



A reference BMC

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OpenBMC

Devils in the Details

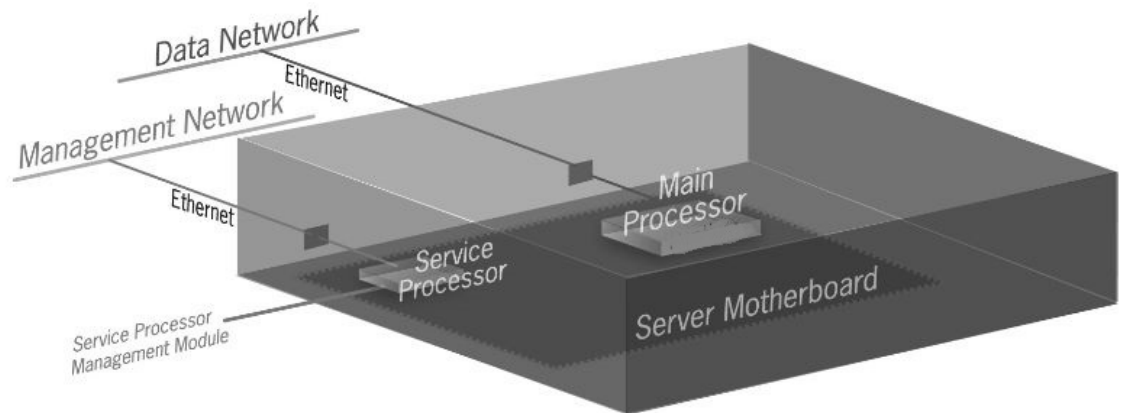






What is a BMC?

- BMC – Baseboard Management Controller
 - System On a Chip
 - Manages Procs, DIMMs, Fans, Power Supplies, etc
 - Reports externally to management software
 - Data and Management separate operators



What is OpenBMC

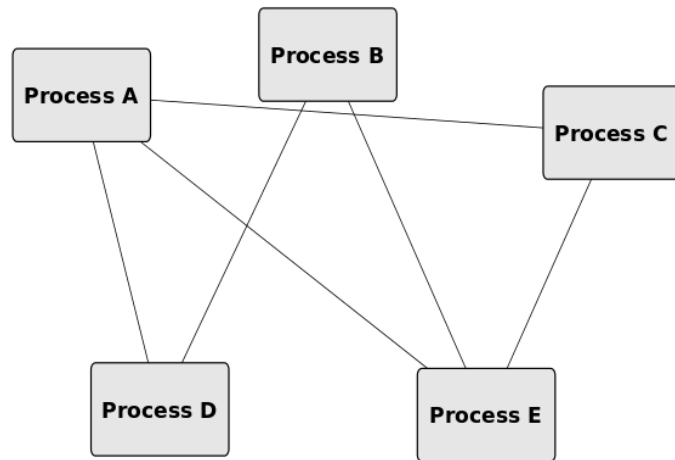
- Provides simplified management of:
 - Environment
 - Inventory
 - Sensors and event logs
- Based on OpenEmbedded technologies built via Yocto
- Embedded Linux stack
 - Linux Kernel 4.6, Yocto 2.1, python, SSH
- Applications communicate via D-Bus
- Users communicate via REST

What is OpenBMC

- 100% compatible with OpenPOWER Hostboot/Opal
 - Aka BIOS
 - <https://github.com/open-power/op-build>
- Can simply be a reference implementation
- Currently runs on...
 - AST2400 and AST2500 BMC hardware

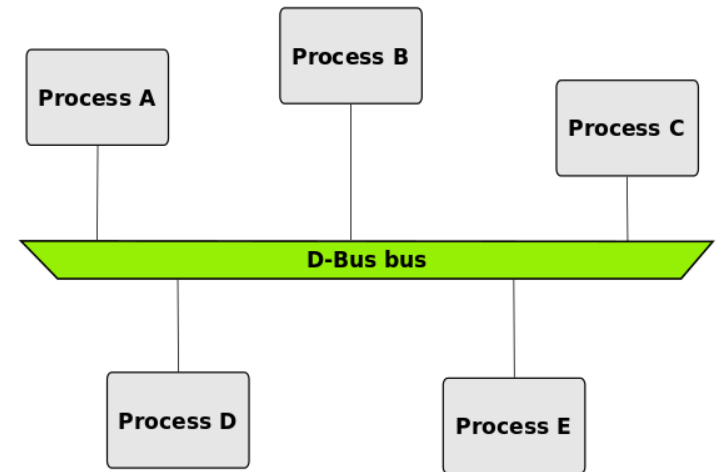
What the heck is D-Bus

inter-process communication (IPC) and remote procedure call (RPC) mechanism that allows communication between multiple computer programs (that is, processes) concurrently running on the same machine



