CS530
HW1

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Programming & Good Habbits

- ***Always*** **check return code!**
  - `open(), write()`
  - `malloc()`
  - `switch (errno) { ... }`
- **Initialize *all* variables!**
  - `int i=0;`
  - `struct timeval timeout;`
    `memset(&timeout, 0, sizeof(struct timeval));`
- ***Never*** **leak any resources!**
  - `malloc() and free()`
  - `open() and close()`
  - **Delete temporary files**

Programming & Good Habbits (Cont...)

- ***Don't*** **assume external input will be short**
  - use `strncpy()` and not `strcpy()`
  - use `snprintf()` and not `sprintf()`
  - use `sizeof()` and not a constant, for example,

```
unsigned char buf[80];

buf[0] = '\0'; /* initialization */
strncpy(buf, sizeof(buf), *argv[1]);
buf[sizeof(buf)-1] = '\0'; /* in case *argv[1] is long */
```

- **Fix your code so that you have *zero* compiler warnings!**

Notes on gdb

The debugger is your friend! Get to know it!

compile program with:	`-g`
start debugging:	`gdb hw1`
set breakpoint:	`(gdb) break foo.c:123`
run program:	`(gdb) run`
clear breakpoint:	`(gdb) clear`
stack trace:	`(gdb) where`
print field:	`(gdb) print f.BlockType`
printf():	`(gdb) printf "%02x\n",buf[0]`
single-step at same level:	`(gdb) next`
single-step into a function:	`(gdb) step`
print field after every cmd:	`(gdb) display f.BlockType`
assignment:	`(gdb) set f.BlockType=0`
continue:	`(gdb) cont`
quit:	`(gdb) quit`

Numbers

- 'Z' is 0x5a (hex)
  - integer: 90
  - hex: 0x5a
  - binary: 0101 1010
  - octal: 0132
  - hexstring representation: "5a"
- Memory
  - char buf[40]
  - hexstring: e7c16723f8e70c751ddd01c51d7c27d
    - buf[0] = 0xe7
    - buf[1] = 0xc1
    - buf[2] = 0x67
    - ...
    - buf[15] = 0x7d

Hexdump

```
000000: 59 65 73 74 65 72 64 61  79 2c 0a 41 6c 6c 20 6d  Yesterday,.All m
000010: 79 20 74 72 6f 75 62 6c  65 73 20 73 65 65 6d 65  y troubles seeme
000020: 64 20 73 6f 20 66 61 72  20 61 77 61 79 0a 4e 6f  d so far away.No
000030: 77 20 69 74 20 6c 6f 6f  6b 73 20 61 73 20 74 68  w it looks as th
000040: 6f 75 67 68 0a 54 68 65  79 27 72 65 20 68 65 72  ough.They're her
000050: 65 20 74 6f 20 73 74 61  79 0a 4f 68 2c 20 49 20  e to stay.Oh, I
000060: 62 65 6c 69 65 76 65 0a  49 6e 20 79 65 73 74 65  believe.In yeste
000070: 72 64 61 79 2e 0a 0a 53  75 64 64 65 6e 6c 79 2c  rday...Suddenly,
000080: 0a 49 27 6d 20 6e 6f 74  20 68 61 6c 66 20 74 68  .I'm not half th
000090: 65 20 6d 61 6e 20 49 20  75 73 65 64 20 74 6f 20  e man I used to
0000a0: 62 65 0a 54 68 65 72 65  27 73 20 61 20 73 68 61  be.There's a sha
0000b0: 64 6f 77 20 68 61 6e 67  69 6e 67 20 6f 76 65 72  dow hanging over
0000c0: 20 6d 65 2e 0a 4f 68 2c  20 79 65 73 74 65 72 64   me..Oh, yesterd
0000d0: 61 79 0a 43 61 6d 65 20  73 75 64 64 65 6e 6c 79  ay.Came suddenly
0000e0: 2e 0a 0a 57 68 79 20 73  68 65 20 68 61 64 20 74  ...Why she had t
0000f0: 6f 20 67 6f 2c 20 49 20  64 6f 6e 74 20 6b 6e 6f  o go, I dont kno
000100: 77 0a 53 68 65 20 77 6f  75 6c 64 6e 27 74 20 73  w.She wouldn't s
000110: 61 79 2e 0a 49 20 73 61  69 64 20 73 6f 6d 65 74  ay..I said somet
000120: 68 69 6e 67 20 77 72 6f  6e 67 2c 20 6e 6f 77 20  hing wrong, now
000130: 49 20 6c 6f 6e 67 0a 46  6f 72 20 79 65 73 74 65  I long.For yeste
000140: 72 64 61 79 0a 0a 59 65  73 74 65 72 64 61 79 2c  rday..Yesterday,
000150: 0a 4c 6f 76 65 20 77 61  73 20 73 75 63 68 20 61  .Love was such a
000160: 6e 20 65 61 73 79 20 67  61 6d 65 20 74 6f 20 70  n easy game to p
000170: 6c 61 79 0a 4e 6f 77 20  49 20 6e 65 65 64 20 61  lay.Now I need a
000180: 20 70 6c 61 63 65 20 74  6f 20 68 69 64 65 20 61   place to hide a
000190: 77 61 79 0a 4f 68 2c 20  49 20 62 65 6c 69 76 65  way.Oh, I belive
0001a0: 0a 49 6e 20 79 65 73 74  65 72 64 61 79 2e 20 0a  .In yesterday. .
0001b0: 0a 2d 2d 0a 0a 62 79 20  4a 6f 68 6e 20 4c 65 6e  .--..by John Len
0001c0: 6e 6f 6e 20 61 6e 64 20  50 61 75 6c 20 4d 63 43  non and Paul McC
0001d0: 61 72 74 6e 65 79 0a --  -- -- -- -- -- -- -- --  artney.
```

