AMD µProf Release Notes

Release v3.2

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Thank you for using AMD uProf. Please use the AMD's developer community to provide your feedback. You can check out the User Guide and the AMD uProf blog at AMD uProf's product page.

This version contains (for 64-bit Windows and Linux platforms):

- AMDuProf Graphical User Interface Tool
- AMDuProfCLI Command Line Interface Tool
- AMDuProfPcm Command Line Interface Tool (*Linux Only*)
- AMDProfileController APIs to selectively enable and disable the CPU Profiling during runtime of the profiled application
- AMDPowerProfileAPI library APIs to configure and collect the Power, Frequency and Thermal counters

Highlights of this release v3.2

The following are new features in this release

- New platform support for CPU Profiling - AMD EPYC™ 7002 Processor (Rome). Following Linux distro versions are supported.
  - RHEL 8.0.2 or later

Update 2 of RHEL 8 is requires kernel-4.18.0-80.7.1.el8 or later. Refer:
https://access.redhat.com/support/policy/amd
https://access.redhat.com/errata/RHSA-2019:1959

- CentOS 8.0.1905 updated with kernel version kernel-4.18.0-80.7.1.el8 or later
- Ubuntu
  - Ubuntu 18.04.3 LTS or later
  - Ubuntu 19.04 kernel version 5.0.0-16.17 or later
  - Ubuntu 19.10 kernel version 5.3.0 or later
- SUSE
  - SLE15 SP1 with kernel version 4.12.14-197.26 or later
- Older Linux distros and kernel versions on Rome may lead to following NMI error messages emitted on the console:

  kernel: Uhhuh. NMI received for unknown reason 3d on CPU 1.
  kernel: Do you have a strange power saving mode enabled?
  kernel: Dazed and confused, but trying to continue

- CPU Profiling
  - Profile data processing improvements on Linux:
    - Faster profile data processing and report generation.
    - Reduced memory consumption.
  - Improvements in attributing callstack samples while constructing the callgraph and flame graph.
  - On Linux, support various profiling for non-root users, based on "/proc/sys/kernel/perf_event_paranoid" value:
    - Support TBP of process(es), when the perf_event_paranoid is set to <= 1.
    - Support EBP of process(es), when the perf_event_paranoid is set to <= 2.
    - Support IBS of process(es), when the perf_event_paranoid is set to <= 0.
    - Support profiling of all the processes running in the system (System-wide profiling of any profile type), when perf_event_paranoid us set to <= 0.
    - Support EBP with multiplexing, when perf_event_paranoid is set to "-1".

    Note: Setting perf_event_paranoid to "-1", will support all the profile types.

  - AMDuProfCLI option changes:
    - Replaced the AMDuProfCLI report command's "--no-inline" to "—inline". Reporting of inlined functions in C, C++ executables is turned off by default.
    - On Linux, added the capability to profile only the specified task. A new option "--tid" to "collect" command, only to profile only the given thread id.
    - Added new option "--show-sys-src" to generate the detailed function report of the system module functions with source statements if the debug information is available for those system modules.

- Added new AMDuProfCLI option “--list" to “info” command to list the supported:
    - predefined collect profile configuration (collect-configs)
    - report data view configurations (view--configs)
    - raw PMC events that can be used with collect command (--pmu-events)
- Add new options “--collect-config”, “--view-config” and “--pmu-event” to AMDuProfCLI’s “info” command.

- GUI Improvements
    - Simplified SETTINGS page sections:
        - Consolidated all the user settings under a new “Preferences” window.
        - Added new “Symbols” settings window to specify the symbol paths and symbol servers.
        - On Windows, uProf uses the cache path mentioned with _NT_SYMBOL_PATH as default, otherwise it will use its default download path.
        - Symbol paths are persistent across all the profile runs.
        - Consolidated the Live Power profiler specific options in “Select Profile Type” → “System-wide Power Profile (Live)” section of PROFILE page, in a new collapsible pane.
    - Scaled the Thread Concurrency chart for higher core systems to avoid horizontal scrolling.
    - Flame Graph improvements:
        - Navigation from Flame graph to source view for functions having self-samples.
        - Visualize Flame graph by sorting based on larger callstack.
        - Faster Flame graph generation.

- Power Profiling
    - Support Power profiler on “3rd Gen AMD Ryzen Desktop Processor” without a dGPU.
    - Support “Package” temperature counter for Ryzen processors.
    - Disabled the “--histogram” and “--cumulative” options of “timechart” command of AMDuProfCLI.
    - Moved “CorrelatedPower” category counters to “Power” category for family 17h processors.

- Quality and Usability improvements
    - Multiple bug fixes

Highlights of previous minor release v3.1

The following are new features in this release:

- New platform support for Performance and Power profiling
  - AMD EPYC™ 7002 Processor
- Usability Improvements++
  - Easier navigation to Flame Graph window in ANALYZE page
  - By default, expand the Filters and Options collapsible pane in ANALYZE and SOURCE pages
- Quality
  - Bug fixes

Highlights of major release v3.0

- Flame Graph - a callstack trace visualizer to identify hot call-paths
- Support Linux kernel profiling and kernel-space drivers
- Improved symbol discovery for Linux system libraries
- Remote Profiling support:
  - Host OS: Windows &Target OS: Linux
  - Callgraph window in GUI
- New platform support for Performance and Power profiling
  - 3rd Gen AMD Ryzen Desktop Processor
- GUI feature to search function names in ANALYZE page
- New OS support
  - openSUSE Leap 15, SLES 12 & 15
  - Windows 10 (May 2019 Update), Windows Server 2019
- Improved data translation to reduce the time taken to process the raw profile data records
- Linux Power Profiler drivers supports latest Linux kernel version
- Many bug fixes to improve the overall stability of the product

