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Dynamic Tables Framework: A Step Towards Automatic Generation of Advanced Configuration and Power Interface (ACPI) & System Management BIOS (SMBIOS) Tables

Spring 2018 UEFI Seminar and Plugfest
March 26-30, 2018
Presented by Sami Mujawar (Arm Ltd.)

Agenda

- Introduction
- Dynamic Tables Framework
- Status & Plans
- Links
- Questions

Introduction

Background

- Number of firmware builds for a platform.

Juno	x	big/ big.LITTLE/ LITTLE	x	Display/ Headless	x	Debug/ Release	=	Firmware
		3	x	2	x	2	=	12
		(MADT)		(FADT)				(6 ACPI variants)

- Multiple firmware builds for similar platforms/hardware variants.
- Erroneous tables generated while handcrafting tables.

Goals

- Configurable firmware builds.
- Unify firmware build for similar platforms.
- Minimize/eliminate human induced errors.
- Ability to validate, and generate firmware that complies with relevant specifications.

Simplicity

- Select which ACPI tables to install.
- Provide hardware information.
- Framework generates the ACPI tables.
- Allow use of pre-generated tables.

Dynamic Tables Framework

Framework Architecture

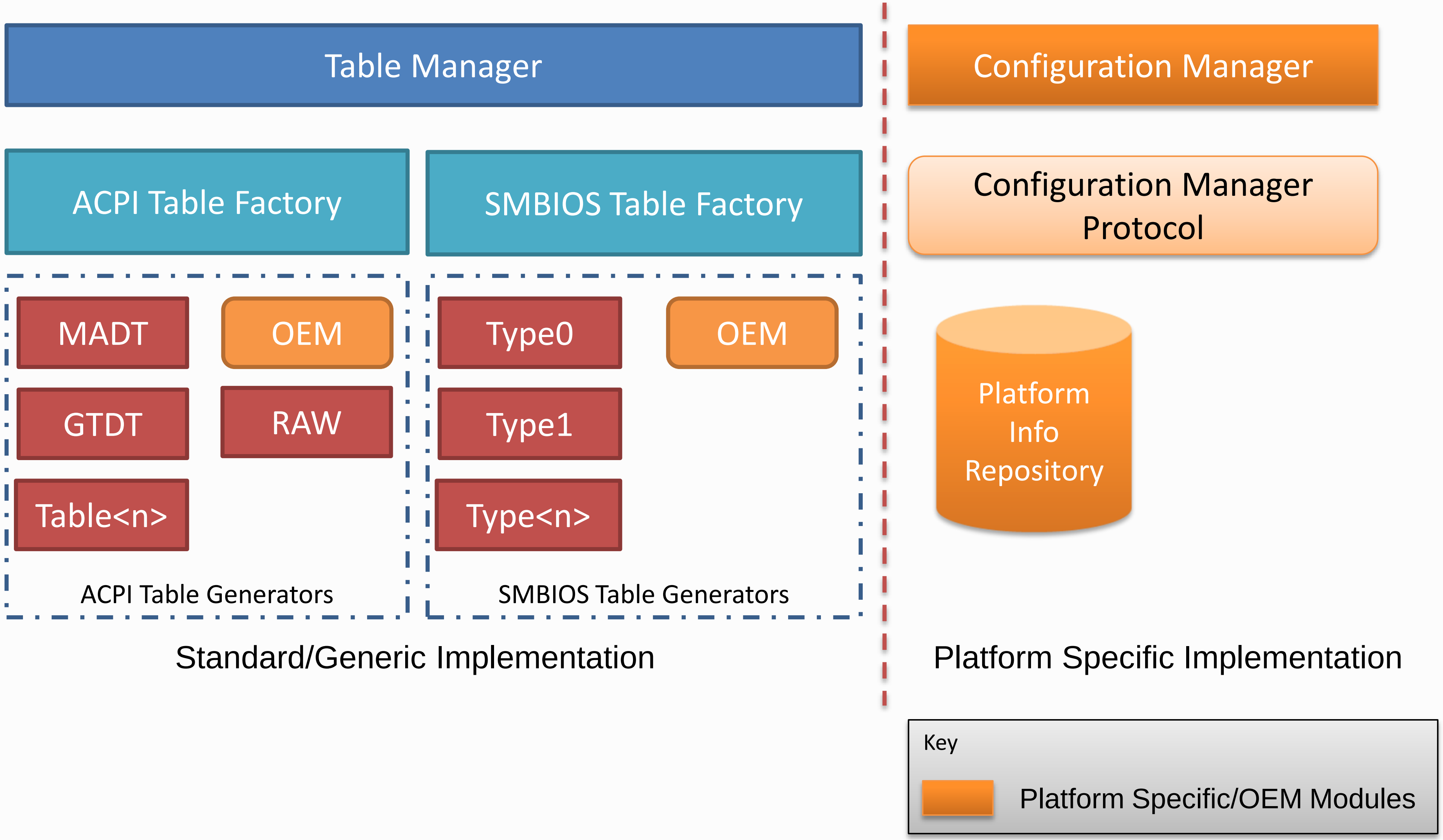


Table Manager

ACPI Table Factory

SMBIOS Table Factory

MADT

OEM

GTDT

RAW

Table<n>

ACPI Table Generators

Type0

OEM

Type1

Type<n>

SMBIOS Table Generators

Standard/Generic Implementation

Configuration Manager

Configuration Manager Protocol

Platform Info Repository

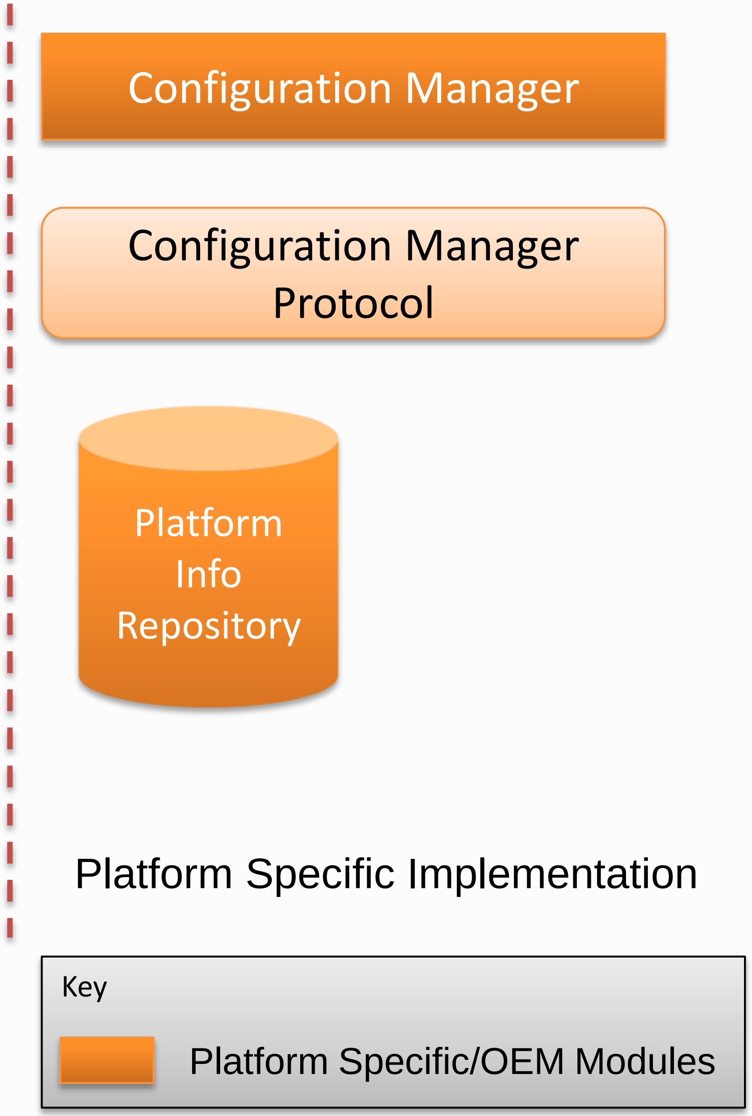
Platform Specific Implementation

Key

🟧 Platform Specific/OEM Modules

Configuration Manager

- Platform specific implementation.
- Collates the platform hardware information required for building the tables.
- Populates an abstract Platform Information Repository.
- Provides a list of tables to be installed.
- Implements the Configuration Manager Protocol that provides an interface to access the platform information.


