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# DSP Tools Update

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# Three DSP Breakthroughs Announced in 2000

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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

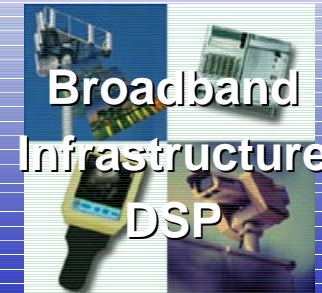
## C5000™ DSP



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

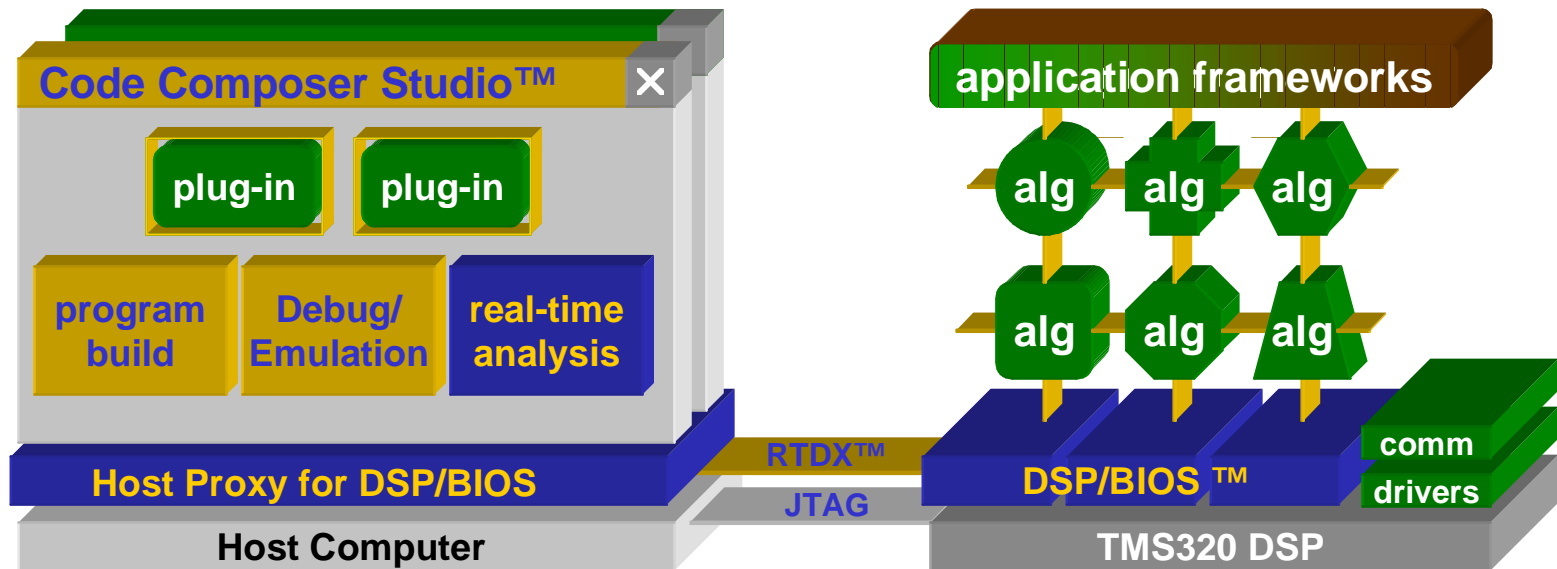
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# eXpressDSP™ - DSP Tools

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- ▶▶ Code Composer Studio IDE
- ▶▶ CCS Plug-ins
- ▶▶ Program Build
- ▶▶ Emulation
- ▶▶ DSP/BIOS
- ▶▶ DSP Algorithm Standard
- ▶▶ New Development Boards
- ▶▶ Other Highlights



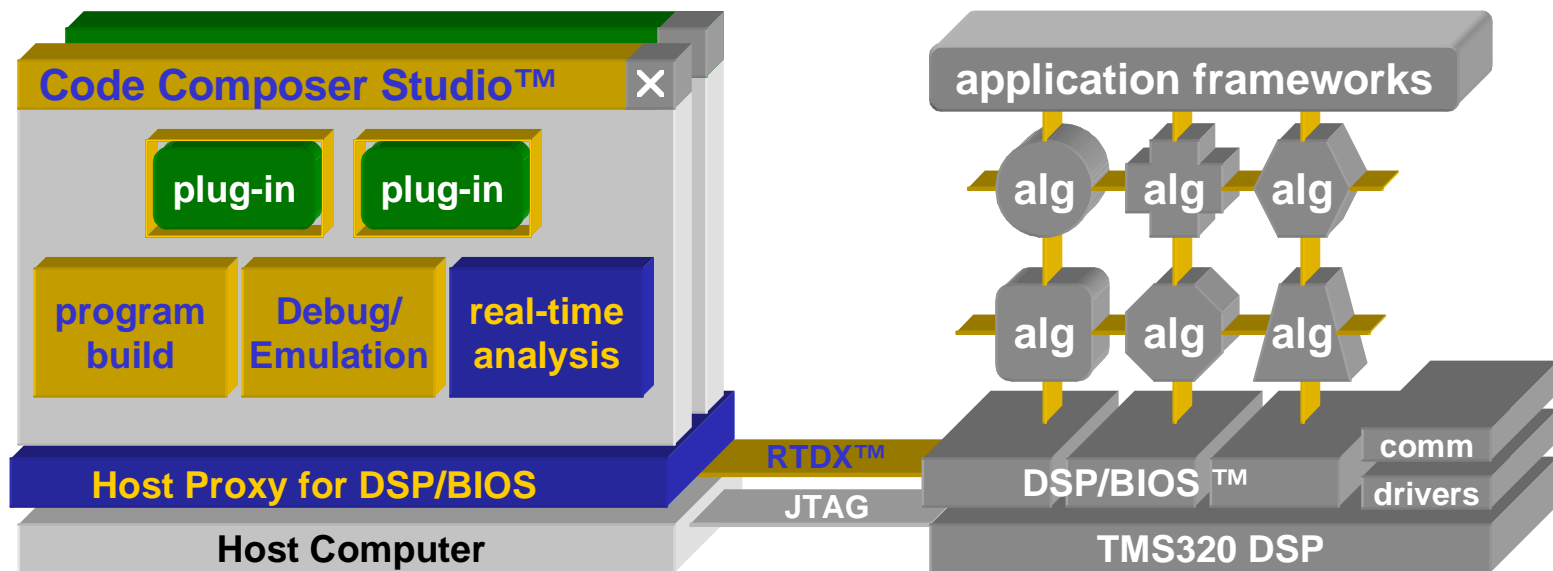
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# Code Composer Studio IDE

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- ▶ Provides edit, debug and build components in a Integrated Development Environment (IDE)



# Code Composer: Edit, Build, Debug

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```
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;
```

