



# UEFI & EDK II Training

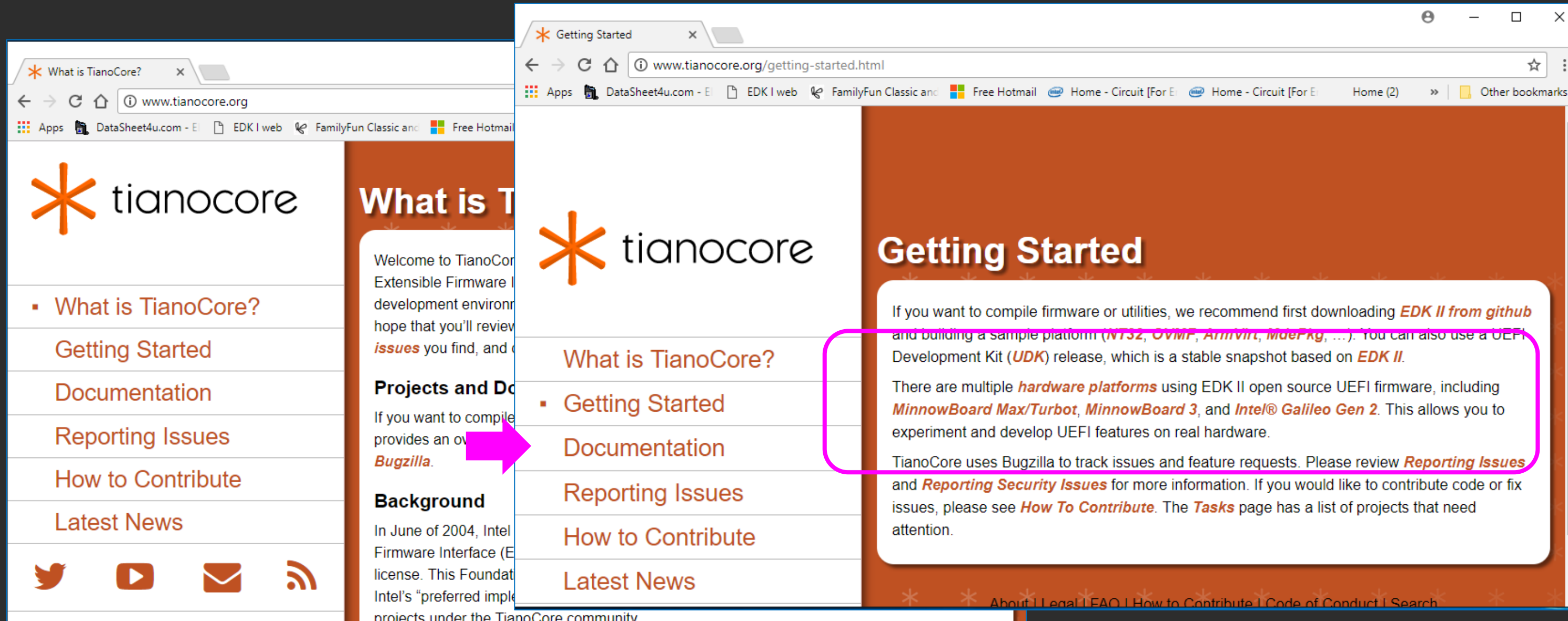
Open Source UEFI Platforms

[tianocore.org](https://tianocore.org)



# LESSON OBJECTIVE

-  Chart the organization of the Tianocore.org repositories
-  Recognize the various Open Source UEFI Platforms



**What is TianoCore?**

Welcome to TianoCore Extensible Firmware Interface (EFI) development environment. We hope that you'll review [issues](#) you find, and contribute back.

**Projects and Documentation**

If you want to compile firmware or utilities, we recommend first downloading [EDK II from github](#) and building a sample platform ([NTS2](#), [OVMF](#), [ArmVirt](#), [MdePkg](#), ...). You can also use a UEFI Development Kit ([UDK](#)) release, which is a stable snapshot based on [EDK II](#).

There are multiple [hardware platforms](#) using EDK II open source UEFI firmware, including [MinnowBoard Max/Turbot](#), [MinnowBoard 3](#), and [Intel® Galileo Gen 2](#). This allows you to experiment and develop UEFI features on real hardware.

TianoCore uses Bugzilla to track issues and feature requests. Please review [Reporting Issues](#) and [Reporting Security Issues](#) for more information. If you would like to contribute code or fix issues, please see [How To Contribute](#). The [Tasks](#) page has a list of projects that need attention.

Platforms [Emulator](#), [OVMF](#), [ArmVirt](#), [MdePkgHardware platforms](#): [MinnowBoard Max/Turbot](#), [Up Squared](#), and [Intel® Galileo Gen 2](#).

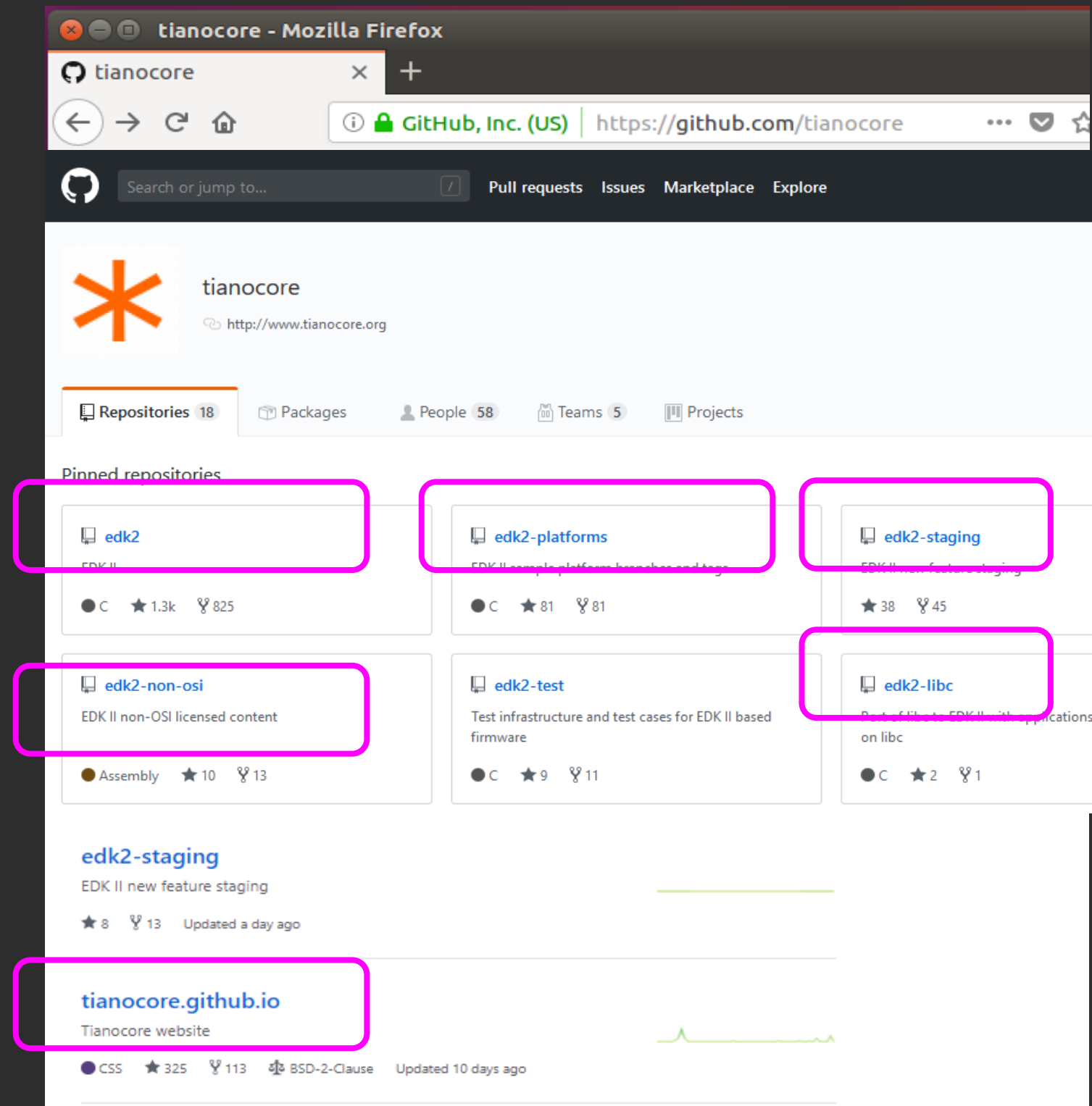


# GitHub

[Github/tianocore](https://github.com/tianocore)

