OPEN SOURCE HOST FIRMWARE DIRECTIONS LINUXFEST NORTHWEST

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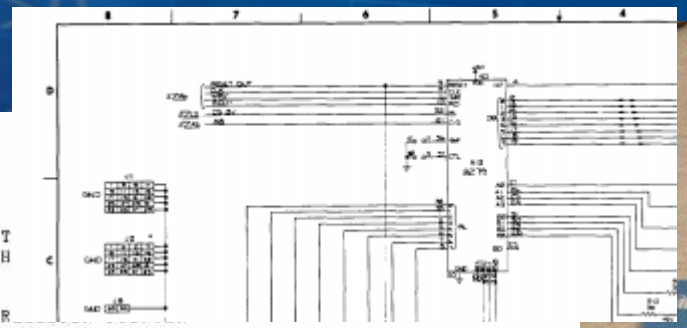
MY BEGINNING



```
ISIS-II 8080/8085 MACRO ASSEMBLER, X108          SDK85


  LOC  OBJ          SEQ          SOURCE STATEMENT

                     933 ; DESCRIPTION:  RGLOC RETURNS T
                     934 ;               INDICATED BY TH
                     935 ;
                     936 RGLOC:
  02FC 2AFD20        937          LHLD    RGPTR    ; GET R
  02FF 2600          938          MVI     H,0      ; /IN H & L
  0301 01ED03        939          LXI     B,RGTBL  ; GET REGISTER SAVE LOCATION TABLE ADDRESS
  0304 09            940          DAD     B        ; POINTER INDEXES TABLE
  0305 6E            941          MOV     L,M      ; GET LOW ORDER BYTE OF REGISTER SAVE LOC:
  0306 2620          942          MVI     H,(RAMST SHR 8) ; GET HIGH ORDER BYTE OF
                     943                                  ; /REGISTER SAVE LOCATION
  0308 C9            944          RET
                     945 ;
