LINUX CLUSTER MONITOR

Supermicro Solution and Integration Center

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Contributed by:
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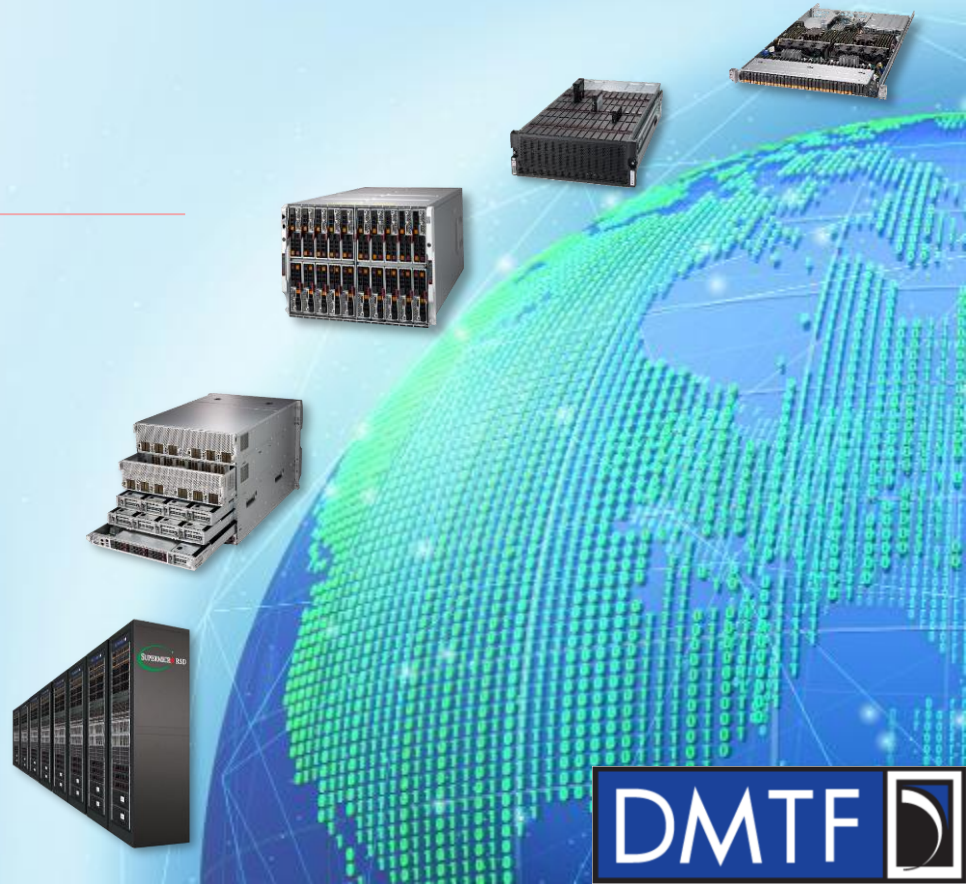
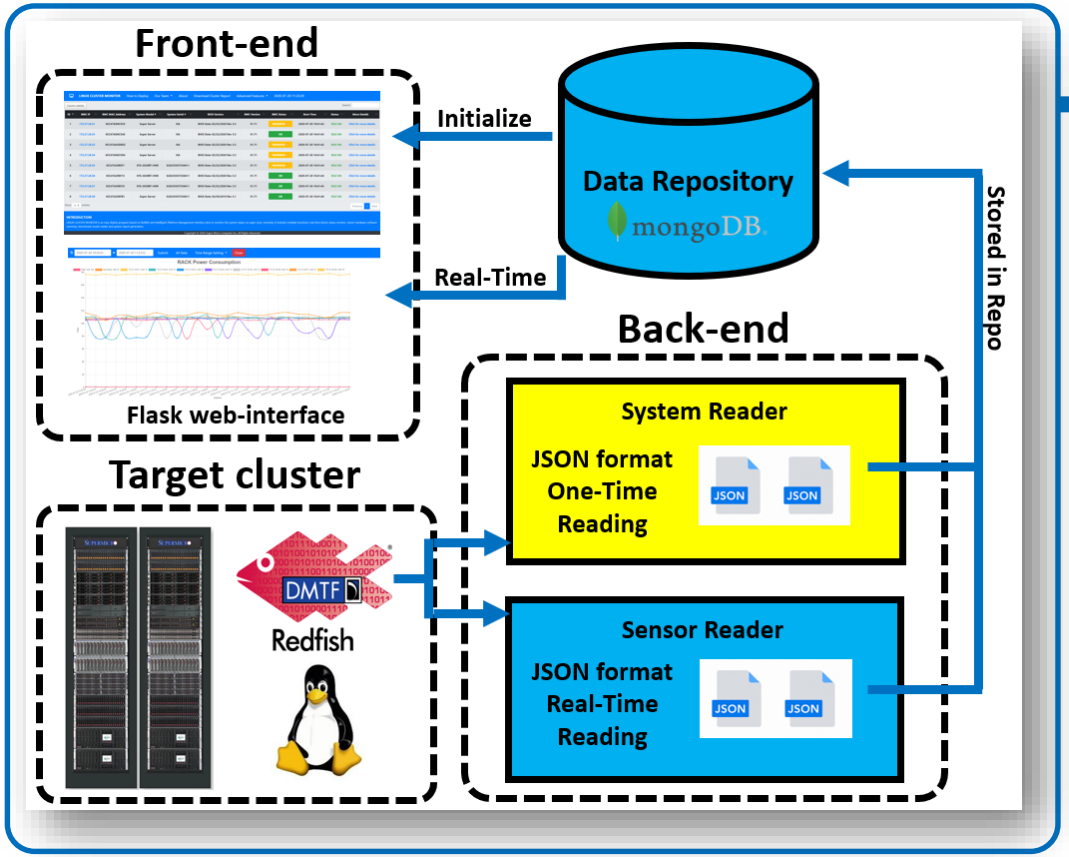
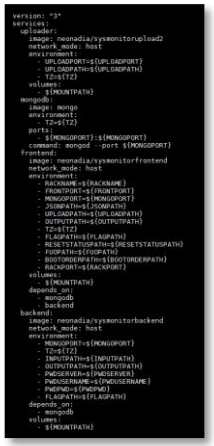


