```
1: // $Id: shortstring2.cpp,v 1.7 2016-08-03 13:16:57-07 - - $
 3: // Alternate short string optimization.
 4:
 5: #include <iostream>
 6: using namespace std;
7:
 8: struct opt_string {
9:
       char* pointer_;
10:
       size_t size_;
11:
       union {
12:
          char data_[16];
13:
          size_t capacity_;
14:
       };
15:
16:
       bool is_long() const {
17:
          return pointer_ != data_;
18:
       }
19:
20:
       size_t size() const {
21:
          return size_;
22:
       }
23:
24:
       size_t capacity() const {
25:
          return is_long() ? capacity_ : sizeof data_ - 1;
26:
       }
27:
28:
       opt_string(): pointer_(data_), size_(0) {
29:
          data_[0] = ' \setminus 0';
30:
31:
       ~opt_string() {
32:
          if (is_long() and pointer_) delete[] pointer_;
33:
34:
       }
35:
36: };
37:
38: int offset (void* base, void* field) {
       return static_cast<char*> (field) - static_cast<char*> (base);
39:
40: }
41:
42: #define SHOW(X) cout << #X << " = " << X << endl;
43: int main() {
44:
       opt_string u;
45:
       SHOW (sizeof u);
46:
       SHOW (sizeof u.pointer_);
47:
       SHOW (sizeof u.size_);
48:
       SHOW (sizeof u.data_);
49:
       SHOW (sizeof u.capacity_);
50:
       SHOW (offset (&u, &u.pointer_));
51:
       SHOW (offset (&u, &u.size_));
52:
       SHOW (offset (&u, &u.data_));
53:
       SHOW (offset (&u, &u.capacity_));
54: }
55:
56: //TEST// ./shortstring2 >shortstring2.out
57: //TEST// mkpspdf shortstring2.ps shortstring2.cpp* shortstring2.out
58:
```

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\$cmps109-wm/Examples/wk10a-miscellaneous/short-string-opt/

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13:16:57 shortstring2.cpp.log 1: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@ mkc: starting shortstring2.cpp 2: shortstring2.cpp: \$Id: shortstring2.cpp, v 1.7 2016-08-03 13:16:57-07 - -\$ 3: g++ -g -00 -std=gnu++14 -rdynamic -Wall -Wextra -Wold-style-cast shortst ring2.cpp -o shortstring2 -lglut -lGLU -lGL -lX11 -lrt -lm 4: cpplint.py.perl shortstring2.cpp 5: Done processing shortstring2.cpp 6: @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@ mkc: finished shortstring2.cpp

\$cmps109-wm/Examples/wk10a-miscellaneous/short-string-opt/shortstring2.out

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```
1: sizeof u = 32
2: sizeof u.pointer_ = 8
3: sizeof u.size_ = 8
4: sizeof u.data_ = 16
5: sizeof u.capacity_ = 8
6: offset (&u, &u.pointer_) = 0
7: offset (&u, &u.size_) = 8
8: offset (&u, &u.data_) = 16
9: offset (&u, &u.capacity_) = 16
```

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