OS, ELF

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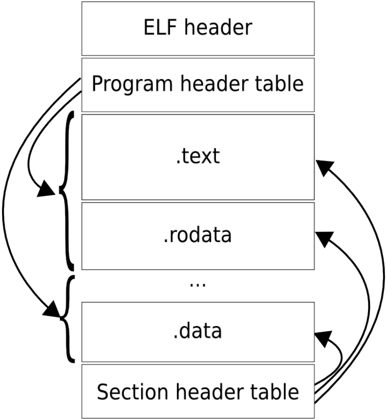
(static) Executlabe and Linkable Format (ELF)

ELF components

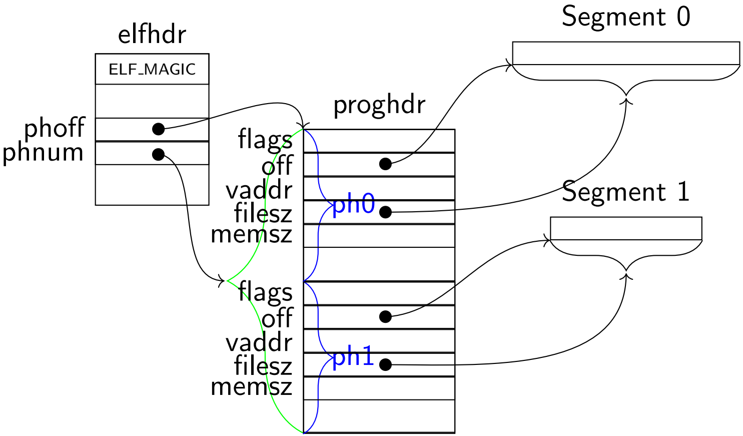
1. ELF header. Must begin at byte zero of the file.
2. PROGHDR vector.
3. Program segments.

