SONIC ARCHITECT & PLATFORM MANAGEMENT SERVICE

YING XIE (MICROSOFT)

ORIGINAL PRESENTATIONS

- OCP workshop: SONiC Software Archtecture (video, slides) by Rodny Molina from LinkedIn
- OCP workshop: SONiC Platform (video , slides) by Joe LeVeque from Microsoft
- https://www.opencompute.org/events/past-events

AGENDA

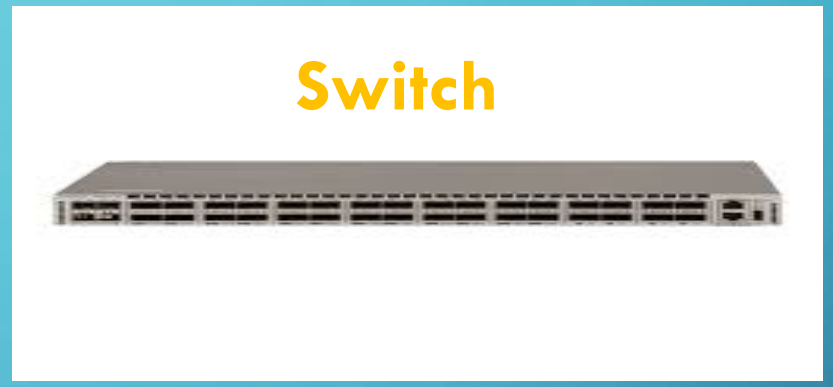
- SONiC nomenclature
- SONiC platform and software architecture
- SONiC platform management API and porting guide

SONIC NOMENCLATURE: PLATFORM V.S HWSKU

Platform	Platform-specific peripheral hardware	ASIC model (sometimes referred to as ASIC platform)	HWSKU
• SONiC shares definition with ONIE • Entire collection of hardware comprising a physical device	• SFP transceivers • Front-panel LEDs • Fans • etc.	• Chipset which implements dataplane • Managed by SAI • Not a part of this presentation	• One particular configuration on a hardware platform • Port breakout • Speed • Port map

SONIC NOMENCLATURE: DATA PLANE AND CONTROL PLANE

- Data plan:
  - ASIC
  - Front panel ports
- Control plane:
  - SONiC o.s.
  - Programming the ASIC
- CPU port



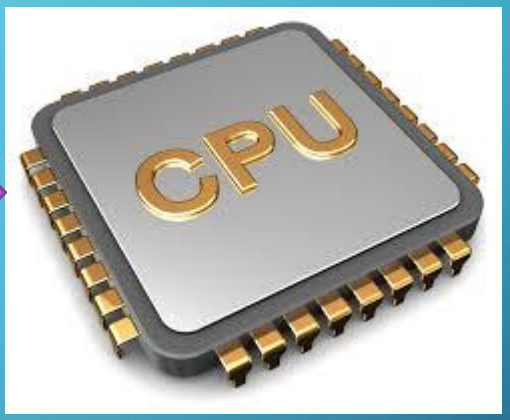
SONiC

ASIC

SONIC SOFTWARE ARCHITECTURE

- Data flow
- Configuration flow
- Software modules
- Processes naming conventions and roles

SOFTWARE ARCHITECTURE: DATA FLOW



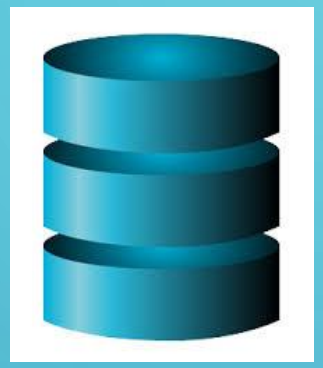
SOFTWARE ARCHITECTURE: CONFIG FLOW

- Source of truth
  - Minigraph
  - Config DB
- Databases
  - Config DB
  - Application DB
  - State DB
  - ASIC DB
  - Counters DB

