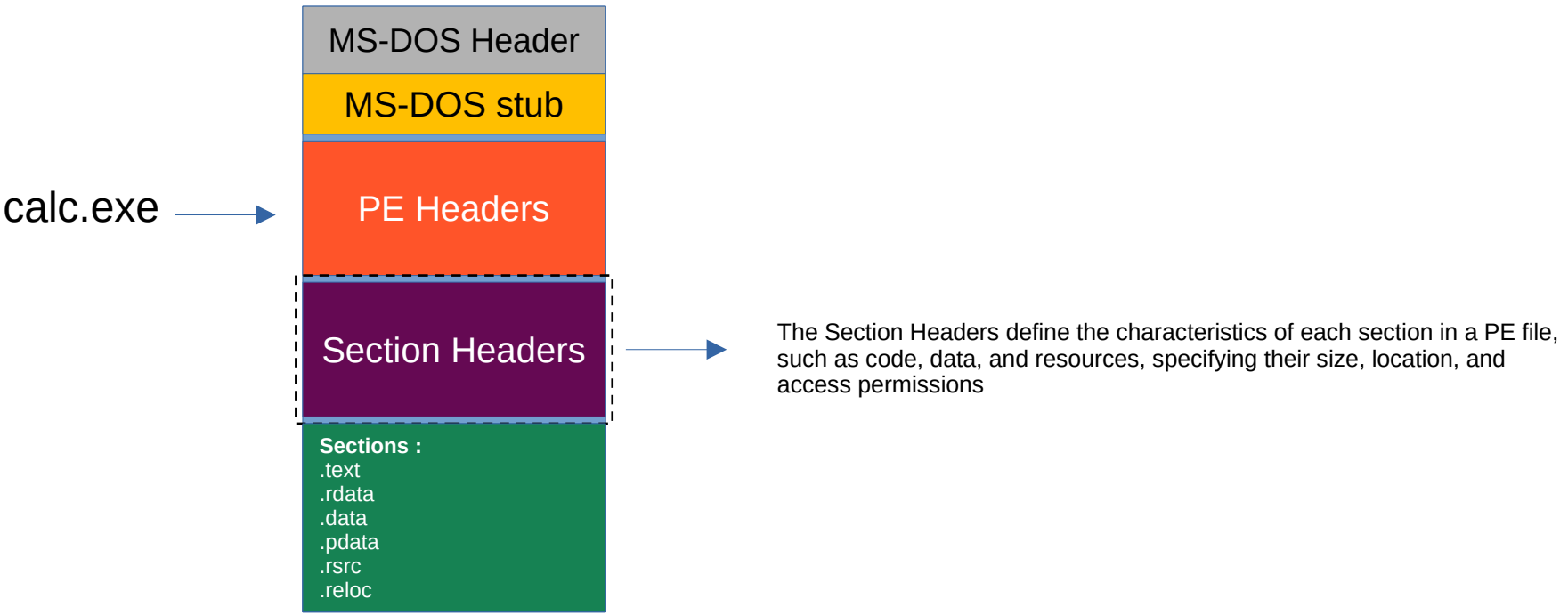
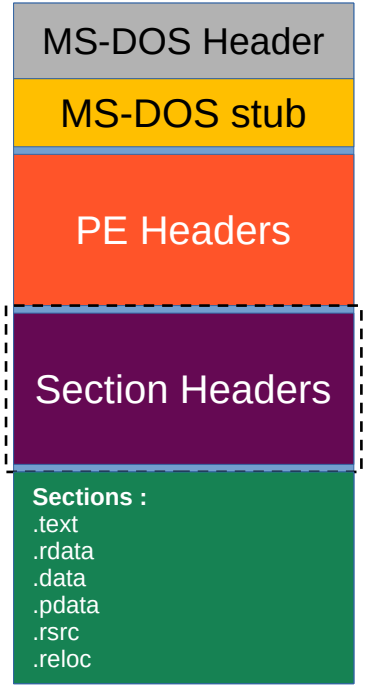
# PE file structure



