

Using Memory

```
#include <stdio.h>
#include <stdlib.h>

struct foo_struct {
    int x;
    char a; char b; char c; char d;
};

int
main()
{
    int i;
    char a[40];
    int *iptr = (int *) a;
    struct foo_struct *sptr = (struct foo_struct *) a;
```

Using Memory

```
for (i=0; i<40; i++) {  
    a[i] = (char) i;  
}
```

```
for (i=0; i<10; i++) {  
    printf("%2d = 0x%08x\n", i, iptr[i]);  
}
```

```
printf("x = 0x%08x  a = %d  b = %d  c = %d  d = %d\n",  
       sptr[0].x, (int) sptr[0].a, (int) sptr[0].b,  
       (int) sptr[0].c, (int) sptr[0].d);
```

```
exit(0);
```

```
}
```

Using Memory: Example Output (x86)

0 = 0x03020100

1 = 0x07060504

2 = 0x0b0a0908

3 = 0x0f0e0d0c

4 = 0x13121110

5 = 0x17161514

6 = 0x1b1a1918

7 = 0x1f1e1d1c

8 = 0x23222120

9 = 0x27262524

x = 0x03020100 a = 4 b = 5 c = 6 d = 7

Using Memory: Example Output (Sparc)

0 = 0x00010203

1 = 0x04050607

2 = 0x08090a0b

3 = 0x0c0d0e0f

4 = 0x10111213

5 = 0x14151617

6 = 0x18191a1b

7 = 0x1c1d1e1f

8 = 0x20212223

9 = 0x24252627

x = 0x00010203 a = 4 b = 5 c = 6 d = 7

Writing to a File

```
#include <stdio.h>
#include <stdlib.h>
#include <assert.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <fcntl.h>

int
main()
{
    int i, rc, fd;
    int array[40];
```

Writing to a File

```
for (i=0; i<40; i++) {
    array[i] = i;
}

fd = open("test-output", O_WRONLY | O_CREAT, S_IRWXU);

if (fd < 0) {
    perror("open failed");
    exit(1);
}
```

Writing to a File

```
rc = write(fd, array, sizeof(array));

if (rc < 0) {
    perror("write failed");
    exit(1);
}

close(fd);
exit(0);
}
```

Writing to a File: Example Output

```
% cat test-output
```

```
#@u
```

```
!$%
```


Writing to a File: Example Output (x86)

```
# Print offsets and values in Hex (x)
```

```
xxd test-output
```

```
00000000: 0000 0000 0100 0000 0200 0000 0300 0000  . . . . .
00000010: 0400 0000 0500 0000 0600 0000 0700 0000  . . . . .
00000020: 0800 0000 0900 0000 0a00 0000 0b00 0000  . . . . .
00000030: 0c00 0000 0d00 0000 0e00 0000 0f00 0000  . . . . .
00000040: 1000 0000 1100 0000 1200 0000 1300 0000  . . . . .
00000050: 1400 0000 1500 0000 1600 0000 1700 0000  . . . . .
00000060: 1800 0000 1900 0000 1a00 0000 1b00 0000  . . . . .
00000070: 1c00 0000 1d00 0000 1e00 0000 1f00 0000  . . . . .
00000080: 2000 0000 2100 0000 2200 0000 2300 0000  . . . ! . . . "
00000090: 2400 0000 2500 0000 2600 0000 2700 0000  $ . . . % . . . &
```

Writing to a File: Example Output (Sparc)

```
# Print offsets and values in Hex (x)
```

```
xxd test-output
```

```
00000000: 0000 0000 0000 0001 0000 0002 0000 0003  . . . . .
00000010: 0000 0004 0000 0005 0000 0006 0000 0007  . . . . .
00000020: 0000 0008 0000 0009 0000 000a 0000 000b  . . . . .
00000030: 0000 000c 0000 000d 0000 000e 0000 000f  . . . . .
00000040: 0000 0010 0000 0011 0000 0012 0000 0013  . . . . .
00000050: 0000 0014 0000 0015 0000 0016 0000 0017  . . . . .
00000060: 0000 0018 0000 0019 0000 001a 0000 001b  . . . . .
00000070: 0000 001c 0000 001d 0000 001e 0000 001f  . . . . .
00000080: 0000 0020 0000 0021 0000 0022 0000 0023  . . . ! .
00000090: 0000 0024 0000 0025 0000 0026 0000 0027  . . . $ . . . % .
```

Arrays and Addresses

```
#include <stdio.h>
#include <stdlib.h>

static char *alpha = "abcdefghijklmnopqrstuvwxyz";

int
main()
{
    char a[12];
    char *b = 0;
    int i;
```

Arrays and Addresses

```
for (i=0; i<12; i++) {
    a[i] = alpha[i];
}

printf("addr of a = %p\n", &a);
printf("addr of a[0] = %p\n", &a[0]);
printf("*a = %c\n", *a);
printf("addr of b = %p\n", &b);
printf("addr of b[0] = %p\n", &b[0]);
printf("b = %p\n", b);
printf("\n");
```

Arrays and Addresses

```
b = a;
printf("addr of b = %p\n", &b);
printf("addr of b[0] = %p\n", &b[0]);
printf("b = %p\n", b);
printf("*b = %c\n", *b);
printf("\n");
```

```
b = &a[4];
printf("addr of b = %p\n", &b);
printf("addr of b[0] = %p\n", &b[0]);
printf("b = %p\n", b);
printf("*b = %c\n", *b);
printf("\n");
```

```
exit(0);
```

```
}
```

Arrays and Addresses: Example Output (x86)

```
addr of a = 0xbfe79b88
```

```
addr of a[0] = 0xbfe79b88
```

```
*a = a
```

```
addr of b = 0xbfe79b84
```

```
addr of b[0] = (nil)
```

```
b = (nil)
```

```
addr of b = 0xbfe79b84
```

```
addr of b[0] = 0xbfe79b88
```

```
b = 0xbfe79b88
```

```
*b = a
```

```
addr of b = 0xbfe79b84
```

```
addr of b[0] = 0xbfe79b8c
```

```
b = 0xbfe79b8c
```

```
*b = e
```