

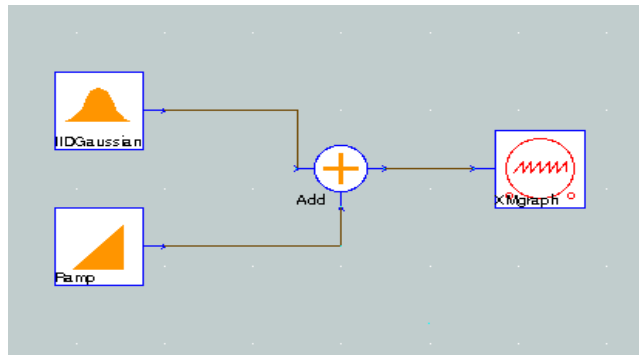
CGC6000
**PTOLEMY CODE GENERATION
DOMAIN FOR TMS320C6X**

Sresth Kumar
Vikram Sardesai
Hamid Rahim Sheikh

TMS320C6x VLIW RISC DSP

- High Performance Multimedia Processor (1600+ MIPS)
- Targets computationally intensive Embedded Signal Processing applications like DVD, Digital TV etc.
- Efficient C Compiler.
- C Code generated by Ptolemy CGC is not optimized for the C6x.
- For complex blocks (e.g. DCT & FFT) considerable performance improvement has been reported using code optimized for C6x.

Ptolemy Code Generation Mechanism



```
{ fire demo.IIDUniform1 }  
{ fire demo.Ramp1 }  
{ fire demo.Add.input=21 }
```

```
{ /* star demo.IIDUniform1 (class CGCIIDUniform) */  
... code for IID Gaussian...  
output_0 = scale * (randomValue - 0.5) + center;  
}  
{ /* star demo.Ramp1 (class CGCRamp) */  
output_1 = value_5;  
value_5 += 1.0;  
}  
{ /* star demo.Add.input=21 (class CGCAdd) */  
output_2 = output_0 + output_1;  
}
```

Proposed Work

- Use C coding framework for TI's C6x Compiler.
- Code Generation for SDF graphs only.
- Build a library of functions optimized for the C6x.
- Derive CGC6000 from the CGC.
- Re-write a subset of stars to incorporate C-style function calls to the library.
- Test CGC6000 on C6x Evaluation Board.
- Evaluate Performance and make comparisons.

References

- Jose Luis Pino, Soonhoi Ha, Edward A. Lee, Joseph T. Buck
“*Software Synthesis for DSP Using Ptolemy*” Journal of VLSI
Signal Processing, vol. 9, pp. 7-21, 1995.
- R. P. Colwell, R. P. Nix, J. J. O'Donnell, D. B. Papworth, P. K.
Rodman, “*A VLIW architecture for a trace scheduling compiler*”
IEEE Trans. on Computers, pp. 967 – 979, 1991.
- E. A. Lee, D. G. Messerschmitt, “*Synchronous Data Flow*”,
Proc. of the IEEE, vol. 75, no. 9, pp. 1235-1245, Sept. 1987
- E. A. Lee, et al. University of California at Berkeley, “*The
Almagest*” Regents of the University of California, 1995.