# PE file structure

calc.exe



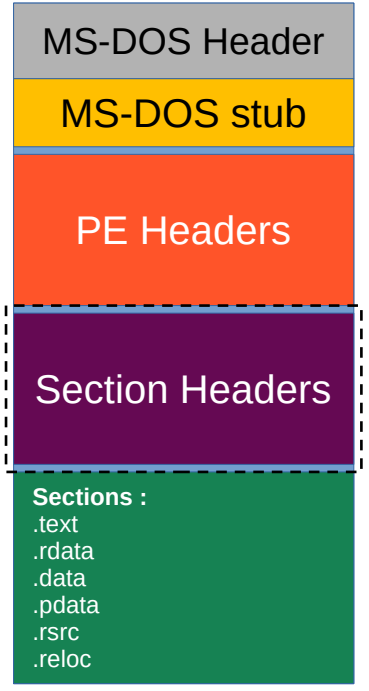

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2E | 74 | 65 | 78 | 74 | 00 | 00 | 00 | D0 | 0B | 00 | 00 | 00 | 10 | 00 | 00 |
| 00 | 0C | 00 | 00 | 00 | 04 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 00 | 00 | 00 | 00 | 20 | 00 | 00 | 60 | 2E | 72 | 64 | 61 | 74 | 61 | 00 | 00 |
| 76 | 0C | 00 | 00 | 00 | 20 | 00 | 00 | 00 | 0E | 00 | 00 | 00 | 10 | 00 | 00 |
| 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 40 | 00 | 00 | 40 |
| 2E | 64 | 61 | 74 | 61 | 00 | 00 | 00 | B8 | 06 | 00 | 00 | 00 | 30 | 00 | 00 |
| 00 | 02 | 00 | 00 | 00 | 1E | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 00 | 00 | 00 | 00 | 40 | 00 | 00 | C0 | 2E | 70 | 64 | 61 | 74 | 61 | 00 | 00 |
| F0 | 00 | 00 | 00 | 00 | 40 | 00 | 00 | 00 | 02 | 00 | 00 | 00 | 20 | 00 | 00 |
| 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 40 | 00 | 00 | 40 |
| 2E | 72 | 73 | 72 | 63 | 00 | 00 | 00 | 10 | 47 | 00 | 00 | 00 | 50 | 00 | 00 |
| 00 | 48 | 00 | 00 | 00 | 22 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 00 | 00 | 00 | 00 | 40 | 00 | 00 | 40 | 2E | 72 | 65 | 6C | 6F | 63 | 00 | 00 |
| 2C | 00 | 00 | 00 | 00 | A0 | 00 | 00 | 00 | 02 | 00 | 00 | 00 | 6A | 00 | 00 |
| 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 40 | 00 | 00 | 42 |

winnt.h

```
typedef struct _IMAGE_SECTION_HEADER
{
BYTE        Name[8];
 union
 { DWORD   PhysicalAddress;
   DWORD   VirtualSize;
 }                    Misc;
 DWORD     VirtualAddress;
 DWORD     SizeOfRawData;
 DWORD     PointerToRawData;
 DWORD     PointerToRelocations;
 DWORD     PointerToLinenumbers;
 WORD                 NumberOfRelocations;
 WORD                 NumberOfLinenumbers;
 DWORD     Characteristics;
} IMAGE_SECTION_HEADER
```

