



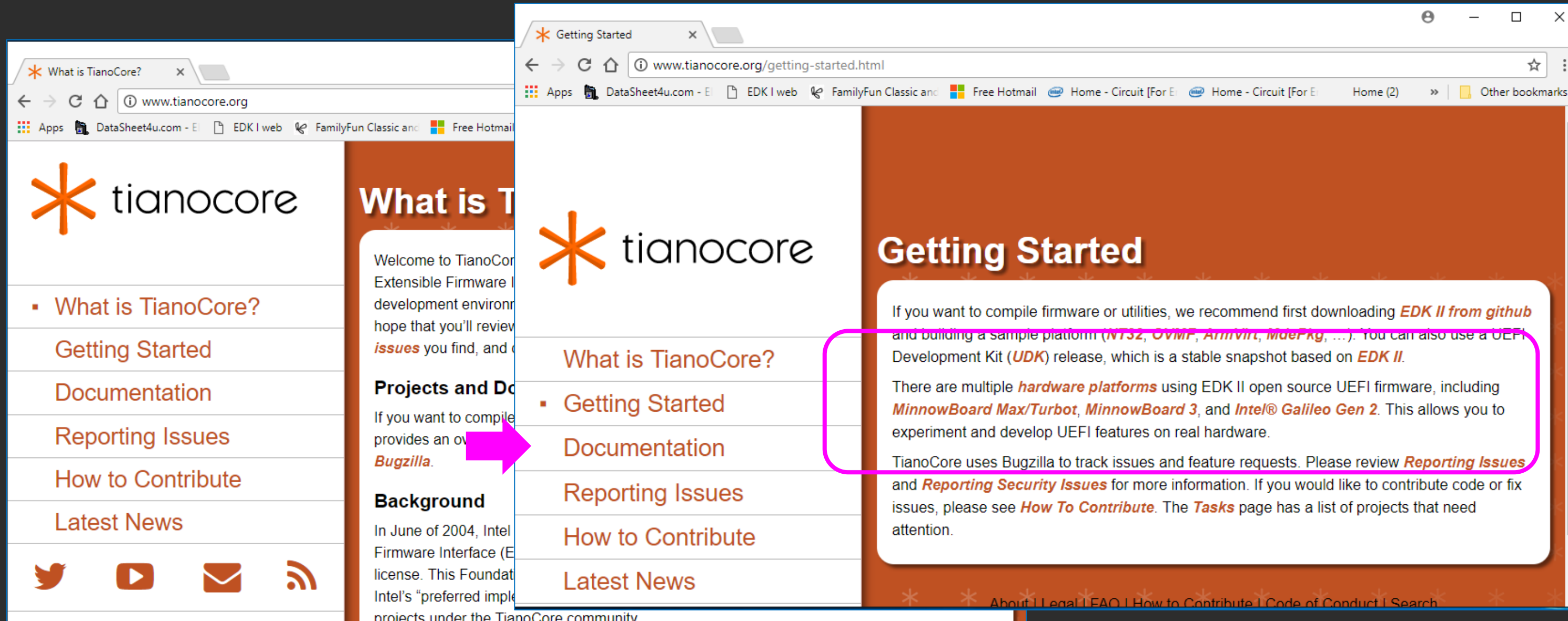
# UEFI & EDK II Training

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.

**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](#).

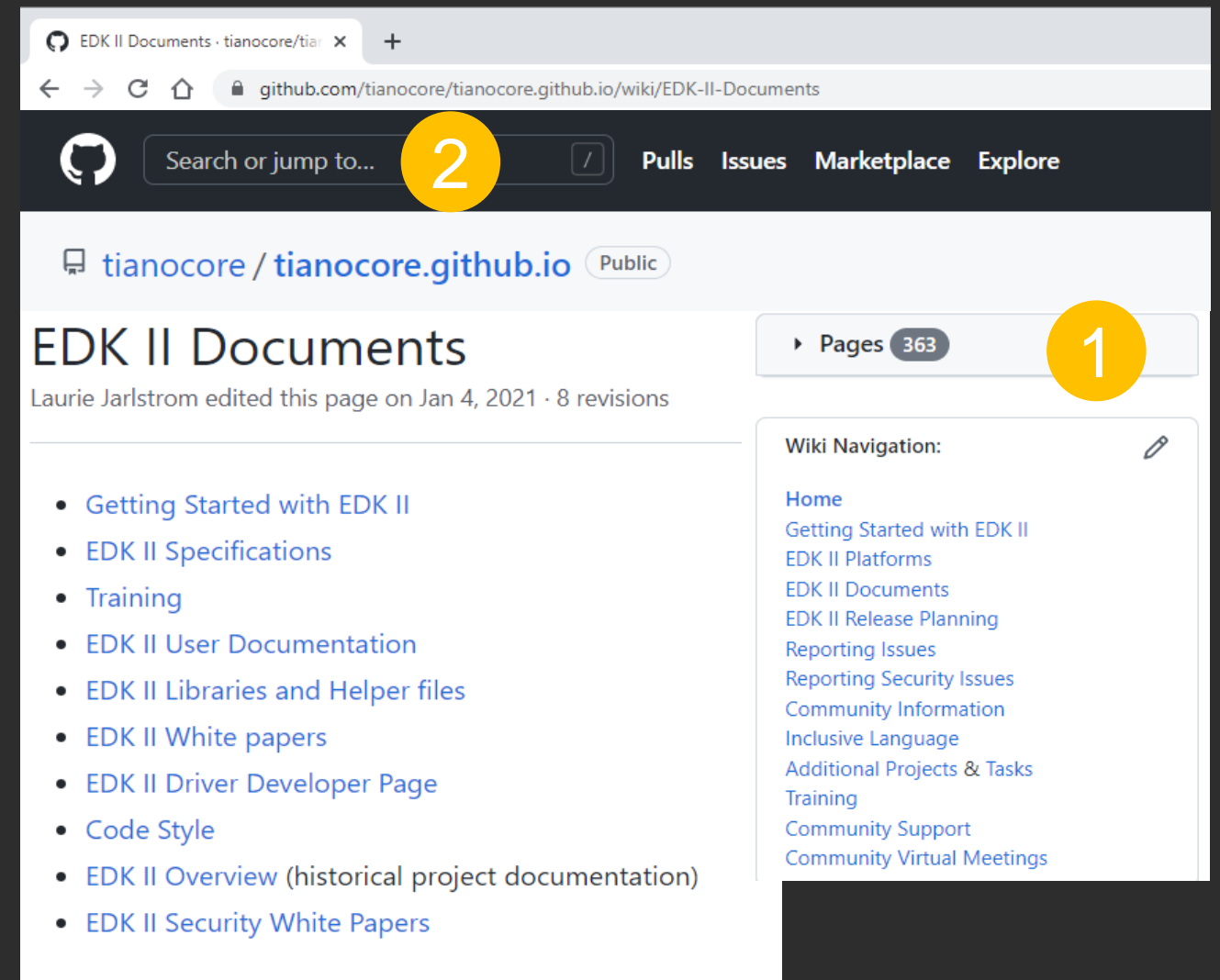
# Tianocore Documentation & Wiki



Rich set of documentation on EDK II

How to find documentation:

1. Search the Wiki pages from the Pages Tab
2. Search all the Tianocore wiki pages from the GitHub search



# Tianocore EDK II Specifications

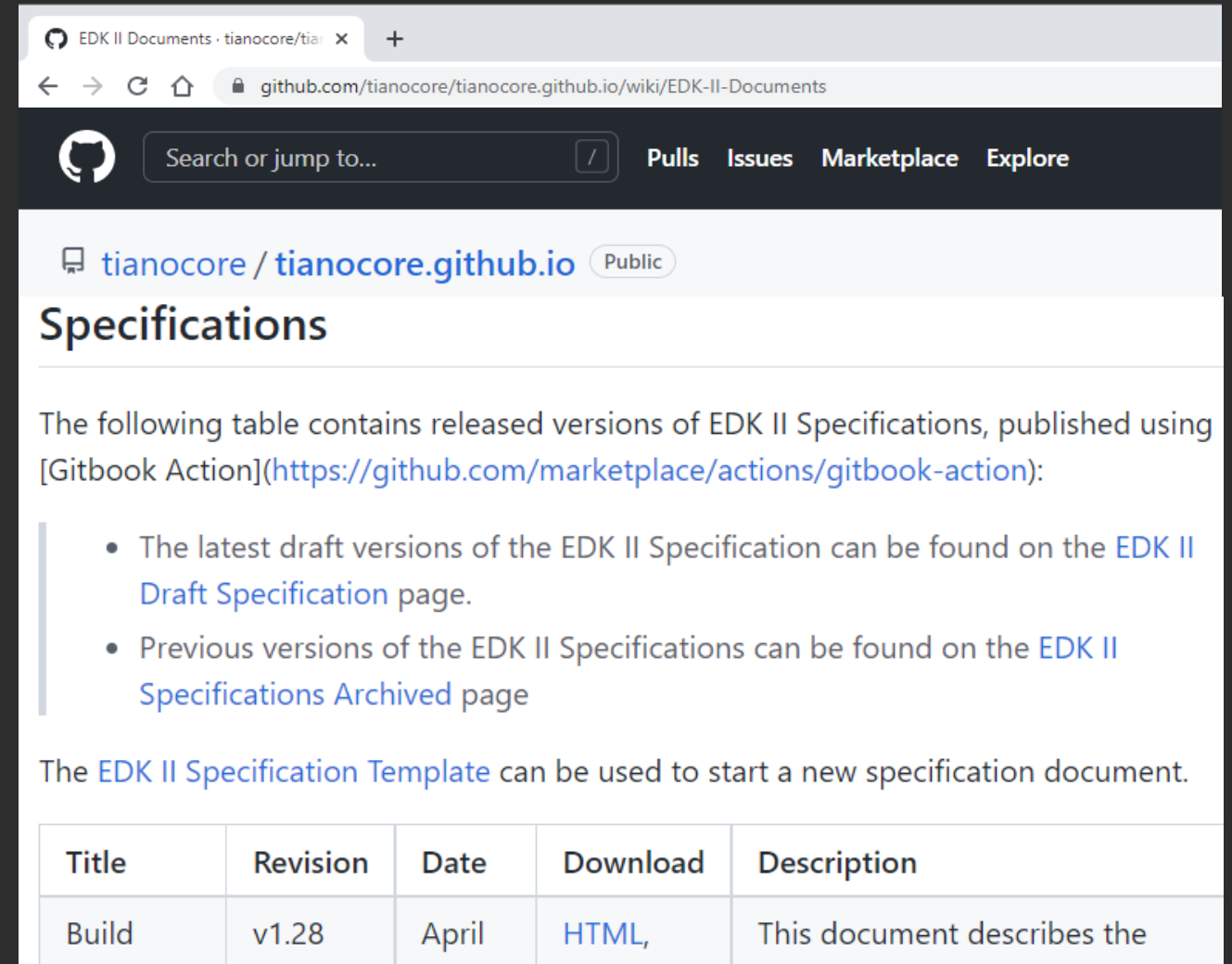


EDK II Specifications include:

- Build, DEC, DSC, FDF, IDF, INF, Meta Data, UNI, VFR, C coding standards, Min-Platform

Specifications can be viewed with various formats

- On-Line HTML
- Download PDF
- ePub
- GitHub Repo of doc



EDK II Documents · tianocore/tianocore.github.io

github.com/tianocore/tianocore.github.io/wiki/EDK-II-Documents

Search or jump to... Pulls Issues Marketplace Explore

tianocore / tianocore.github.io Public

## Specifications

The following table contains released versions of EDK II Specifications, published using [Gitbook Action](https://github.com/marketplace/actions/gitbook-action):

- The latest draft versions of the EDK II Specification can be found on the [EDK II Draft Specification](#) page.
- Previous versions of the EDK II Specifications can be found on the [EDK II Specifications Archived](#) page

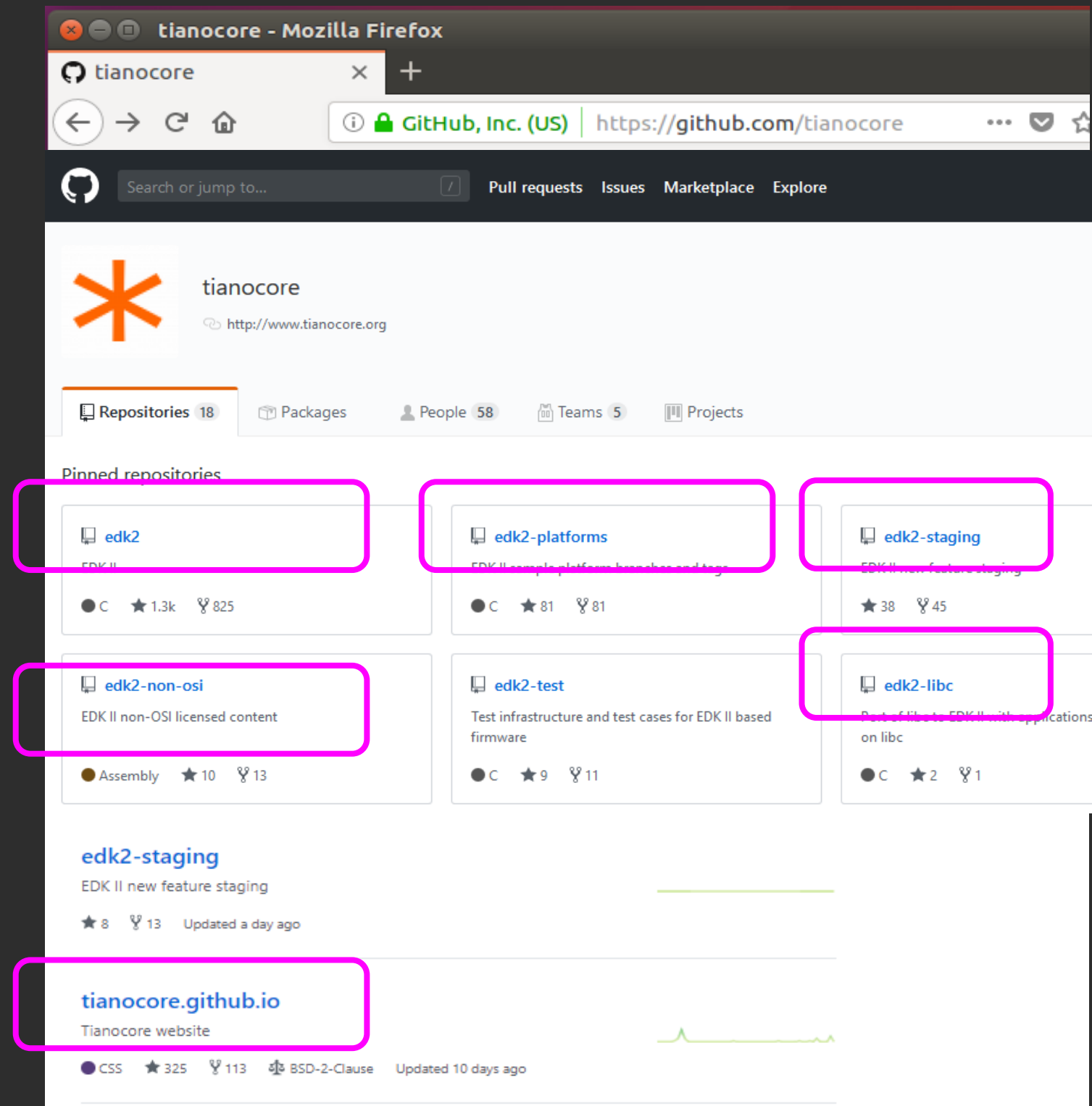
The [EDK II Specification Template](#) can be used to start a new specification document.

