



# How the Yocto Project addressed RDK scalability issues

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# About us



- **Yocto Project Community Manager**
- **@Linaro**
- **Designed/implemented Yocto Project based RDK**



- **RDK architect**
- **OpenEmbedded and Yocto Project maintainer**
- **Yocto Project TSC member**

# Agenda

- **What is the Yocto Project?**
- **What is the RDK?**
- **Scalability issues**
- **Yocto Project to the rescue!**
- **Collaboration benefits**



# What is the Yocto Project?

# What is the Yocto Project?

**yocto**  
PROJECT™

SEARCH  Go

ABOUT  
ECOSYSTEM  
DOWNLOADS  
TOOLS + RESOURCES  
DOCUMENTATION

**New to the Project**  
Want to learn more, or just kick the tires? Start here.

[START HERE TO LEARN MORE](#) ▼

It's not an embedded Linux distribution  
– it creates a custom one for you

The Yocto Project is an open source collaboration project that provides templates, tools and methods to help you create custom Linux-based systems for embedded products regardless of the hardware architecture. [Read more](#)

The Yocto Project is a set of templates, tools and methods that help you build custom Linux-based systems.

# The Yocto Project

- **An open source, collaborative project**
  - hosted by the Linux Foundation in 2010
  - Project architect is Richard Purdie.
  - Uses OpenEmbedded which started in 2003.
- **Support all platforms:**
  - ARM, x86, PPC, MIPS, RISC-V
- **The de facto industry standard “tool kit” for building custom embedded Linux operating systems with**
  - over 50% market share by volume
  - over 80% market share by revenue
  - Released twice a year (April and October)

# Why?

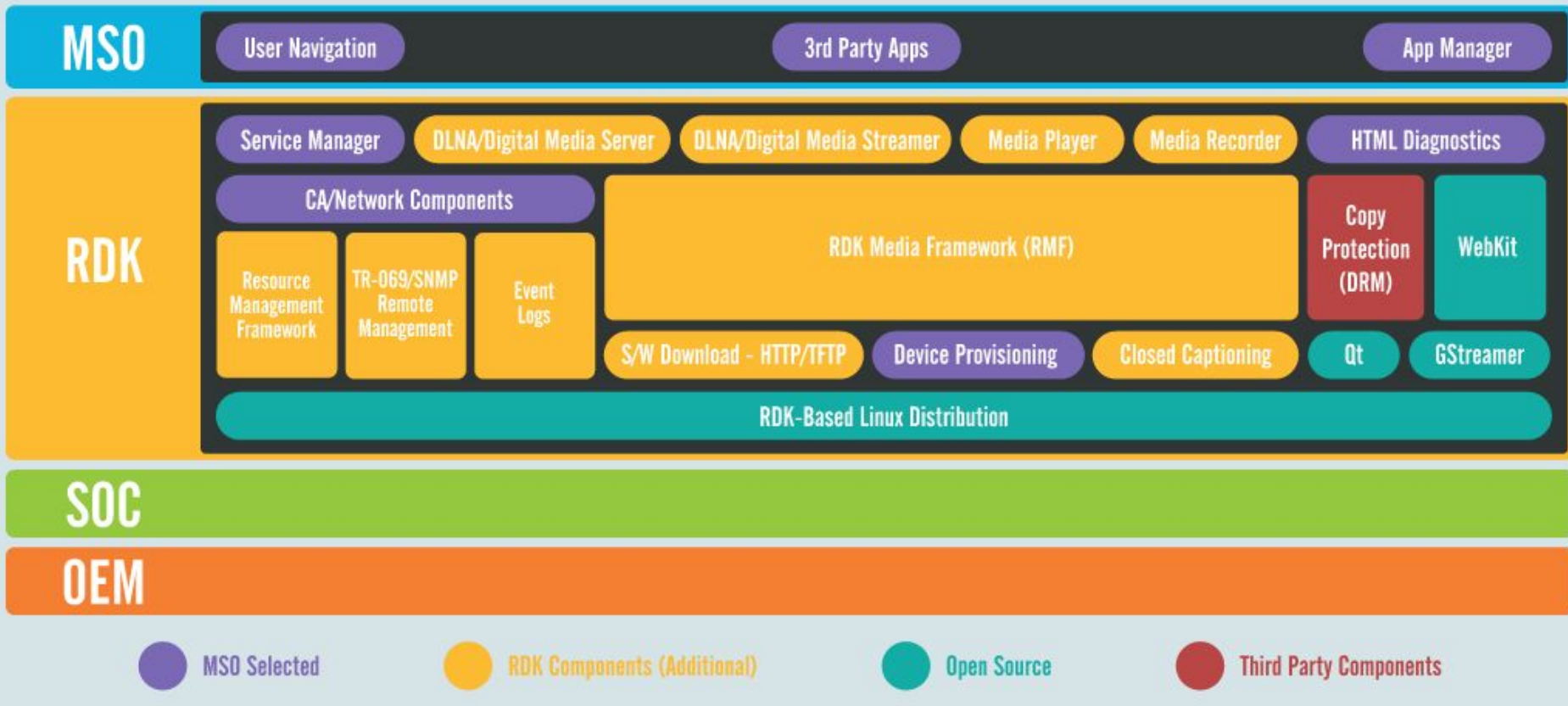
- **Spend less time on things that bring no value to your business:**
  - up-to-date recipes for thousands of packages
  - Quickly build an entire Linux system from source, using a validated set of packages (toolchain, busybox, libc, init system...)
  - Built in support for package management
  - Predictable and reproducible builds
- **Provides set of standard tools and build guidelines.**
  - reuse across projects or organizations
  - autobuilders/bots
  - Helps manage adherence to Open Source Licensing
  - Minimal dependencies on host and users
- **Flexibility and customization:**
  - Configure the system at will.