# PE file structure

calc.exe



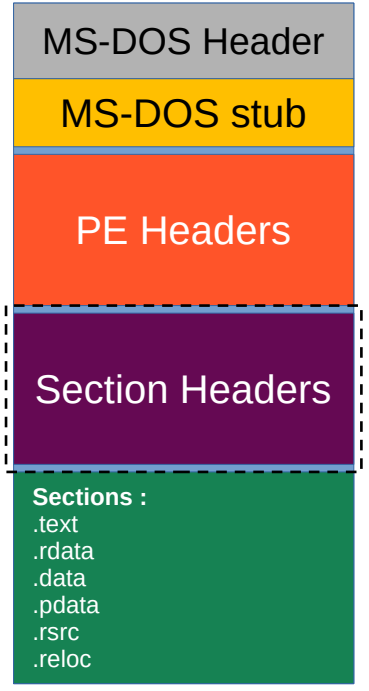

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .text | | | | D0 0B 00 00 | 00 10 00 00 | | | |
| 00 0C 00 00 | 00 04 00 00 | | | 00 00 00 00 | 00 00 00 00 | | | |
| 00 00 00 00 | 20 00 00 60 | .rdata | | | | | | |
| 76 0C 00 00 | 00 20 00 00 | 00 0E 00 00 | 00 10 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .data | | | | B8 06 00 00 | 00 30 00 00 | | | |
| 00 02 00 00 | 00 1E 00 00 | | | 00 00 00 00 | 00 00 00 00 | | | |
| 00 00 00 00 | 40 00 00 C0 | .pdata | | | | | | |
| F0 00 00 00 | 00 40 00 00 | 00 02 00 00 | 00 20 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .rsrc | | | | 10 47 00 00 | 00 50 00 00 | | | |
| 00 48 00 00 | 00 22 00 00 | | | 00 00 00 00 | 00 00 00 00 | | | |
| 00 00 00 00 | 40 00 00 40 | .reloc | | | | | | |
| 2C 00 00 00 | 00 A0 00 00 | 00 02 00 00 | 00 6A 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 42 | | | | | |

winnt.h

```
typedef struct _IMAGE_SECTION_HEADER
{
BYTE        Name[8];
 union
 { DWORD   PhysicalAddress;
   DWORD   VirtualSize;
 }                    Misc;
 DWORD     VirtualAddress;
 DWORD     SizeOfRawData;
 DWORD     PointerToRawData;
 DWORD     PointerToRelocations;
 DWORD     PointerToLinenumbers;
 WORD                 NumberOfRelocations;
 WORD                 NumberOfLinenumbers;
 DWORD     Characteristics;
} IMAGE_SECTION_HEADER
```

# PE file structure

calc.exe




| | | | |
|---|---|---|---|
| .text | | D0 0B 00 00 | 00 10 00 00 |
| 00 0C 00 00 | 00 04 00 00 | 00 00 00 00 | 00 00 00 00 |
| 00 00 00 00 | 20 00 00 60 | .rdata | |
| 76 0C 00 00 | 00 20 00 00 | 00 0E 00 00 | 00 10 00 00 |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 |
| .data | | B8 06 00 00 | 00 30 00 00 |
| 00 02 00 00 | 00 1E 00 00 | 00 00 00 00 | 00 00 00 00 |
| 00 00 00 00 | 40 00 00 C0 | .pdata | |
| F0 00 00 00 | 00 40 00 00 | 00 02 00 00 | 00 20 00 00 |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 |
| .rsrc | | 10 47 00 00 | 00 50 00 00 |
| 00 48 00 00 | 00 22 00 00 | 00 00 00 00 | 00 00 00 00 |
| 00 00 00 00 | 40 00 00 40 | .reloc | |
| 2C 00 00 00 | 00 A0 00 00 | 00 02 00 00 | 00 6A 00 00 |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 42 |

winnt.h

```
typedef struct _IMAGE_SECTION_HEADER
{
BYTE        Name[8];
 union
 { DWORD   PhysicalAddress;
   DWORD   VirtualSize;
 }                    Misc;
 DWORD     VirtualAddress;
 DWORD     SizeOfRawData;
 DWORD     PointerToRawData;
 DWORD     PointerToRelocations;
 DWORD     PointerToLinenumbers;
 WORD                 NumberOfRelocations;
 WORD                 NumberOfLinenumbers;
 DWORD     Characteristics;
} IMAGE_SECTION_HEADER
```