We Keep IT Green™

Program Architecture



Containerize



Docker Compose with Multi-Rack

Single command deployment anywhere:
$ docker_deploy RACK

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Current Progress Overview

Front-end:

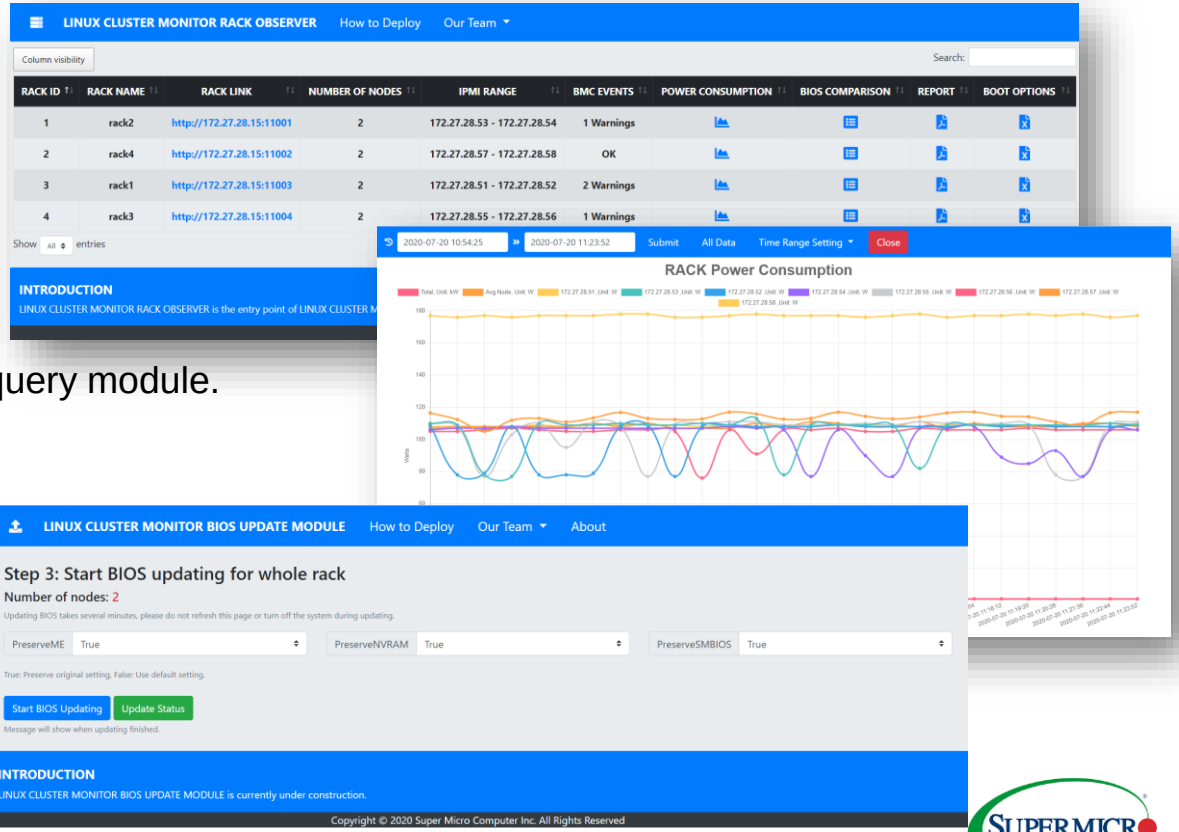
1. Advanced features.
2. Rack view.
3. System status.
4. Remade every single page