## Concept of Repositories

- Main development - **edk2**
- Other platforms - **edk2-platforms**
- Not compatible w/ edk2 & edk2-platforms licensing - **edk2-non-osi**  
**edk2-libc**
- C Library- Python **edk2-staging**
- Work in Progress -
- Online Info & Help (Wiki pages)  
**[tianocore.github.io](https://tianocore.github.io)**
- To download use “**git clone**” then “**git checkout**”

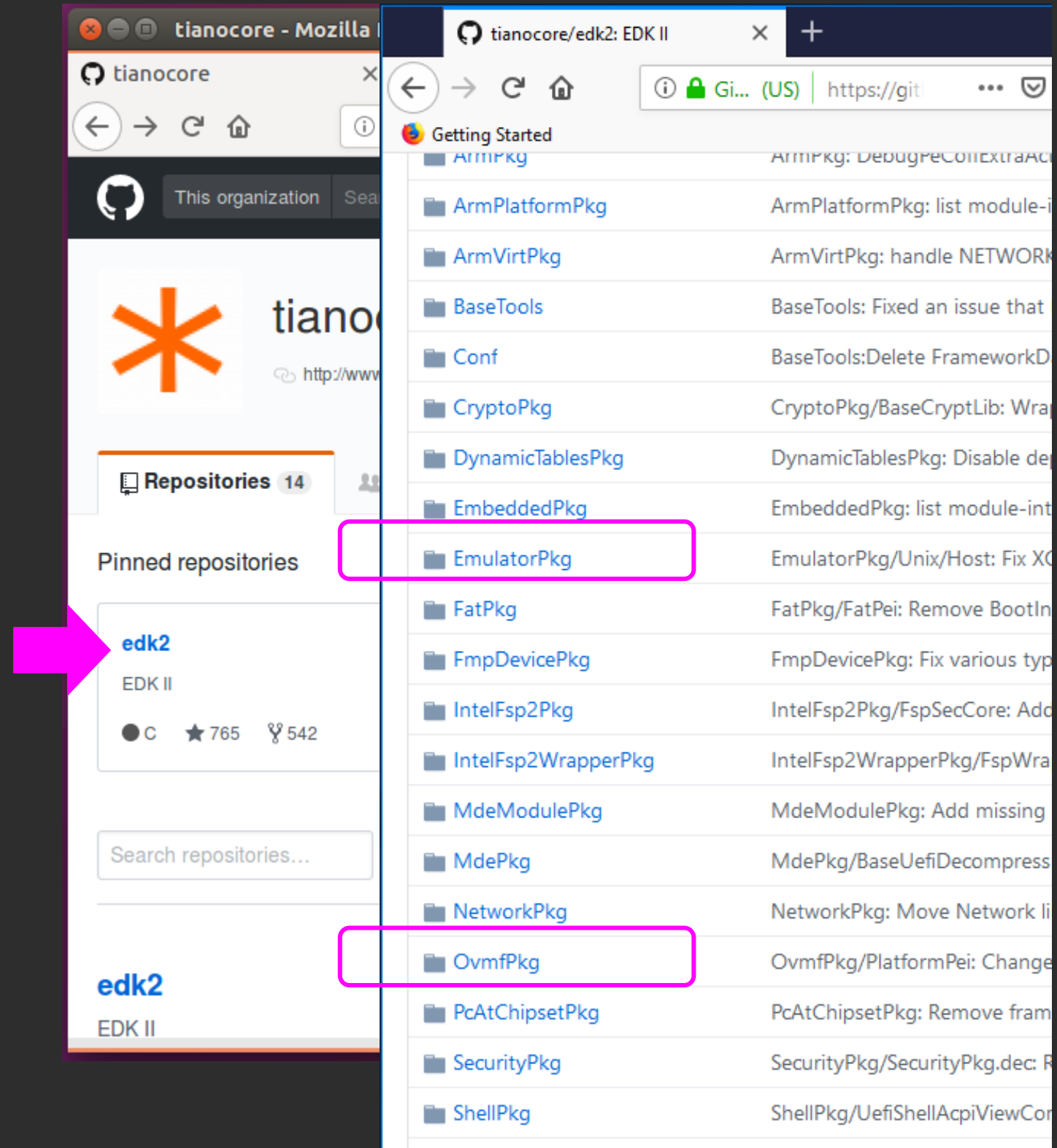


edk2 – Platforms on edk2- “CORE”

