

5/4

## Declaration

(extern) int sum (int, int);

## Last Class

- ① Compilation System
- ② Include guards
- ③ Extern (Declaration / Definition)
- ④ Linking Process

Linking

② → Dynamic Linking

① ↓  
Static Linking

Takes relocatable object files (.o)  
and generates an executable object file  
→ can be loaded into  
memory & run.

## ② Dynamic Linking

Linking happens only during  
load time or run-time.

Static

→ Large executable  
files:

main → 20 KB

↓  
contains some  
library code

Dynamic

→ Smaller  
executables

main → 2 KB

↓  
libraries are  
loaded during  
load time or  
run time

# Main Task of a Linker

↓  
Resolution & Relocation

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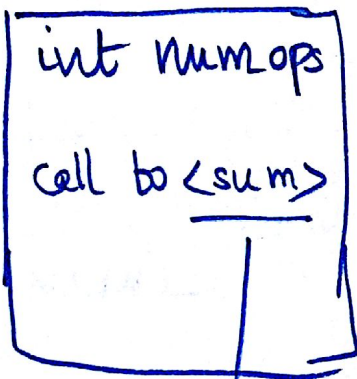
Resolves the unknown symbols

=>

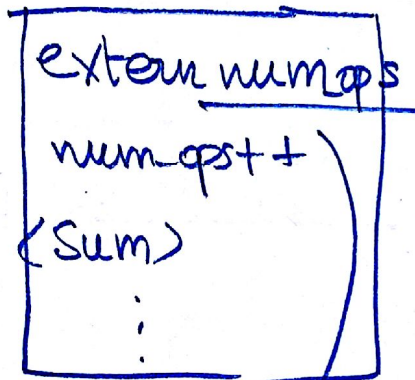
search files to replace symbol references with actual

usable ~~addresses~~ addresses in memory

main.o



sum.o



unknown symbol

unknown symbol

---

Cannot directly map to the <sum> function in sum.o

They all start from 0000...0

So .....

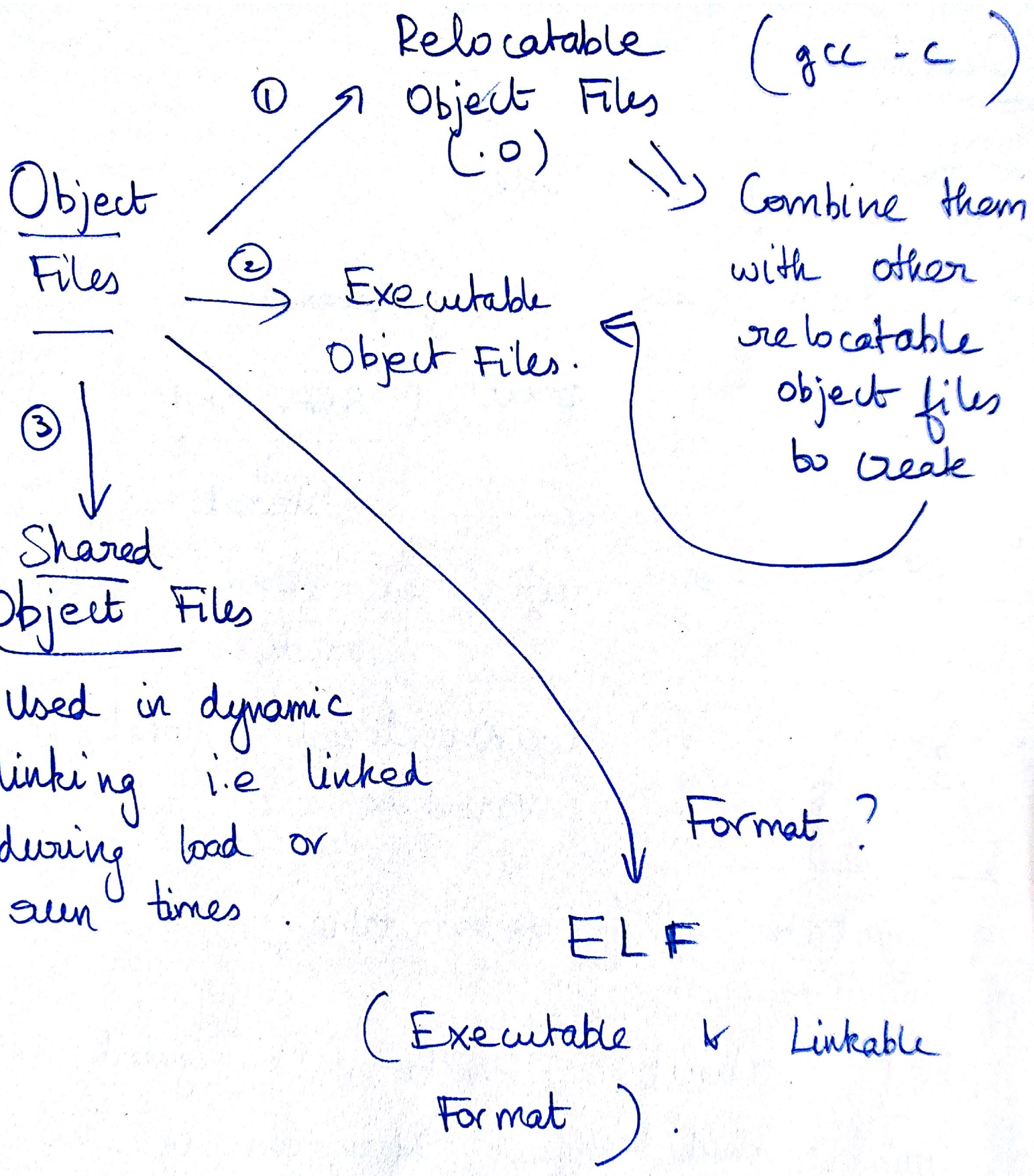


so before resolving, they have  
to be relocated by the linker.

Move their sections to a  
single linear executable file  
and resolve the symbol.

→ compute the new address  
in the new address space.

resolution x relocation they  
happen in tandem.





ELF Header → contains information.

that a linker can parse and interpret this object file.

What does it have?

→ Size of the header

→ Object file type.

→ OS.

// readelf -a sum.o //

Section Header Table

Location \* sizes, of all the sections.

# Sections

◦ text

→ code!

◦ rodata

→ string literal

printf ("sum = %d", i

↓  
literal.

◦ data

→

initialized global  
variables

◦ bss

→

uninitialized global  
variables.

◦ Symtab

(Symbol table).

Info about functions & global  
variables that are referenced in the  
program.



Why? global variables are stored  $\rightarrow$  data sec

What happens when we combine O's?  $\rightarrow$  your global variable will be relocated within the data section.

$\rightarrow$  Any calls to a local function ~~X~~

$\rightarrow$  rel\_data

① int global\_1 = global\_2;

When the initial value is another global var?

② int global\_3 = external\_func();  
... is returned by an external function.



debug / line

-g → compile using

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static

(storage class → auto, register, extern)

① A static variable in a function keeps its value between invocations.

Example static.c

② // Next class