Back-end:

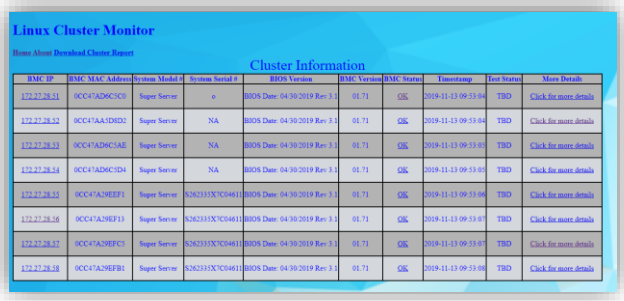
1. System password reading and query module.
2. Real-time diagram display.
3. Efficiency improvement.

Docker:

1. Containerize the program.
2. Compose the docker image.
3. Multiple-racks deployment.

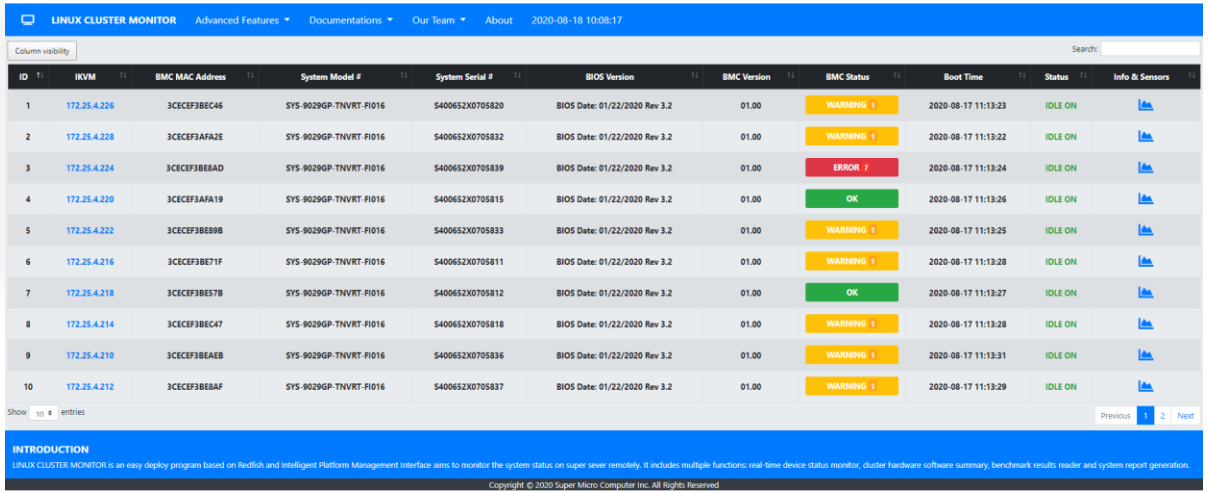


Home Page: Node View



Prototype

By the end of Feb. 2020



New contents:

- BMC status real-time displays.
- Advanced features.
- PDF report.
- Program introduction.
- Foot notes.

