

# CLEAR SPEED ADVANCE™ e720 ACCELERATOR

## Enterprise-class accelerator compatible with HP blades for High Performance Computing

ClearSpeed's Advance™ accelerators are designed specifically to address the performance requirements of numerically intensive applications. Their high performance, low power designs enable you to maximize your datacenter's performance within its space, power and cooling constraints.

The ClearSpeed Advance e720 brings all the benefits of ClearSpeed's latest accelerator technology to HP's blade servers. It delivers new levels of compute performance, reliability, precision and accuracy for high performance computing (HPC) applications in financial services and a wide variety of scientific disciplines.

The Advance e720's compact size and low power enable it to be installed quickly and easily into the type II mezzanine slot in HP blade servers, without requiring any additional cooling or power supplies. The e720 provides a PCIe x8 connection, via the HP type II connector, to the host and includes one ClearSpeed CSX700 and 2 GBytes of ECC-protected DRAM.

The CSX700 is the latest member of the ClearSpeed processor family and is the world's most power efficient 64-bit floating point accelerator.

Practical Petascale systems must be built from components with a high Mean Time Between Failure (MTBF). The Advance e720 incorporates the most advanced set of reliability features of any accelerator and perfectly complements the enterprise-class philosophy of HP's blade servers. These features include the use of Error Correcting Codes (ECC) on all memories, both on- and off-chip; low power design to significantly reduce the thermal stress on the system; and the avoidance of moving parts.

All of these factors are essential to achieve the required MTBF for enterprise-class systems.

### Why choose ClearSpeed acceleration?

- High reliability RAS features
- Performance: 96 GFLOPS of double precision floating point (peak).
- Precision: 64 & 32 bit floating point, IEEE 754 compatible.
- Energy efficient: 3.84 GFLOPS per watt (96 GFLOPS / 25 watts)
- Easy to install: simply plug one into an available type II mezzanine connector, available in HP bladesystem servers.
- Easy to use: accelerates standard math libraries, including Level 3 BLAS and LAPACK.
- Easy to program: Software Development Kit supports ANSI C with parallel programming extensions.

Visit [www.clearspeed.com](http://www.clearspeed.com) for the latest performance and product information



# CLEARSPD ADVANCE™ e720 ACCELERATOR

There are a number of ways to accelerate your application. Two of the most popular methods are: plug and play via standard libraries, or native code development.

## Plug and Play acceleration

The Advance e720 works with the host processor on the most computationally intensive portions of an application. When a call is made by an application to a ClearSpeed supported standard math library, it is intercepted by ClearSpeed's accelerated math library (CSXL) which determines if the function call can be accelerated. If so, the required data is transferred to the Advance e720 and the answer is calculated by CSXL using both the e720 and the multi-core host in parallel. CSXL then transparently combines the results and returns them to the calling application. The use of heterogeneous acceleration is transparent to the end user and the application.

## Native Code Development

The compute intensive kernels from an application can be ported to run natively on ClearSpeed accelerators using the Software Development Kit (SDK).

ClearSpeed's SDK provides a full suite of professional software development tools built around an ANSI C-based cross compiler. It enables developers to write and debug code, develop new applications or to port existing applications to the ClearSpeed Advance accelerator family.

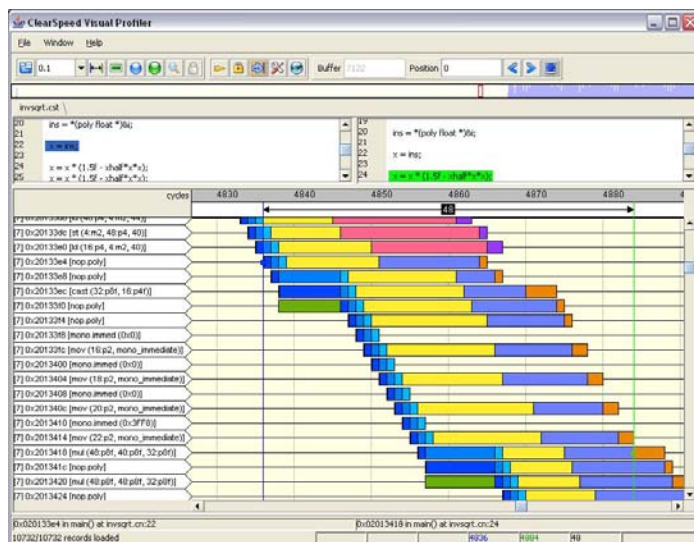
The SDK includes:

- A suite of tools including an industry standard source-level debugger based on gdb and an ANSI C-based cross compiler for ClearSpeed's CSX family of processors
- An extensive set of standard C libraries based on the newlib open source library together with a set of libraries to support architecture-specific features
- The ClearSpeed Vector Math Library and ClearSpeed Random Number Generator Library
- Documentation for the software development tools and languages

Regardless of the acceleration method used, the ClearSpeed Visual Profiler provides a unique and powerful capability to visualize and optimize your application.

## ClearSpeed Visual Profiler

For developers, the ClearSpeed Visual Profiler toolset provides insight at every level of the system including the interactions between multiple host processors and one or more ClearSpeed Advance accelerator boards. By delivering a consistent visual representation across the entire system, it provides the best possible environment in which to develop code that will perform optimally in today's multi-core and heterogeneous accelerated systems.



## Advance e720 Specifications

### Operational Characteristics

- **Performance:** 96 GFLOPS of double precision floating point (peak).
- **Precision:** 64 and 32 bit floating point, IEEE 754 compatible.
- **Energy efficiency:** ~4 GFLOPS per watt.

### Specifications

- **Features:** 1 x ClearSpeed CSX700 processor.
- **Size:** HP blade type II mezzanine card form factor.
- **Host interface:** HP blade type II mezzanine connector.
- **Memory:** 2 Gbyte DDR2-533 SDRAM, ECC support on both the DRAM and CSX700 memories: single-bit correct; multi-bit detect. Error correcting scrubbing hardware.
- **Bandwidth:** 8 Gbytes/s to DRAM, 192 Gbytes/s to internal memory.

### Software

- Available for Microsoft Windows, Red Hat® and SUSE™ Linux® operating systems.
- Base software including:
  - Open source device driver,
  - Runtime libraries to interface to board,
  - CSXL math library for accelerating BLAS and LAPACK functions.
- Software Development Kit available:
  - C compiler with parallel programming extensions,
  - Standard C libraries,
  - Vector math library,
  - Random number generator library,
  - FFT library,
  - Industry standard GDB debugger,
  - Visual profiler,
  - Instruction set and cycle accurate simulators.

### Minimum System Requirements

- 32 or 64-bit, Intel or AMD x86 processor (or compatible).
- An available HP blade type II mezzanine slot.

# CLEARSPED ADVANCE™ e720 ACCELERATOR

Copyright 2008 ClearSpeed Technology plc. The information contained herein is subject to change without notice.  
ClearSpeed shall not be liable for technical or editorial errors or omissions contained herein.

ClearSpeed, Advance, and CATS are trademarks or registered trademarks of ClearSpeed Technology plc. All other marks are the property of their respective owners.