SmartEdge Platform – Embedded Software

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Contents

Introduction

The purpose of this whitepaper is to act as a reference for the numerous aspects related to Embedded Software needs on the SmartEdge™ platform. It details the numerous contemporaneous development tools, debug tools and middleware components.
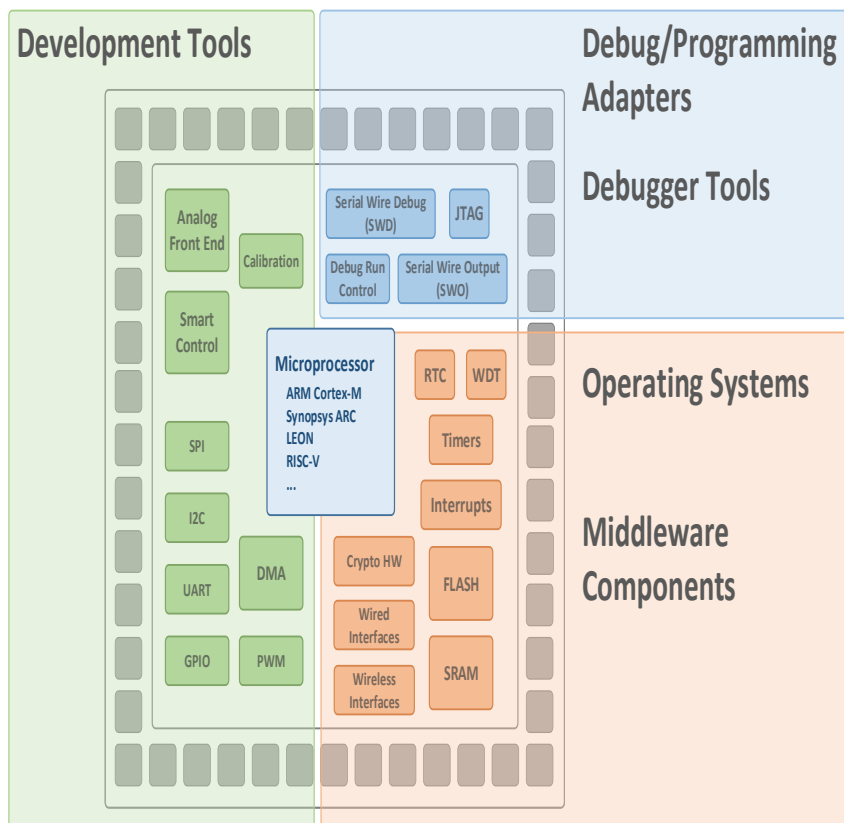
Overview

The diagram below shows the Embedded System Software Developer's view of a smart edge Platform.

There are many tools, operating systems and components available to address the needs of the embedded software ecosystem. These consist of both commercial and non-commercial versions and it is common that the commercial versions typically come as a contiguous suite tied to a fixed set of tools, operating systems and/or components. e.g. If you are using the ARM Keil RTX Operating System then you are tied to the ARM µVision Keil IDE, ARM Keil ULINK adaptor and the ARM Keil µVision debugger.

Adesto have a good understanding of the hardware dependencies of an embedded software ecosystem. Adesto have working partnerships with IP vendors so can deliver the required hardware capabilities to ensure a client's particular embedded software ecosystem needs are met.

Development Tools

Development Tools typically consist of an Integrated Development Environments (IDEs) that exposes a Graphical User Interface (GUI) for Code Development, Code Compilation, Binary Deployment and Debugging.

Integrated Development Tools

Some common IDEs are:

- ARM Keil µVision IDE
- Synopsys MetaWare Development Toolkit
- Segger Embedded Studio
- Green Hills MULTI IDE
- Wind River Workbench
- QNX Momentics Tool Suite
- Eclipse IDE

Compilers

Some common compilers are:

- ARM Compilers
- Synopsys MetaWare Compilers
- Green Hills Optimizing Compilers
- Wind River Diab Compiler
- GNU Compilers
- LLVM Compilers

Software Components

It is becoming increasingly common for devices targeting the Industrial IoT to run its application(s) on an Operating System (OS) instead of bare metal. Embedded Linux and Real-Time Operating Systems (RTOS) are a common choice of OS for microprocessor based embedded systems.

An RTOS typically enables the most efficient use of a microprocessor and optimizes overall task management. It is also common for an RTOS to provide support components such as Bootloaders and File Systems.

Real-Time Operating Systems

Some common RTOS are:

- ARM Keil RTX
- Synopsys MQX
- Segger embOS
- Green Hills INTEGRITY
- FreeRTOS
- Micrium uC/OS
- Express Logic ThreadX
- Wind River VxWorks
- QNX Neutrino

Middleware Components

Middleware Components are typically delivered as highly integrated, fully optimized and verified software packages allowing speed up of software development. Middleware Components typically cover the following areas:

- Connectivity
- Communication Protocols
- Networking Stacks
- Crypto and Security

Debugging

Debug/Programming Adapters

Adapters are typically required to connect the Embedded System Software Developer's system to the device's debug interfaces (JTAG, SWD, SWO) for binary deployment, debug and programming. Some common adapters are:

- ARM Keil ULINK
- Ashling Opella-XD
- Segger J-Link
- Lauterbach PowerDebug
- Green Hills Probe
- Tin Can Tools Flyswatter

Debugger Tools

The Debugger Tools are typically exposed by the Integrated Development Environment, some common Debugger Tools are:

- ARM Keil µVision Debugger
- Synopsys MetaWare Debugger
- Segger Ozone
- Lauterbach TRACE32
- Green Hills TimeMachine
- GNU GDB with Eclipse GUI
- Open OCD

SmartEdge^{TM} Platform

Renesas, formerly Dialog's SmartEdge^{TM} platform incorporates all the Sensor AFE (Analog Front End), Calibration, Control, Communication and Security elements of a smart edge device, all integrated onto a single cost-effective ASIC chip. Our ASIC & IP division has a strong legacy of embedded software development through its internal teams and partner eco-system. With more than 20 years' experience designing advanced embedded mixed-signal chips for hundreds of customers in every major region, Adesto delivers a new breed of design-centric semiconductor supplier capable of optimising its designs for every customer, yet achieving cost economies not thought possible with custom chips designs until now.

Revision History

Revision	Date	Description
1.0	Mar 01, 2018	Initial release
1.1	Dec 22, 2021	Re-brand