Configuration Manager
Configuration Manager Protocol
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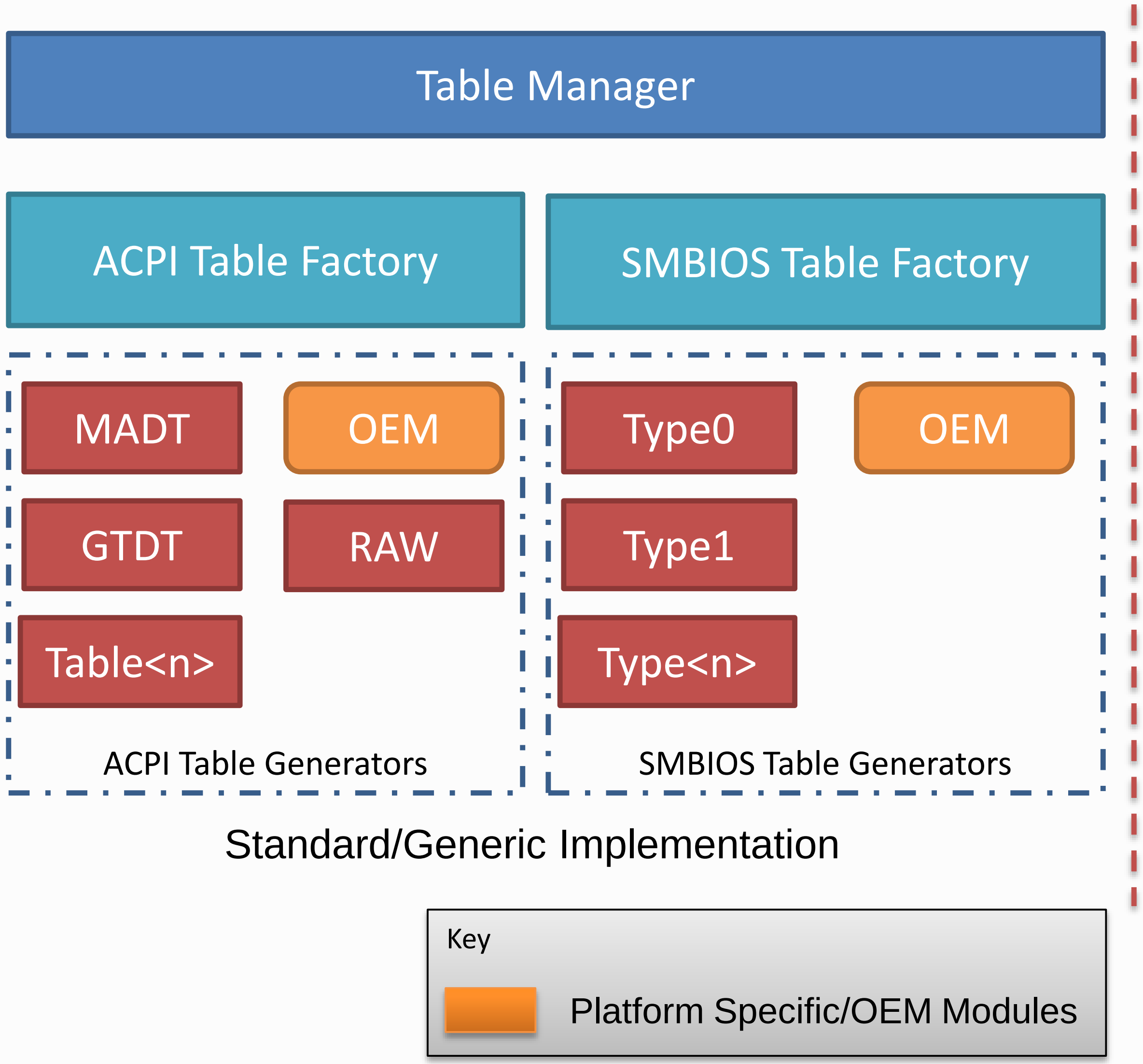
Platform Specific Implementation
Key
Platform Specific/OEM Modules

