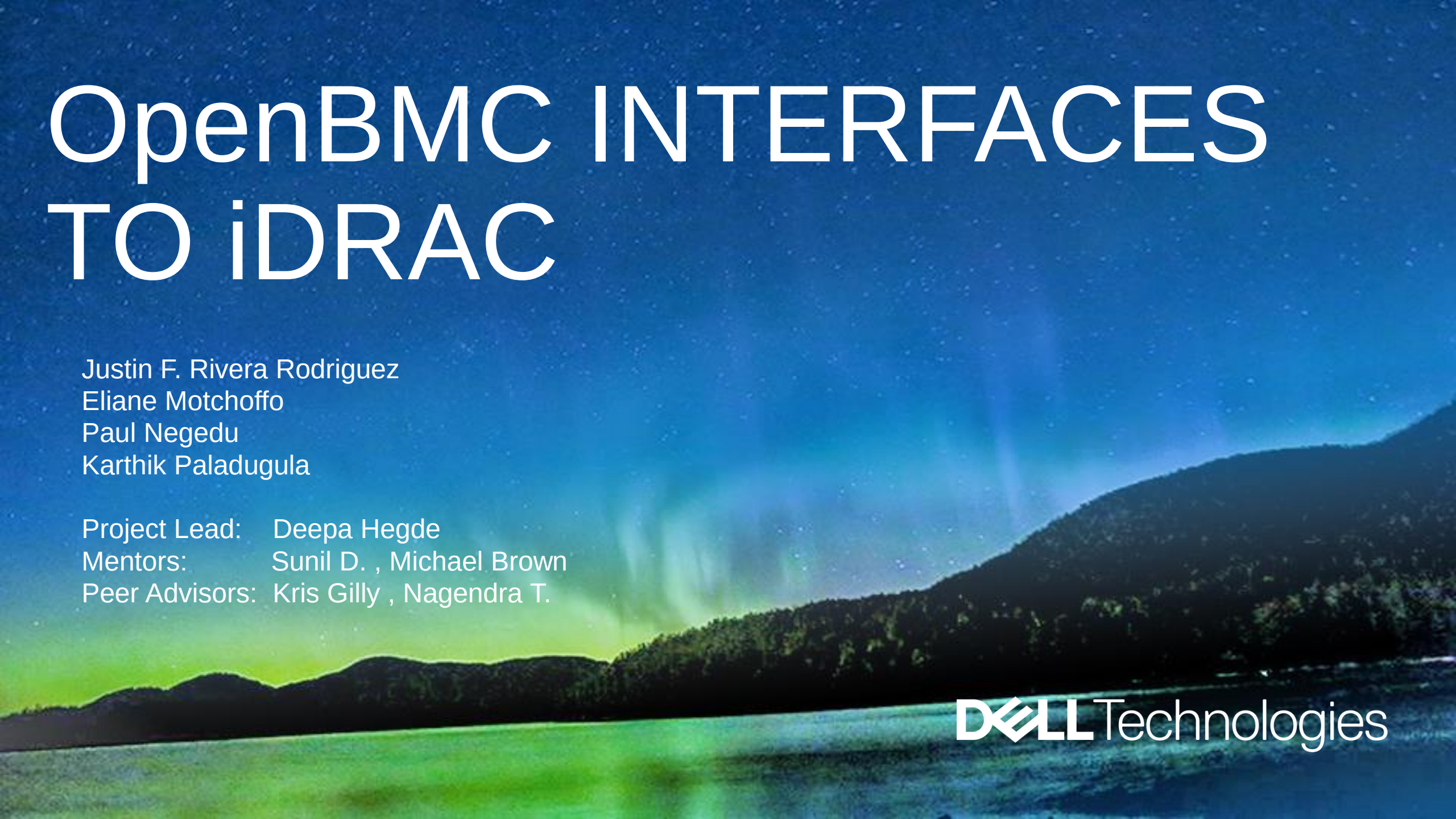
OpenBMC INTERFACES TO iDRAC

Justin F. Rivera Rodriguez
Eliane Motchoffo
Paul Negedu
Karthik Paladugula

Project Lead: Deepa Hegde
Mentors: Sunil D. , Michael Brown
Peer Advisors: Kris Gilly , Nagendra T.



Agenda



Team Introductions



The Problem



Solution



Design



Future Goals



Q&A

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- Member of IEEE-CAS Committee
- Loves sports and technology
- Proudest accomplishment this summer was working as a Dell intern while taking online classes and with a great outcome.



