

RAM Based Dynamic Files

Abstract:

Flash memory may not be fast enough or may wear out from constant writes needed in dynamically altered files. This tech note explains the advantages and access characteristics of both non-volatile static RAM based files and temporary dynamic RAM based files.

Flash Memory Files System

Flash memory is the default and most common storage location for the Linux files system in an IPm embedded controller. Flash memory is permanent memory (does not require a battery to retain data). There are some limitations to the Flash memory: Write cycles are slower than RAM memory and periodically sectors need erasure, which is a slow operation, not well suited for real-time file updates. Further, Flash memory can wear out from constant write cycles. Although, the IPm firmware has a “wear-leveling” feature to vary (spread out) the location of new entries to the file system, constant writes to files are not recommended for Flash memory.

Non-volatile (battery-backed) Static RAM Files

IPm controllers also contain a battery-backed, low power static RAM memory that is better suited for frequently written files. It is faster than Flash memory and does not require sector erasure, as does the Flash memory. As such it is well suited for real-time disk access. This static RAM, however, is a limited size, typically 512K in entry-level IPm products. (At the time of this writing, maximum available static memory is 2 Megabytes. It should be noted that this extra static memory adds cost to the controller.) Care should be taken in the use of this limited memory to be considerate of space that may be used by other applications. (ISaGRAF uses a RAM based file to write retained variables, SIXNET retained variables use this memory, and Sixlog uses this memory for datalog files.)

Static RAM file system provides the same file journaling as Flash memory, to insure that data writes to files in this memory are safe in the event of unscheduled power interruption. It should also be noted that the self-recharging Lithium battery will likely retain files through power outages of weeks, but not many months. For longer data retention, the Flash file system is recommended.

To access Non-volatile Static RAM files, reference the directory: /nvram

Temporary Dynamic RAM Files

Dynamic files that need not be retained through power outages may be written directly to the SDRAM memory. This 32-bit wide memory provides the fastest access time. File compression is not enabled on these files to maximize performance.

To access temporary dynamic RAM files, reference the directory: /tmp