Copyright (c) Rational Systems, Inc. 1990-1994  
TMS320C54x COFF Linker Version 1.21  
Copyright (c) 1997 Texas Instruments Incorporated  
Build Complete,  
0 Errors, 0 Warnings.

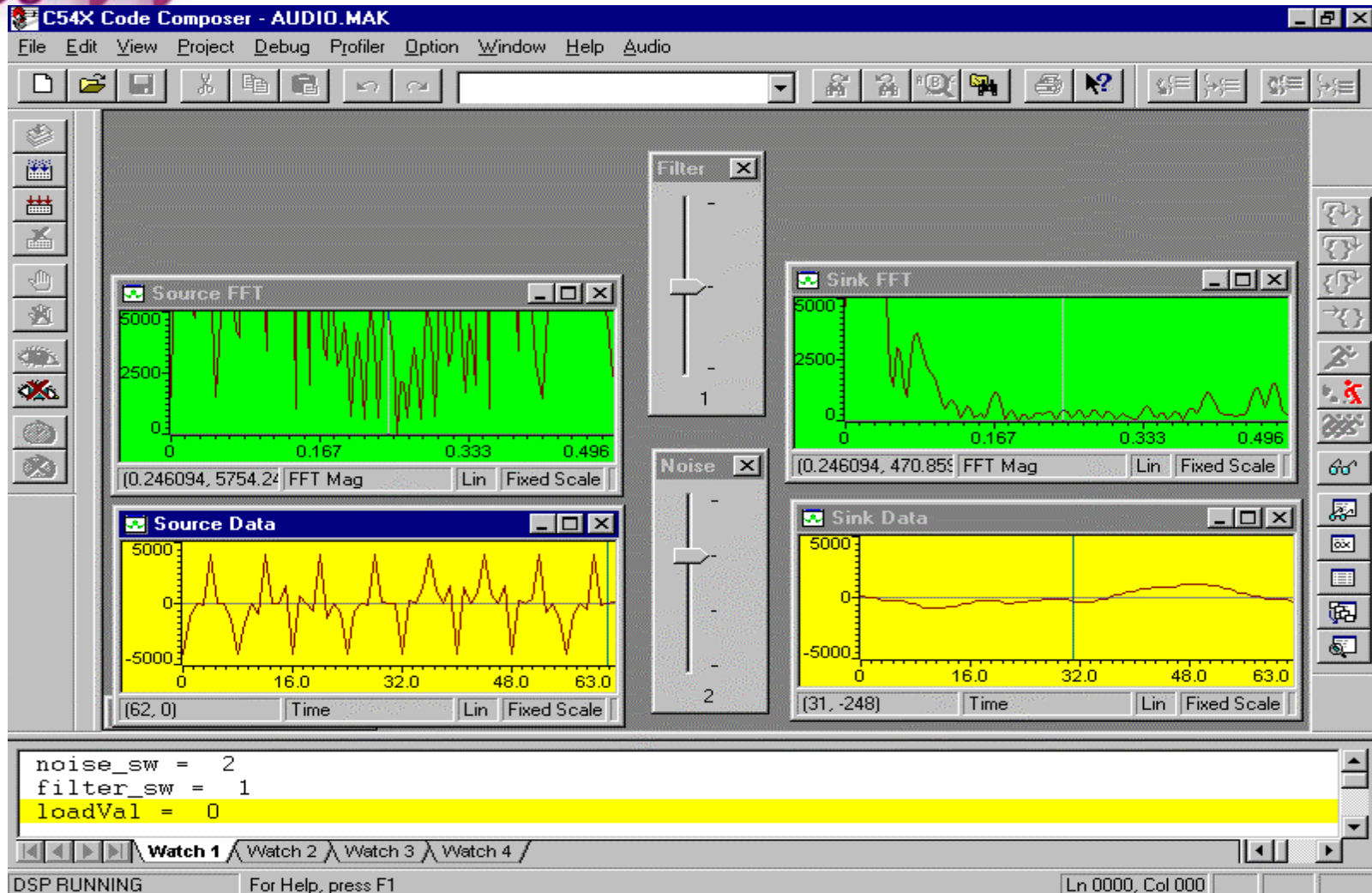
DSP HALTED For Help, press F1 Ln 68, Col 37

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# Code Composer: State-of-the-art IDE

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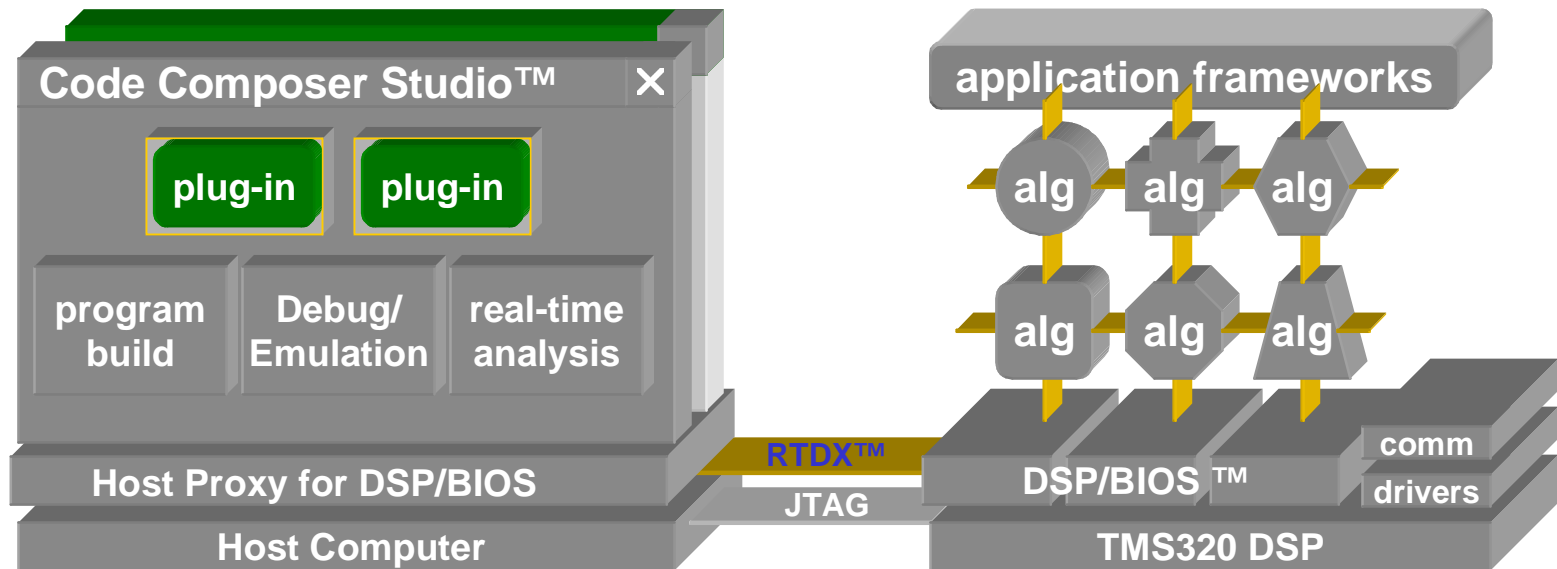
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# CCS Plug-ins in eXpressDSP