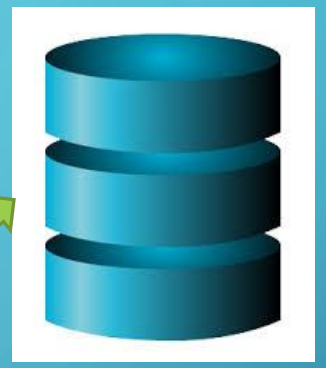
SOFTWARE ARCHITECTURE: CONTAINERIZED SOLUTION AROUND REDIS DATABASE

SONIC DATABASES

CONFIG_DB



APPL_DB



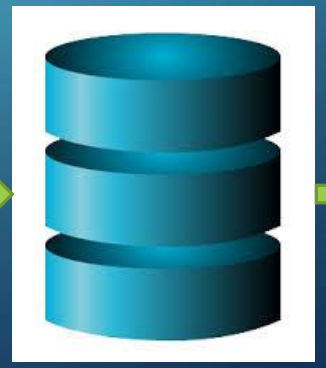
STATE_DB

ASIC

XXX_MgrD

XXX_syncd

orchagent



ASIC_DB

syncd

Linux **Kernel**

SNMP

DHCP RL

PMON

TEAMD

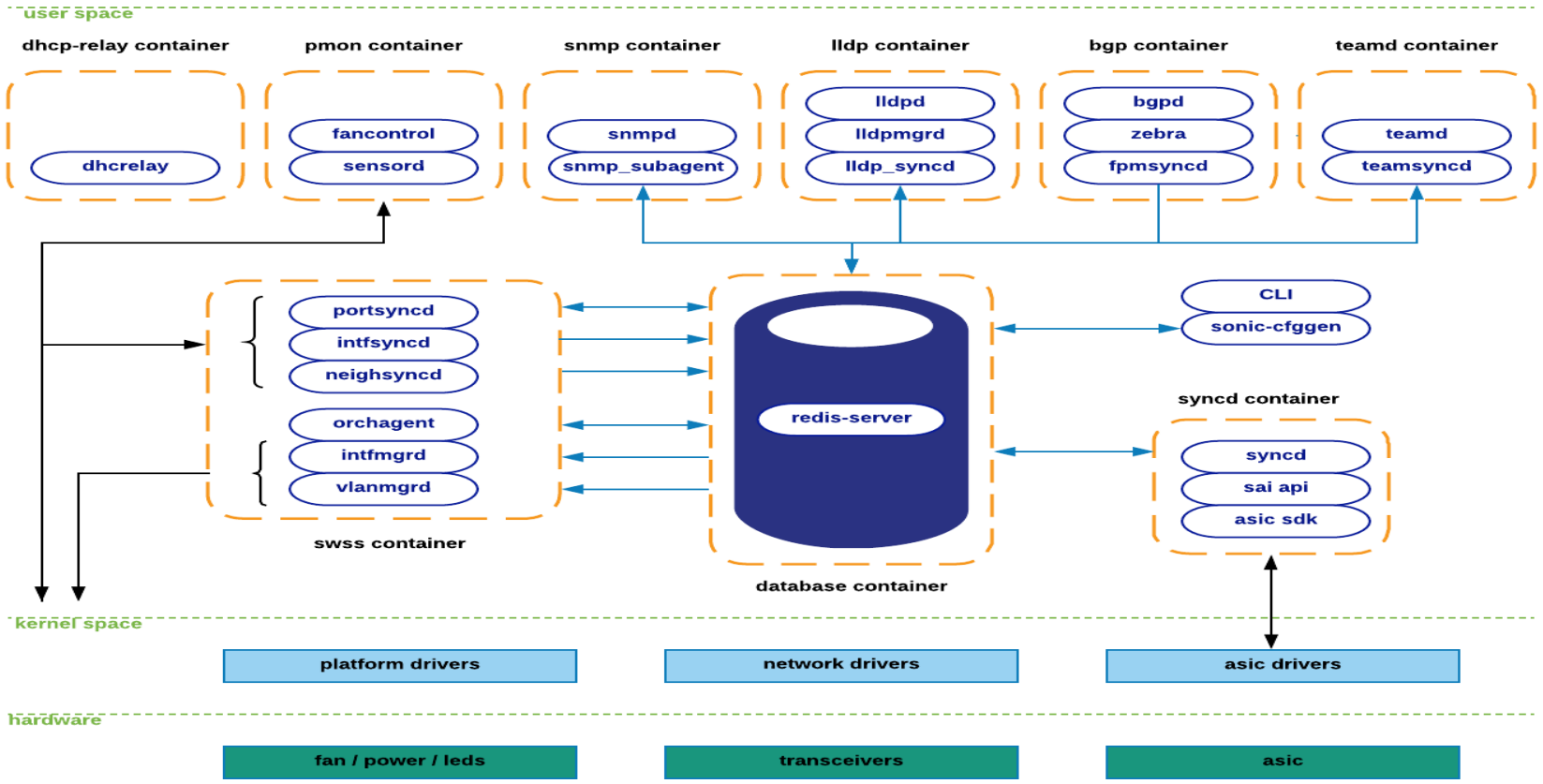
LLDP

BGP

SWSS

SYNCD

ASIC


user space
dhcp-relay container
pmon container
snmp container
lldp container
bgp container
teamd container
dhcrelay
fancontrol
sensord
snmpd
snmp_subagent
lldpd
lldpmgrd
lldp_syncd
bgpd
zebra
fpmsyncd
teamd
teamsyncd
portsyncd
intfsyncd
neighsyncd
orchagent
intfmgrd
vlanmgrd
swss container
redis-server
database container
CLI
sonic-cfggen
syncd container
syncd
sai api
asic sdk
kernel space
platform drivers
network drivers
asic drivers
hardware
fan / power / leds
transceivers
asic