Title	Revision	Date	Download	Description
Build	v1.28	April	<a href="#">HTML</a> ,	This document describes the



# Concept of Repositories

- Main development - **edk2**
  - Other platforms - **edk2-platforms**
  - Not compatible w/ edk2 & edk2-platforms licensing - **edk2-non-osi**
  - C Library- Python 3 **edk2-libc**
  - Work in Progress - **edk2-staging**
  - Online Info & Help (Wiki pages) **tianocore.github.io**
- To download use “**git clone**” then “**git checkout**”



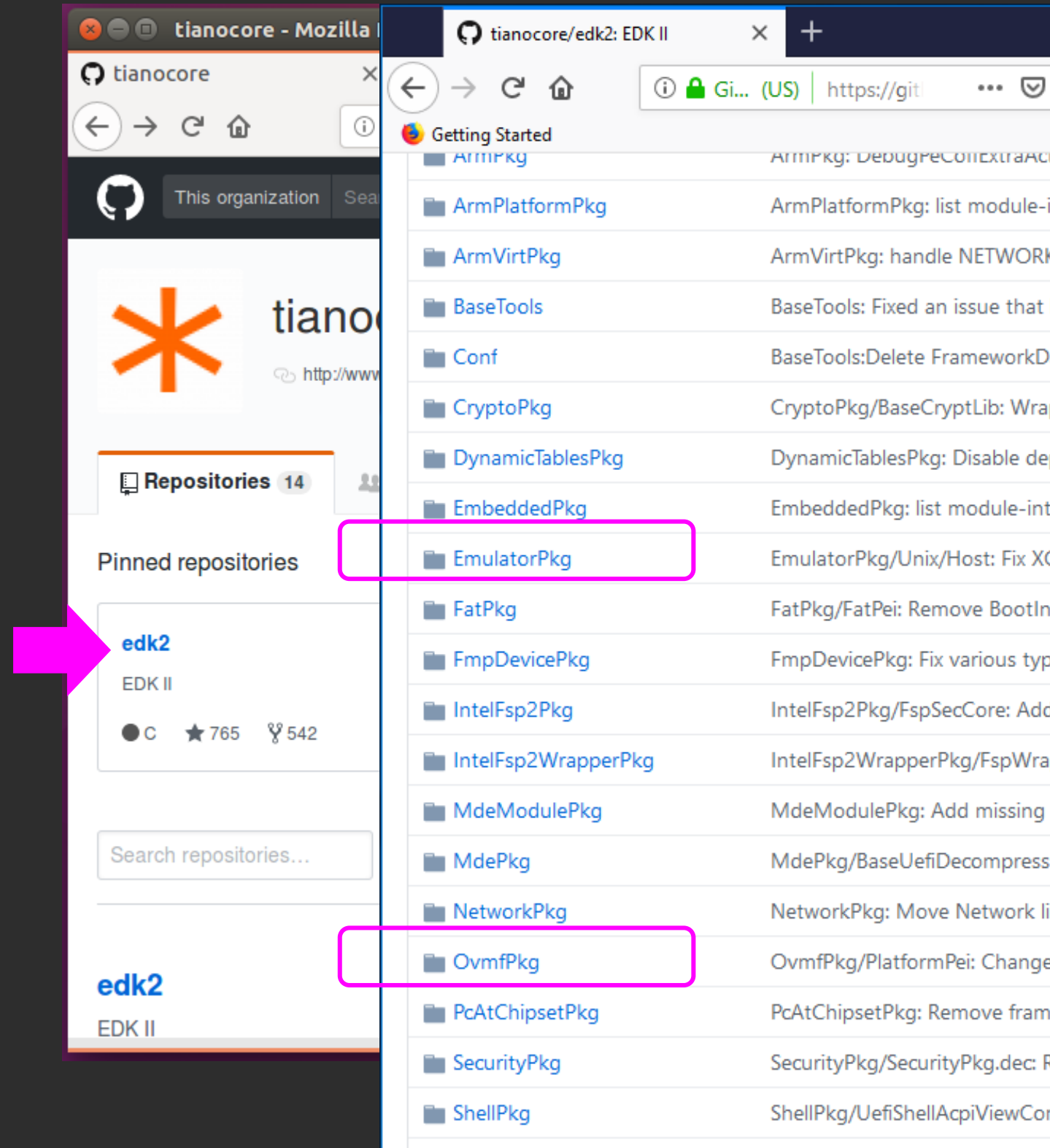
# [GitHub Tianocore.org](https://github.com/Tianocore.org)

edk2 – Platforms on edk2- “CORE”

EmulatorPkg

OvmfPkg

See *Readme.md* files



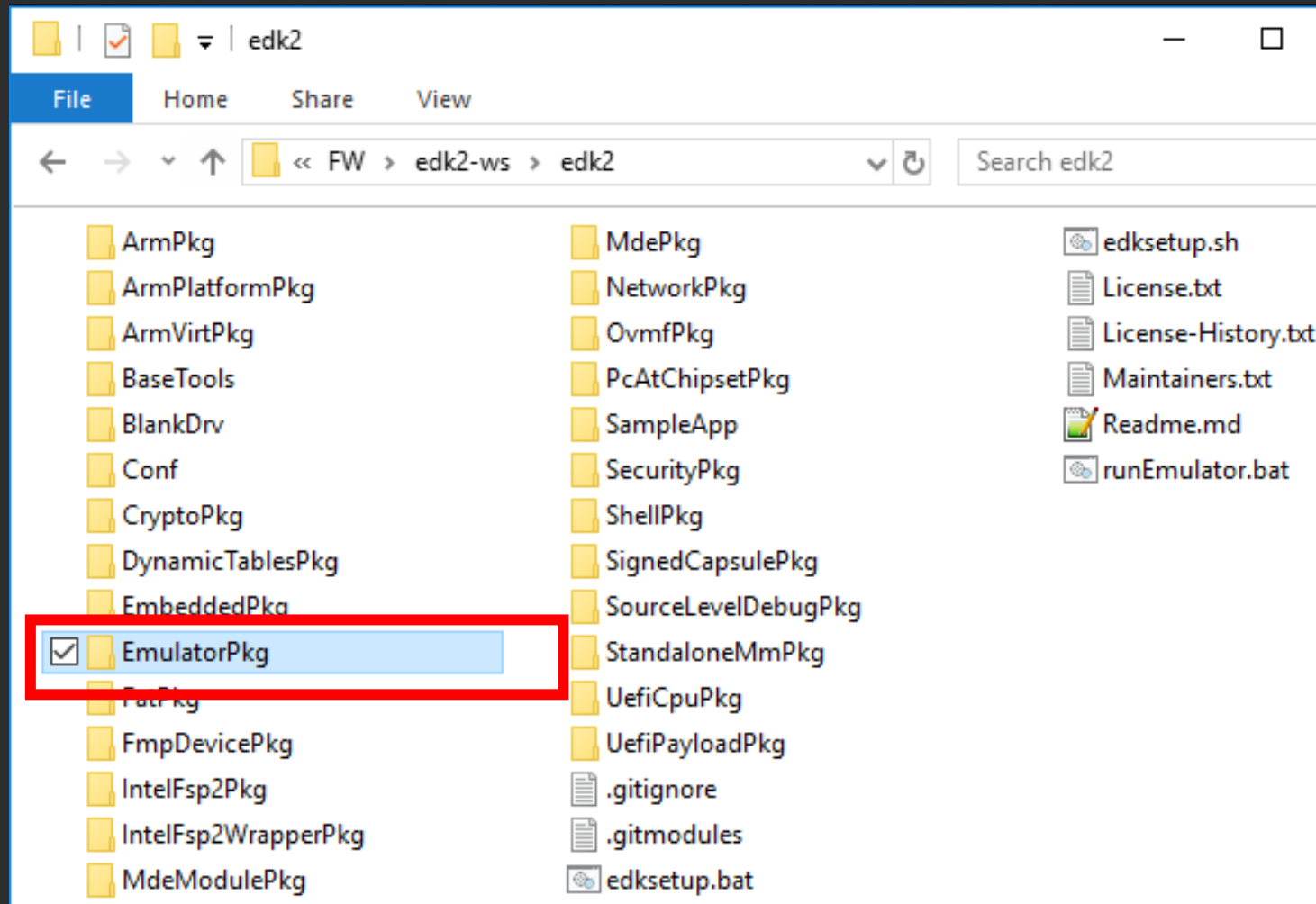
The image shows a screenshot of the Tianocore GitHub organization page and a list of repositories. A pink arrow points from the 'edk2' repository in the 'Pinned repositories' section to the 'edk2' repository in the 'Repositories' list. The 'edk2' repository is highlighted with a pink box. The 'edk2' repository is listed as 'EDK II' with 765 stars and 542 forks. The 'edk2' repository is also listed in the 'Repositories' list, where it is highlighted with a pink box. The 'edk2' repository is also listed in the 'Repositories' list, where it is highlighted with a pink box.

