



GCC & Binutils

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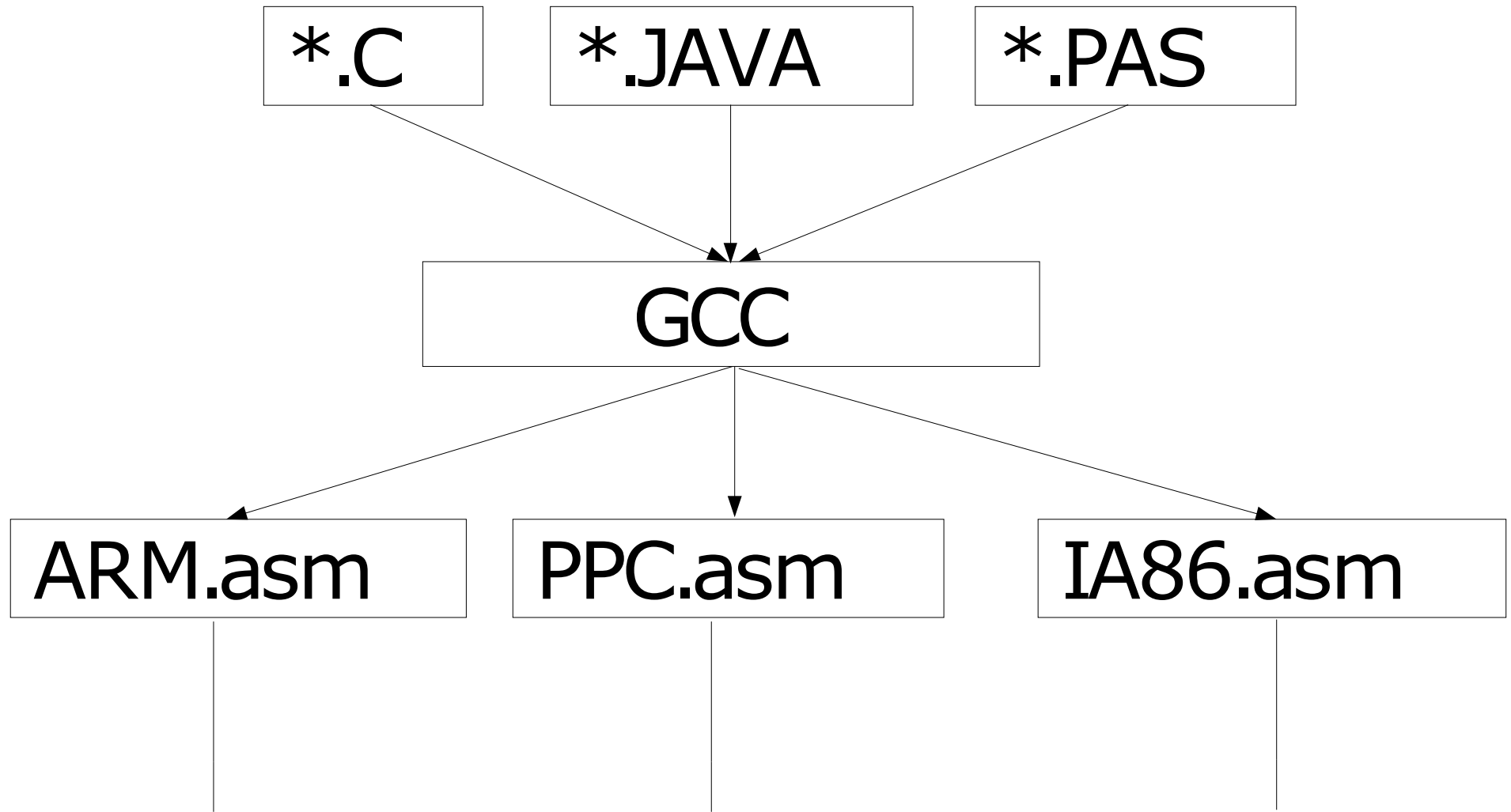


Compiling

- From dictionary
 - To put together
 - To compose from many sources
 - To translate (a program) into machine language
- Compilation can involve:
 - preprocessing
 - compiling
 - assembling
 - linking