……

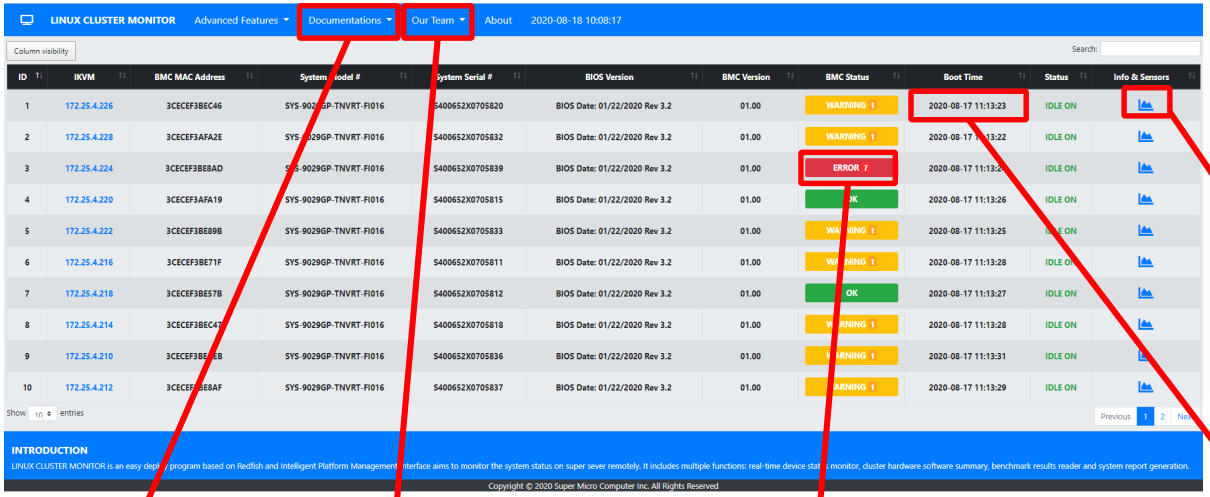
Current version

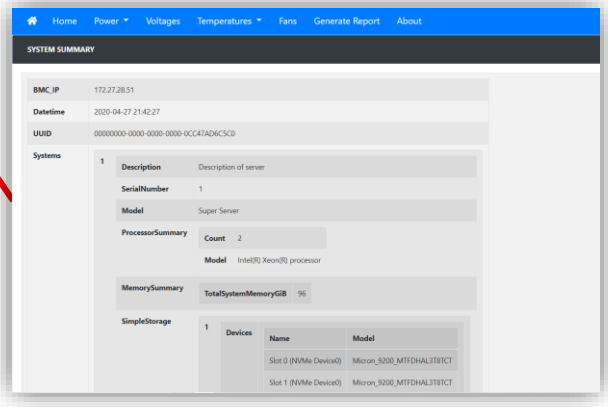
By the end of July 2020

Remake:

1. New navigation bar with dropdown menu.
2. New system overall information table.
3. Dynamical interface.

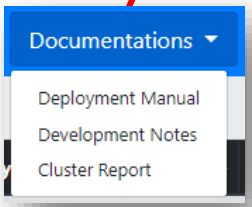
Home Page: Node View



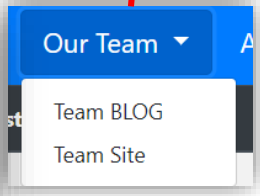


Details page

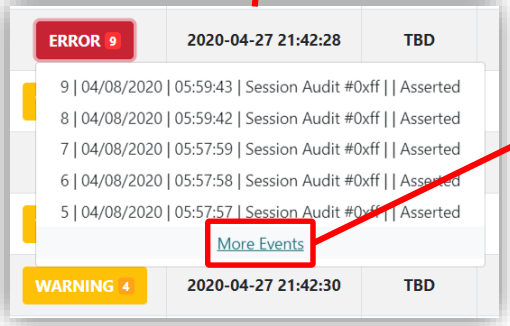
Monitor boot up timestamp



Readme

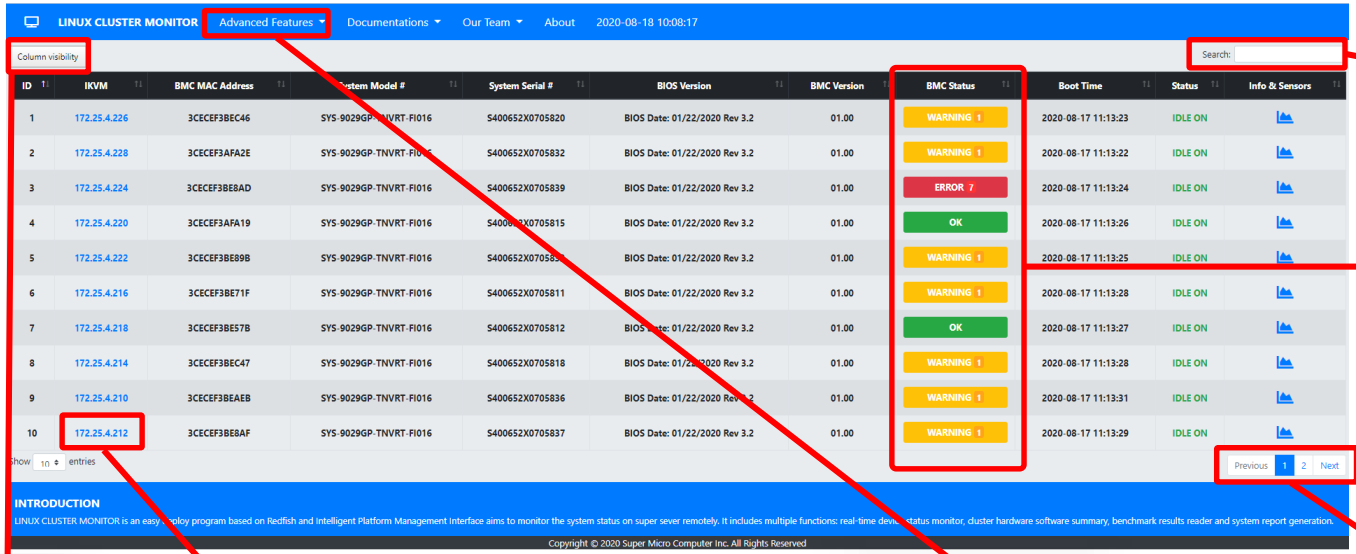


Team Sites



Events log