EmulatorPkg

OvmfPkg

See *Readme.md* files

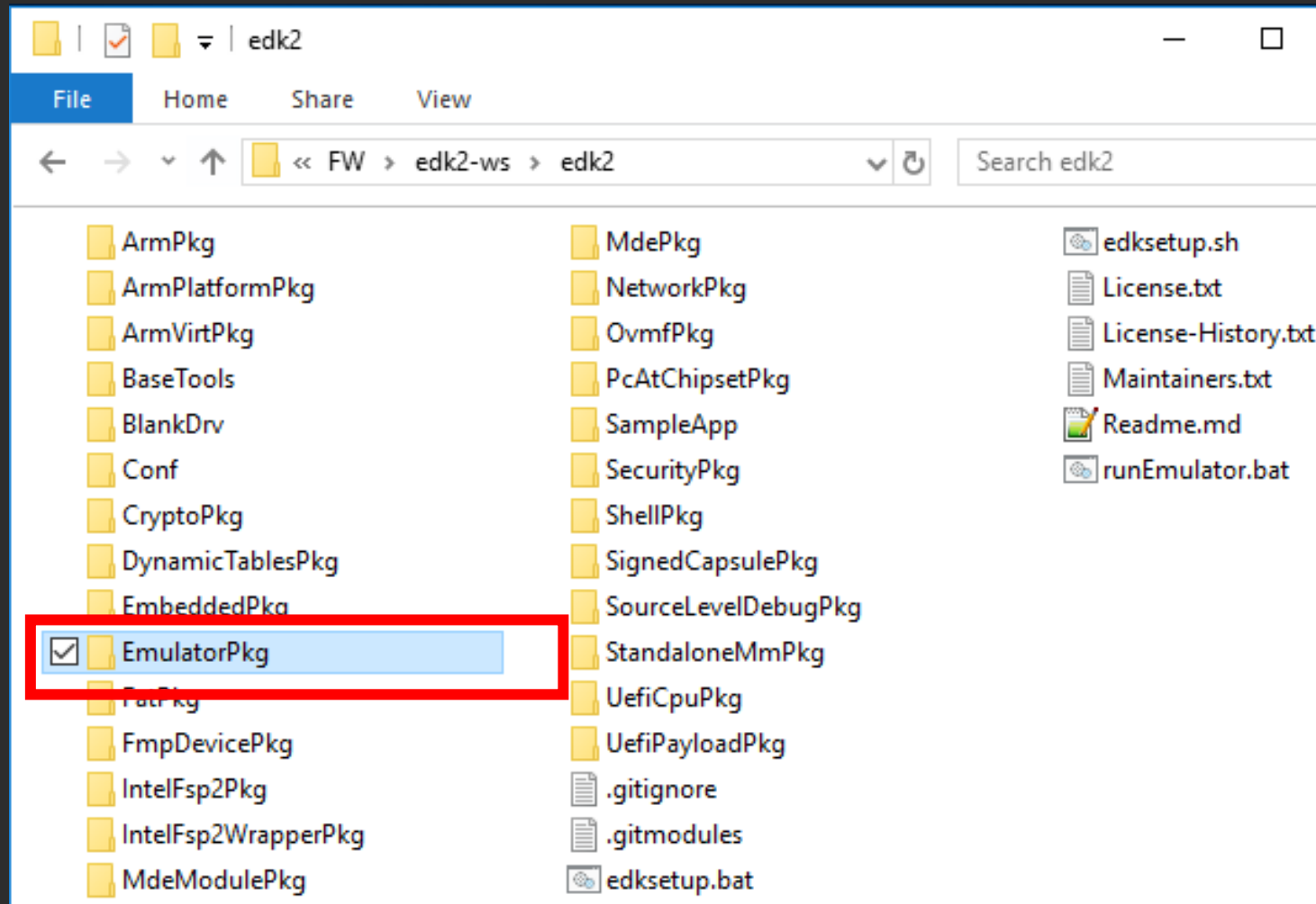




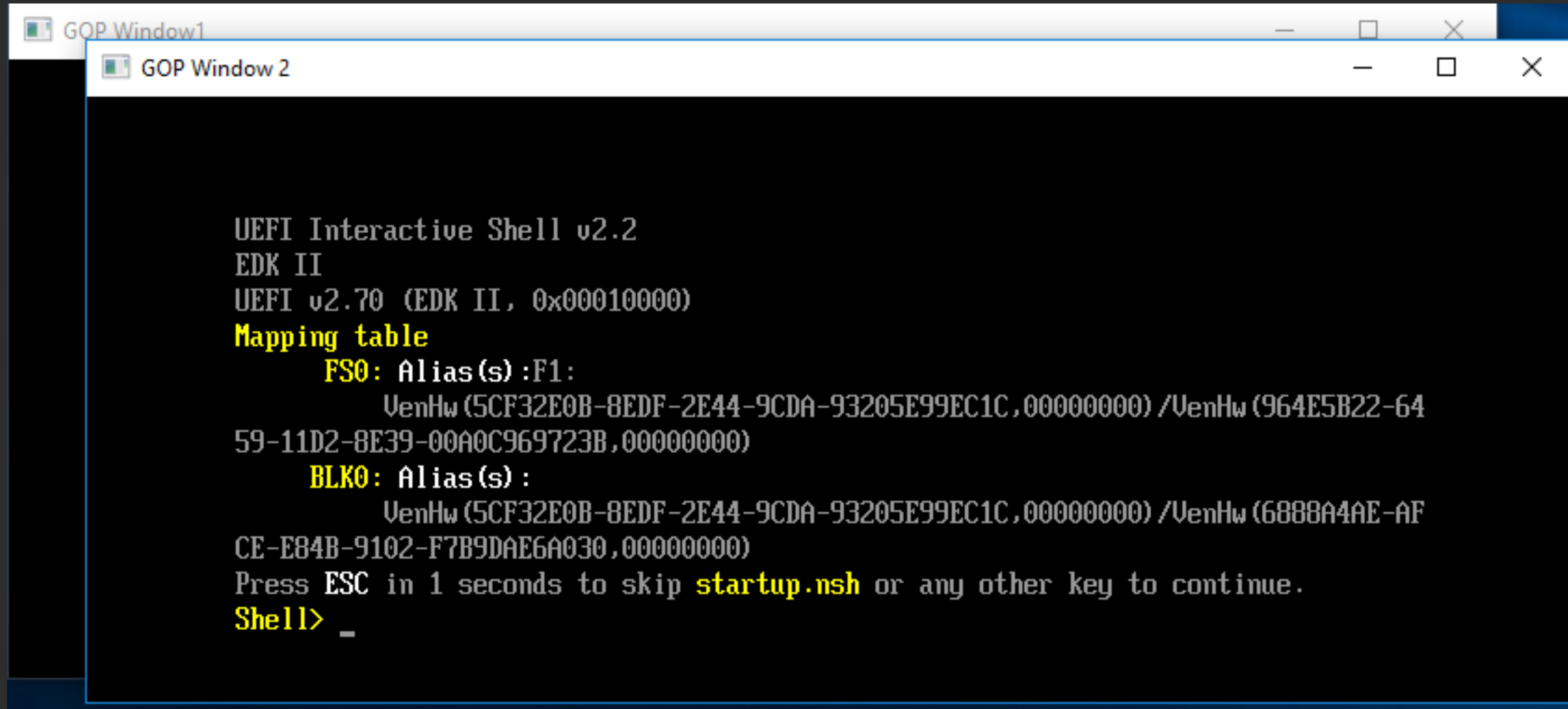
# Emulation Directory Structure

## EmulatorPkg files

- ✓ EmulatorPkg.dsc
- ✓ EmulatorPkg.dec
- ✓ EmulatorPkg.fdf



# Running Emulator with Windows



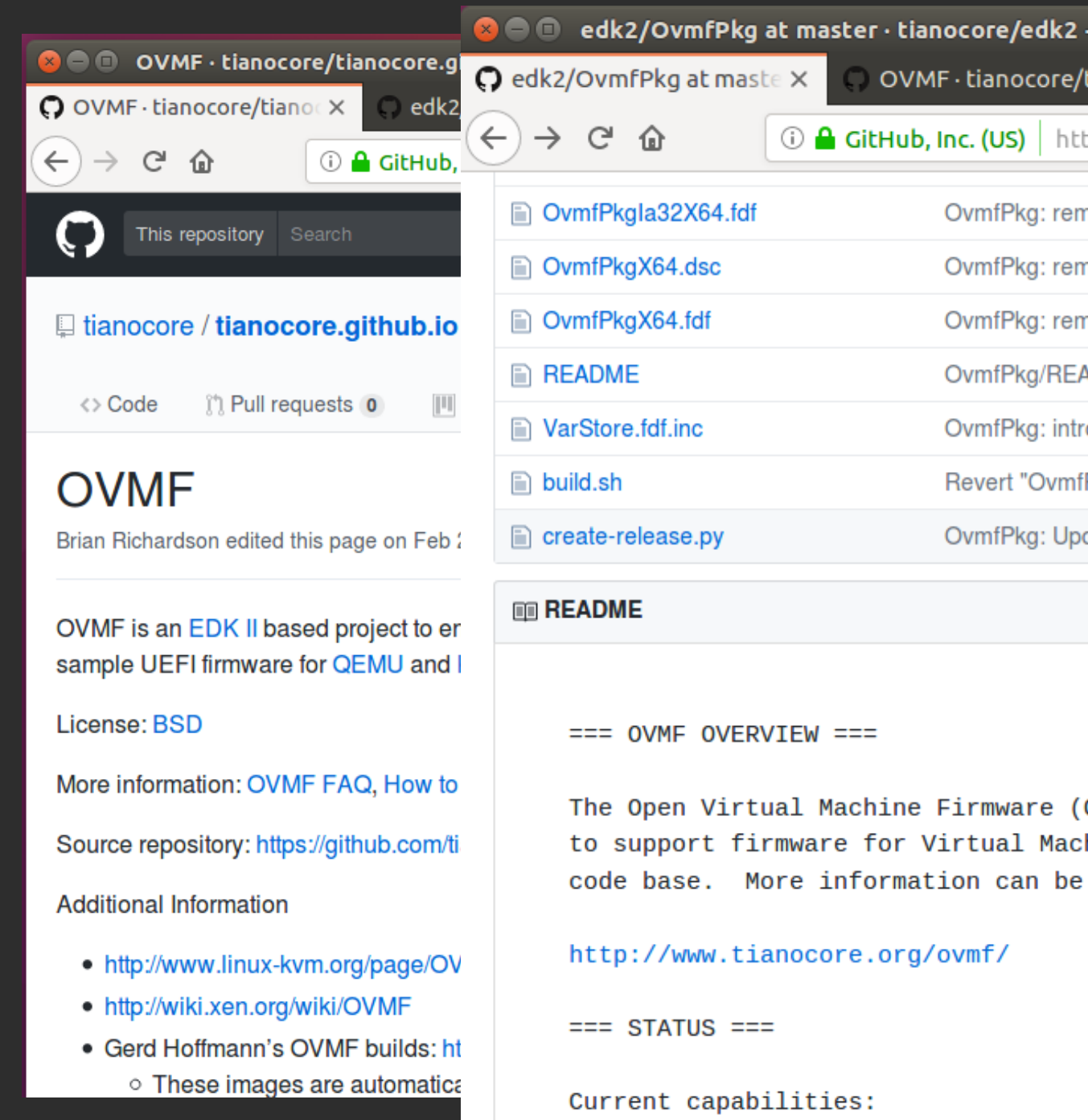
```

GOP Window1
GOP Window 2

UEFI Interactive Shell v2.2
EDK II
UEFI v2.70 (EDK II, 0x00010000)
Mapping table
  FS0: Alias(s):F1:
        VenHw (5CF32E0B-8EDF-2E44-9CDA-93205E99EC1C,00000000) /VenHw (964E5B22-64
59-11D2-8E39-00A0C969723B,00000000)
  BLK0: Alias(s):