Repository	Description
ArmPkg	ArmPkg: DebugPeContextExtraAC
ArmPlatformPkg	ArmPlatformPkg: list module-i
ArmVirtPkg	ArmVirtPkg: handle NETWORK
BaseTools	BaseTools: Fixed an issue that
Conf	BaseTools:Delete FrameworkD
CryptoPkg	CryptoPkg/BaseCryptLib: Wra
DynamicTablesPkg	DynamicTablesPkg: Disable de
EmbeddedPkg	EmbeddedPkg: list module-int
EmulatorPkg	EmulatorPkg/Unix/Host: Fix XC
FatPkg	FatPkg/FatPei: Remove BootIn
FmpDevicePkg	FmpDevicePkg: Fix various typ
IntelFsp2Pkg	IntelFsp2Pkg/FspSecCore: Add
IntelFsp2WrapperPkg	IntelFsp2WrapperPkg/FspWra
MdeModulePkg	MdeModulePkg: Add missing
MdePkg	MdePkg/BaseUefiDecompress
NetworkPkg	NetworkPkg: Move Network li
OvmfPkg	OvmfPkg/PlatformPei: Change
PcAtChipsetPkg	PcAtChipsetPkg: Remove fram
SecurityPkg	SecurityPkg/SecurityPkg.dec: R
ShellPkg	ShellPkg/UefiShellAcpiViewCor

# Emulation Directory Structure

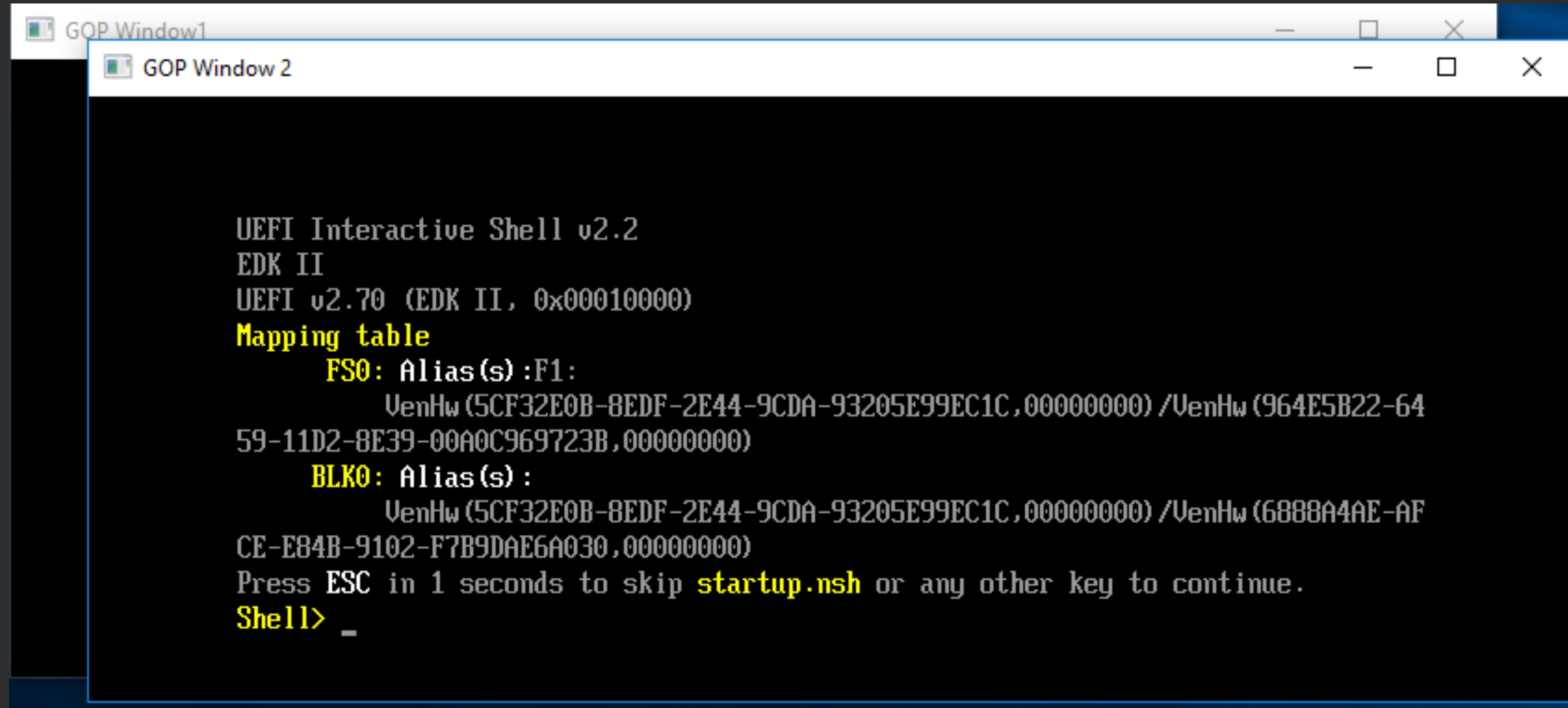
## EmulatorPkg files

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





# Running Emulator with Windows



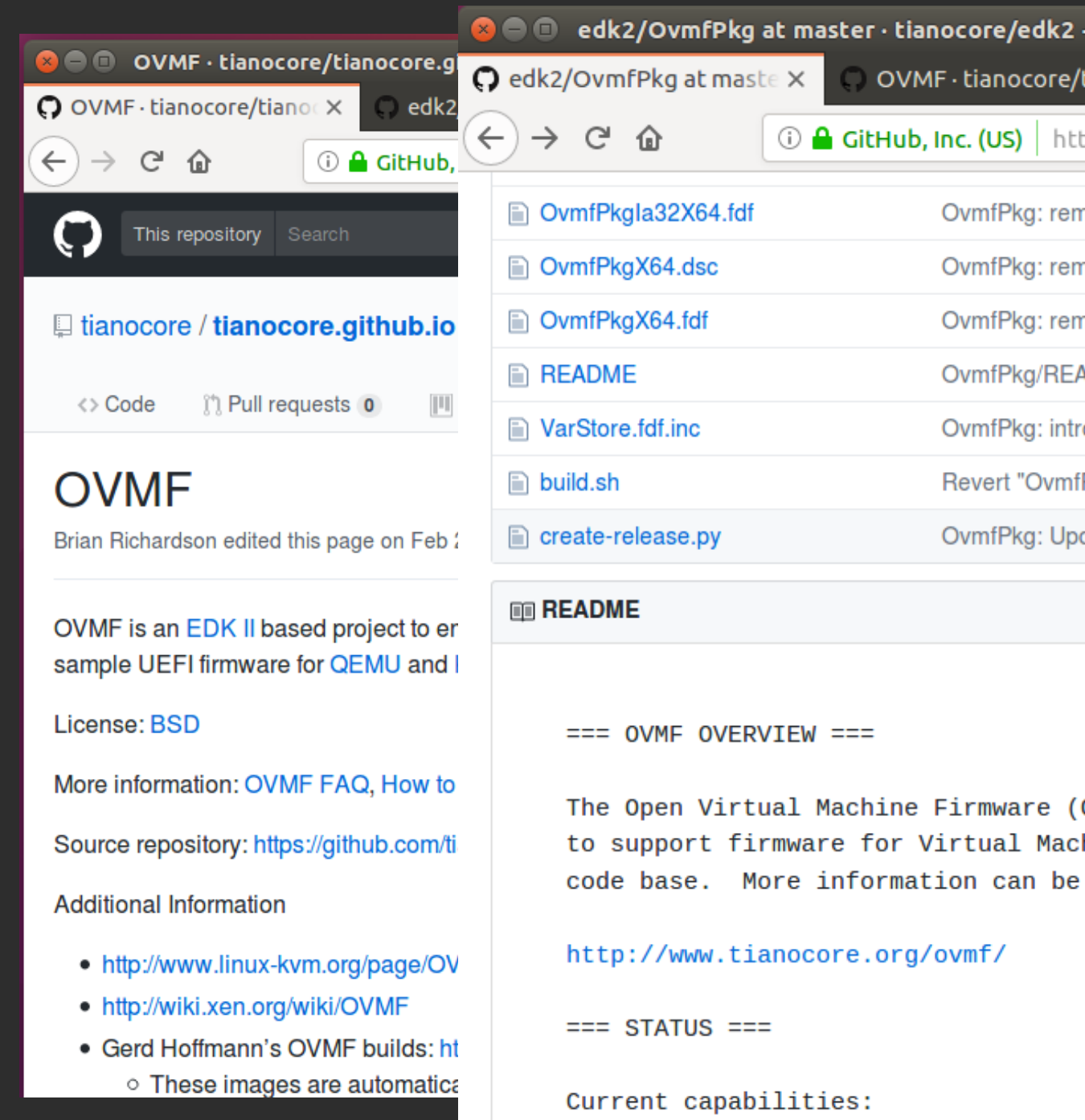
```

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> _
```