Table Manager



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SMBIOS Table Generators

Standard/Generic Implementation

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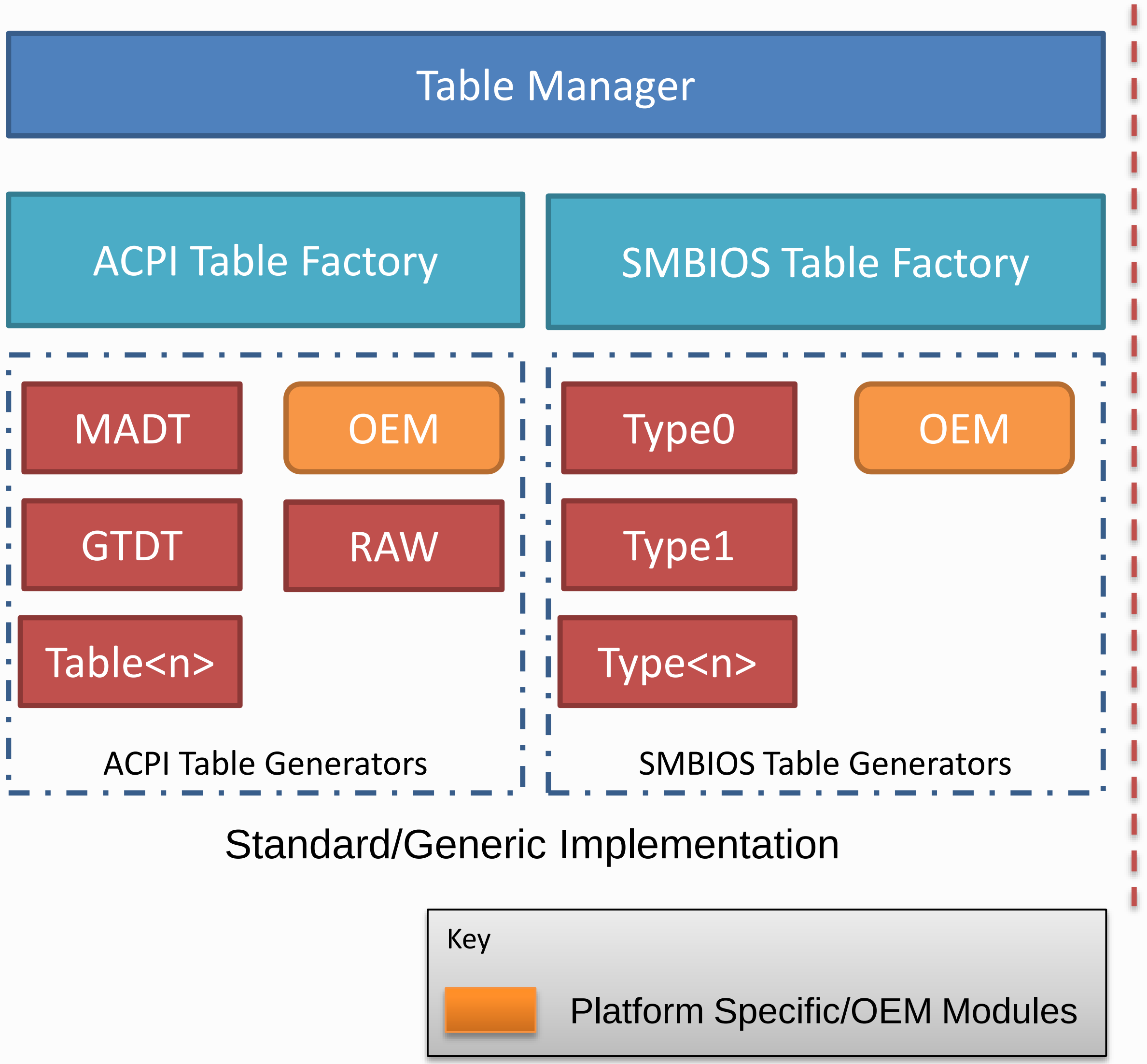
🟧 Platform Specific/OEM Modules

