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



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

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# Yosemite v1 Chassis

- Designed by Facebook

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- Consists of 4 slots in a chassis called Yosemite allowing up to 4 servers per sled.

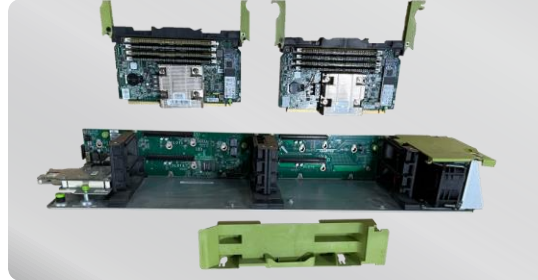
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- Designed specifically for Facebook datacenters for hyperscale workload

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- Contributed to the Open Compute Project in 2015 -

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# Yosemite v1 Chassis

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

<https://engineering.fb.com/2015/03/10/core-data/introducing-yosemite-the-first-open-source-modular-chassis-for-high-powered-microservers/>

A rack of Yosemite v1 is 48 nodes providing 192 discrete CPUs + cores



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# Mono Lake Platform



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Mono Lake platform consists of Intel Xeon D-1500 Series "Broadwell" processors



Comes with FB OpenBMC



A released but immature Intel FSP and closed source UEFI BIOS Firmware

## Legacy FSP Projects

FSP Project Name	Directory Name	FSP Specification Version
5th Generation Intel® Core™ processors and chipsets (formerly Broadwell)	BroadwellFspBinPkg	v1.0
Intel® Xeon® Processor D Product Family (formerly Broadwell-DE)	BroadwellDEFspBinPkg	v1.0

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Different Form Factors



High scalability

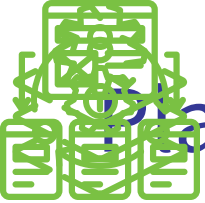


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# Platform Challenges



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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]

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# Host Firmware

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

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coreboot  
integrated with a  
custom FSP and  
LinuxBoot payload

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Replaces the  
original closed  
source UEFI BIOS  
firmware



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**Note:** The SPS/ME firmware is only available from Intel under NDA

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# Coreboot

**Initial implementation for Mono Lake was previously available on [coreboot.org](https://coreboot.org) on the 4.11 branch**



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- Was not in a production-worthy state

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## 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

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**All code has been upstreamed to [coreboot.org](https://coreboot.org) on the 4.11 branch**

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# Custom Broadwell-DE FSP



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Public FSP from Intel only supports up to 8 cores / 16 threads

SysPro is licensed by Intel to build and distribute custom FSPs

Our custom FSP supports up to 16 cores / 32 threads

Also includes fixes to a few other issues that we've identified

**Note:** Our FSP is not available publicly per Intel license terms

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# LinuxBoot (U-root) Payload



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## 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**

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# BMC Firmware

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ASPEED AST1250  
BMC in Yosemite  
v1 chassis

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Yosemite v1  
chassis can hold  
up to 4 Mono  
Lake server cards

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Firmware based  
on Facebook's  
OpenBMC  
implementation



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# 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



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# 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

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# → Call to Action

**Submitted to OCP for review** [\[link to PR\]](#)

**Looking for feedback through code reviews and testing**

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# Open Discussion



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