Justin F. Rivera Rodriguez
University of Puerto Rico Mayaguez Campus
Computer Engineering '23

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- Loves to code, play basketball and travel
- Member of BNA
- Member of IEEE
- Returning intern at DELL



Paul Negedu
University of Kansas
Electrical Engineering '22

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- Loves hiking and traveling
- Undergraduate Research Assistant
- Member of BNA
- One of my favorite Intern activity this summer was the P&O Hackathon



Eliane Motchoffo
University of Mass. Lowell
Computer Science '22

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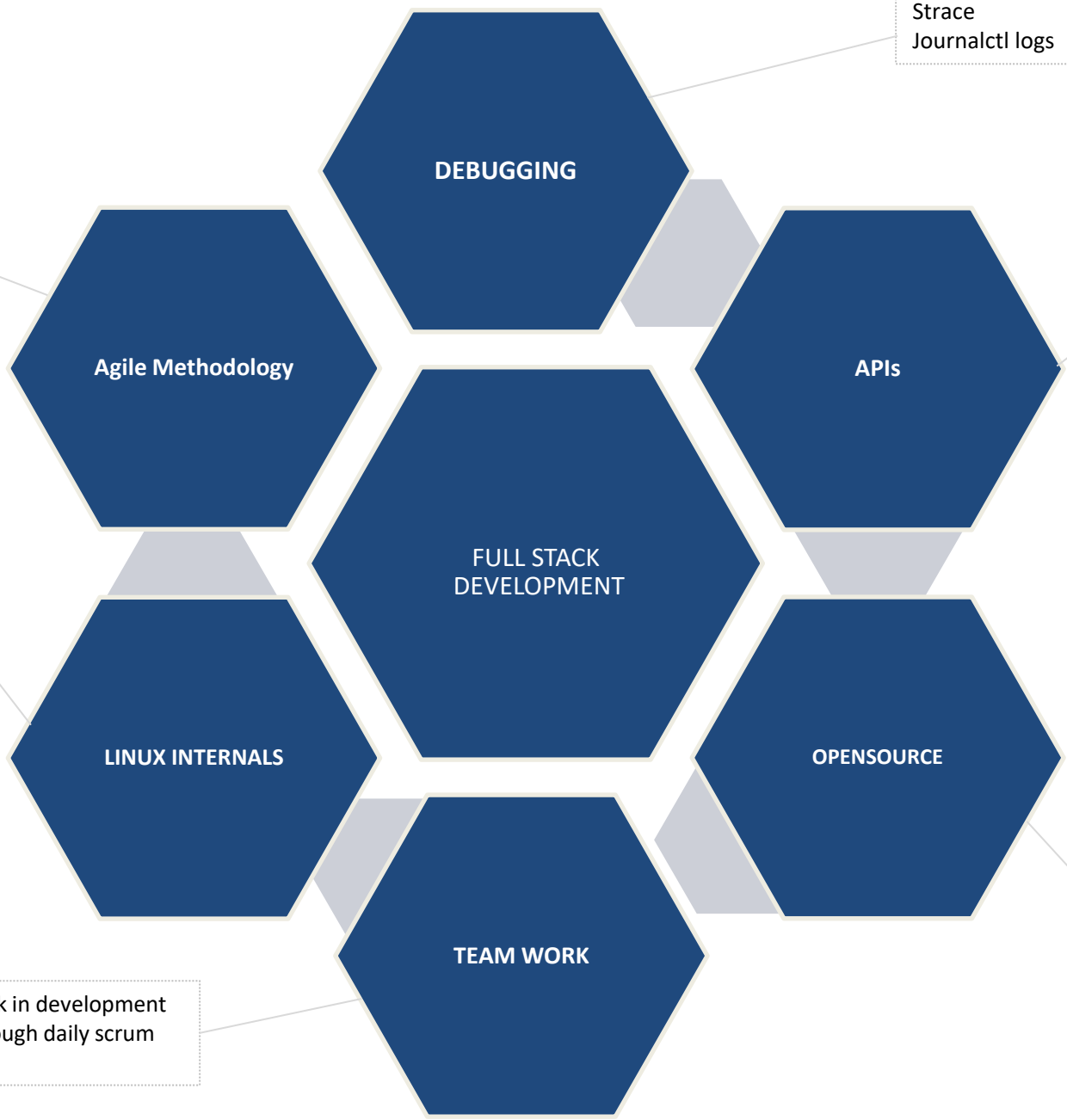
- Love to dance, member of GT Qurbani
- Marketing Director of SASE (Society of Asian Scientists and Engineers)



Karthik Paladugula
Georgia Institute of Technology
Computer Engineering '22

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Key Learnings



Printf
Strace
Journalctl logs

Create Epics, Stories and tasks
JIRA
Attend daily scrums
Story and task Estimation

RESTful API(get, post, put, patch, delete)
Interface for HTTP
JSON payload response with key value pairs

Linux command line interface (CLI)
Dbus communication protocol

github
Apt-install
Issue tracking
Dependency management

Coordinated work in development team setting through daily scrum meetings

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Problem statement

Customers want consistency in the management and orchestration of their miscellaneous environment

The OpenBMC Project community supports an open source BMC firmware stack that works across heterogeneous systems.



