

DISSECTED FILE

```
~$ uname -m
armv7l
~$ ./simple.ARM
Hello World!
```

HEXADECMAL DUMP	ASCII DUMP	FIELDS	VALUES	EXPLANATION
7F 45 4C 46 01 01 00 00 00 00 00 00 00 00 00 00	.ELF.....	e_ident	0x7F, "ELF"	CONSTANT SIGNATURE
02 00 28 00 01 00 00 00 60 00 00 00 40 00 00 00	..(.....@...	EI_CLASS, EI_DATA	1, 1	32 BITS, LITTLE-ENDIAN
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	EI_VERSION	1	ALWAYS 1
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	e_type	2	EXECUTABLE
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	e_machine	28	ARM PROCESSOR
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	e_version	1	ALWAYS 1
00 00 00 00 00 00 00 00 34 00 20 00 01 00 28 00	.....4.....	e_entry	0x8000060	3 ADDRESS WHERE EXECUTION STARTS
04 00 03 00	....	e_phoff	0x40	PROGRAM HEADERS' OFFSET
		e_shoff	0xB0	SECTION HEADERS' OFFSET
		e_ehsize	0x34	ELF HEADER'S SIZE
		e_phsize	0x20	SIZE OF A SINGLE PROGRAM HEADER
		e_phnum	1	COUNT OF PROGRAM HEADERS
		e_shsize	0x28	SIZE OF A SINGLE SECTION HEADER
		e_shnum	4	COUNT OF SECTION HEADERS
		e_shstrndx	3*	INDEX OF THE NAMES' SECTION IN THE TABLE

HEXADECMAL DUMP	ASCII DUMP	FIELDS	VALUES	EXPLANATION
01 00 00 00		p_type	1	THE SEGMENT SHOULD BE LOADED IN MEMORY
00 00 00 00		p_offset	0	OFFSET WHERE IT SHOULD BE READ
00 00 00 00		p_vaddr	0x80000000	VIRTUAL ADDRESS WHERE IT SHOULD BE LOADED
00 00 00 00		p_paddr	0x80000000	PHYSICAL ADDRESS WHERE IT SHOULD BE LOADED
00 00 00 00		p_filesz	0x90	SIZE ON FILE
00 00 00 00		p_memsz	0x90	SIZE IN MEMORY
00 00 00 00		p_flags	5	READABLE AND EXECUTABLE

HEXADECMAL DUMP	ASCII DUMP	ARM ASSEMBLY	EQUIVALENT C CODE
00 20 80 E3 14 10 8F		mov r2, #13	
00 00 00 EF 01 00 A0		add r1, pc, #20	
00 00 00 EF 01 00 A0		mov r0, #1	
00 00 00 EF 01 00 A0		mov r7, #4	
00 00 00 EF 01 00 A0		svc #0	write(STDOUT_FILENO, "Hello world!\n", len("Hello world!\n"));
00 00 00 EF 01 00 A0		mov r0, #1	
00 00 00 EF 01 00 A0		mov r7, #1	exit(1);
00 00 00 EF 01 00 A0		svc #0	

HEXADECMAL DUMP	ASCII DUMP	STRINGS
48 65 6C 6C 6F 20 57 6F 72 6C 64 21 0A 00	Hello.World!..	"Hello World!\n", 0

HEXADECMAL DUMP	ASCII DUMP	SECTION NAMES
00 2E 73 68 73 74 72 74 61 62 00 2E 74 65 78 74	..shstrtab..text	..shstrtab..text
00 2E 72 6F 64 61 74 61 00	..rodata.	..rodata.

HEXADECMAL DUMP	ASCII DUMP	SECTION HEADER TABLE
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		INDEX
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		NAME
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		TYPE
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		FLAGS
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		ADDRESS
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		OFFSET
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		SIZE

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

LOADING PROCESS

1 HEADER

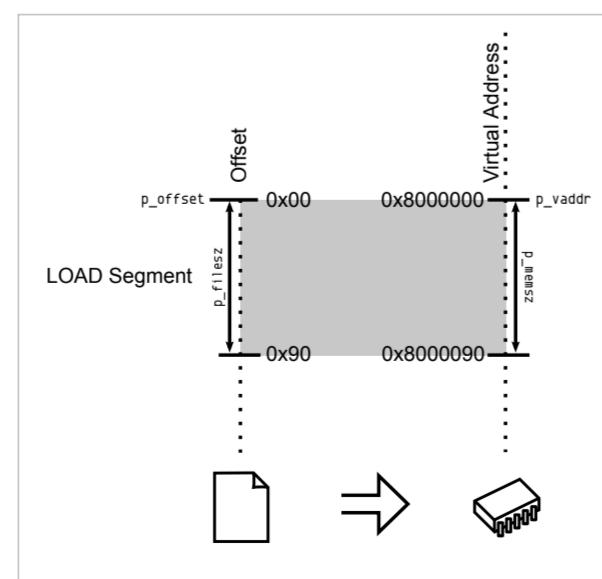
THE ELF HEADER IS PARSED
THE PROGRAM HEADER IS PARSED
(SECTIONS ARE NOT USED)

2 MAPPING

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

3 EXECUTION

ENTRY IS CALLED
SYSCALLS ARE ACCESSED VIA:
- SYSCALL NUMBER IN THE R7 REGISTER
- CALLING INSTRUCTION SVC



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