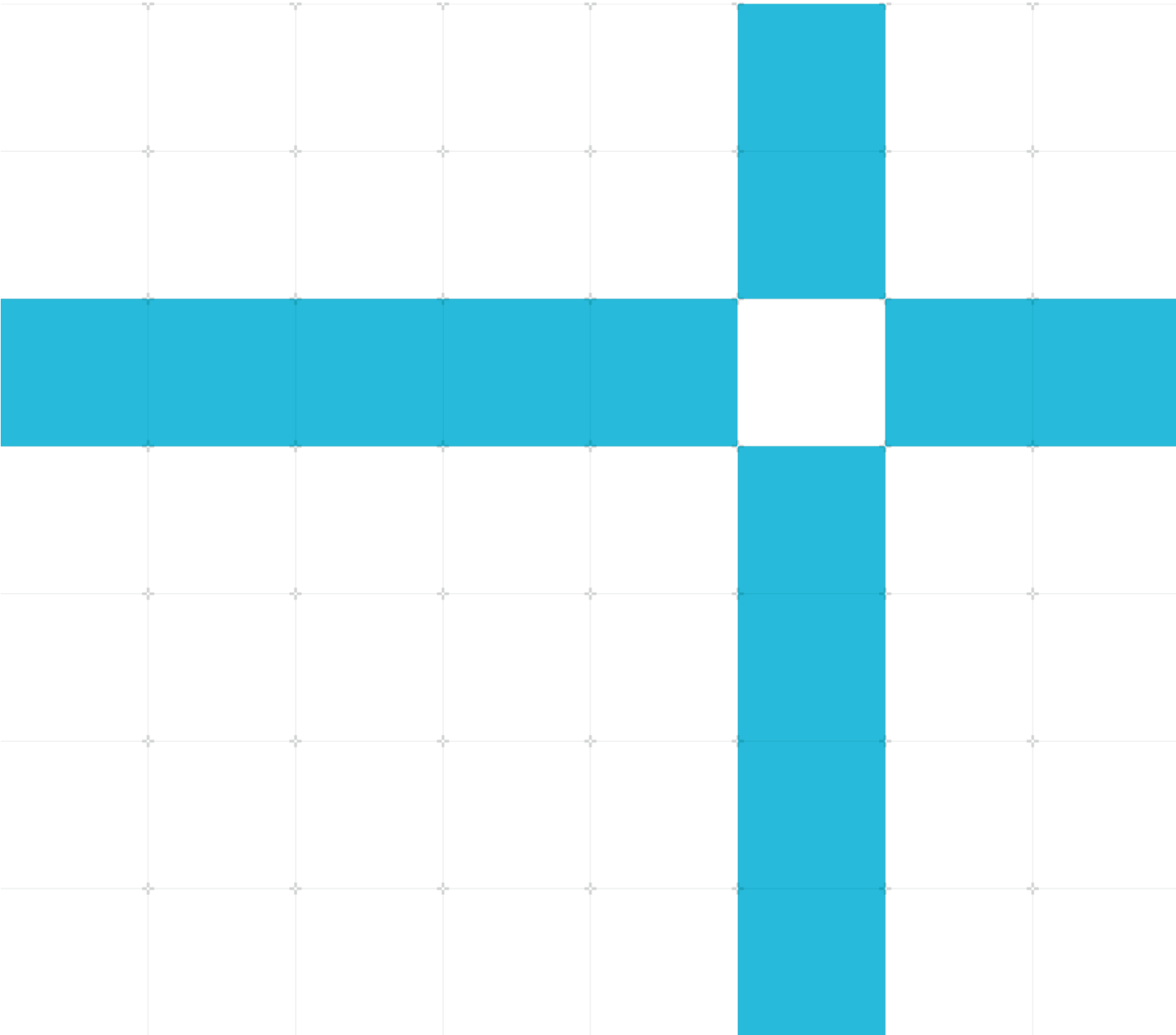
DS-5 Development Studio

Revision: 001

DS-5 Development Studio Changelog

Non-Confidential

Issue 1.0
107742



DS-5 Development Studio Changelog

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Release information

Document history

Issue	Date	Confidentiality	Change
1.0	08-SEP-2022	Non-Confidential	First version

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(LES-PRE-20349)

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Contents

1. Overview

For a summary of what's new in each release of Arm DS-5 Development Studio, see the changelog below. This information is also provided with the release notes of each DS-5 version.

2. Version 5.29.3

Build 5293015

Dated 2019/10/02

This is a summary of the new features and other major changes in this release:

2.1.1. DS-5 Debugger

- New device support for:
  - Intel Agilex SoC FPGA

2.1.2. Linaro GCC Toolchain

- Linaro GCC toolchain 4.8-2014.04 has been removed from the DS-5 installer. A greater variety of **GCC toolchains** is available on developer.arm.com and can be installed alongside DS-5 following **this tutorial**.

2.1.3. Examples

- Removed Linux kernel image for Cortex-A9 FVP. Examples which previously relied on this Linux kernel image have been updated to provide instructions to create a similar runtime environment.

3. Version 5.29.2

Build 5292004

Dated 2019/01/07

This is a summary of the new features and other major changes in this release:

3.1.1. DS-5 Debugger

- New device support for:
  - Renesas RZ/A2M
  - Intel Stratix 10 SoC FPGA – additional support for cross triggering between CPU and FPGA

4. Version 5.29.1

Build 5291003

Dated 2018/07/26

This is a summary of the new features and other major changes in this release:

4.1.1. DS-5 Debugger

- Added Japanese translations

4.1.2. Arm Streamline Performance Analyzer

- Updated Streamline to version 6.7.1
- Added Japanese translations

4.1.3. Mali Graphics Debugger

- Updated Mali Graphics Debugger (MGD) to version 4.9.4

5. Version 5.29

Build 5290003

Dated 2018/06/11

This is a summary of the new features and other major changes in this release:

5.1.1. Arm Compiler

- Updated Arm Compiler 6 to version 6.10.1, adding support for latest processors, optimizations and bug fixes

5.1.2. DS-5 Debugger

- New processor support for Cortex-A76 (Ultimate) and Cortex-M35P (Professional)
- Debugger support for CoreSight ELA-600 Embedded Logic Analyzer
- Support for Arm Debug Interface version 6 (ADIv6)
- Support for integration of third party debug probes
- Operating System awareness for Keil RTX5
- Target system autodetection using ULINK2, ULinkPro(D) and CMSIS-DAP debug probes
- Performance improvements when connecting to many core systems
- New device support for:
  - Arm Musca-A Board Cortex-M33 (SSE-200 subsystem)
  - Marvell 88f8040
  - NXP i.MX8M EVK
  - Arm Fixed Virtual Platforms:
    - Base Cortex-A76
    - MPS2 Cortex-M35P

5.1.3. Simulation models

- Updated Fixed Virtual Platforms (FVPs) to version 11.4
- Added Base_A76x1, Base_A55x4_A76x2

5.1.4. Arm Streamline Performance Analyzer

- Updated Streamline to version 6.7
- Support added for Cortex-A76 (Ultimate), Mali-G76, Mali-G52 and Mali-G31 allowing Streamline to be used with the latest Arm cores

- RTX5 Bare-metal example added to show how to instrument an operating system
- Added support for comparing and merging captures together to see if optimizations have improved system performance
- Hardware counters can now be selected and added when the trace is running by dragging them onto the trace
- Support added for systems that have up to 128 cores allowing Streamline to be used with Arm servers
- Non-root support greatly improved to add:
  - Sampling information for the user's application
  - CPU hardware counter information
- Support for call stack unwinding from userspace gatord captures

5.1.5. Mali Graphics Debugger

- Updated Mali Graphics Debugger (MGD) to version 4.9.3
- Full trace replay support has been greatly improved:
  - OpenGL ES 3.2 support has been added so that all OpenGL ES traces can be replayed back on the target
  - Multi-context support has been added to replaying traces back on the target
  - Mali Graphics Debugger can automatically upload traces onto the target to be replayed

5.1.6. Examples

- Added bare-metal examples for Cortex-A76
- Added examples for Keil RTX version 5 RTOS
- Added use-case scripts for ELA-600 to the DTSL examples
- Added a multi-core primes example for Cortex-R8

6. Version 5.28.1

Build 5281010

Dated 2018/01/11

This is a summary of the new features and other major changes in this release:

6.1.1. DS-5 Debugger

- USB-Blaster support for Intel Stratix 10 device
- Increased the number of devices that can be addressed by DS-5 and DSTREAM in a single debug session
  - DSTREAM: Support for up to 254 CoreSight devices (including up to 128 CPUs)
  - DSTREAM-ST: Support for up to 1022 CoreSight devices (including CPUs)
- Bug fixes and performance improvements
- New device support for:
  - Intel AMX5600

6.1.2. Arm Streamline Performance Analyzer

- Support for profiling Midgard GPUs with driver r21p0 and later
- Support for profiling Bifrost GPUs with driver r9p0 and later
- Bug fixes and performance improvements

7. Version 5.28

Build 5280120

Dated 2017/11/24

This is a summary of the new features and other major changes in this release:

7.1.1. Arm Compiler

- Updated Arm Compiler 6 to version 6.9 and Arm Compiler 5 to version 5.06u6, adding support for latest processors, optimizations and bug fixes

7.1.2. DS-5 Debugger

- Added support for debugging systems implementing Armv8.4-A extensions
- Added Operating System awareness for Wind River VxWorks on Armv7 and Armv8 architecture devices
- New device support for:
  - 96 Boards HiKey 960
  - Cortex-M Prototyping System (MPS2+) Cortex-M3 DesignStart
  - Cortex-M Prototyping System (MPS3) Cortex-M33 IoT
  - Intel Stratix 10
  - Realtek Real-M200
  - Realtek Real-M300
  - Realtek Real-M500
  - Arm Fixed Virtual Platforms:
    - Base_RevC_2xAEMv8A

7.1.3. Arm Streamline Performance Analyzer

- Updated Streamline to version 6.5
- Wizard included to setup using Streamline with Fast Models
- Streamline Bare-metal support has been improved:
  - Importing of instruction trace into Streamline
  - Transporting Bare-metal trace data over ETM
- Support for profiling Python scripts and Just In Time (JIT) compiled languages
- Included example traces to help the user understand how to use Streamline

7.1.4. Simulation models

- Updated Fixed Virtual Platforms (FVPs) to version 11.2
- PPU (Power Policy Unit) version 1.1
- Partial Power Down of L3 Caches now supported in Fast Models with DSU (DynamIQ Shared Unit) capabilities
- ITM support added to Cortex-M Fast Models

7.1.5. Eclipse IDE

- Updated Eclipse to version 4.6.3 (Neon)

7.1.6. Mali Graphics Debugger

- Updated Mali Graphics Debugger (MGD) to version 4.8
- Host side performance improvements making MGD more responsive to the user and reducing overall memory consumption
- New device manager which allows automated setup of the target
- Increased the tracing speed of applications and included new trace modes which allows the user to pick which assets get traced
- Android O support
- Improved VR functionality by including support for the Multiview extension

7.1.7. Examples

- Added Armv8-A Linux application debug example
- Added Armv8-A Linux kernel debug example
- Added Arm Compiler 6 version of TrustZone example
- Added Arm Compiler 6 version of Cortex-R4, R5 & R7 startup code examples
- Added timer interrupts into Armv8-A startup code
- Added Cortex-Axx named versions of Armv8-A example startup code
- Streamline examples for Linux and barman can now be imported into Eclipse using the DS-5 Example Importer Wizard

7.1.8. Supported host platforms

- Added Support for Ubuntu Desktop Edition 16.04 LTS

8. Version 5.27.1

Build 5271024

Dated 2017/06/09

This is a summary of the new features and other major changes in this release:

8.1.1. Arm Compiler

Updated Arm Compiler 6 to version 6.7.1, adding support for Cortex-A75 and Cortex-A55 processors

8.1.2. DS-5 Debugger

- Added debug support for Cortex-A75 and Cortex-A55, including Examples
- Added support for trace data integrity monitoring in DSTREAM-ST
- Added support for SC300 part identification in the Platform Configuration Editor in DS-5
- New device support for:
  - Arm Fixed Virtual Platforms:
    - Base_A75x1
    - Base_A55x1
    - Base_A55x4_A75x2
    - CoreLink SGI-572
    - CoreLink SGI-575
    - CoreLink SGM-573
    - CoreLink SGM-773
    - CoreLink SGM-775

8.1.3. Arm Streamline Performance Analyzer

- Bare metal tracing over ITM interface, including support for M- class processors and DWT based counters
- Support for Cortex-A55 and Cortex-A75
- Support for Mali-G72