                     946 ;*****************************************************************
                     947 ;
                     948 ; FUNCTION: RGNAM - DISPLAY REGISTER NAME
                     949 ; INPUTS: NONE
                     950 ; OUTPUTS: NONE
                     951 ; CALLS: OUTPT
                     952 ; DESTROYS: A,B,C,D,E,H,L,F/F'S
                     953 ; DESCRIPTION: RGNAM DISPLAYS, IN THE ADDRESS FIELD OF THE DISPLAY,
                     954 ;               THE REGISTER NAME CORRESPONDING TO THE CURRENT
                     955 ;               REGISTER POINTER VALUE.
                     956 ;
                     957 RGNAM:
  0309 2AFD20        958          LHLD    RGPTR    ; GET REGISTER POINTER
  030C 2600          959          MVI     H,0
  030E 29            960          DAD     H        ; MULTIPLY POINTER VALUE BY 4
  030F 29            961          DAD     H        ;/(REGISTER NAME TABLE HAS 4 BYTE ENTRIES)
  0310 01B903        962          LXI     B,NMTBL  ; GET ADDRESS OF START OF REGISTER NAME TABLE
  0313 09            963          DAD     B        ; ARG - ADD TABLE ADDRESS TO POINTER - RESULT IS
                     964                           ;/ADDRESS OF APPROPRIATE REGISTER NAME IN H & L
  0314 AF            965          XRA     A        ; ARG - USE ADDRESS FIELD OF DISPLAY
  0315 0600          966          MVI     B,NODOT  ; ARG - NO DOT IN ADDRESS FIELD
  0317 CDB702        967          CALL    OUTPT    ; OUTPUT REGISTER NAME TO ADDRESS FIELD
  031A C9            968          RET
                     969 ;
                     970 ;*****************************************************************
                     971 ;
                     972 ; FUNCTION: RSTOR - RESTOR USER REGISTERS
                     973 ; INPUTS: NONE
                     974 ; OUTPUTS: NONE
                     975 ; CALLS: NOTHING
                     976 ; DESTROYS: A,B,C,D,E,H,L,F/F'S
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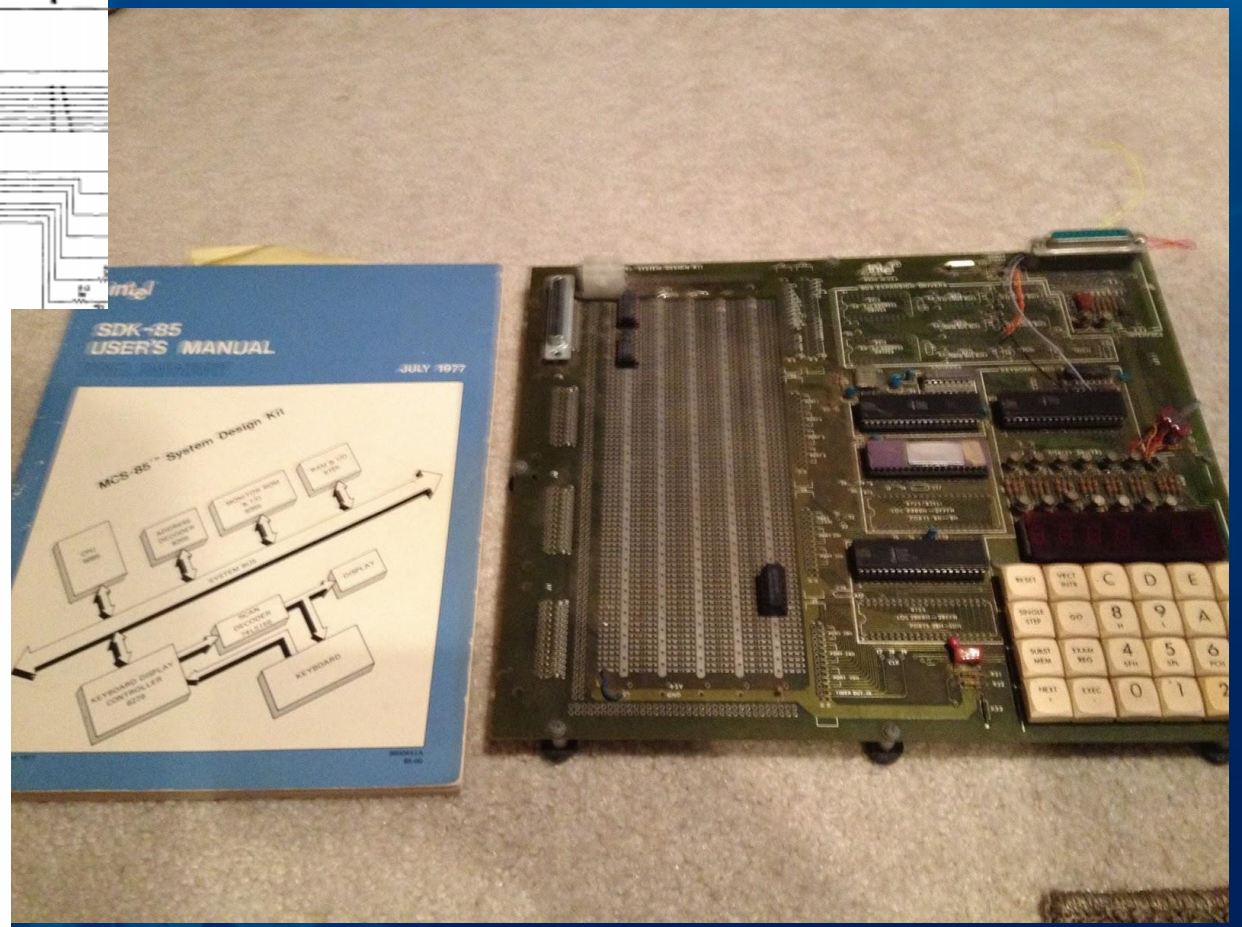
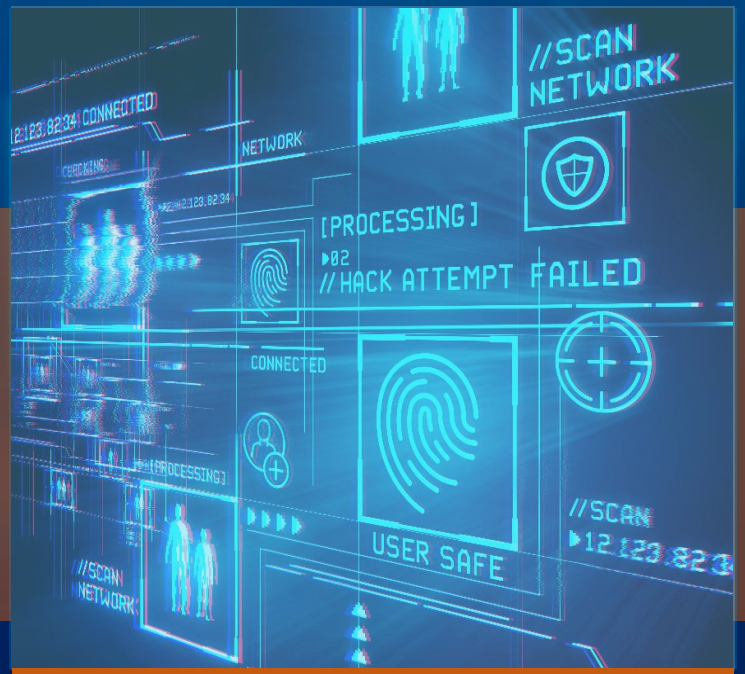


S.O.S

SIMPLICITY

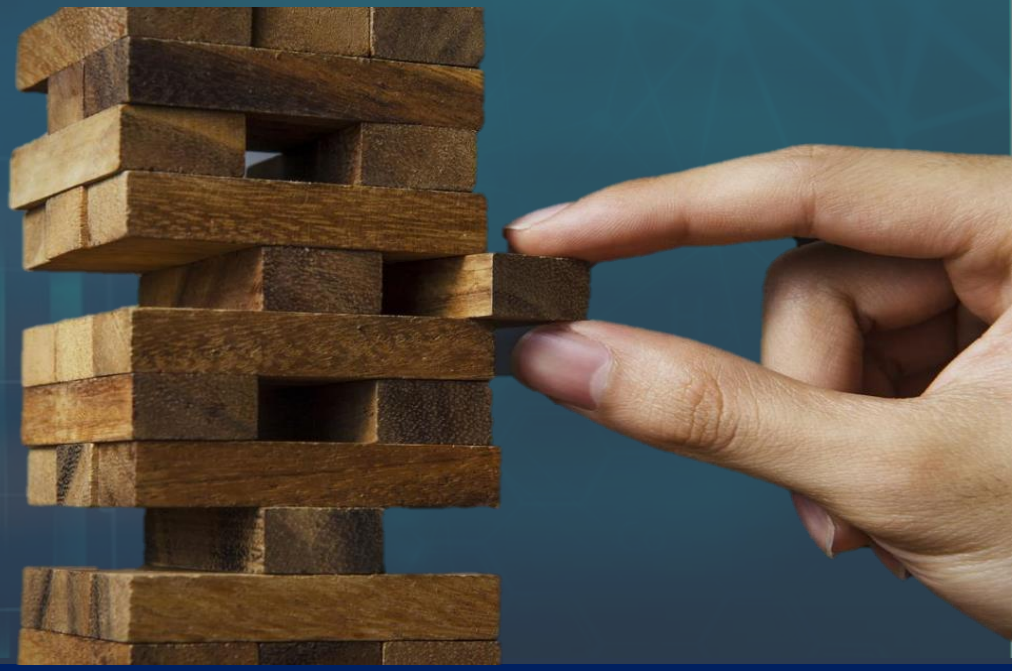
OPENNESS



SECURITY

SIMPLICITY

THEN



INTEL BUILDS BROAD AND COMPLEX CODE BASE

CUSTOMERS ASSUME RISKS SIMPLIFYING THE CODE