# What is the RDK?



# RDK Video software stack



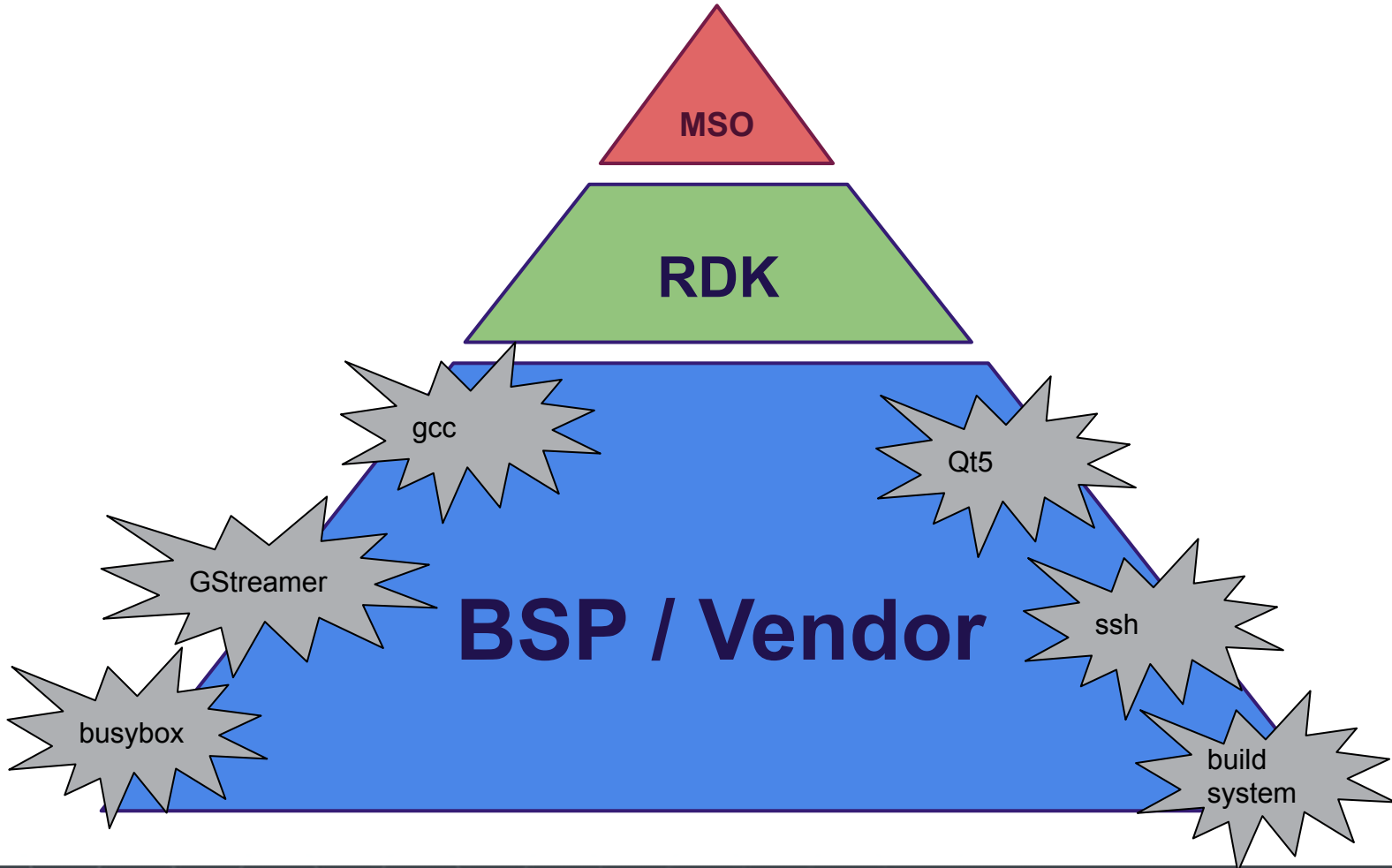


# Scalability issues

# RDK 1.x : why the need for change?

- **Legacy RDK build system**
  - started with a trivial script
  - grew into a very complex “program”
- **Difficult to use,**
  - lack of documentation
- **Difficult to maintain and satisfy the scalability of RDK community**
- **Very slow upgrade of standard open source core components**
  - security
  - bugs
  - improvements

