

What will be under the hood?

Silicon Valley trends in high-tech systems (not applications).

Bartłomiej Sieka, Semihalf

Bistpiration 2013, Krakow

Agenda

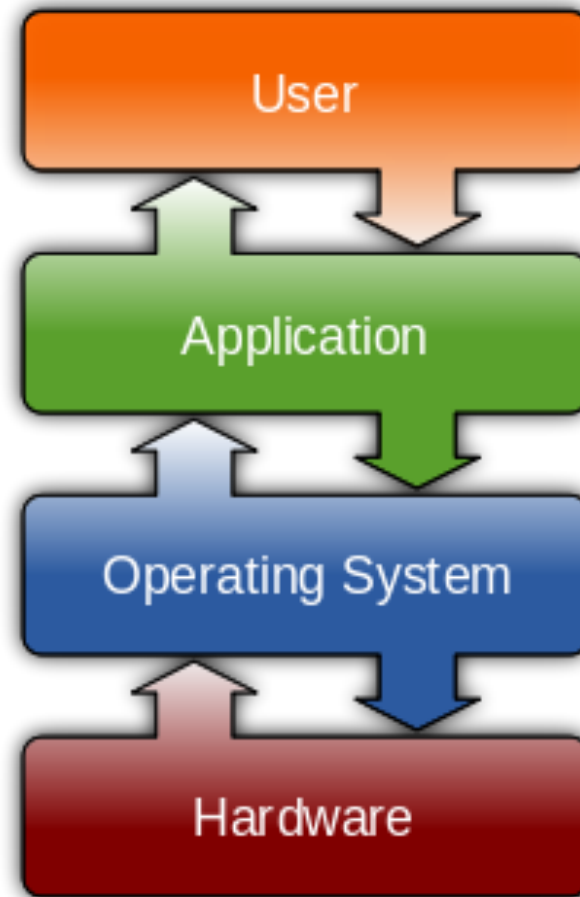
- Intro
- Non-application perspective (tech + business)
 - Embedded systems
 - System software
- Software Defined Networking (SDN)
- ARM server
- Very dynamic landscape
- Big business opportunity

Embedded Systems

- A computer system dedicated to one specific function (or a limited number of functions)
- Often needs to work in a constrained environment (size, power, harsh conditions)
- Examples
 - Cellphone, home gateway, TV set, PVR, ...
 - Network gear, traction control, space probe, ...
- \$5,2B market (software), 9% CAGR

System Software

- ROM
- Boot loader
- Operating System
- Device Drivers
- Frameworks and libraries
 - Networking stacks
 - Virtualization
 - Video
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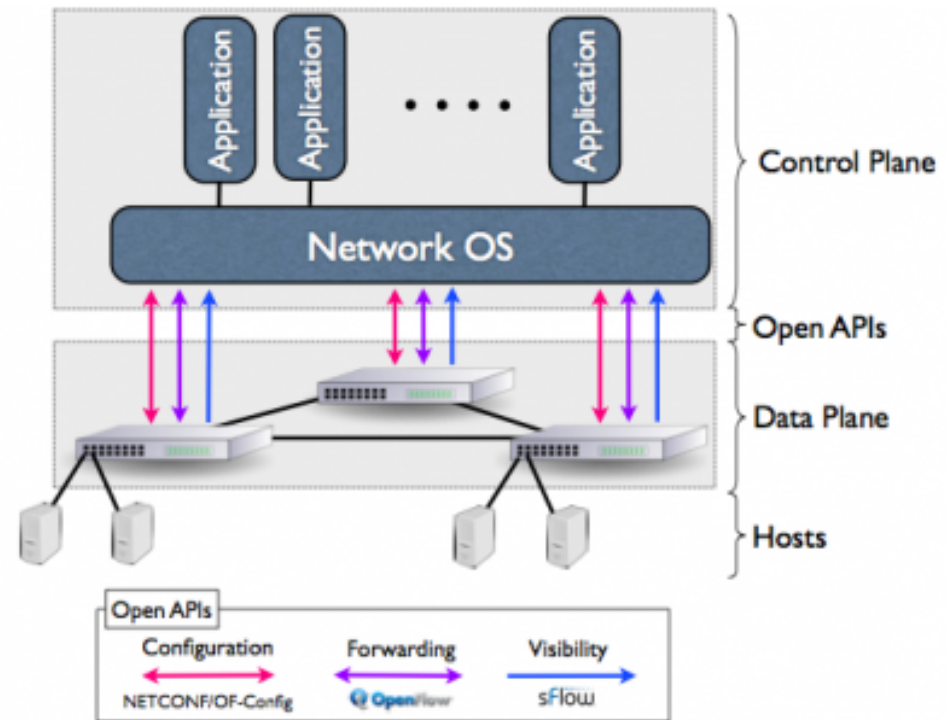
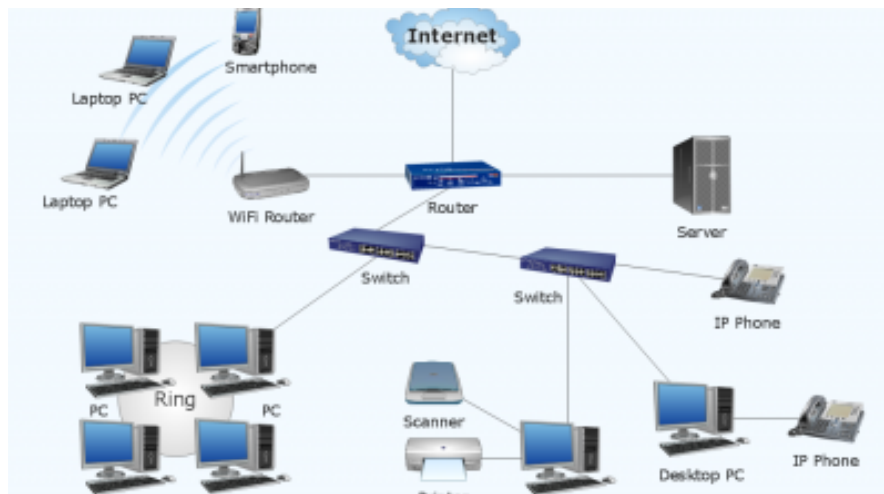