        VenHw (5CF32E0B-8EDF-2E44-9CDA-93205E99EC1C,00000000) /VenHw (6888A4AE-AF
CE-E84B-9102-F7B9DAE6A030,00000000)
Press ESC in 1 seconds to skip startup.nsh or any other key to continue.
Shell> _
```

# Open Virtual Machine Firmware (OVMF)

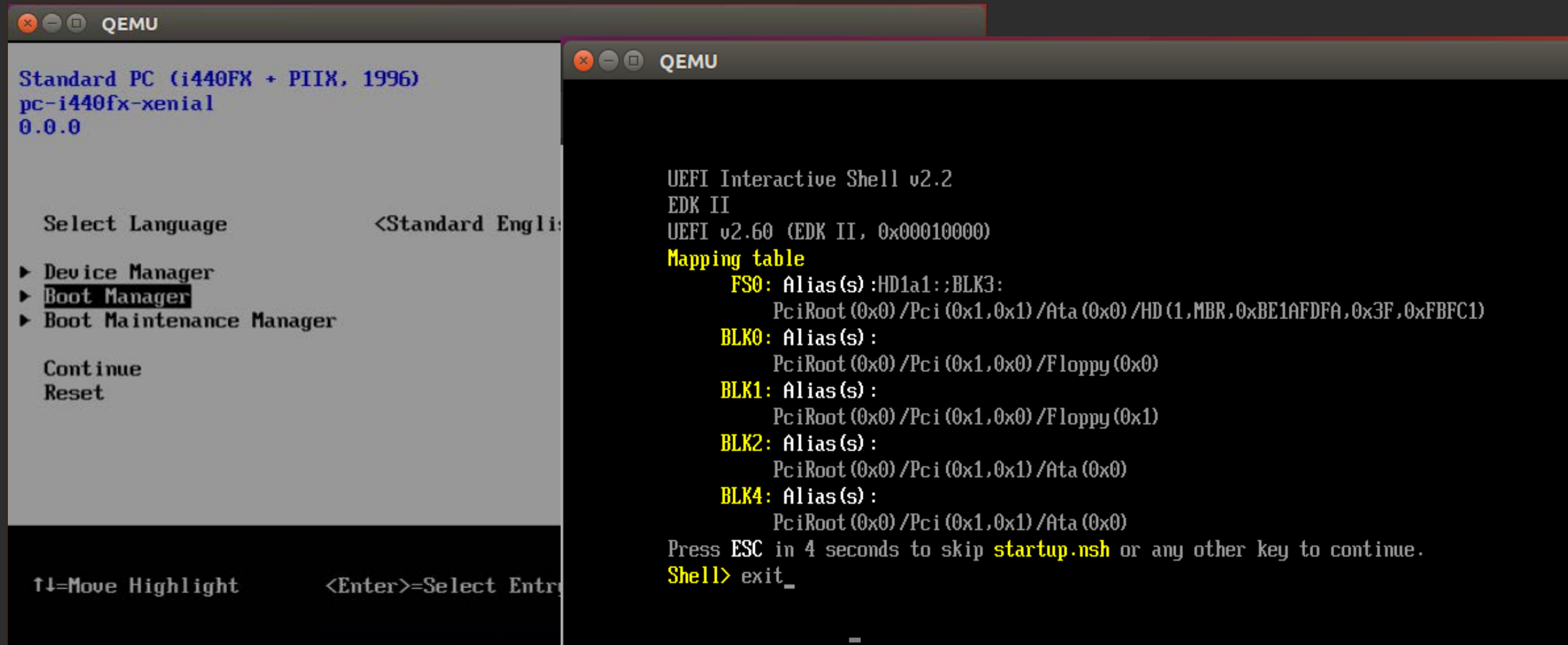
- Uses EDK II to support firmware in the OvmfPkg platform package
- Supports UEFI: Helps develop/debug drivers & applications
- QEMU VM; emulates IA32 (x86)/X64 (x86-64) based system
- Exit condition → UEFI Shell
- Tool Chain/OS Support
- Information [Ovmf wiki](https://www.tianocore.org/ovmf/wiki/), Tianocore.org





