Catalytic COMPILERS

FxP TOOLBOX

Add True Fixed-Point Arithmetic Capabilities to MATLAB™

- **Easy to Use MATLAB Toolbox.**
- **Adds True Fixed-Point Arithmetic to MATLAB.**
- **Permits Easy Conversion of Working Double Precision MATLAB to Fixed-Point Arithmetic.**
- **Fixed-Point Precision Permits Direct Mapping to Hardware DSPs.**
- **Bitwise Identical Results to Fixed-Point Processors.**
- **Supports Modulo, and Saturation Arithmetic; Signed and Unsigned Operands.**

The Catalytic Compilers FxP Toolbox™ is a MATLAB package which enables users to express computations using fixed-point arithmetic rather than MATLAB's default floating-point arithmetic. The FxP toolbox executes fixed-point operations precisely: the results are identical in precision and accuracy to operations executed on typical fixed-point hardware such as Digital Signal Processors (DSP). The toolbox supports signed and unsigned operands, saturation and modulo arithmetic, and rounding modes of round, truncate, floor, and ceiling.

The FxP Toolbox makes it simple to convert computations. Because the toolbox uses the class and operator-overloading features of MATLAB, converting a working program into fixed-point arithmetic requires only the insertion of a few constructors and assignment statements.

For more information about how we can catalyze your design, send email to info@catacomp.com

```
xfp = fxp(x, 4, 4,  s );
fxp_error = abs(FIR(x)   double(FIR(xfp)));
function y = FIR(x)
      coefficients = [1 0.5 0.25 0.125];
       y = dot(coefficients,x)/ length(x);
```

The FxP Toolbox provides a simple interface to user-written transcendental and mathematical functions such as *sin*, *cos*, *exp*, and *sqrt*. This interface allows your MATLAB prototypes to use the same functions that will be used in the final application, thereby guaranteeing identical results between prototype and implementation as well as permitting early exploration of transcendental behavior.

The advanced SP&C FxP Toolbox extends fixed-point support to all functions in both the *Signal Processing* and *Communications* MATLAB[1] toolboxes. These toolboxes can either be executed directly in fixed-point or in floating point with the results converted to fixed-point.

The fragment in the graphic above shows how simple it is to convert MATLAB programs into fixed-point arithmetic using the FxP Toolbox. The highlighted statement is the only change necessary to run the filter as signed 8-bit fixed-point with 4 bits of precision to the right of the decimal. The variable *fxp_error* holds the error injected in the computation by the conversion to fixed-point.

[1] In order to use the extended features of the Catalytic Compilers Fixed-Point Toolbox, you must be licensed for the appropriate MATLAB™ toolboxes (Signal Processing, Communications, or both) from The MathWorks, Inc.

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