Subject: 32-bit Unsigned Integers, Was: Unsigned Integers - How?
Posted by davidf on Sat, 08 Feb 1997 08:00:00 GMT
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Peter Berdeklis <peter@atmosp.physics.utoronto.ca> carries on this discussion about 16-bit unsigned integers when he writes:

> Unfortunately, I'm not reading 16-bit integers but 32-bit integers.
> Sorry I forgot to mention that. So how would I pull the same trick
> with 32-bit integers?

Somehow, Peter, I just *knew* you didn't have 16-bit integers! :-)

Alright, I know how to answer part of this question. Perhaps we can get some help with the rest.

Suppose you have 100 32-bit *unsigned* integers in a data file. Read them into IDL long *signed* integers. Like this:

```
data = LONARR(100)
READU, lun, datafile, data
```

First of all, if your data values are all less than 2L^31-1 or 2147483647 you are home free, don't worry about a thing. If your data has values greater than that, things get a little dicey. (Note that MAX(data) won't help much here because values of 2L^31 and higher will show as *negative* values. You basically will have to know this some other way.)

Now, here is where I start to get unsure of myself. I know how to turn *one* unsigned 32-bit integer into its real value. You use the BYTE function to individually read the four bytes of information in the 32-bit integer and you reconstruct those bytes into a DOUBLE-PRECISION value. The code looks like this:

```
number = data(0)
factor = 256.0D
realNumber = BYTE(number, 0)*factor^3 + BYTE(number,1)*factor^2 +$
  BYTE(number,2)*factor^1 + BYTE(number,3)*factor^0
```

This is for a big endian machine, like most UNIX machines. If you are on a little endian machine (like a PC), you will have to reverse the order in which the real number is constructed. Your code will look like this:

```
number = data(0)
factor = 256.0D
```

```
  realNumber = BYTE(number, 0)*factor^0 + BYTE(number,1)*factor^1 +$
    BYTE(number,2)*factor^2 + BYTE(number,3)*factor^3
```

What I don't know how to do (perhaps Bill Thompson or Mitchell Grunes
can help us here), is how to do this for the whole array at once in
an "array" type way. I certainly know how to write a loop! :-)

```
  realNumbers = DBLARR(N_ELEMENTS(data))
  factor = 256.0D
  FOR j=0, N_ELMENTS(data)-1 DO BEGIN
     realNumbers(j) = BYTE(data(j), 0)*factor^0 + BYTE(data(j),1)*factor^1 +$
     BYTE(data(j),2)*factor^2 + BYTE(data(j),3)*factor^3
  ENDFOR
```

Perhaps that will get us started.

> By the way David, I just looked up your Web page. Thanks for the tips.
> Since you worked at RSI, do you know why IDL doesn't have an
> unsigned data type?

No, I don't know why. Perhaps they believe idle minds are the
devil's workshop. :-)

Goin' dancin'. See you later...

David

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