GLAST Large Area Telescope

Instrument Flight Software
Flight Unit Design Review
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Secondary Boot Code (SBC)

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Secondary Boot Overview

- Primary boot handles initialization from power-on or reset to start of RTOS execution
  - Software contained in SUROM
  - No RTOS services available
- Secondary boot handles initialization from start of RTOS execution to application control of instrument
  - Secondary boot on SIU proceeds in response to a command from the ground. The SIU controls EPU secondary boot.
  - Software contained in EEPROM or delivered by file upload to primary boot
  - RTOS services available

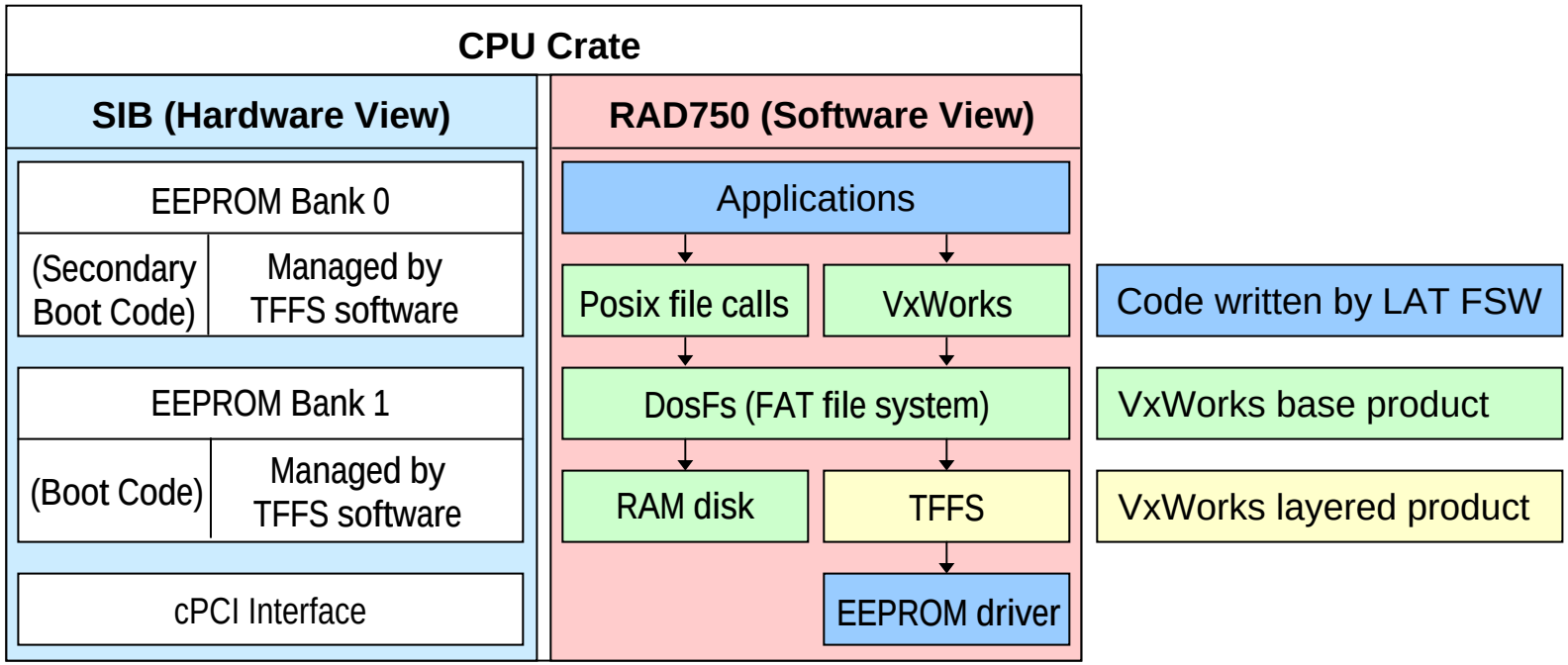
SBC Requirements

- Configure and initialize VxWorks RTOS
  - VxWorks 5.5 kernel
  - BSP and drivers for RAD750 CPU board hardware
- Provide file system non-volatile storage
  - Small code object modules (variable length)
  - Small configuration objects (variable length)
- Load application object modules
- Call application initialization functions
- Report diagnostics and error from secondary boot process
  - Fatal errors reboot and leave behind information in boot diagnostics area

