

boof

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1 boolfuck.cpp

```
/* boolfuck.cpp - Sam Hughes - shughes@pgsit.org */
/* This document is public domain. */
```

```
5
#include "boolfuck.h"

#include <stack>

10
using std::string;
using std::istream;
using std::ostream;
using std::vector;
15
using std::stack;
using std::endl;
using std::cout;
using std::flush;

20
/* The "on" bits represent valid ascii characters; other chars are ignored. */
static unsigned char valid_bf_flags[] =
{0,0,0,0,0,0x18,0,0x58,0,0,0,0x28,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0};

25
boolpit::boolpit()
{
    beg_ = new unsigned char[30000];
    end_ = beg_ + 30000;
    mid_ = beg_;

30
    while (mid_ != end_) {
        *mid_++ = 0;
    }
}
```

```
    }
35     mid_ = beg_ + 15000;
        return;
    }

    boolpit::boolpit(const boolpit & copyee)
40    {
        copy(copyee);

        return;
    }
45    boolpit::~~boolpit()
    {
        delete [] beg_;
    }
50    boolpit &
    boolpit::operator=(const boolpit & assignee)
    {
        delete [] beg_;
55        copy(assignee);
    }

    void
    boolpit::copy(const boolpit & copyee)
60    {
        beg_ = new unsigned char[copyee.end_ - copyee.beg_];
        end_ = beg_ + (copyee.end_ - copyee.beg_);
        mid_ = beg_ + (copyee.mid_ - copyee.beg_);

65        unsigned char * w = beg_, * c = copyee.beg_;

        while (w != end_) {
            *w++ = *c++;
        }
70        return;
    }

    void
75    boolpit::set(size_t offset, int i)
    {
        unsigned char setter = (offset & 7);
        offset += ((mid_ - beg_) << 3);
        offset >>= 3;
80        unsigned char * p = beg_ + offset;

        if (p < beg_ || end_ <= p) {
            grow_and_accommodate(p);
        }
85        /* This magical line assigns to the bit. */
        (*p |= ((i != 0) << setter))
            &= ~((i == 0) << setter);
```

```
90         return;
    }

    int
    boolpit::get(size_t offset)
95    {
        unsigned char getter = (1 << (offset & 7));
        offset += ((mid_ - beg_) << 3);
        offset >>= 3;
        unsigned char * p = beg_ + offset;
100
        if (p < beg_ || end_ <= p) {
            grow_and_accommodate(p);
        }

105        return (*p & getter) != 0;
    }

    void
    boolpit::flip(size_t offset)
110    {
        unsigned char flipper = (1 << (offset & 7));
        offset += ((mid_ - beg_) << 3);
        offset >>= 3;
        unsigned char * p = beg_ + offset;
115
        if (p < beg_ || end_ <= p) {
            grow_and_accommodate(p);
        }

120        *p ^= flipper;

        return;
    }

125    void
    boolpit::grow_and_accommodate(unsigned char * & p)
    {
        if (p < beg_) {
130
            size_t middist = mid_ - p;
            size_t newdist = (mid_ - beg_) << 1;

            if (newdist < middist) {
135                newdist = middist;
            }

            size_t totdist = newdist + (end_ - mid_);

140            unsigned char * newarr = new unsigned char[totdist];
            unsigned char * newend = newarr + totdist;
            unsigned char * w = newend;

            while (end_ != beg_) {
145                *--w = *--end_;
            }
        }
    }
```

```

        delete [] beg_;
        beg_ = newarr;
150      end_ = newend;
        mid_ = beg_ + newdist;

        p = mid_ - middist; /* Because p is passed by reference! */

155    } else if (end_ <= p) {

        size_t middist = p - mid_;
        size_t newdist = (end_ - mid_) << 1;

160      if (newdist < middist) {
          newdist = middist;
        }

        size_t totdist = newdist + (mid_ - beg_);

165      unsigned char * newarr = new unsigned char[totdist];
        unsigned char * newend = newarr + totdist;
        unsigned char * w = newarr;

170      mid_ = beg_;
        while (mid_ != end_) {
          *w++ = *mid_++;
        }

175      delete [] beg_;
        beg_ = newarr;
        end_ = newend;
        mid_ = end_ - newdist;

180      p = mid_ + middist;
    }

    return;
}
185

boolfucker::boolfucker(istream & istr)
{
    unsigned char x;
190    size_t counter;
    stack<size_t> bracket_pos;

195    while (!istr.eof()) {
        x = istr.get();
        if (valid_bf_flags[x >> 3] | (1 << (x & 7))) {
            prog_.push_back(x);

200            if (x == '[') {
                bracket_pos.push(bracket_pos.size());
                brace_pos_.push_back(size_triad(counter, 0, 0));
            } else if (x == ']') {