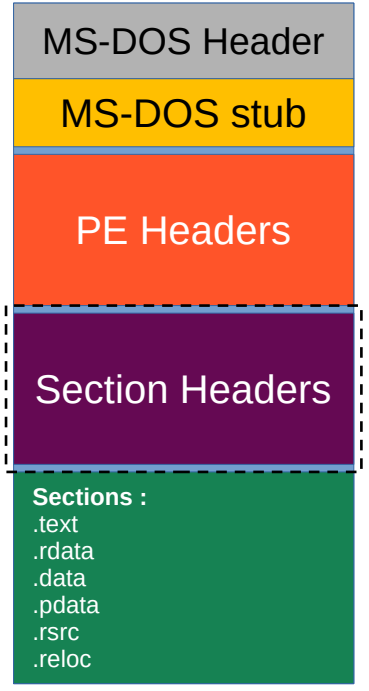
**Virtual Size**

This is the size of the section in memory when loaded.

It represents the actual size needed by the section at runtime.

# PE file structure

calc.exe




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .text | | | | D0 0B 00 00 | 00 10 00 00 | | | |
| 00 0C 00 00 | 00 04 00 00 | | | 00 00 00 00 | 00 00 00 00 | | | |
| 00 00 00 00 | 20 00 00 60 | .rdata | | | | | | |
| 76 0C 00 00 | 00 20 00 00 | 00 0E 00 00 | 00 10 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .data | | | | B8 06 00 00 | 00 30 00 00 | | | |
| 00 02 00 00 | 00 1E 00 00 | 00 00 00 00 | 00 00 00 00 | | | | | |
| 00 00 00 00 | 40 00 00 C0 | .pdata | | | | | | |
| F0 00 00 00 | 00 40 00 00 | 00 02 00 00 | 00 20 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .rsrc | | | | 10 47 00 00 | 00 50 00 00 | | | |
| 00 48 00 00 | 00 22 00 00 | 00 00 00 00 | 00 00 00 00 | | | | | |
| 00 00 00 00 | 40 00 00 40 | .reloc | | | | | | |
| 2C 00 00 00 | 00 A0 00 00 | 00 02 00 00 | 00 6A 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 42 | | | | | |

winnt.h

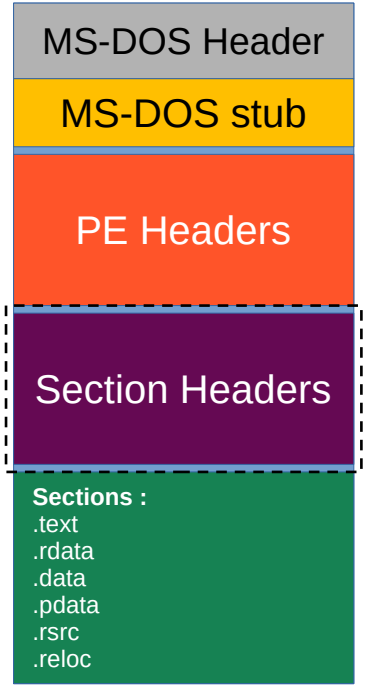
```
typedef struct _IMAGE_SECTION_HEADER
{
BYTE        Name[8];
 union
 { DWORD   PhysicalAddress;
   DWORD   VirtualSize;
 }                    Misc;
 DWORD     VirtualAddress;
 DWORD     SizeOfRawData;
 DWORD     PointerToRawData;
 DWORD     PointerToRelocations;
 DWORD     PointerToLinenumbers;
 WORD                 NumberOfRelocations;
 WORD                 NumberOfLinenumbers;
 DWORD     Characteristics;
} IMAGE_SECTION_HEADER
```

**Virtual Address**

This is the virtual address of the section in memory when loaded.