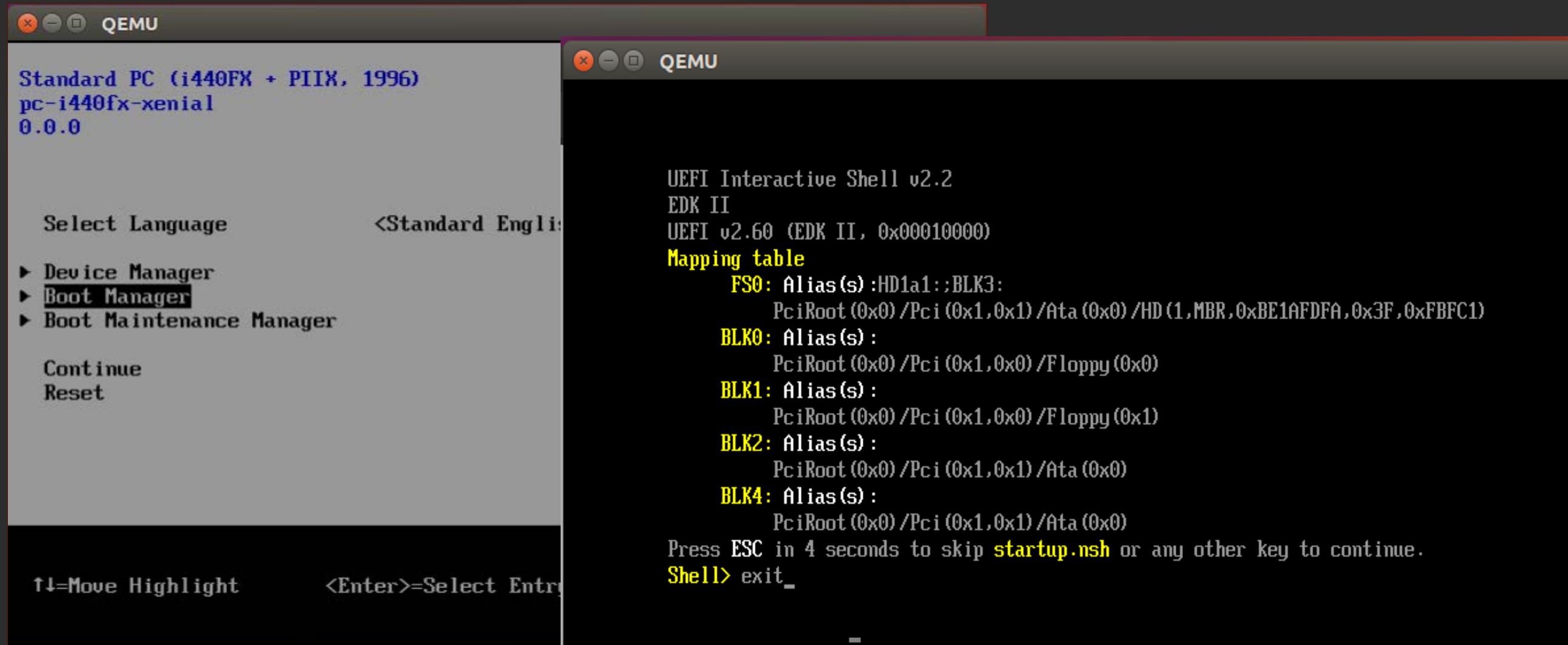
# Open Virtual Machine Firmware (OVMF)

- 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 displays two overlapping QEMU window screenshots. The left window shows the BIOS boot screen for a 'Standard PC (i440FX + PIIX, 1996)' with version '0.0.0'. It features a 'Select Language' menu with '<Standard English>' selected, and a list of options: 'Device Manager', 'Boot Manager' (highlighted), and 'Boot Maintenance Manager'. At the bottom, it says 'Continue' and 'Reset'. The right window shows the 'UEFI Interactive Shell v2.2' with 'EDK II' and 'UEFI v2.60 (EDK II, 0x00010000)'. It displays a 'Mapping table' with entries for 'FS0', 'BLK0', 'BLK1', 'BLK2', and 'BLK4', each showing its alias and path. The prompt 'Shell>' is visible at the bottom.

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

Select Language          <Standard English>

▶ Device Manager
▶ Boot Manager
▶ Boot Maintenance Manager

Continue
Reset

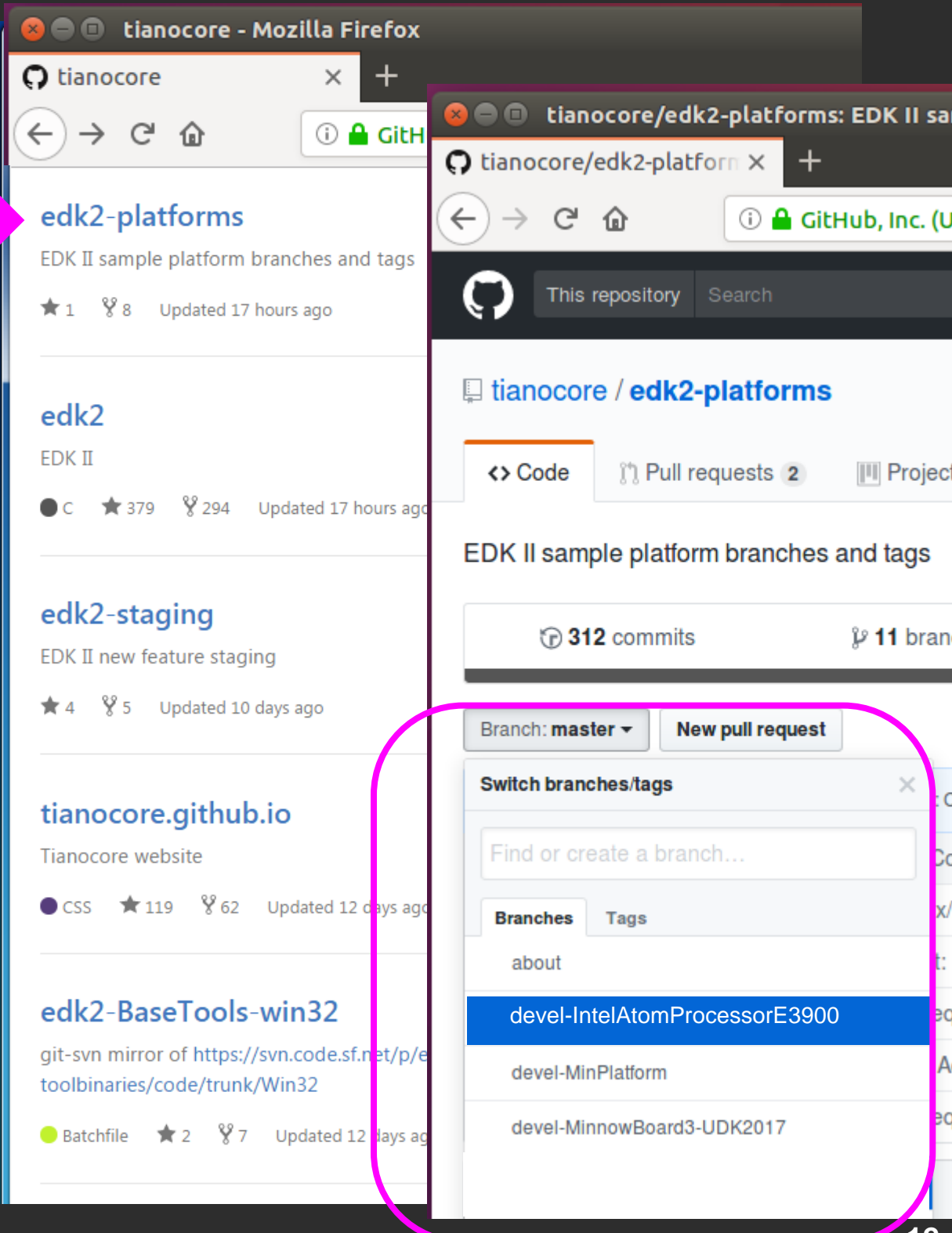
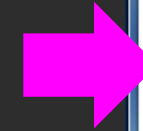
↑↓=Move Highlight      <Enter>=Select Entry

