DSP Tools Update

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Three DSP Breakthroughs Announced in 2000

Impacting Future of Broadband, Emerging & Mass Markets

C2000™ DSP
- TI C28x™ DSP Core: The world’s first control optimized DSPs
  - Up to 400 extended precision MIPS
  - Best C/C++ Control Code Efficiency
  - Software compatible with C24x™ DSP

C5000™ DSP
- TI C55x™ DSP Core: The world’s lowest mW/MIPS DSPs
  - As low as 0.05mW/MIPs for longest battery life
  - Best code density
  - Software compatible with C54x™ DSP

C6000™ DSP
- TI C64x™ DSP Core: The world’s highest performance DSPs
  - Scalable to 1.1GHz
  - Best DSP compiler, ease of use
  - Software compatible with C62x™ DSP
  - C67x High performance floating point

TI C67x High performance floating point
eXpressDSP™ - DSP Tools

- Code Composer Studio IDE
- CCS Plug-ins
- Program Build
- Emulation

- DSP/BIOS
- DSP Algorithm Standard
- New Development Boards
- Other Highlights

![Diagram](Image)
Code Composer Studio IDE

Provides edit, debug and build components in a Integrated Development Environment (IDE)
Code Composer: Edit, Build, Debug

```c
int error_id = 0;
extern void DSS_init(void);

/*
 * ========== main ==========
*/

void main()
{
    DSS_init();
    LOG_printf(&trace, "audio example started.");
}

/*
 * ========== audio ==========
*/

/* global so Code Composer can see them */
int *src, *dst;
```
Code Composer: State-of-the-art IDE

Texas Instruments - The World Leader in DSP and Analog
Plug-in: A s/w application that uses the CCS APIs in the Software developer’s kit (SDK) & integrates with, customizes or extends the host & target development tool with additional specialized functionality
Types of Plug-ins

Build it Fast!
- Application Generation
- UML/SDL Modeling & Design Visualization
- System Simulation & Design
- External Text Editors
- Filter Design Packages
- Hardware Support
- RTOS Support
- Target Content Configuration

Make it Perfect!
- Code Analysis
- Real-time Analysis
- Real-time Instrumentation
- Run-time Error Analysis
- Signal Generators
- Integrated customized test & verification utilities
- Factory/field test & diagnostics

Hyperception™ - Visual Application Builder is Compliant
Program Build

- Best in Class Compiler Performance
- Profile Based Compiler
  - Visualize and optimize code size and performance trade-offs
- Visual Linker
  - Visualize and simplify system memory allocation
Compile Benchmarks

http://www.ti.com/sc/docs/tools/dsp/ccstutor.htm#benchmarks
Emulation Technology

- Standard JTAG Emulation
- Real Time Data Exchange (RTDX)
- Advanced Event Triggering
- Real-Time Trace
DSP/BIOS

- scalable, instrumented, real-time kernel
- provides a standard software foundation for a growing base of interoperable program components
Mix-and-Match Modules

REAL-TIME CAPTURE
- software event logs
- statistics accumulators
- host cmd/data channels

HARDWARE ABSTRACTION
- real-time clock services
- device-independent I/O
- logical memory segments

MULTIPLE THREADS
- HW+SW interrupts
- synchronized tasks
- background routines

TARGET TMS320 DSP HARDWARE

DSP/BIOS Kernel Interface

real-time host link

SUM	COUNT	MAX

wall-clock time
periodic functions

streams
messages

dynamic allocation
static

RAM
FFFF

0000

post()
get() put()

post ()

pend ()
Implicit diagnostics DSP/BIOS performs *automatically*:

- Real Time Operating System
- Monitor worst-case task execution time
- Provide “software logic analyzer” display of task execution
A TI published set of programming rules & guidelines for algorithms running on TI DSPs

TMS320 DSP Algorithm Standard
TMS320 DSP Algorithm Standard

- Reduce software integration issues in systems
- Applicable across a multitude of application areas
- TTO 3 day workshop - 1st class 9/5
- eXpressDSP compliance program
- E-store with Algorithms
  - [http://www.dspvillage.com](http://www.dspvillage.com)
Development Boards/ Highlights

- New Development Boards
- CCS 2.0 release (1Q01)
eXpressDSP™ - DSP Tools

**Code Composer Studio™**
- plug-in
- plug-in
- program build
- Debug/Emulation
- real-time analysis

**Host Proxy for DSP/BIOS**

**Host Computer**

**application frameworks**

**alg**

**alg**

**alg**

**alg**

**alg**

**alg**

**alg**

**alg**

**DSP/BIOS™**

**comm drivers**

**TMS320 DSP**

**RTDX™**

**JTAG**