Introduction to the Jasmine OpenSSD Platform

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Project Overview

- **Project #1. Log Block FTL**
  - “A Space-efficient Flash Translation Layer for CompactFlash Systems,” 2002
  - Implement on OpenSSD Platform

- **Project #2. Term Project**
  - Implement other FTLs
  - Performance, Reliability
Jasmine OpenSSD Platform
Storage Device
HDD vs SSD
HDD vs SSD

- HDD
  - Slow Read/Write speed
  - Different Sequential/Random I/O speed
  - In-Place update

- SSD
  - Fast Read/Write speed
  - Similar Sequential/Random I/O speed
  - In-Place update is impossible.
    - Page unit write/ Block unit erase.
  - Wearing.
The OpenSSD Project

- It is an initiative to promote research and education on the recent SSD technology

- Providing OpenSSD platforms on which open source SSD firmware can be developed
Indilinx Jasmine Platform

- Barefoot Controller (ARM7TDMI-S)
- Power Switch
- NAND Flash Module
- SATA 3.0Gbps
- Power
- Mobile SDRAM
- JTAG
- UART
- Factory Mode Jumper
Hardware Architecture

![Diagram of hardware architecture with components such as SRAM, NAND Flash, ARM7TDMI-S Core, NAND Controller, Buffer Manager, SATA Device, DRAM Controller, Memory Utility, Clock Generator, UART, GPIO, Timer, WDT, PMU, ICU, JTAG, DRAM Access Bus, SATA Host interface, NAND Flash, and JTAG debug port.]
Hardware Architecture

**Micro processor**

- SRAM (96KB) Controller
- ROM Controller
- ARM7TDMI-S Core Controller
- NAND Controller
- Buffer Manager
- SATA Device
- DRAM Controller
- Memory Utility

**For debug**

- Clock Generator
- UART
- GPIO
- Timer
- WDT
- PMU
- ICU
- JTAG

**Code, variable**

- Read/write to flash
- Buffer

**Hardware Components**

- SRAM
- NAND Flash
- ARM7TDMI-S Core
- Clock Generator
- UART
- GPIO
- Timer
- WDT
- PMU
- ICU
- JTAG

**Connections**

- AHB
- DRAM Access Bus
- JTAG debug port
Development Environment
Development Environment

▪ Hardware Requirement

▪ Software Requirement
  • Code Sourcery G++ Lite Edition for ARM EABI
  • MS Visual Studio 2010
  • MS Visual Studio Express Free Edition 2010
  • Jasmine OpenSSD Firmware
Hardware Setup

Serial
UART
RS 232 Cable
SATA Cable
Power Cable
SATA
Power
Hardware Setup

SATA to USB gender
Software Setup

- Code Sourcery G++ Lite Edition for ARM EABI
  - To build firmware binary (firmware.bin)

- MS Visual Studio 2010 & MS Visual Studio Express Free Edition 2010
  - To build the firmware installer (install.exe)

- Hyper Terminal
  - To debug firmware with serial communication
  - BAUD_115200/8/N/1/X
Firmware & Installer

- Download Jasmine Firmware
  - http://www.openssd-project.org
  - 1.1.0 Version

- Build firmware
  - cd ./build_gnu
  - build.bat

- Build the firmware installer
  - Compile installer folder with Visual C++
  - Or, you can download from http://csl.skku.edu/uploads/ICE3028S12/InstallerXP.zip
Install Firmware

- Power-up Jasmine board as ‘Factory Mode’

- Run installer
  
  > cd ./build_gnu
  
  > install.exe
Install Firmware

- Install for the first time
  - 1 -> 2 -> 6 -> 3

- Re-install
  - 1 -> 2 -> 3
Run Firmware

- **Power-down** Jasmine board
- **Power-up** Jasmine board as ‘*Normal Mode*’

- Now, Jasmine is ready to process SATA command
Technical Resource

- Download resources from OpenSSD Wiki
  - http://www.openssd-project.org
  - FTL Developer’s Guide
  - Jasmine Firmware
Contact TA

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Any Questions?