Run OpenBMCWeb on IDRAC

Map IDRAC Data to dbus objects

Use IDRAC SDK to deliver a container for OpenBMCWeb

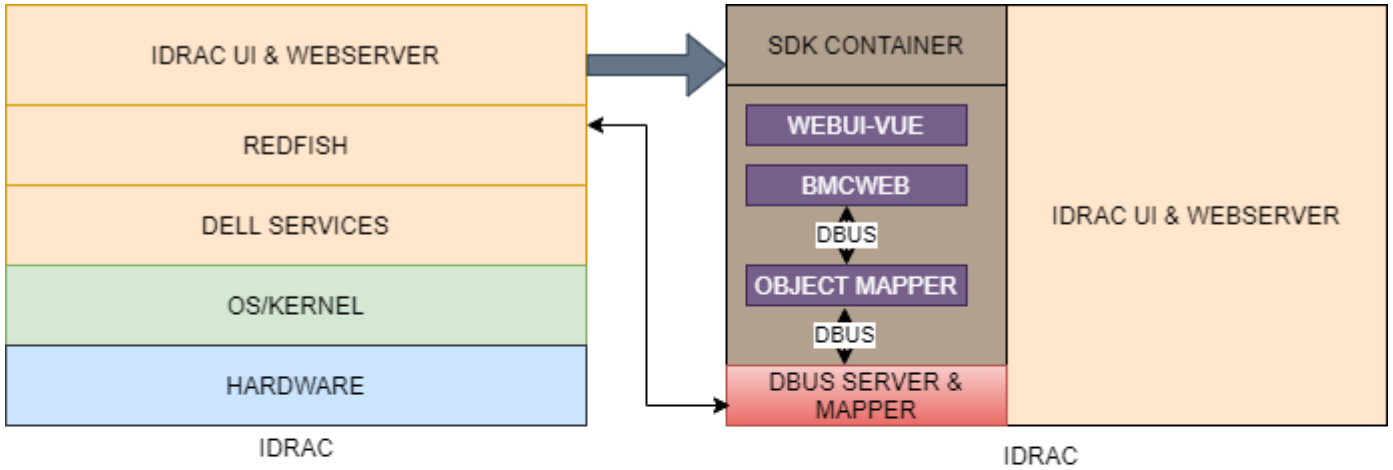
Solution

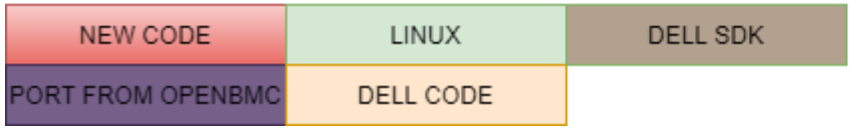
Phase I

- Used open-source repos to create dbus objects.
- Leverage OpenBMC webserver and webui-vue which are available as open source to replace iDRAC UI and backend.
- Use IDRAC Redfish to source manageability data.

Phase II

- *Use iDRAC SDK to build an installable plugin which contains the web server and UI.*

