Next Generation Firmware

Open Compute Project

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System Firmware
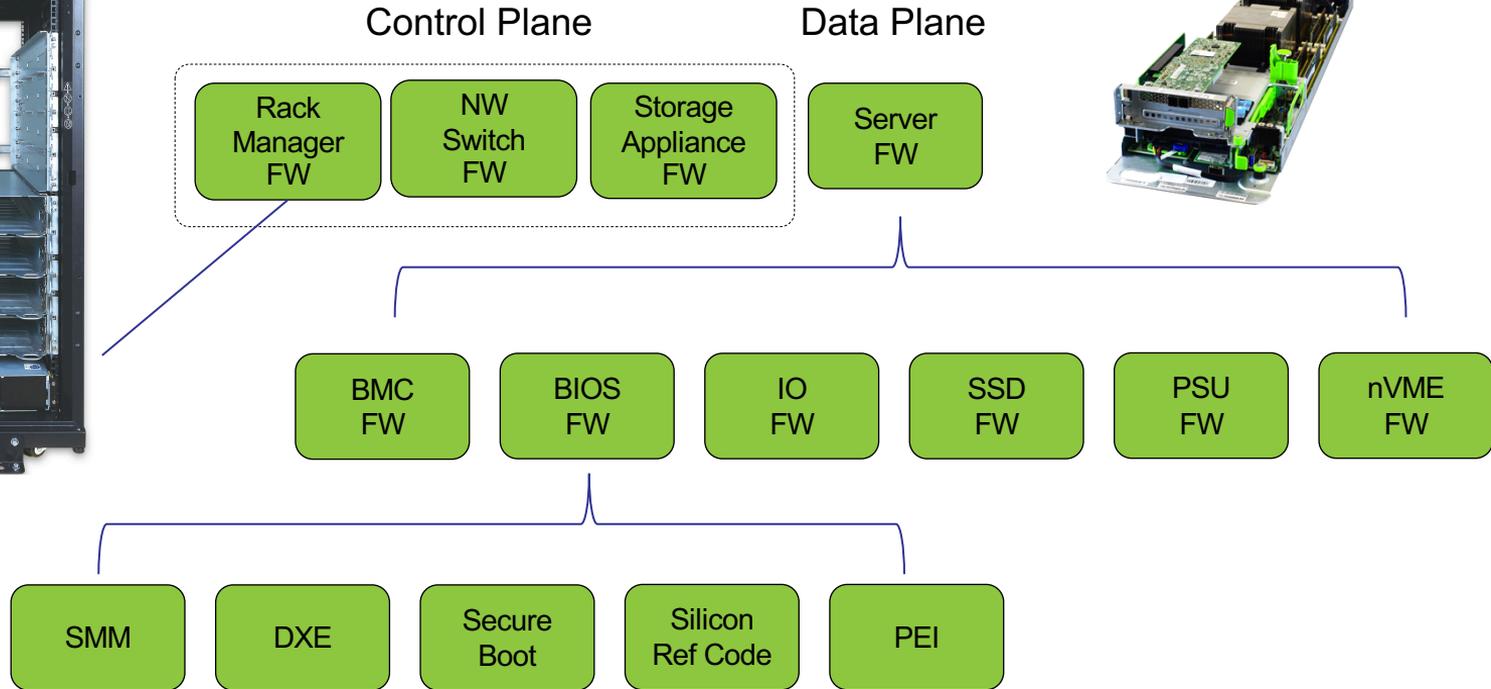
Gives life to the silicon & your system

Goal is to get to the OS – Simple, right?

- Silicon initialization - CPU, DRAM controller, "uncore" logic
- Find and initialize peripherals
- Load target OS
- Provide runtime service availability (e.g. RAS handlers)

Increasing complexity over the years

- Drivers, networking, crypto, application support
- Millions of lines of code
- System **firmware has become an OS**

Where does System Firmware reside?