SBC Software Organization

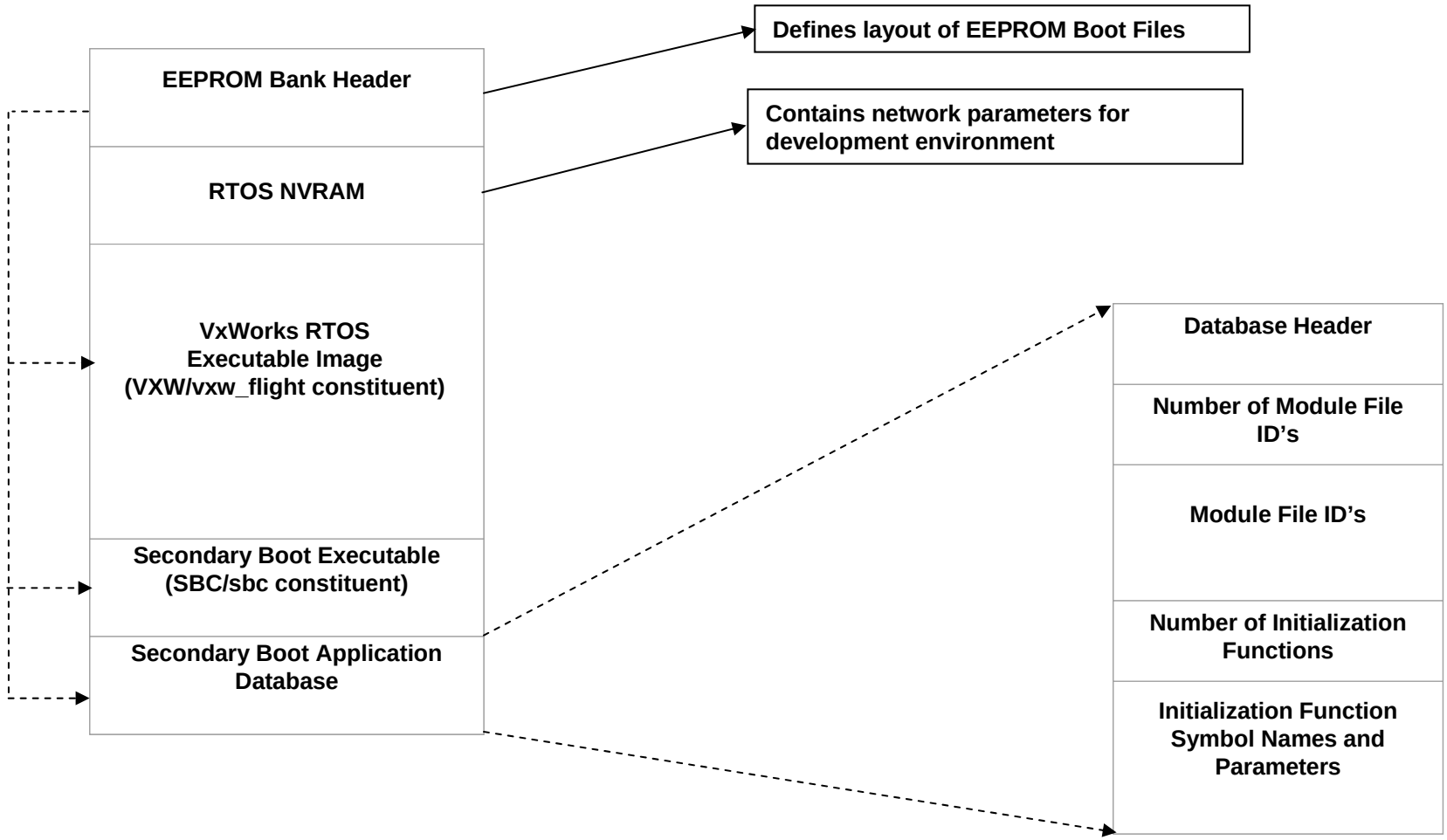
- Package VXW contains VxWorks BSP
  - Constituent: vxw_flight - provides kernel, BSP, and drivers for RAD750 board accessories
    - vxw_flight constituent also contains a small number of application modules statically linked with it
      - ZLIB/zlib_inflate, FILE/file_hdr
  - Package VXW also contains many BSP variants
    - Development configurations run debugger, shell, networking, etc…
    - Flight configuration is subset of development configurations
    - Similar configurations available for COTS CPU boards
- Package SBC contains application loader
  - Constituent: sbc – provides application initialization

TFFS/EEPROM File System Architecture



- **TFFS provides wear-leveling of EEPROM locations**
  - **Multiple updates of the same file or file system meta-data is spread across all locations**
  - **Provides access to raw EEPROM driver functions (memory dump, memory poke)**
  - **Two independent file systems provided for every CPU**
- **EEPROM Driver manages interaction with EEPROM chips on SIB board**
  - **Write programming and completion status**
  - **Manages write lock and unlock of SIB EEPROM banks**

Boot EEPROM Organization



Application Initialization

- Create RAM disk file system partition
- Mount file system partitions
- Validate application database boot file
- Read list of application object module files
- Validate each object module file
- Inflate each object module file
- Invoke VxWorks dynamic loader for each object module file
- Read list of application initialization functions
- Call each application initialization function with parameters
- Examine status code returned by functions for fatal errors
- Report any errors in boot diagnostics area
- Reboot if error is fatal
- Otherwise, applications are now in control

Forward Work

- **Code progress:**
  - **Secondary boot code is 95% complete.**
  - **File and memory management are 50% coded.**

- **Both primary and secondary boot, and ability to manipulate the file system, have been demonstrated on SIU**
  - **More extensive file and memory management to be demonstrated in November 2004**

- **Completion schedule:**
  - **Secondary boot code and unit test complete 10/30/04**
  - **File and memory management complete 11/30/04**