# OVMF BIOS w/ QEMU

## Boots to UEFI Shell



The image shows two overlapping QEMU window screenshots. The left window displays the BIOS boot menu for a 'Standard PC (i440FX + PIIX, 1996)' with 'pc-i440fx-xenial 0.0.0'. The 'Boot Manager' option is highlighted. The right window shows the 'UEFI Interactive Shell v2.2' with a mapping table for storage devices. The mapping table lists FS0 as the primary hard drive and BLK0, BLK1, BLK2, and BLK4 as floppy drives. The prompt 'Shell>' is visible at the bottom of the right window.

```
Standard PC (i440FX + PIIX, 1996)
pc-i440fx-xenial
0.0.0

Select Language          <Standard English>

▶ Device Manager
▶ Boot Manager
▶ Boot Maintenance Manager

Continue
Reset

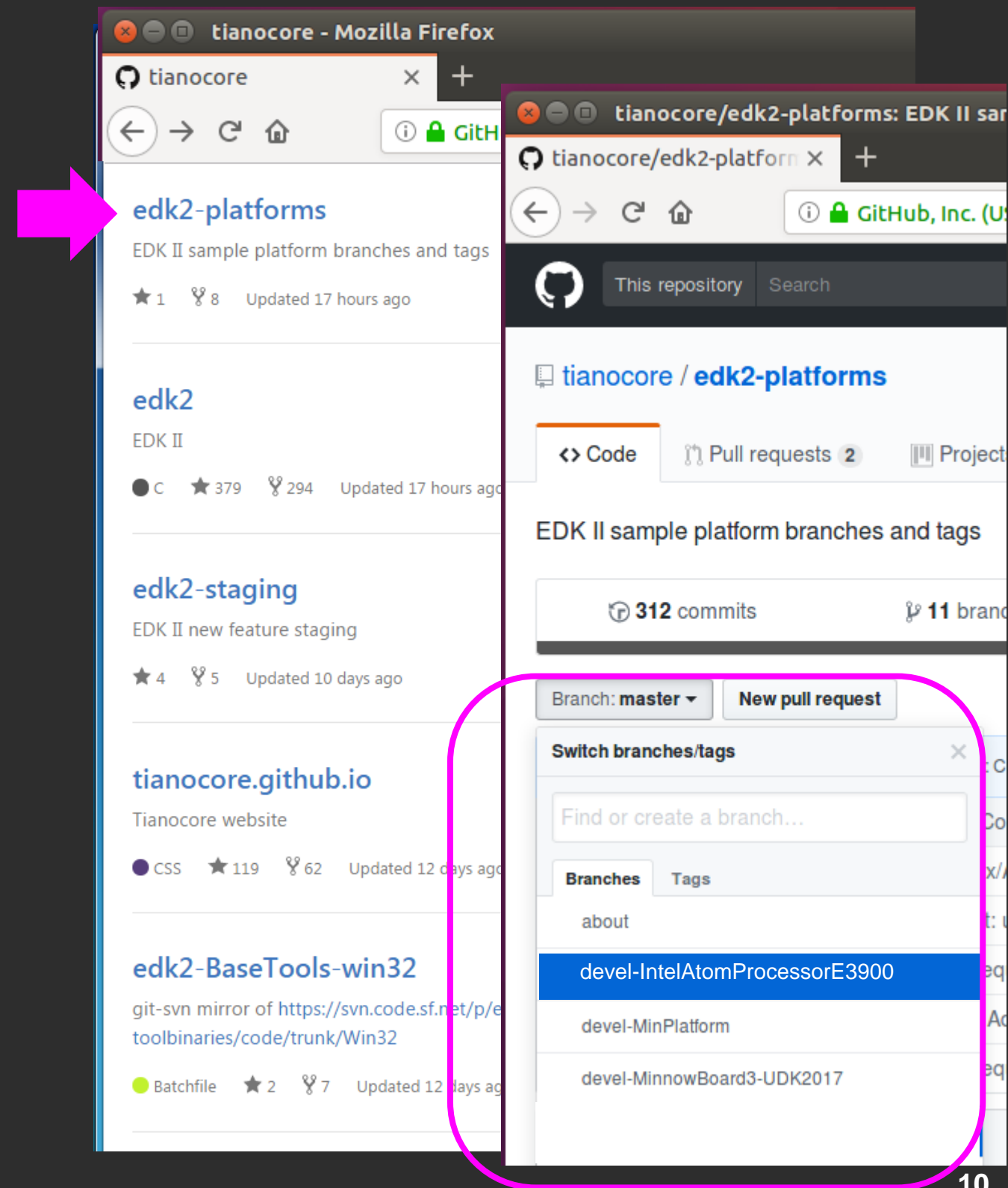
↑↓=Move Highlight      <Enter>=Select Entry

UEFI Interactive Shell v2.2
EDK II
UEFI v2.60 (EDK II, 0x00010000)
Mapping table
  FS0: Alias(s) :HD1a1::BLK3:
        PciRoot (0x0) /Pci (0x1,0x1) /Ata (0x0) /HD (1,MBR,0xBE1AFDFA,0x3F,0xFBFC1)
  BLK0: Alias(s) :
        PciRoot (0x0) /Pci (0x1,0x0) /Floppy (0x0)
  BLK1: Alias(s) :
        PciRoot (0x0) /Pci (0x1,0x0) /Floppy (0x1)
  BLK2: Alias(s) :
        PciRoot (0x0) /Pci (0x1,0x1) /Ata (0x0)
  BLK4: Alias(s) :
        PciRoot (0x0) /Pci (0x1,0x1) /Ata (0x0)
Press ESC in 4 seconds to skip startup.nsh or any other key to continue.
Shell> exit_
```

# Platforms Tianocore.org

## edk2-platforms – Platforms

- devel-IntelAtomProcessorE3900  
– Leaf Hill, Up Squared (Apollo Lake)
- Vlv2TbltDevicePkg  
– BayTrail-I
- MinPlatformPkg – (w/ FSP )
  - KabylakeOpenBoardPkg
  - TigerlakeOpenBoardPkg
  - WhiskeyLakeOpenBoardPkg
  - WhitleyOpenBoardPkg
- How to build  
See *Readme.md* files



# Slim BootLoader (SBL) Project



Fast & Secure Open source boot solution  
for IoT Use Cases

Github: <https://github.com/slimbootloader>

Supported Hardware:

QEMU

UP2 Board

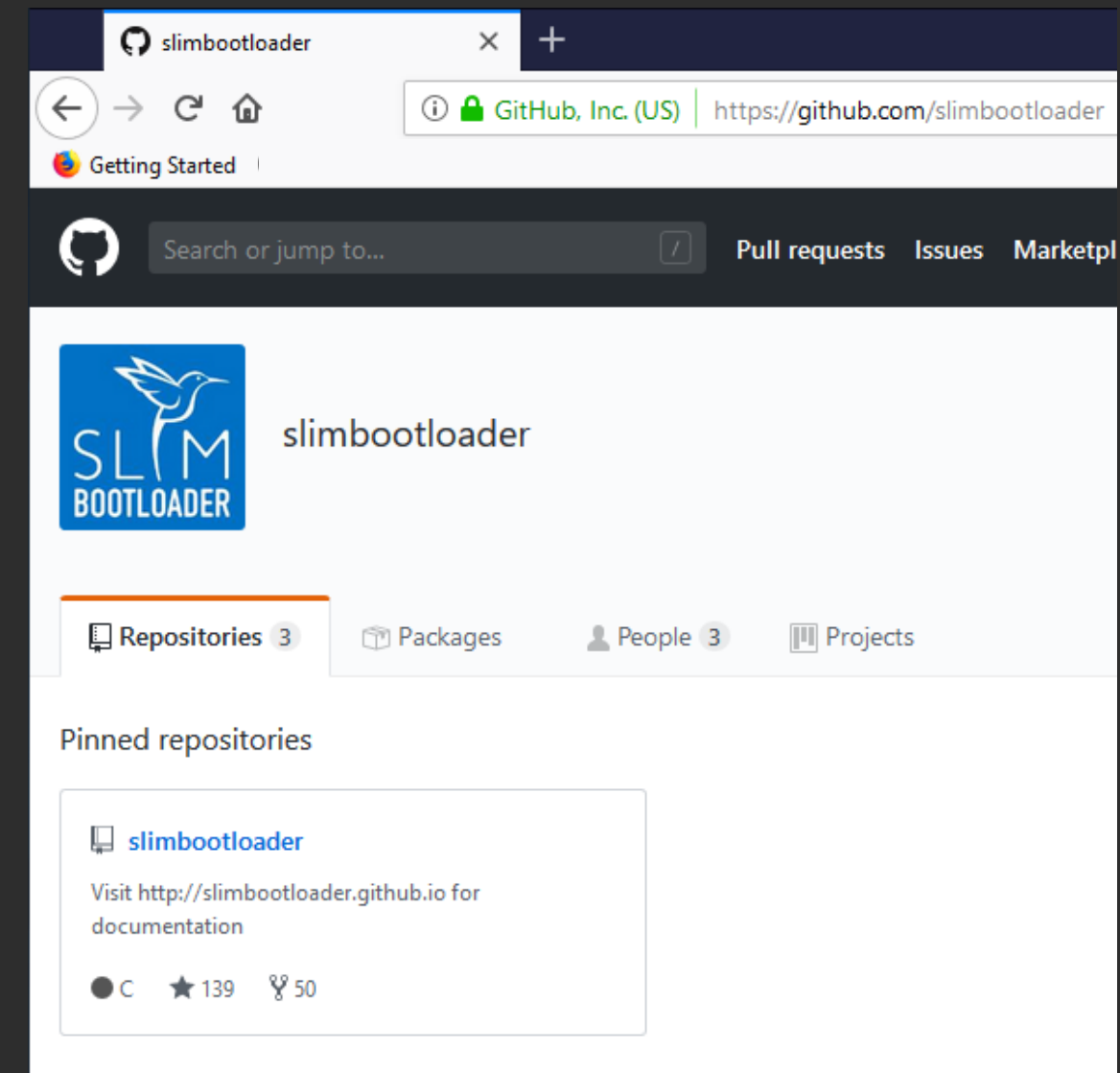
Apollo Lake CRB

Whisky Lake CRB

Coffee Lake Refresh CRB

UP Xtreme Board

Documentation: [Slim Bootloader Project](#)



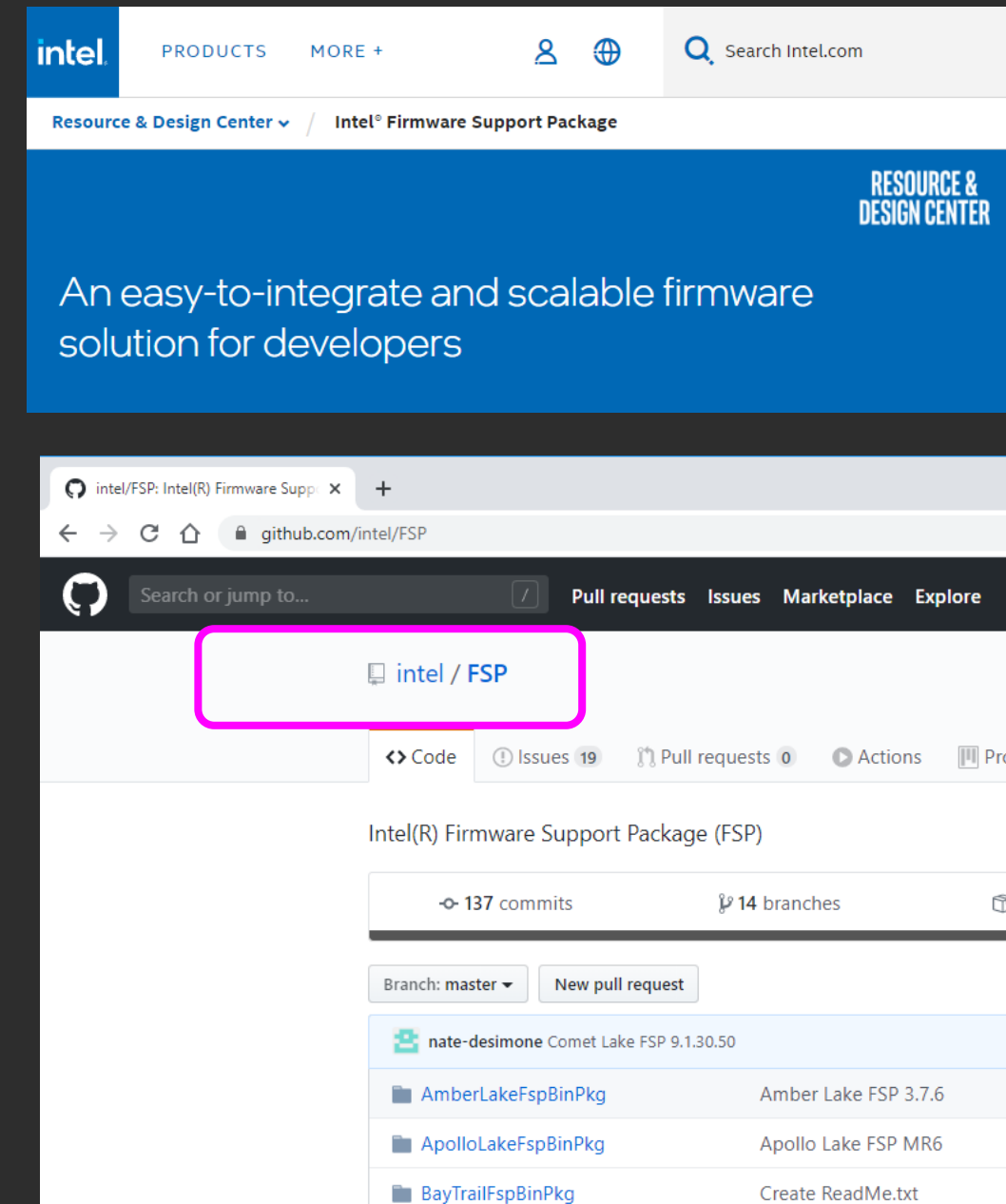
## intel Intel Developer Zone Overview

Repository of Intel FSP binaries posted by Intel on github:

Includes documentation on how to integrate with various platforms: <https://github.com/intel/FSP>

