Accelerated Mainline Linux Development Ahead Of SoC Availability

Date: 2023-06-28
Bryan Brattlof
Praneeth Bajjuri
About Us: TI Processors and Open Source

Decades of contribution and collaboration

Ingrained culture to give back to the community

Upstream FIRST!

Focus on long term, sustainable and quality products

Upstream and opensource ecosystem in device architecture

Upstream FIRST mentality!
About Me

Bryan Brattlof – Texas Instruments
● Linux Software Developer
● Bootloaders – U Boot

Praneeth Bajjuri – Texas Instruments
● Linux SW Manager
● Android Enthusiast
● Product Tree Maintainer
Disclaimers

This is a technology presentation, not product-readiness or roadmap commitments

The opinions represented here are mine and do not reflect Texas Instruments
The Design Process In School

GET HARDWARE → WRITE DRIVER → BLINK LED → GET A+
please write me a Linux driver to blink an LED

Sure! Here's an example of a simple Linux kernel driver that can be used to blink an LED connected to a GPIO pin:

```c
#include <linux/init.h>
#include <linux/module.h>
#include <linux/gpio.h>
#include <linux/timer.h>

#define LED_GPIO_PIN 17  // GPIO pin number to control the LED
#define BLINK_DELAY_MS 500 // Blinking delay in milliseconds
```
The Design Process In School

GET HARDWARE → WRITE DRIVER → BLINK LED → GET A+
The Design Process In School

Amused I am not.
The Design Process

THE IDEA

SUPPORT

WAKEUP

DESIGN

VALIDATE

TAPEOUT
The Design Process

THE IDEA → DESIGN → VALIDATE → TAPEOUT → WAKEUP → SUPPORT → THE IDEA
The Design Process

Support → Idea → Design → Validate → Tapeout → Wakeup → Support
Step 1 - The Idea

What do we want to make this time?
Step 1 - The Idea

- Identify a market and community fit
- Design
  - Validate
  - Tapeout
  - Wakeup
- Support

THE IDEA
Step 1 - The Idea

Support → Design → Validate → Tapeout → Wakeup → Support

Will the Linux community support it?
Step 1 - The Idea

How open source friendly are they?
Step 2 - Design
Step 2 - Design

- Support
- Design
- Validate
- Tapeout
- Wakeup

Design Details

How will this work with each Linux subsystem?
Step 3 - Validate

Validate the design and tapeout, then support and wakeup.
Step 3 - Validate

VLAB - qemu for chips
Great for initial driver dev or large refactor
Step 3 - Validate

THE IDEA

 SUPPORT

 WAKEUP

 DESIGN

 VALIDATE

 TAPEOUT

 VLAB - QEMU FOR CHIPS

 GREAT FOR INITIAL DRIVER DEV OR LARGE REFACCTOR
Step 3 - Validate

The Idea
Design
Validate
Emulation
Cycle accurate modeling to get performance data

Support
Wake up
Tapeout

Texas Instruments
Step 3 - Validate

The Idea

Design

Validate

Tapeout

Wakeup

Support

Emulation

Cycle accurate modeling to get performance data
Step 3 - Validate

Support -> Idea -> Design

Wakeup -> Validate

Tapeout -> Finding Bugs
Step 3 - Validate

THE IDEA

SUPPORT

Design

WAKEUP

VALIDATE

TAPEOUT

LIMITATIONS
Step 3 - Validate

Support → The Idea → Design → Validate → Tapeout → Wakeup

Gain confidence in our design
Step 4 - Tapeout

Support → Idea → Design → Validate → Wakeup → Tapeout

Sending the design to be realized
Step 4 - Tapeout

THE IDEA

DESIGN

VALIDATE

WAKEUP

SUPPORT

TAPEOUT

THE SUPPORTING COMPONENTS IN LINUX

the supporting components in Linux
Step 5 - Wakeup

Wakeup → Design → Validate → Tapeout → Support

The Idea → First Signs of Life
Step 5 - Wakeup
Step 6 - Support

The Idea
Design
Validate
Tapeout
Wakeup
Support

More bug hunting
Wrapping Up
Credits and Acknowledgements

- Texas Instruments Inc.
- The Linux Foundation.
Q&A

• **Contact Information:**
  - Bryan Brattlof <bb@ti.com>
  - Praneeth Bajjuri <praneeth@ti.com>

• Also on IRC @ libera.chat #linux-ti

Learn more about TI products

- [https://www.ti.com/linux](https://www.ti.com/linux)
- [https://www.ti.com/processors](https://www.ti.com/processors)
- [https://www.ti.com/edgeai](https://www.ti.com/edgeai)

Why choose TI MCUs and processors?

- **Scalability**
  
  Our products offer scalable performance that can adapt and grow as the needs of your customers evolve.

- **Efficiency**
  
  We design products that extend battery life, maximize performance for every watt expended, and unlock the highest levels of system efficiency.

- **Affordability**
  
  We strive to make innovation accessible to all by creating cost-effective products that feature state-of-the-art technology and package designs.

- **Availability**
  
  Our investment in internal manufacturing capacity provides greater assurance of supply, supporting your growth for decades to come.