
Subject: Decomposing a bit field?

Posted by [rjp23](#) on Wed, 21 Jul 2010 09:40:02 GMT

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Hi all,

I have some data that is contained within a 32-bit field.

I'm using some code from a colleague which seems to almost do what I want but not quite.

An example of one of the data values is 15982561

The following code takes this and creates an array of 1s and 0s for whether each bit is set or not.

```
test=intarr(32)
for i=0, 31 do begin test[i]=(ISHFT((15982561),-i) AND 1B)
```

However, for example bits 1-4 need to be combined (and contain data from 0-15). As I don't quite understand what the code above is doing I'm not sure how to (or if it can be) modified to not just operate on the individual bits but on groups of bits.

What I need to extract is the information in the following form:

Bit 0: 0 or 1
Bits 1-4: 0-15
Bit 5: 0 or 1
Bits 6-8: 0-8
etc

Thanks in advance

Subject: Re: Decomposing a bit field?

Posted by [Steve\[5\]](#) on Wed, 21 Jul 2010 10:29:14 GMT

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Rob wrote:

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ISHFT - moves bits right or left so that the bits you want are at the end of the value. AND selects the bits that you want.

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bit0= ishft(15982561,0) and 1B

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bits1to4 = ishft(15982561,-1) and 17B

> Bit 5: 0 or 1

bit5 = ishft(15982561,-5) and 1B

> Bits 6-8: 0-8

bits6to8 = ishft(15982561,-6) and 7B

> etc

>

> Thanks in advance

Subject: Re: Decomposing a bit field?

Posted by [greg.addr](#) on Wed, 21 Jul 2010 10:31:27 GMT

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On 21 Jul., 11:40, Rob <rj...@le.ac.uk> wrote:

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>

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> etc
>
> Thanks in advance

The code you have is progressively shifting the bits to the right (i.e. dividing by 2^i) and copying the resulting least significant bit into the test array. You can achieve what you want with something like this:

```
IDL> a=15982561
IDL> print,(a and ishft(1,indgen(32))) gt 0 ;decomposition like yours
(least significant on the left)
 1 0 0 0 0 1 1 1 1 1 1 1 1 0 1 1 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

IDL> bit=[0,1,5,6] ;start bit for each group
IDL> n_bits=[1,4,1,3] ;no. of bits in each
IDL> print,2^n_bits-1 ;max values for each group
 1 15 1 7
IDL> print,2^n_bits-1 and ishft(a,-bit) ;the result
 1 0 1 7
```

regards,
Greg

Subject: Re: Decomposing a bit field?
Posted by [Chris\[6\]](#) on Wed, 21 Jul 2010 10:33:09 GMT
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On Jul 20, 11:40 pm, Rob <ry...@le.ac.uk> wrote:
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> etc
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> Thanks in advance

The code you attached creates an array whose ith element is 1 if the
ith bit (i.e. the 2^i component) is 1 -- confirm with an easy number
like 5 (101 in binary). So the easiest way to combine bits 1-4 would
be something like
answer = total([1, 2, 4, 8] * test[1:4])
or, more mysteriously,
answer = ishft(number, -1) and 15B

chris

Subject: Re: Decomposing a bit field?
Posted by [rjp23](#) on Wed, 21 Jul 2010 11:25:52 GMT
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On Jul 21, 11:29 am, Steve <[f...@k.e](#)> wrote:

> Rob wrote:
>> for i=0, 31 do begin test[i]=(ISHFT((15982561),-i) AND 1B)
>
>> However, for example bits 1-4 need to be combined (and contain data
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>> Bits 6-8: 0-8
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> bits6to8 = ishft(15982561,-6) and 7B
>
>> etc
>
>> Thanks in advance
>
>

Thanks everyone, that makes much more sense now.

I just wanted to confirm where the 7B comes from above.

I assume it's because I'm checking 3 bits so it's 1+2+4. If I had a group of 4 bits it's be 1+2+4+8 (15 like in Chris's example below), right?

Subject: Re: Decomposing a bit field?
Posted by [Steve\[5\]](#) on Wed, 21 Jul 2010 16:04:02 GMT
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The "B" suffix to a number tells IDL that it is to be interpreted in octal so indeed 17B is $8+4+2+1=15$ in decimal

Subject: Re: Decomposing a bit field?

Posted by [David Fanning](#) on Wed, 21 Jul 2010 16:09:11 GMT

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Steve writes:

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> octal so indeed 17B is $8+4+2+1=15$ in decimal

Well, not exactly. :-)

Octal numbers (octal numbers!?) are typically written with a double quote in front of them:

```
IDL> number = "17  
IDL> print, number  
15
```

Cheers,

David

--

David Fanning, Ph.D.

Fanning Software Consulting, Inc.

Coyote's Guide to IDL Programming: <http://www.dfanning.com/>

Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Subject: Re: Decomposing a bit field?

Posted by [penteado](#) on Wed, 21 Jul 2010 16:21:20 GMT

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On Jul 21, 1:04 pm, Steve <f...@k.e> wrote:

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No, B means that it is of type byte, regardless of the base used.

Subject: Re: Decomposing a bit field?

Posted by [Chris\[6\]](#) on Wed, 21 Jul 2010 22:41:04 GMT

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On Jul 21, 1:25 am, Rob <rj...@le.ac.uk> wrote:

> On Jul 21, 11:29 am, Steve <f...@k.e> wrote:

>

>

>

>> Rob wrote:

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> group of 4 bits it's be 1+2+4+8 (15 like in Chris's example below),
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right- 7 is (000000....111) in binary. So if you take "x and 7" it
will set all but the last three bits to zero. So it throws away all
the leading bits, and returns the last 3 bits as some number (0-7)

15 (0000.....1111) does the same thing, but with 4 bits instead of 3.
chris