Wiki: <https://github.com/intel/FSP/wiki>

- current specifications

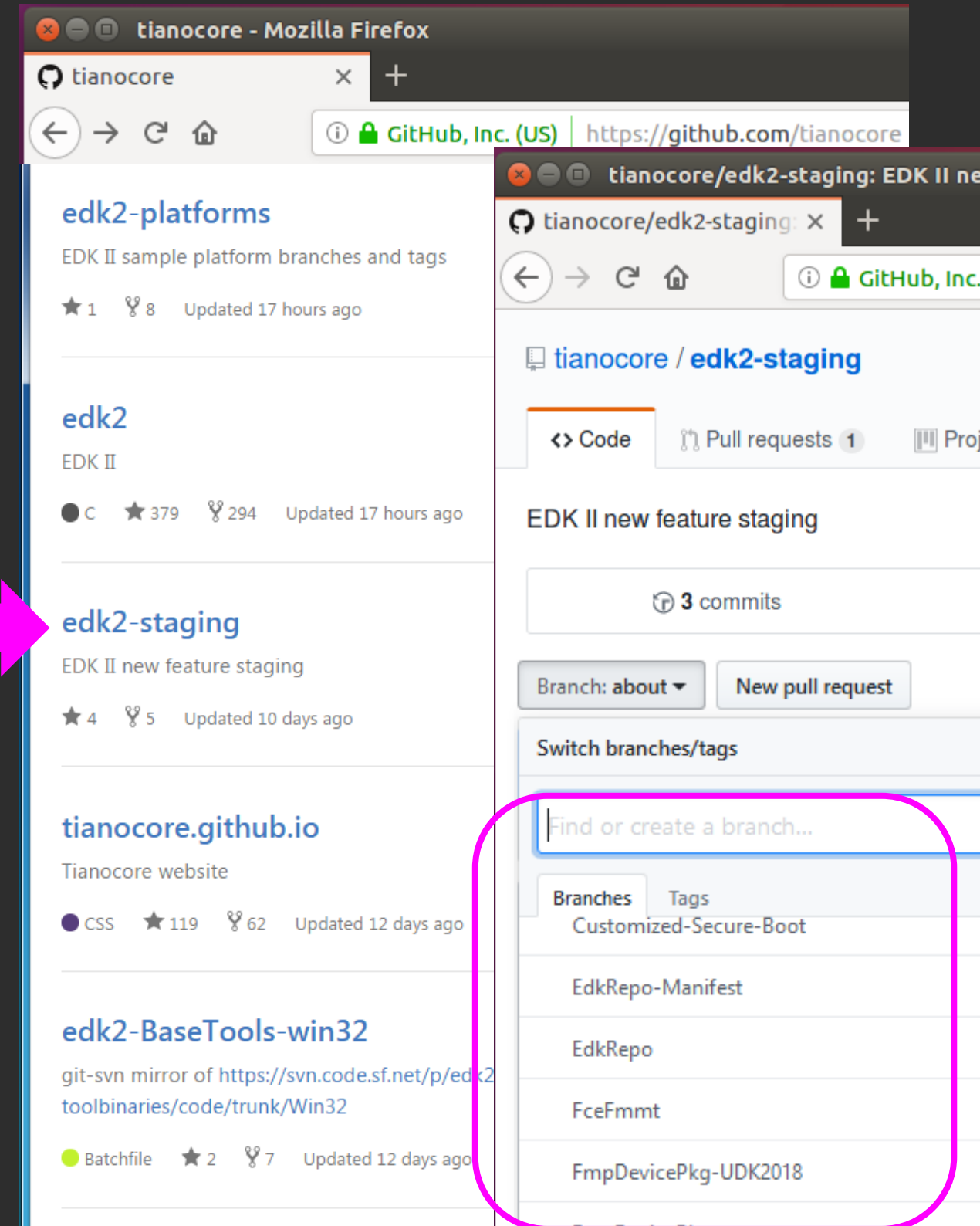


# Staging TIANOCORE.ORG

Implementations not yet Ready for EDK II Main  
[edk2-staging](#)



## Projects on branches

- Host-based FW analysis (HBFA)
- edk2-host-test
- FceFmmt (FW Utils)
- UEFI\_PCI\_ENHANCE-2
- EdkRepo
- Cpu/6-level
- HTTPS-TLS
- RICS-V
- ...
- See *Readme.md* files



The image shows two browser windows. The left window displays the GitHub repository list for 'tianocore', with 'edk2-staging' highlighted. The right window shows the 'tianocore/edk2-staging' repository page, with the 'Switch branches/tags' section circled in pink. This section includes a search bar 'Find or create a branch...' and a list of branches: 'Customized-Secure-Boot', 'EdkRepo-Manifest', 'EdkRepo', 'FceFmmt', and 'FmpDevicePkg-UDK2018'.

# Summary

-  Chart the organization of the Tianocore.org repositories
-  Recognize the various Open Source UEFI Platforms



# Questions?



# Return to Main Training Page



Return to Training Table of contents for next presentation [link](#)





# ACKNOWLEDGEMENTS

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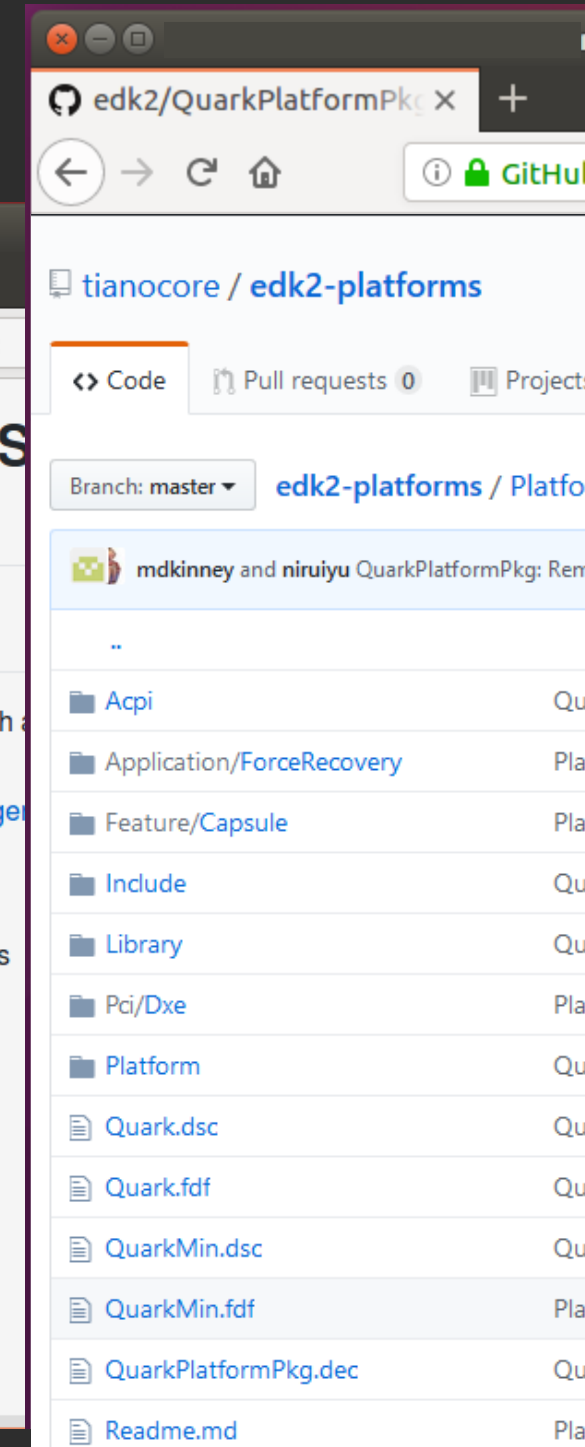
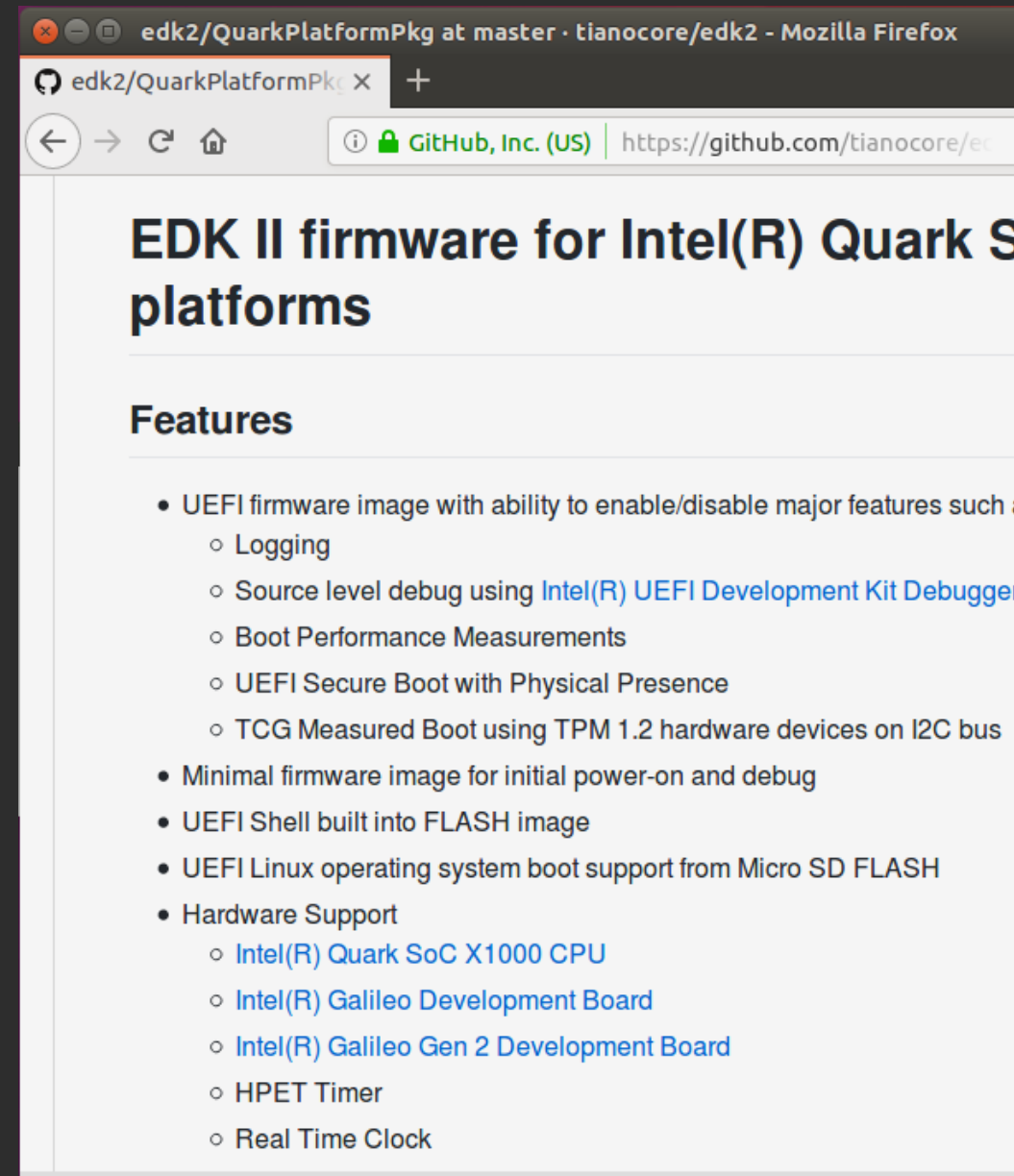
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**BACK UP**