ELF file, very abstract

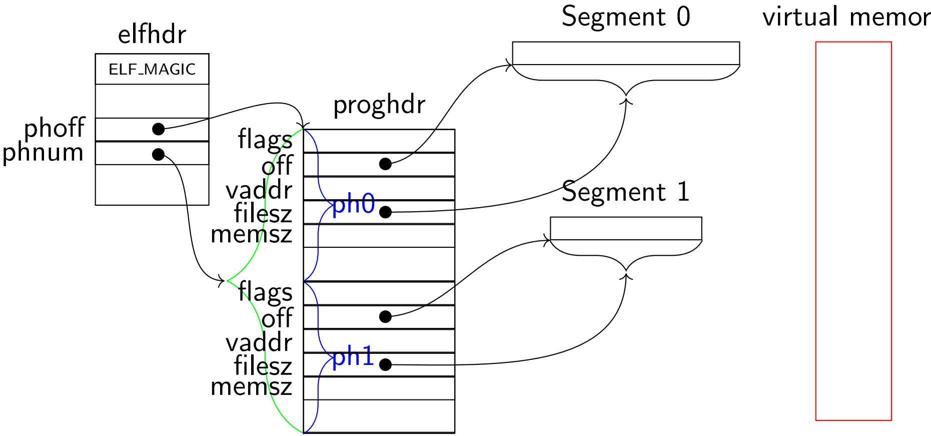


By Suruea - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=2922605

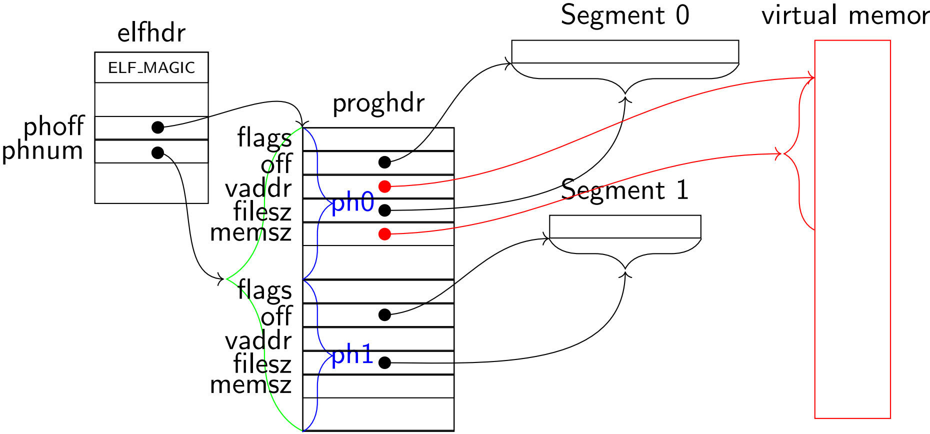
ELF, more detailed



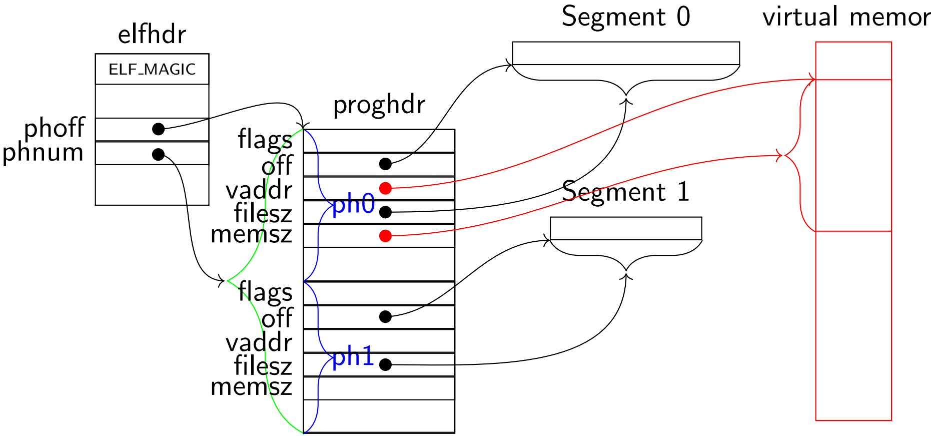
ELF, more detailed



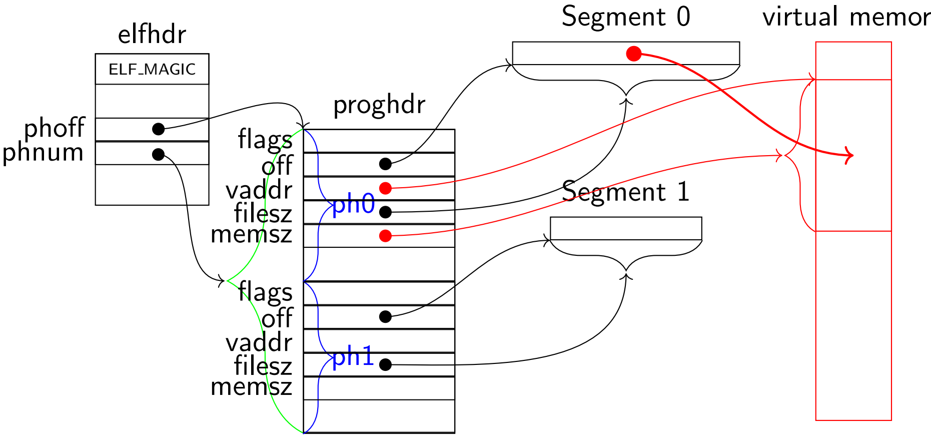
ELF, more detailed



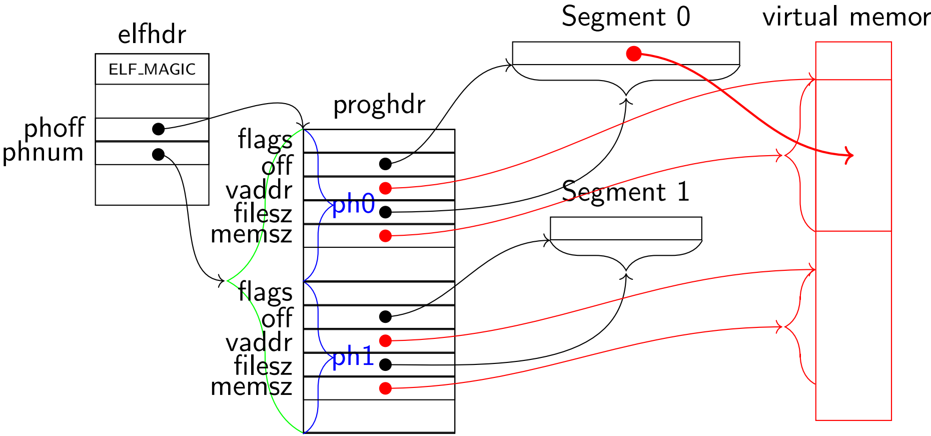
ELF, more detailed



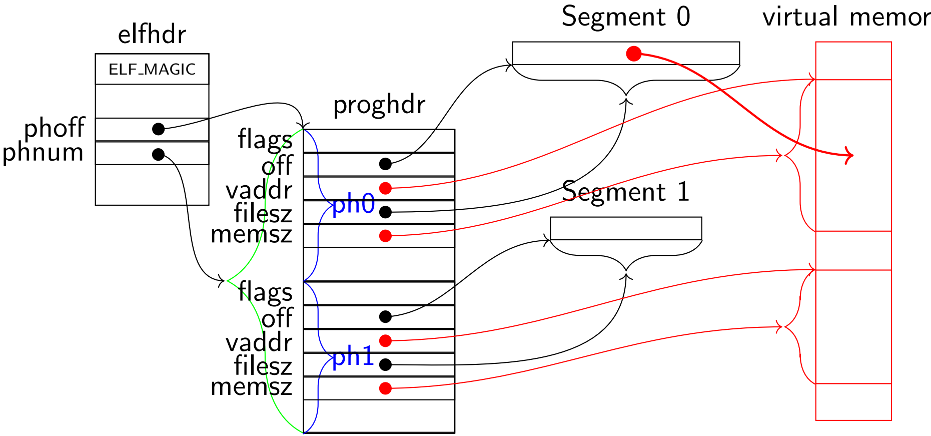
ELF, more detailed



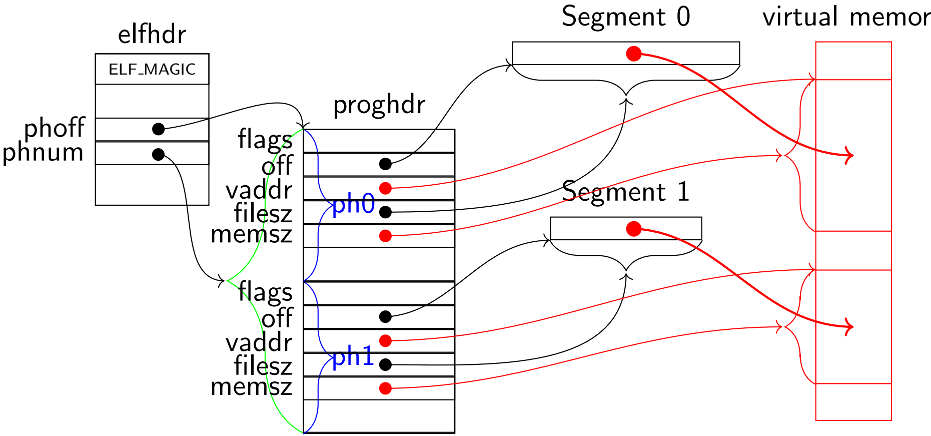
ELF, more detailed



ELF, more detailed



ELF, more detailed



ELFHDR

```
struct elfhdr {
  uint magic; // must equal ELF_MAGIC
  uchar elf[12];
  ushort type;
  ushort machine;
  uint version;
  uint entry;  // Entry point
  uint phoff;  // (File) Location of PROGHDR vectors
  uint shoff;
  uint flags;  // flag
  ushort ehsize;
  ushort phentsize;
  ushort phnum; // Length of PROGHDR vector
  ushort shentsize;
  ushort shnum;
  ushort shstrndx;
};
```

ELFHDR fields we are interested in

- **magic**: Should be ELF_MAGIC (0x464C457F).
- **entry**: Virtual address the program is starting at.
- **phoff**: File offset the Program segments Headers vector begins at.
- **phnum**: Number of elements in the Program segments Headers vector.

For each segment there is PROGHDR

```c
struct proghdr {
 uint type;   // Only PROG_LOAD matters to us
 uint off;    // Section location in file
 uint vaddr;  // Virtual address of section
 uint paddr;  // Physical address of section
 uint filesz;// Section size in file
 uint memsz;  // Section size in memory
 uint flags;
 uint align;
};
```