Hexdump (Cont...)

Binary file:

```
000000: 47 49 46 38 39 61 4b 00  6e 00 84 00 00 bf 60 60  GIF89aK.n.~..~‘‘
000010: f9 ef ef 9f 10 10 b9 50  50 99 00 00 db a5 a5 f2  ~~~~..~PP~..~~~~
000020: df df b3 40 40 d2 8f 8f  ec cf cf cc 7f 7f ff ba  ~~~@@~~~~~~~..~~
000030: 10 c6 70 70 ac 30 30 a6  20 20 ff ff ff e5 bf bf  .~pp~00~  ~~~~~~
000040: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
000050: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
000060: 00 00 00 00 00 00 00 00  00 00 00 00 00 21 f9 04  .............!~.
000070: 01 00 00 0f 00 2c 00 00  00 00 4b 00 6e 00 00 05  .....,....K.n...
000080: fe e0 23 8e e3 62 9e 68  aa ae 6c eb a2 64 4c be  ~~#~~b~h~~l~~dL~
000090: 74 6d df b2 78 12 7c ef  ff c0 a0 70 48 f4 ad 64  tm~~x.|~~~~pH~~d
0000a0: c5 a4 72 c9 84 8d 98 d0  a8 b4 77 7a 4e af 58 61  ~~r~~~~~~wzN~Xa
0000b0: f5 91 ed 7a 79 26 d1 77  7c ad 06 73 e8 b4 7a cd  ~~~zy&~w|~.s~~z~
0000c0: 0e ee 80 0b b6 7c 4e 27  b9 17 f0 78 7d cf cf e5  .~~.~|N’~.~x}~~~
0000d0: f3 7d 81 81 7f 3f 61 82  87 74 84 46 7a 88 31 09  ~}~~.?a~~t~Fz~1.
0000e0: 05 07 26 0e 29 07 00 05  01 73 8a 54 8c 8d 01 05  ..&.)....s~T~~..
0000f0: 03 37 07 0c 10 6b 9a 60  9c 82 01 01 02 8f 07 3c  .7...k~‘~~...~.<
000100: 0e 3f 95 97 29 0e 05 69  a6 04 86 87 0a 9e 03 4c  .?~~)..i~.~~.~.L
```

You must match the above format *exactly*