OUR NEW FOCUS – SIMPLE AND SCALABLE SOLUTIONS

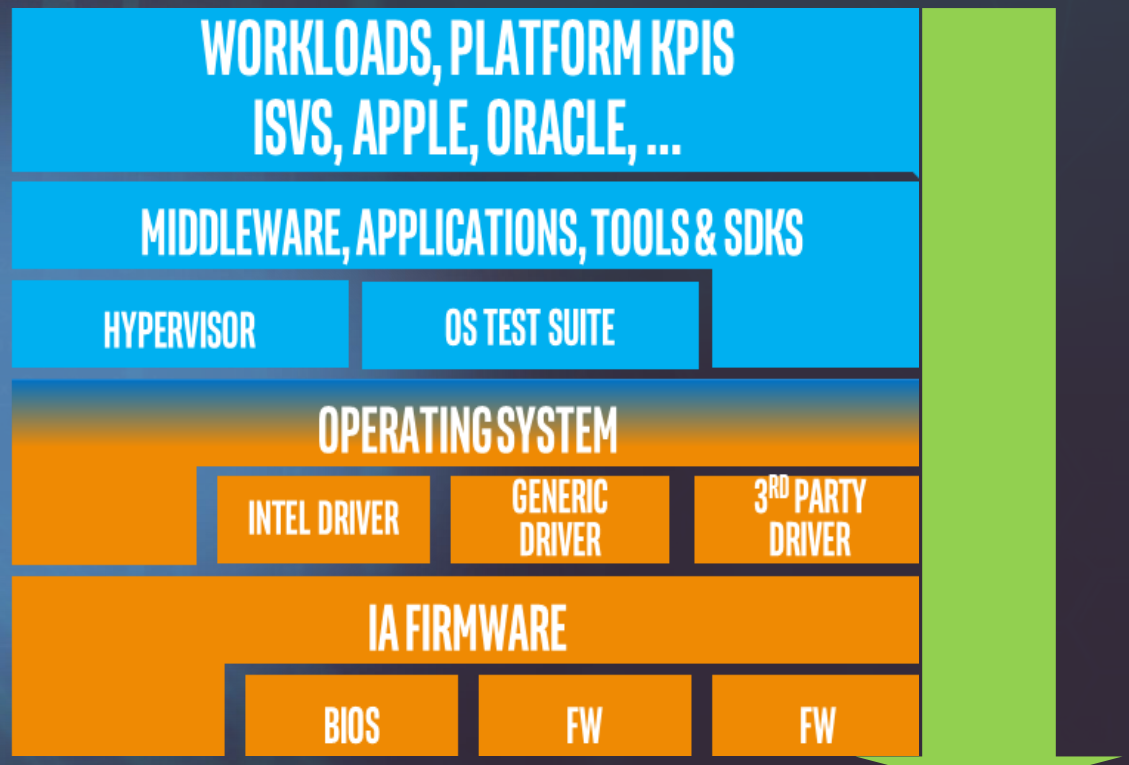
OPENNESS

PARTNERS DEMANDING OPEN SOURCE FURTHER DOWN THE ENTIRE STACK

CUSTOMER FOCUSED

SOLUTION ORIENTED

TECHNOLOGY ALIGNED



SECURITY

BROADENING OUR SECURITY MINDSET

WE'RE MAKING PROGRESS

FSP2.0+
INTEL® SLIM
BOOTLOADER
MIN PLATFORM
ARCHITECTURE

SIMPLICITY

OPENNESS

SECURITY

FSP – Firmware Support Package

WE'RE MAKING PROGRESS

FSP2.0+
INTEL® SLIM
BOOTLOADER
MIN PLATFORM
ARCHITECTURE

SIMPLICITY

OPEN SOURCE UEFI
PLATFORMS (CLIENT,
IOT, SERVER)
SOUND FIRMWARE,
MICROPYTHON

OPENNESS

SECURITY

FSP – Firmware Support Package
UEFI – Unified Extensible Firmware Interface

WE'RE MAKING PROGRESS

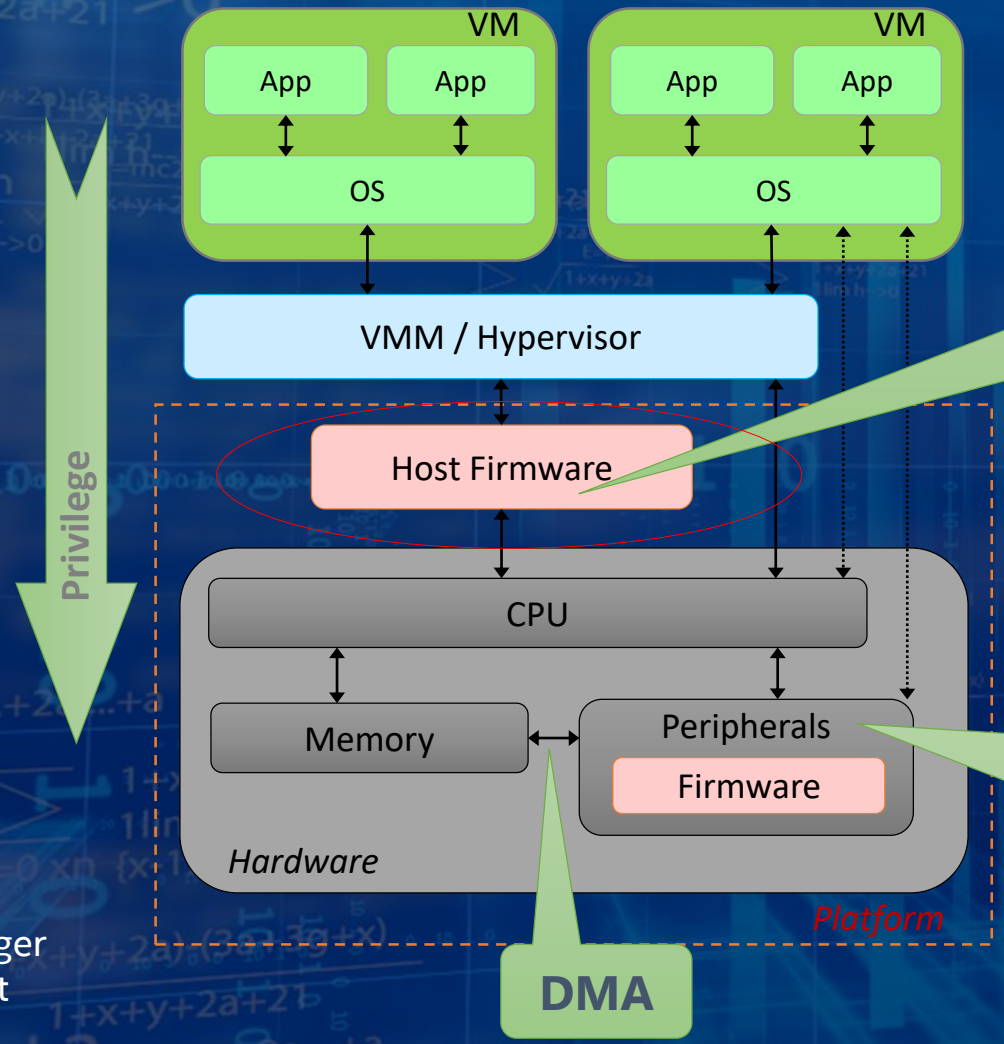
SIMPLICITY	OPENNESS	SECURITY
FSP2.0+ INTEL® SLIM BOOTLOADER MIN PLATFORM ARCHITECTURE	OPEN SOURCE UEFI PLATFORMS (CLIENT, IOT, SERVER) SOUND FIRMWARE, MICROPYTHON	CHIPSEC CAPSULE UPDATE

FSP – Firmware Support Package
UEFI – Unified Extensible Firmware Interface

Firmware options

From https://en.wikipedia.org/wiki/Chinese_restaurant

WHERE IS FIRMWARE?