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_
```

# Intel Platforms Tianocore.org

## edk2-platforms – Platforms

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



The screenshot shows the Tianocore GitHub repository page for `edk2-platforms`. The page displays the repository name, description, and a list of branches. A pink circle highlights the 'Switch branches/tags' dropdown menu, which is open, showing a list of branches including `devel-IntelAtomProcessorE3900`.

# Slim BootLoader (SBL) Project



Fast & Secure Open source boot solution  
for IoT Use Cases

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

Supported Hardware:

QEMU

UP2 Board

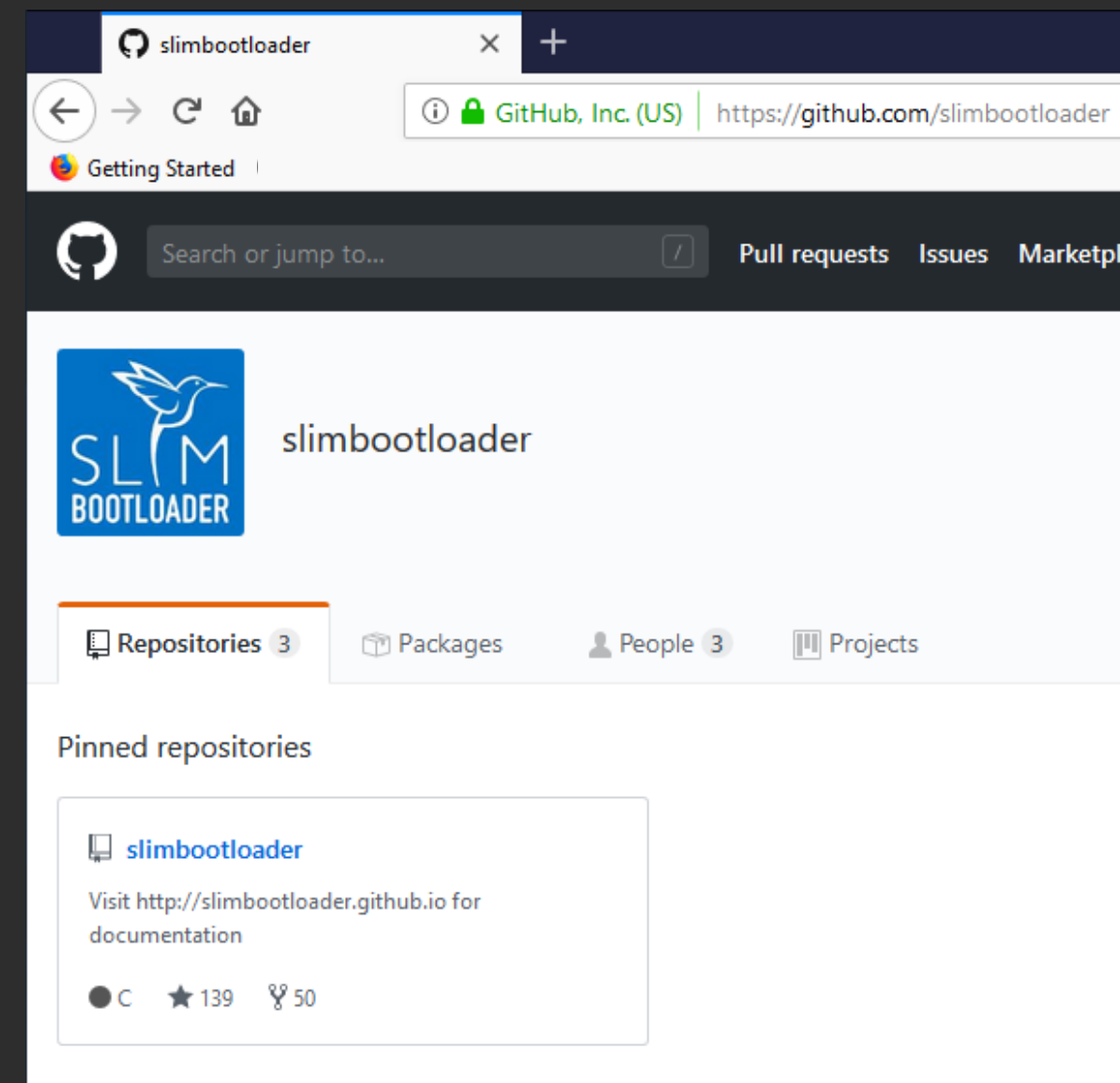