# RDK 1.x : the BSP problem



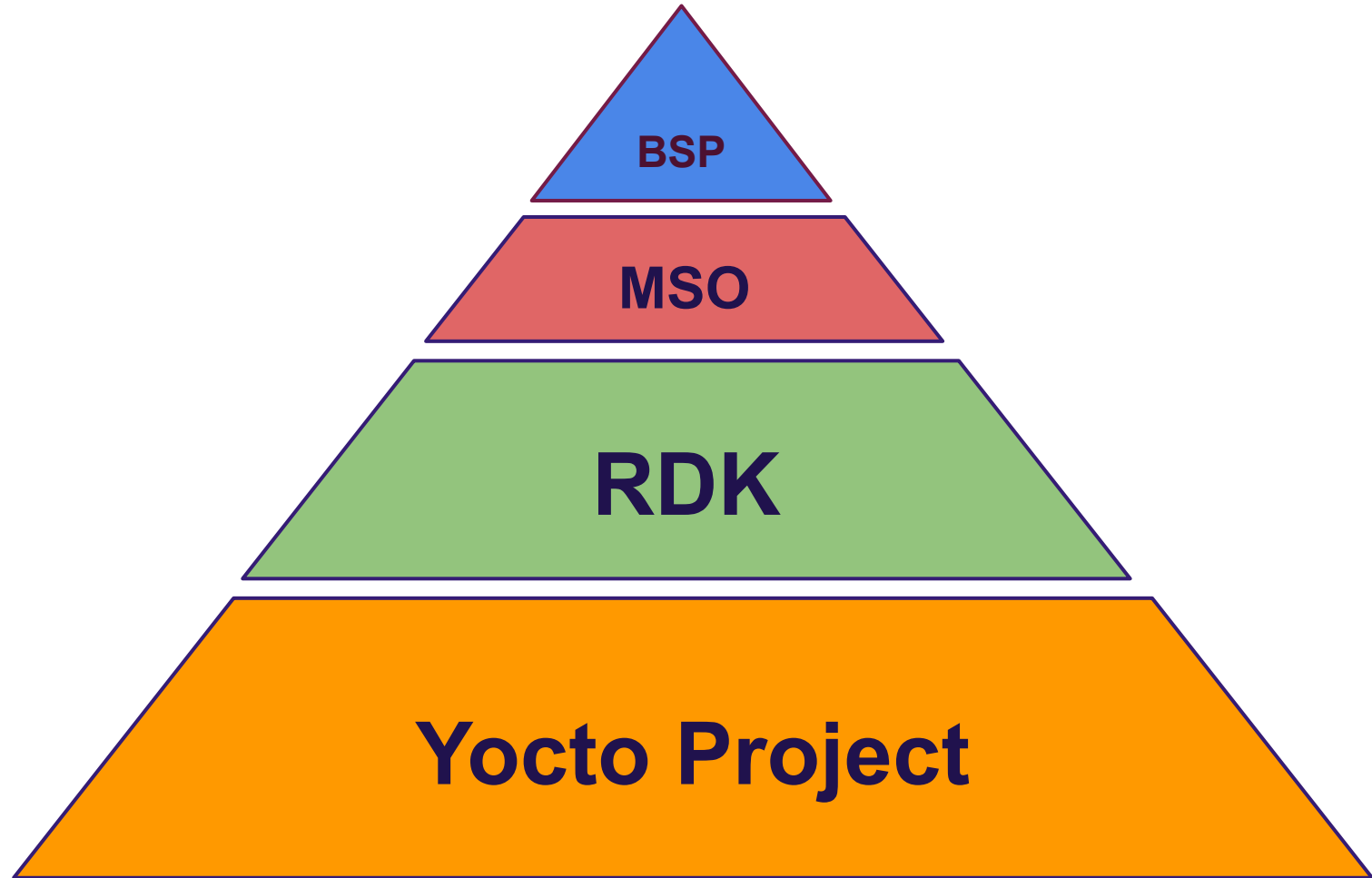


# Yocto Project to the rescue

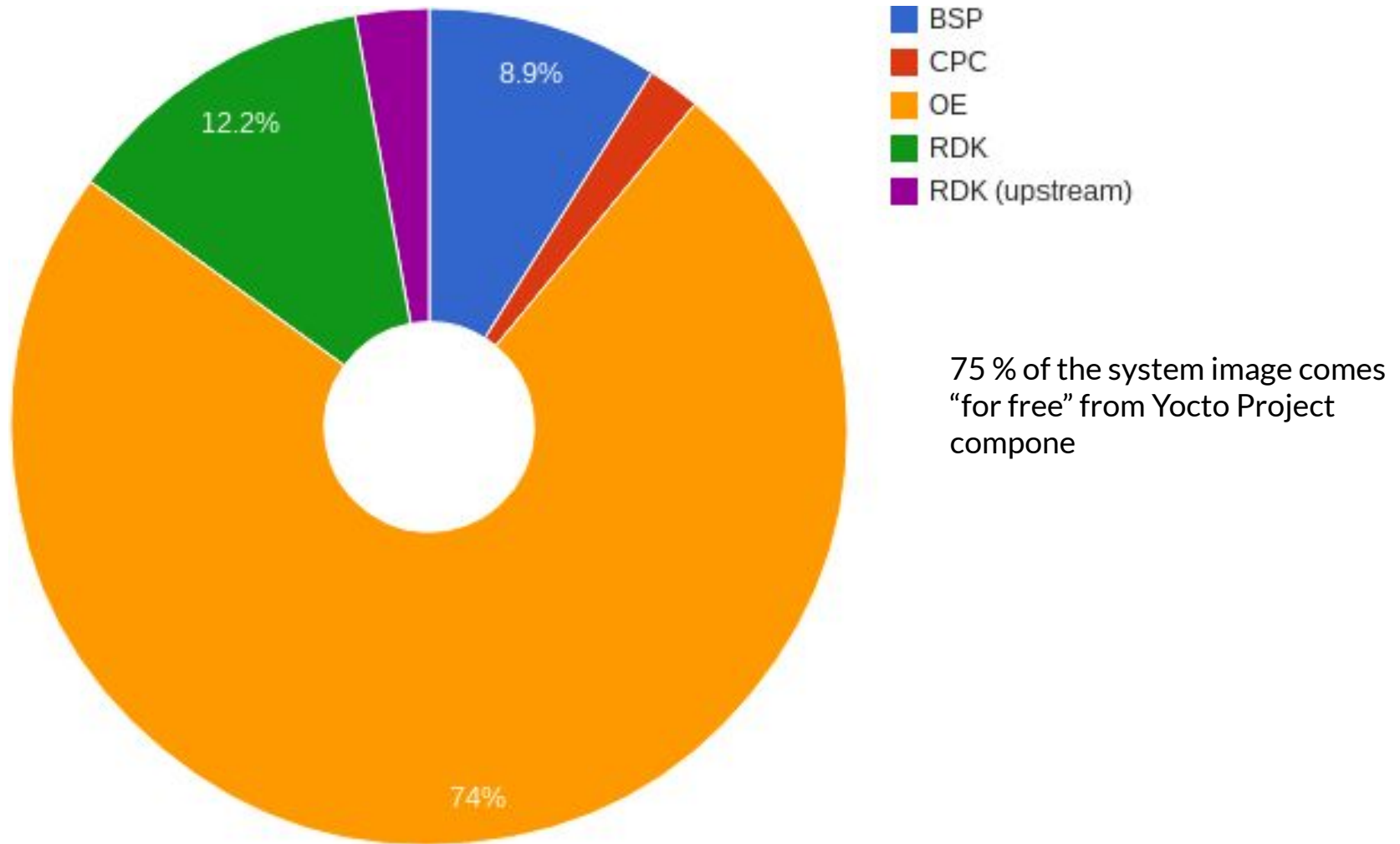
# Migration to Yocto Project: goals

- **RDK unification**
- **Clear separation of ownership and responsibilities**
- **Yocto Project as a foundation for RDK**
  - rely on well supported (and existing!) recipes
  - maintenance and security updates
- **Simplified and consistent build infrastructure**
- **Upgradability**
- **Reduce cost of entry for new vendor and new adopters**