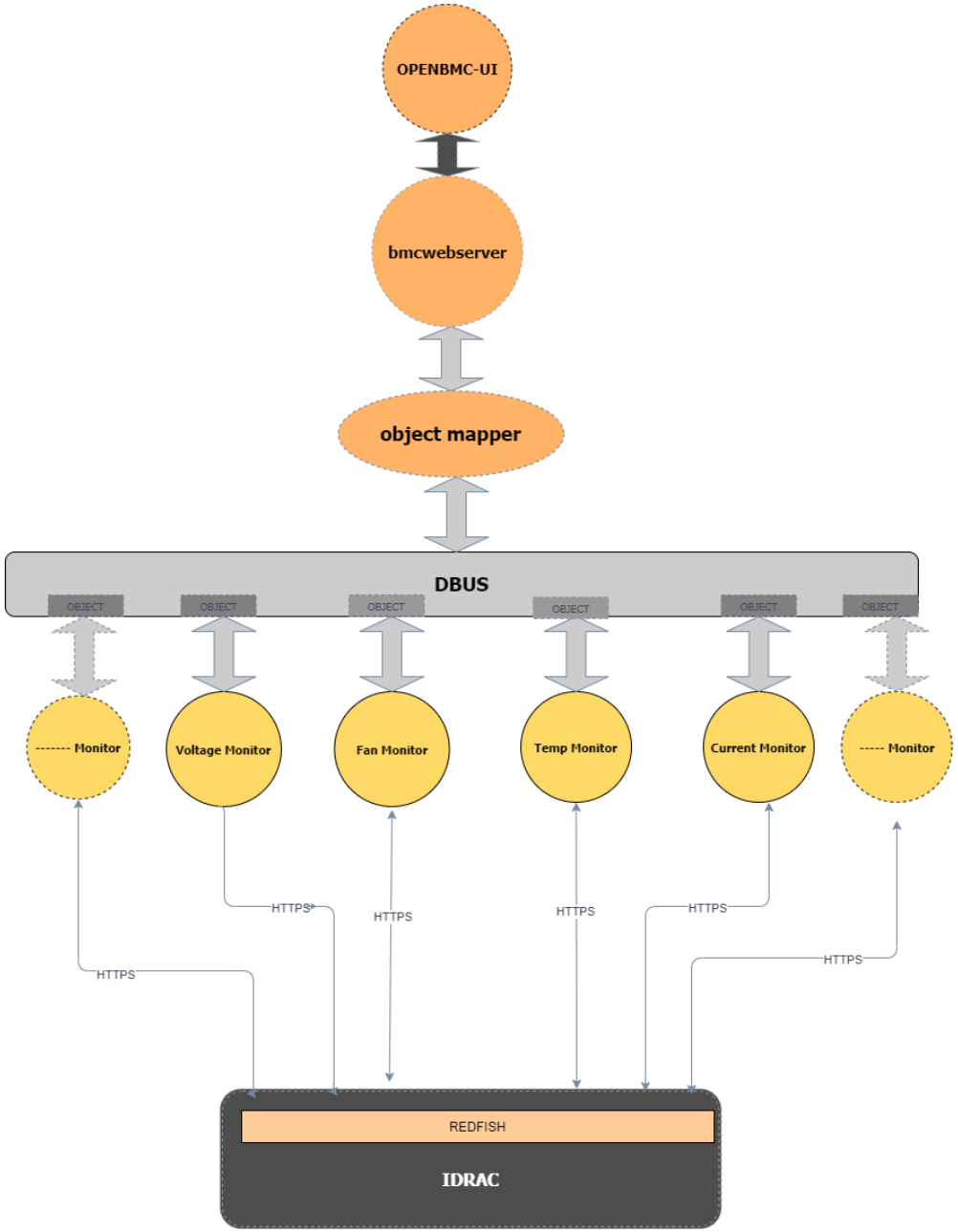




(sailfish)

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Architecture



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OpenBMC Interfaces for iDRAC

Provides an installable OpenBMC Web UI plugin for iDRAC



Benefits:

- Customers have a choice to use OpenBMC UI or traditional iDRAC UI
- Faster debugging and feature velocity
- Simplifies integration and porting of modular components that are available
- Support from the online community