PLATFORM MANAGEMENT SERVICE

- Platform services
- Peripheral devices

PLATFORM PERIPHERAL DEVICES

- Power supply units (PSUs)
- Fan modules
- SFP transceivers
- Front-panel LEDs
- Environment sensors
- System EEPROM
- System status registers

POWER SUPPLY UNITS (PSUS)

- Read:
  - Number of PSU slots
  - PSU presence
  - PSU operational status
  - PSU fan direction
  - PSU fan speed
  - Temperature sensors
- Write:
  - PSU status LED
  - PSU fan speed

FAN MODULES

- Read:
  - Number of fan module slots
  - Fan module presence
  - Fan direction
  - Fan speed
  - Expected fan speed and tolerance
  - Fan module EEPROM data (model #, serial #)
  - Fan interrupt events (remove/add fan module)
- Write:
  - Fan speed
  - Fan module status LED

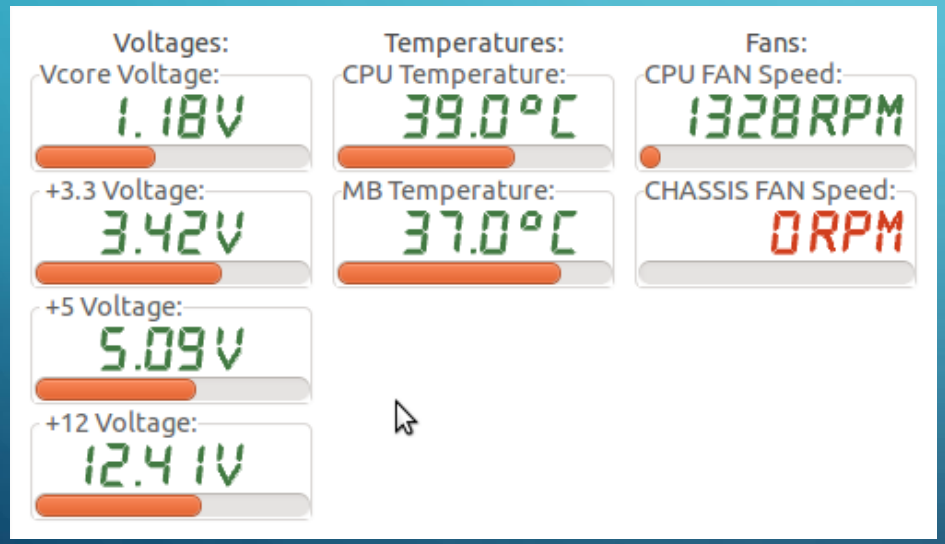
SFP TRANSCEIVERS

- Read:
  - Transceiver presence
  - Transceiver EEPROM data
    - Cable type, vendor, part #
    - Optical monitoring data
    - Temperature / voltage
  - Transceiver low-power mode status
  - Transceiver interrupt events (plug/unplug)
- Write:
  - Reset transceiver
  - Enable/disable low-power mode

FRONT-PANEL LEDS

- Write:
  - Set port LED states
    - SONiC-defined patterns/colors for link speed/breakout modes
  - Set available front-panel status LED states
    - Overall status
    - Fan status
    - PSU status
    - etc.

ENVIRONMENT SENSORS



- Read:
  - All available temperature, voltage and fan speed sensors
  - Monitored by lm-sensors; alarms written to syslog

SYSTEM EEPROM

- Read:
  - Model number
  - Serial number
  - Base MAC address

SYSTEM STATUS REGISTERS

- Read:
  - Determine if previous reboot was caused by hardware
    - Power loss
    - Thermal overload
    - Hardware watchdog
    - etc.