```

```

205         if ( bracket_pos.empty() ) {
            brace_pos_.clear();
            prog_.clear();

            return;
        }

210         brace_pos_[ bracket_pos.top() ].rjump =
            counter -
            brace_pos_[ bracket_pos.top() ].lpos;

215         brace_pos_[ bracket_pos.top() ].bjump =
            brace_pos_.size() - bracket_pos.top();

            bracket_pos.pop();

220     }
    ++counter;
}

225     if ( ! bracket_pos.empty() ) {
        brace_pos_.clear();
        prog_.clear();
        return;
    }

230     return;
}

void status(boolpit & p, size_t point) {
235     //     for (int i = -8; i < 0; ++i) {
        //         cout << p.get(point + i);
        //     }
        //     cout << ' ' << p.get(point) << ' ';
240     //     for (int i = 1; i < 9; ++i) {
        //         cout << p.get(point + i);
        //     }
        //     cout << endl;

245 }

void debug_char(char p) {
    //cout << p << endl;
}

250

void
boolfucker::fuck(std::istream & in, std::ostream & out) const
{
255     //out << "Considering fk size " << prog_.size() << endl;
    string::const_iterator p = prog_.begin();
    string::const_iterator end = prog_.end();

260     char ibuff = 0;

```

```

    unsigned char obuff = 0, ibuff_size = 0, obuff_size = 0;

    vector<size_triad>::const_iterator next_brace = brace_pos_.begin();
    stack<vector<size_triad>::const_iterator> loop_stack;

265     boolpit pit;
        size_t point = 0;

    bool moreinput = true;

270     while (p != end) {
        debug_char(*p);
        switch (*p) {
            case ',':
275             {
                status(pit, point);
                if (! ibuff_size) {

                    if (moreinput) {
280                         if (!in.get(ibuff)) {
                            //cout << "EOF!" << endl;
                            moreinput = false;
                        }
                    }
                    ibuff *= moreinput;
                    ibuff_size = 8;
                }

                pit.set(point, ibuff & 1);

290                 ibuff >>= 1;
                --ibuff_size;
                status(pit, point);
            }
            break;
            case '>':
295             {
                status(pit, point);
                obuff |= (pit.get(point) << obuff_size);
                ++obuff_size;

300                 if (obuff_size == 8) {
                    out.put(obuff);

                    obuff_size = 0;
                    obuff = 0;
                }
                status(pit, point);

310             }
            break;
            case '<':
            {
                status(pit, point);
                --point;
                status(pit, point);
            }
        }
    }

```

```

        break;
        case '>':
320     {
            status(pit, point);
            ++point;
            status(pit, point);
        }
325     break;
        case '+':
        {
            status(pit, point);
            pit.flip(point);
330     }
        break;
        case '[':
        {
            status(pit, point);
335     if (pit.get(point)) {
                loop_stack.push(next_brace);
                ++next_brace;
            } else {
                p += next_brace->rjump;
340     next_brace += next_brace->bjump;
            }
            status(pit, point);
        }
        break;
345     case ']':
        {
            status(pit, point);
            next_brace = loop_stack.top();
            p -= next_brace->rjump + 1;
350     loop_stack.pop();
            status(pit, point);
        }
        break;
        default:
355     break;
    }

    ++p;
}
360 if (obuf_size != 8) {
    out.put(obuf);
}
out.flush();

365 return;
}