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- ▶▶ 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

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## 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

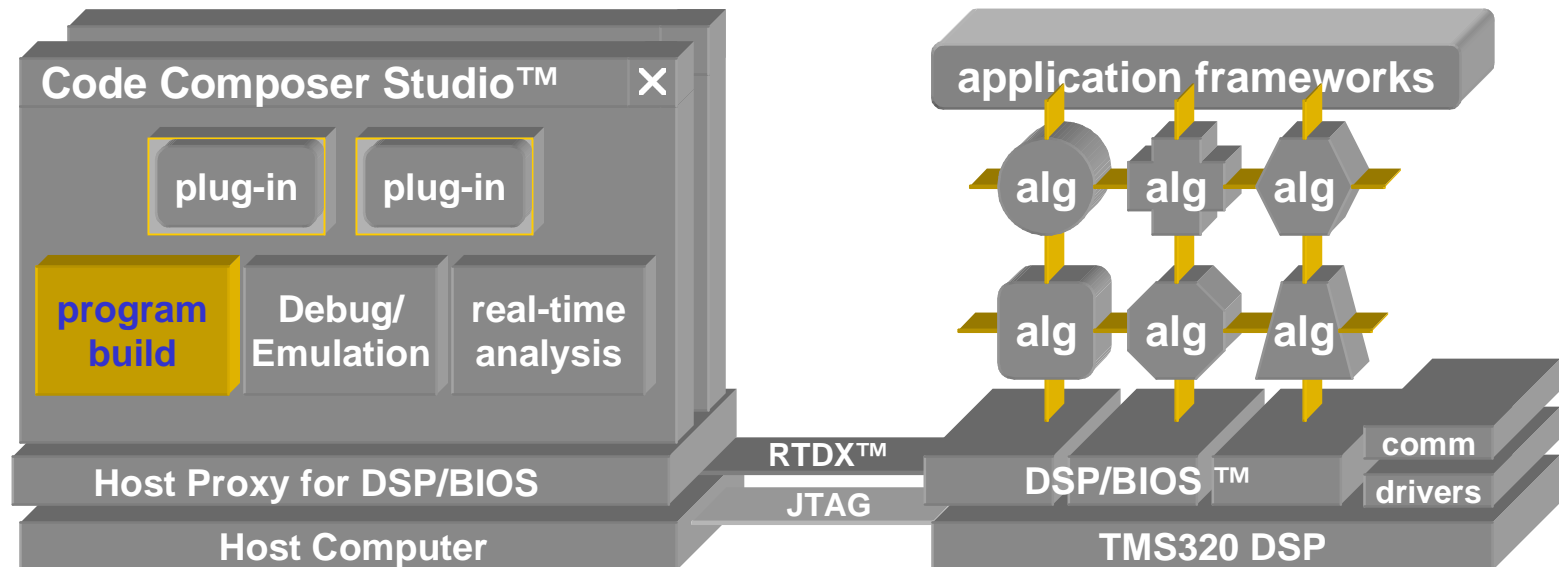
Hyperception™ - Visual Application Builder is Compliant



# Program Build

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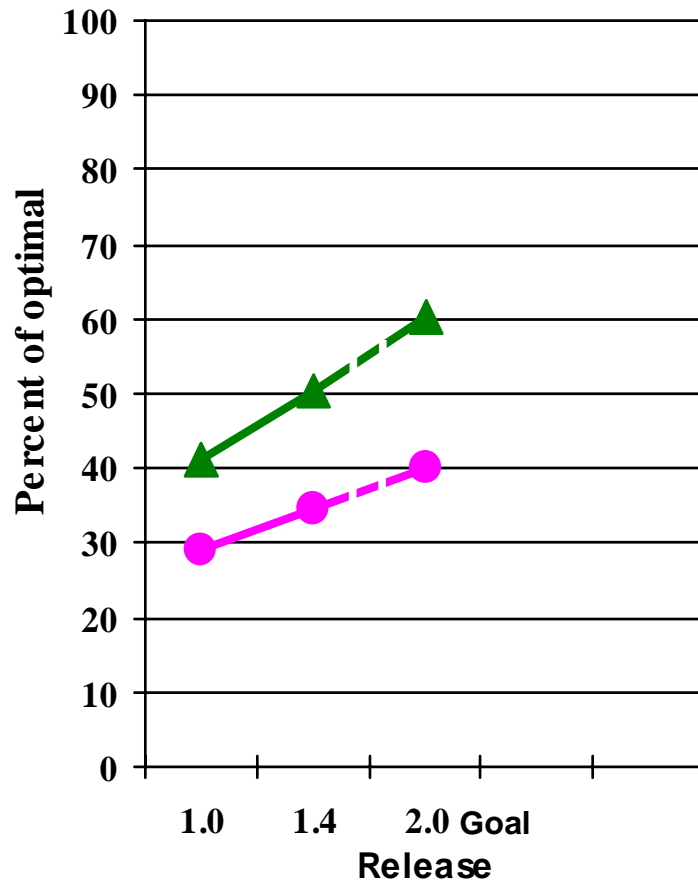
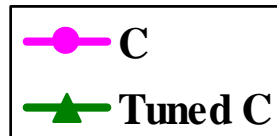