# PE file structure

calc.exe




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .text | | | | D0 0B 00 00 | 00 10 00 00 | | | |
| 00 0C 00 00 | 00 04 00 00 | | | 00 00 00 00 | 00 00 00 00 | | | |
| 00 00 00 00 | 20 00 00 60 | .rdata | | | | | | |
| 76 0C 00 00 | 00 20 00 00 | 00 0E 00 00 | 00 10 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .data | | | | B8 06 00 00 | 00 30 00 00 | | | |
| 00 02 00 00 | 00 1E 00 00 | 00 00 00 00 | 00 00 00 00 | | | | | |
| 00 00 00 00 | 40 00 00 C0 | .pdata | | | | | | |
| F0 00 00 00 | 00 40 00 00 | 00 02 00 00 | 00 20 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .rsrc | | | | 10 47 00 00 | 00 50 00 00 | | | |
| 00 48 00 00 | 00 22 00 00 | 00 00 00 00 | 00 00 00 00 | | | | | |
| 00 00 00 00 | 40 00 00 40 | .reloc | | | | | | |
| 2C 00 00 00 | 00 A0 00 00 | 00 02 00 00 | 00 6A 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 42 | | | | | |

winnt.h

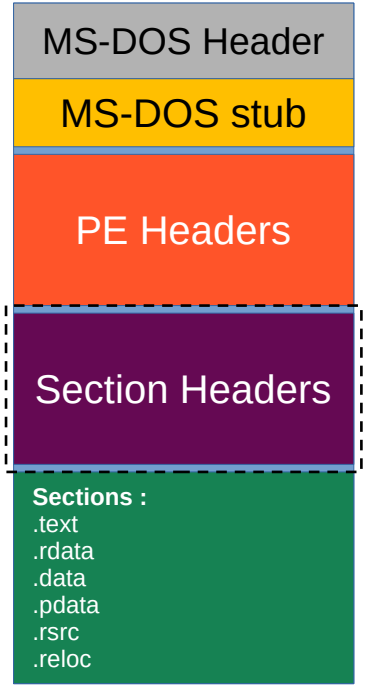
```
typedef struct _IMAGE_SECTION_HEADER
{
BYTE        Name[8];
 union
 { DWORD   PhysicalAddress;
   DWORD   VirtualSize;
 }                    Misc;
 DWORD     VirtualAddress;
 DWORD     SizeOfRawData;
 DWORD     PointerToRawData;
 DWORD     PointerToRelocations;
 DWORD     PointerToLinenumbers;
 WORD                 NumberOfRelocations;
 WORD                 NumberOfLinenumbers;
 DWORD     Characteristics;
} IMAGE_SECTION_HEADER
```

**Size of Raw Data**

This is the size of the section stored on disk.

# PE file structure

calc.exe




| | | | |
|---|---|---|---|
| .text | | D0 0B 00 00 | 00 10 00 00 |
| 00 0C 00 00 | 00 04 00 00 | 00 00 00 00 | 00 00 00 00 |
| 00 00 00 00 | 20 00 00 60 | .rdata | |
| 76 0C 00 00 | 00 20 00 00 | 00 0E 00 00 | 00 10 00 00 |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 |
| .data | | B8 06 00 00 | 00 30 00 00 |
| 00 02 00 00 | 00 1E 00 00 | 00 00 00 00 | 00 00 00 00 |
| 00 00 00 00 | 40 00 00 C0 | .pdata | |
| F0 00 00 00 | 00 40 00 00 | 00 02 00 00 | 00 20 00 00 |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 |
| .rsrc | | 10 47 00 00 | 00 50 00 00 |
| 00 48 00 00 | 00 22 00 00 | 00 00 00 00 | 00 00 00 00 |
| 00 00 00 00 | 40 00 00 40 | .reloc | |
| 2C 00 00 00 | 00 A0 00 00 | 00 02 00 00 | 00 6A 00 00 |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 42 |