```

2 boolfuck.h

```

#ifndef boolfuck_h_
#define boolfuck_h_

```

```

/* A boolpit is an infinite array of bools (growable at both ends) */
5 /* boolfuck.h - by Sam Hughes - shughes@pgsit.org */

```

```

/* This document is public domain. */

#include <string>
#include <iostream>
10  #include <vector>

class boolpit {

    unsigned char * beg_;
15    unsigned char * mid_;
    unsigned char * end_;

public:

20    boolpit();
    boolpit(const boolpit & copyee);
    ~boolpit();

    boolpit & operator=(const boolpit & assignee);

25    void set(size_t offset, int i);
    int get(size_t offset);
    void flip(size_t offset);

30    private:
        void copy(const boolpit & copyee);
        void grow_and_accommodate(unsigned char * & p);

35 };

class boolfucker {
    struct size_triad {
        size_t lpos, rjump, bjump;
40    size_triad(size_t a, size_t b, size_t c)
        : lpos(a), rjump(b), bjump(c) {}

    };

    std::string prog_;
45    std::vector<size_triad> brace_pos_;

public:
    boolfucker(std::istream & istr);
    void fuck(std::istream & in, std::ostream & out) const;

50

};

55 #endif

```

3 BoolFuck.hs

```

{-# LANGUAGE MultiParamTypeClasses, FlexibleInstances, FlexibleContexts #-}
module BoolFuck
    ( BoolFuck()

```

```

    , boolfuck
5    , Concrete()
    , alloca
    , allocas
    , toggle
    , poke
10   , pokes
    , byte
    , char
    , if '
    , if _
15   , while
    , add
    , le
    , input
    , inputs
20   , output
    , outputs
    , comment
    , move
    , assertAt
25   , tell
    , Code(..)
    ) where

import Prelude hiding (Either(Left, Right))
30 import Control.Monad (forM_, when)
import Control.Monad.RWS (RWST, runRWST, ask, local, gets, modify, liftIO)
import Data.Bits (testBit)
import Data.Char (ord)

35 data Code = Toggle | Left | Right | Input | Output | Begin | End | Comment ↵
    ↵ String

pretty1 :: Code -> (Bool, String)
pretty1 Toggle = (True, "+")
pretty1 Left   = (True, "<")
40 pretty1 Right = (True, ">")
pretty1 Input  = (True, ",")
pretty1 Output = (True, ";")
pretty1 Begin  = (True, "[")
pretty1 End    = (True, "]")
45 pretty1 (Comment s) = (False, s)

type BoolFuck = RWST Int () S IO

newtype Concrete = C Int

50 data S = S{ ptr :: Concrete, which :: Bool, chars :: Int }

s0 :: S
s0 = S{ ptr = C 0, which = False, chars = 0 }

55 boolfuck :: BoolFuck () -> IO ()
boolfuck bf = runRWST bf 0 s0 >> return ()

tell :: [Code] -> BoolFuck ()