GNU Compiler Collection





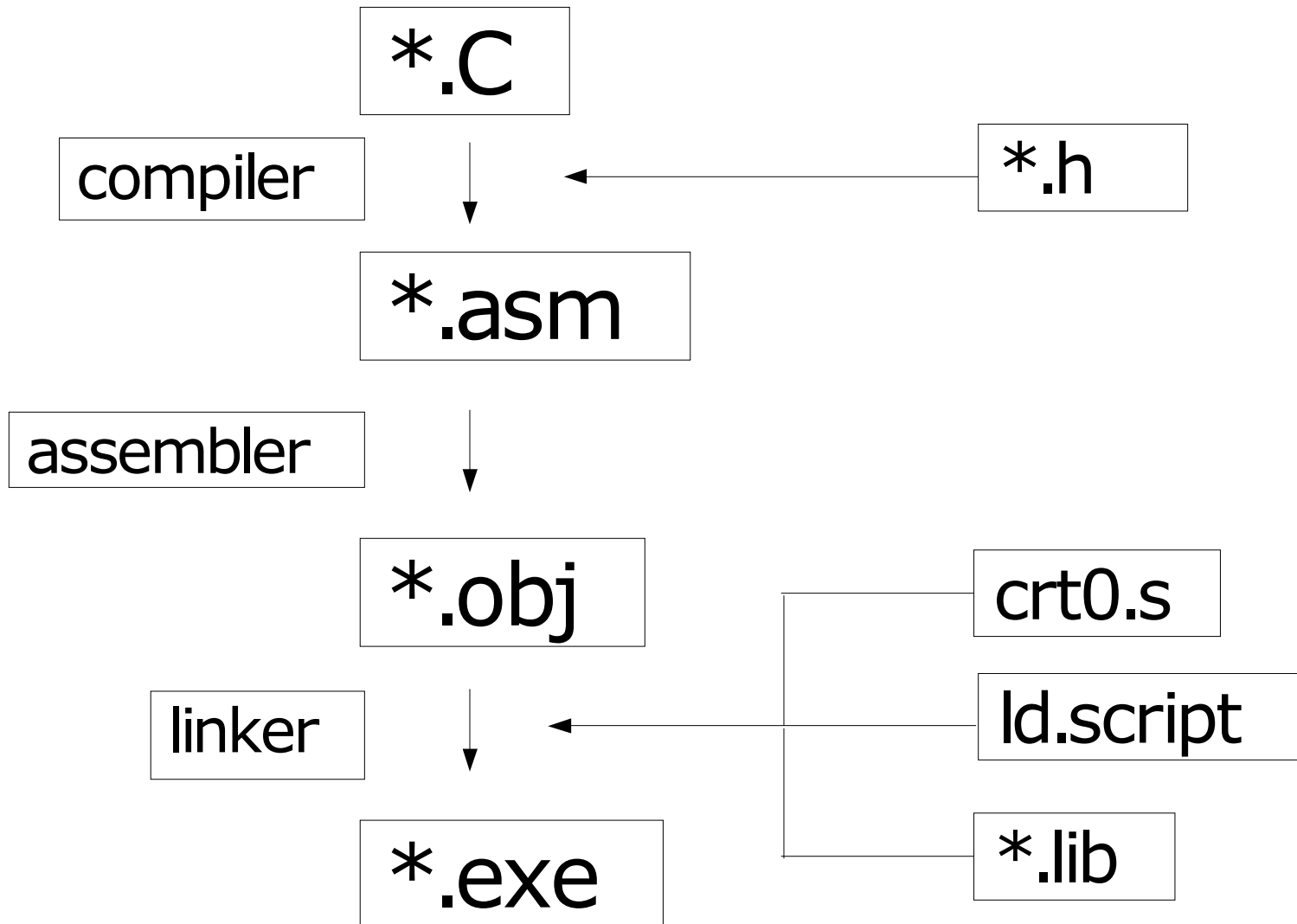
Exercise

■ Simple compilation

```
# cat > test.c
#include <stdio.h>
int main(void)
{
    printf("Hello World\n");
    return 0;
}
^d
# gcc -S test.c
# ls -lh test.*
# cat test.s
```