8.1.4. Simulation models

- Updated Fixed Virtual Platforms (FVPs) to version 11.0
- Added Cortex-A75x1, Cortex-A55x1 and Cortex-A75x2/Cortex-A55x4 FVPs

8.1.5. Examples

- Added bare-metal examples for Cortex-A75 and Cortex-A55

8.1.6. Supported host platforms

- Support for Ubuntu Desktop Edition 12.04 LTS has been removed from this release

9. Version 5.27

Build 5270014

Dated 2017/04/27

This is a summary of the new features and other major changes in this release:

9.1.1. Arm Compiler

- Updated Arm Compiler 6 to version 6.7 and Arm Compiler 5 to version 5.06u5, adding support for latest processors, optimizations and bug fixes
- Compilation for Cortex-M23 and Cortex-M33 is now supported with a DS-5 Professional Edition License

9.1.2. DS-5 Debugger

- Added support for debugging systems implementing Armv8.3-A extensions
- Added debug support for Armv8-A Scalable Vector Extensions (SVE)
- Added support for DSTREAM-ST debug probe
- Added support for streaming trace from DSTREAM-ST including live decode of ITM and STM trace sources
- Added Memory Protection Unit (MPU) support with a new MPU view and `mpu` commands (for Armv8-M architecture only)
- Added debug support for AArch32 and AArch64 HLT-based semihosting (Version 2.0)
- Added option to launch the command-line debugger using a launch configuration exported from Eclipse
- Added option to launch the command-line debugger in a server mode, allowing remote interaction
- Added Operating System awareness for SYSGO PikeOS on Armv7 and Armv8 architecture devices
- Extended Operating System awareness for ExpressLogic ThreadX to Armv8-A architecture devices
- Bare-metal debug for Cortex-M23 and Cortex-M33 is now supported with a DS-5 Professional Edition License
- New device support for:
  - Cortex-M Prototyping System (MPS2+) Cortex-M23 IoT
  - Cortex-M Prototyping System (MPS2+) Cortex-M33 IoT
  - Raspberry Pi 2
  - Raspberry Pi 3

- Texas Instruments RM57Lx
- Arm Fixed Virtual Platforms:

9.1.3. Arm Streamline Performance Analyzer

- Non-rooted systems are now supported
- Profiling for the Mali-G51 now supported
- Streamline Bare-metal support has been improved to include the following:
  - Transporting the profiling data off the target using STM
  - Cortex-R support for both storing profiling data in memory and transferring off the target using STM
- Added support for split-debug files allowing debug symbols to be stored separately from the image

9.1.4. Simulation models

- Updated Fixed Virtual Platforms (FVPs) to version 10.3

9.1.5. Eclipse IDE

- Added a new Welcome page providing access to videos and blogs about DS-5

9.1.6. Mali Graphics Debugger

- Non-Mali systems are now supported allowing the use of MGD with other devices
- User scripting has been added allowing automation and customization of MGD
- Installing MGD on rooted systems is now an easy automated process
- Compiler included with has been updated to include support for OpenGL ES 3.2 for Shaders
- Daydream applications are now supported

9.1.7. Examples

- Updated RTX4 from 4.81 to 4.82, and now available for Cortex-R4, A5 & A7 as well as A9
- Added PMU example for Armv8/AArch64
- Added STM example for Juno
- Added Cortex-M startup code that builds with Arm Compiler 6
- Added SVE examples into standard DS-5 edition
- Added example to demonstrate HLT semihosting in mixed AArch32/AArch64 Armv8 example

10. Version 5.26.2

Build 5262002

Dated 2016/12/14

This is a summary of the new features and other major changes in this release:

10.1.1. DS-5 Debugger

- Added Japanese translation bundles for DS-5 v5.26.0

11. Version 5.26

Build 5260008

Dated 2016/11/29

This is a summary of the new features and other major changes in this release:

11.1.1. DS-5 Debugger

New features:

- Added debug support for Cortex-M23, Cortex-M33 and Cortex-R52 including examples
- Improved MMU handling during debug of Linux startup code
- Added support for automated DSTREAM firmware update
- Simplified adding Examples with a new Example import flow wizard
- Extended the debugger events view with DWT packet display and support for custom (user written) ITM data decoders
- Added conditional watchpoints support
- Added CMM script import support
- Improved control of the displayed data format in the memory view

New platform support:

- Arm Cortex-M Prototyping System (MPS2) Cortex-M7 (CS_ITM)
- RC Module MB76.01
- RC Module MB77.07
- RC Module MB127.01
- Renesas R-CAR Gen3
- Xilinx Zynq UltraScale+ MPSoC
- Arm Fixed Virtual Platforms:
  - Base Cortex-R52
  - MPS2 Cortex-M23
  - MPS2 Cortex-M33
  - MPS2 AEMv8M
  - Mobile_Ref_Data_Buzz
  - Mobile_Ref_Data_Collins
  - Infra_Ref_Data_Ashbrook_A72
  - Infra_Ref_Data_Ashbrook_A53

The native Debug Hardware Utilities have been removed from this release. The equivalent functionality is now provided within the DS-5 Eclipse IDE.

- Debug Hardware Configuration has been replaced by the Platform Configuration Editor, click **here** for more info
- Debug Hardware Update has been replaced by the Debug Hardware Firmware Installer, click **here** for more info
- Debug Hardware Config IP has been replaced by Debug Hardware Configure IP, click **here** for more info

11.1.2. Streamline

- Added Mali-G71 support
- Streamline can now be used on baremetal systems or systems with a minimal operating system
- Improved support for systems with many cores
- Added ultra-high resolution mode allowing sample data up to 1 microsecond
- Added the ability to import Perf data

11.1.3. Mali Graphics Debugger

- Vulkan frame capture now works with depth and stencil attachments as well as supporting transient attachments and multiple subpasses
- Mali Graphics Debugger now supports "Full trace replay"
- Vulkan Linux Support
- Moved to new version of the Vulkan Loader for Android

11.1.4. Examples

- Added new bare-metal example for Armv8-M (Cortex-M23 / Cortex-M33)
- Added new bare-metal example for Armv8-R (Cortex-R52)
- Updated CMSIS-RTX RTOS for Cortex-A9 to version 4.81
- Added a new version of smp_primes_ITM that builds with Arm Compiler 6

11.1.5. Fixed Virtual Platforms (FVPs)

For DS-5 Ultimate users, the following FVPs have been added:

- Cortex-M23
- Cortex-M33
- Cortex-R52

11.1.6. DS-5 Arm Compiler updates

- Updated Arm Compiler 6 to version 6.6 and Arm Compiler 5 to version 5.06u4, adding support for latest processors, optimizations and bug fixes

11.1.7. Debug Hardware

New DSTREAM firmware version 4.30.0 containing:

- Support for access to Cortex-M23, Cortex-M33 and Cortex-A52 Arm cores

11.1.8. Other updates

- The Eclipse IDE has been updated to version 4.5.2 (Mars)

12. Version 5.25

Build 5250010

Dated 2016/07/26

This is a summary of the new features and other major changes in this release:

12.1.1. DS-5 Debugger

- Debug of programs that use overlays
- Cache and MMU views for Cortex-A7 and Cortex-A5
- Jython updated to version 2.7
- Detection of and example configuration scripts for the CoreSight ELA-500 Embedded Logic Analyzer
- Enhanced Stack View which now shows parameter and local variable values

12.1.2. Mali Graphics Debugger

DS-5 now ships with the Mali Graphics Debugger. The Mali Graphics Debugger allows developers to trace OpenGL ES and OpenCL API calls in their application and understand frame-by-frame the effect on the application to help identify possible issues. For more information click Mali Graphics Debugger.

12.1.3. Fixed Virtual Platforms (FVPs)

Many more FVPs are now shipped with DS-5. FVPs allow DS-5 users to run code in a high speed simulated environment which means you can check your code functions as expected without access to real hardware.

For DS-5 Ultimate users, the FVPs cover the following Arm microprocessor cores:

- Cortex-M0, Cortex-M0plus, Cortex-M3, Cortex-M4, Cortex-M7, Cortex-R4, Cortex-R5, Cortex-R7, Cortex-R8, Cortex-A5, Cortex-A7, Cortex-A9, Cortex-A15, Cortex-A17, Cortex-A32, Cortex-A35, Cortex-A53, Cortex-A57, Cortex-A72, Cortex-A73

For DS-5 Professional users, the FVPs cover the following Arm microprocessor cores:

- Cortex-M3, Cortex-R4, Cortex-A9

12.1.4. DS-5 Arm Compiler updates

Click below for information on the changes that went into the Arm Compiler:

- **Arm Compiler 6**
- **Arm Compiler 5**

12.1.5. Debug Hardware

New DSTREAM firmware version 4.29.0 containing:

- Support for access to Cortex-A5 and Cortex-A7 Cache and TLB RAM
- Support for Armv8.2 Extensions

12.1.6. Other updates

- Windows 10 support

13. Version 5.24.1

Build 5241017

Dated 2016/06/08

This is a summary of the new features and other major changes in this release:

13.1.1. DS-5 Debugger

- Added support for Cortex-A73

13.1.2. Simulation Models

New device support for:

- Base Cortex-A73
- Base Cortex-A73/Cortex-A53

13.1.3. Debug Hardware

- New DSTREAM firmware version 4.27.0 containing fixes to support Armv8-M cores.

13.1.4. Other updates

- Bug fixes and performance improvements.

14. Version 5.24

Build 5240022

Dated 2016/03/29

This is a summary of the new features and other major changes in this release:

14.1.1. Arm Compiler

- Updated to Arm Compiler 6.4.
- Updated to Arm Compiler 5.06u2.

14.1.2. DS-5 Debugger

- Substantial changes to the graphical user interface, for improved performance and usability:
  - Showing operating system threads or tasks in the Debug Control view is now optional, and is turned off by default.
  - Display of the program call stack has moved from the Debug Control view to the new Stack view.
  - The Memory view no longer pre-reads more than visible on screen.
  - The Registers view is now populated with all registers by default, with new search capability and the option to create custom registers sets.
  - A new toggle button on the Variables, Registers and Expressions views changes the format of all numerical values to hexadecimal at once.
- Added support for reverse debugging AArch64 Linux applications.
- Latest bug fixes and improvements for all supported debug probes (DSTREAM units require updating with firmware version 4.26.30 as shipped with this version of DS-5).
- Added support for Cortex-A35, Cortex-A32 and Cortex-R8.
- Initial debug support for Armv8-M and Armv8-R architectures.
- Improved performance for parsing and display of CMSIS-SVD defined register sets.
- Improved debug performance for ULINKpro and ULINKpro(D) connections
- Use case script functionality integrated with the Scripts view.
- Various improvements to the Platform Configuration Editor.
- New device support for:
  - Applied Micro 883208 (X-Gene™ core)
  - Marvell 88FR101
  - Marvell 88FR111
  - Arm Fixed Virtual Platforms:

- Base Cortex-A32
- Base Cortex-A35
- Base Cortex-A57/Cortex-A32
- Base Cortex-A57/Cortex-A35
- Versatile™ Express Cortex-R8

Open DS-5 to find the full set of target platforms supported by DS-5.

- Note the following has been removed:
  - `gdbserver` executable. Linux application debug via `gdbserver` is still supported, however you must now supply your own `gdbserver` executable for the target (typically provided as part of the target toolchain).
  - Debugging of Android native applications or libraries is no longer supported, and corresponding target configuration database entries and resources have been removed.

14.1.3. Arm Streamline Performance Analyzer

- Added Cortex-A32 support.
- Improved template support, allowing them to work with dynamic charts and big.LITTLE systems.
- When collecting from an energy meter, we now provide an energy chart in addition to the power, voltage, and current charts we've always provided.

14.1.4. Simulation models

- Updated to Fixed Virtual Platforms 9.6 release (64-bit installation only).
- Added new Armv8-A Foundation Platform model (64-bit installation only).
- Note that on 32-bit host platforms, the Versatile™ Express AEMv8-A model has been removed.

14.1.5. Eclipse IDE

- Integrated an evaluation version of the leading MISRA conformance tool LDRAlite™. More information can be found at **http://www.ldra.com/technology-partners/arm/**.
- Added EGit plug-ins, providing support for the Git version control system.

14.1.6. Examples

- Added new bare-metal startup code for Cortex-R8, named "startup_Cortex-R8".
- Added Timer + GICv3 support to Armv8 Fireworks examples, to demonstrate timed interrupts.
- Added new single-core examples that run on the Foundation Platform model, named "calendar_ARMv8", "fireworks_ARMv8x1" and "startup_ARMv8x1".
- Updated the Armv8 bare-metal startup code "startup_Cortex-A53-A57-A72" to support Cortex-A72 in addition to the existing Cortex-A53 and Cortex-A57.