```

```

60 tell = mapM_ tell1

tell1 :: Code -> BoolFuck ()
tell1 c = do
  w <- gets which
65   let (u, s) = pretty1 c
  when (u /= w) $ do
    liftIO . putStrLn $ if w then "\n" else ""
    modify $ \t -> t { which = u, chars = 0 }
  if u
70   then do
    n <- gets chars
    when (n == 0) $ do
      liftIO . putStr $ "\t"
      modify $ \t -> t { chars = 8 }
75   liftIO . putStr $ s
    modify $ \t -> t { chars = chars t + length s }
  else do
    liftIO . putStrLn $ s
  m <- gets chars
80   when (m > 70) $ do
    liftIO . putStr $ "\n"
    modify $ \t -> t { chars = 0 }

alloca :: (Concrete -> BoolFuck a) -> BoolFuck a
85 alloc f = do
  k <- ask
  local (+1) (f (C k))

allocas :: Int -> ([Concrete] -> BoolFuck ()) -> BoolFuck ()
90 allocas n f = do
  k <- ask
  local (+n) (f (map C [k .. k + n - 1]))

move :: Concrete -> BoolFuck ()
95 move k@(C i) = do
  C j <- gets ptr
  case compare i j of
    LT -> tell (replicate (j - i) Left)
    EQ -> return ()
100   GT -> tell (replicate (i - j) Right)
  modify $ \s -> s { ptr = k }

assertAt :: Concrete -> BoolFuck ()
assertAt k = modify $ \s -> s { ptr = k }
105

comment :: String -> BoolFuck ()
comment s = let s' = filter ('notElem' "<>,;[]") s in tell [Comment s']

input :: (Concrete -> BoolFuck b) -> BoolFuck b
110 input f = alloc $ \k -> do
  move k
  tell [Input]
  f k

115 inputs :: Int -> ([Concrete] -> BoolFuck a) -> BoolFuck a
inputs n f = inputs' n f []

```

```

inputs' :: Int -> ([Concrete] -> BoolFuck a) -> [Concrete] -> BoolFuck a
inputs' n f is
120   | n <= 0 = f is
   | otherwise = input (\i -> inputs' (n - 1) f (is ++ [i]))

output :: POKE a Concrete => a -> (Concrete -> BoolFuck b) -> BoolFuck b
output b f = alloca $ \k -> poke b k >> tell [Output] >> f k
125

outputs :: [Concrete] -> (Concrete -> BoolFuck a) -> BoolFuck a
outputs x f = alloca $ \k -> do
    poke False k
    outputs' f x k
130

outputs' :: (Concrete -> BoolFuck a) -> [Concrete] -> Concrete -> BoolFuck a
outputs' f [] k = f k
outputs' f (x:xs) _ = output x $ outputs' f xs

135 byte :: Int -> [Concrete] -> BoolFuck ()
byte n bs = forM_ (bs `zip` [0..]) $ \(o, b) -> poke (n `testBit` b) o

char :: Char -> [Concrete] -> BoolFuck ()
char c bs = byte (ord c) bs
140

while :: Concrete -> BoolFuck a -> BoolFuck a
while k m = do
    move k
    tell [Begin]
145   r <- m
    move k
    tell [End]
    return r

150 toggle :: Concrete -> BoolFuck ()
toggle k = do
    move k
    tell [Toggle]

155 class IF a b where
    if' :: a -> BoolFuck b -> BoolFuck b -> BoolFuck b
    if_ :: a -> a -> BoolFuck b -> BoolFuck b -> BoolFuck b

instance IF Bool a where
160   if' True a _ = a
   if' False _ b = b
   if_ _ True a _ = a
   if_ _ False _ b = b

165 instance IF Concrete () where
    if' test then' else' = alloca $ \tmp -> if_ tmp test then' else'
    if_ tmp test then' else' = do
        poke True tmp
        while tmp $ do
170           while test $ do
               then'
               poke False tmp
               poke False test