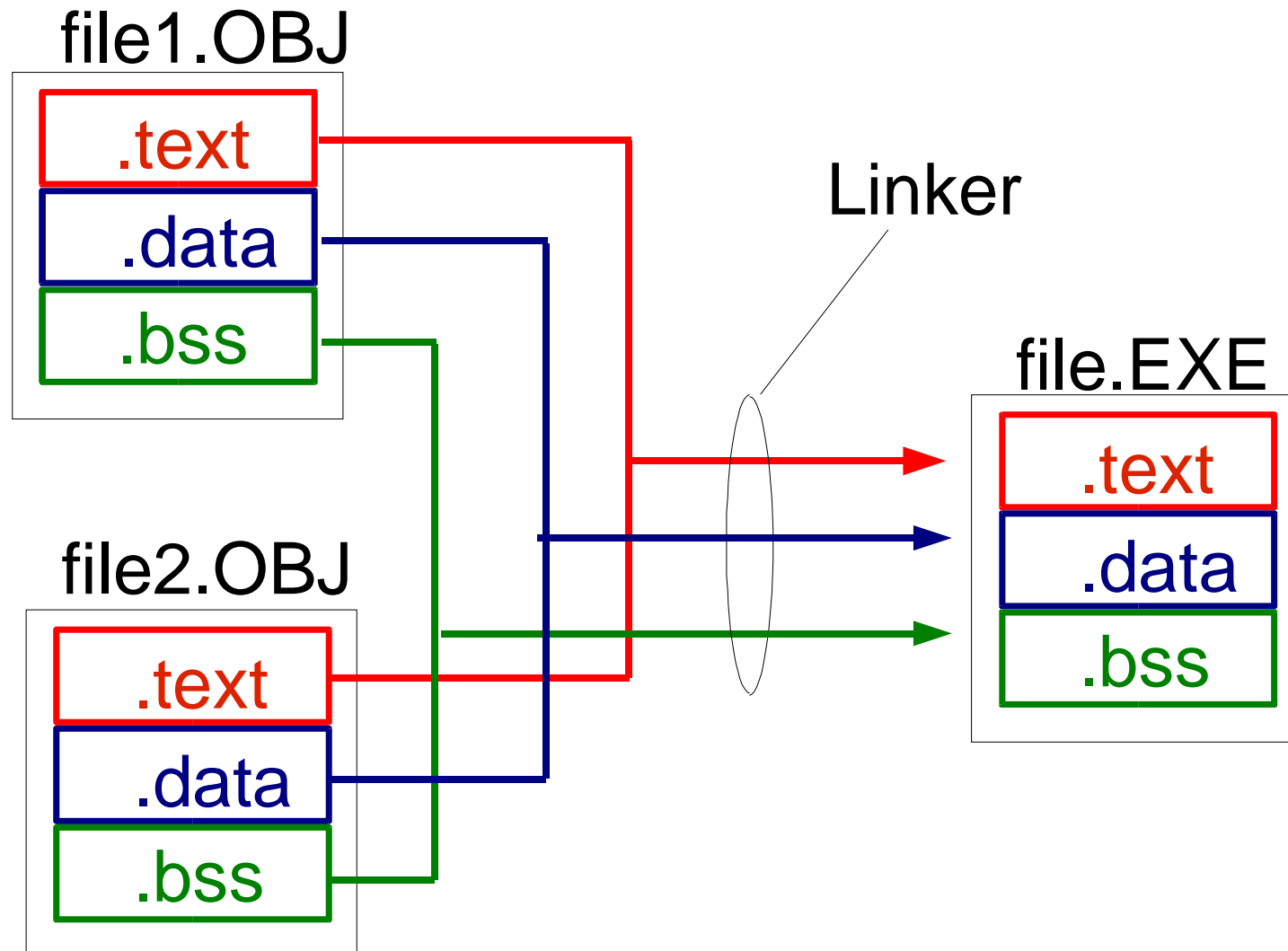


Executable Files





Linker





Exercise

■ Simple assembling

```
# gcc -c test.s  
# ls -lh test.*  
# cat test.o  
# objdump -h  
# objdump -p test.o  
etc...
```



C Run Time 0 - CRT0

- CRT0 . o
 - Initialize the executable file
 - stack pointer
 - .bss section
 - Defines special symbols like `_start`
 - Calls `main()`



Linker Script

- Text file with some configurations
- Memory map for the application
 - Address of Sections
 - Informations to ELF Header
- Features of different (micro)Processors
- Attributes of each section - read/write

```
# ld --verbose
```



EXE and OBJ Format

- Information about file
 - How to load the file?
 - Information to linker
 - 'Road Map' of file's organization
- 3 different kind of ELF's
 - relocatable - link
 - executable - execution
 - shared - both





Exercise

■ Simple linking

```
# gcc -o test.bin test.o
# ls -lh test.*
# objdump -h
# objdump -p test.bin
# nm -h
# nm test.bin
etc...
```



Links

- GNU Pro Toolkit

<http://www.redhat.com/docs/manuals/gnupro/>

- ELF Format

<http://stephane.carrez.free.fr/ELF/ch4.intro.html>