Apollo Lake CRB

Whisky Lake CRB

Coffee Lake Refresh CRB

UP Xtreme Board

Documentation: [Slim Bootloader Project](https://slimbootloader.github.io)



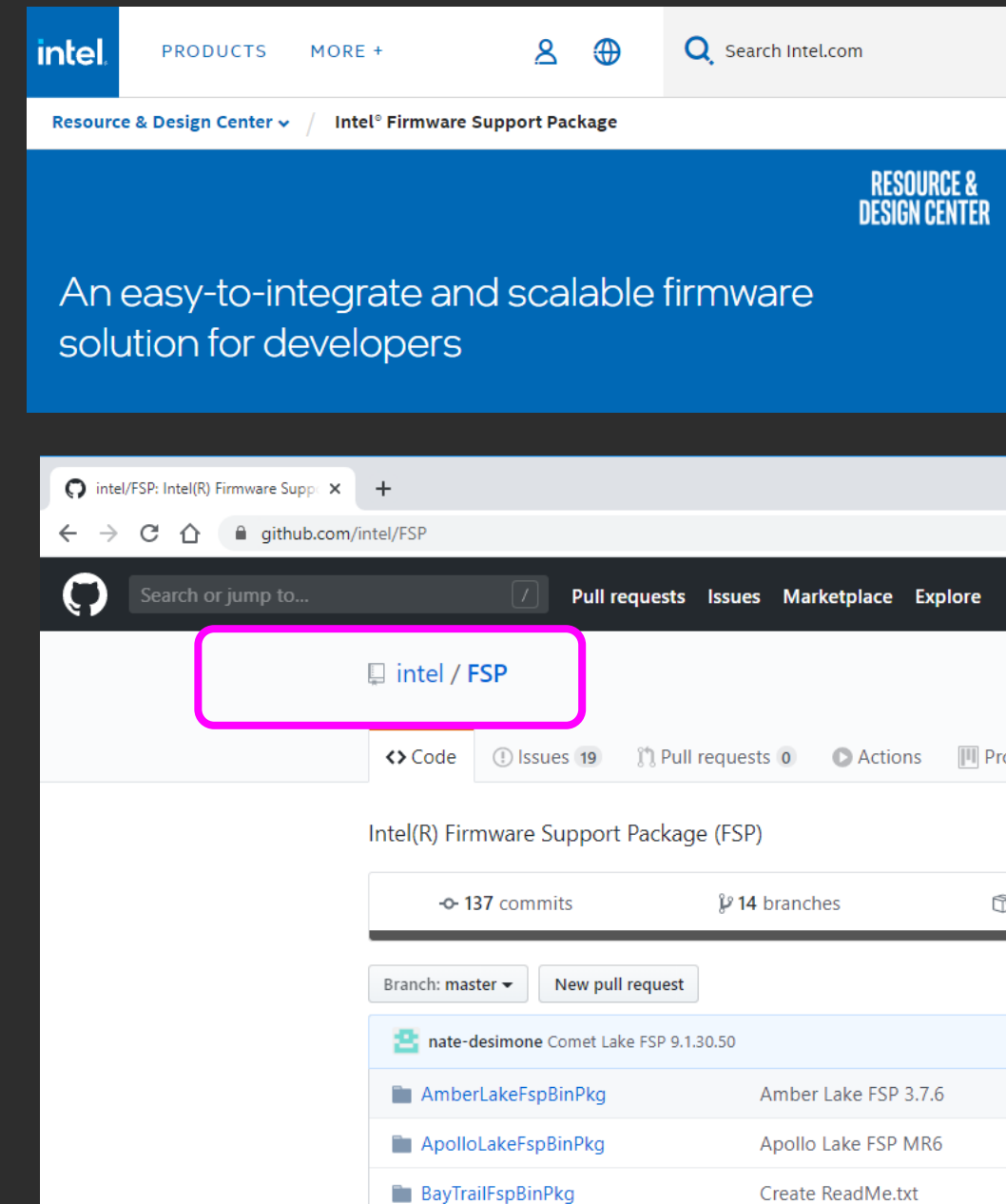
## intel Intel Developer Zone Overview

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



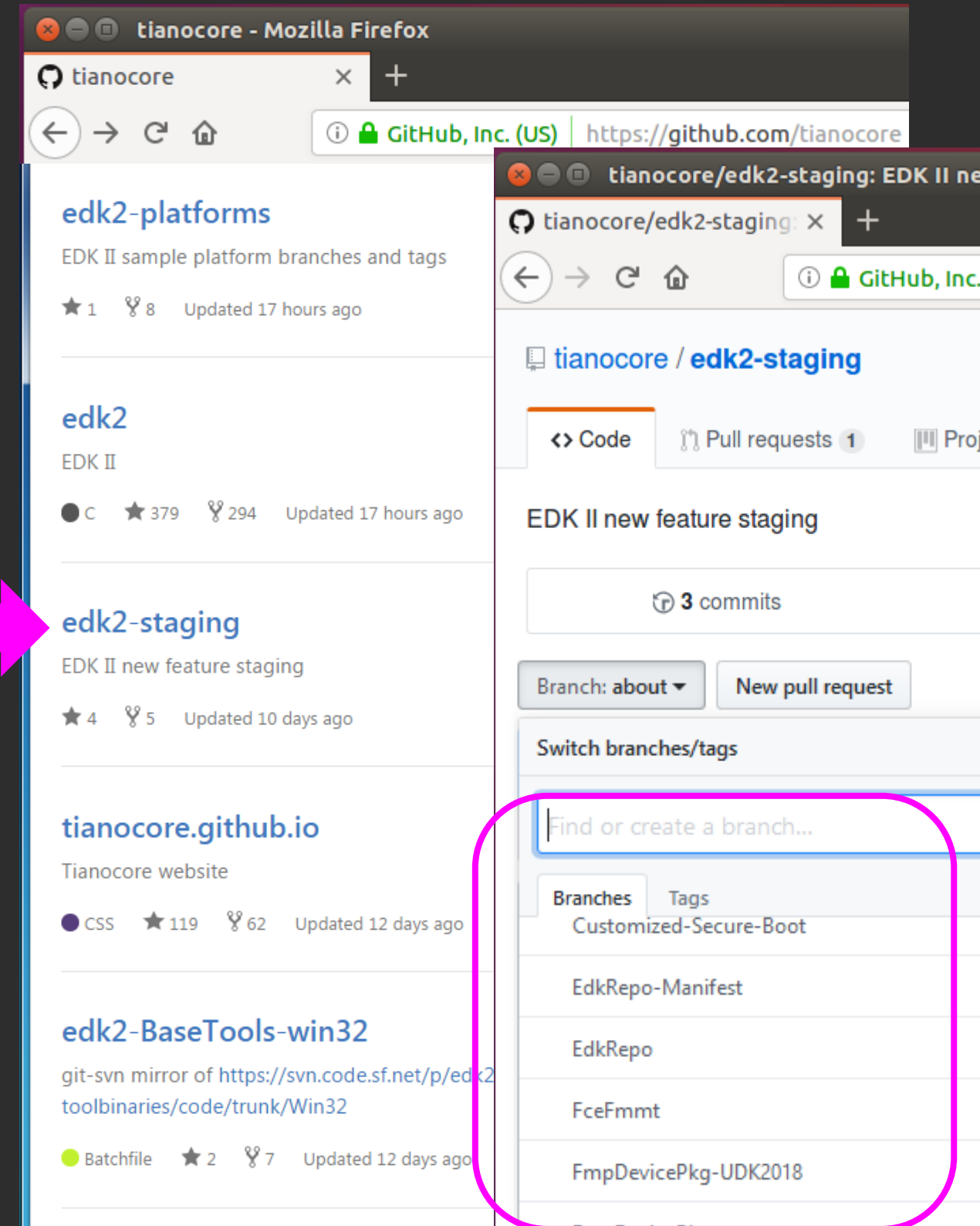


# Staging TIANOCORE.ORG

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, showing a list of branches including '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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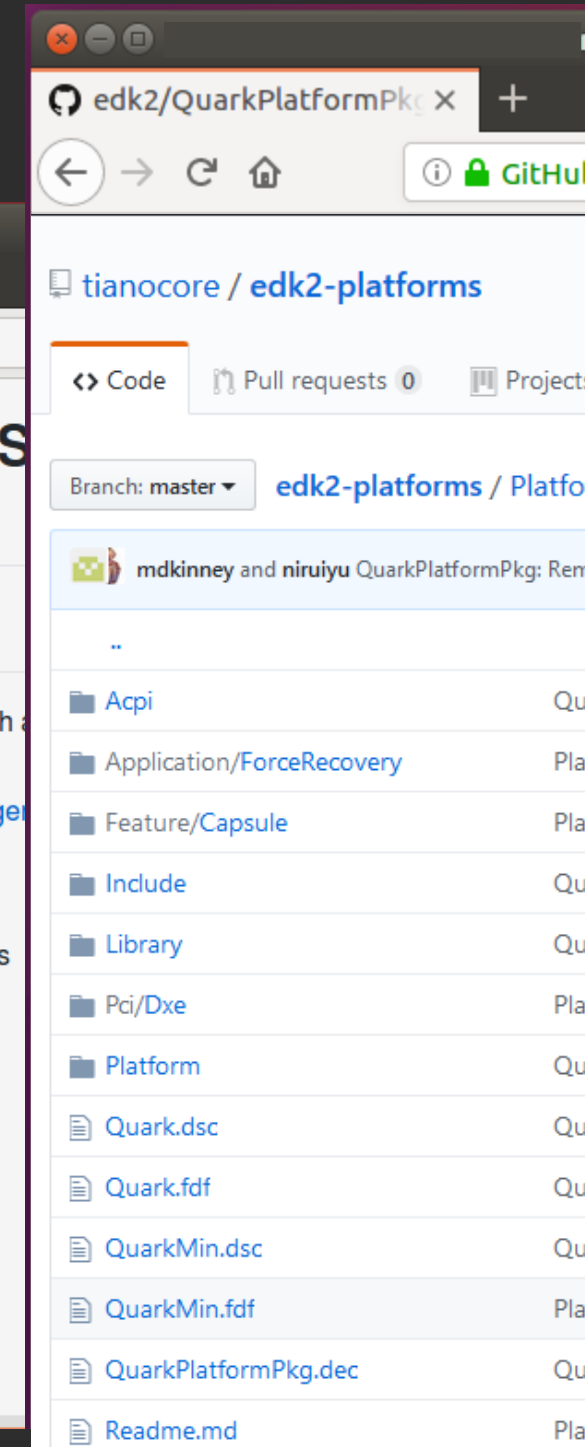
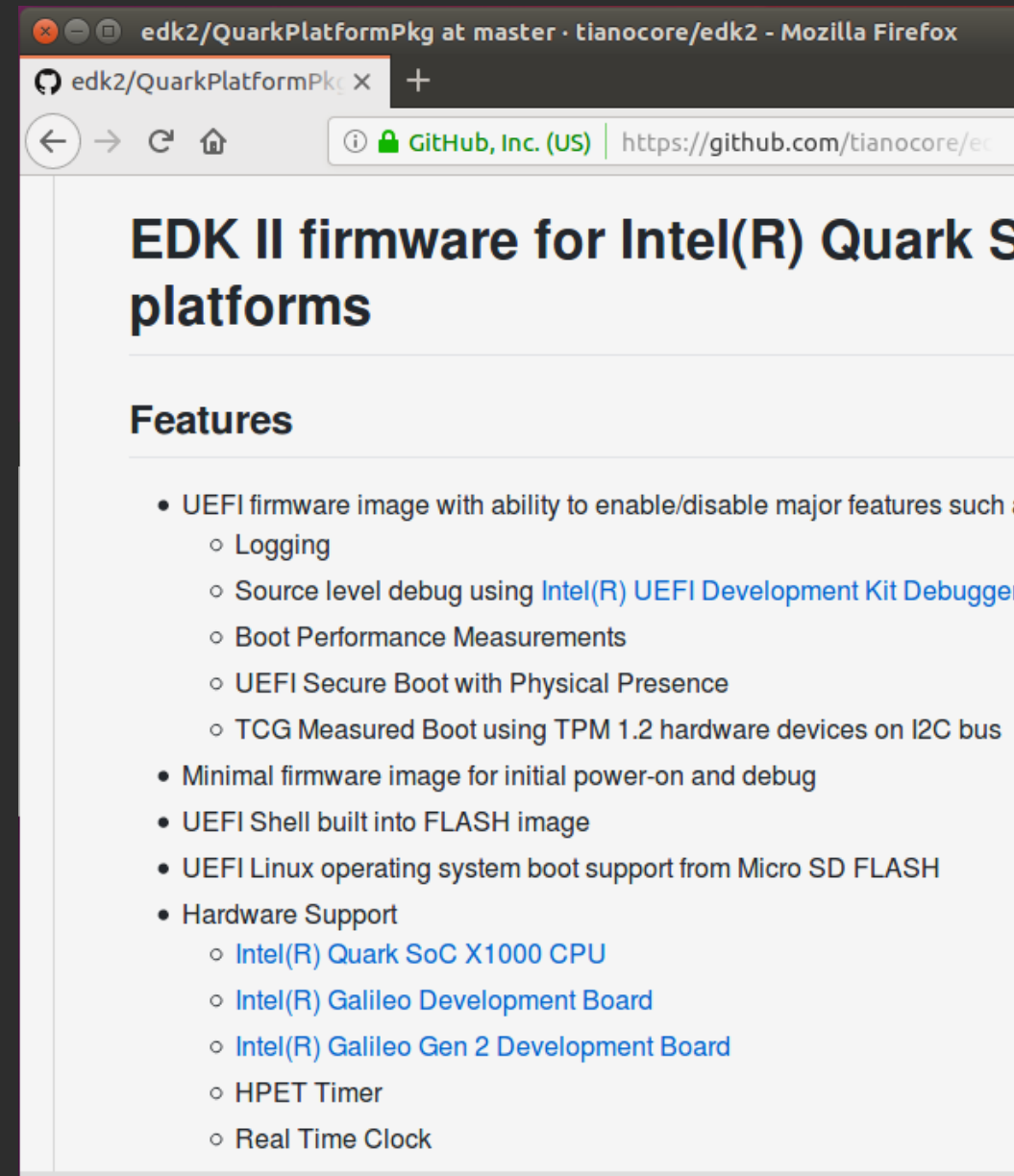
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**BACK UP**