Customers

- OEM, ODM and end users

Growth

- Open-source community

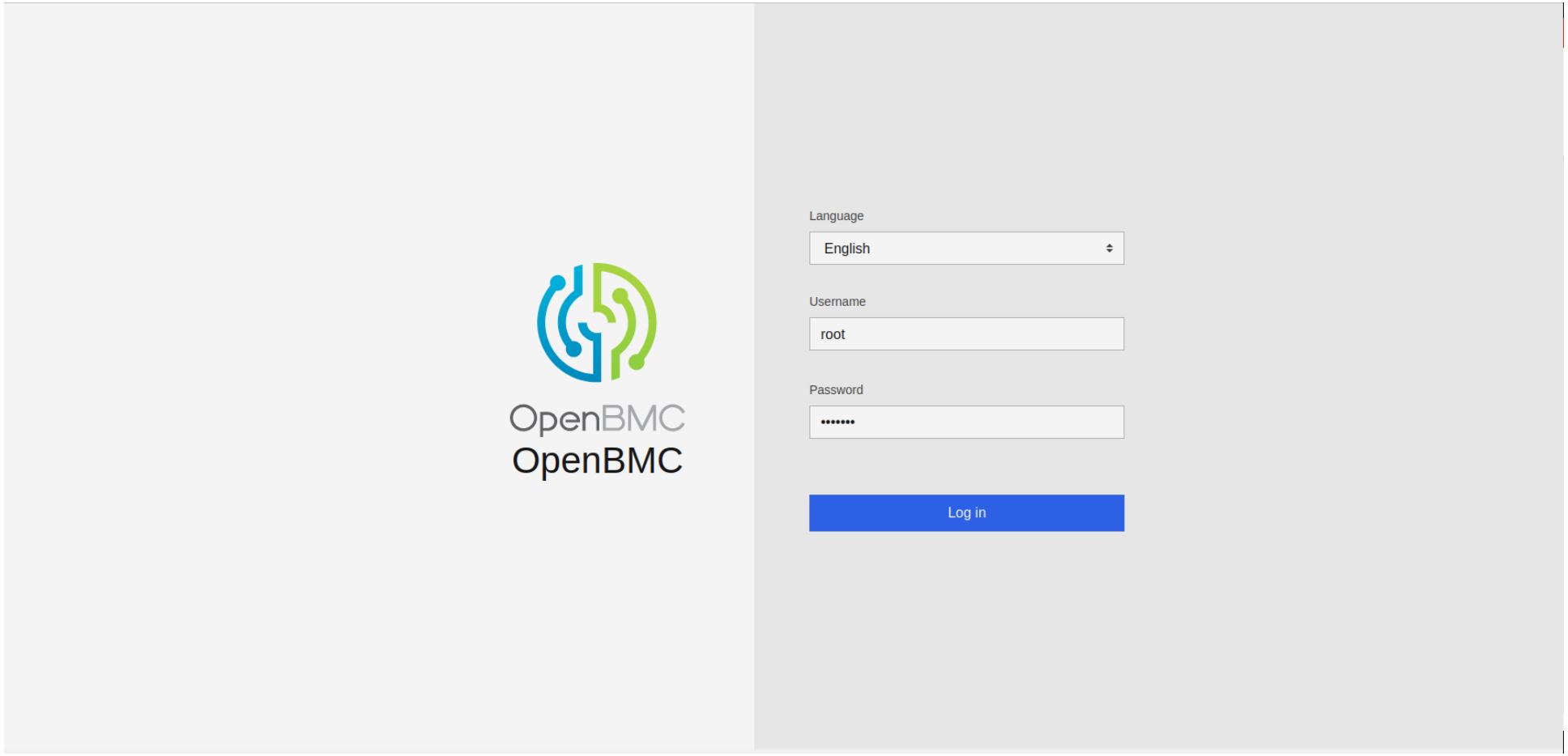
WebUI & Bmcweb

- OpenBMC’s user interface is built on vue.js
- BMC Web is an embedded webserver for openbmc developed in C++
- BMC Web provides authorization and supports the redfish stack



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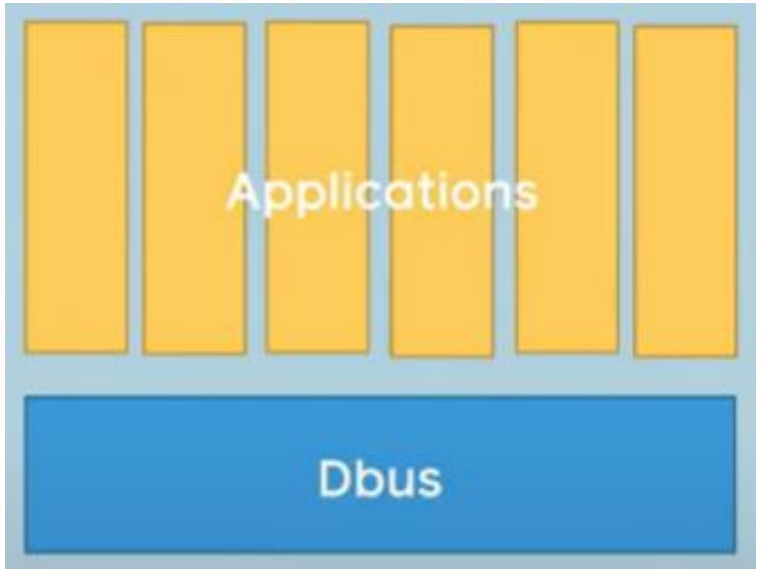
WebUI Overview



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DBUS

- OpenBMC is organized as many small processes communicating over d-bus.
- Some processes are d-bus servers(sensorMonitors, inventory)
- Others are clients(BMCWeb, IPMI)



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Dbus object introspect



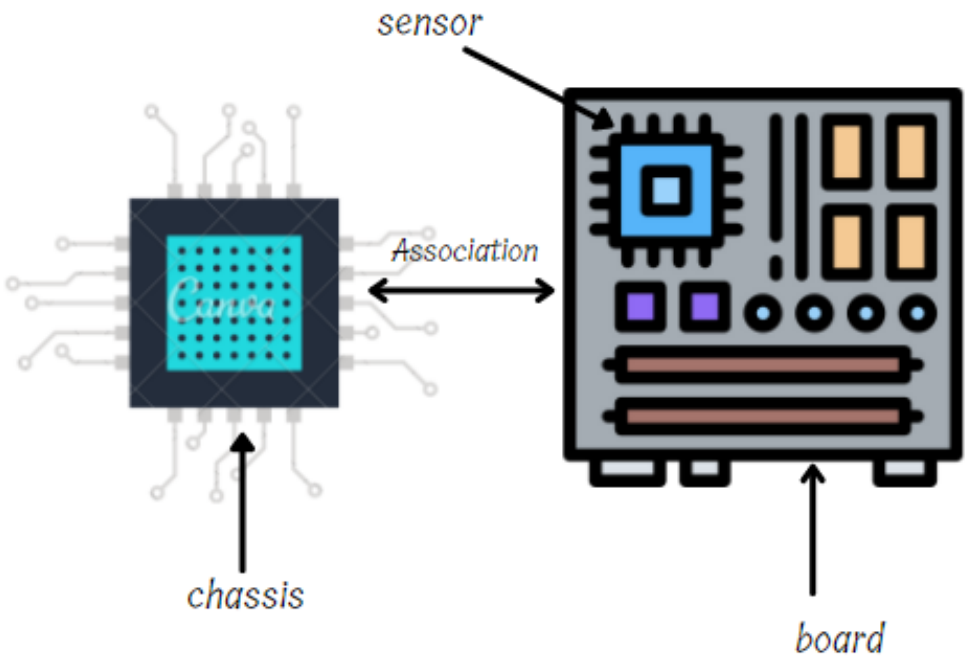

```
{
    "@odata.context": "/redfish/v1/$metadata#Sensor.Sensor",
    "@odata.id": "/redfish/v1/Chassis/System.Embedded.1/Sensors/CPU1Temp",
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "Name": "CPU1 Temp",
    "Id": "CPU1Temp",
    "Description": "Instance of Sensor Id",
    "ReadingType": "Temperature",
    "ReadingUnits": "Cel",
    "Status": {
        "Health": "OK",
        "State": "Enabled"
    },
    "Reading": 34.0,
    "PhysicalContext": "CPU",
```


```
xyz.openbmc_project.Association.Definitions   interface -         -
.Associations                                 property  a(sss)    1 "bmc" "all_sensors" "/xyz/openbmc_pro…
xyz.openbmc_project.Sensor.Threshold.Critical interface -         -
.CriticalAlarmHigh                            property  b         false
.CriticalAlarmLow                             property  b         false
.CriticalHigh                                 property  d         107
.CriticalLow                                  property  d         nan
.CriticalHighAlarmAsserted                    signal    d         -
.CriticalHighAlarmDeasserted                  signal    d         -
.CriticalLowAlarmAsserted                     signal    d         -
.CriticalLowAlarmDeasserted                   signal    d         -
xyz.openbmc_project.Sensor.Threshold.Warning  interface -         -
.WarningAlarmHigh                             property  b         false
.WarningAlarmLow                              property  b         false
.WarningHigh                                  property  d         97
.WarningLow                                   property  d         nan
.WarningHighAlarmAsserted                     signal    d         -
.WarningHighAlarmDeasserted                   signal    d         -
.WarningLowAlarmAsserted                      signal    d         -
.WarningLowAlarmDeasserted                    signal    d         -
xyz.openbmc_project.Sensor.Value              interface -         -
.MaxValue                                     property  d         inf
.MinValue                                     property  d         -inf
.Unit                                         property  s         "xyz.openbmc_project.Sensor.Value.Unit…
.Value                                        property  d         34
```


