Multiple file linking in C: A short detour

Ack: Example from slides on **Linking**

15-213: Introduction to Computer Systems
11th Lecture, Sept. 30, 2010

Instructors:
Randy Bryant and Dave O'Hallaron

Multiple file linking in C: A short detour

```c
/* main.c */

#include <stdio.h>

void swap();

int buf[2] = {0x137, 0x291};

int main()
{
    printf("%d, %d\n", buf[0], buf[1]);
    swap();
    printf("%d, %d\n", buf[0], buf[1]);
    return 0;
}
```

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void swap();

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    printf("%d, %d\n", buf[0], buf[1]);
    swap();
    printf("%d, %d\n", buf[0], buf[1]);
    return 0;
}
```

```c
/* swap.c */
extern int buf[];

int *bufp0 = &buf[0];
int *bufp1;

#define BADVALUE 0x999

void swap()
{
    int temp = BADVALUE;

    bufp1 = &buf[1];
    temp = *bufp0;
    *bufp0 = *bufp1;
    *bufp1 = temp;
}
```

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How to get an executable program from multiple C files?

gcc options

gcc options

- Preprocessing only

```
gcc –E main.c
```

-- Output on stdout

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- Preprocessing only

```
gcc -E main.c
```

-- Output on stdout

- Object code generation

```
gcc -c main.c
```

-- Generates main.o

gcc options

- Preprocessing only

  `gcc -E main.c` -- Output on stdout

- Object code generation

  `gcc -c main.c` -- Generates main.o

- Assembly code generation

  `gcc -S main.c` -- Generates main.s

gcc options

- Preprocessing only

  `gcc -E main.c` -- Output on stdout

- Object code generation

  `gcc -c main.c` -- Generates main.o

- Assembly code generation

  `gcc -S main.c` -- Generates main.s

- Full compilation only

  `gcc main.c swap.c` -- Generates a.out

gcc options

- Use –g option to enable debugging

objdump

- Usage: objdump <option(s)> <file(s)>
- Display information from object <file(s)>

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- Display information from object <file(s)>

```
objdump -d a.out
```

-- dump only .text section

objdump

- Usage: objdump <option(s)> <file(s)>
- Display information from object <file(s)>

```
objdump -d a.out      -- dump only .text section
objdump -D a.out      -- dump all sections
```

objdump

- Usage: objdump <option(s)> <file(s)>
- Display information from object <file(s)>

```
objdump -d a.out
```
-- dump only .text section

```
objdump -D a.out
```
-- dump all sections

```
objdump -S swap.o
```
-- If .o is created with –g display source statements