

OpenBMC

Open Software Framework for Next-
Generation System Management

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Agenda

- **Introduction**
- **History**
- **Current Status**
- **Facebook OCP 2018**
- **The Linux Foundation**
- **What's Next?**



What is a BMC?

- **BMC – baseboard Management Controller**
 - Run at AC plug time
 - Provides simplified management of:
 - Environment
 - Inventory
 - Sensors and even logs
 - Ex. Processors, DIMMs, Fans, Power Supplies, etc.
 - Reports externally to management software



What is Open BMC?

- OpenBMC is an open software framework to build a complete Linux image for a Board Management Controller (BMC).
- OpenBMC/OpenBMC vs. Facebook/OpenBMC





Open BMC History

- Started in Facebook in 2014 Jun
- Developed for Facebook ToR, Wedge
- OpenBMC for IBM Power
- Leverage Yocto Environment
- Open sourced through github
- Founding organizations of the OpenBMC project are Microsoft, Intel, IBM, Google, and Facebook.



Goals with OpenBMC

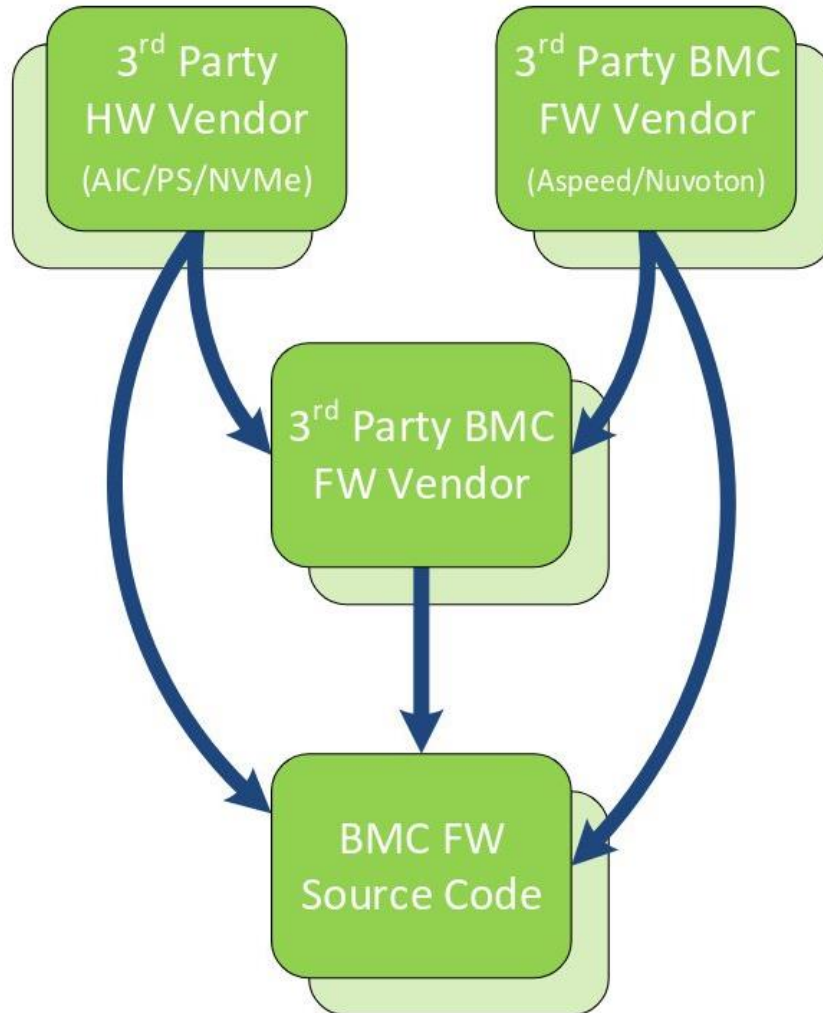
- **Product Development Cycle**
 - Faster Response
 - Reuse (ODMs, Customers)
 - Flexibility (Compute, Storage, Network)
 - Hardware Vendor Participation
 - Manageability Commoditization
 - Common Interfaces
 - Discovery, Updates, Sensor and FRU Configuration