HARDWARE WATCHDOG

- Read:
  - Watchdog status
- Write:
  - Arm watchdog
  - Disarm watchdog

PORTING A NEW PLATFORM TO RUN SONIC

- SAI
- Platform driver(s)
- Platform plugins
- HWSKU definition
- ?
- Profit

https://github.com/Azure/SONiC/wiki/Porting-Guide

DOES THE NEW PLATFORM USE NEW ASIC

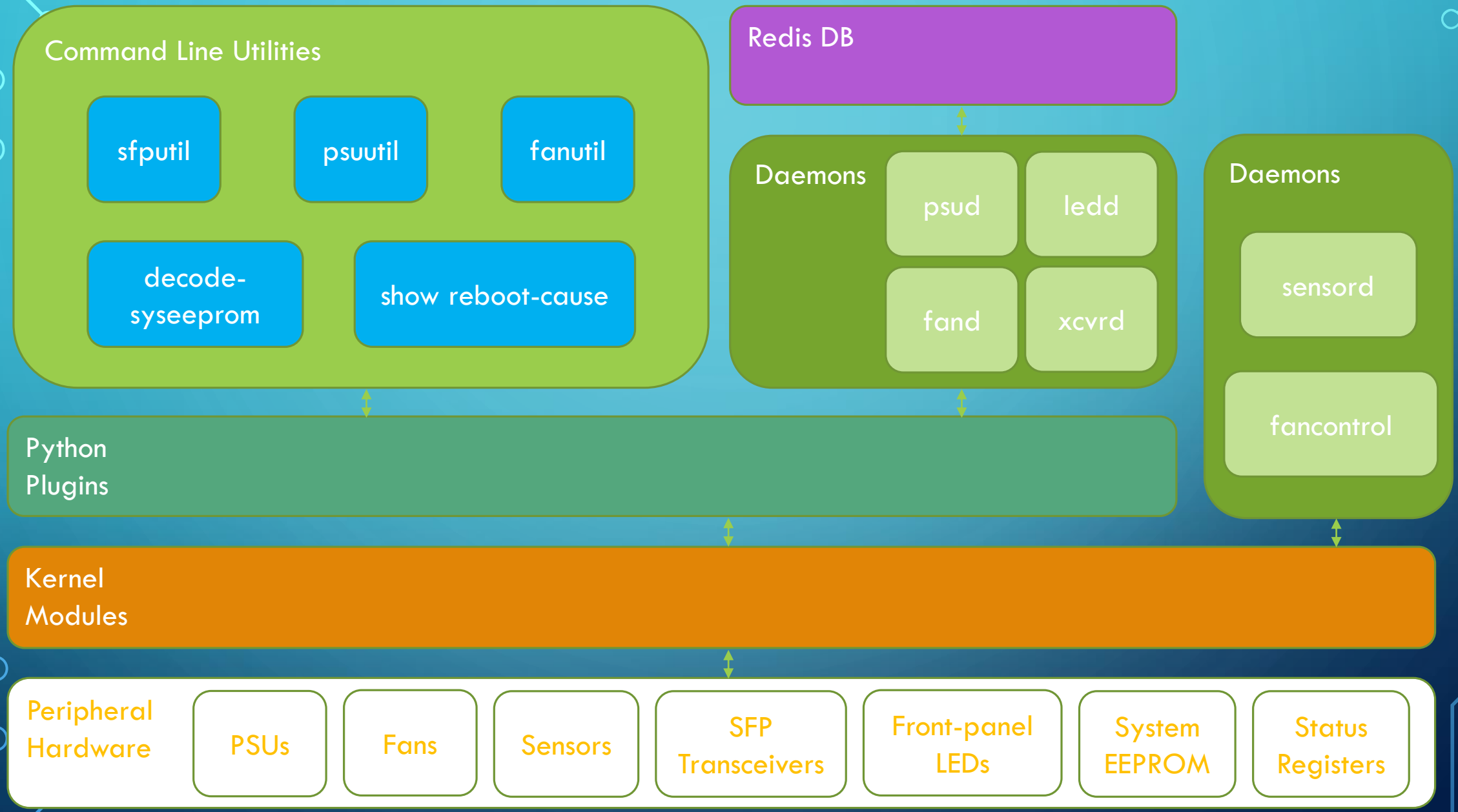
ASIC

sai

SDK

IMPLEMENTATION

Kernel modules	• Expose peripheral hardware registers • Provided by platform vendor
Platform-specific plugins	• Standardized Python API • Vendor implements functions to communicate with exposed hardware
Client applications	• Command line utilities, daemons • Load platform-specific plugins


Command Line Utilities
sfputil
psuutil
fanutil
decode-syseeprom
show reboot-cause
Redis DB
Daemons
psud
ledd
fand
xcvrd
Daemons
sensord
fancontrol
Python Plugins
Kernel Modules
Peripheral Hardware
PSUs
Fans
Sensors
SFP Transceivers
Front-panel LEDs
System EEPROM
Status Registers

Thank You

Q & A