winnt.h

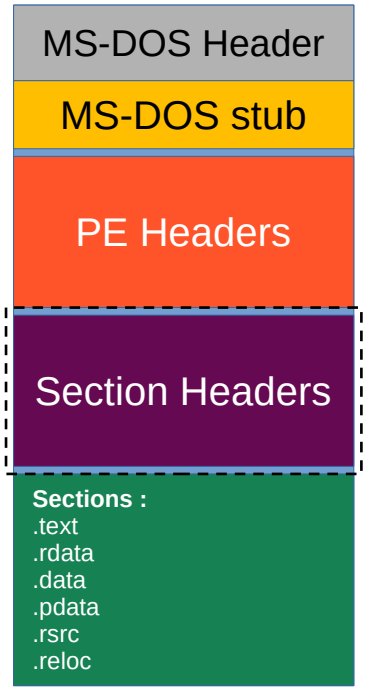
```
typedef struct _IMAGE_SECTION_HEADER
{
BYTE        Name[8];
 union
 { DWORD   PhysicalAddress;
   DWORD   VirtualSize;
 }                    Misc;
 DWORD     VirtualAddress;
 DWORD     SizeOfRawData;
 DWORD     PointerToRawData;
 DWORD     PointerToRelocations;
 DWORD     PointerToLinenumbers;
 WORD                 NumberOfRelocations;
 WORD                 NumberOfLinenumbers;
 DWORD     Characteristics;
} IMAGE_SECTION_HEADER
```

**Pointer to Raw Data**

This field tells you where the section's data starts in the file (on disk).

# PE file structure

calc.exe




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .text | | | | D0 0B 00 00 | 00 10 00 00 | | | |
| 00 0C 00 00 | 00 04 00 00 | 00 00 00 00 | 00 00 00 00 | | | | | |
| 00 00 00 00 | 20 00 00 60 | .rdata | | | | | | |
| 76 0C 00 00 | 00 20 00 00 | 00 0E 00 00 | 00 10 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .data | | | | B8 06 00 00 | 00 30 00 00 | | | |
| 00 02 00 00 | 00 1E 00 00 | 00 00 00 00 | 00 00 00 00 | | | | | |
| 00 00 00 00 | 40 00 00 C0 | .pdata | | | | | | |
| F0 00 00 00 | 00 40 00 00 | 00 02 00 00 | 00 20 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 40 | | | | | |
| .rsrc | | | | 10 47 00 00 | 00 50 00 00 | | | |
| 00 48 00 00 | 00 22 00 00 | 00 00 00 00 | 00 00 00 00 | | | | | |
| 00 00 00 00 | 40 00 00 40 | .reloc | | | | | | |
| 2C 00 00 00 | 00 A0 00 00 | 00 02 00 00 | 00 6A 00 00 | | | | | |
| 00 00 00 00 | 00 00 00 00 | 00 00 00 00 | 40 00 00 42 | | | | | |

winnt.h

```
typedef struct _IMAGE_SECTION_HEADER
{
BYTE        Name[8];
 union
 { DWORD   PhysicalAddress;
   DWORD   VirtualSize;
 }                    Misc;
 DWORD     VirtualAddress;
 DWORD     SizeOfRawData;
 DWORD     PointerToRawData;
 DWORD     PointerToRelocations;
 DWORD     PointerToLinenumbers;
 WORD                 NumberOfRelocations;
 WORD                 NumberOfLinenumbers;
 DWORD     Characteristics;
} IMAGE_SECTION_HEADER
```

The **Characteristics field** in the PE section header is a set of flags that describe the attributes of a section. These flags indicate whether the section contains code , data , uninitialized data, or special properties like write protection or execution permissions.

| | |
|---|---|
| 0x00000020 | Section contains executable code. |
| 0x00000040 | Section contains initialized data. |
| 0x00000080 | Section contains uninitialized data |
| 0x20000000 | Section can be executed |
| 0x40000000 | Section can be read. |
| 0x80000000 | Section can be written to. |
| 0x02000000 | Section can be discarded after loading. |
| 0x10000000 | Section can be shared between processes. |
| 0x04000000 | Section cannot be cached in memory. |