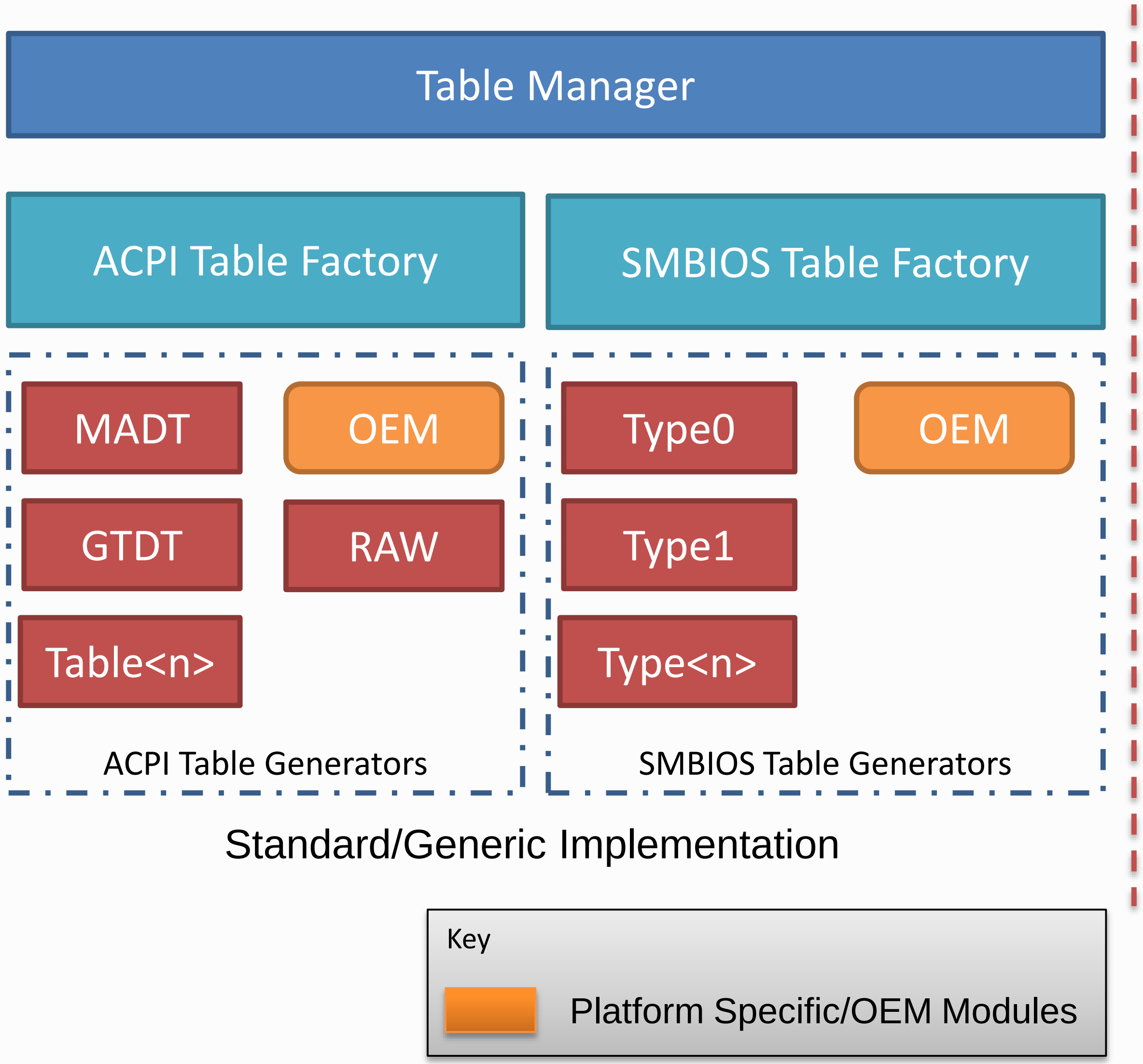
- Drives the table generation and installation.
  - Retrieves the list of tables to install from the Configuration Manager.
  - Gets the required table generators from the Table Factory
  - Invokes the table generator to build the tables.
  - Installs the tables.