Home Page: Node View



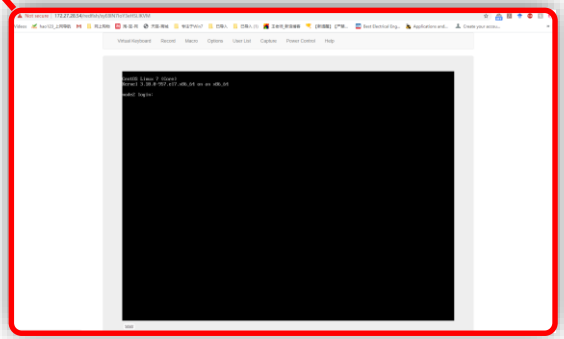
Keyword Search: row customization

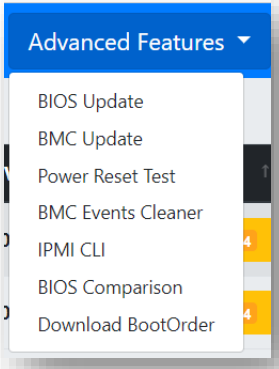
Monitor & System Status

Pages

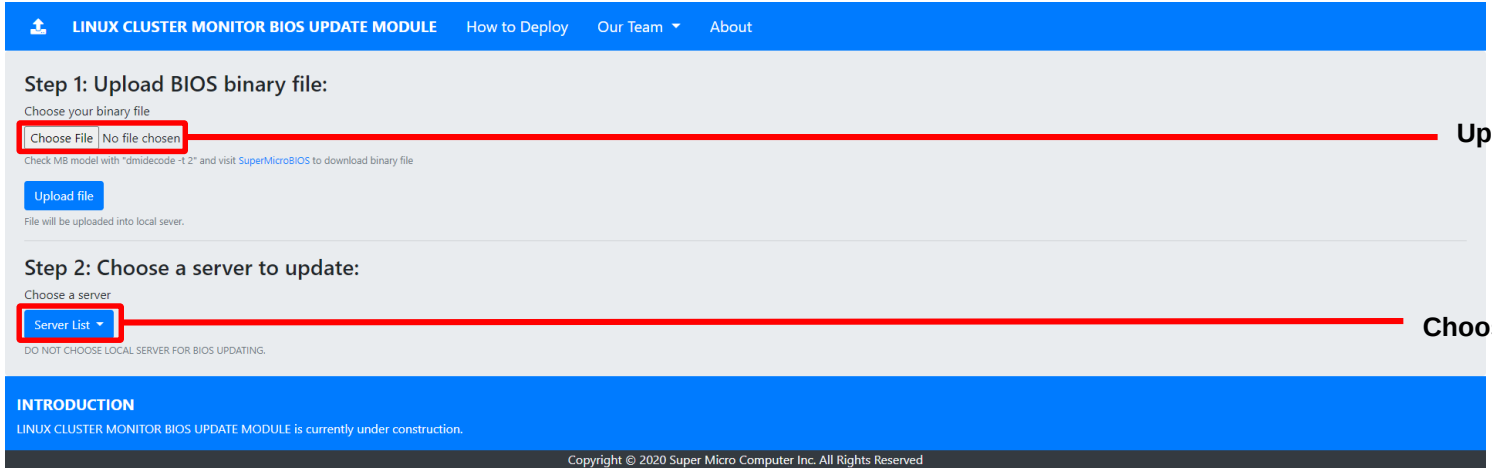
Column Customization

IKVM



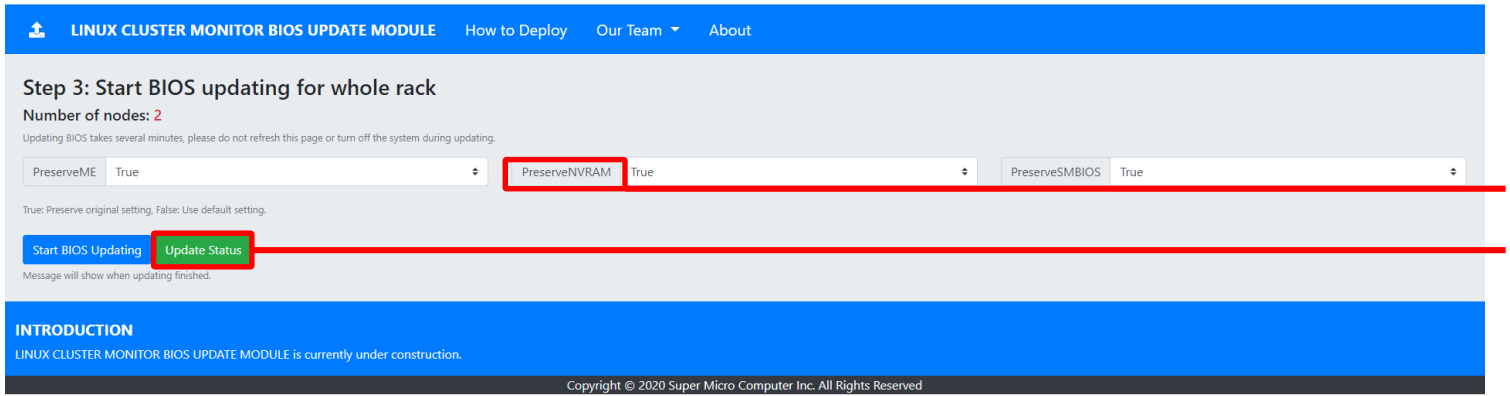


Advanced Features: Bios Update



Upload binary file from local

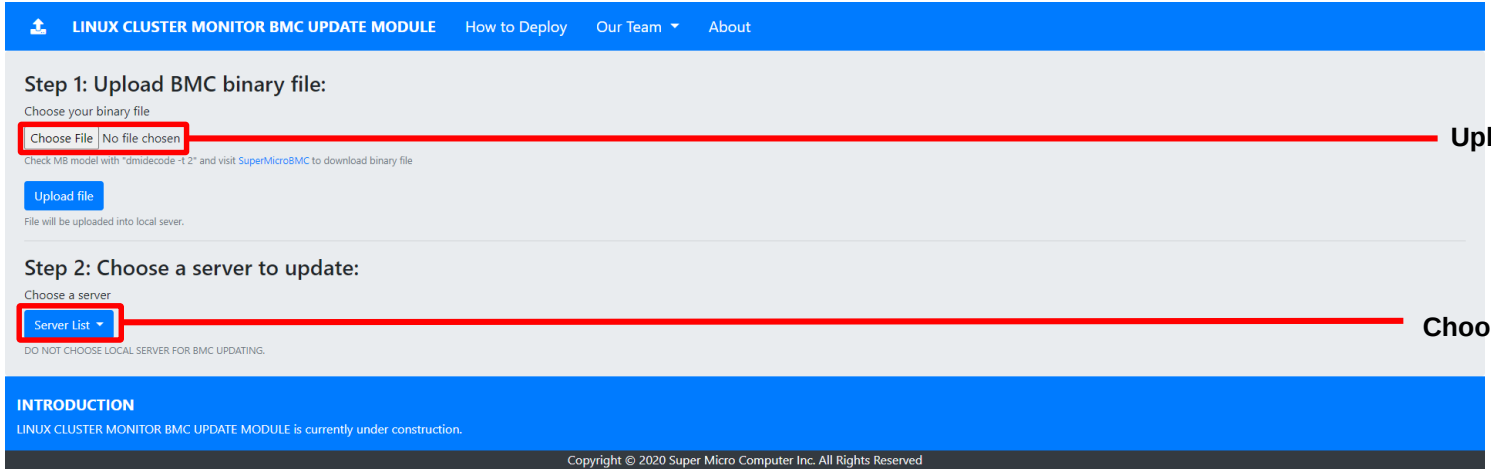