Control Plane

Data Plane

Rack Manager FW

NW Switch FW

Storage Appliance FW

Server FW

BMC FW

BIOS FW

IO FW

SSD FW

PSU FW

nVME FW

SMM

DXE

Secure Boot

Silicon Ref Code

PEI

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This has created a few problems...

Complex and important part of the software stack

Runs at highest level of privilege

Must integrate into company's SW architecture

Very few engineers looking at it?
- Much of it has remained stubbornly closed
- Not many people trained to work on this code
- Must support multiple generations,
- otherwise creates obsolescence

Real Problem for companies with lots of Hardware

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Opportunity leads to OSF

2016: Talks began for an open source firmware effort

Goals were laid out to enable:

- Innovations and customizations in the system firmware stack

- Closer collaboration with suppliers/vendors

- Better error handling, diagnostics, remediations

- Continuous integration and testing

- Auditable and traceable code, integration with authentication devices.

- Coordination with firmware for ASICs, BMCs, rack management, etc.
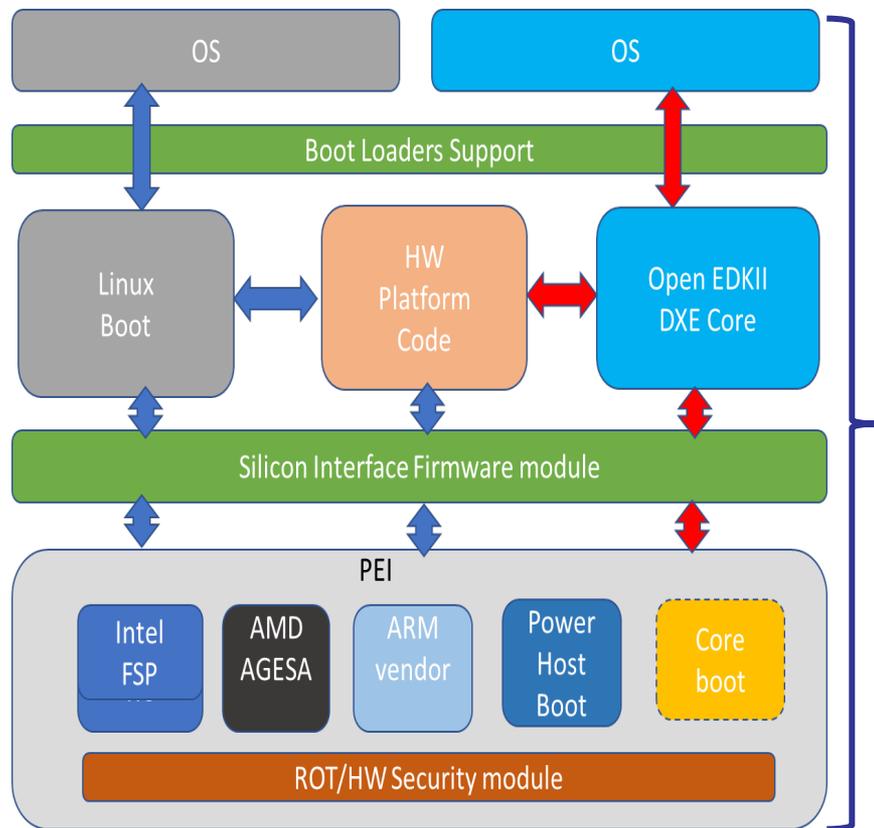
- Open tooling, Faster deployment

OPEN SYSTEMS FIRMWARE

Embedded Software

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Open System Firmware - Vision

Mission: Develop an open source philosophy based 'system firmware' modules, to support different OS and different CPU silicon vendors.

Companies Contributing to OSF development: Intel, Microsoft, Google, Facebook, Lenovo, Two Sigma, Horizon, 9 Elements, Cavium, AMD, IBM, etc.