Why do Systems Stuff?

- Complex and challenging problems
- Pop-up the hood and see how stuff works
- Learn new things all the time
- Academic research roots
- Beautiful code (sometimes not)
- Good business too!
- What's next?

SDN: New Networking Paradigm

- Move network functions to decoupled software



SDN Overview

- Characteristics
 - Plane separation (app, control, data)
 - Centralization (configuration, mgmt)
 - Concept of network application (NEW!)
 - Standard protocols (no lock-in)
- Who's interested
 - Enterprise
 - Network operators
 - Service providers (IaaS, SaaS)
 - Next: mobile cloud

SDN Benefits

- Cost reduction
 - CAPEX (commodity hw, simpler networking gear)
 - OPEX (automation, less manpower)
- Scalability of applications and network services
- Flexibility, cloud bursting on-demand
- Faster roll-out and time to market
- Enabling new services and products

SDN Business-wise

- Super hot, everyone is doing it
 - Startups
 - Enterprise
 - Big networking guys
- Game changer: major market players threatened

SDN Market

- Big market opportunity
 - \$360 million in 2013 to \$3.7 billion by 2016, (IDC)
 - \$198 million in 2012 to \$2.10 billion in 2017 (Market Research)
- Market still forming, currently 3 major players
 - VMware (custom solution)
 - Cisco (custom solution)
 - OpenFlow (open source)

SDN Start-ups

- Funding (as of January 2013)
 - Big Switch Networks: \$45,3M
 - NoviFlow
 - Plexxi: \$48M
 - Midokura: \$5,5M
 - Plumgrid: \$10,7M
 - Pica
 - Embrane: \$27M
 - LineRate Systems
- Exits
 - Nicira by VMware: \$1,26B
 - Contrail by Juniper: \$176M

ARM Server

- Servers now built on x86 chips (Intel has 95%)
- ARM chips becoming a feasible choice
 - More features
 - More performance
 - Better software ecosystem
- The promise?
 - Lower energy consumption, lower OPEX
 - Bargaining power with Intel

ARM Market

- Size
 - \$11B server market (TAM)
- Still forming, not quite there yet
 - 64 bit chips needed
 - A lot of work bringing software on par with x86
 - Existing long-term contracts for Intel chips

Key Players

- Silicon vendors and system providers
 - AMD (64-bit sampling Q1 2014)
 - Applied Micro (X-Gene)
 - Calxeda
 - Cavium (64-bit sampling mid 2014)
 - DELL+Marvell
 - Samsung
 - ... and many more
- Who's interested?
 - Data center operators
 - Business: Google, Facebook, ...
 - Providers: Amazon, EMC, ...
 - Telecomms (less, but still)

Take-aways

- System software is cool
- New trends emerging
 - SDN: paradigm shift, customer education
 - ARM server: cost reduction, easy to understand
- Very dynamic situation, still time to play
- Markets ripe for disruption
- Some of this stuff being done in Krakow!