ROCM PLATFORM ON LINUX

Compiler Front End

Device LLVM Compiler (GCN)
- LLVM Opt Passes
- GCN Target

Host LLVM Compiler
- LLVM Opt Passes
- CPU ISA Target

CPU Code
GPU Code

GCN Assembly

AMDGPU Driver Enabled with ROCm

User Space
- Language Runtime API
- ROCr System Runtime API
- ROCm Thunk API

Kernel Space
- ROCm Kernel Driver (KFD)
- AMDGPU Kernel Driver

DRM
TTM
KFD FEATURES AND HW SUPPORT

Upstreaming progress:
- 4.17: Fiji, Polaris
- 4.18: Vega10
- 4.19: Raven Ridge
- 4.20: Vega20

Compatible with ROCm 1.9

- User mode queues
- Automatic memory residency management
- Multi-GPU memory mapping
- Shared Virtual Memory
- Device enumeration and properties (Topology)
- Asynchronous events

Not yet upstream:
- Peer2peer memory mapping
- DMABuf import / export (GFX interop, IPC)
- GDB support
- (RDMA)
**ROCm PROGRAMMING MODEL OPTIONS**

**HIP**  
*Convert CUDA to portable C++*
- Single-source Host+Kernel
- C++ Kernel Language
- C Runtime (CUDA-like)
- Platforms: AMD GPU, NVIDIA (same perf as native CUDA)

*When to use it?*
- Port existing CUDA code
- Developers familiar with CUDA
- New project that needs portability to AMD and NVIDIA

**HCC**  
*True single-source C++ accelerator language*
- Single-source Host+Kernel
- C++ Kernel Language
- C++ Runtime
- Platforms: AMD GPU

*When to use it?*
- New projects where true C++ language preferred
- Use features from latest ISO C++ standards

**OpenCL**  
*Khronos Industry Standard accelerator language*
- Split Host/Kernel
- C99-based Kernel Language
- C Runtime
- Platforms: CPU, GPU, FPGA

*When to use it?*
- Port existing OpenCL code
- New project that needs portability to CPU, GPU, FPGA
## ROCM ML Software Stack

<table>
<thead>
<tr>
<th>Applications</th>
<th>Machine Learning App</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frameworks</td>
<td></td>
</tr>
<tr>
<td>Caffe</td>
<td>TensorFlow</td>
</tr>
<tr>
<td>Keras</td>
<td></td>
</tr>
<tr>
<td>Caffe2</td>
<td>PyTorch</td>
</tr>
<tr>
<td>MxNet</td>
<td></td>
</tr>
<tr>
<td>Middleware &amp; Libraries</td>
<td></td>
</tr>
<tr>
<td>MIOpen</td>
<td>BLAS, FFT, RNG</td>
</tr>
<tr>
<td>RCCL</td>
<td>Eigen</td>
</tr>
<tr>
<td>Programming Models</td>
<td></td>
</tr>
<tr>
<td>HCC</td>
<td>HIP</td>
</tr>
<tr>
<td>OpenCL™</td>
<td>Python</td>
</tr>
<tr>
<td>ROCm</td>
<td></td>
</tr>
<tr>
<td>ROCm Platform</td>
<td></td>
</tr>
</tbody>
</table>

*Italicics = Under Dev*
LINKS

Online Documentation: https://rocm-documentation.readthedocs.io/en/latest/


GitHub: https://github.com/RadeonOpenCompute/ROCm
DISCLAIMER & ATTRIBUTION

The information presented in this document is for informational purposes only and may contain technical inaccuracies, omissions and typographical errors.

The information contained herein is subject to change and may be rendered inaccurate for many reasons, including but not limited to product and roadmap changes, component and motherboard version changes, new model and/or product releases, product differences between differing manufacturers, software changes, BIOS flashes, firmware upgrades, or the like. AMD assumes no obligation to update or otherwise correct or revise this information. However, AMD reserves the right to revise this information and to make changes from time to time to the content hereof without obligation of AMD to notify any person of such revisions or changes.

AMD MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE CONTENTS HEREOF AND ASSUMES NO RESPONSIBILITY FOR ANY INACCURACIES, ERRORS OR OMISSIONS THAT MAY APPEAR IN THIS INFORMATION.

AMD SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT WILL AMD BE LIABLE TO ANY PERSON FOR ANY DIRECT, INDIRECT, SPECIAL OR OTHER CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF ANY INFORMATION CONTAINED HEREIN, EVEN IF AMD IS EXPRESSLY ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

ATTRIBUTION
© 2018 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, FirePro and combinations thereof are trademarks of Advanced Micro Devices, Inc. in the United States and/or other jurisdictions. ARM is a registered trademark of ARM Limited in the UK and other countries. PCIe is a registered trademarks of PCI-SIG Corporation. OpenCL and the OpenCL logo are trademarks of Apple Inc. and used by permission of Khronos. OpenVX is a trademark of Khronos Group, Inc. Other names are for informational purposes only and may be trademarks of their respective owners. Use of third party marks / names is for informational purposes only and no endorsement of or by AMD is intended or implied.