Trusted Firmware-A Tech Forum
Nov 5, 2020

Trusted Firmware-A Testing Framework Overview
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Topics

- Testing framework architecture
- Platform ports
- Tests
- Improvement areas
Introduction

- Suite of bare metal tests to exercise the Trusted Firmware-A (TF-A) features from the Normal World (EL2 or EL1)
- Run-to-completion model executing on the boot CPU
- Functional testing without dependency on a Rich OS
- Interacts with TF-A through its SMC interface
Building blocks

- Core framework
- Drivers: GIC, UART, flash, timers, etc
- Interrupts: SGIs #0 to #7 as NS interrupts, SGI #7 as wake IRQ
- Logging: non-volatile memory, UART console
- Libraries: events, irq, power mgmt, inter-CPU communication, IO
- Makefiles and XML files
- Platform ports
- Tests under tftf/tests
- Test images: TFTF test binary, firmware update, SPM, SPM-MM
- Test database: tests_list.c (build artifact)
Available Tests

- Framework validation tests
- Runtime services tests
- CPU extensions tests
- Firmware update tests
- Template tests
- Performance tests
- Miscellaneous tests
## Available platforms

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Platform name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arm</td>
<td>FVP, Juno, RD-N1-Edge, SGI575</td>
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<tr>
<td>HiSilicon</td>
<td>Hikey960</td>
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<tr>
<td>NVIDIA</td>
<td>Tegra194, Tegra186, Tegra210</td>
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</tbody>
</table>
Platform port requirements

- Mandatory drivers
  - GIC
  - Watchdog timer
  - System timer
  - Non-volatile memory or DRAM region for logging
- Crash console
- Power domain tree
- Physical to logical CPU ID
- Platform defines: stack size, cluster and core count, image base, IRQ
- List of tests to skip (optional)
Implementing tests

- **Prologue:** typedef test_result_t (*test_function_t)(void)
  - Main entry function running on boot CPU
  - Should run to completion
  - Should return the test status to the framework

- **Build**
  - Tests should be added to an existing or new .mk under tftf/tests
  - Tests should be added to corresponding .xml under tftf/tests
  - Names for .mk and .xml must match
  - Generate tftf.bin with the new tests

- **Sample tests**
  - tftf/tests/template_tests
How to enable or disable tests?

- Enable tests
  
  export CROSS_COMPILE=<toolchain> PLAT=<platform> TESTS=<test suite> ttf

- Disable failing tests from tests_to_skip.txt

```plaintext
# Tegra194 platforms enter system suspend only from the boot core
PSCI System Suspend Validation/system suspend from all cores

# Tegra194 platforms do not support CPU suspend with PSTATE_TYPE_POWERDOWN
PSCI STAT/Stats test cases for CPU OFF
PSCI STAT/Stats test cases after system suspend

# Tegra194 platforms do not support memory mapped timers
Boot requirement tests
```
Improvement areas

- Position independent execution
- One test binary for all platforms
- Support for running the test image as a NS VM
- Interactive shell
- Dynamic installation of tests
- More tests to improve code coverage
- More platforms
References

Questions?