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Without D-Bus

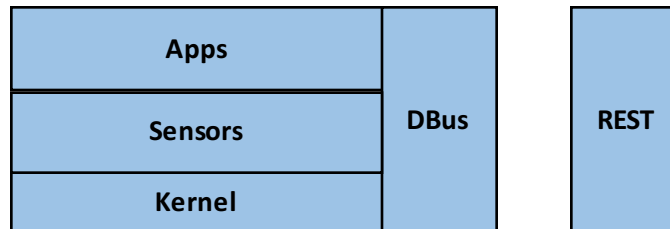
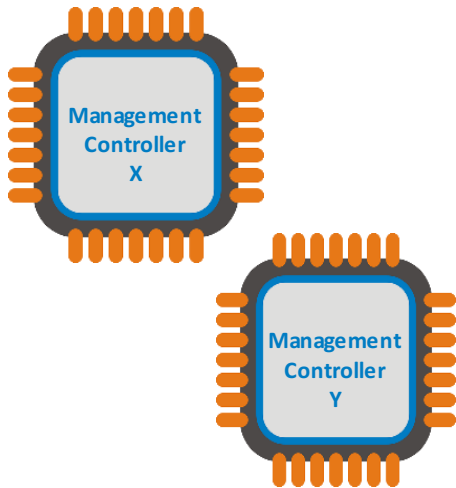


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With D-Bus

Features of OpenBMC

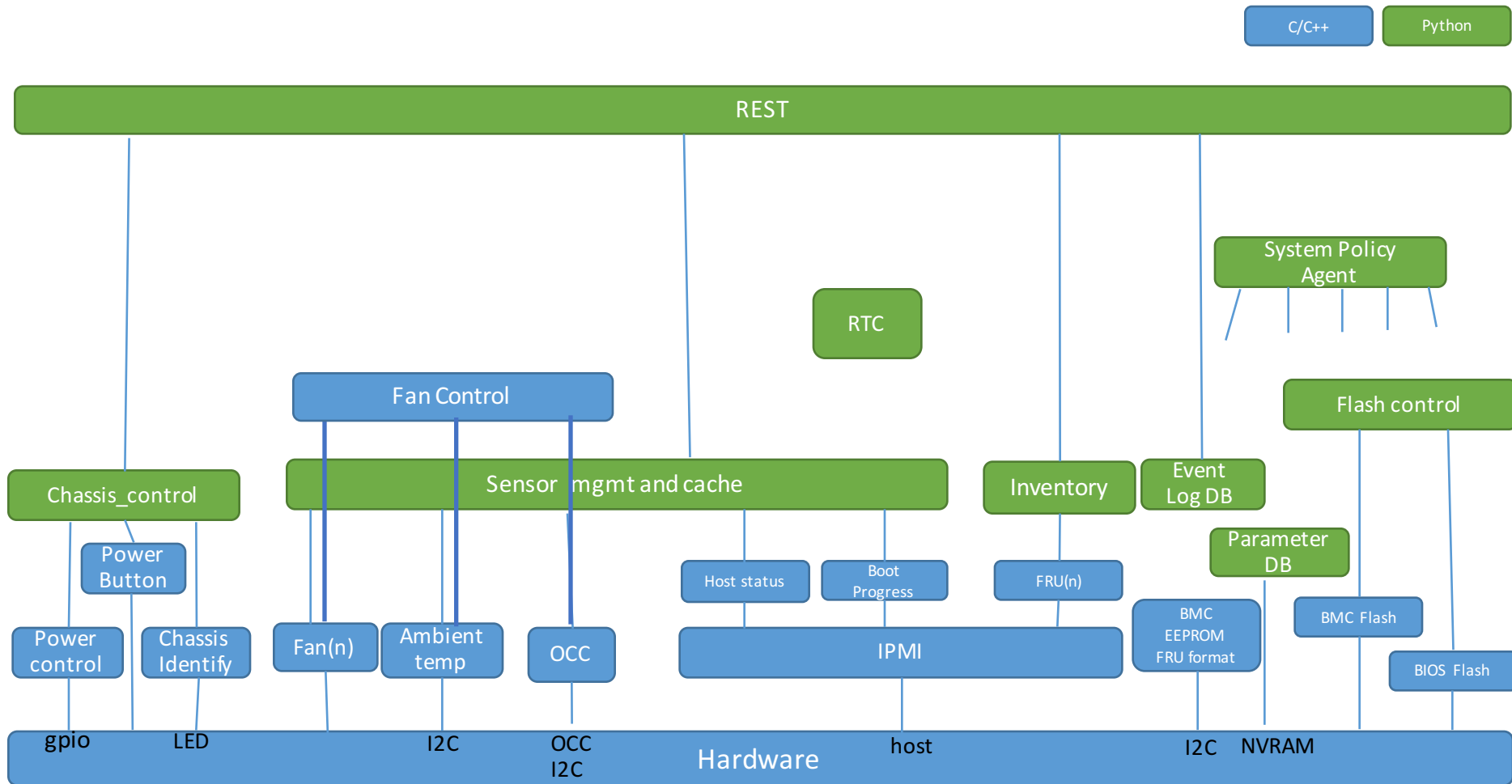
- Dbus is the heart
 - Swap out hardware and User Interfaces
 - Bindings for C/C++, python and more



