OPEN POSSIBILITIES.

Yosemite v1 Mono Lake Platform Enablement - “Open All The Way Down”
Yosemite v1 Mono Lake Platform Enablement – “Open All The Way Down”

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Yosemite v1 Chassis

- Designed by Facebook
- Consists of 4 slots in a chassis called Yosemite allowing up to 4 servers per sled.
- Designed specifically for Facebook datacenters for hyperscale workload
- Contributed to the Open Compute Project in 2015 -

OPEN POSSIBILITIES.
Yosemite v1 Chassis

Facebook designs are now accessible for everyone – Thank you Facebook!


A rack of Yosemite v1 is 48 nodes providing 192 discrete CPUs + cores
Mono Lake Platform consists of Intel Xeon D-1500 Series "Broadwell" processors. It comes with FB OpenBMC. A released but immature Intel FSP and closed source UEFI BIOS Firmware.

Legacy FSP Projects

<table>
<thead>
<tr>
<th>FSP Project Name</th>
<th>Directory Name</th>
<th>FSP Specification Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th Generation Intel® Core™ processors and chipsets (formerly Broadwell)</td>
<td>BroadwellFspBinPkg</td>
<td>v1.0</td>
</tr>
<tr>
<td>Intel® Xeon® Processor D Product Family (formerly Broadwell-DE)</td>
<td>BroadwellDEFspBinPkg</td>
<td>v1.0</td>
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</tbody>
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Endless Possibilities

- Different Form Factors
- High scalability
- OCP everywhere
Platform Challenges

- Moving from a single purpose hyperscale platform to a general-purpose computing platform
- Circularity gives us the motivation to do this work and ultimately the community benefits
- An open platform that can meet computing needs for most business sectors [sans the Intel FSP]

OPEN POSSIBILITIES.
Host Firmware

Intel Xeon D-1500 Series “Broadwell-DE” SoC, 16 cores/32 threads

coreboot integrated with a custom FSP and LinuxBoot payload

Replaces the original closed source UEFI BIOS firmware

Note: The SPS/ME firmware is only available from Intel under NDA
Initial implementation for Mono Lake was previously available on coreboot.org on the 4.11 branch

- Was not in a production-worthy state

Fixes and Enhancements:

- Ported in SMM handler v2 code from master
- Ported in IMPI KCS driver bugfixes from master
- Numerous other IMPI fixes and enhancements
- Cleaned up ACPI tables
- Updated to use latest microcode
- Cleaned up devicetree and Kconfig

All code has been upstreamed to coreboot.org on the 4.11 branch
<table>
<thead>
<tr>
<th>Custom Broadwell-DE FSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public FSP from Intel only supports up to 8 cores / 16 threads</td>
</tr>
<tr>
<td>SysPro is licensed by Intel to build and distribute custom FSPs</td>
</tr>
<tr>
<td>Our custom FSP supports up to 16 cores / 32 threads</td>
</tr>
<tr>
<td>Also includes fixes to a few other issues that we’ve identified</td>
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**Note:** Our FSP is not available publicly per Intel license terms
LinuxBoot (U-root) Payload

Enhancements:

- Included systemboot to support VPD, IMPI, BMC EOP, etc.
- Added systemboot support for generic booters
  - boot (in place of localboot)
  - pxeboot (in place of fbnetboot)
- Added support for additional file systems: btrfs, xfs, ext4

Note: Requires larger BIOS region to fit everything

Upstreaming still in progress
BMC Firmware

| ASPEED AST1250 BMC in Yosemite v1 chassis | Yosemite v1 chassis can hold up to 4 Mono Lake server cards | Firmware based on Facebook’s OpenBMC implementation |
Firmware Summary

Open firmware solutions (or as open as they can be) for Mono Lake

See Mono Lake systems booting in the OCP Experience Center (hurry fast, it closes in 30 minutes!)

Here is a link to the video
Current Status

- Documentation and Build utilities are complete
- Platform successfully boots to your favorite Linux distribution
- Support for coreboot linuxboot/u-boot
- IPXE boot supported
- Planned k8s installation on Mono Lakes at Experience Center
- OpenBMC currently running FB OpenBMC with support for IPMI
Call to Action

Submitted to OCP for review [link to PR]

Looking for feedback through code reviews and testing
Open Discussion