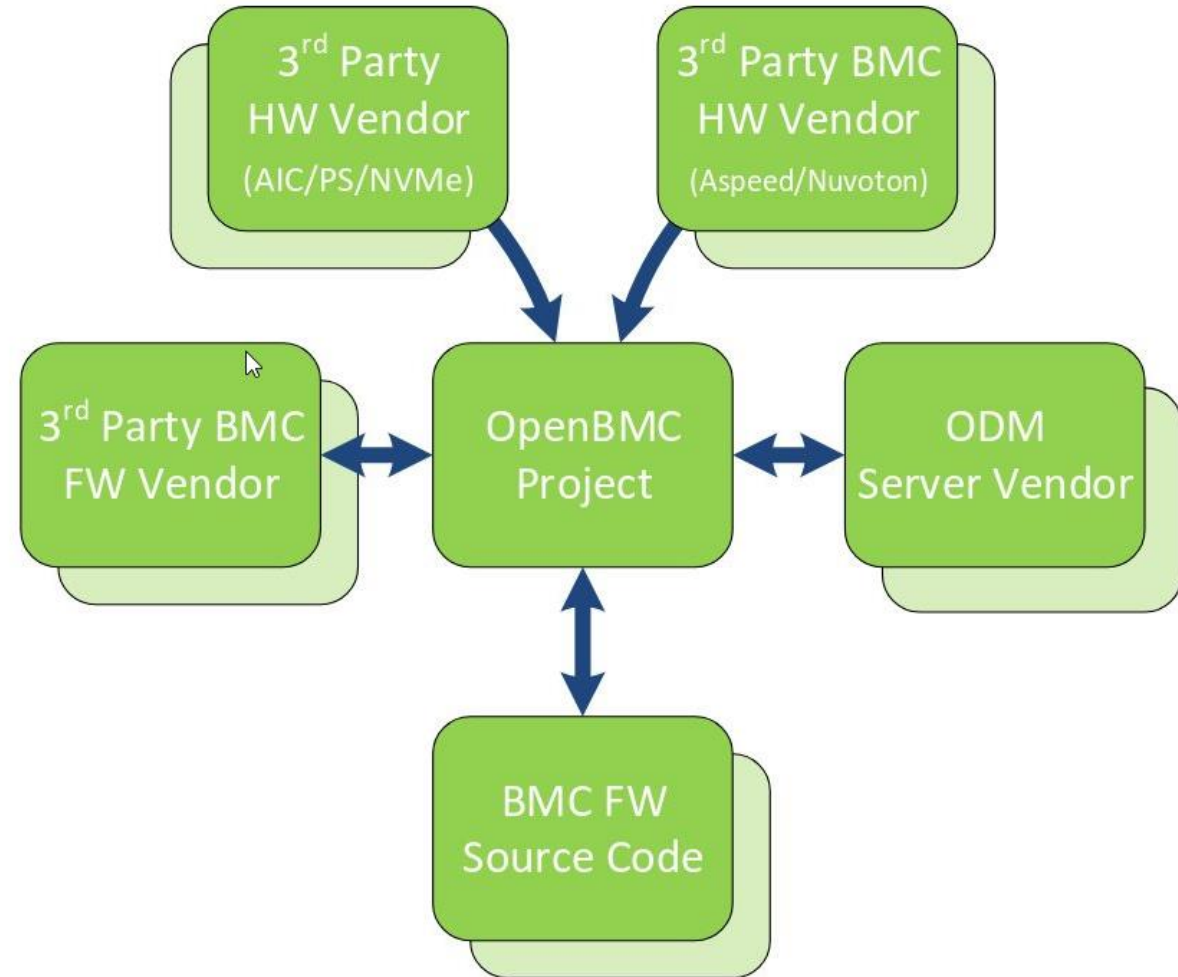
OpenBMC Development Model



Traditional



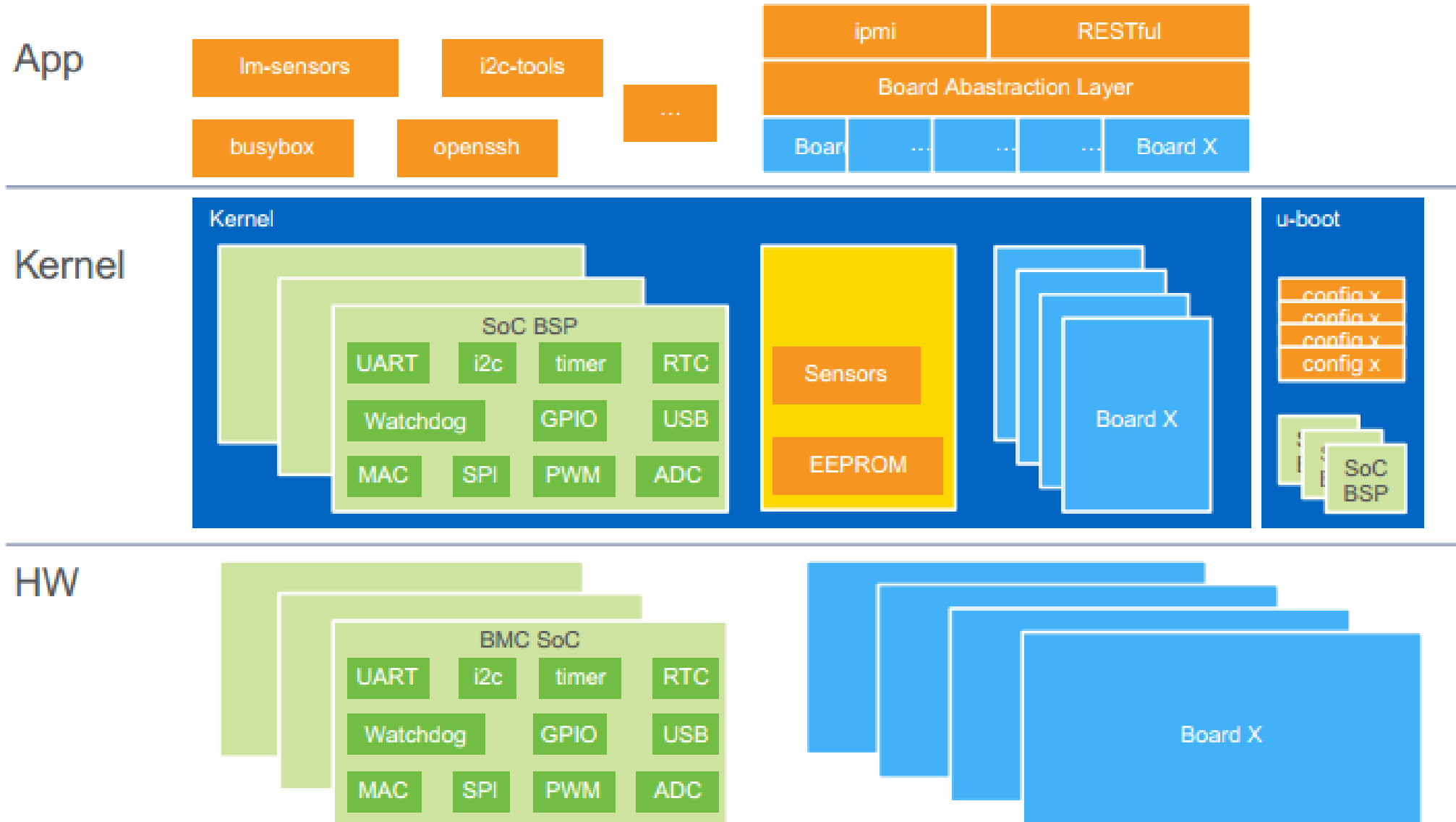
OpenBMC



Refer: https://www.phoronix.com/image-viewer.php?id=2018&image=openbmc_dev_model_lrg



