm/bin/runprog
 7:       2   limit c :     0 max core file size (KB)
 8:       3   limit f : 4194303 max output file size (KB)
 9:       4   limit t : 4294967295 max CPU time (sec)
10:       5   stdin   : /dev/null
11:       6   stdout  : voidstar.out
12:       7   stderr  : voidstar.err
13:       8   log     : voidstar.log
14:       9   listing : voidstar.lis
15:      10   Command : voidstar
16:      11   starting: pid 24510: 18:56:47.00
17:      12   finished: pid 24510: 18:56:47.00, real 0.00, user 0.00, sys 0.00
18:      13   pstatus: 0x0000 EXIT STATUS = 0
19:
20: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
21: stdin: /dev/null
22: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
23:
24:
25: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
26: stdout: voidstar.out
27: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
28:
29:       1    hello world foo bar baz qux this is a test
30:       2    HELLO WORLD FOO BAR BAZ QUX THIS IS A TEST
31:       3    6.02e+23 49 287 -99 -472 0 6e-22 inf
32:       4    23.78 1.6902 2.4579 nan nan -inf -21.222 inf
33:
34: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
35: stderr: voidstar.err
36: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
37:
```