# RDK 2.x layer architecture

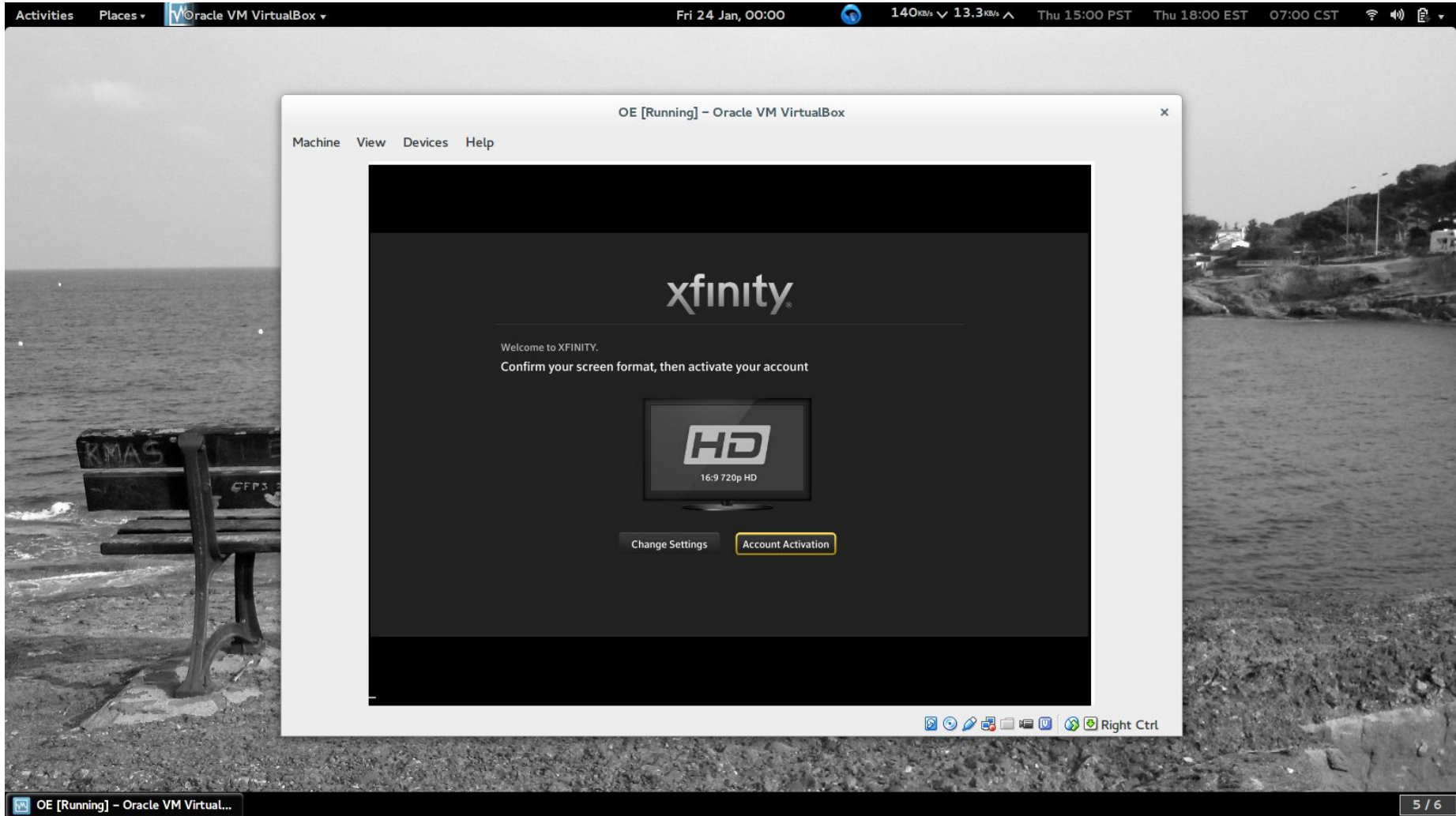


# RDK 2.x: origin of software components





# Bonus track: the RDK Emulator





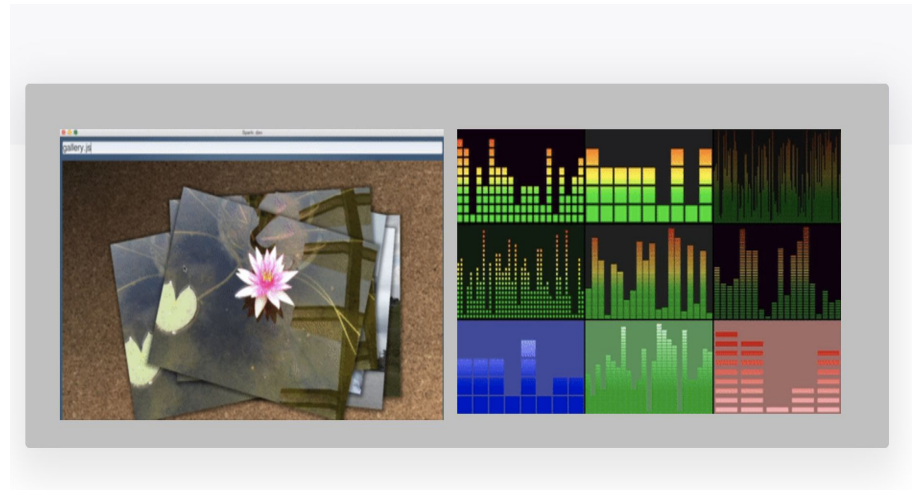
# Collaboration Benefits

# Yocto Project RDK benefits

- **Build “on the shoulders of giants”**
- **Standard distribution and build tools**
  - Reduce fragmentation and differentiation across SoCs in areas that don't matter
  - Reduce entry barrier for newcomers in the RDK community
  - Benefits from development, innovation and support from the entire Yocto Project ecosystem
  - Thousands of components already pre-integrated
- **Standard BSP deliveries**
  - Homogeneous across all RDK SoC vendors
  - BSP layer can be made independent of RDK, and can be reused for any OpenEmbedded based project
- **Growing RDK community**

# Benefits ... RDK 3.0

- **RDK has gained sharper Innovation focus**
  - Westeros - Embedded Wayland Compositor
  - Spark UI <http://www.sparkui.org//index.html>
  - Firebolt SDK
  - Application Development Kit for RDK: <https://firebolt.app>
  - Optimized Embedded Browser Framework ( WPE )
  - Secure Video playback
  - OpenCDM



## Benefits... RDKs Horizontal Scale

- RDK Projects: <https://rdkcentral.com/projects/>
- RDK-V - Video Clients and gateways
- RDK-B - Broadband, edge gateways
  - DOCSIS, EPON, GPON, DSL
- RDK-C - Smart Security Cameras
- RDK for WiFi Access points
- ...

# Daily Driver Benefits...

- **Reduced build times (~3x)**
  - trusted incremental builds
- **Lot of Documentation**
  - Eases Developer Onboarding
- **Open Source Community**
  - Better Chances of finding developers
- **Licensing tools**
  - Help in compliance
- **Testing Infrastructure**
  - Indirect benefits
- **Security patches**
  - Backports

# Challenges?

- Learning curve  
⇒ Adopting open source culture
- Developer workflow  
⇒ devtool
- Yocto Project upgrade  
⇒ Yocto Project LTS?
- Continued build time improvements  
⇒ Hash equivalency in Yocto Project 3.0



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## Questions and Answers





**Thank you for your attention**