- ▶ **Best in Class Compiler Performance**
- ▶ **Profile Based Compiler**
  - ◆ Visualize and optimize code size and performance trade-offs
- ▶ **Visual Linker**
  - ◆ Visualize and simplify system memory allocation



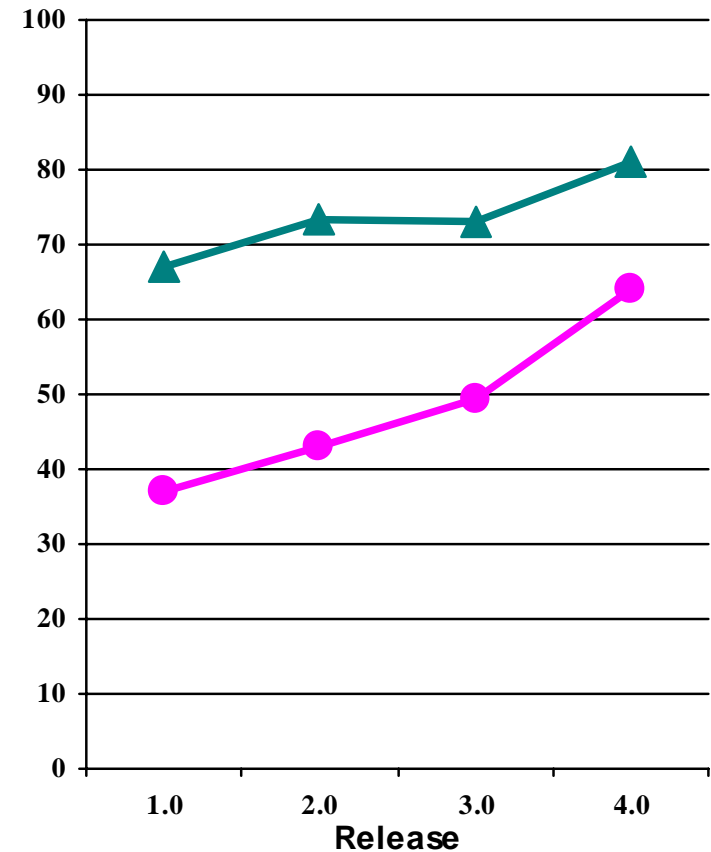
# Compile Benchmarks

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## C55x Compiler



## C62x/C67x Compiler

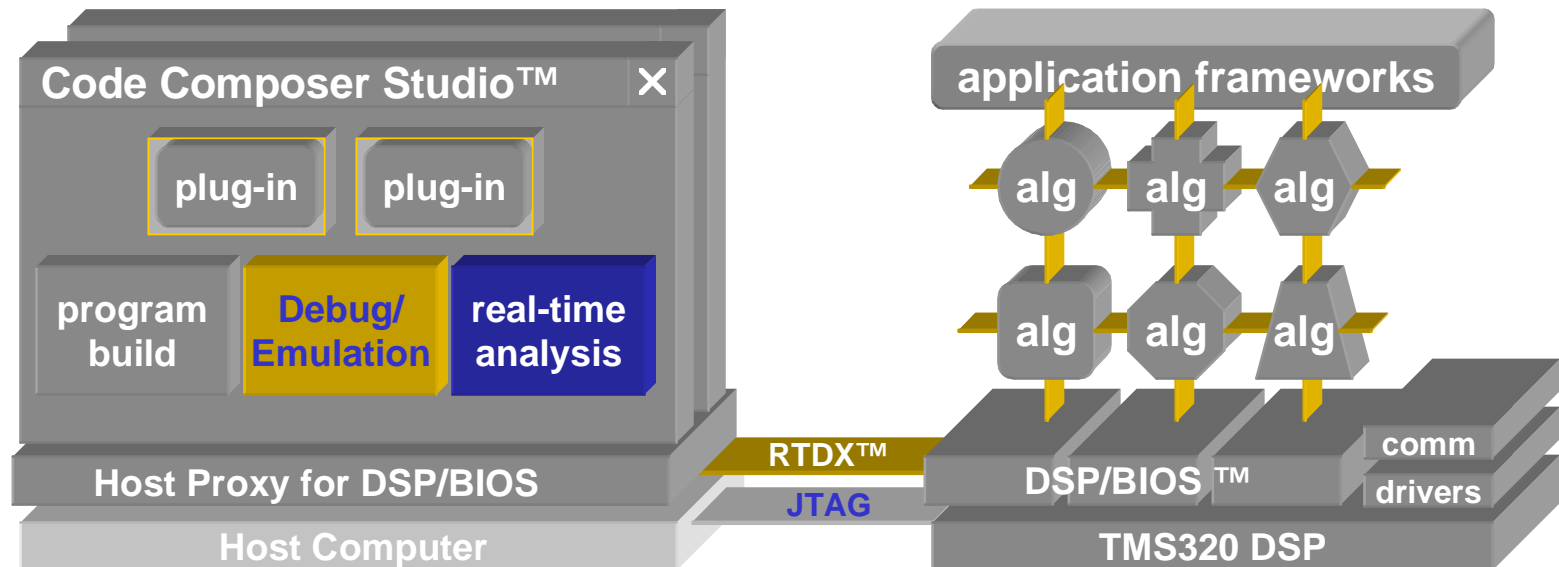


<http://www.ti.com/sc/docs/tools/dsp/ccstutor.htm#benchmarks>