Work Streams: Open EDKII DXE core, Linux Boot, Core Boot, Intel FSP, AMD AGESA, ARM boot code, HW platform module, Build tools, Automated test support, HW requirements, etc.
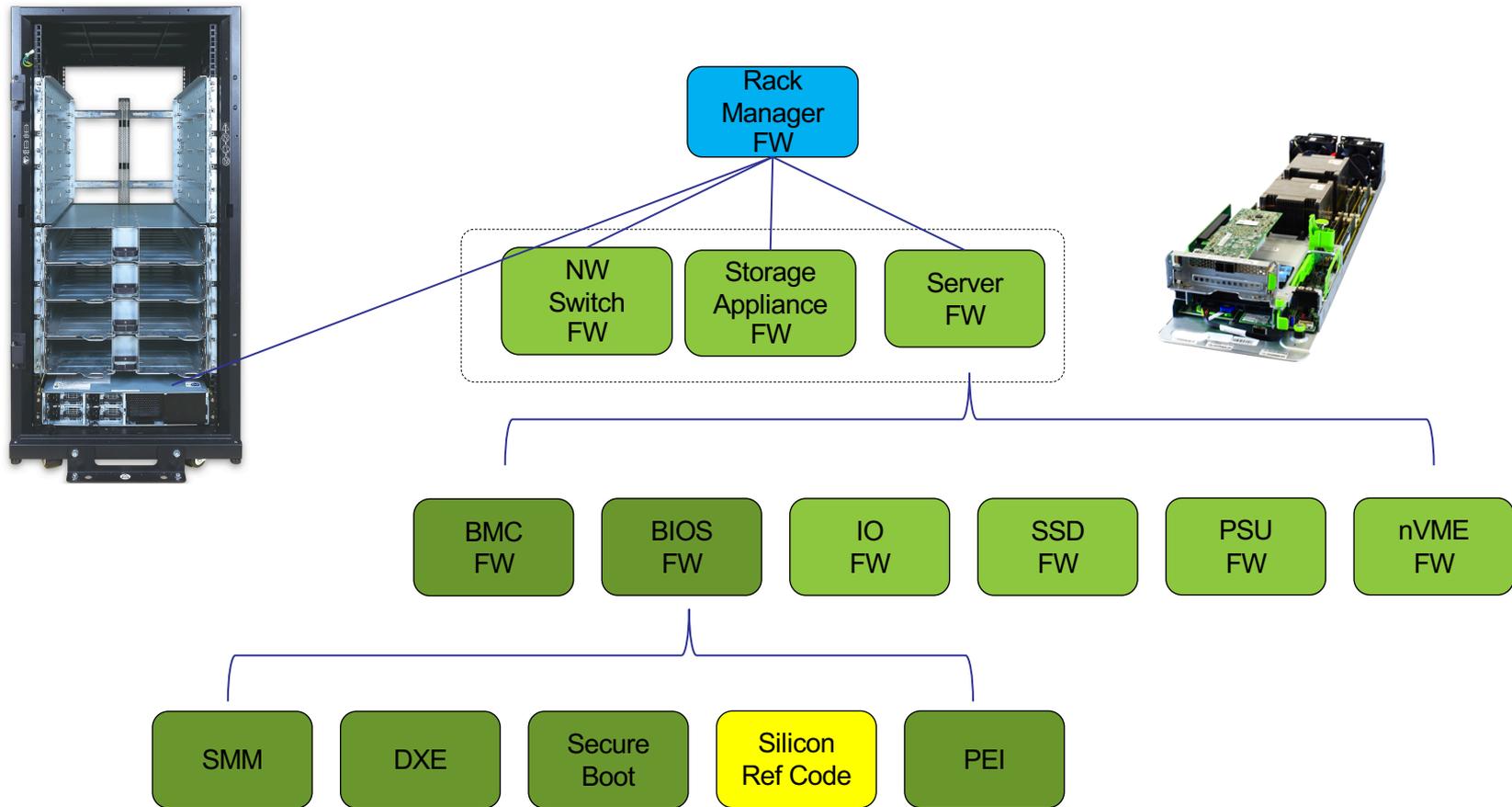
GitHub Repositories Collateral link:
https://github.com/opencomputeproject/OSF

Bi-weekly OSF discussions : Architectural reviews, workstream progress, agenda setting and other collaborative discussions on OSF development.