OpenBMC Dbus Interface Examples

- Attach an interface, get the benefits
 - **Org.openbmc.Service**
 - Obtain information about the service
 - “status”, “information”
 - **Org.openbmc.delete**
 - The Parent interface is delete’able
 - **Org.openbmc.InventoryItem**
 - Properties for all inventory
 - “Fault”, “Present”

Applications



Connect via REST

- <https://github.com/openbmc/docs/blob/master/rest-api.md>
- `<uri>`
Show properties of this uri
- `<uri>/`
Show children
- `<uri>/list`
Recursively show children
- `<uri>/enumerate`
Recursively show children uri's with all properties
- `<uri>/attr/<property>`
Set/Get single property
- `<uri>/action/<method>`
Call a method (POST/PUT)
- `<uri>/schema`
Show the methods and properties

Lets see some examples!!!

- Login

- `curl -c cjar -b cjar -k -H "Content-Type: application/json" -X POST https://<ip>/login -d "{\"data\": [\"root\", \"OpenBmc\"] }"`

- Temperatures ok?

- `curl -c cjar -b cjar -k https://<ip>/org/openbmc/sensors/temperature/ambient`

- Power On the Server

- `curl -c cjar -b cjar -k -H "Content-Type: application/json" -X POST https://<ip>/org/openbmc/control/chassis0/action/powerOn -d "{\"data\": [] }"`

Where is this code?

- Github repository:
 - <https://github.com/openbmc>
- Get Started - Readme
 - <https://github.com/openbmc/openbmc>
- Schema
 - <https://github.com/openbmc/docs/blob/master/dbus-interfaces.md>

