

# Zapcc Liberated, HMM and GPL

By *Roy Schestowitz*

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- [Zapcc high-speed C++ compiler now open source](#) [4]

Zapcc, a caching C++ compiler built for speed, has gone open source.

Ceemple Software, Zapcc's builder, claims the compiler offers dramatic improvements in both incremental and full builds compared to building with Clang 4.0 and Clang 5.0. Based on heavily modified code from the Clang compiler project, Zapcc uses an in-memory compilation cache in a client-server architecture. All compilation information is remembered between runs.

- [Heterogeneous memory management meets EXPORT\\_SYMBOL\\_GPL\(\)](#) [5]

One of the many longstanding ? though unwritten ? rules of kernel development is that infrastructure is not merged until at least one user for that infrastructure exists. That helps developers evaluate potential interfaces and be sure that the proposed addition is truly needed. A big exception to this rule was made when the heterogeneous memory management (HMM) code was merged, though. One of the reasons for the lack of users in this case turns out to be that many of the use cases are proprietary; that has led to some disagreements over the GPL-only status of an exported kernel symbol.

The HMM subsystem exists to support peripherals that have direct access to system memory through their own memory-management units. It allows the ownership of ranges of memory to be passed back and forth and notifies peripherals of changes in memory mappings to keep everything working well together. HMM is not a small or simple subsystem, and bringing it into the kernel has forced a number of low-level memory-management changes. After a multi-year development process, the core HMM code was merged for the 4.14 kernel, despite the lack of any users.

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