Consume. Collaborate. Contribute.

Current State of BIOS FW(initialization)

- Developer's Kit will be available from Wiwynn
- LinuxBoot approach had working hardware at OCP Summit in March
- Facebook and Intel have a EDK II POC using Open Rack sled
- Demo planned for OCP Regional Summit in Amsterdam

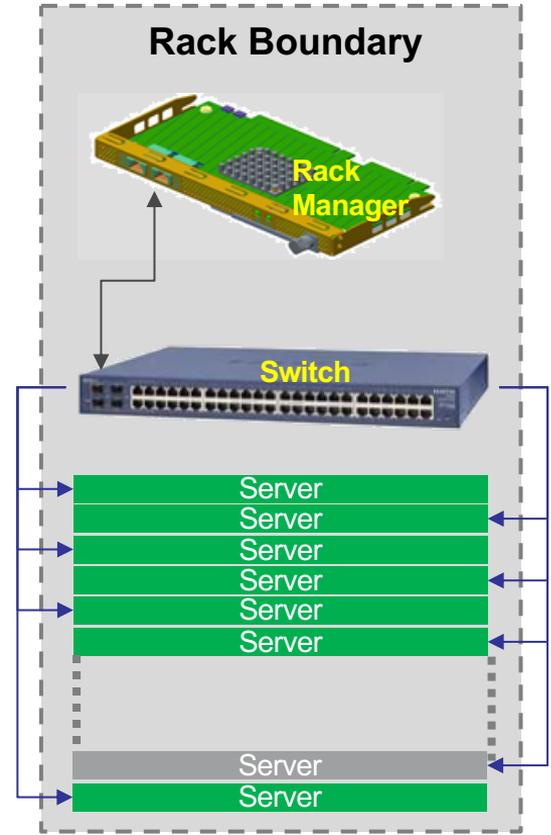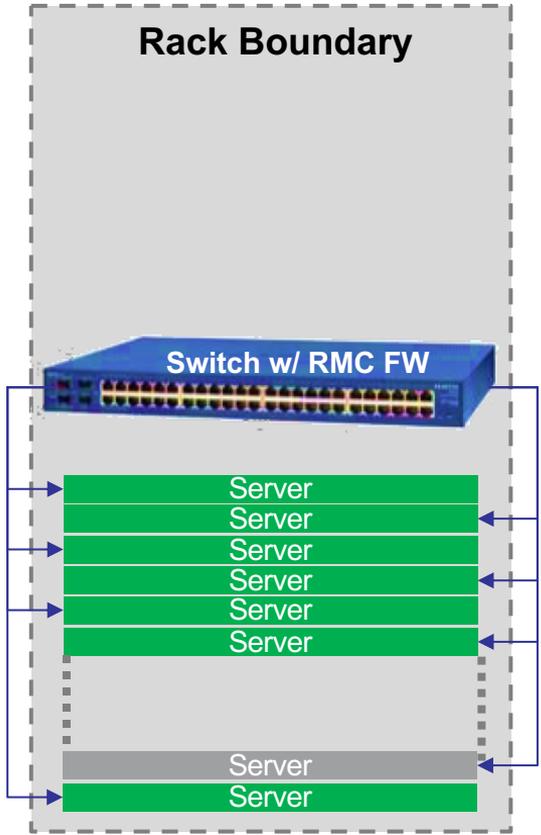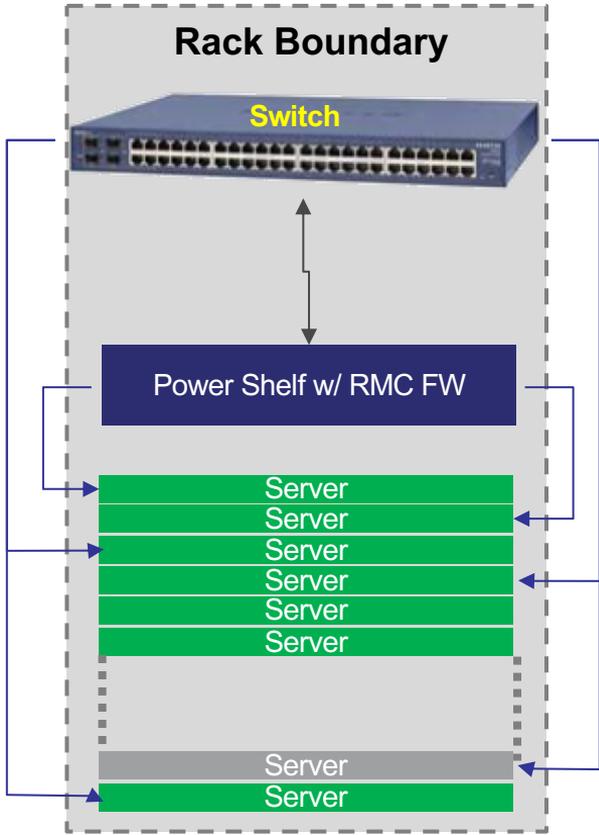- September 26th – Announcement Planned regarding OSF