Supported Processors

- CPU Profiling
  - Family 17h Processors - Ryzen, Ryzen PRO, Threadripper, AMD EPYC™ 7001, AMD EPYC™ 7002, 3rd Gen AMD Ryzen Desktop Processor
  - All the older CPUs and APUs
  - Intel Processors (Timer based profiling only)
- Power Profiling:
  - AMD CPUs: Ryzen, Ryzen PRO, Threadripper, AMD EPYC™ 7001, AMD EPYC™ 7002, 3rd Gen AMD Ryzen Desktop Processor
  - AMD APUs: Carrizo, Kaveri, Mullins, Temash, Stoney, Bristol
  - AMD dGPUs: Graphics IP 7 GPUs, AMD Radeon 500 Series and FirePro models

Supported Operating Systems

AMD uProf supports the 64-bit version of the following Operating Systems:

- Microsoft Windows
  - Windows 7
  - Windows 10 (including May 2019 Update)
  - Windows Server 2016
  - Windows Server 2019
- Linux
  - Ubuntu 16.04 & later
  - RHEL 7.0 & later
  - openSUSE Leap 15.0
  - SLES 12 & 15
  - CentOS 7.0 & later

Note: Windows 7 requires Microsoft update KB2999226 https://support.microsoft.com/en-us/kb/2999226

System Requirements

AMD µProf contains a host of development features with varying system requirements:

CPU Profiling

- Time-Based Profiling can be performed on any x86 or AMD64 (x86-64) CPU/APU.
- Event-Based Profiling (EBP) and Instruction-Based Sampling (IBS) profile types require an AMD CPU or APU.
- CPU Profiling on Linux platforms - Limitations of PERF
  - For Zen microarchitecture, EBP and IBS profiling on Linux requires Linux kernel 4.9 and above.
  - On Linux, IBS Fetch profiling shows extremely low number of samples.
- For first generation Zen microarchitecture-based systems, IBS might not be enabled by default and needs to be enabled from the BIOS settings.

Power Profiling

- Power profiling functionality requires AMD Radeon software to be installed on the supported AMD APUs or dGPUs. For getting the latest Radeon software release: Please visit http://support.amd.com/us/gpudownload/Pages/index.aspx

Known Issues

CPU Profiling

- On Linux, IBS Fetch profiling collects extremely low number of samples or collected only in kernel space.
- SLES 15 SP1 running on Rome processor, CPU profiling may lead to NMI error messages. [2487]. Refer section “New platform support” under “Highlights of the release v3.2”.
- On Linux, Summary page displays "No Data Present" after IBS profile run, though there is data on Analyze page. [1379]
- On Ubuntu distros, AMDuProf UI may abort on launch due to Qt and X server issues. [1185]
- Profile control API's does not work with C based applications.
- CPU Profiler report command invocation with --symbol-server & --symbol-cache-dir options crashes if Ctrl-C is pressed.
- Call stack info shown on Linux is inaccurate if the callpath includes any PLT jump. [2225]
- PERF call chains which contain call stacks across modules have shown to be truncated. This results in inaccurate "Deep Samples" analysis.
- Call stack info on Linux is inaccurate of the callpath includes inlined functions and FPO together using 32-bit target application. [1512]
- If call-stack has recursive functions, sum of samples of a function in callee table is not same as Inclusive sample of function table for that function. [759, 809]
- CPU Profiling is disabled on Windows 8 and 8.1 if Hyper-V is enabled. (Note that installing Microsoft Windows Phone 8.0 SDK activates Hyper-V.)
- CPU Profiler doesn’t launch and profiling of Windows Store App.
- On Windows, CLR Application profiling doesn’t work in this release.
- uProf GUI doesn’t release the PDB file handle of the target application after translation, due to which the same application can’t be compiled unless uProf GU is closed. [2042]
- Samples missing when timer interval is less than 1msecs. [2010]
- Profiling of Java apps running on 32-bit JVM on Linux platform is not supported.
- Profiling Java programs with explicitly specifying the AMD uProf’s JVMTI profile agent using Java’s -agentpath option may lead to empty source view. Users are advised to launch Java under the tool to profile Java programs.
- CPU Profiler IMIX report may omit instruction-name (by showing empty space) for few instructions.
- If AMD µProf is installed in path that includes non-ASCII Unicode characters, profiling does not work.
- AMDuProfCLI crashes if "Ctrl + C" pressed (to kill the profiling) during system wide profiling on RHEL 7.6. Happens 7 out of 10 times. [2273]
- Memory footprint issue on performing CPU profile with Ubuntu 19.04 on 3rd Gen AMD Ryzen Desktop Processor. [2359, 2354]

Power Profiling

- If the profiled station goes into Sleep/Hibernate state during a Power Profiling session, only data collected before hibernation is displayed, and the navigation slider does not respond.
- If AMD dGPU is connected and goes to BACO state during profile run, values may not be correct. [1859]

Remote Profiling

- Source view will only show the disassembly when the user navigates to the source view. [2600, 2602]
- Firewall should be disabled before launching the Remote Agent on the target system.
- Profiling on Linux host and Windows target is experimental.
- Source view for Java application is not supported.
- Remote agent running on Linux seg-faults while a client is trying to connect. Happen only when the agent is launched with non-root permission and the uProf is installed using DEB/RPM package. [2211]
- If there is any unexpected communication error, it is better to close and restart the AMDRemoteAgent and the AMDuProf running on the host system.
- Remote connection gets disconnect upon canceling session in initializing state in case of Linux to Linux config for remote power profile session. [2342]
- Using timer event with less than 1ms sampling interval results in CPU cycle event. [2360]

Support

- Please use AMD's Developer Community for bug reports, support and feature requests.