

## DISSECTED FILE

```
~$uname -m
i686
~$./simple.elf
Hello World!
```

The diagram illustrates the internal structure of a Linux executable file, showing how different parts are organized and how they relate to each other. It includes:

- ELF HEADER:** Contains technical details for identification and execution. It includes fields like `e_ident` (signature and endianness), `e_type` (executable type), `e_machine` (architecture), and `e_entry` (entry point).
- PROGRAM HEADER TABLE:** Provides execution information for segments, including `p_type`, `p_offset`, `p_vaddr`, `p_paddr`, `p_filesz`, `p_memsz`, and `p_flags`.
- SECTIONS:** Contains the contents of the executable, including `CODE` (executable information), `DATA` (information used by the code), and `SECTIONS' NAMES`.
- SECTION HEADER TABLE:** Provides linking information for sections, including `sh_name`, `sh_type`, `sh_flags`, `sh_addr`, `sh_offset`, and `sh_size`.
- HEXADECIMAL DUMP:** Shows the raw bytes of the file, color-coded by section.
- ASCII DUMP:** Shows the human-readable text within the file, such as the string "Hello World!".
- X86 ASSEMBLY:** Shows the machine code instructions, such as `mov ecx, 0x8000090` and `write(STDOUT_FILENO, "Hello world!\n", len("Hello world!\n"))`.
- EQUIVALENT C CODE:** Shows the high-level logic of the assembly, including `write(STDOUT_FILENO, "Hello world!\n", len("Hello world!\n"))` and `exit(1)`.
- STRINGS:** Lists the strings found in the file, such as "Hello World!\n".
- SECTION NAMES:** Lists the names of the sections, such as `.shstrtab..text` and `.rodata`.

## LOADING PROCESS

### 1 HEADER

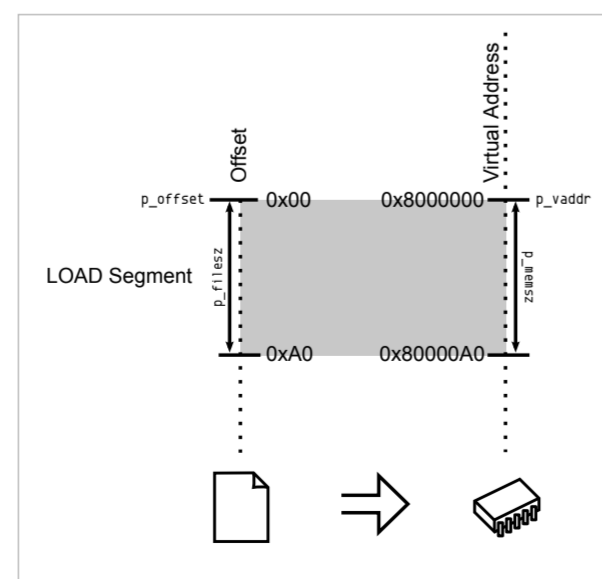
THE ELF HEADER IS PARSED  
THE PROGRAM HEADER IS PARSED  
(SECTIONS ARE NOT USED)

### 2 MAPPING

THE FILE IS MAPPED IN MEMORY  
ACCORDING TO ITS SEGMENT(S)

### 3 EXECUTION

ENTRY IS CALLED  
SYSCALLS<sup>kernel</sup> ARE ACCESSED VIA:  
- SYSCALL NUMBER IN THE EAX REGISTER  
- CALLING INTERRUPT 0x80



## TRIVIA

THE ELF WAS FIRST SPECIFIED BY U.S. L. AND U.I. FOR UNIX SYSTEM V, IN 1989

THE ELF IS USED, AMONG OTHERS, IN:

- LINUX, ANDROID, \*BSD, SOLARIS, BEOS
- PSP, PLAYSTATION 2-4, DREAMCAST, GAMECUBE, WII
- VARIOUS OSES MADE BY SAMSUNG, ERICSSON, NOKIA,
- MICROCONTROLLERS FROM ATMEL, TEXAS INSTRUMENTS

THIS IS THE WHOLE FILE, HOWEVER, MOST ELF FILES CONTAIN MANY MORE ELEMENTS. EXPLANATIONS ARE SIMPLIFIED, FOR CONCISENESS.