No Hardware Required

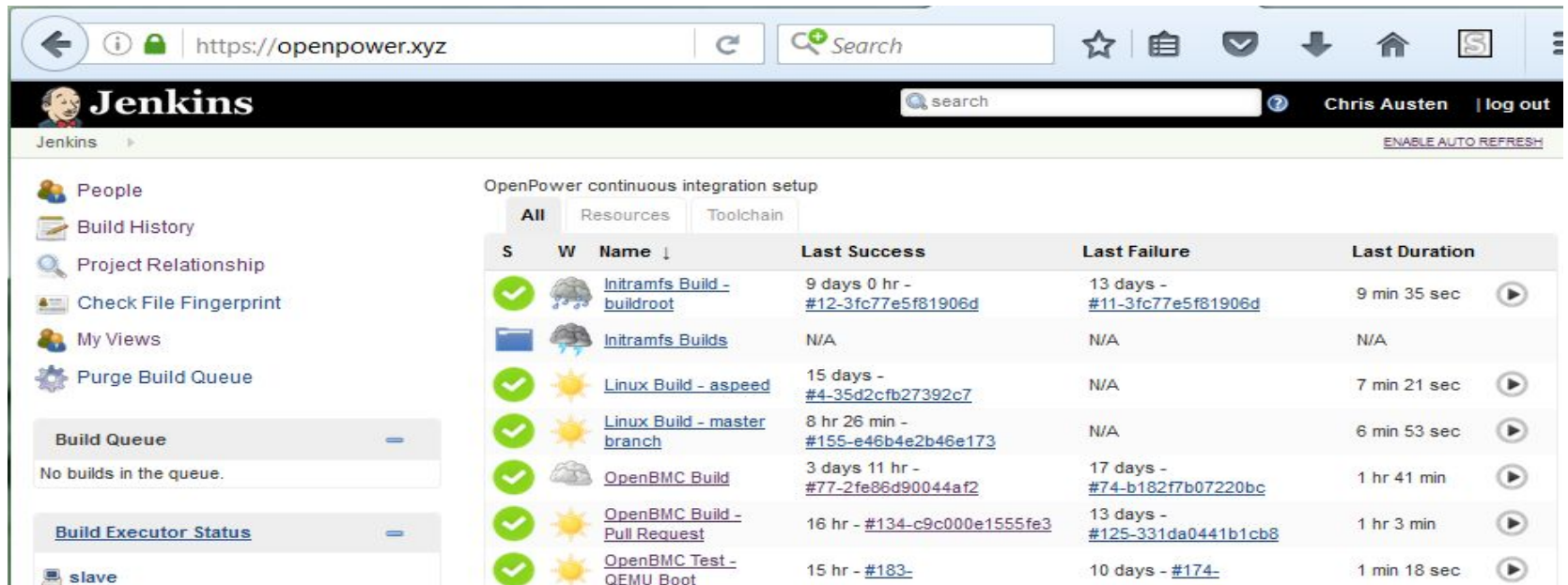
```
QEMU
Phosphor OpenBMC (Phosphor OpenBMC Project Reference Distro) 0.1.0 qemuarm tty1
qemuarm login:      Starting Network Service...
[ OK ] Started Phosphor OpenBMC host IPMI to DBUS example implementation.
[ OK ] Started Serial Getty on ttyAMA0.
[ OK ] Started Phosphor OpenBMC QEMU application example.
[ OK ] Started Phosphor OpenBMC fan management daemon.
      Starting SSH Key Generation...
[ OK ] Started Serial Getty on ttyAMA1.
[ OK ] Reached target Login Prompts.
      Starting Login Service...

Phosphor OpenBMC (Phosphor OpenBMC Project Reference Distro) 0.1.0 qemuarm tty1
qemuarm login:
```

```
causten@causten-VirtualBox: ~
$ curl -k https://192.168.7.2/org/openbmc/
{
  "data": [
    "/org/openbmc/NetworkManager",
    "/org/openbmc/HostIpmi",
    "/org/openbmc/examples",
    "/org/openbmc/HostServices",
    "/org/openbmc/records"
  ],
  "message": "200 OK",
  "status": "ok"
}causten@causten-VirtualBox:~
$ ssh root@192.168.7.2
root@192.168.7.2's password:
root@qemuarm:~#
```

- OpenBMC simulation does not require hardware
- Useful for non hardware specific applications.
 - Event Logs, userid creation/policies
 - REST interactions
 - Early POC dev

Automated Build Verification



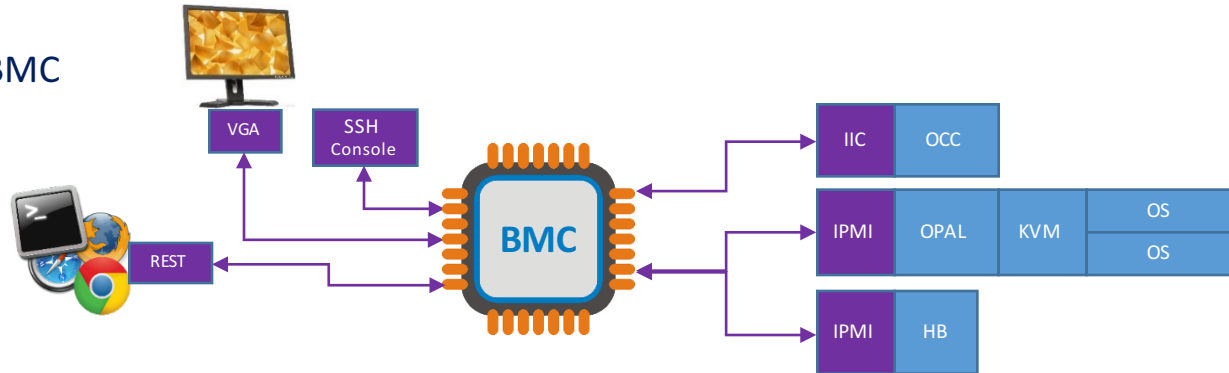
The screenshot shows the Jenkins web interface at <https://openpower.xyz>. The left sidebar contains navigation links: People, Build History, Project Relationship, Check File Fingerprint, My Views, and Purge Build Queue. Below these are sections for 'Build Queue' (showing 'No builds in the queue.') and 'Build Executor Status' (showing 'slave'). The main content area is titled 'OpenPower continuous integration setup' and displays a table of build jobs. The table has columns for status (S), icon (W), name, last success, last failure, and last duration. All jobs are marked with a green checkmark, indicating successful builds.