Table Factory



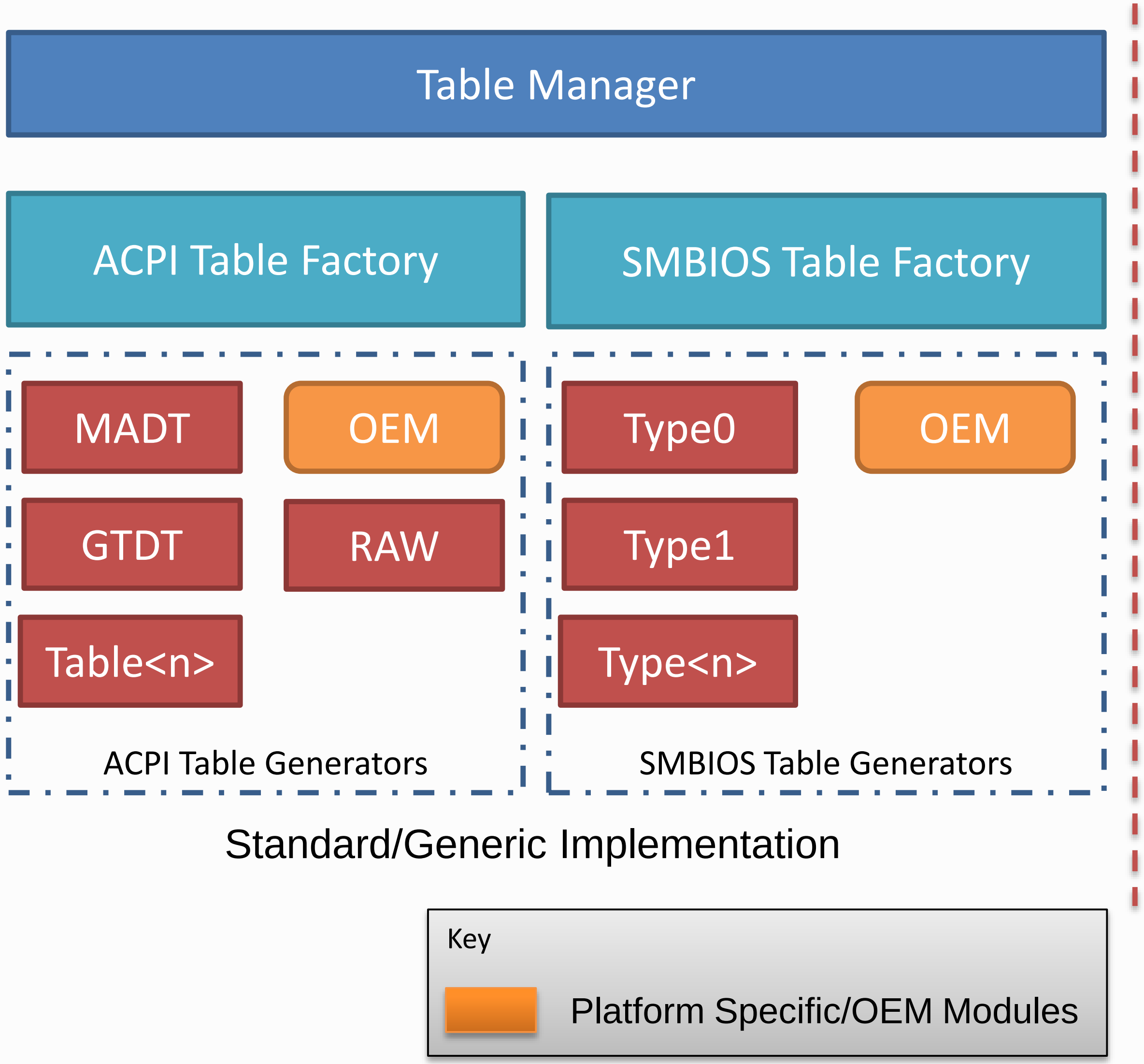
- The table factory is responsible for managing the list of available table generators.
- The table generators register with the table factory.