Host firmware – UEFI, coreboot*, U-Boot*, Linuxboot*, Intel® FSP

A specific Peripheral may have its own processor, and its own firmware, which is undetectable by host CPU/OS.

VM – Virtual Machine
OS – Operating System
VMM – Virtual Machine Manager
CPU – Central Processing Unit
DMA – Direct Memory Access

Do others believe this?

The Future of Firmware

We have been witnessing an interesting phenomenon since the beginning of this century: open source projects are gaining momentum, led by companies such as Google and Facebook. Many legacy and proprietary software solutions are either disappearing or losing steam very quickly; open source solutions are becoming a primary interest of technologists at an amazing speed.

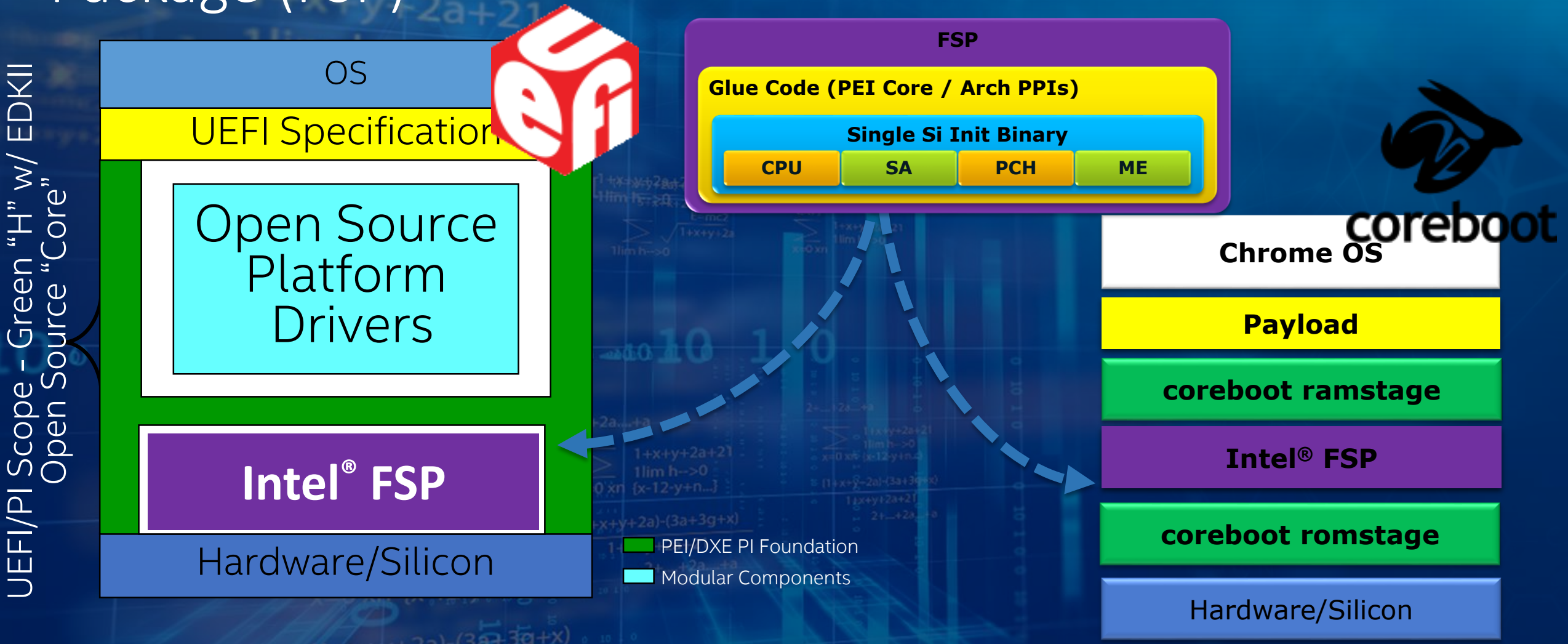
Even though this century is still young, we are riding on a fascinating wave that will make the 21st century a distinctly different century than any other. The phrase "open source" clearly connotes sharing and collaboration, in contrast to the waning business philosophy of

From https://www.apress.com/us/book/9781484200711

What are we doing

- Open development environment
  - Open source core
  - Open source platform code
  - IP protected initialization in well-defined binary blob
  - Open up all of the build tools

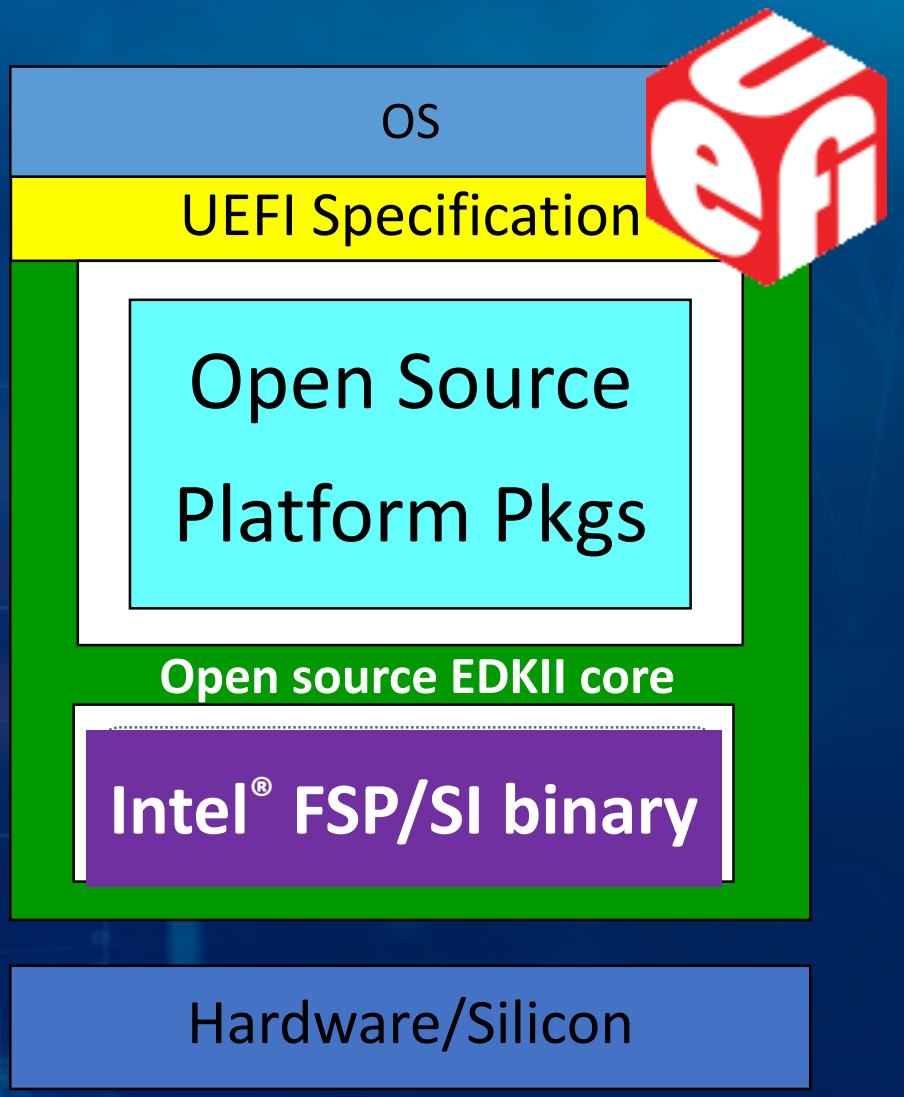
