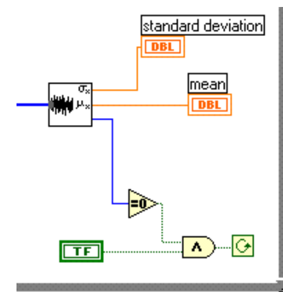
PHY 406 - Microprocessor Interfacing Techniques
LabVIEW Tutorial - Part VI
Error Handling

Handling Errors

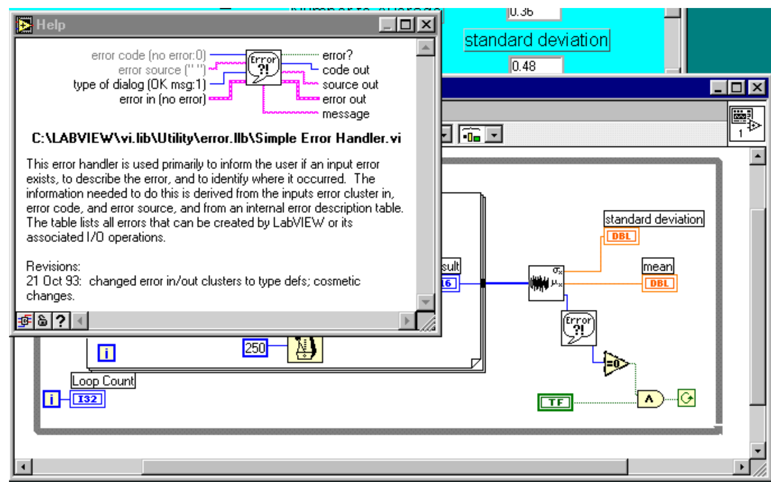
Before I show you how to connect an error message handler into the system it is important to realise that an error handler has to do something with the error or it will happen again. In this case if we find an error (array dimension <1) then unless we either increase the array dimension or abort the program, it will immediately happen again, and again, and again..... It is therefore important to always think about what to do about an error as well as report it. In addition if we are going to stop the program, we must ensure that the error is reported before the program is stopped - ie the data flow must be through the error handler.

The standard deviation box has an error output for exactly this purpose. It is an integer whose value is 0 in normal operation and non-zero if there is an error. A simple error handler therefore would stop the program if the error output was non-zero. Or phrased another way: The program continues if the run switch is on (true) and the error output is zero. The logic looks like this:



This will certainly stop the VI if the error output becomes non-zero, but it won't tell you why it's stopping! What we need is an indicator to tell us what the error is. If you actually put an indicator on the line it will indicate a number (-20003 to be precise) but that still doesn't tell me what the error is. I need that error to be interpreted in plain Canadian. This is the job of the (simple) error handler. Find that on **functions>>Time & Dialog** (bottom left corner) and place it on the diagram.

This function is quite complex as you can see from the help screen (**Ctrl-H** remember!). The only two leads you need at the moment are the "error code" input and the "code out". Remember what I said about dataflow. The error handler must be traversed before the VI si stopped. We therefore wire the error output of the standard deviation analysis to the input and the output to the comparator and abort logic. This ensures the proper dataflow.



Now when you run the VI, try using 0 as the number of elements to average and see what happens. You should get a nice error box which tells you that "Error -20003 has occured at an unknown location and the probable cause is that the number of samples for analysis is less than one.

A final piece of customisation is to add a text string to tell the system where the error occurred - the error source. After all, in a real VI there might be a number of places that this error could occur and you would like to know which one it really is. You can resolve this by adding a "string" constant for the error source. String constants are exactly what they seem you can find them under **functions>>string>>string constant** or you can use the wiring tool and the pop-up menu to create a string constant input - you'll need a steady hand for that, things are getting tight in that area! In both cases add an appropriate string to explain wher the error is coming from and the box will reflect that text. Notice the new colour for the string wiring.

Summary

- The action taken after an error should make sure that the system does not loop on the error - appropriate action may be an abort
- The dataflow must go through the error handler before the error recovery action is taken

Exercise

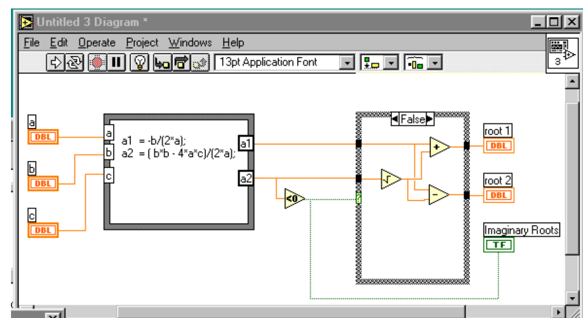
Under **Advanced** there is a **Stop** function. Modify your VI to use it. Is this a good idea? What are the pros and cons of **Stop** vs other means of stopping the VI?

Decision, Decisions!

One thing that we often need to do is to take a different action depending on a decision. "If the number is negative, then don't take the square root" is a reasonable example and one which will avoid an error if we cope with it properly. In LabVIEW we can use a **case** construct to take care of this. A **case** construct consists of a number of overlaid panels each corresponding to a particular value of the input variable. The simplest case is a true/false decision which can be implemented with a boolean variable, more complex cases involve more states and use an integer control variable.

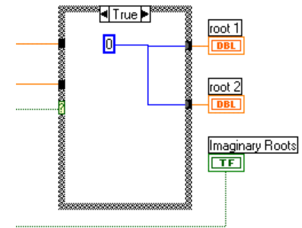
Case constructs must all have the same number of inputs and outputs. All outputs must be driven on all panels of the construct, inputs may be used or ignored at will.

A simple case construct can be made if we try to find the roots of a quadratic equation with coefficients a,b and c - we need to account for imaginary roots. Here is the VI I put together for that. You should try and re-create it. The **Case** structure is under **Structures**.



The other panel of the **Case** structure simply palces a zero in each of the outputs. Remember that every output must be driven on every pane - no exceptions.

Here is the other pane of the **Case** structure. Notice that the unwanted inputs are ignored.



Summary

- **Case** structures allow programs to take different paths depending upon the conditions.
- All panels of a **case** structure have the same number of inputs and outputs.
- Unused inputs can be ignored
- All outputs must be driven.

Exercise

Try writing aVI to compute sin(x), cos(x) or tan(x) depending upon an input control (if you get really good try using a “text ring” control). Your program should also worry about the legality of input.