Table Generators



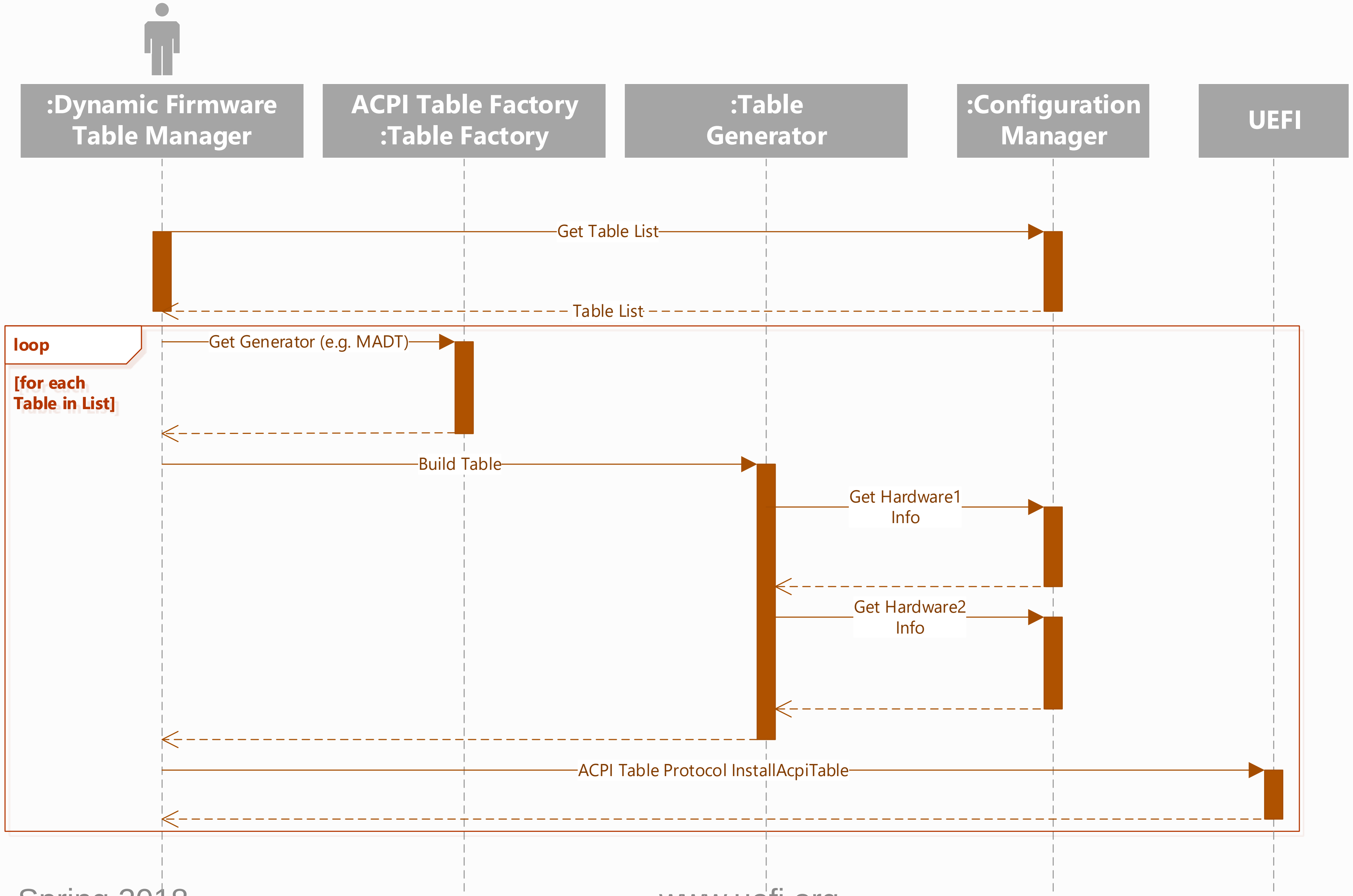
- Implement table specific logic for constructing the tables.
- Uses Configuration Manager Protocol interface to fetch the required platform information for building the table.
- Perform checks to see if the information provided to generate the table is consistent with the specifications.