UEFI and coreboot with the Intel Firmware Support Package (FSP)



From https://firmware.intel.com/sites/default/files/resources/SF14_STTS001_102f.pdf

Internal mode of evolution

- **FSP / Binary FV's** - Evolution of the Intel ® Firmware Support Package (FSP) from 1.0 to 1.1(simplified boot flow), to 2.0 – Intel.com/fsp
- **Open Source platform code** – Simplified, product quality, open source capable platform package. Built on industry standards and EDK II technology for ease of porting. Upstream platform code. – tianocore.org
- EDKII – existing upstream/open source core
- MinTree – minimum open source core and platform code to boot shrinkwrap OS

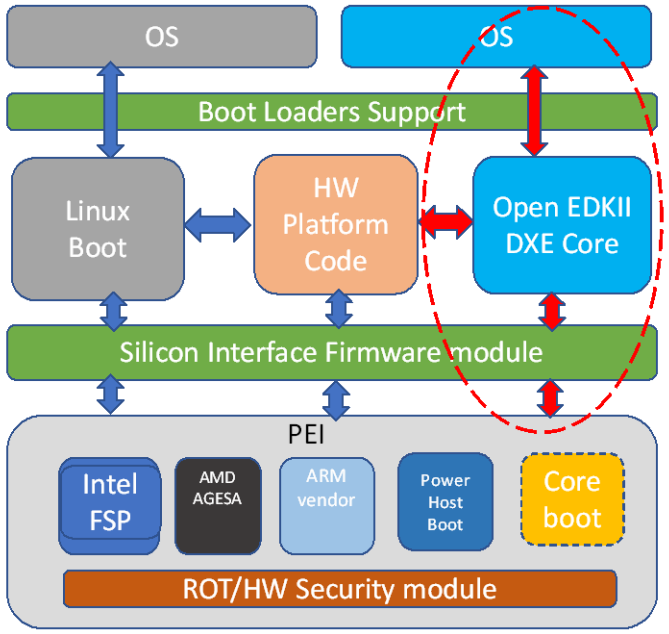


Status on open source

- Active work stream in Open Compute Conference (OCP) for Open Source http://www.opencompute.org/wiki/Open_System_Firmware
- Intel FSP 2.0 binaries for all client Atom and Core CPU's
- https://github.com/intelfsp and other opaque binaries at https://github.com/tianocore/edk2-non-osi/
- Open source EDKII platform code for IOT, client and server at https://github.com/tianocore/edk2-platforms
- UEFI EDKII core at https://github.com/tianocore/edk2
- Open source platforms for Atom, Core and Microserver at https://github.com/coreboot/coreboot

EXAMPLES

Open EDK II workstream prog

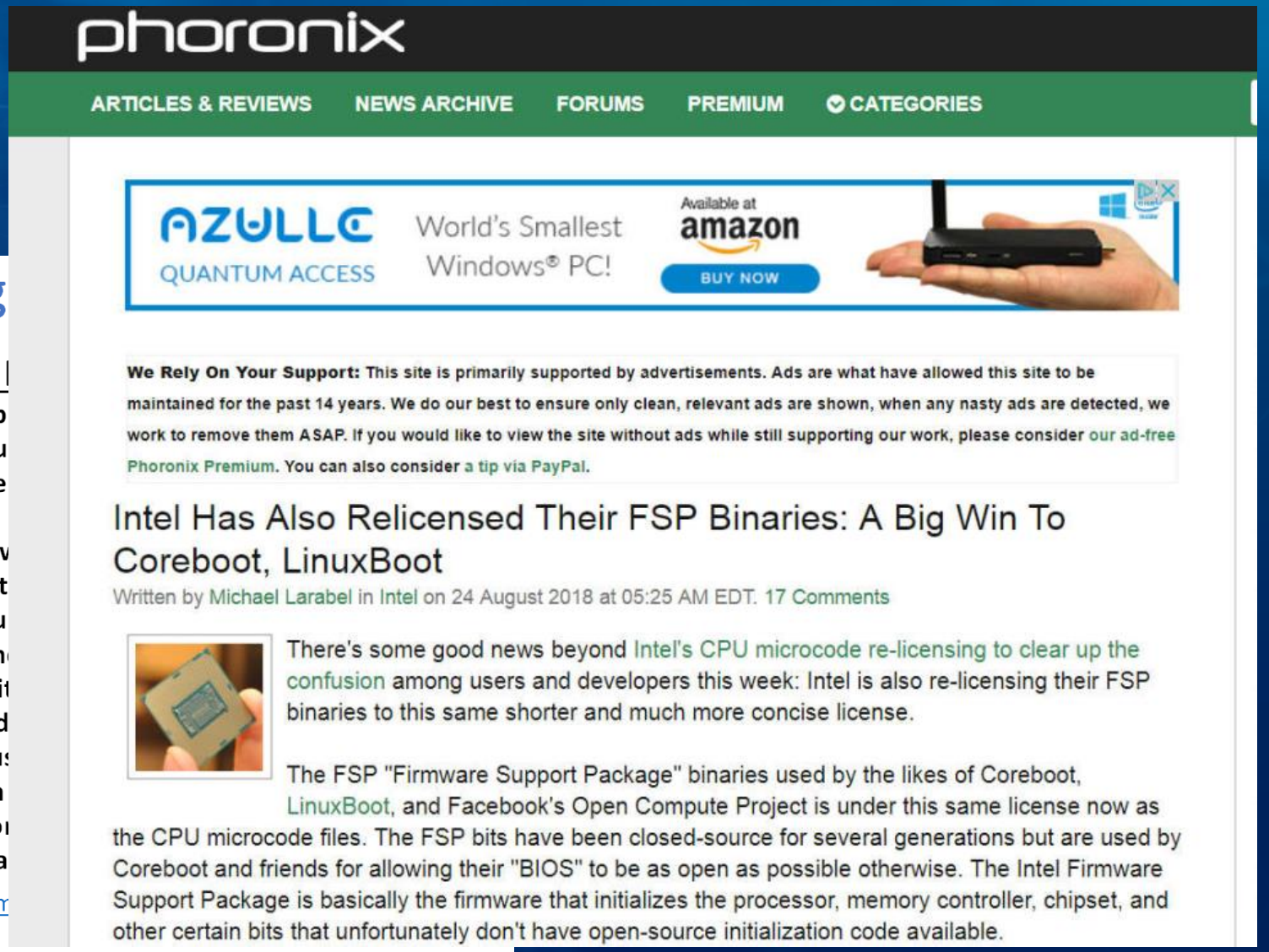


Open EDK

- Make comp
