KDE Embedded

WHAT – WHY – NEXT

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WHAT DO I MEAN WITH “EMBEDDED”? 

- Devices with a defined scope/task
- For this talk: always with a Linux Kernel
- ... with CPU, GPU, and all the nice hardware features we like :)
curiosity / challenge / adventure

it's cool :)

create something
goal at the horizon

Flexible to use bleeding edge HW
Understand the system at a core
Pure joy of solving complex (or easy problems
The once-in-a-lifetime moment when booting a self-compiled Kernel
The goals of KDE Embedded (so far) ...

- allow easy integration of KF5/KF6 libraries into industry/automotive ecosystems

- provide easy to use demo systems for KDE technology on embedded devices (Plasma Mobile, Plasma Bigscreen)
OUR ECOSYSTEM FOR SYSTEM INTEGRATION

Creates customized distro images:
- industry standard
- allows easy port to new hardware
- biggest power: can rebuild everything
- provides all artifacts around an image
OUR YOCTO LAYERS

Packages that we keep updated to be used by device creators:
- meta-kf5
- meta-kf6
- meta-kde
- meta-kde-demo

KF5/KF6
100%
All KF* libs are provided by meta-kf5 / meta-kf6

Plasma
100%
All of Plasma, Plasma Mobile & Plasma Bigscreen

Apps
6%
Currently we package only apps as needed for demos
Raspberry Pi 4
The classic: ARM64 chip with MESA GL + VK driver

VisionFive2
First RISC-V board + on-board PowerVR GPU

Beagle(Play|V) ?
ARM & RISC-V boards with big community + PowerVR GPUs

...?
A lot is happening in the field

“It only works when it runs on the device”

This collection of boards is what people working on KDE embedded are typically using for smoke tests & demos
1st meta-kf5 commit 2014

KDE Booth ELCE’19
First presentation of revived meta-kf5/-kde Yocto layers

Plasma @ RISC-V FOSDEM’19
First external contributions, which helped getting Plasma run on Western Digital RISC-V board with external GPU

Plasma @ VisionFive 2 FOSDEM’23
Massive community interest at the booth because we were the first with a running Plasma Wayland-Shell
CHALLENGES

Product

Hardware Landscape

People

NEXT ~1-3 YEARS
meta-kf*
Our "best-seller", used in industry products

Demoing in fields we never went before
Raise interest for KDE in embedded community

Checkout new devices
Run Plasma & apps as a stack benchmark

Provide a “Pro-Mode”? 
This is just an idea yet, but I think it makes sense...

MAKE SOMETHING THAT MAKES SENSE

Beyond the KF packages there is not much usage by industry; is that “okay & expected” or do we strive for more?

IDEAS? → BoF
I LOVE MY STEAMDECK

Steamdeck implements an awesome idea: Let the user easily switch from the main app of the system to a powerful management/debugging/benchmarking system.

→ this sounds like a general super helpful feature for many embedded devices
→ could this be a general feature for KDE embedded?
RISC-V

THAT topic for dev boards. Everyone has one in their pipeline, just this week Beagle Foundation announced a new one! CPU wise closing to what we know from ARM/x86

GPUs

The main pain on getting Plasma running. Especially on RISC-V only binary blob/non-MESA drivers available as of now... but improving
Needs of embedded devices are different than on "ordinary" desktops: They trade flexibility with robustness, security and fault-tolerance. But they still have desktop like problems in complexity.
DON'T SCARE PEOPLE AWAY BY THE FIRST BUILD

Yocto is not known for being easily approachable, but for its steep learning curve...

First Steps
Bootstrap Config
https://community.kde.org/Yocto
1. create build container
2. setup Yocto via repo & init script
3. build, wait, flash and your cross fingers during the first boot ;)

Collaboration
Matrix: #yocto:kde.org
New matrix channel exists since last FOSDEM, come and join!

New People
We are few...
And need you! If you have general interest or already use our layers, come and join!
Getting Started
Get a supported device & follow the wiki

During this adventure you will experience fear, frustration and absolute joy when you flash your system to an SD card, put it into the device AND it actually starts and displays something on the screen!

Shopping List

SD-card : ~ 15 €
USB-to-RS232 Converter : ~ 5 €
SD-card writer : ~ 10 €
Dev Board : ~80-150 €

https://community.kde.org/Yocto
EMBEDDED DEVELOPMENT IS DIFFERENT

To speed-up development, we use desktop systems to develop & test natively and only WHEN it is ready, test and fix software on the devices.

Thus:
- host computer is the main work-horse
- new software is developed and tested exactly like any KDE app
- host computer provides cross-compile toolchain to build software for target
- and then (hopefully) we only have to fix the “minor” tweaks for making the software run proper
CONTINUOUS INTEGRATION

MAKE CONTRIBUTION SIMPLER

Transform Yocto Version Compatibility from Manual to Automatic

Big number of supported Yocto versions and manual fresh build requires TBs of free space & CPU time

- need merge check builds for layers
- coverage for main release tracks
SPREAD USAGE

Can we make the KDE meta layers more easy to use? How to attract more users? (or is every KF5/KF6 user in Yocto land already using them?)

NEW ADVENTURES

Come to the BoF or discuss your ideas during Akademy!
Homework
Tell me where KDE makes sense in the (Linux-)embedded field

Add-On
Go and get you some HW and play around with :)

Q/A?