Bake the Firmware Right

Validate ACPI, UEFI and SBBR with Firmware Test Suite

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Agenda

- Introduction to Firmware Test Suite
- FWTS Framework
- Installation and Source Code
- FWTS User Interfaces
- FWTS Tests for SBBR

Before talking about FWTS...

The Question

- We know all ingredients (specs)
- But do we bake bread (implement firmware) right?

What is Firmware Test Suite (FWTS)?

- A tool that automates firmware checking
  - It verifies functions and definitions in specs against implementations
  - It runs in Linux
  - It is open source (GPLv2)
- The recommended ACPI SCT

Firmware Test Suite

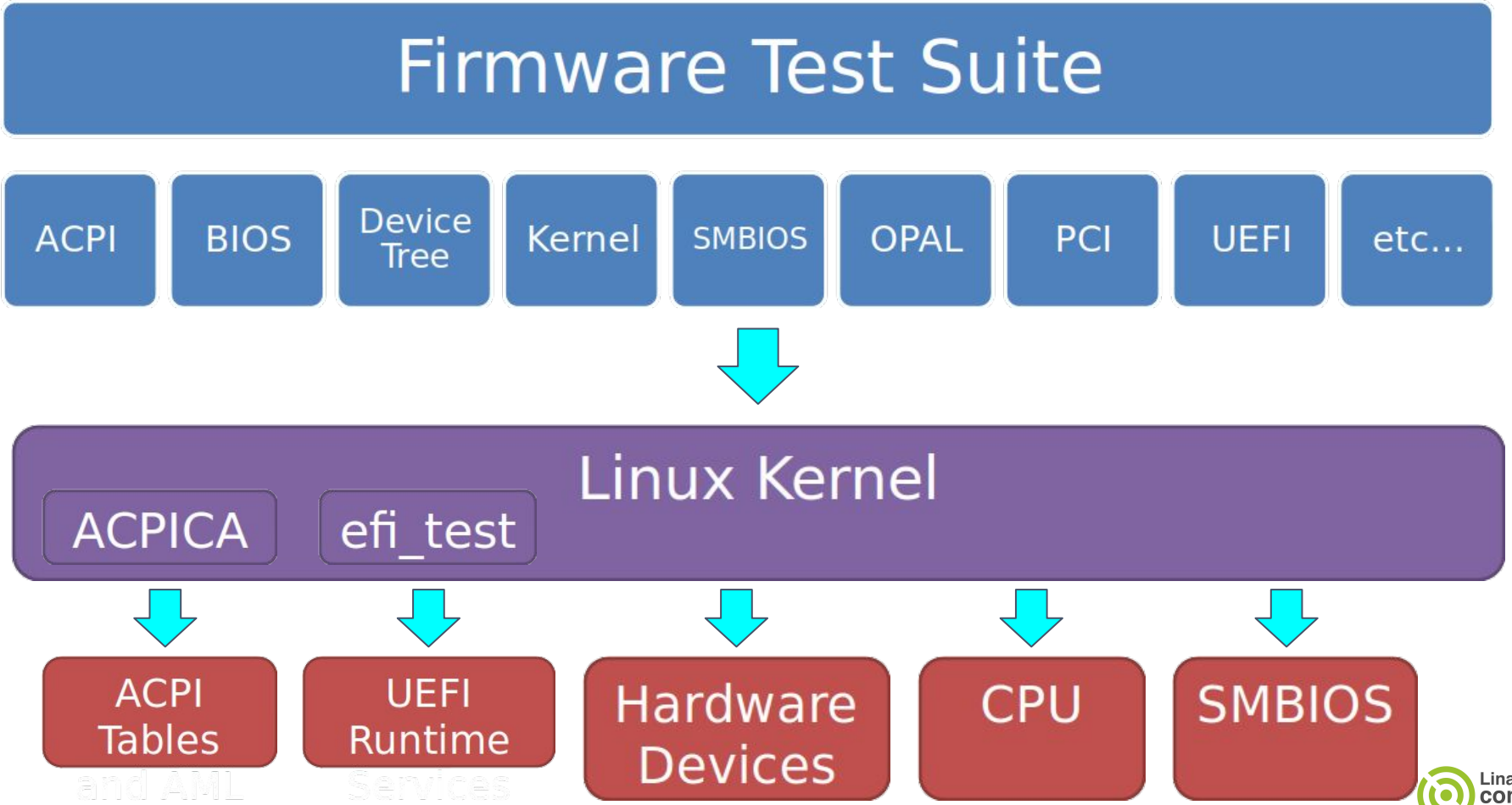
ACPI | BIOS | Device Tree | Kernel | SMBIOS | OPAL | PCI | UEFI | etc...