- Support mu
- Standardize modules
- Support nev interfaces' t
- Simply Setu
- Optimize th Serviceabilit
- **Delivered Mt.Olympus
- Working on setup optio IPMI interfa

**https://github.com/tianocore/edk2-platforms/tree/devel-MinPlatform/Platform

Let's together accelerate OSF development

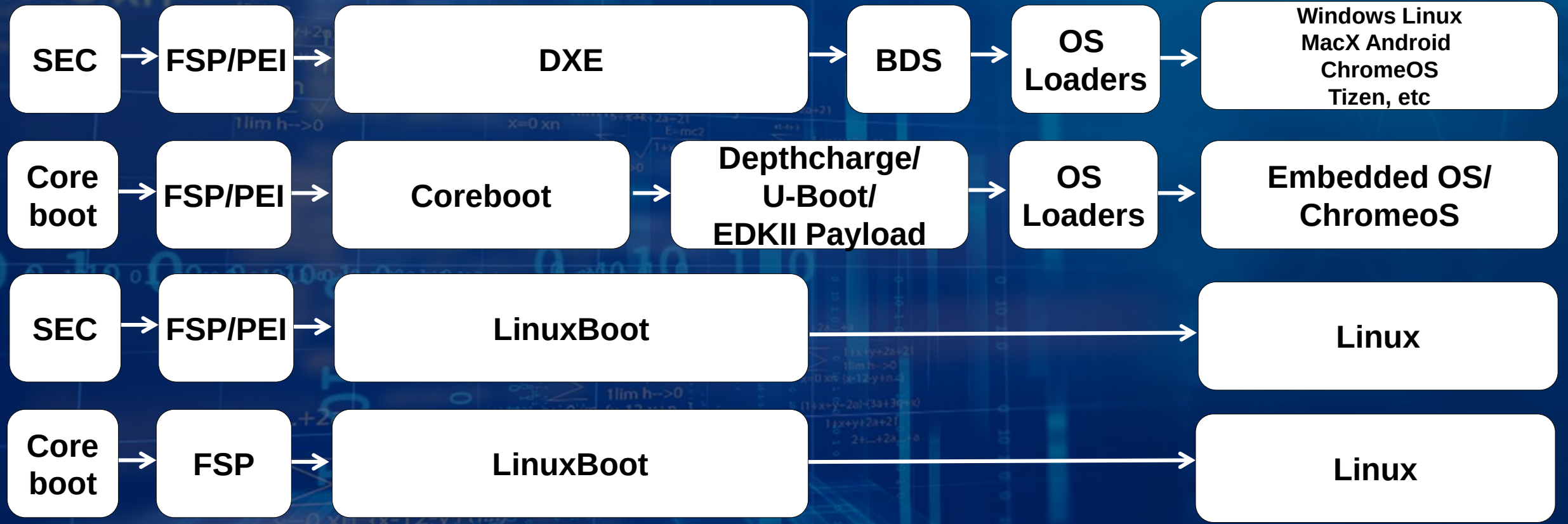


Phoronix article

Challenges

- Free up tools
  - Many SI tools are still closed
- Free up SI code
  - Intel FSP considered ‘soft’ lock down. Can go 2 paths – hard lock-down/boot-rom or liberate code and fully open source
- Documentation delay
  - Open source has to await public documents like EDS
- Debug of binaries

Tying it all up



Path to openness

Open Source core
+ Open Source Platform code
+ Intel FSP binary

Open source core
+ closed source
Silicon Code (MRC)

Open Source core + Open Source Platform code
+ Intel FSP SDK (source + binary)

All closed

All Open Source

ENGAGEMENT/FEEDBACK

S.	SIMPLICITY: KEEP IT SIMPLE & SCALABLE (KISS)
O.	OPENNESS: DESIGN FOR AN OPEN WORLD
S.	SECURITY: BROADEN OUR APPROACH

Call to action

- Provide feedback on this direction
- Get involved in the various open source firmware and standards activities

More information

- http://www.uefi.org/
- http://ww.tianocore.org
- https://github.com/tianocore/edk2
- https://github.com/tianocore/edk2-platforms