# Emulation Technology

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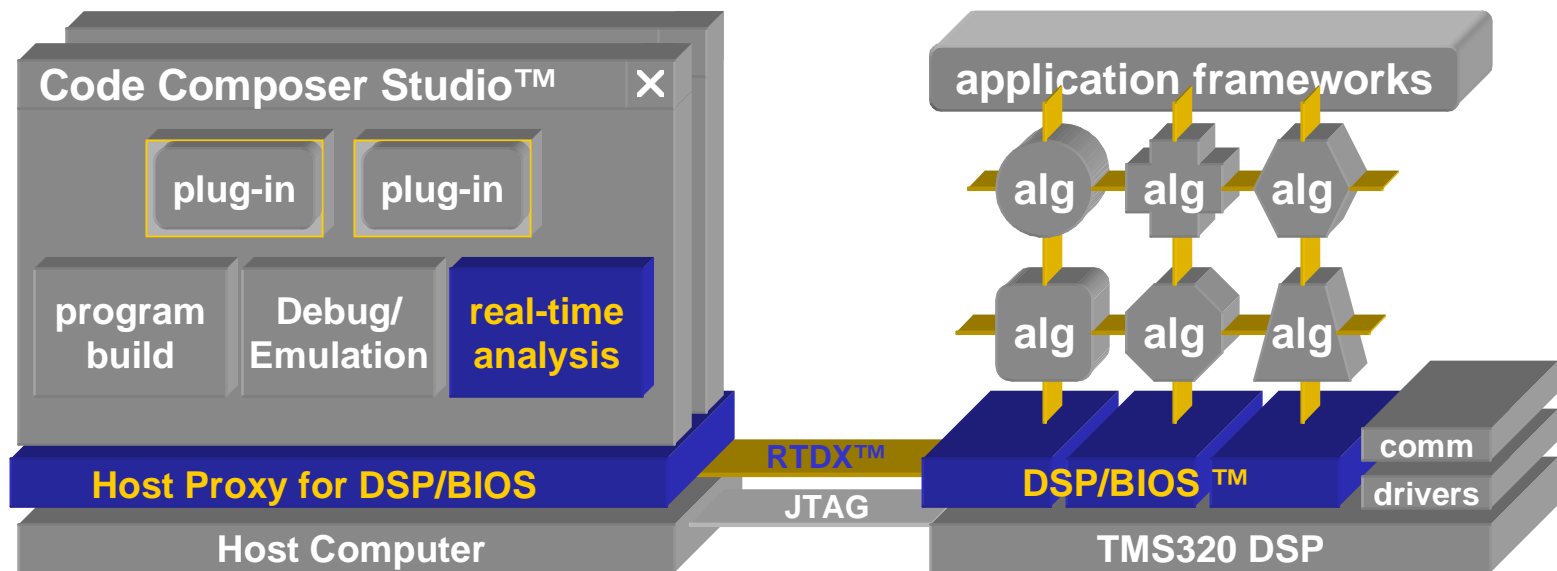
- ▶ Standard JTAG Emulation
- ▶ Real Time Data Exchange (RTDX)
- ▶ Advanced Event Triggering
- ▶ Real-Time Trace



# DSP/BIOS

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- ▶ **scalable, instrumented, real-time kernel**
- ▶ **provides a standard software foundation for a growing base of interoperable program components**



# Mix-and-Match Modules

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## REAL-TIME CAPTURE