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Object Mapper and Association

- OpenBMC needs to know the physical relationship between objects.
- ObjectMapper is the application which keeps track of the associations.



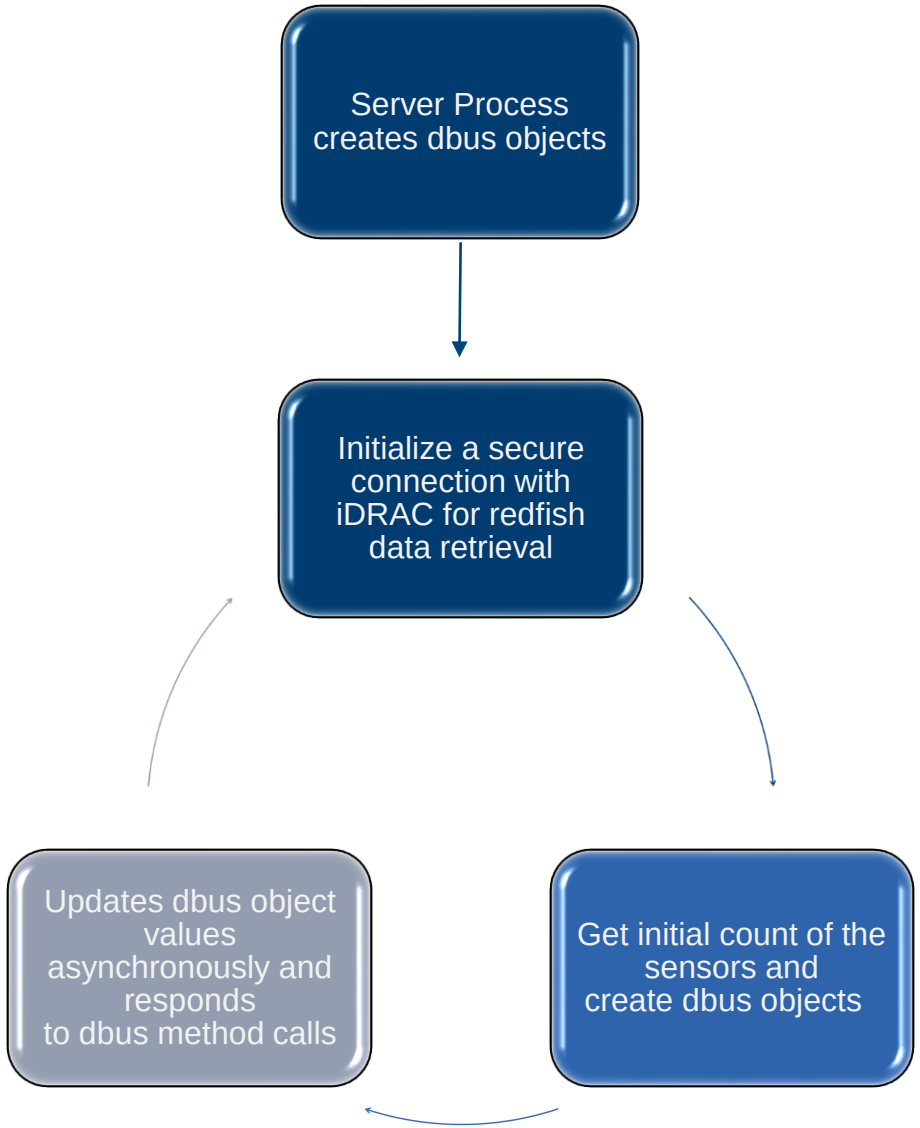
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Object Mapper tree

```
eliane@eliane-VirtualBox:~$ sudo busctl --no-p tree xyz.openbmc_project.ObjectMapper
└─/xyz
  └─/xyz/openbmc_project
    ├─/xyz/openbmc_project/inventory
    │ ├─/xyz/openbmc_project/inventory/chassis
    │ │ └─/xyz/openbmc_project/inventory/chassis/all_sensors
    │ └─/xyz/openbmc_project/inventory/system
    │   └─/xyz/openbmc_project/inventory/system/all_sensors
    ├─/xyz/openbmc_project/object_mapper
    └─/xyz/openbmc_project/sensors
      ├─/xyz/openbmc_project/sensors/power
      │ └─/xyz/openbmc_project/sensors/power/SystemPowerControl
      │   └─/xyz/openbmc_project/sensors/power/SystemPowerControl/chassis
      └─/xyz/openbmc_project/sensors/voltage
        ├─/xyz/openbmc_project/sensors/voltage/CPU1MEMABCDVR
        │ └─/xyz/openbmc_project/sensors/voltage/CPU1MEMABCDVR/bmc
        ├─/xyz/openbmc_project/sensors/voltage/CPU1MEMEFGHVR
        │ └─/xyz/openbmc_project/sensors/voltage/CPU1MEMEFGHVR/bmc
        ├─/xyz/openbmc_project/sensors/voltage/CPU1VCOREVR
        │ └─/xyz/openbmc_project/sensors/voltage/CPU1VCOREVR/bmc
        └─/xyz/openbmc_project/sensors/voltage/PS1Voltage
          └─/xyz/openbmc_project/sensors/voltage/PS1Voltage/bmc
```

