To solve these limitations, we can add a debugging instrument that **dumps** strategic information into an array at run time. We can then observe the contents of the array at a later time. One of the advantages of dumping is that the JTAG debugger allows you to visualize memory even when the program is running. So this technique will be quite useful in systems with a JTAG debugger. Assume **happy** and **sad** are strategic 8-bit variables. The first step when instrumenting a dump is to define a buffer in RAM to save the debugging measurements.

```
#define SIZE 20
unsigned char HappyBuf[SIZE];
unsigned char SadBuf[SIZE];
unsigned long Cnt;
```

The **Cnt** will be used to index into the buffers. **Cnt** must be initialized to zero, before the debugging begins. The debugging instrument, shown in Program 9.7, dumps the strategic variables into the buffers. When writing debugging instruments it is good style to preserve all registers. The function **Save** is a minimally intrusive debugging dump.

```
void Save(void){
  if(Cnt < SIZE){  // make sure there is room
    HappyBuf[Cnt] = happy; // record happy
    SadBuf[Cnt] = sad;     // record sad
    Cnt++;
  }
}
```

Program 9.7. Instrumentation dump.

Next, you add calls to **Save()** at strategic places within the system. You can either use the debugger to display the results, or add software that prints the results after the program has run and stopped.

One problem with dumps is that they can generate a tremendous amount of information. If you suspect a certain situation is causing the error, you can add a **filter** to the instrument. A filter is a software/hardware condition that must be true in order to place data into the array. In this situation, if we suspect the error occurs when another variable gets large, we could add a filter that saves in the array only when the variable is above a certain value. In the example shown in Program 9.8, the instrument dumps only when **sad** is greater than 100.

```
void Save(void){
  if(sad > 100){     // conditional debug; dump only if sad>100
    if(Cnt < SIZE){  // make sure there is room
      HappyBuf[Cnt] = happy; // dump strategic data
      SadBuf[Cnt] = sad;
      Cnt++;
    }
  }
}
```

Program 9.8. Instrumentation dump with filter.

About (https://www.edx.org/about-us) Jobs (https://www.edx.org/jobs)
Press (https://www.edx.org/press) FAQ (https://www.edx.org/student-faq)
Contact (https://www.edx.org/contact)

Help

EdX is a non-profit created by founding partners Harvard and MIT whose mission is to bring the best of higher education to students of all ages anywhere in the world, wherever there is Internet access. EdX's free online MOOCs are interactive and subjects include computer science, public health, and artificial intelligence.

(http://www.meetup.com/edX-Global-Community/)

(http://www.facebook.com/EdxOnline)

(https://twitter.com/edXOnline)

(https://plus.google.com/108235383044095082735/posts)

(http://youtube.com/user/edxonline)

© 2014 edX, some rights reserved.

Terms of Service and Honor Code -
Privacy Policy (https://www.edx.org/edx-privacy-policy)