- Refreshed the Streamline examples with latest `streamline_annotate.c/.h` and recaptured the corresponding `.apc`'s.
- Updated RTX with support for Cortex-A5x1 and Cortex-A7x1, in addition to the existing Cortex-A9x1.

15. Version 5.23.1

Build 5231008

Dated 2015/12/16

This is a summary of the new features and other major changes in this release:

- Arm Streamline Performance Analyzer
  - Added support for Cortex-A35
  - Added preliminary support for the Tizen OS
  - The actions performed by target setup are now contained within a script that can be modified by the user to suit their environment, if necessary. The script can be found at`/sw/streamline/gator/setup/gator_setup`
  - Improved UI responsiveness when many annotations are in view in the timeline
  - Improved UI responsiveness when the heatmap is viewed on large displays
  - More state is preserved when closing and reopening a report
  - Floating point numbers can now have negative exponents in series expressions
  - Selected entries in the log view can now be copied to the clipboard
  - A version of gatord compiled for Armv8 is now included in the distribution
  - Gator versions prior to 5.17 are no longer supported
  - Added a more efficient way of collecting ftrace data that can be enabled in the capture settings dialog; when enabled, ftrace counters will not display during live capture and will only appear when viewing the resulting report
  - Improved the efficiency of user-space annotations
- DS-5 Debugger
  - New device support for:
    - Juno Arm Development Platform (r2)

16. Version 5.23

Build 5230020

Dated 2015/11/18

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 6.3 for latest improvements and bug fixes
  - updated to Arm Compiler 5.06u1 for latest improvements and bug fixes
- Arm Streamline Performance Analyzer
  - Streamline is moved out of Eclipse for DS-5 into a separate application
  - templates allow replicating settings between different analysis reports, and replace snippets
  - added support for Live chart editing (including expressions), cross section marker, and bookmarks
  - UI navigation performance improvements
  - annotations are filterable directly in the Timeline view
  - counter configuration provides improved feedback on incorrect or incompatible settings
  - zoom level can be specified when exporting timeline data from the UI or commandline
- DS-5 Debugger
  - added OS awareness for eForce μC3/Compact and μC3/Standard
  - substantial improvements have been made to the refresh performance of the Registers,Variables and Expressions views
  - support for Arm v8.1 Extensions
  - various improvements to the Platform Configuration Editor (PCE) including:
    - improved topology link editing and validation
    - improved component discovery: added support for manual ROM table base address entry
  - new debugger commands added for running, listing and querying usecase scripts
  - new device support for:
    - 96Boards HiKey
    - Actions Semiconductor ActDuino S500, S700 and S900
    - Cavium ThunderX-r2
    - Freescale i.MX6 UltraLite
    - Freescale LS1024A-RDB
    - Renesas RZG1E_R8A7794
    - Intel AXM5600x16 and AXM5600x4 SIM

        - Arm FVP Versatile Express Cortex A5x1
- DSTREAM/RVI
    - new 4.25.0 build 16 of firmware included
- DS-5
    - installation now includes FlexNet 11.13.1.0 license server binaries
    - GNU Make tool is updated to version 4.1
- Examples
    - Jython examples are separated into a new `Jython_examples.zip` file
    - new bare-metal startup example for Cortex-A53 and Cortex-A57 added: `startup_Cortex-A53-A57` in `Bare-metal_examples_ARMv8.zip`
    - example Linux Distribution kernel is modified to support Virtio P9 virtual file system, in addition to the legacy VMFS
    - added Armv7-A examples for Arm Compiler 6: `fireworks_A9-FVP_AC6` and `smp_primes_A9x4_AC6`in `Bare-metal_examples_ARMv7.zip`
    - `rtsm.zip` is now merged into `Linux_distribution_example.zip`
- Simulation models
    - updated to Fixed Virtual Platforms 9.4 release (64-bit host installation only)

17. Version 5.22

Build 5220021

Dated 2015/07/22

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 5.05u2 for latest improvements and bug fixes
  - updated to Arm Compiler 6.02 for latest improvements and bug fixes
- Arm Streamline Performance Analyzer
  - Android ATRACE_BEGIN/END annotations are now supported
  - Streamline can now retrieve executables and the libraries they used directly from the target during capture for analysis
  - warnings now show up in the Live view as they occur, rather than only after a capture has been analyzed
  - the upcoming Mali "Utgard" DDK release for Mali-400 and Mali-450 will support userspace gator
- DS-5 Debugger
  - Variables view provides auto-completion and browsing for local variables
  - improved ability to cope with powered-down Armv8 hardware targets
  - debugger can now access CoreSight components on AXI-AP bus at addresses > 4GB
  - additional controls are provided in the DTSL options dialog for configuring Marvell HSSTP connections
  - new device support for:
    - Juno Arm Development Platform (r1)
    - Freescale i.MX7 SDB
    - Spansion S6J3110EJAA
    - Texas Instruments EVMK2H KeyStone II
- DSTREAM/RVI
  - new 4.24.0 build 12 of firmware included
- Examples
  - added a new Streamline cache example to the Linux application examples, showing the use of Streamline to locate poor cache performance in application code
  - added a bare-metal example showing the use of ITM on a Cortex-M4 platform
  - added bare-metal-boards `hello world` examples for Altera Arria 10 and Spansion Traveo boards

- updated the port of RTX for Cortex-A9 from RTX v4.74 to RTX v4.78, and corrected the behaviour of os_suspend(); see its readme for details on this and other fixes
- Linux examples Xaos, Streamline_annotate and Streamline_cache_test are updated to use the latest streamline_annotate.c/.h, and the Streamline .apc's recaptured
- Linux Distribution example is updated to replace old softfloat AEL filesystem with a recent Linaro hardfloat filesystem
- converted remaining examples that used EB-Cortex-A8 model or Microcontroller Prototyping System (MPS) target to use Cortex-A9 model or MPS2 instead

- Installer
  - added support for installing different versions of DS-5 on the same host; previous versions are no longer automatically uninstalled
- Java
  - Java Runtime Environment (JRE) for Eclipse and other Java applications in DS-5 is upgraded to version 8
- Eclipse
  - Eclipse IDE is upgraded to version 4.4.2 (Luna)
- Simulation models
  - Cortex-A8 simulation model for Emulation Baseboard has been removed
  - updated to Fixed Virtual Platforms 9.3 release (64-bit host installation only)

18. Version 5.21.1

Build 5211009

Dated 2015/04/28

This is a summary of the new features and other major changes in this release:

- DSTREAM/RVI
  - new 4.23.0 build 36 of firmware included:
    - build 36 fixes an issue with failing to read on-chip trace from TI Keystone II

19. Version 5.21

Build 5210017

Dated 2015/03/28

This is a summary of the new features and other major changes in this release:

- Supported Host Platforms
  - Windows XP is no longer supported
- Arm Compiler
  - updated to Arm Compiler 6.01u2 for embedded and bare-metal code for Armv8-A (DS-5 Ultimate Edition only) and Armv7-A processors
- Arm Streamline Performance Analyzer
  - adds support for Cortex-A72
  - adds support for Mali-T8xx
  - improved support for Ftrace counters
  - annotate.h supports creating custom activity charts and an example is provided to show this
  - supports dark and light themes, configurable in Streamline preferences
  - additional Mali GPU snippets for the Midgard series of Mali GPUs
- DS-5 Debugger
  - substantial improvements have been made to all areas of debugger performance
  - Registers and Variables views allow you to choose which registers and variables are displayed
  - Snapshot Viewer connections can now be made within the graphical debugger using the new Generic - Snapshot entries in the Debug Configurations dialog
  - Snapshot Viewer now supports Armv8 architecture as well as multi-core systems
  - new CMSIS-DAP firmware for ULINK2 probe improves USB stability on some Windows hosts
  - undodb-server executable is updated for speed improvements and bug fixes when using application rewind
  - new device support for:
    - Cortex-A9x1 pre-configured to boot Arm Embedded Linux
    - Cortex-A9x4 pre-configured to boot Arm Embedded Linux
    - FastModel connections: VE Cortex A7x3, VE_Cortex_A17x3, VE_Cortex_A12x3, MPS2_Cortex_M7, MPS_Cortex_M0, MPS_Cortex_M0Plus, MPS_Cortex_M3, and MPS_Cortex_M4
    - Cavium - ThunderX
    - Renesas - RZ/T1 R7S910x01/02/06/07/11/13/15/16/17/18, RTK7910018S00000BE
    - Generic - Snapshot

        - Freescale - i.MX6 Solo adds ULINKpro connection support
        - Freescale - i.MX6 SoloLite adds ULINKpro connection support
        - Freescale - i.MX6 SoloX Sabre SDB adds ULINKpro and ULINKpro D connection support
        - Freescale - TWR-LS1021A adds mbed CMSIS-DAP connection support
- DSTREAM/RVI
    - new 4.23.0 build 35 of firmware included
- Examples
    - Armv7 model-based examples now use the VE-A9x1 FVP model from the new "Arm FVP (Installed with DS-5)" folder instead of the deprecated EB-A8 FVP model
    - Armv8 bare-metal examples cache invalidation function now uses the code from the Arm Armv8-A Architecture Reference Manual, and alignment checking has been made explicit
    - DTSLExamples.zip, previously at sw\DTSL, have been updated and moved into the main DS-5 Examples
    - RTX for Cortex-A9 now has a new NEON example added to demonstrate compiling for NEON, FPU initialisation, and NEON task switching
    - RTX for Cortex-A9 can have the default 64K (16-bit) maximum private stack size limit increased to 32-bit by compiling the RTX library with __LARGE_PRIV_STACK
    - CoreSight Access Library example now supports Armv8, ETMv4 and STM-500
- Simulation Models
    - added single-core Cortex-A9 simulation model for bare-metal and Linux application development

20. Version 5.20.2

Build 5202025

Dated 2015/02/20

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 6.01u1 for embedded and bare-metal code for Armv8-A (DS-5 Ultimate Edition only) and Armv7-A processors
- DS-5 Debugger
  - new device support for:
    - Cortex-A72
    - Altera - Arria 10 SoC
    - Freescale - i.MX6 SoloX Sabre SDB
    - Renesas - RZT1
- DSTREAM/RVI
  - new 4.22.0 build 9 of firmware included

21. Version 5.20.1

Build 5201031

Dated 2014/12/11

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 5.05u1 for latest improvements and bug fixes
- DS-5 Debugger
  - new device support for:
    - Axxia 56xx
- DSTREAM/RVI
  - new 4.22.0 version of firmware included

22. Version 5.20

Build 5200024

Dated 2014/10/22

This is a summary of the new features and other major changes in this release:

- Supported Host Platforms
  - Ubuntu Desktop Edition 14.04 LTS (64-bit) is added as a supported host platform
  - Ubuntu Desktop Edition 10.04 LTS (32-bit) is no longer supported
  - Arm Compiler 5.05 adds support for Windows Server 2012
  - Windows Server 2003 is no longer supported
- Arm Compiler
  - updated to Arm Compiler 5.05 for latest improvements and bug fixes
  - updated to Arm Compiler 6.00u2 (for embedded and bare-metal code for ARMv8-A processors, DS-5 Ultimate Edition only)
    - for further information on changes see file`sw/ARMCompiler6.00u2/sw/info/readme.html` in the DS-5 installation directory
  - Eclipse IDE is extended with the capability to register and use different versions of ARM Compiler and gcc than the versions supplied
  - `add_toolchain` command allows registering new compiler toolchains, in addition to those pre-supplied with DS-5, from the command line (DS-5 Command Prompt on Windows, via`suite_exec` on Linux)
  - `select_toolchain` and `select_default_toolchain` commands allow selecting a compiler toolchain from the command line (DS-5 Command Prompt on Windows, via `suite_exec` on Linux)
- Arm Streamline Performance Analyzer
  - user space gator (beta) support for:
    - Annotations
    - Custom counters
    - onlining/offlining of cores
    - hwmon counters, filesystem counters, Linux counters
    - OpenCL kernel tracing for Mali GPU and Arm NEON
  - reduced probe effect of gator by about 15%
  - chart generation from the ftrace buffer using regex expressions
  - automatically copy and run gatord on the target
  - execute a command on the target from Streamline

- adds support for Mali-T7xx (also available in 5.19.1)
- support Android Runtime (ART) images
- ADB devices appear in the Connection Browser
- Stack and Call Graph views removed
- includes gator version 20

