Dave Murray: Developing Fast DSP Libraries for Advanced Processors

- DSP libraries need to be efficient
- Efficiency is expensive to achieve
- Liberator is our tool for minimising development expense while maximising efficiency. It targets processors with a SIMD capability
- Everything that can be automated is done by Liberator
- We do the rest by hand
Liberator Factorises libraries into four levels:

- **API**: how the routines will be called. Current APIs: Full VSIPL (including double precision); CSIPL (a “plain C” lookalike); FFTW; several proprietary APIs.

- **Algorithm description**: including multi-algorithms for efficiency in varying situations

- **Code Generation**: Packages data into vectors; handles edge effects; performs multithreading; blocks the data; unrolls loops; prefetches when that's helpful; manages cache; handles edge effects (data size not a multiple of SIMD length); handles unaligned and strided data.

- **Processor-dependent back end**: Needs to handle only MIMD-sized vectors. We have back ends for PPC/G4; Intel/SSE; MIPS64
Example Performance Figures: multiple FFTs (N by N)
For more details:

- See our poster
- Chat to me (Dave Murray)
- See us at www.nassoftware.co.uk