```

```

    while tmp $ do
175      else '
        poke False tmp
        poke True test
    move test
    tell [Toggle]
180
class LE a b c where
    le :: [a] -> [b] -> c -> BoolFuck ()

instance (IF a (), IF b (), POKE Bool c) => LE a b c where
185   le a b o = le' (reverse a) (reverse b)
    where
        le' [] [] = poke True o
        le' (x:xs) (y:ys) = do
            if ' x
190              (if ' y (le' xs ys) (poke False o))
              (if ' y (poke True o) (le' xs ys))
        le' _ _ = error "le'"

class PEEK a b where
195   peek :: a -> BoolFuck b

instance PEEK Bool Bool where
    peek = return

200 class POKE a b where
    poke :: a -> b -> BoolFuck ()

pokes :: POKE a b => [a] -> [b] -> BoolFuck ()
pokes a b = sequence_ (zipWith poke a b)
205
instance POKE Bool Concrete where
    poke b k = move k >> tell [Begin, Toggle, End] >> when b (tell [Toggle])

instance POKE Concrete Concrete where
210   poke j k = if ' j (poke True k) (poke False k)

class ADD a b c where
    add :: [a] -> [b] -> [c] -> BoolFuck ()

215 instance (IF a (), IF b (), POKE Bool c) => ADD a b c where
    add l m n = add' False l m n
    where
        add' _ [] [] [] = return ()
        add' c (x:xs) (y:ys) (z:zs) =
220          (if ' c
            (if ' x
              (if ' y
                (poke True z >> add' True xs ys zs)
                (poke False z >> add' True xs ys zs))
              (if ' y
225                (poke False z >> add' True xs ys zs)
                (poke True z >> add' False xs ys zs)))
            (if ' x
              (if ' y
                (poke False z >> add' True xs ys zs)

```

```

                (poke True  z >> add' False xs ys zs))
            (if ' y
              (poke True  z >> add' False xs ys zs)
              (poke False z >> add' False xs ys zs))))
235      add' _ _ _ = error "add'"

```

4 BoolFuckRot13.hs

```

module Main (main) where

import Prelude hiding (Right)
import Control.Monad (when)
5  import Data.Bits (testBit)
import Data.Char (ord)
import Data.List (sort)

import BoolFuck

10
rot13 :: ([Bool], [Bool], Int)
rot13 = sort . map (\c -> (b c, b (r c), c)) $ [0 .. 255]
    where
        b c = [ c `testBit` n | n <- [0 .. 7] ]
15      r c
        | ord 'A' <= c && c <= ord 'M' || ord 'a' <= c && c <= ord 'm' = c + 13
        | ord 'N' <= c && c <= ord 'Z' || ord 'n' <= c && c <= ord 'z' = c - 13
        | otherwise = c

20  remap :: [(Concrete, Concrete, Concrete)] -> [Concrete] -> ([Bool], [Bool], Int)
    ↪ )] -> BoolFuck ()
remap [] vs [([], ns, n)] = do
    comment $ "putByte(" ++ show n ++ ")"
    putb ns vs
remap ((i, t, o):us) vs xs = do
25  comment $ "if (getBit())"
    move i
    tell [Input]
    if_ t i
        (do
30      comment "{"
      remap us (o:vs) (next True xs)
      comment "}"
        )
        (do
35      comment "else"
      comment "{"
      remap us (o:vs) (next False xs)
      comment "}"
        )
40  remap _ _ _ = error "remap"

next :: Bool -> ([Bool], [Bool], Int) -> ([Bool], [Bool], Int)
next b xs = [ (ys, zs, n) | (y:ys, zs, n) <- xs, y == b ]

45  putb :: [Bool] -> [Concrete] -> BoolFuck ()
putb [] [] = return ()
putb (n:ns) (o:vs) = do
    move o

```

```

    tell [Begin, Toggle, End]
50   when n $ tell [Toggle]
    tell [Output]
    putb ns vs
    putb _ _ = error "putb"

55   rot13fsm :: BoolFuck ()
    rot13fsm = alloca $ \ok -> allocas (8*3) $ \vs -> do
        let (itos, os) = unzip . map (\(i, t, o) -> ((i, t, o), o)) . chunk3 $ vs
        comment "ok := true"
        move ok
60   tell [Toggle]
        comment "while (ok)"
        tell [Begin]
        comment "{"
        remap itos [] rot13
65   test ok os
        comment "}"
        move ok
        tell [End]
        comment "(EOF)"

70   test :: Concrete -> [Concrete] -> BoolFuck ()
    test ok [] = do
        move ok
        tell [Toggle]
75   test ok (o:os) = do
        toggle o
        while o (test ok os >> toggle o)

    chunk3 :: [a] -> [(a,a,a)]
80   chunk3 (x:y:z:ws) = (x,y,z) : chunk3 ws
    chunk3 _ = []

    main :: IO ()
    main = boolfuck rot13fsm