- DS-5 Debugger
  - MMU awareness is extended to support Armv8 (DS-5 Ultimate Edition only)
  - DS-5 Debugger python scripting is extended with methods to access the MMU:`listTranslations` and `translate`
  - cache viewing is extended to support L1 cache on Cortex-A53 and L1 and L2 caches on Cortex-A57 when using hardware targets
  - cache viewing is extended to support L1 and L2 caches on Cortex-A53 and Cortex-A57 when using Fast Models version 8.4 / 9.0 or later
  - added OS awareness for Mentor Graphics Nucleus® on Armv5, Armv6M and Armv7 architecture devices
  - OS awareness for Quadros Systems RTXC is extended to Armv7M architecture devices
  - trace support is available when using simulation models
  - new `assemble` command is added to allow Arm assembly to be written directly to memory
  - new device support for:
    - Cortex-M7
    - Dual Arria V SoC (2 Dual Core SoCs)
    - Dual Cyclone V SoC (2 Dual Core SoCs)
    - Cortex-M Prototyping System (MPS2) Cortex-M7 (SMM-M7)
    - Cortex-M Prototyping System (MPS2) Cortex-M7 (SMM-M7CS)
    - VE_Cortex_M7 FVP Model
    - Marvell 88i9346
  - ULINK2, ULINKpro ULINKpro D and CMSIS-DAP support added to:
    - Cortex-M Prototyping System (MPS2) Cortex-M0
    - Cortex-M Prototyping System (MPS2) Cortex-M0+
    - Cortex-M Prototyping System (MPS2) Cortex-M1
    - Cortex-M Prototyping System (MPS2) Cortex-M3
    - Cortex-M Prototyping System (MPS2) Cortex-M4
    - Cortex-M Prototyping System (MPS2) Cortex-M7 (SMM-M7)
    - Cortex-M Prototyping System (MPS2) Cortex-M7 (SMM-M7CS)
  - DSTREAM trace support added to:

        - Versatile_Express_A53x2_SMM
    - Fast Models trace added to:
        - Cortex-A8
        - VE_AEMv8x1
        - VE_AEMv8x4
        - VE_Cortex_A9x4
- DSTREAM/RVI
    - new 4.20.0 version of firmware included
    - new High-Speed Serial Trace Port (HSSTP) probe for DSTREAM supporting Arm HSSTP and Marvell SETM serial trace protocols
- Examples
    - bare-metal Armv8 SMP start-up code example added that initializes the system in AArch64 EL3 then launches an AArch32 SMP application in EL1: `startup_ARMv8_AArch64_with_AArch32_app`
    - bare-metal start-up code added for Cortex-A17 MPCore: `startup_Cortex-A17MPCore`
    - bare-metal start-up code added for Cortex-M7: `startup_Cortex-M7`
    - all example Linux applications are now built for both hardfloat and softfloat
    - Cortex-M examples for MPS boards are updated to also run on MPS2 boards
    - CoreSight Access Library demo is enhanced to capture trace for all cores by default, and now includes an example trace capture for Versatile Express Cortex-A15x2+A7x3 (TC2)
    - Cortex-A9 bare-metal example projects are now compatible with the supplied Cortex-A9 FVP simulation model

23. Version 5.19.1

Build 5191005

Dated 2014/08/19

This is a summary of the new features and other major changes in this release:

- Arm Streamline Performance Analyzer
  - support for Mali-T7xx series
- DS-5 Debugger
  - fixed SDDEBUG-16898: DAP register access errors when connected to USB Blaster targets

24. Version 5.19

Build 5190027

Dated 2014/07/16

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 5.04u2 for latest improvements and bug fixes
- Arm Streamline Performance Analyzer
  - user space Gator now supports kernels 3.4 and later
  - OpenCL improvements
  - early access for Mali-V500 support
  - generic support for Gator to generate charts from filesystem entries
  - GPU activity charts are displayed in the Live view
  - DS-5 ships with a pre-built "gatord" binary
  - Android application package .apk files are now supported as a valid program image
  - Chart configuration allows for drag and drop of series between charts
  - Streamline Data panel adds report searching/filtering
  - support added for generic Summary Tables
  - Gator support for Mali-T7xx is available from **https://git.linaro.org/arm/ds5/gator.git**
- DS-5
  - Eclipse IDE is upgraded to version 4.3.2 (Kepler)
  - Jython is upgraded to version 2.5.3
  - installation now includes FlexNet 11.12.1.0 binaries
- DS-5 Debugger
  - added MMU support (for Armv7 architecture only) with a new MMU view and `mmu` commands
  - added OS awareness for Quadros Systems RTXC on Armv5, Armv6M and Armv7 architecture devices
  - Trace view shows a graphical representation of position in and size of trace buffer
  - add support in the Trace view for searching the trace buffer for a data access on a specified address (ETMv4 + ETMv3)
  - Memory view can be configured to show the contents of processor caches
  - Memory view adds an option to display addresses in a compressed format
  - device support changes include:

        - adds support for Juno Arm Development Platform (ADP)
        - i.MX Solo and SoloLite are extended with connections via ULINKpro
        - Emerald-P target now supports TPIU trace
        - MB9BF506N (Generic) target is moved from Fujitsu to Spansion
        - adds support for AEMv8 simulation model running with a single core (DS-5 Ultimate Edition only)
        - adds support for Renesas RZ/A1L R7S721020 devices
        - Renesas RZ/A1 devices now allow connection using mbed CMSIS-DAP and Toragi CMSIS-DAP hardware units
        - adds support for Alpha Project AP-RZA-0A board
    - new Platform Configuration Editor provides graphical views for creating and editing platforms in the DS-5 Debugger configuration database
- DSTREAM/RVI
    - new 4.18.0 version of firmware included
    - adds cache preservation when debugging Cortex-A15
    - rvi_log_client executable is renamed to dbghw_log_client
    - dbghw_log_client has an extra option `-daplog` that can be used to enable / disable the logging of DAP operations
    - dbghw_batchupdater tool added to allow batch updating of multiple DSTREAM/RVI hardware units
- Examples
    - RTX updated to version 4.74 (see README.txt within the RTX example directory for further information)
    - CMSIS_RTOS_RTX.zip can now be imported directly into Eclipse (as an archive file) rather than having to unzip it first outside of Eclipse
    - new bare-metal examples for Armv8 showing how to enable caches and the MMU, execution level (EL) switching, multi-core execution, semihosting and debugger features:`startup_v8_ARMCompiler6` and `fireworks_v8_ARMCompiler6`
    - bare-metal start-up code added for Cortex-A12: `startup_Cortex-A12MPCore`
- GCC Toolchain:
    - updated to Linaro GCC Toolchain 4.8-2014.04 for Linux applications and Linux kernel

25. Version 5.18.1

Build 5181003

Dated 2014/05/20

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - added Arm Compiler 6.00u1 for embedded and bare-metal code for Armv8-A processors (DS-5 Ultimate Edition only)
  - for further information on changes see file `sw/ARMCompiler6.00/sw/info/readme.html` in the DS-5 installation directory
- DS-5 Debugger
  - fixed SDDEBUG-16375: Connection to some targets unexpectedly refused with an evaluation license

26. Version 5.18

Build 5180018

Dated 2014/04/07

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 5.04u1 for latest improvements and bug fixes
  - added Arm Compiler 6.00 for embedded and bare-metal code for Armv8-A processors (DS-5 Ultimate Edition only)
    - for further information on changes see file `sw/ARMCompiler6.00/sw/info/readme.html` in the DS-5 installation directory
- Arm Streamline Performance Analyzer
  - data capture possible without gator.ko via user-space only gatord on Linux kernel 3.12 and later (early access feature)
  - OpenCL visualization from Mali GPU (early access feature)
  - added image source path substitution
  - Chart configuration supports log charts, line charts and has a redesigned counter source display
  - includes gator version 18
- DS-5 Debugger
  - added the ability to view cache contents in the Data view and on the command line for Cortex- A15
  - Memory view highlights areas of memory that are cached (where cache data is available)
  - `trace dump` command is extended to support dumping of STM and ITM trace
  - added OS awareness for SEGGER embOS™ on Armv5, Armv6M and Armv7 architecture devices
  - exclusive access to a DSTREAM unit can be obtained by connecting with 'username@' prefixed to the IP address or hostname
  - new views are added in Eclipse for configuring and updating the firmware on DSTREAM and RealView ICE hardware debug units
  - RTOS Data view is renamed to OS Data view
  - trace reporting is extended to support ITM and STM
  - improved error messages when trace decode encounters issues
  - device support extended to include:
    - Arm FVP: VE_Cortex_A12x4, VE_Cortex_A7x1, VE_Cortex_A7x2, VE_Cortex_A7x4, VE_Cortex_R5x1, VE_Cortex_R5x2, VE_Cortex_R7x1, VE_Cortex_R7x2

    - Cyclone V SoC (Single Core)
    - Cortex-M Prototyping System (MPS2): Cortex-M0, Cortex-M0+, Cortex-M1, Cortex-M3 and Cortex-M4
    - Faraday SoCreativeIV-A380
    - i.MX6 DualLite
    - i.MX6 SoloLite
    - Linux Application Debug: Application Debug, Connections via AArch64 gdbserver
    - LSI: AXM5500 SIM, AXM5500x4 SIM, AXM5504, AXM5508, AXM5512, AXM5516
    - Pandaboard: debug of the Cortex-M3s
    - TMDX570LS04HDK: added ULINKpro/ULINKpro D support
    - TMDX570LS12HDK: added ULINKpro/ULINKpro D support
    - TMDX570LS31HDK: added ULINKpro/ULINKpro D support
- DSTREAM/RVI
    - new 4.17.0 version of firmware included
- Eclipse
    - Eclipse IDE is upgraded to version 4.3 (Kepler)
- Java
    - Java Runtime Environment (JRE) for Eclipse and other Java applications in DS-5 is upgraded to version 7
- Simulation Models:
    - updated to Fixed Virtual Platforms 8.3.2 release
    - added Armv8 simulation model for Armv8 development (DS-5 Ultimate Edition only)

The following features are at beta status:

- Arm Streamline Performance Analyzer
    - Streamline can now analyse Cortex-M targets using DSTREAM, ITM and DWT with an RTOS such as RTX
- DS-5 Debugger
    - new Linux application rewind feature allows you to seamlessly run and step backwards, use breakpoints and watchpoints (on supported kernels and targets) and examine the state of your application at any point in the past

The following features are deprecated and might be removed in a future release:

- Minimum supported Java version
    - use of Java 6 is deprecated for running Arm's Eclipse plug-ins, and future releases of DS-5 will require Java 7 as the minimum supported version
- Simulation models

    - Cortex-A8 simulation model for Emulation Baseboard is deprecated
- Supported host platforms
    - support for Windows XP is deprecated and will be removed at the end of Q3 2014
    - support for Windows Server 2003 is deprecated and will be removed at the end of Q3 2014
    - support for Ubuntu Desktop Edition 10.04 LTS is deprecated

27. Version 5.17.1

Build 5171010

Dated 2014/01/23

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 5.04 for latest improvements and bug fixes
    - optional Arm Compiler Qualification Kit for Arm Compiler v5.04 is now available to help obtain certification for products in safety critical applications
- Arm Streamline Performance Analyzer
  - Memory Used chart now filterable by process
  - processes view in Live and Timeline shows per-process %CPU and Memory Used statistics
  - for Cortex-M/ITM captures, exceptions/interrupts are integrated into the scheduler trace heatmap
  - for Cortex-M/ITM captures, additional exception statistics are available via the Exceptions table
  - for Cortex-M/ITM captures, support added for ASCII annotations
  - combined .apc/.apd files into a single container
  - support added for the RT-Preempt Full kernel
  - Kconfig now ships with the gator driver to allow easy integration into the Linux build system
  - Caiman open sourced and the Caiman protocol defined and shipped with DS-5 located in `/sw/energy_probe`
  - Gator supports filmstrip for Mali-T6xx GPUs - requires Mali-T6xx DDK r4p0
  - Gator, Caiman, and Streamline support IPv6 addresses
  - CCN-504 supported
- DS-5 Debugger
  - added OS awareness for Micrium® µCOS-II® on Cortex-M family devices
  - MQX operating system support is enhanced with visibility of Real-Time TCP/IP Communication Suite (RTCS) state
  - breakpoints in C and assembly code now track changes to source code
  - Trace Control view provides a menu option for dumping trace data to a file
  - new commands `trace list/info/dump/report` provide access to trace information from the command line
  - Trace Control view shows the relationship between trace source and trace capture devices