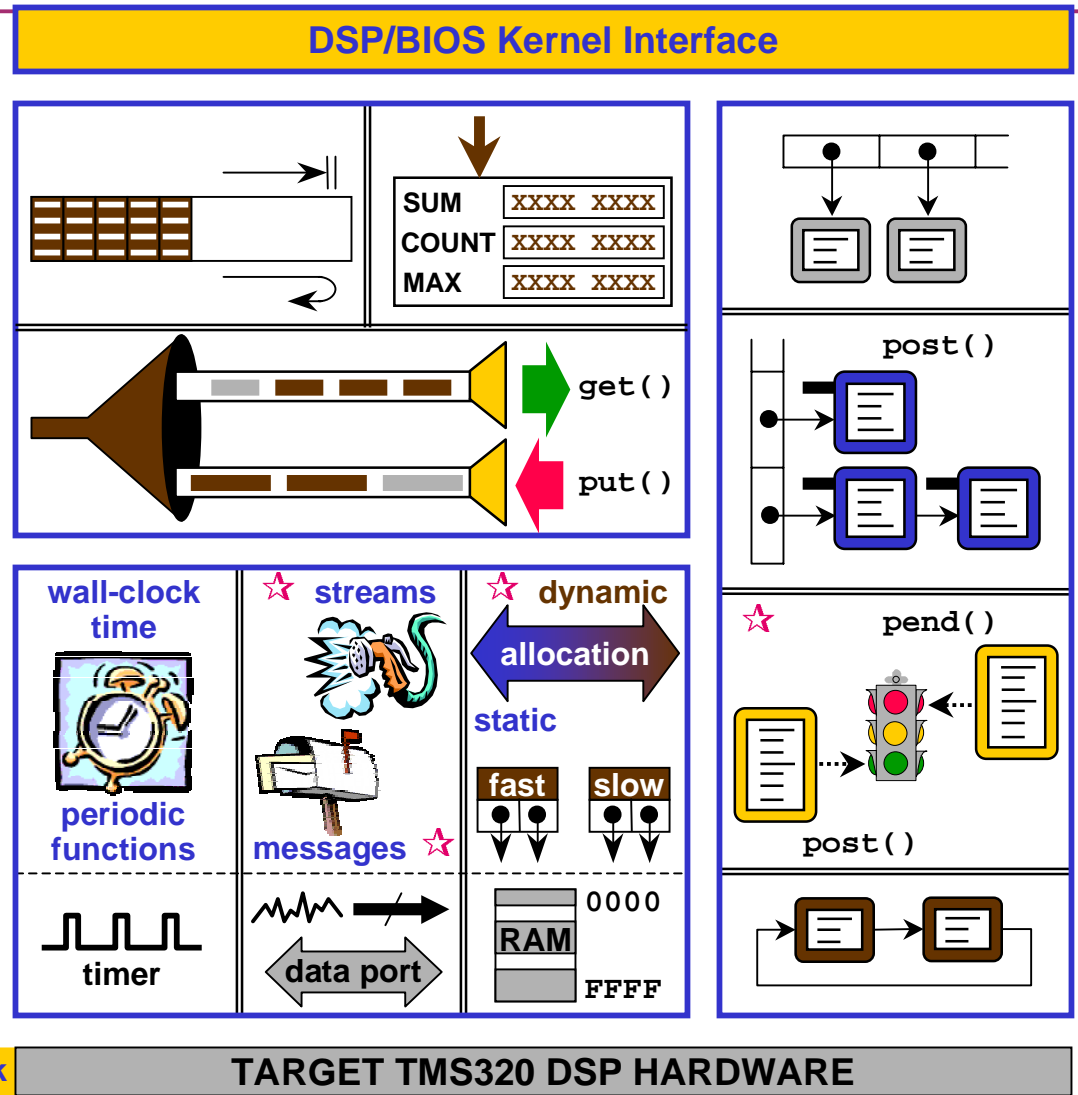
- software event logs
- statistics accumulators
- host cmd/data channels

## HARDWARE ABSTRACTION

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

## MULTIPLE THREADS

- HW+SW interrupts
- synchronized tasks
- background routines



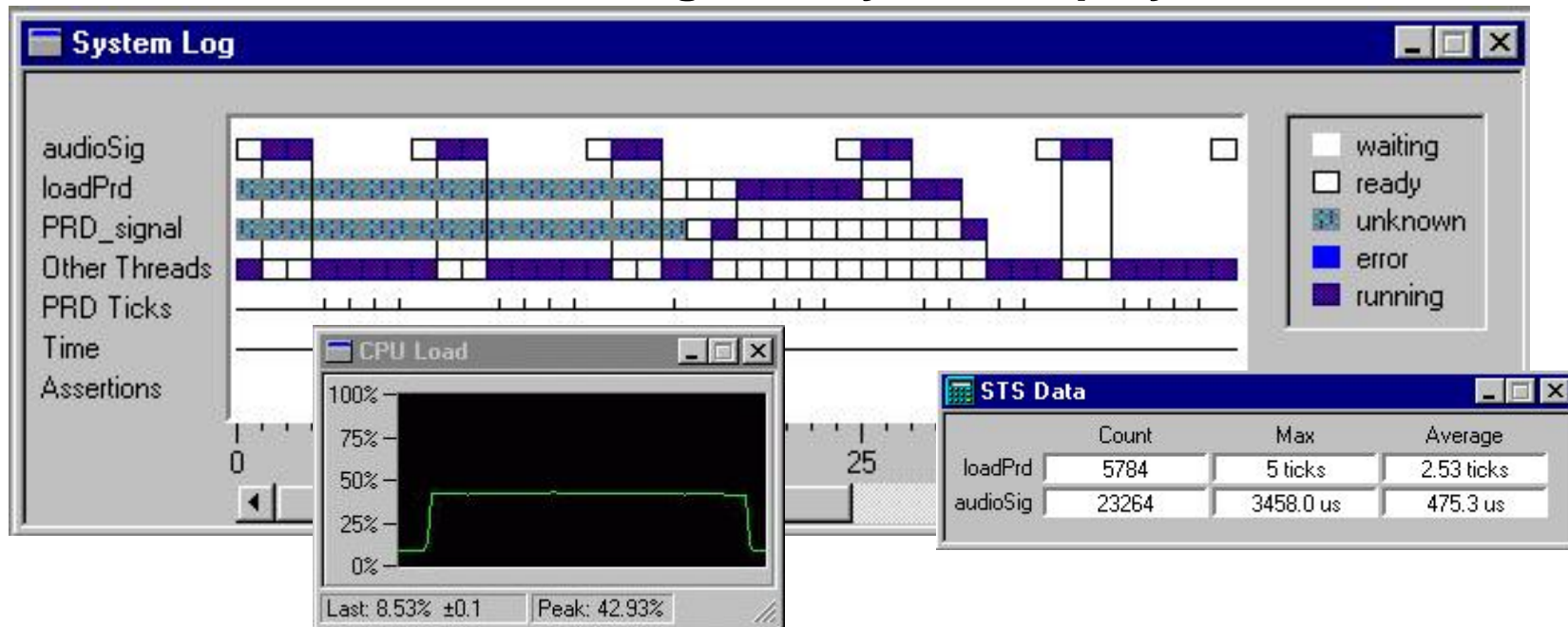
☆ = DSP/BIOS II

# DSP/BIOS: Visual real-time analysis

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Implicit diagnostics DSP/BIOS performs *automatically*:

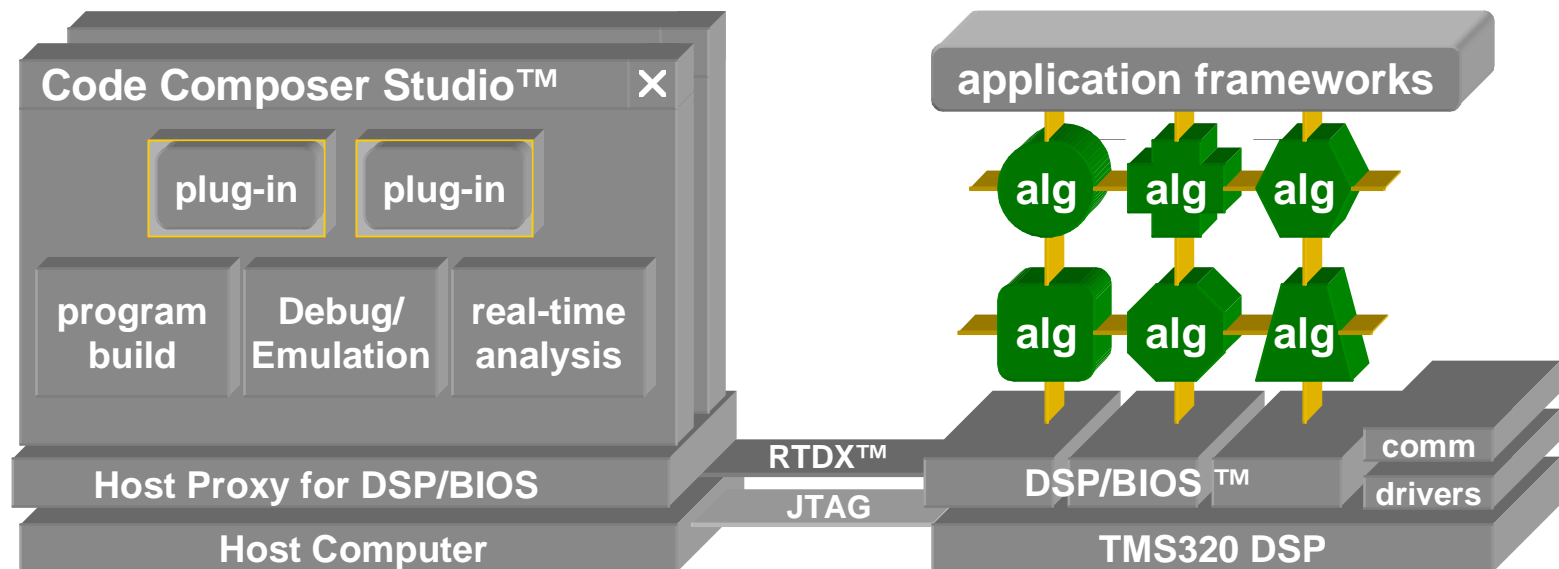
- ◆ Real Time Operating System
- ◆ Monitor worst-case task execution time
- ◆ Provide “software logic analyzer” display of task execution



# TMS320 DSP Algorithm Standard

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- ▶▶ A TI published set of programming rules & guidelines for algorithms running on TI DSPs





# TMS320 DSP Algorithm Standard

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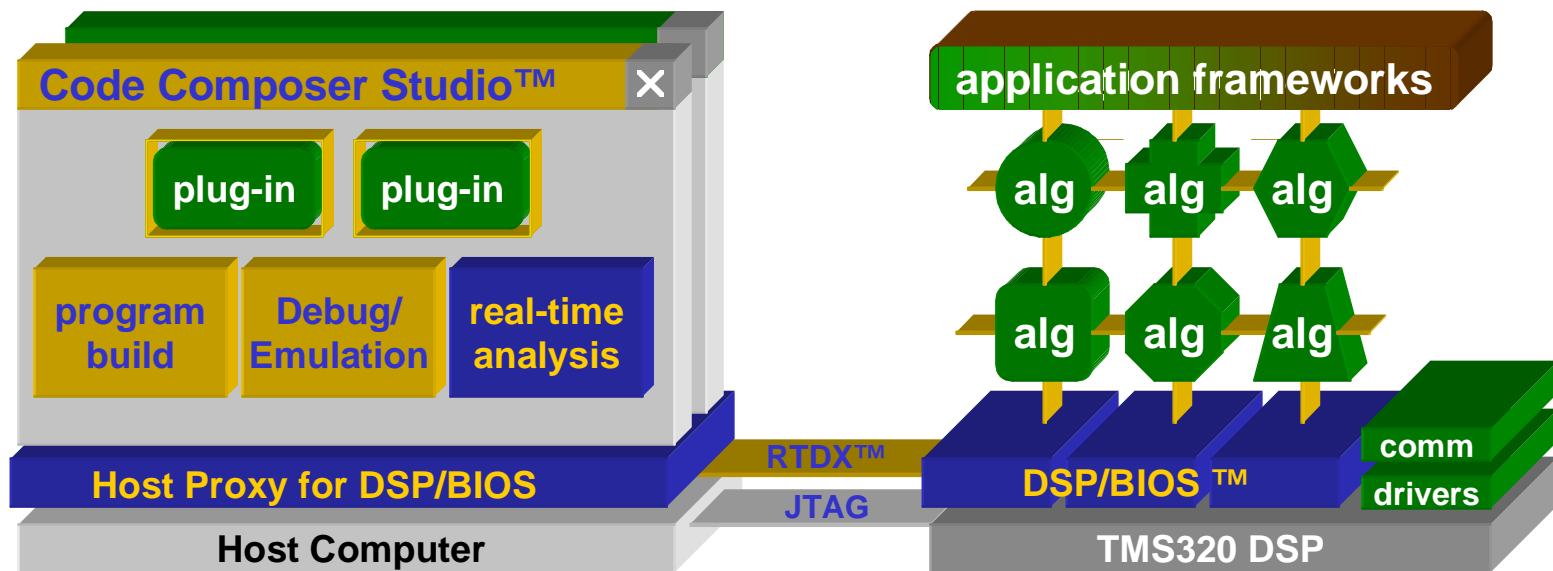