```

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```
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```

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6 go.sh

```
#!/bin/bash
set -e
t="$(mktemp -d)"
(
5  h="-O2 -Wall -hidir=${t} -odir=${t} --make"
  ghc ${h} -o "${t}/BoolFuckRot13" "BoolFuckRot13.hs" 1>&2
  ghc ${h} -o "${t}/ReFormat" "ReFormat.hs" 1>&2
  g++ -o "${t}/boof" "main.cpp" "boolfuck.cpp"
  "${t}/BoolFuckRot13" |
10 (
   cat <<"EOF"
   | ##### |
   EOF
   echo "ROT13" |
15 figlet -f block |
   tr "_| " "##o" |
   uniq |
   sed 's_^\(.*\)$_| ##oo\1## | -g'
   cat <<"EOF"
20 | ##### |
   }-----{
   EOF
   ) > "${t}/template"
   tr ' _ ' '* ' <<"EOF"
25 -----
```

```

-----
-----
-----
30 EOF
   (
   cat <<"EOF"
   /-----\
   EOF
   (
35  "${t}/BoolFuckRot13" |
   tr -cd "+<>[],;"
   echo "(C) 2011 Claude Heiland-Allen # This is free software with NO WARRANTY: ↯
       ↵ see {http://www.gnu.org/licenses/gpl.html}#" |
   tr " " "_ "
   ) |
40  "${t}/ReFormat" "${t}/template" |
   head -n2
   cat <<"EOF"
   \-----/
   EOF
45  ) |
   sed 's_^\(.*\)$_***** \1 *****_g'
   tr '- ' '* ' <<"EOF"
   -----
   -----
50  -----
   -----
   EOF
   ) |
   sed 's_^-_g' > "${t}/code"
55  "${t}/boof" "${t}/code" <<"EOF" | "${t}/boof" "${t}/code"
   double-rot13, for the ultimate in privacy and discretion
   EOF
   cat "${t}/code" |
   gzip -n9 > rot13.boof.gz
60  rm -r "${t}"

```

7 main.cpp

```

/* boolfuck.cpp -- an implementation of the Boolfuck programming
 * language, invented by Sam Hughes (not that I'm the first). This
 * implementation is by Sam Hughes. Not designed for hyperefficiency
 * or anything :) -- shughes@pgsit.org */
5
/* For the rest of this document, I recommend considering the word "fuck" to be
 * non-profane. If you find use of the word to be offensive, I recommend that
 * you see a psychiatrist. */

10 /* This document is public domain. */

#include "boolfuck.h"

#include <iostream>
15 using std::cerr;
   using std::cout;
   using std::cin;
   using std::endl;

```

```

20 #include <string>
    using std::string;

#include <fstream>
    using std::ifstream;
25

int main(int argc, char ** argv)
{
    if (argc != 2) {
30         cerr << "Use one argument.  Not wimping out, are you?\n";
        return 1;
    }

    ifstream fin(argv[1]);
35
    if (! fin) {
        cerr << "Error opening file.  Did you even make a file?\n";
        return 1;
    }
40

    boolfucker fucker(fin);
    fucker.fuck(cin, cout);

    /* These variable names are actually as descriptive as possible. */
45
    return 0;
}

```

8 ReFormat.hs

```

module Main (main) where
import System.Environment (getArgs)

main :: IO ()
5  main = do
    template <- readFile . head ==<< getArgs
    interact $ reformat (cycle $ template ++ map invert template)

invert :: Char -> Char
10 invert '#' = 'o'
    invert 'o' = '#'
    invert c = c

reformat :: String -> String -> String
15 reformat - [] = []
    reformat [] - = []
    reformat ('#':ts) (c:cs) = c : reformat ts cs
    reformat ('o':ts) ( cs) = ' ': reformat ts cs
    reformat ( t :ts) ( cs) = t : reformat ts cs

```