NAME

units − decimal and binary prefixes

DESCRIPTION

Decimal prefixes

The SI system of units uses prefixes that indicate powers of ten. A kilometer is 1000 meter, and a megawatt is 1000000 watt. Below the standard prefixes.

Prefix	Name	Value
q	quecto	10^−30 = 0.000000000000000000000000000001
r	ronto	10^−27 = 0.000000000000000000000000001
y	yocto	10^−24 = 0.000000000000000000000001
z	zepto	10^−21 = 0.000000000000000000001
a	atto	10^−18 = 0.000000000000000001
f	femto	10^−15 = 0.000000000000001
p	pico	10^−12 = 0.000000000001
n	nano	10^−9 = 0.000000001
µ	micro	10^−6 = 0.000001
m	milli	10^−3 = 0.001
c	centi	10^−2 = 0.01
d	deci	10^−1 = 0.1
da	deka	10^ 1 = 10
h	hecto	10^ 2 = 100
k	kilo	10^ 3 = 1000
M	mega	10^ 6 = 1000000
G	giga	10^ 9 = 1000000000
T	tera	10^12 = 1000000000000
P	peta	10^15 = 1000000000000000
E	exa	10^18 = 1000000000000000000
Z	zetta	10^21 = 1000000000000000000000
Y	yotta	10^24 = 1000000000000000000000000
R	ronna	10^27 = 1000000000000000000000000000
Q	quetta	10^30 = 1000000000000000000000000000000

The symbol for micro is the Greek letter mu, often written u in an ASCII context where this Greek letter is not available.

Binary prefixes

The binary prefixes resemble the decimal ones, but have an additional 'i' (and "Ki" starts with a capital 'K'). The names are formed by taking the first syllable of the names of the decimal prefix with roughly the same size, followed by "bi" for "binary".

Prefix	Name	Value
Ki	kibi	2^10 = 1024
Mi	mebi	2^20 = 1048576
Gi	gibi	2^30 = 1073741824
Ti	tebi	2^40 = 1099511627776
Pi	pebi	2^50 = 1125899906842624
Ei	exbi	2^60 = 1152921504606846976
Zi	zebi	2^70 = 1180591620717411303424
Yi	yobi	2^80 = 1208925819614629174706176

Discussion

Before these binary prefixes were introduced, it was fairly common to use k=1000 and K=1024, just like b=bit, B=byte. Unfortunately, the M is capital already, and cannot be capitalized to indicate binary-ness.

At first that didn’t matter too much, since memory modules and disks came in sizes that were powers of two, so everyone knew that in such contexts "kilobyte" and "megabyte" meant 1024 and 1048576 bytes, respectively. What originally was a sloppy use of the prefixes "kilo" and "mega" started to become regarded

as the "real true meaning" when computers were involved. But then disk technology changed, and disk sizes became arbitrary numbers. After a period of uncertainty all disk manufacturers settled on the standard, namely k=1000, M=1000 k, G=1000 M.

The situation was messy: in the 14k4 modems, k=1000; in the 1.44 MB diskettes, M=1024000; and so on. In 1998 the IEC approved the standard that defines the binary prefixes given above, enabling people to be precise and unambiguous.

Thus, today, MB = 1000000 B and MiB = 1048576 B.

In the free software world programs are slowly being changed to conform. When the Linux kernel boots and says

```
hda: 120064896 sectors (61473 MB) w/2048KiB Cache
```

the MB are megabytes and the KiB are kibibytes.

SEE ALSO

The International System of Units ⟨https://www.bipm.org/documents/20126/41483022/SI−Brochure−9.pdf⟩.