# Intel® Quark SoC X1000 Platform Project EDK II

- Uses EDK II to support firmware
- QuarkPlatformPkg  
-Intel® Galileo Gen2
- How to Build: [Quark Readme.md](#)



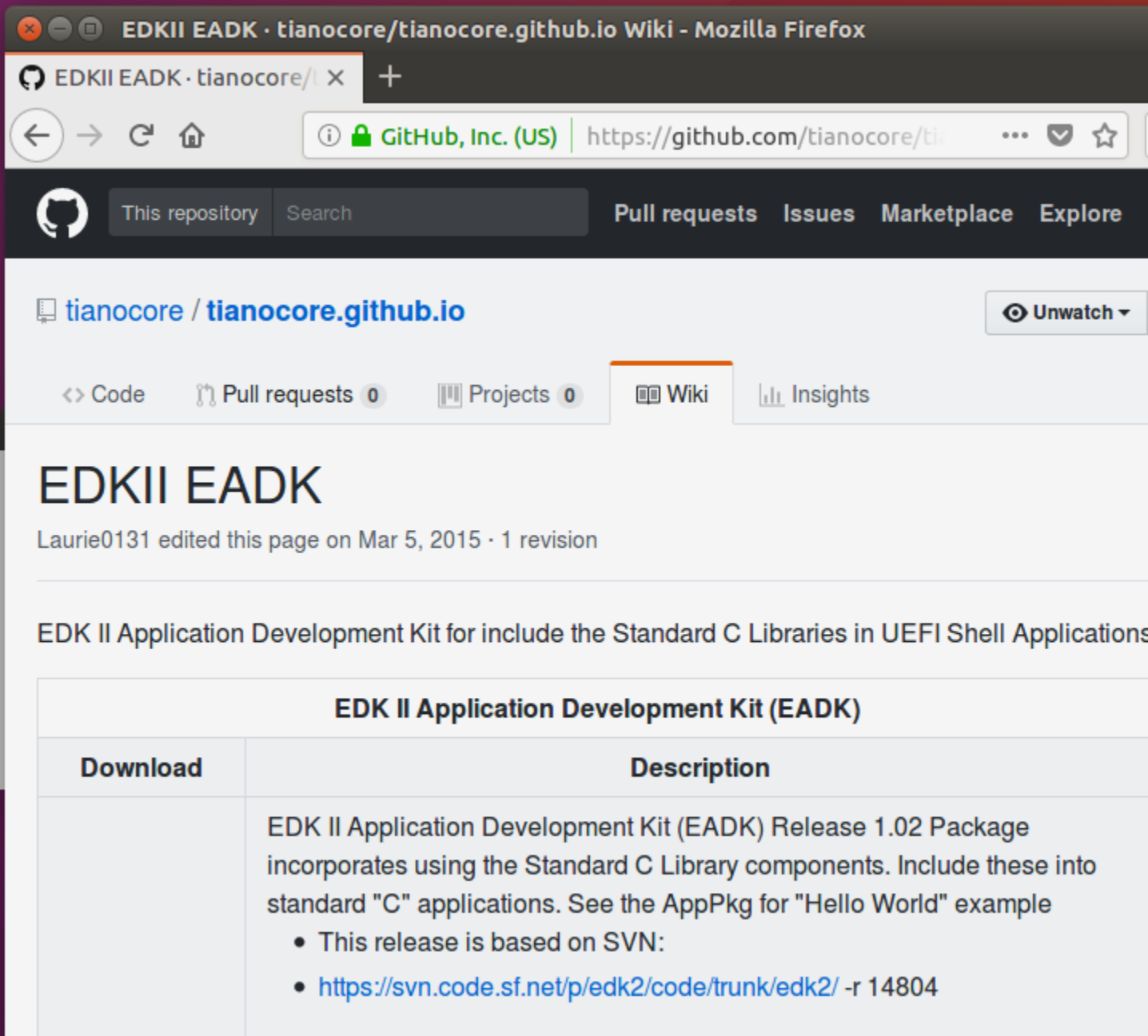


# EDK II EADK

EDK II Application Development Kit includes the Standard “C” Libraries in UEFI Shell Applications

Link: [wiki EADK](#)

Github: [edk2-libc](#)



The screenshot shows a Mozilla Firefox browser window displaying the GitHub Wiki for the 'EDKII EADK' repository. The page title is 'EDKII EADK' and it was last edited by Laurie0131 on Mar 5, 2015. The content describes the EDK II Application Development Kit (EADK) Release 1.02 Package, which includes standard C library components for UEFI Shell applications. A table provides download links and descriptions for the release.

EDK II Application Development Kit (EADK)	
Download	Description
	<p>EDK II Application Development Kit (EADK) Release 1.02 Package incorporates using the Standard C Library components. Include these into standard "C" applications. See the AppPkg for "Hello World" example</p> <ul style="list-style-type: none"><li>• This release is based on SVN:</li><li>• <a href="https://svn.code.sf.net/p/edk2/code/trunk/edk2/">https://svn.code.sf.net/p/edk2/code/trunk/edk2/</a> -r 14804</li></ul>

# EDK II EADK COMPONENTS

EDK II Application Development Kit includes the Standard C Libraries in UEFI Shell Applications

## Components

- Utilities (Python 2.7.2, & 2.7.10 etc.)
- C Library
- BSD Socket Library
- Network Socket Library – Ipv4 / Ipv6

## Packages /AppPkg /StdLib

# EDK II EADK – STANDARD ANSI C LIBRARY

## FreeBSD Port

## ANSI/POSIX compliant

System I/O	- open(), read(), write(), close(), stat()
Standard I/O	- fopen(), printf(), gets(), getchar(), . . .
String/Char	- strcmp(), isascii(), atoi(), . . .
Memory	- malloc(), free(), realloc(), . . .
Time/Date	- time(), asctime(), ctime(), . . .
Math	- sqrt(), pow(), sin(), log(), . . .