- cdbimporter tool is enhanced to support System Trace Macrocell (STM) as well as AHB and AXI address spaces
- Eclipse preferences for Configuration Database is enhanced with Test Platforms dialog to allow checking the validity of platforms
- register set for Cortex-A15 is updated based on the latest technical reference manual (Cortex- A15 r4p0), and now includes Performance Monitor Unit (PMU) registers
- register set is added for CoreLink CCN-504 Cache Coherent Network
- standalone version of Debug and Trace Services Layer (DTSL) included in `/sw/DTSL`
- standalone version of Remote Device Debug Interface (RDDI) included in`/sw/debugger/RDDI`
- device support extended to include:
  - Cortex-M Prototyping System / Cortex-M0: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M0+: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M1: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M3: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M4: DSTREAM and RealView-ICE support
  - Versatile_Express_V2P-CA15_A7: Snapshot View
  - CALAO Systems: Snowball - Snapshot View
- bug fixes and improvements:
  - support for debugging Linux kernel with Large Physical Address Extension (LPAE) turned on: the debugger was unable to read the details of loaded kernel modules, generating Debug Precise Abort errors [SDDEBUG-14760]
  - support for L2C-310 on Cortex-A9 systems: DSTREAM firmware will perform maintenance on L2 cache if L2 cache is enabled, but some cores have disabled MMUs [SDDEBUG-14156]
  - extended DSTREAM DHCP support to fix compatibility issues with some firewalls: some routers require the 'secs' field to be set in BOOTP request [SDDEBUG-15492]

- DSTREAM/RVI
  - new 4.16.0 version of firmware included
- Examples
  - a flash programming example `flash_example-FVP-A9x4` in the `Bare-metal_examples.zip` shows two ways of programming flash devices using DS-5: using a Keil Flash Method and using a Custom Flash Method written in Jython
  - new examples in `CoreSight_Access_Library.zip` demonstrate how to configure and access CoreSight hardware from Linux applications, and how to later process that data in DS-5 Debugger
  - new bare-metal boards example: `Atmel-ATSAMA5D35-EK_RAM`

The following features are at beta status:

- Arm Streamline Performance Analyzer
  - Streamline can now analyse Cortex-M targets using DSTREAM, ITM and DWT with an RTOS such as RTX
- DS-5 Debugger
  - new Linux application rewind feature allows you to seamlessly run and step backwards, use breakpoints and watchpoints (on supported kernels and targets) and examine the state of your application at any point in the past

The following features are deprecated and might be removed in a future release:

- Minimum supported Java version
  - use of Java 6 is deprecated for running Arm's Eclipse plug-ins, and future releases of DS-5 will ship with Java 7 and require this as the minimum supported version
- Simulation models
  - Cortex-A8 simulation model for Emulation Baseboard is deprecated
- Supported host platforms
  - support for Ubuntu Desktop Edition 10.04 LTS is deprecated

28. Version 5.17

Build 5170015

Dated 2013/12/16

This is a summary of the new features and other major changes in this release:

- Arm Compiler
  - updated to Arm Compiler 5.04 for latest improvements and bug fixes
    - optional Arm Compiler Qualification Kit for Arm Compiler v5.04 is now available to help obtain certification for products in safety critical applications
- Arm Streamline Performance Analyzer
  - Memory Used chart now filterable by process
  - processes view in Live and Timeline shows per-process %CPU and Memory Used statistics
  - for Cortex-M/ITM captures, exceptions/interrupts are integrated into the scheduler trace heatmap
  - for Cortex-M/ITM captures, additional exception statistics are available via the Exceptions table
  - for Cortex-M/ITM captures, support added for ASCII annotations
  - combined .apc/.apd files into a single container
  - support added for the RT-Preempt Full kernel
  - Kconfig now ships with the gator driver to allow easy integration into the Linux build system
  - Caiman open sourced and the Caiman protocol defined and shipped with DS-5 located in /sw/energy_probe
  - Gator supports filmstrip for Mali-T6xx GPUs - requires Mali-T6xx DDK r4p0
  - Gator, Caiman, and Streamline support IPv6 addresses
  - CCN-504 supported
- DS-5 Debugger
  - added OS awareness for Micrium® µCOS-II® on Cortex-M family devices
  - MQX operating system support is enhanced with visibility of Real-Time TCP/IP Communication Suite (RTCS) state
  - breakpoints in C and assembly code now track changes to source code
  - Trace Control view provides a menu option for dumping trace data to a file
  - new commands trace list/info/dump/report provide access to trace information from the command line
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- cdbimporter tool is enhanced to support System Trace Macrocell (STM) as well as AHB and AXI address spaces
- Eclipse preferences for Configuration Database is enhanced with Test Platforms dialog to allow checking the validity of platforms
- register set for Cortex-A15 is updated based on the latest technical reference manual (Cortex- A15 r4p0), and now includes Performance Monitor Unit (PMU) registers
- register set is added for CoreLink CCN-504 Cache Coherent Network
- standalone version of Debug and Trace Services Layer (DTSL) included in /sw/DTSL
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- device support extended to include:
  - Cortex-M Prototyping System / Cortex-M0: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M0+: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M1: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M3: DSTREAM and RealView-ICE support
  - Cortex-M Prototyping System / Cortex-M4: DSTREAM and RealView-ICE support
  - Versatile_Express_V2P-CA15_A7: Snapshot View
  - CALAO Systems: Snowball - Snapshot View

- DSTREAM/RVI
  - new 4.15.0 version of firmware included
  - support added for SMP debugging on Armv8 devices
- Examples
  - a flash programming example flash_example-FVP-A9x4 in the Bare-metal_examples.zip shows two ways of programming flash devices using DS-5: using a Keil Flash Method and using a Custom Flash Method written in Jython
  - new examples in CoreSight_Access_Library.zip demonstrate how to configure and access CoreSight hardware from Linux applications, and how to later process that data in DS-5 Debugger
  - new bare-metal boards example: Atmel-ATSAMA5D35-EK_RAM

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  - Streamline can now analyse Cortex-M targets using DSTREAM, ITM and DWT with an RTOS such as RTX
- DS-5 Debugger
  - new Linux application rewind feature allows you to seamlessly run and step backwards, use breakpoints and watchpoints (on supported kernels and targets) and examine the state of your application at any point in the past

The following features are deprecated and might be removed in a future release:

- Minimum supported Java version
  - use of Java 6 is deprecated for running Arm's Eclipse plug-ins, and future releases of DS-5 will ship with Java 7 and require this as the minimum supported version
- Simulation models
  - Cortex-A8 simulation model for Emulation Baseboard is deprecated
- Supported host platforms
  - support for Ubuntu Desktop Edition 10.04 LTS is deprecated

29. Version 5.16

Build 5160048

Dated 2013/10/23

- Supported host platforms
  - added support for Red Hat Enterprise Linux 6 Workstation
- Arm Compiler
  - updated to Arm Compiler 5.03u3 for latest improvements and bug fixes
- Arm Streamline Performance Analyzer
  - auto-discover Gator, DSTREAM, and RealView ICE connections over the local network
  - support added for Mali-450 GPU
  - Streamline Data view adds the ability to import and export zipped capture files
  - chart configuration in the Timeline view provides settings for lower and upper extent of displayed data
  - Timeline view allows filtering by thread name
  - experimental support added for Cortex-A12 Performance Monitor Unit (PMU)
  - experimental support added for CoreLink CCN-504 Cache Coherent Network hardware counters
  - includes gator version 16
- DS-5 Debugger
  - added OS awareness for Express Logic ThreadX® on Cortex family devices
  - OS awareness for Micrium® µCOS-III® extended to Cortex-A family devices
  - Trace view now supports searching by instruction address, data address, function name and index
  - new Trace Control view to display information about trace capture devices and configure when trace capture is started and stopped
  - new commands `trace-start` and `trace-stop` allow starting and stopping trace capture from scripts
  - support is added for 64-bit data from STM (System Trace Macrocell)
  - Trace view allows display of captured trace data without stopping the target
  - device support extended to include:
    - i.MX6 Solo (Generic): DSTREAM and RVI
    - Vybrid VF5xx: ULINKPro, ULINKPro D and CMSIS-DAP, RVI and DSTREAM
    - Vybrid VF3xx: ULINKPro, ULINKPro D and CMSIS-DAP, RVI and DSTREAM
    - mbed NXP LPC11U24: CMSIS-DAP

        - mbed NXP LPC1768: CMSIS-DAP
    - ULINKPro and ULINKPro D support added to:
        - Altera - Arria V SoC
        - Altera - Cyclone V SoC
        - Arm Development Boards - Versatile Express A9x4
        - Atmel - SAMA5D3x
        - Avnet - Zedboard_JTAG_J15
        - beagleboard.org - OMAP 3530
        - Freescale - i.MX50 Generic
        - Freescale - i.MX50 EVK
        - Freescale - i.MX51 Generic
        - Freescale - i.MX51 PDK
        - Fujitsu - MB9BF506N Generic
        - Nufront - NS115 Generic
        - Nufront - NS115 Development Kit
        - Phytec - Vybrid-VF65
        - ST - SPEAr1310
        - Texas Instruments - OMAP 3430 Generic
        - Texas Instruments - OMAP 34XX Generic
        - Texas Instruments - OMAP 3530 Generic
        - Texas Instruments - OMAP 35XX Generic
        - Texas Instruments - OMAP 3630 Generic
        - Xilinx - Zynq-7000 EPP Emulation Board
        - Xilinx - Zynq-7000 EPP ZC702
    - ULINKPro D support added to:
        - Keil - Keil MCBSTM32E Evaluation Board
        - Freescale - Vybrid VF6xx
        - Renesas - RZ/A1H R7S721001
    - ULINK2 support added to:
        - Arm Development Boards - Versatile Express A9x4
    - CMSIS-DAP support added to:
        - Phytec - Vybrid-VF65
- DSTREAM/RVI
    - new 4.14.0 version of firmware included

  - powerdown awareness for Freescale i.MX6 and TI KeyStone platforms is added
  - support added for CoreSight components and Cortex cores on AHB/AXI interfaces
  - allows simultaneous connection from DS-5 and csat tools to the same target
- Eclipse IDE
  - notifications are added for support and maintenance expiry and impending license expiry
  - updated to PyDev (Python development plug-ins) version 2.7.5 in Eclipse IDE for latest enhancements and fixes
- Examples
  - new Linux examples `application_rewind_1` and `application_rewind_2` demonstrating application rewind
  - new bare-metal example `Freescale-iMX6Q_RAM` showing debug support for the Freescale i.MX6Q
  - numerous fixes and improvements to RTX real-time operating system (see README.txt within the RTX example directory for further information)

The following features are at beta status:

- Arm Streamline Performance Analyzer
  - Streamline can now analyse Cortex-M targets using DSTREAM, ITM and DWT with an RTOS such as RTX
- DS-5 Debugger
  - new Linux application rewind feature allows you to seamlessly run and step backwards, use breakpoints and watchpoints (on supported kernels and targets) and examine the state of your application at any point in the past

The following features are deprecated and might be removed in a future release:

- Minimum supported Java version
  - use of Java 6 is deprecated for running Arm's Eclipse plug-ins, and future releases of DS-5 will ship with Java 7 and require this as the minimum supported version
- Simulation models
  - Cortex-A8 simulation model for Emulation Baseboard is deprecated
- Supported host platforms
  - support for Ubuntu Desktop Edition 10.04 LTS is deprecated

30. Version 5.15

Build 5150015

Dated 2013/06/17

- Arm Compiler
  - updated to Arm Compiler 5.03u2 for latest improvements and bug fixes
    - adds support for Cortex-A12 (`--cpu Cortex-A12`)
- Arm Streamline Performance Analyzer
  - Capture & Analysis Options dialog adds a Keep option to limit the amount of data to process from a capture session
  - per-cpu disclosure added to the real-time live display
  - CPU Wait charts are now user configurable
  - Log view allows filtering on `When` and `Duration`
  - performance of .apc file generation is improved
  - redesigned interface for displaying warnings
- DS-5
  - separate installers are provided for 32-bit and 64-bit Windows
- DS-5 Debugger
  - processor support extended to include Cortex-A12
  - watchpoints are now supported when connected to CADI simulation models
  - added OS awareness for FreeRTOS™ on Cortex-M family devices
  - added OS awareness for Micrium® µCOS-III® on Cortex-M family devices
  - breakpoint and memory commands now set an internal $ variable with the breakpoint or memory region number so that these can be used in subsequent scripting commands
  - new command `newvar` allows creation of new variables in DS scripts
  - new address space AXI: provides direct memory access via a CoreSight™ Debug Access Port
  - cdbimporter now supports Embedded Trace FIFO (ETF) and Embedded Trace Router (ETR) devices
  - device support extended to include: Avnet ZedBoard, Freescale i.MX6 Dual, Mindspeed T2200 / T3300, pandaboard.org OMAP 5432, Renesas RZ/A1H R7S721001, ST-Ericsson U8540, TI OMAP 543X and TI TMDX570LS04HDK / TMDX570LS12HDK / TMDX570LS31HDK / TMDXRM42HDK / TMDXRM46HDK / TMDXRM48HDK
- DSTREAM/RVI
  - new 4.12.0 version of firmware included
  - support added for > 32-bit addresses on AXI-AP