- https://github.com/tianocore/tianocore.github.io/wiki/EDK-II-white-papers
- https://github.com/IntelFsp/FSP
- http://www.intel.com/fsp
- http://firmware.intel.com
- http://www.coreboot.org
- http://opencompute.org/
- http://opencompute.org/projects/open-system-firmware/
- https://www.apress.com/us/book/9781484200711
- https://www.degruyter.com/view/product/484468
- https://www.degruyter.com/view/product/484477
- https://www.youtube.com/watch?v=Dh6N7Pj1CL
- https://cansecwest.com/slides/2015/UEFI%20open%20platforms_Vincent.pptx
- https://github.com/rrbranco/BlackHat2017/blob/master/BlackHat2017-BlackBIOS-v0.13-Published.pdf
- https://github.com/tianocore/edk2-platforms/blob/devel-MinPlatform/Platform/Intel/MinPlatformPkg/Docs/A_Tour_Beyond_BIOS_Open_Source_IA_Firmware_Platform_Design_Guide_in_EFI_Developer_Kit_II%20-%20V2.pdf
- https://firmware.intel.com/sites/default/files/A_Tour_Beyond_BIOS_Creating_the_Intel_Firmware_Support_Package_with_the_EFI_Developer_Kit_II_%28FSP2.0%29.pdf
- https://firmware.intel.com/sites/default/files/A_Tour_Beyond_BIOS_Using_the_Intel_Firmware_Support_Package_with_the_EFI_Developer_Kit_II_%28FSP2.0%29.pdf
- https://software.intel.com/en-us/blogs/2018/09/10/designing-firmware-for-an-open-world
- https://www.phoronix.com/scan.php?page=news_item&px=Intel-Better-FSP-License

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