

Embedded Alley Application Modeling for Flash Systems

Eliminates guesswork in
system level design
Accurately estimates product
lifetime expectancy

Models a solution using
simulation or real hardware

Analyzes statistical results
against product requirements

Models typical I/O write characteristics

application logs
syslogd
product updates
(firmware, OS, applications)
temporary space
application specific data
(video, audio,
compress/uncompress data)

Models typical I/O read characteristics

application binaries
product updates
(firmware, OS, applications)
temporary space
application specific data
(databases, routing tables, web
interfaces, maps, video, audio,
streaming media, documents)

Application modeling for system design

Application modeling provides vital system engineering feedback throughout the product life cycle of intelligent devices. It assists in application design, while validating hardware selection. Embedded Alley™ builds on its extensive Linux expertise to develop effective modeling processes for performance analysis, helping OEMs determine the best hardware and software choices early in the design process.

Modeling for devices with flash memory

Flash memory is pervasive in modern intelligent devices, for storage of applications, multimedia and other end-user content. The particulars of available flash technologies, however, present OEMs with a range of design challenges: Of the two main types of NAND flash memory, multi-level cell flash (MLC) has a much lower erase cycle endurance than SLC (single-level cell). However, MLC is less expensive for high density parts and therefore most popular in current product designs. MLC block integrity is also affected by reading, and requires strong error correction (ECC) to check data validity. This combination of both read and write cycle sensitivity presents unique challenges to flash-based designs, leaving OEMs guessing as to how to choose flash technology and file systems. Embedded Alley Application Modeling eliminates the guesswork and helps meet product requirements for life expectancy and performance ahead of critical design choices (MLC or SLC). Embedded Alley can create an effective product model using a NAND simulator (nandsim), early-stage production hardware or a similar reference board.

These models illuminate the read and write behavior of the entire software stack, including application updates, data logging, user preferences and data files, as well as top-to-bottom system performance. The Embedded Alley Application Modeling solution condenses multiple years of end-product use into a few hours or days,

allowing system designers to collect and analyze performance data to compare with design requirements.

Using the modeling data

The outcome of modeling gives designs a pass/fail grade indicating whether the modeling run completed successfully, together with detailed statistics. Analysis of modeling statistics provides OEMs with information to help optimize system attributes to meet product lifetime

requirements. Modeling output also facilitates planning for additional features and provides rich data to feedback into system engineering processes. Embedded Alley custom modeling tools allow OEMs to iterate the modeling process to test a broad set of scenarios. Modeling results help OEMs make informed decisions for the best hardware choices, the right file system and the optimum software design for the life of their products.