  - drive strengths of the JTAG/SWD signals on the DSTREAM probe are reduced to prevent signal reflection issues with certain targets
  - improved support for large multi-core systems containing Cortex devices
- Eclipse IDE
  - removed a limitation on linker command line lengths when building projects on Windows host platforms
  - License Manager dialog provides a diagnostics tab to help resolve licensing errors
  - improved visibility of product update notifications
- Examples
  - new projects `Freescale-Vybrid-VF6xx-A5_RAM` and `Freescale-VF6xx-M4_RAM` in `Bare-metal_boards_examples.zip` demonstrate basic bare-metal applications running on Freescale Vybrid VF6xx devices
  - ports of RTX for Renesas RZ/A1 device and GENMAI board are included in `CMSIS_RTOS_RTX.zip`
- GCC Toolchain:
  - updated to Linaro GCC Toolchain 2013.03 for Linux applications and Linux kernel
- Simulation Models
  - pre-supplied Real-Time Simulation Models (RTSM) are rebranded to Fixed Virtual Platforms (FVP)

31. Version 5.14

Build 1702

Dated 2013/03/26

- Arm Compiler
  - updated to Arm Compiler 5.03 for latest enhancements and bug fixes:
    - improved performance on well-formed loops and switch-based FSMs
    - new loop optimizations, enabled with --loop_optimization_level=2
- Arm Streamline Performance Analyzer
  - new live view added to show performance data as it is being captured
  - Timeline view displays individual kernel threads under the kernel process.
  - Timeline view allows easy restoration of auto-generated charts via the snippets menu.
  - includes gator version 13
  - gator adds support for monitoring the performance of CoreLink CCI-400 (Cache Coherent Interconnect)
  - gator adds support for environmental data such as temperature, voltage, power and energy within the Linux kernel via the hwmon interface
  - gator adds support for capturing counters from clusters independently in a big.LITTLE system
- DS-5 Debugger
  - added OS awareness for Keil CMSIS-RTOS RTX on Cortex-M and Cortex-A9 devices
  - added OS awareness for Freescale MQX RTOS on Arm processor-based Freescale devices
  - trace displays can be time-correlated within the debugger and with external tools
  - support is provided for displaying the CoreSight Global Timestamp unit
  - instruction and data trace from ETMv4 devices (such as Cortex-R7) is now supported
  - Altera USB-Blaster is supported as a connection mechanism to Altera Arria V SoC and Cyclone V SoC boards
  - context menu in the Debug Control and Trace views allows editing DTSL (Debug and Trace Services Layer) options during a debug session
  - new command set/show dtsl-options can be used to access DTSL options during a debug session
  - new command set/show trust-ro-sections-for-opcodes controls whether trace and disassembly can rely on data from read-only sections within any images that are loaded
  - device support extended to include: Altera Arria V SoC, Altera Cyclone V SoC and Atmel ATSAMA5D3x
- DSTREAM/RVI

- new 4.11.0 version of firmware included
- Cortex-A50 series support now also includes support for Cortex-A53
- stepping speed on Cortex-A cores is improved
- SWD connections are supported over 38-pin Mictor connector and Arm and TI 14-pin JTAG connectors

- Examples
  - new Jython script jython_pmu to demonstrate use of the Performance Monitor Unit (PMU) to count elapsed cycles and user-defined events
  - source code and examples for a Cortex-A9 port of Keil CMSIS-RTOS RTX are included in CMSIS_RTOS_RTX.zip
  - Linux application examples cpp, cpp_library, cppex, cppex_library and example_library are removed
  - BeagleBoard/xM Linux distributions in the Linux examples are removed

32. Version 5.13

Build 1622

Dated 2012/12/14

- Arm Compiler
  - Updated to Arm Compiler 5.02u1 for latest bug fixes
- Arm Streamline Performance Analyzer
  - Capture & Analysis Options dialog allows configuring Arm Energy Probe options
  - hierarchy of annotations in the form of groups and channels
  - zoom performance in the Timeline view is improved
  - includes gator_v12
- DS-5 Debugger
  - define command can use the variable $argv to refer to all the arguments
  - new document command allows help to be attached to newly defined commands
  - custom commands now auto-complete in the Commands view and display their help in a tooltip
  - device support extended to include: Boundary Devices SABRE Lite, Boundary Devices Nitrogen6x, HardKernel O-Droid Q, Phytec PhyCORE Vybrid, Samsung Exynos 4410, Samsung Exynos 4412 and Samsung Exynos 5250
- DSTREAM/RVI
  - new 4.10.0 version of firmware included
- Examples
  - jython script jython_ttd to demonstrate decoding MMU translation tables

33. Version 5.12

Build 1571

Dated 2012/10/13

- Supported host platforms
  - Added Ubuntu Desktop Edition 12.04 LTS
- DS-5
  - Separate installers are provided for 32-bit (install_x86_32.sh) and 64-bit (install_x86_64.sh) Linux. Note 32-bit compatibility libraries are still required on 64-bit hosts (see section **Install on Linux**)
- Arm Compiler
  - Updated to Arm Compiler 5.02:
    - Support for Cortex-M0+
    - Performance improvements on CoreMark benchmark on Cortex-M3 and Cortex-M4 processors
    - Up to 40% performance improvements for 64-bit multiply operations on Cortex-M0 and Cortex-M0+, to accelerate DSP code
- Arm Streamline
  - Per-cluster viewing in the timeline (charts and x-ray mode) for big.LITTLE systems
  - National Instruments™ M Series DAQ for USB (USB-62xx) supported as external data source
  - Time filtering of analysis reports from the command line
- DS-5 Debugger
  - Initial support for flash programming, provided by new debugger command flash load
  - Data trace support for Cortex-A8, Cortex-A5, Cortex-R4 and Cortex-R5
  - Instruction trace support for Cortex-R7
  - Support for DWARF4 debug information generated by gcc 4.5 releases
  - Device support extended to include Emtrion DIMM-EMEV2 and DIMM-MX53 boards
  - The debugger no longer configures vector catches by default on connecting. However, when using Eclipse for DS-5, user-defined vector catch configurations are remembered on a per debug configuration basis. Vector catch is especially useful in the early stages of a bare-metal project where, for example, interrupt handlers and memory protection are not yet written. For more details search for "Handling processor exceptions" in the DS-5 help.
- Examples
  - A flash programming example has been added, comprising:
    - flash_algo-STM32F10x: flash algorithm targeted at STM32F10x family processor (as present on MCBSTM32E board), and

    - flash_blinky-MCBSTM32E: a blinky example payload targeted at MCBSTM32E board
- Another Jython scripting example has been added, jython_infostate, to display the state (stack frame / execution context) of a bare-metal or Linux application. This illustrates the use of several Jython debug classes/services (such as getExecutionContext(), getProgramAddress() and getRegisterNames()), and can be used as a starting point for your own debug scripts.
- The Linux application examples (gnometris, threads, xaos, etc.) can now be built with either hard-float or soft-float libraries
- As a consequence of moving from CodeSourcery gcc to Linaro gcc, the ability to build the Linux application examples with armcc has been removed from their makefiles

34. Version 5.11

Build 1479

Dated 2012/07/31

- Arm Compiler toolchain: updated to 5.01u4 release for latest bug fixes
- Arm Compiler toolchain: Windows Server 2008 R2 is added as a supported host platform
- GCC Toolchain: Linaro GCC Toolchain 2012.05 (**https://launchpad.net/gcc-linaro/4.7/4.7-2012.05**) is added, and introduces support for hardfloat as well as including many new optimisations for Armv7 architecture targets; the previous CodeSourcery toolchain is removed, but can still be obtained from **here**
- Arm Streamline: support added for Mali-T6xx
- Arm Streamline: editing of charts is now performed inline in the Timeline view, replacing the separate Chart Configuration view
- Arm Streamline: Timeline view chart configurations can be imported and exported for easy sharing with other developers
- Arm Streamline: Timeline view allows filtering by thread
- Arm Streamline: Snippets button at bottom of Timeline view allows easy adding of new charts
- Arm Streamline: includes gator_v10
- Arm Streamline: gator compatibility extended to Linux 3.5
- DS-5: Windows 7 service pack 1 is added as a supported host platform
- DS-5: installation now includes FlexNet 11.10.1.0 binaries
- DS-5: new armlmdiag utility added next to existing licensing utilities (/sw/FLEXnet_/ /) to aid in diagnosing licensing problems
- DS-5: added Target Configuration Editor plug-ins to Eclipse to allow importing, exporting and editing peripheral description files in a variety of formats
- DS-5: settings panel for Arm Compiler projects now allows configuring additional object files to link against
- DS-5 Debugger: the Files tab in the debug launch dialog provides an Add peripheral description files option to allow CMSIS-SVD peripheral description files to be loaded when connecting to the target
- DS-5 Debugger: Trace view shows data addresses and values when enabled in the DTSL Options dialog for devices that contain an ETMv3.5
- DS-5 Debugger: content of Trace view can be filtered using the new Trace Record Filter Settings dialog
- DS-5 Debugger: right-click on column headers in the Trace view to configure which columns are displayed

- DS-5 Debugger: new Events view added for configuring, displaying and filtering data from System Trace Macrocell (STM) components (STM support is beta status)
- DS-5 Debugger: debug launch dialog has changed to provide a tree view to select target platform and debug operation
- DS-5 Debugger: debug launch dialog allows configuration of the parameters used when launching a CADI simulation model
- DS-5 Debugger: new command set/show debug-agent can be used to access configuration settings for an attached DSTREAM or RealView ICE hardware unit
- DS-5 Debugger: new Target Console view provides access to semihosting when using simulation models that provide their own semihosting implementation
- DS-5 Debugger: device support extended to include: Arm Versatile Express AEMv7A RTSM (configured as Cortex-A15), Arm Versatile Express Cortex-A15x1 + Cortex-A7x1 RTSM, Arm Versatile Express Cortex-A15x4 + Cortex-A7x4 RTSM, Arm Versatile Express Cortex-A15x1 RTSM, Arm Versatile Express Cortex-A15x2 RTSM, Arm Versatile Express Cortex-A15x4 RTSM, Arm Versatile Express V2P Cortex-A15x2 + Corex-A7x3 and Freescale Vybrid VF6xx
- DSTREAM/RVI: new 4.8 version of firmware included
- Eclipse: License Manager Dialog allows choosing which license to use in the case where multiple different licenses are available
- Eclipse: RXTX serial terminal plug-in is added (search for Terminal in Eclipse's Show View dialog)
- Examples: pre-built Linux example executables are now built with Linaro GCC (except U-Boot, Beagle and Beagle xM Linux distributions)
- Examples: TrustZone example is now supported on Versatile Express Cortex-A9x4 RTSM
- Examples: bare-metal examples fireworks_A9x2- RTSM and smp_primes_A9x2-RTSM for the obsolete EB Cortex-A9x2 RTSM are replaced by fireworks_A9x4-RTSM andsmp_primes_A9x4-RTSM for the VE Cortex-A9x4 RTSM
- Examples: Xaos example and Streamline analysis file xaos-multithreaded- VXA9x4-example.apc are enhanced to illustrate thread naming and annotation of thread functions
- Examples: Beagle and Beagle xM Linux distributions are unchanged from DS-5 5.10 and will no longer be updated in future releases
- Simulation Models: dual-core Cortex-A9 simulation model for Emulation Baseboard is removed