# Intel® Quark SoC X1000 Platform Project EDK II

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

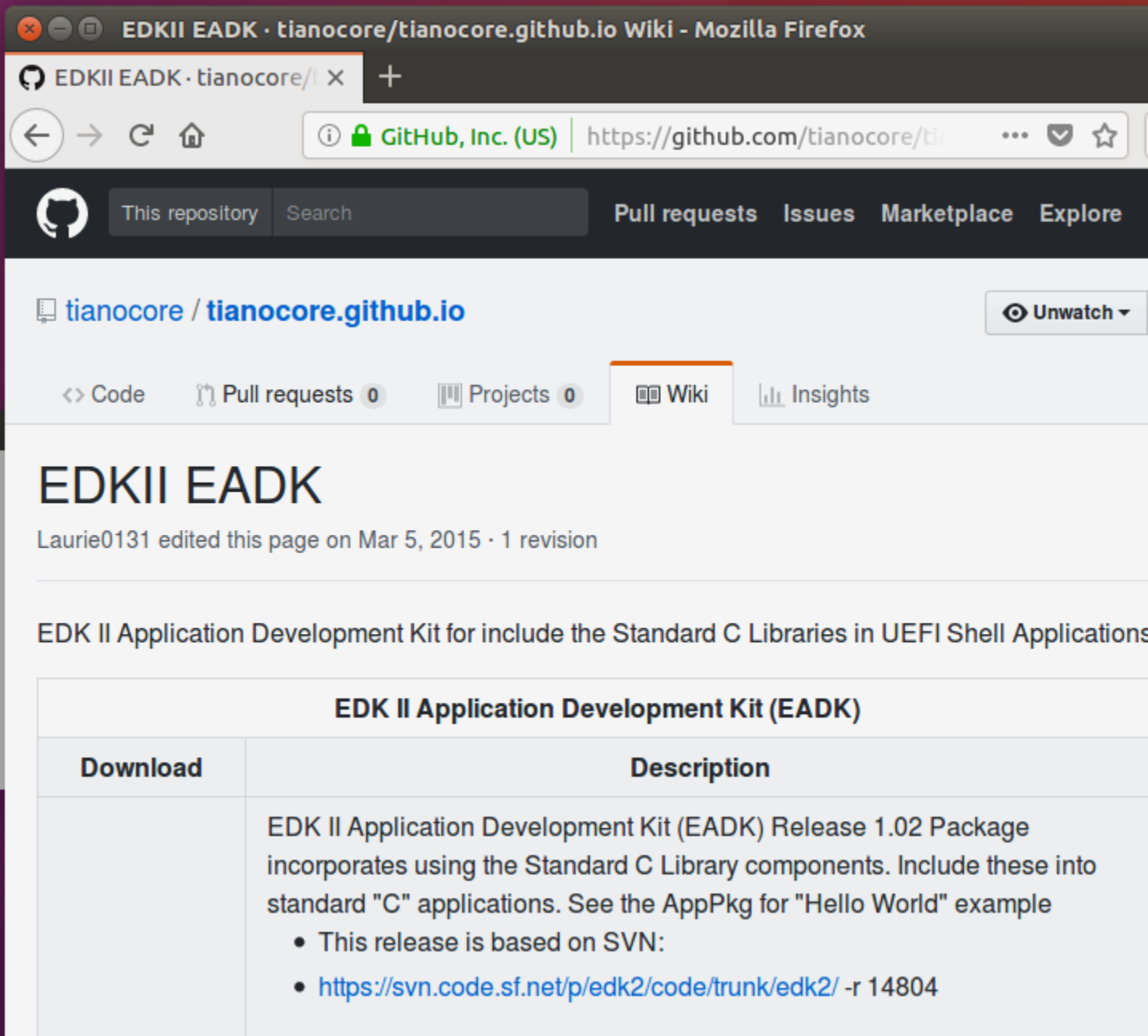


# EDK II EADK

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

Link: [wiki EADK](#)

Github: [edk2-libc](#)



The screenshot shows a web browser window displaying the GitHub Wiki page for EDKII EADK. The browser's address bar shows the URL <https://github.com/tianocore/tianocore.github.io/wiki/EDKII-EADK>. 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 the Standard C Library components for UEFI Shell Applications. A table provides download links and descriptions for the package.

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

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