Rack Manager FW

NW Switch FW

Storage Appliance FW

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Rack Manager Data Traffic Interfaces

Fabric bound
- REDFISH
- SWORDFISH
- SSH
- Legacy REST
- Web GUI

openRMC Rack Manager

Device bound
- REDFISH
- SWORDFISH
- SSH
- IPMI
- I2C

Integrated w/ Power Shelf

Rack Boundary

Switch

Power Shelf w/ RMC FW

Server
Server
Server
Server
Server
Server

Server
Server

Integrated w/Switch

Rack Boundary

Switch w/ RMC FW

Server
Server
Server
Server
Server
Server

Server
Server

Stand Alone

Rack Boundary

Rack Manager

Switch

Server
Server
Server
Server
Server
Server

Server
Server

Current State of RMC FW

- Repo: https://github.com/opencomputeproject/Rack-Manager
- Developer's Kit will be available from Wiwynn
- LinuxBoot approach had working hardware at OCP Summit in March
- Microsoft, Inspur, and Intel have made code contributions
- Demo planned for OCP Regional Summit in Amsterdam

Orchestration Software

Control Plane   Data Plane

| Rack Manager FW | NW Switch FW | Storage Appliance FW | Server FW |

BMC FW | BIOS FW | IO FW | SSD FW | PSU FW | nVME FW

SMM | DXE | Secure Boot | Silicon Ref Code | PEI

Consume. Collaborate. Contribute.