S	W	Name ↓	Last Success	Last Failure	Last Duration
✓	☁	Initramfs Build - buildroot	9 days 0 hr - #12-3fc77e5f81906d	13 days - #11-3fc77e5f81906d	9 min 35 sec
	☁	Initramfs Builds	N/A	N/A	N/A
✓	☀	Linux Build - aspeed	15 days - #4-35d2cfb27392c7	N/A	7 min 21 sec
✓	☀	Linux Build - master branch	8 hr 26 min - #155-e46b4e2b46e173	N/A	6 min 53 sec
✓	☁	OpenBMC Build	3 days 11 hr - #77-2fe86d90044af2	17 days - #74-b182f7b07220bc	1 hr 41 min
✓	☀	OpenBMC Build - Pull Request	16 hr - #134-c9c000e1555fe3	13 days - #125-331da0441b1cb8	1 hr 3 min
✓	☀	OpenBMC Test - QEMU Boot	15 hr - #183-	10 days - #174-	1 min 18 sec

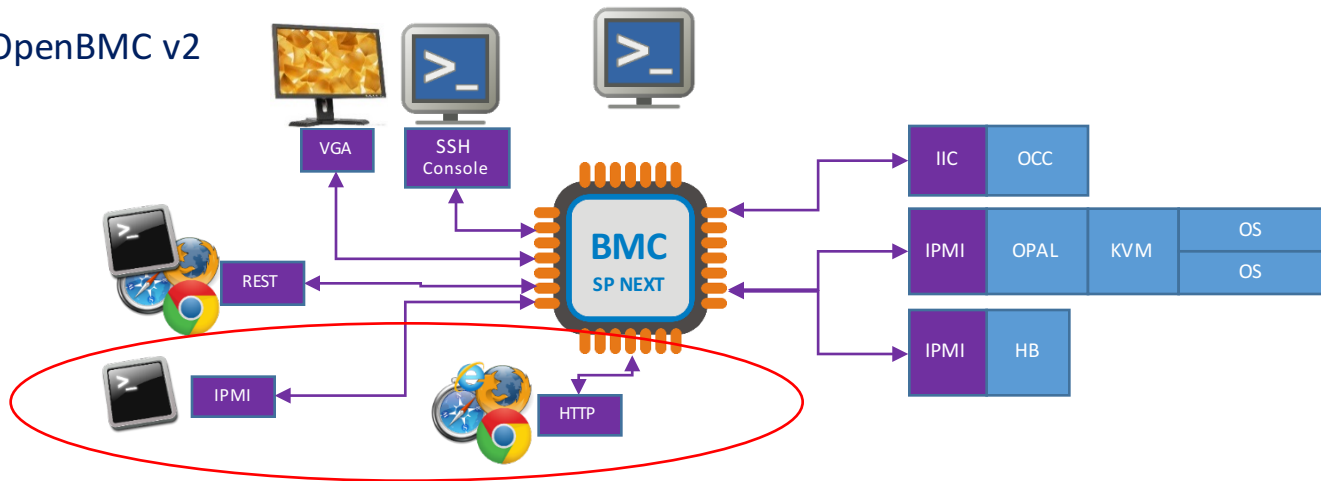
- <https://github.com/openbmc/openbmc>
 - Code is available to everyone
- <https://openpower.xyz>
 - Automated Jenkins server
 - Every commit... tested

Interface progression

OpenBMC



OpenBMC v2



Features we are developing

- Error and Trace Logs
- Code Update
- SLP Support
- OpenFSI debug support
- Virtualized interface to host
- “out of band” IPMI
- User Interface ← *looking for Sponsor Users*

Join Us

- Possible areas feature enhancements...
 - OpenStack IroniC
 - Redfish
 - Web User Interface
 - Remote IPMI
 - Energy Scale utilities
 - Designs beyond the data center
 - QEMU enhancements for board
 - Documentation
- Sponsor Users needed

Thank You

- Chris Austen
 - austenc@us.ibm.com
- Code:
 - <https://github.com/openbmc>
- IRC
 - IRC Freenode.net #openbmc

