Booting it successfully for the first time in mainline

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FOSDEM 18
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- Hardware and Linux enthusiast
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Agenda

• What is Board Bring-Up?
• Process of the development of a new board.
• What’s wrong with this process.
• How mainline can help us to improve this process.
• Lessons learned.
What is Board Bring-Up?

“Board bring-up is the process of validating, both electrically and functionally, a new circuit board design including the porting of boot firmware and the development of a Board Support Package.”
Hardware

- Component selection
- Circuit Design (Schematic)
- Bill of Materials (BOM)
- PCB prototypes
- Certification
Software

- Firmware programming
- Bootloader
- Kernel and device drivers
- Software stack
- Application development
What's the problem?

- Board Respin
- HARDWARE
- SOFTWARE
- BUG!
Has this ever happened to you?
And how we can do this?

Work together!

Software

Hardware
How mainline can help us to improve the process?

Components selection & Circuit Design (Schematic)
Component selection

- Main processor
  - Evaluate the Board Support Package
  - Consider if it’s well supported in mainline
- Other IC, sensors, displays, real time clocks ...
  - Check that the driver is upstream.
- Do NOT abuse of use of microcontrollers.
  - Can an IC replace the microcontroller?
Connecting two displays: First option

SoC → width x height → μC (i2c bridge) → i2c address → width x height

Display

Display

width x height
Connecting two displays: Second option

SoC → FPGA

2 * width x height → FPGA

FPGA → Display

width x height

FPGA → Display

width x height
Critical components selection
Circuit design (Schematic)

• Let software team review the schematic
  – Write the devicetree file (architecture specific)
• Configure properly the muxer settings of the pins.
  – Enable of ICs.
  – Enable of regulators.
  – Look at pull-up and pull-down muxer possibilities.
Lessons learned

- Follow the rule. Upstream first.
- Work as close to mainline at early stages of development.
- Review the schematic from software POV can catch lots of errors.
- Try to do as much as possible the software development even before you have the first prototypes.
- Don’t play ping-pong. Work together.
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Any questions?