ACPI

- acpitables
- fadt
- mcfg
- method
- more ACPI tables ...

UEFI

- esrt
- securebootcert
- uefibootpatch
- more uefi runtime tests



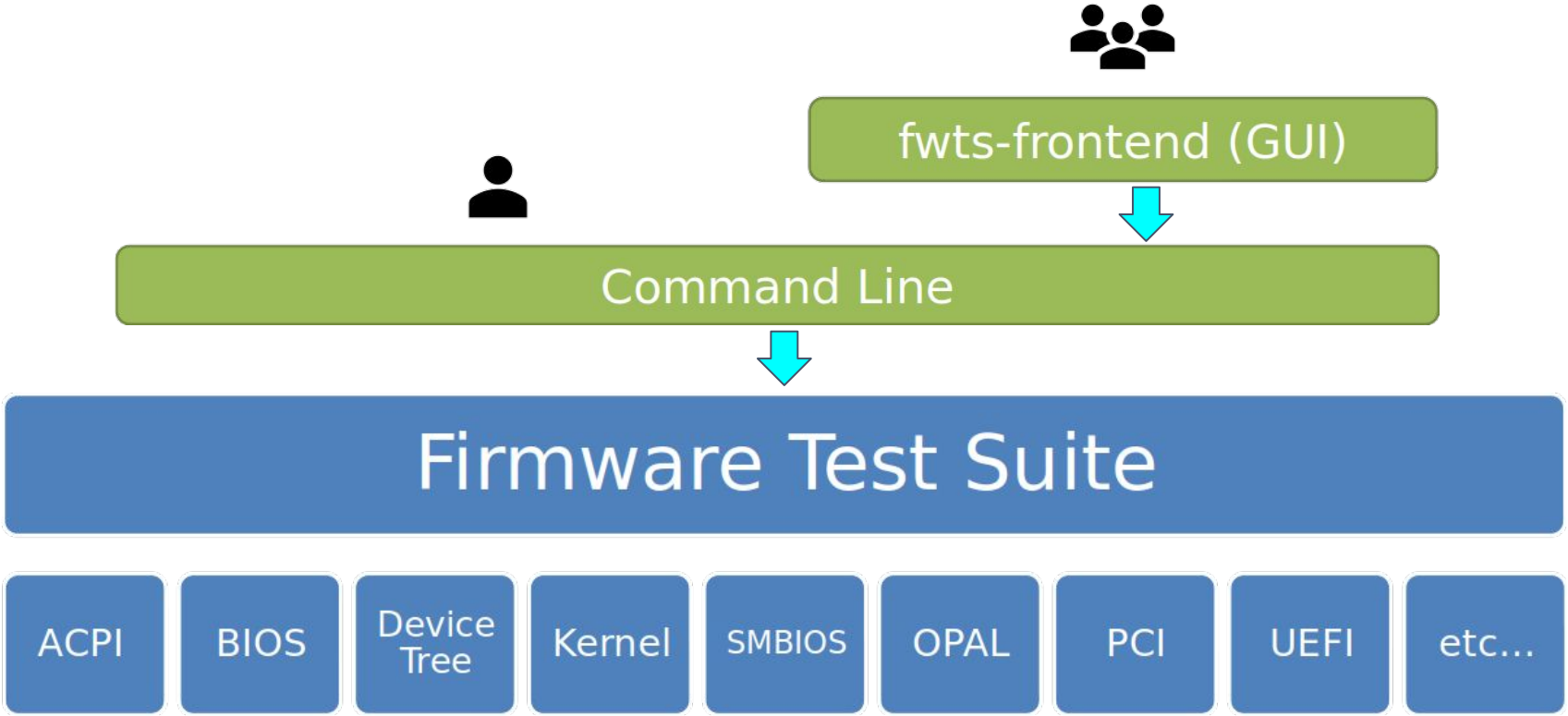
Install FWTS

- In Ubuntu
  - Add repository for latest release
    - sudo add-apt-repository ppa:firmware-testing-team/ppa-fwts-stable
  - Install fwts
    - sudo apt update
    - sudo apt install fwts fwts-frontend
- Source Code
  - git clone git://kernel.ubuntu.com/hwe/fwts.git
    - git clone https://github.com/ColinIanKing/fwts
  - make clean && make -j4 && sudo make install