35. Version 5.10

Build 1389

Dated 2012/05/15

- Arm Compiler toolchain: updated to 5.01u3 release for latest bug fixes
- Arm Streamline: new dynamic Chart Config view allows controlling the Timeline view appearance
- Arm Streamline: Capture options allows setting Sample Rate to None to disable periodic sampling interrupts
- Arm Streamline: Timeline view shows why threads stop / suspend due to contention, I/O or mutexes
- Arm Streamline: additional Timeline view filtering per process
- Arm Streamline: Timeline view allows exporting counter data to a text file
- Arm Streamline: Data view allows toggling between standard and compact listings
- DS-5 Debugger: Memory and Screen views can be configured to refresh periodically when running or stopped
- DS-5 Debugger: DS-5 -> Target Database in Eclipse Preferences dialog is enhanced to allow multiple target databases to be configured
- DS-5 Debugger: debug launch configuration dialog allows editing trace and other system options
- DS-5 Debugger: processor support extended to include Cortex-M0+ and Cortex- R7
- DS-5 Debugger: pandaboard and Snowball board support extended to use hardware cross-triggering for tighter multi-core synchronisation
- DS-5 Debugger: multi-core systems with clusters now show cluster grouping in the Debug Control view and in the output of the info cores command
- DS-5 Debugger: new command preprocess allows printing the value of C preprocessor macros
- DS-5 Debugger: device support extended to include: Arm Microcontroller Prototyping System (Cortex-M0+), Freescale Kinetis L Series, Fujitsu MB9BF506N, NXP Shiner and Origen board (contains Exynos 4210)
- DSTREAM/RVI: new 4.7 version of firmware included
- Examples: bare-metal start-up code added for the Cortex-M0+ and Cortex-R7 processors: startup_Cortex-M0+, startup_Cortex-R7
- Examples: examples ported to Cortex-A9x4 RTSM platform: kernel_module, smp_primes_A9x4-RTSM
- Examples: new Hello World example for Xilinx Zynq ZC702: Xilinx- Zynq_ZC702_RAM
- Examples: added Linux distribution with kernel version 2.6.38 for use with simulation models of Versatile Express board with Armv7 architecture compatibility
- Simulation Models: added Cortex-A9x4 simulation model for Versatile Express board

- **Simulation Models:** dual-core Cortex-A9 simulation model for Emulation Baseboard is deprecated and will be removed in a future release

36. Version 5.9

Build 1304

Dated 2012/03/01

- Arm Compiler toolchain: updated to 5.01u2 release for latest bug fixes
- Arm Streamline: Timeline filtering per process selection
- Arm Streamline: Timeline process pane can be configured to display GPU (graphics processor) and VPU (vertex processor) heat map
- Arm Streamline: visualization of Mali™ GPU vertex and fragment processors trace activity
- Arm Streamline: DVFS clock frequency is displayed in the Timeline chart
- Arm Streamline: support for all performance counters on Qualcomm Scorpion processors (for example MSM8660)
- Arm Streamline: support for the architecturally compliant counters on Qualcomm Krait processors (for example MSM8960)
- Arm Streamline: current, voltage and power usage can be analyzed using the Energy Probe hardware unit (available to purchase separately)
- Arm Streamline: added onlining/offlining support for perf inside gator
- Arm Streamline: gator uses perf HAL on Linux versions 3.0 and later
- Arm Streamline: includes gator_v8
- DSTREAM/RVI: new 4.6 version of firmware included
- DS-5: Linux Edition is renamed to Basic Edition
- DS-5: installation now includes FlexNet 11 binaries
- DS-5 Debugger: added support for debugging Linux symmetric multiprocessing (SMP) systems
- DS-5 Debugger: Debug Control view provides separate visibility of active (currently scheduled) threads and all threads
- DS-5 Debugger: Debug Control view and command line indicate the power state of each core
- DS-5 Debugger: when performing Linux kernel debug, the list of threads that is printed when stopping now only includes the active (currently scheduled) threads; use info threads to list all the threads
- DS-5 Debugger: new address spaces AHB: and APB: added for direct memory access via a CoreSight™ Debug Access Port
- DS-5 Debugger: memory can be accessed whilst the target is running (subject to the target and address spaces supporting this)
- DS-5 Debugger: memory can be filled using new Fill Memory dialog in Eclipse and using memory fill from the command line

- DS-5 Debugger: debugger can connect to VSTREAM (available for purchase separately) to debug on RTL simulators and hardware emulators
- DS-5 Debugger: device support extended to include: Arm Versatile Express V2P Cortex-A15, Arm Versatile Express with Cortex-A15 NEON Soft Macrocell Model, Arm Versatile Express with Cortex- R5x2, Arm Versatile Express Cortex-A15x4 + CortexA7x4 RTSM, CALAO Systems Snowball board, Freescale i.MX6 Quad, NVIDIA Tegra 3, PandaBoard ES, ST-Ericsson AP9500, TI AM3352/4/6/7/8/9 / OMAP 4460 and Xilinx Zynq-7000 EPP ZC702
- Eclipse: ELF Content Editor now displays segment information in a separate tab
- Examples: new example added to demonstrate TrustZone® debugging on Versatile™ Express A9x4 board: TrustZone
- Examples: new example added to demonstrate symmetric multiprocessing (SMP) bare- metal debug on Cortex-A15 MPCore™: smp_primes_A15x2-Coretile
- Examples: new example added to demonstrate symmetric multiprocessing (SMP) bare- metal debug on Snowball: fireworks_snowball
- Examples: new instrumented C code example added to demonstrate instrumented Arm Streamline bookmark, text, and visual annotations: Streamline_annotate
- Examples: new example Jython script added in DS-5 Debugger: jython_hash
- Examples: bare-metal start-up code added for the Cortex-A15 MPCore processor: startup_Cortex-A15MPCore
- Examples: Kernel module debug example now has a generic makefile, to build it against any kernel with user-supplied dependencies, for example, for use on Snowball

37. Version 5.8

Build 1261

Dated 2012/01/23

- **Eclipse:** updated Japanese translations for Eclipse plug-ins and product documentation

Arm DS-5 Development Studio version 5.8 build 1213 dated 2011/11/29:

- **Arm Compiler toolchain:** updated to 5.01u1 release for latest bug fixes
- **Arm Compiler toolchain:** added support for Cortex-A7
- **Arm Streamline:** command line streamline tool provides new - timeline option to export Timeline data as text
- **Arm Streamline:** annotation support is extended to the Linux kernel
- **Arm Streamline:** event sampling can be performed at microsecond resolution
- **Arm Streamline:** gator is modified to cope when all cores enter hibernate state
- **Arm Streamline:** callstack unwinding is supported within kernel code
- **Arm Streamline:** pins can be attached to charts in the Timeline view to identify areas of interest
- **Arm Streamline:** Functions view adds an Image column showing the image that each function comes from
- **Arm Streamline:** added support for Performance Monitoring Unit (PMU) on Cortex- A7
- **Arm Streamline:** includes gator_v7
- **DS-5 Debugger:** Debug Configuration dialog includes improved support for debugging Android NDK-generated native libraries
- **DS-5 Debugger:** trace start and stop points and trace ranges can be configured to restrict trace capture to areas of interest
- **DS-5 Debugger:** trace triggers can be configured to mark points of interest in the trace capture and then locate them in the Trace view
- **DS-5 Debugger:** instruction trace for Cortex-A5 and Cortex-A7 is supported
- **DS-5 Debugger:** Eclipse extension point interface added for third-party OS support (contact Arm for further information)
- **DS-5 Debugger:** added set/show print current-vmid commands to control automatic printing of the current Virtual Machine ID (VMID) when it changes
- **DS-5 Debugger:** added core/thread apply command to execute a command over one or more cores or threads
- **DS-5 Debugger:** debugger supports connecting to third-party CADI-based simulation models
- **DS-5 Debugger:** cdbimporter tool extended to allow importing of third-party simulation models into the DS-5 Debugger configuration database

- DS-5 Debugger: device support extended to include: Arm Emulation Baseboard with ARM1156T2F-S Core Tile, Arm Versatile Express with Cortex-A15x2 Soft Macrocell Model, Atmel AT91SAM9G25 / AT91SAM9X35, LG Electronics L9, Mindspeed M84000 (Transcede 4000) and NXP LPC3131 / LPC3141 / LPC3152
- Examples: Xaos example extended to demonstrate Streamline visual annotation feature
- Examples: added new start-up code examples in /examples/Bare-metal_examples.zip: startup_Cortex-A7
- Examples: pre-supplied Linux kernel and filesystem are now identical for BeagleBoard and Beagle-xM
- Examples: example Linux kernel distributions are updated to linux-2.6.38
- Examples: source code for Linux image for Cortex-A8 RTSM is now supplied (as a separate download)
- Simulation Models: model_shell executable is included to facilitate running third-party simulation models

38. Version 5.7

Build 1210

Dated 2011/11/28

- Eclipse: updated Japanese translations for Eclipse plug-ins and product documentation

Arm DS-5 Development Studio version 5.7 build 1139 dated 2011/09/30:

- Arm Compiler toolchain: updated to 5.01 release for latest bug fixes and enhancements
- Arm Compiler toolchain: inline assembler now supports Thumb-2 instructions
- Arm Compiler toolchain: new stack protection feature, enabled using -- protect_stack, helps to guard against local buffer overflows
- Arm Compiler toolchain: vectorization enhanced to cope with const-references
- Arm Streamline: selecting a range in the Timeline view shows aggregated event counters for that period
- Arm Streamline: bookmarks can be set in the Timeline view to quickly label and return to important points
- Arm Streamline: Timeline view bookmarks can be automatically created by adding annotation functions in your application
- Arm Streamline: command line interface added to allow scriptable capturing, analysis and reporting of Streamline data
- Arm Streamline: event-based sampling (beta) allows event counters to be sampled after a configured number of samples events have occurred
- Arm Streamline: added ability to display Linux thread names
- Arm Streamline: support for 64-bit counters is added
- Arm Streamline: gator daemon is released as open source
- Arm Streamline: Cortex-A15 is fully supported (was previously early access)
- Arm Streamline: includes gator_v6
- DS-5: Ubuntu Desktop Edition 10.04 LTS (32-bit only) is added as a supported host platform
- DS-5 Debugger: added the ability to debug bare-metal applications on the pre- supplied dual-core Cortex-A9 Real-Time System Model (RTSM)
- DS-5 Debugger: added jython interface to allow larger and more complex debugger scripts to be created
- DS-5 Debugger: new Functions view added to allow browsing and searching function by name, address, source file and image
- DS-5 Debugger: Event Viewer (early access) added to allow capture and display of logging events from bare-metal applications using the Instrumentation Trace Macrocell (ITM)
- DS-5 Debugger: Expression Inspector view can be moved from the title bar

- DS-5 Debugger: Breakpoint Properties dialog provides quick access to scripts in the Scripts view for attaching to breakpoints
- DS-5 Debugger: added set/show print double-format/float-format commands to set and show the display format of double and single precision floating-point values
- DS-5 Debugger: added info inst-sets to list the available instruction sets for use in disassembly and other related commands
- DS-5 Debugger: hardware breakpoint functionality extended to support hypervisor debug, including hypervisor specific and virtual machine specific breakpoints
- DS-5 Debugger: internal breakpoints that the debugger uses to support features such as semihosting and Linux kernel debug are now visible in the Breakpoints view and on the command line
- DS-5 Debugger: built-in DS-5 scripting functions extended to include strncmp, strcpy, strncpy and memcpy
- DS-5 Debugger: cycle-accurate tracing is available for some platforms
- DS-5 Debugger: device support extended to include: Arm Microcontroller Prototyping System (Cortex-M0/Cortex-M1/Cortex-M4), Keil MCBSTR9, ST STA2064/65, ST STR912, TI AM1707 / AM1808 / DM3725 / DM3730 / DM8168 / OMAP 3530 / OMAP L138 and Xilinx Zynq-7000 EPP
- DS-5 Debugger: processor support extended to include: Cortex-M0/M1/M4, Cortex-R5, Arm946E-S, Arm966E-S, Arm968E-S and Arm1156T2(F)-S
- DSTREAM/RVI: new 4.5 version of firmware included
- DSTREAM/RVI: CoreSight Access Tool (CSAT) added for low-level access to CoreSight components
- Eclipse: updated to Eclipse 3.7, CDT 8.0, RSE 3.3 and added PyDev 2.2.2
- Eclipse: ELF Content Editor now displays section information in a separate tab
- Examples: examples ported to Cortex-A9x2 RTSM platform: fireworks_a9x2rtsm, smp_primes_a9x2rtsm
- Examples: new example added to demonstrate use of the DS-5 Event Viewer functionality with ITM on the Versatile Express Cortex-A9x4 platform: smp_primes_ITM
- Examples: bare-metal start-up code added for the Cortex-A15 processor, including vector table, exception handlers, MMU, caches and VFP/NEON initialization, based on the Versatile Express Cortex- A15 platform: startup_Cortex-A15
- Examples: bare-metal start-up code added for the Cortex-R5(F) processor, including vector table, exception handlers, MPU, caches, TCM and VFP initialization, based on the Versatile Express R5x2 platform: startup_Cortex-R5
- Examples: bare-metal start-up code added for the Cortex-M0/M1/M4 processors, including vector table, SysTick timer and interrupt handler, all written in C, based on the Microcontroller Prototyping System: startup_Cortex-M0, startup_Cortex-M1 and startup_Cortex-M4