- ▶▶ Reduce software integration issues in systems
- ▶▶ Applicable across a multitude of application areas
- ▶▶ TTO 3 day workshop - 1st class 9/5
- ▶▶ eXpressDSP compliance program
- ▶▶ E-store with Algorithms
  - ▶ <http://www.dspvillage.com>



# Development Boards/ Highlights

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- ▶▶ New Development Boards
- ▶▶ CCS 2.0 release (1Q01)

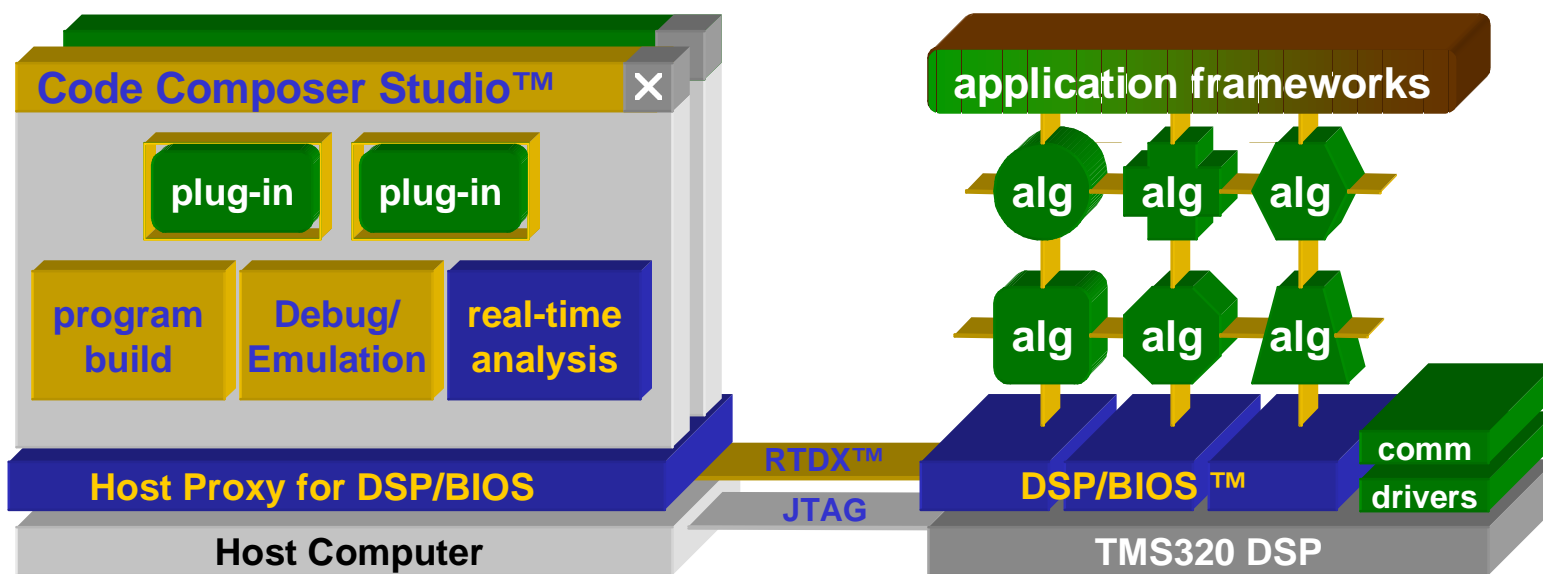


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