Table Generator Types



- Standard
  - Generic implementation
  - RAW
- OEM
  - Allows customization

Table generation sequence



Status & Plans

Current Status

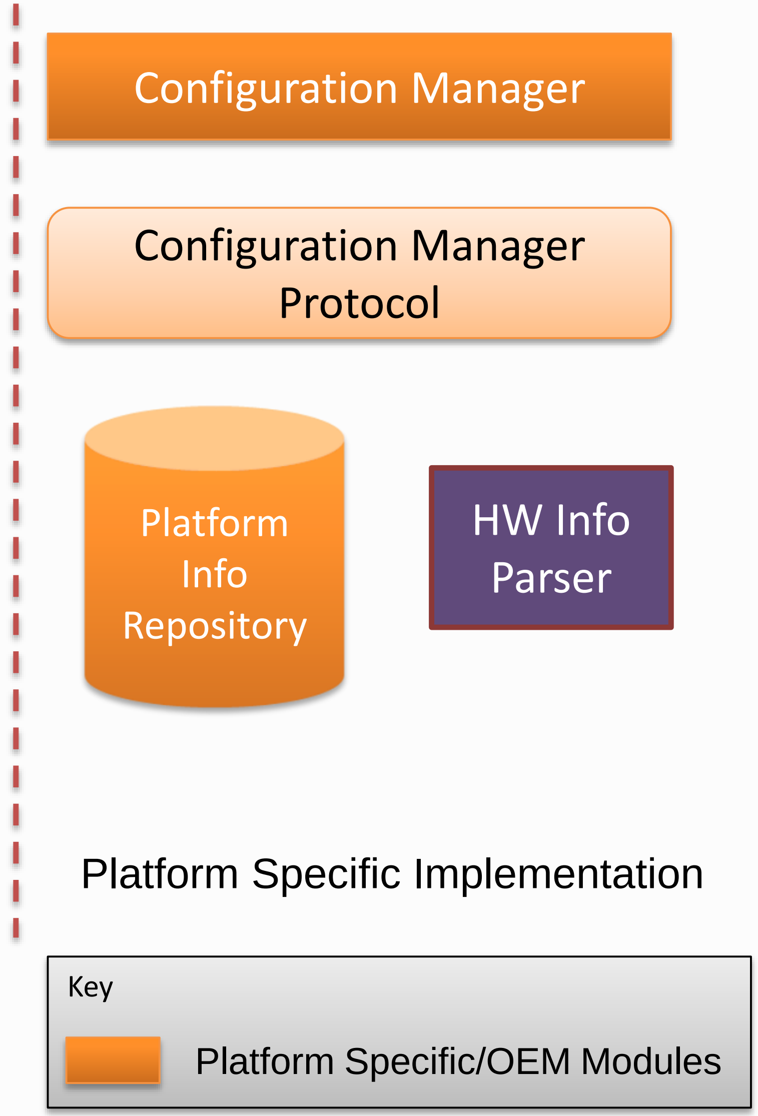
- Prototyped on Juno and FVP model platforms.
- ACPI 6.2 with support for the following tables:
  - DBG2
  - FADT
  - GTDT
  - IORT
  - MADT
  - MCFG
  - SPCR
  - RAW (DSDT/SSDT)

Future Plans

- Supporting more ACPI tables.
- Hardware information parser.
- Adding SMBIOS support.

Hardware Information Parser

- Parser capable of loading hardware information from a suitable hardware description format represented using, for example, XML or JSON.
- Enables firmware customisation from generated system descriptions.



Configuration Manager

Configuration Manager Protocol

Platform Info Repository

HW Info Parser

Platform Specific Implementation

Key

🟧 Platform Specific/OEM Modules

Links

- Dynamic Tables Framework

  https://github.com/tianocore/edk2-staging/tree/dynamictables

  https://github.com/tianocore/edk2-platforms/tree/devel-dynamictables

- ACPICA Patch

  https://lists.acpica.org/pipermail/devel/2018-March/001755.html

- ACPIview

  https://lists.01.org/pipermail/edk2-devel/2018-March/022465.html

Questions?

Impact?

- Memory footprint?
  - RAM requirement may increase somewhat.
    - Memory footprint only increases at boot time (no runtime services impact).
  - Image Size may be slightly increased.
    - Can be optimized by excluding generators that are not required for the platform.
- Boot time?
  - Possible optimization using:
    - Cached information.
    - Tables pre-generated using dynamic tables framework, possibly extracted using ACPIview.

Thanks for attending the Spring 2018 UEFI Plugfest

For more information on the UEFI Forum and UEFI Specifications, visit http://www.uefi.org

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