- **Examples:** new example added to demonstrate NEON auto-vectorization of the Fireworks bare-metal application using Arm Compiler, and shows how to modify the source code to improve vectorization, and how to measure the performance gain: optimization3
- **Examples:** xaos example extended to demonstrate Streamline text annotation
- **Examples:** kernel_module example modified to demonstrate kernel module debug on the Cortex-A8 RTSM platform
- **Simulation Models:** added dual-core Cortex-A9 Emulation Baseboard platform model

39. Version 5.6

Build 1077

Dated 2011/08/25

- Arm Streamline: fixed incorrect parsing of debug information from some images
- Eclipse: updated Japanese translations for Eclipse plug-ins, and added Japanese translations for Welcome page and RSE

Arm DS-5 Development Studio version 5.6 build 1051 dated 2011/07/28:

- Arm Compiler toolchain: updated to 5.0u1 release for latest bug fixes
- Arm Streamline: new Log view displays output from printf() style annotations that you can place within your application
- Arm Streamline: views are enhanced to display process IDs in addition to process names
- Arm Streamline: support added for level 2 cache controller (L2C310) performance counters; this can be used as a reference implementation to support other memory mapped performance counters
- Arm Streamline: gator daemon updated to support Cortex™-A5
- Arm Streamline: addition of visual annotation feature to allow screenshots from the target to be displayed in the Timeline view
- Arm Streamline: early access support for Cortex-A15 and Qualcomm Snapdragon
- Arm Streamline: includes gator_v5
- DS-5: initial support for Japanese localization, including the Windows installer, Eclipse IDE, DS-5 Debugger and Streamline Performance Analyzer
- DS-5 Debugger: added the ability to debug bare-metal applications on the pre- supplied Cortex-A8 Real-Time System Model (RTSM)
- DS-5 Debugger: processor support extended to include Arm7TDMI®, Arm11® MPCore®, Arm1176JZF-S®, Cortex-M3, Cortex-R4, Cortex-A5 and Cortex-A15
- DS-5 Debugger: added support for TrustZone® debugging, including accessing Secure and Normal worlds and world-specific breakpoints
- DS-5 Debugger: Memory Importer dialog allows entry of minimum and maximum addresses to be written to
- DS-5 Debugger: the context menu on connections in the Debug Control view adds an option to reset all the views to link against that connection
- DS-5 Debugger: Memory view allows toggling the endianness used to display data
- DS-5 Debugger: SMP support for the Versatile Express Cortex-A9x4 platform is enhanced to use cross-trigger hardware to achieve tight synchronization when multiple cores stop
- DS-5 Debugger: device support extended to include: Arm Emulation Baseboard with Arm11 MPCore or Cortex-R4F Core Tile, Arm Microcontroller Prototyping System (Cortex-M3), Arm

Platform Baseboard for Arm1176JZF-S, Arm Versatile Express A5x2, Arm Versatile Express with Cortex-A15 Soft Macrocell Model, Atmel AT91SAM9M10 / AT91SAM9G35 / AT91SAM9263-EK, CSR SiRFprimaII, Freescale i.MX233, Kyoto KZM-A9-Dual, ST SPEAr1310 and TI DM6467 / Blaze MDP

- DTSL: register access provided to ITM and STM CoreSight™ components
- Examples: new set of examples added in /examples/Bare- metal_boards_examples.zip to illustrate basic debug from on-chip RAM for the majority of the boards supported by DS-5
- Examples: added new start-up code examples in /examples/Bare-metal_examples.zip: startup_ARM926EJ-S, startup_ARM1136JF-S, startup_Cortex-A5MPCore, startup_Cortex-M3, startup_Cortex-R4
- Examples: added new examples in /examples/Bare- metal_examples.zip to demonstrate bare-metal debug on the Cortex-A8 simulation model and the Panda board: fireworks_a8rtsm, fireworks_panda
- Examples: calendar example in /examples/Bare- metal_examples.zip is updated to run on the bare-metal Cortex-A8 simulation model

40. Version 5.5

Build 966

Dated 2011/05/23

- Arm Compiler toolchain: Arm Compiler 5.0 and its documentation is included
- Arm Streamline: added support for profiling dynamically loaded kernel modules
- Arm Streamline: added Counter Configuration dialog, accessible from the Arm Streamline Data view, to allow configuration of the events that are captured
- Arm Streamline: Android process names are displayed in the Timeline view
- Arm Streamline: includes gator_v4
- Arm Streamline: gator daemon now compiles against Linux kernel 2.6.39
- DSTREAM/RVI: new updated version of firmware included that provides improved support for bare-metal Symmetric Multiprocessing (SMP) debugging
- DS-5: support for Windows Vista (previously deprecated) is now removed
- DS-5 Debugger: added support for debugging and tracing bare-metal SMP systems
- DS-5 Debugger: Memory view has the ability to import and export memory in a variety of formats
- DS-5 Debugger: button added to Trace view to clear trace buffer
- DS-5 Debugger: regions in the debugger memory map can be configured as to whether or not to perform a verify when a memory write occurs
- DS-5 Debugger: device support extended to include: Core Logic CLM9721, Freescale i.MX50, NVIDIA Tegra 250, Samsung Exynos 4210, ST-Ericsson U8500 and TI Sitara AM387x / Integra C6A814x / OMAP 4430
- Eclipse: added editor for Arm Linker scatter files
- Eclipse: added libhover, a plug-in to display tooltip help for C library functions in the source editor
- Examples: new set of examples added in /examples/Bare- metal_examples.zip to illustrate bare-metal development using Arm Compiler toolchain
- Examples: added examples showing code optimization: optimization1 and optimization2
- Examples: added examples showing Cortex-A family start-up code: startup_Cortex- A8, startup_Cortex-A9 and startup_Cortex-A9MPCore
- Examples: Linux kernel distribution is moved into a separate download from the tools

41. Version 5.4

Build 834

Dated 2011/02/02

- Arm Streamline: gator driver supports CPU online/offline
- Arm Streamline: system-library support allowing profiling of libraries from any context
- Arm Streamline: Timeline view adds a caliper (blue arrow controls) to select the data that is used in the other statistical views
- Arm Streamline: Timeline view adds a cross-section marker (blue slider control) to select the data that is shown in the Samples display
- Arm Streamline: support added for analyzing Linux position independent executables (PIE)
- Arm Streamline: support of per-cpu charts
- Arm Streamline: trace capture and analysis is configured from the Arm Streamline Data view, replacing the previous Arm Streamline entry in the Run/Debug Configurations dialog
- Arm Streamline: includes gator_v3
- DSTREAM/RVI: new 4.2 version of firmware included
- DS-5 Debugger: device support extended to include: Arm Versatile Express A9x4, Atmel AT91SAM9G15 / AT91SAM9G20 / AT91SAM9X25, Freescale i.MX25 / i.MX535, NXP LPC3220 / LPC3230 / LPC3240, Samsung S5PC100 / S5PC110 / S5PV210 and TI OMAP 3430 / OMAP 3630
- DS-5 Debugger: added trace export feature to the Trace view
- DS-5 Debugger: access is provided to the NEON registers for those targets that support them
- DS-5 Debugger: silence/unsilence commands added to control whether messages are printed to the console when a breakpoint is hit
- DS-5 Debugger: frozen views can be manually refreshed
- DS-5 Debugger: Disassembly view shows location of inlined functions
- DS-5 Debugger: Disassembly and Memory views can auto-complete symbol names in the Address field and have search buttons that can be used to find loaded symbols
- DS-5 Debugger: support added for debugging Linux position independent executables (PIE)
- DS-5 Debugger: target configurations added to allow tracing of just the Linux kernel (without capturing any user-level code)
- Eclipse: updated to Eclipse 3.6, CDT 7.0 and RSE 3.2
- Eclipse: standalone License Wizard replaced with Eclipse-based License Manager
- Examples: U-Boot example now supports BeagleBoard-xM
- Examples: Xaos example builds with -pthreads for multi-threaded execution

- Examples: Arm Streamline capture example shows multi-threaded Xaos application running on a multi-core platform
- GNU Tools: gcc and binutils are updated to CodeSourcery 2010.09 release, and gdbserver is updated to version 7.0 from CodeSourcery 2010Q1 release

42. Version 5.3

Build 764

Dated 2010/12/02

- This is the first official release of DS-5 Linux Edition, which enables Linux boot code, kernel and driver development via a DSTREAM or RVI target connection unit.
- Arm Streamline: support added for Arm1136JF-S, Arm1176JZF-S and Cortex-A9 (unicore and SMP)
- Arm Streamline: includes gator_v2
- DS-5 Debugger: device support extended to include: Freescale Zoom i.MX27/i.MX31, NXP LPC3250, ST SPEAr300/310/600 and TI AM3517/3730
- DS-5 Debugger: added features to aid Linux kernel and device driver debugging, including listing processes and threads in the Debug Control view, a new Modules view, the ability to pend breakpoints until a module is loaded, and the following new commands:
  - info os-log: to dump the kernel dmesg log
  - info os-modules: to list loaded kernel modules
  - info os-version: to list the kernel version
  - set/show os enabled: to enable and disable kernel support
  - set/show os log-capture: to control dumping of the kernel dmesg log
- DS-5 Debugger: Breakpoint Properties dialog extended to list sub-breakpoints and allows them to be configured
- DS-5 Debugger: set semihosting auto option added to allow semihosting to be enabled automatically when a special symbol is detected in the image that is being debugged
- Eclipse: Eclipse periodically checks for DS-5 updates on the Arm website and places a notification in the Console view when an update is available
- Examples: added Xaos interactive fractal zoomer Linux application to demonstrate Arm Streamline Performance Analyzer
- Examples: added Linux device driver example to demonstrate debugging Linux loadable modules
- Examples: Linux kernel version supplied in examples updated to 2.6.35
- Examples: the example BeagleBoard SD card image now works out-of-the-box, without requiring manual changes to the U-Boot environment

43. Version 5.2

Build 694

Dated 2010/09/30

- Arm Streamline: added generic support for Arm9 and Cortex-A8 processor-based devices
- Arm Streamline: includes gator_v1
- DS-5 Debugger: extended bare-metal debugging over JTAG/SWD to include: Atmel AT91SAM9G45, Freescale i.MX28/i.MX35/i.MX51 and Marvell 88SV581x
- DS-5 Debugger: new set/show commands to configure semihosting
- DS-5 Debugger: search feature added to Expressions, Registers and Variables views
- DS-5 Debugger: new dialog to allow loading images and debug information during a debug session
- DS-5 Debugger: address history added to Disassembly and Memory views
- DS-5 Debugger: symbol searching is substantially faster
- Examples: including a Linux distribution for beagleboard pre-configured for use with Streamline performance analyzer and a new U-Boot example to illustrate the debug of bare-metal bootloaders by DS-5 Debugger

44. Version 5.1

Build 636

Dated 2010/08/06

- Arm Streamline: new performance analysis tool added
- DS-5 Debugger: launch configuration for beagleboard extended to support bare- metal debugging
- DS-5 Debugger: added ability to set watchpoints from the Expressions, Memory and Variables views
- DS-5 Debugger: new Trace view added to display trace when performing bare-metal debug on hardware that contains an ETB (Embedded Trace Buffer)
- Examples: new fireworks example for beagleboard

45. Version 5

Build 594

Dated 2010/07/05

- DS-5 Debugger: launch configuration dialog includes integration with Remote System Explorer for remote log-in and file transfer
- DS-5 Debugger: launch configuration dialog allows connection to gdbsever using a serial port
- DS-5 Debugger: right-clicking in the source view shows an Inspect menu that allows quick evaluation of an expression or variable
- DS-5 Debugger: added Target view to show the capabilities of the target
- Eclipse: DS-5 Home view updated with tutorial videos and cheat sheets
- Examples: added pre-configured DS-5 Debugger launch configurations
- Licensing: added license wizard on Windows
- Licensing: license managed components, including DS-5 Debugger connections and the simulation models, now take into account the support and maintenance period in the license to determine whether updates can be used
- Simulation Models: networking support is now enabled

Arm DS-5 Development Studio version 5.0 build 472 dated 2010/04/28:

- DS-5 Debugger: preliminary support for debugging Android native applications and libraries
- Eclipse: added New Project wizard and builder support for the supplied gcc toolchain
- Examples: addition of new threads example to demonstrate multi-threaded debugging

Arm DS-5 Development Studio version 5.0 build 423 dated 2010/03/31:

- DS-5 Debugger: new launch configuration dialog
- DS-5 Debugger: ability to launch Cortex-A8 model running Linux for application debug using gdbserver
- DS-5 Debugger: drag and drop supported in debugger views
- Eclipse: updated to Eclipse 3.5.2 and RSE 3.1.2 releases
- Simulation Models: inclusion of Cortex-A8 model