

# Re: [RFC] Advanced XIP File System

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  - *Date:* Wed, 3 May 2006 11:54:16 -0700
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Apropos borrowing: borrow the compression from Squashfs.

We borrow much more than the compression from cramfs. We plan to borrow some ideas about compression from squashfs.

- > I've heard people say, "XIP is stupid. Why on earth would I use
- > expensive slow flash instead of cheap fast RAM?"
- > [...] If I
- > take libfoo.so which is about 2MiB and throw it in JFFS2, it
- > compresses to about 1MiB in flash. If I store libfoo.so as an XIP
- > file (uncompressed) in XIP CRAMFS or AXFS it takes up 2MiB of flash. That is
- > 1MiB extra flash for XIP. But the JFFS2 version would need
- > 2MiB of RAM to store that library when used while the XIP system uses
- > 0MiB. That means XIP uses +1MiB of flash and -2MiB of RAM for
- > libfoo.so. So for any extra flash used for XIP, it can save twice
- > that amount of RAM. The end result can be lower cost systems on the
- > small end. The secret is to choose what to make XIP and what to
- > compress on flash.

If 2 MB of RAM are cheaper [as you say] than 1 MB of Flash, where's the advantage when XIP uses more flash?

I didn't mean to suggest I thought 2MB of RAM is cheaper 1MB. People say that, yes. I say that is false. Mwave.com will sell you several 1GB SD card flash at <\$40 while 1GB of DDR2 will cost >\$100. That's actually a strawman argument, just to demonstrate what is possible ;) The economics are different at the embedded side, the RAM isn't the same as what is used in PCs and neither is the Flash. Also the prices are mostly laid out in contracts between large companies and are not public. I don't really want to get into a discussion of Flash pricing and economics, I don't think it appropriate for this forum. Please lets leave it at some people have done this, are doing it, and want to do it in the future (see Mark Lords comment earlier). It gets complicated. Some systems it makes sense for, some it doesn't.

Re: [RFC] Advanced XIP File System

We took Familiar Linux 0.8.3 Opie version and built two versions, one that used jffs2 on NAND and another that used XIP cramfs on NOR. We optimized the XIP cramfs to only uncompress commonly used libraries and binaries. The XIP build used 8MiB more flash. It saved about 20MiB of RAM and was 3X faster at bootup. (Summary support on jffs2 closed the gap to 2X boot up but made the jffs2 use more flash than the XIP). The jffs2 version wouldn't run the PIM apps and the browser and Quake at the same time with only 32MiB of RAM. The XIP version would. The jffs2 version used 42MiB and the XIP 50MiB. Rounding to rational chip sizes that's 32MiB RAM/64MiB Flash versus 64MiB RAM/64MiB Flash.

The point of axfs is to reduce that 8MiB to the absolute minimum. In general application XIP give the system designer the to flexible trade Flash for RAM and RAM for Flash to squeeze the system into the optimal cheapest it can be. AXFS will give more flexiblity with a mainstream solution.

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