FWTS User Interfaces (Command Line)

- Run a single test, ex. C states
  - sudo fwts cpufreq
- Run multiple tests, ex. C states + PCIe ASPM
  - sudo fwts cpufreq aspm
- Run all ACPI tests + all UEFI tests
  - sudo fwts --acpitests --uefitests
- View all tests
  - fwts --show-tests-full

FWTS User Interfaces (GUI)



fwts-frontend

```
Fir                          Select Tests
This will run a suite of firmware tests that will check the BIOS
and ACPI tables.  It can also find issues that can cause Linux
problems.

The default below is to run just all the Batch Tests, but you can
select more tests below if required.

Please select below (using cursor up/down and space) and press
enter to continue.

          (*) All          All Batch Tests
          ( ) ACPI         ACPI Tests
          ( ) UEFI         UEFI Tests
          ( ) Recommended  Recommended Tests
          ( ) Selected     Select Individual Tests
          ( ) Abort        Abort Testing

          <  OK  >       <Cancel>       < Help >
```

Arm's Server Base Boot Requirements

- SBBR "defines the base firmware requirements for out-of-box support of any Arm SBSA-compatible Operating System or hypervisor"
  - ACPI - fwts --acpitests ✔
  - SMBIOS - fwts dmicheck ✔
  - UEFI - fwts --uefitests ✔
- SBBR includes only subsets of ACPI, SMBIOS and UEFI
  - sudo fwts --sbbr

Results.log

```
File  Edit  View  Search  Terminal  Help
Results generated by fwts: Version V19.07.00 (2019-07-25 16:49:38).

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This test run on 27/08/19 at 06:37:28 on host Linux awrep3 4.15.0-58-generic
#64-Ubuntu SMP Tue Aug 6 11:12:58 UTC 2019 aarch64.

Command: "fwts --sbbr".
Running tests: dmicheck xsdt spcr rsdp_sbbr method madt gtdt fadt_sbbr dbg2
acpi_sbbr acpitables.

dmicheck: DMI/SMBIOS table tests.
-------------------------------------------------------------------------------
Test 1 of 4: Find and test SMBIOS Table Entry Points.
This test tries to find and sanity check the SMBIOS data structures.
SMBIOS30 entry loaded from /sys/firmware/dmi/tables/smbios_entry_point
PASSED: Test 1, Found SMBIOS30 Table Entry Point at 0xdfeae98
SMBIOS30 Entry Point Structure:
  Anchor String          : _SM3_
 NORMAL  arm_results.log                    0%  2:  1  [19]tra…
"arm_results.log" 4315L, 211213C
```

Results.log (cont'd)

```
File  Edit  View  Search  Terminal  Help

Low failures: NONE

Other failures: NONE

Test            |Pass |Fail |Abort|Warn |Skip |Info |
---------------+-----+-----+-----+-----+-----+-----+
acpi_sbbr       |    9|     |     |    8|     |     |
acpitables      |   19|     |     |     |     |     |
dbg2            |    2|     |     |     |     |     |
dmicheck        |   66|     |     |     |    2|     |
fadt_sbbr       |    7|     |     |     |     |     |
gtdt            |     |    2|     |     |     |     |
madt            |  295|     |     |     |     |     |
method          | 1676|    1|     |   30|  178|     |
rsdp_sbbr       |    1|     |     |     |     |     |
spcr            |    3|     |     |     |     |     |
xsdt            |    1|     |     |     |     |     |
---------------+-----+-----+-----+-----+-----+-----+
Total:          | 2079|    3|    0|   38|  180|    0|
---------------+-----+-----+-----+-----+-----+-----+
~
NORMAL  arm_results.log                    99% ☰4314:  1  ☰[19]tra…
```

Contact FWTS community

- Mailing List: fwts-devel@lists.ubuntu.com
- Website: https://wiki.ubuntu.com/FirmwareTestSuite
- Facebook: firmwaretestsuite
- Twitter: fwts_team
- UEFI Plugfest

Thank you

Join Linaro to accelerate deployment of your Arm-based solutions through collaboration

contactus@linaro.org

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San Diego 2019