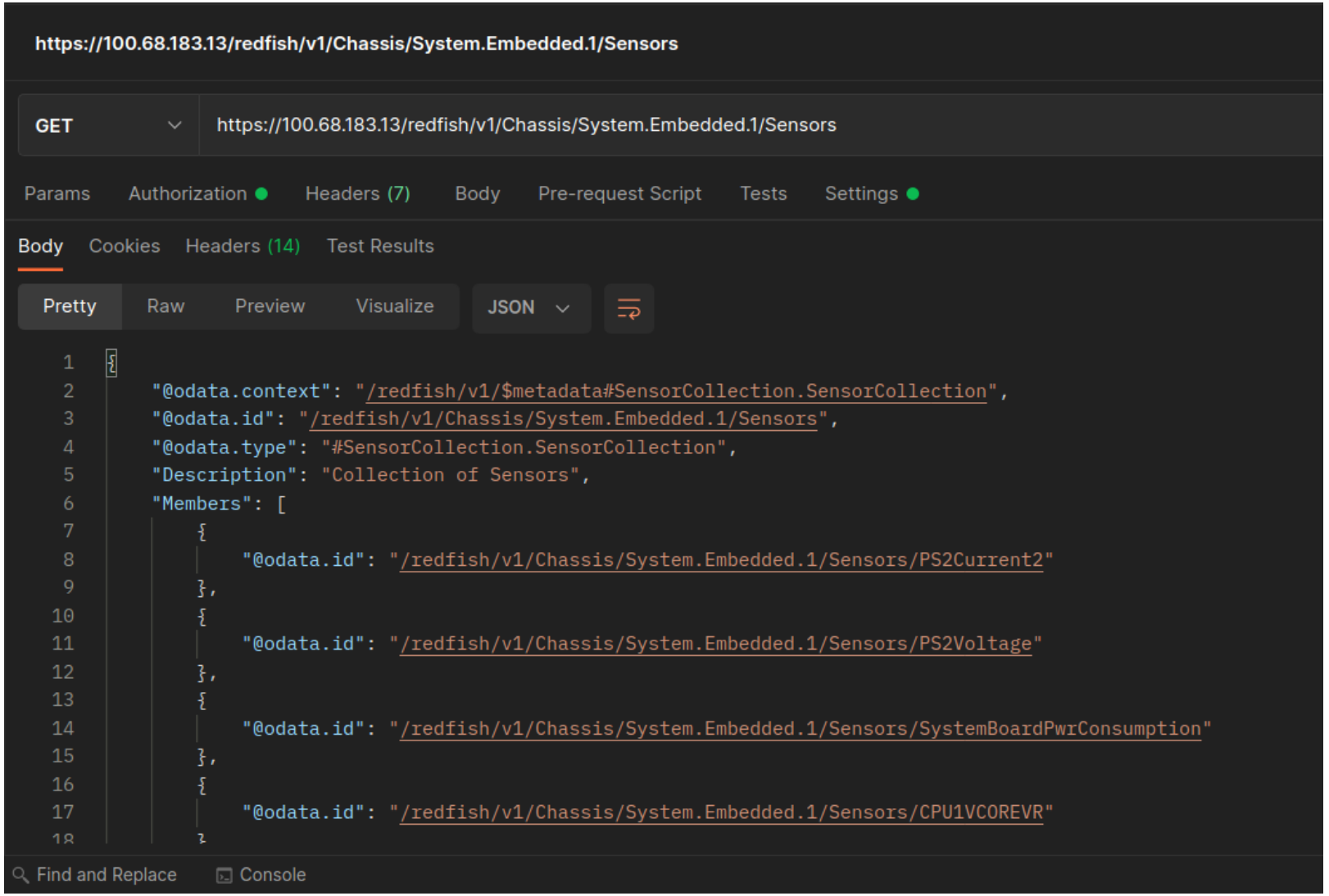

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Redfish data retrieval



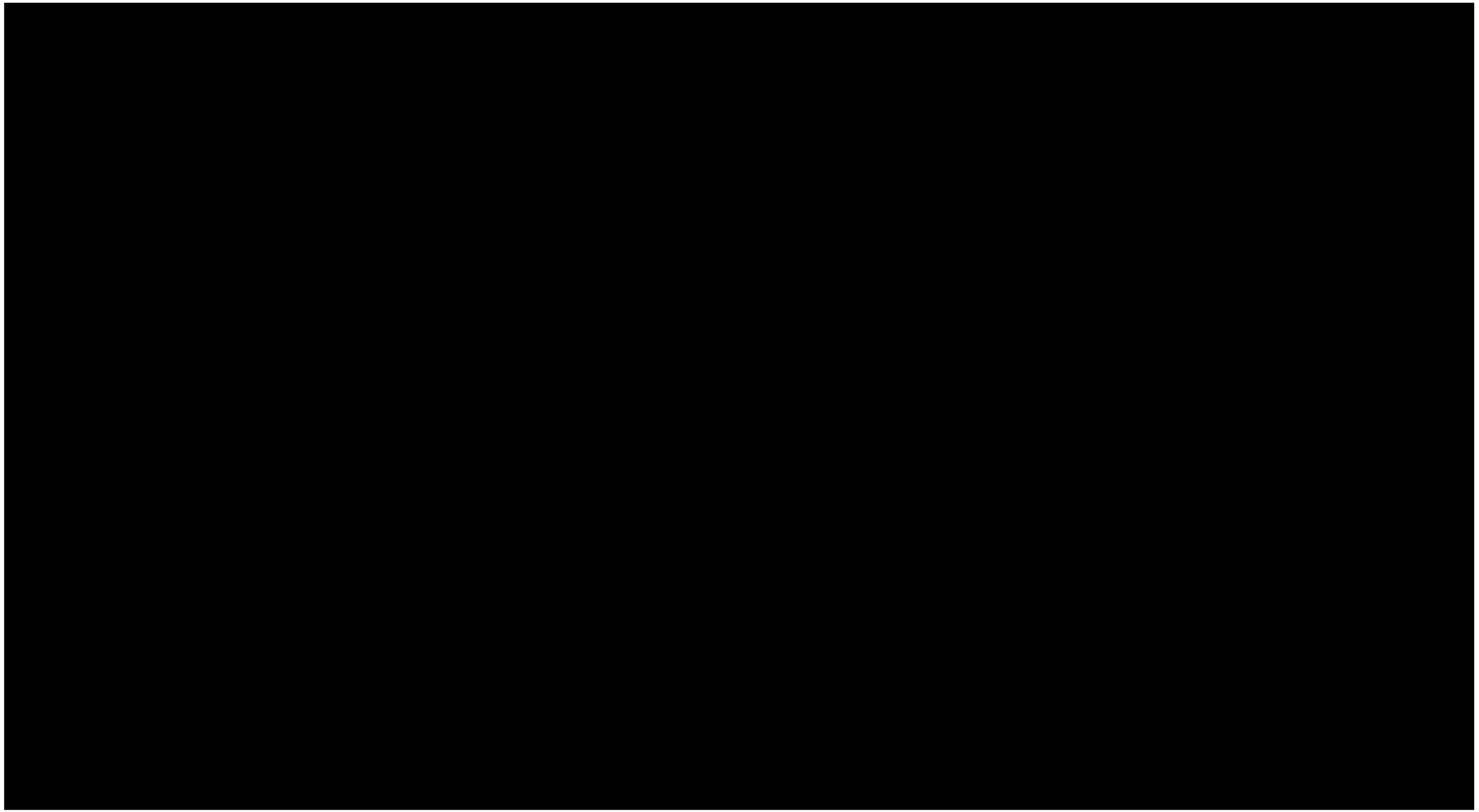
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Redfish Request



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DEMO



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Future Goals

- Containerize OpenBMC web server and User Interface

- Opensource project on github



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