Binary logic

I have some comments for Bert Erickson's Design Idea "Program provides integer-to-binary conversion" (*EDN*, March 2, 1998, pg 110).

First, the basis of all computers and processors used today is binary logic; these devices store and process everything as binary data. Other representations, such as integer, are for convenience. Once you know how the underlying structure operates, then this program is redundant. Why do you need to convert "binary" to "binary"?

Assuming that you *need* to do this conversion, the method provided is inefficient. A compiler stores the integer as 32 bit words. So, you just need to strip each bit by bit and assign it to the array c[ ]. The code snippet follows:

```
unsigned long cintbin_BETTER( unsigned long int x )
{
//  Assume 32 bit integer - we dont need size here
    unsigned long int z = x;

//    for( int i=0; i<n+1; i++ )  // Init NOT required as we
//        c[i] = 0;               // plan to fill up all locations
    for( int i=0; i<32; i++ ) {
          c[i] = (x & 0x00000001); // get lsb, assign to c[i]
          x = x >> 1;              // right shift input by 1 bit
    }
    return z;
}
```

Before writing code, it would be better to remember that you are using a compiler and running the code on a machine that uses binary logic.

The above code runs more than 20 times faster than the one published (I was using an Ultra 2). If you use a processor with no floating-point unit, it would run 200 times faster!

C also provides all the required bitwise operators to write efficient programs without having to do this conversion.

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Design Ideas ideas

Your Design Ideas always contain valuable information, but I would like to add some words of caution to two of your recent contributions: "Fax saver cuts wear, tear, and power" (*EDN*, Jan 1, 1998, pg 102) and "DC/DC converter operates from phone line" (*EDN*, Jan 15, 1998, pg 95).

Both circuits are designed to connect to the telephone network. As such, they are subject to registration under FCC Part 68. Connecting the circuits prior to registration is a violation of FCC rules. Readers should be cautioned about the regulatory requirements.

Technically, the circuit in the fax-saver Design Idea should be capable of meeting the FCC's rules, as long as it doesn't draw excessive dc on-hook current. However, the circuit in the dc/dc-converter Design Idea is unlikely to meet Part 68 registration rules. When the telephone is on-hook (quiescent), the resistance presented to the network must be greater than 5 MΩ to 100V. This fact translates into a permissible current draw of 10 μA at 48V, limiting output current (assuming 70% efficiency) to 67 μA at 5V. In the off-hook (loop) state, more current is available, but it is delivered at a voltage reduced from 48V by a

local loop resistance as high as 1800Ω. FCC rules prohibit drawing substantial loop current (going off-hook) for anything other than placing a call or programming a telephone.

The kernels of genius in these application ideas are welcome, but in some cases should be labeled "Don't try this at home."

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Regarding the algorithm in the Design Idea "Algorithm extracts cube root" (*EDN*, Jan 15, 1998, pg 100), I think the math is flawed.

As the derivative of r^3 is $3r^2$, the approximate formula should be:

$$r\_next=r+(num-r^3)/3r^2,$$

(similar to the equation used for square-root approximation, right?), which gives

$$(num+2r^3)/3r^2$$

and *not*

$$r\_next=(num+r^3)/2r^2,$$

as in the code. The latter works but converges less quickly, I think.

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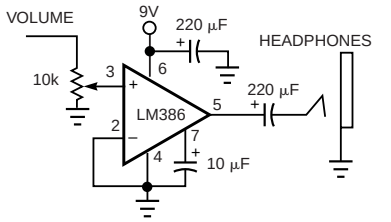
Author's note: The gentleman is correct. His changes do make the routine converge more quickly. However, with enough iterations, both versions will calculate the answer to the same accuracy.

RIP

Several readers have informed *EDN* that the LM389 in the Design Idea "Metal detector uses single IC" (*EDN*, Dec 18, 1997, pg 94) has become obsolete and is no longer available. The authors propose using an LM386, connected as shown in **Figure 1**.

FIGURE 1



Corrections and updates

In "IrDA controller simplifies interfacing, protocol issues" (*EDN*, Dec 4, 1997, pg 22), the price for the TSLM1100 is incorrect. The correct price is $5.55 (1000). Also, in "SmartMedia density, connectivity options expand" (*EDN*, April 9, 1998, pg 18), the price for the 16-Mbyte, two-chip SmartMedia device is incorrect. The correct price is $48 (50,000). We apologize for the errors.

Sound off

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