OpenBMC Architecture





OpenBMC vs. 3rd Party BMC

	OpenBMC	3rd Party BMC
Source Code	<ul style="list-style-type: none">• Open Source @ Github	<ul style="list-style-type: none">• Proprietary, Closed
User Interface	<ul style="list-style-type: none">• SSH to BMC Linux Shell• REST API - JSON objects	<ul style="list-style-type: none">• ipmitool - Raw Bytes
Security	<ul style="list-style-type: none">• Secure Shell (ssh)• http(s)	<ul style="list-style-type: none">• RMCP+ over UDP• Known vulnerabilities
Authentication/Authorization	<ul style="list-style-type: none">• Centralized certificate based	<ul style="list-style-type: none">• BMC-centric username/password database
Multi-Node Management	<ul style="list-style-type: none">• Supported Natively with node/slot number	<ul style="list-style-type: none">• Need to virtualize BMC with multiple IP addresses



OpenBMC System Management

- **SSH Based UI**
- **Utility Based**
 - Chassis control, Event and Sensor views, Firmware Updates, System configuration.
- **IPMI**
 - Sending raw IPMI commands and receiving responses.
- **REST API**
 - OpenBMC provides REST API as another UI for user to interact with the system.



OpenBMC Security

- **Verified Boot**
 - HW Support
 - Two SPI Flash Boot Devices
 - 1 Read-Only using WP (Write Protect)
 - TPM for BMC
 - Glue logic to reset BMC+TPM
 - Key hierarchy to allow online signing and key rotation
 - Verify FIT (Flattened Image Tree)
 - Blob Kernel + RootFS
 - Verified Boot Status
 - Allow audit and take corrective action



OpenBMC Now

- **Product Ready**
- **In production by multiple companies**
 - Deployed within multiple datacenters throughout the world
- **Passed an outrageous amount of manual and automated tests**
 - Manufacturing, Functional Test, System Test
- **Yocto/Bitbake based so continuous kernel and security updates available**



OpenBMC Facebook Last OCP Summit

- Python2->Python3 Migration
- Yocto: Krogoth(2.1)->Rocko(2.4)
- Verified Boot
- OCP LCD Debug Card
 - LCD
 - System Information
 - POST Code
 - GPIO Status
 - SEL
 - Critical Sensors
 - Power Control
- At-Scale Debug
 - Remote debug on Intel server designs



OpenBMC The Linux Foundation

- OpenBMC is now a Linux Foundation project
- Selected as a respected and neutral steward of the project for all involved
 - <https://www.linuxfoundation.org/projects/>
- Owns any project trademarks
- DNS registrant for project domains
 - <https://www.openbmc.org/>
- Github organization owner
 - <https://github.com/openbmc/openbmc>
 -



OpenBMC Goals

- The OpenBMC project's aim is to create a highly extensible framework for BMC software and implement for data-center computer systems.
- A few high-level objectives:
 - Provide a REST API for external management, and allow for "pluggable" interfaces for other types of management interactions.
 - Compatible with host firmware implementations for basic IPMI communication between host and BMC.



OpenBMC Technical Steering Committee

- **Member**

- IBM
- Facebook
- Microsoft
- Intel
- Google



- **Community contributions drive project direction**
- **Working to further define the role**
- **Working to identify new member criteria**



OpenBMC Next – System Management

- **IPMI**

- IPMI 2.0 Compliance and Full DCMI support

- **REST**

- All D-Bus interfaces defined in phosphor-dbus-interfaces repo in GitHub
- All REST APIs have a direct mapping to all defined D-Bus interfaces

- **Web Interface**

- Chassis control, Event and Sensor views, Firmware Updates, Server configuration

- **Event Notification**

- Create dynamic web sockets to get call backs on critical events

- **Redfish**



Reference

- <https://www.opencompute.org/events/past-summits>.
- <https://www.openbmc.org/>
- <https://www.linuxfoundation.org/blog/2018/03/openbmc-project-community-comes-together-at-the-linux-foundation-to-define-open-source-implementation-of-bmc-firmware-stack/>



Best TCO and Workload Optimized IT Solutions for Data Centers