NXP S32 DESIGN STUDIO
ECLIPSE CDT BASED PRODUCT
FOR AUTOMOTIVE WORLD

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S32 DESIGN STUDIO
WHAT IS
S32 DESIGN STUDIO
What Is S32 Design Studio?

- Integrated Development Environment based on Eclipse CDT for NXP Automotive Processors.
  - Component-based architecture
  - Build Integration for various toolchains (GCC, GHS, IAR …)
  - Build Configuration Management support
  - Hardware modularity for NXP devices
  - Custom Debugger solution (S32Debugger)
  - Debugger partners support (Segger, P&E, Lauterbach, GHS)

- Component Integration Platform
  - SDK (FreeMaster, AMMCLib, Platform SDK, Radar SDK, Vision SDK, etc)
  - S32 Configuration Tool
  - S32 Trace
  - Simulators (Synopsys VDK, ASTC VLAB)
  - Flash Tool
WHAT ECLIPSE TECHNOLOGIES ARE USED
Overview of Eclipse Technologies in composition of S32 Design Studio

- Sirius
- Acceleo
- EMF
- Xtext
- EEF
- C/C++ Development Tool
- Eclipse Platform
Arhitecture layers overview of S32 Design Studio

IDE Extension Layer

Hardware Device Layer

Model Runtime Layer

Tool Extension Layer

License Layer

Service Layer

Eclipse Platform Components
S32 DESIGN STUDIO FEATURES OVERVIEW
S32 Design Studio Features

- NXP GNU toolchain for bare-metal and Linux ARM targets
- NXP toolchains for accelerators
- Multicore debugging, Semihosting support
- S32 Debug Probe supported by S32 Debugger and S32 Trace
- Support for Lauterbach and P&E debuggers
- Support for Simulators (VDK, VLAB)
- S32DS Extensions and Updates tool
- Visual graphical tool to support visual programming development
- S32 Configuration Tool framework
- Integrated NXP Software (S32 SDKs, Math and Motor Control Libraries)
- SDK Manager
- S32 Flash Tool
- RTOS aware debug support (FreeRTOS, MQX)
- Peripherals Register View
- DDR configuration and calibration tools
- Collateral page providing convenient access to product manuals, tool guides, how-to videos and application notes
S32 Design Studio Collateral & Modularity Support

- Modularity:
  - Modularity approach
  - Installation modules developed for particular hardware
  - Installation based on Eclipse p2 technology
  - Extended getting started page
S32 Design Studio CDT Wizard Extension

- **Extended CDT wizard:**
  - New Project wizard for application and library projects
    - The Multipage wizard allowing to specify toolchain, tool options, debugger, memory regions or SDK.
  - New Project from Examples
  - Migration wizard
    - The wizard dedicated to supporting migration between toolchains, SDK versions, or devices
  - New Project wizard for Visual programming projects
S32 Design Studio CDT Build Settings Support

- Extended CDT Build Settings:
  - Hardware dependent toolchain options
  - Validation rules between dependent options
S32 Design Studio Debuggers Support

- Debuggers support:
  - S32Debugger
  - Lauterbuch
  - P&E Micro
  - Segger
  - IAR debugger
  - VLAB Simulator
S32 Design Studio Configuration Pins Tool

- Used for pin routing configuration, validation and code generation, including pin functional/electrical properties, run-time configurations

- Main features:
  - Muxing and pin configuration with consistency checking
  - Generated code format is aligned with latest version of header files
  - Graphical processor package view
  - Multiple configuration blocks/functions
  - Easy-to-use device configuration
  - Selection of Pins and Peripherals
  - Package with IP blocks
  - Routed pins with electrical characteristics
  - Registers with configured and reset values
  - Source code for C/C++ applications
  - Automatic pins routing
S32 Design Studio Configuration Clocks Tool

- Allows user to easily configure initialization of the system clock (core, system, bus, peripheral clocks) and generate a C code with clock initialization functions and configuration structures.

Main features:
- Inspect and modify configuration of elements on clock path from clock source up to the core/periopherals.
- Validate clock elements settings and calculate the resulting output clock frequencies.
- Generate a configuration code aligned with latest version of header files.
- Table view of clock elements with their parameters allowing the user to modify the settings and see the outputs.
- Diagram view allowing easy navigation and displaying important settings and frequencies.
S32 Design Studio SDK Management

- **S32 SDK Management Tool**
  - Designed for SDK compositions and contribution
  - Independent SDK instances based on decoupled Ecosystem
  - DSL oriented manifests

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![Screenshot of S32 Design Studio SDK Management interface](image-url)
S32 Design Studio Visual Modeling Support

- S32 Visual Modeling Tool
  - Designed directly to present arithmetic blocks (kernels) sequence for object recognition
  - Based on EMF, EEF, Sirius technology
  - C++ code emitters based on generation Acceleo templates.
S32 Design Studio Trace Support

**Trace Viewer**
- Call Tree Viewer
- Code Coverage Viewer
- Hierarchical Profiler Viewer
- Timeline Viewer

**Code Coverage Viewer**
- Summary Table
  - Function Name
  - Num Calls
  - % Total calls of parent
  - % Total times it was called
  - Inclusive Time (Cycles)

**Hierarchical Profiler Viewer**
- Summary Table
  - Function Name
  - Num Calls
  - % Total calls of parent
  - % Total times it was called
  - Inclusive Time (Cycles)

**Timeline Viewer**
- Profile Mode
- Zoom Mode
- Full View
- Edit Groups
Benefits Of Using S32Design Studio - IDE Eclipse CDT Based

- IDE presented user project and connected infrastructure for build, configuration and debug as one thing
- Project support of NXP Microprocessors and Microcontrollers
- Integrated solution for debugging, flash and trace
- Multicore debugging support
- Injected configuration of SDK, Clock, Pins and other tools
- Technology for visual programming
- Documentation and community support
Key Challenges

• The multicore debugging procedure and project presentation become complex because of the amount of cores and core types constantly increasing in new devices
• Eclipse CDT restriction: the managed build system requires a modern approach