

32-bit Data Types Integral data type

```
#include <Types.h>
```

| | | |
|----------------------|--------------------|---------------------------------------|
| long | signed long word | range: -1,247,483,648...1,247,483,647 |
| unsigned long | unsigned long word | range: 0...4,294,967,295 |
| Size | unsigned long word | range: 0...4,294,967,295 |

| | | |
|---------------|-------------------------------------|---|
| OSType | unsigned long word | range: 0...4,294,967,295. File creator, |
| OsType | | file type. Usually four text chars such as... |
| | | 'TEXT' or 'Guid' or 'WDBF' etc. |
| | typedef OSType * OSTypePtr ; | |

| | |
|----------------|---|
| ResType | Also 4 chars. See Standard Resource Types |
| | typedef ResType * ResTypePtr ; |

| | | |
|--------------|-----------------------------------|------------------------------|
| Fixed | signed long word | range: -32768 ... 32767.xxxx |
| | | xxxx is 1-(1/65536) |
| | typedef Fixed * FixedPtr ; | |

| | | |
|--------------|-----------------------------------|--------------------------|
| Fract | signed long word | range: -2 ... 1.yyyy |
| | | yyyy is 1-(1/1247483647) |
| | typedef Fract * FractPtr ; | |

| | | |
|--------------|----------------|--------------------------|
| float | floating-point | range: library-dependent |
|--------------|----------------|--------------------------|

Notes: As a "Little Endian", the 68xxx CPU represents numbers in memory with the high-order bytes lowest in memory (contrasted to "Big Endians," such as the 80x86 which keeps the lowest-order byte of all data types at the lowest address). Take care to avoid reading 16-bit or 32-bit data which starts at an odd address; see [16-Bit Data Types](#) for details.

The Size data type is used only in [Memory Manager](#) functions relating to [Zone](#) manipulation.

OSType and ResType values are used in [File Manager](#) and [Resource Manager](#) calls respectively. The convention for these data types is to use 4-byte constants containing readable parts of the [ASCII](#) character set. For displaying the value of one of these types, treat it as a 4-character string (lowest byte in memory is the first character, etc.):

```
OSType theFileType;                                /* assume we got via GetFInfo */
Byte      *bp = (Byte *)&theFileType;

printf( "The file type is '%c%c%c%c'\n", bp[0], bp[1], bp[2], bp[3]);
```

| |
|-------------------------|
| Fractional Types |
|-------------------------|

Fixed data types are used in calls to [FontMetrics](#) , [SpaceExtra](#), [SlopeFromAngle](#) and [AngleFromSlope](#) (along with the variety of math operations and conversions provided in the [Toolbox Utilities](#)).

A Fixed value has an implied 'binary point' between bit 16 and bit 15. The high-order word is the (signed) integer portion and the low-order word is the fractional portion. For instance, (Fixed)0x00010001 equates to 1 and 1/65536th (ie, approximately 1.000015258789).

The Fract data type is supported by the 128K ROMs. It allows very accurate representation of numbers between -2 and 2 (errors no worse than 1 part in one billion). Only the math and conversion functions of Toolbox Utilities use this data type directly, but it is handy in high-resolution graphics work (especially typesetting).

A Fract value has an implied 'binary point' between bits 30 and 29. Bit 31 is the sign bit, bit 30 is the one's place, and bits 29 through 0 constitute the fractional part. For instance, (Fract)0x40000001 equates to 1 and 1/1073741824.

The float data type is 32-bits long. Its implementation is compiler- and library-dependent.