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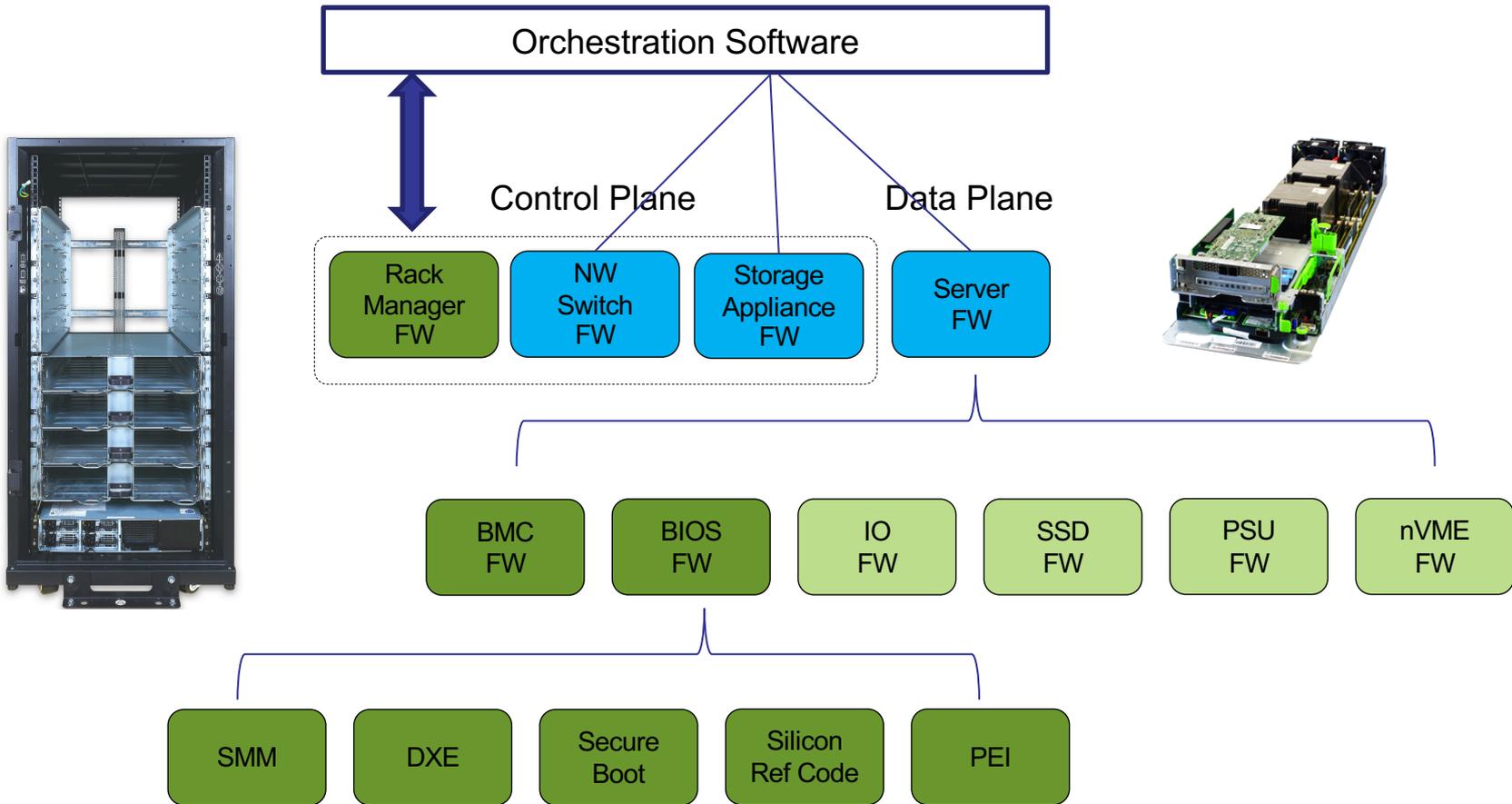
OCP HW Management Strategy

Describe → *Prescribe* → *Test* → **OCP Recognized Products**

OCP Redfish Profiles

Redfish Interop Validator
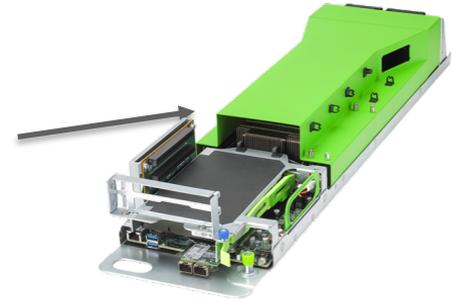
End Goal: A Secure, maintainable platform with API's to keep pace with open source software needs.

Open Source:
BMC , BIOS, Rack Resources across all the IT equipment

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Thank You

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