Choose one or multiple servers



Update settings

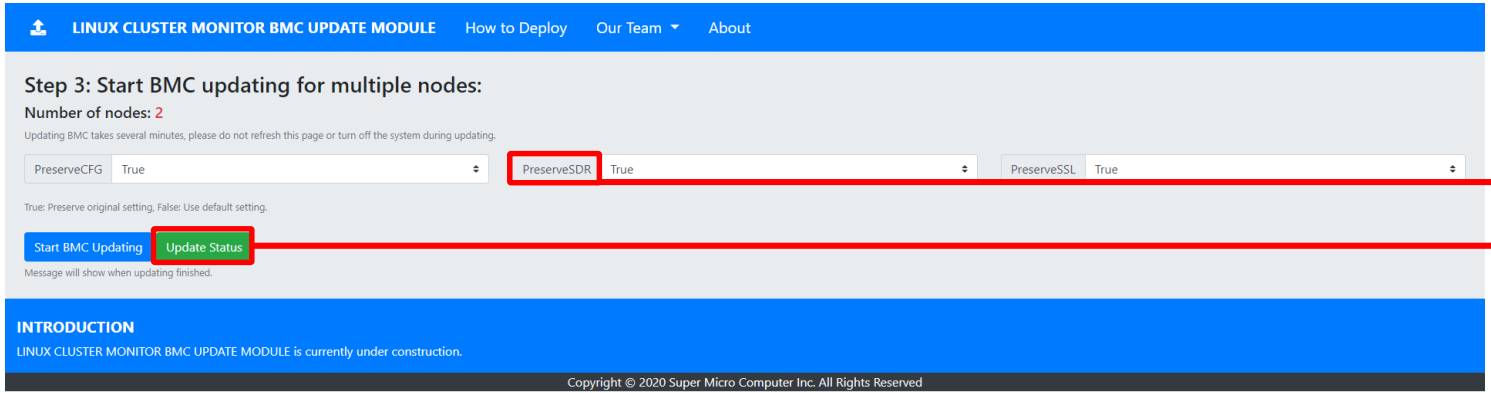
Update status display

Advanced Features: BMC Update



Upload binary file from local

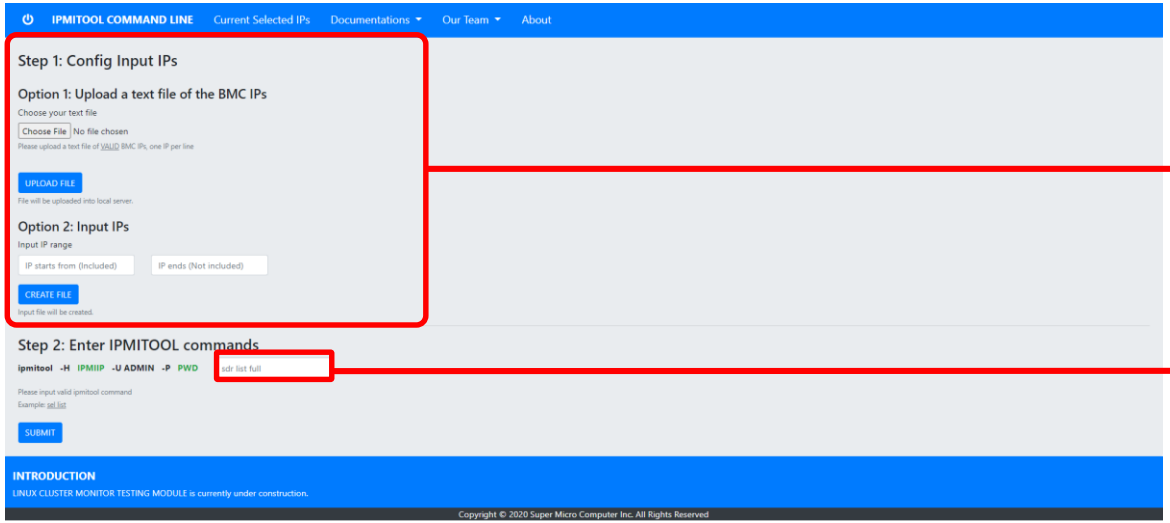
Choose one or multiple servers



Update settings

Update status display

Advanced Features: IPMI CLI



Choose one or multiple node:

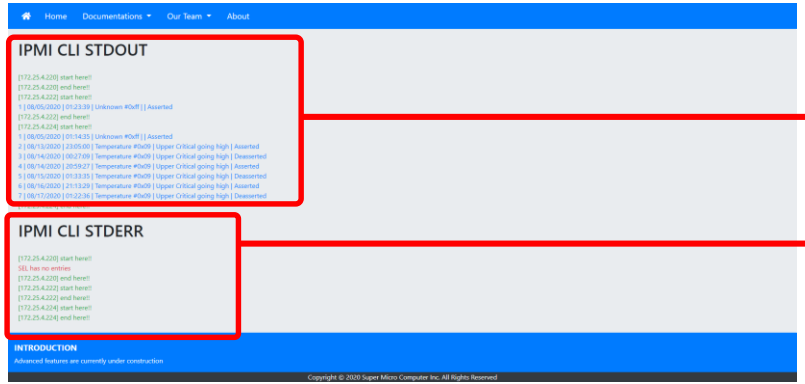
Option 1: upload file.

Option 2: Input an IP range.

IPMI syntax with auto fill:

Authentications & Hostname,

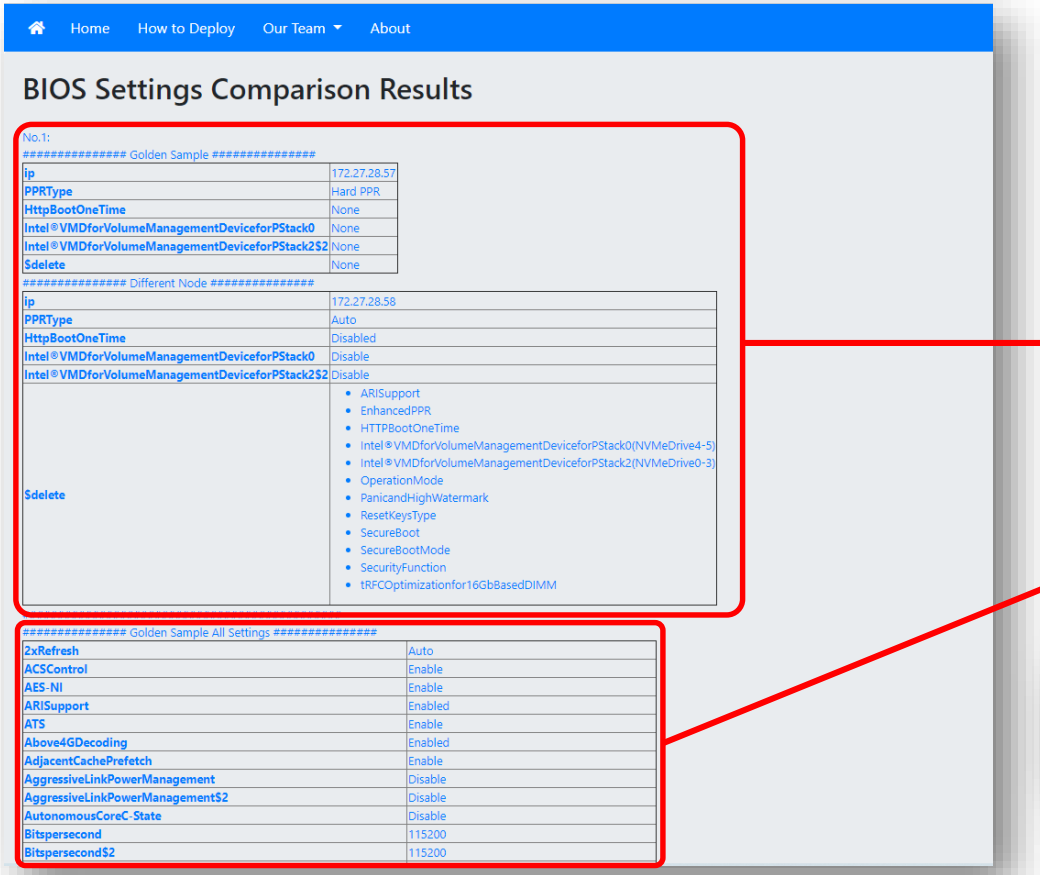
pipe is supported.



IPMI command line standard output

IPMI command line standard error output

Advanced Features: BIOS Comparison



BIOS comparison results:

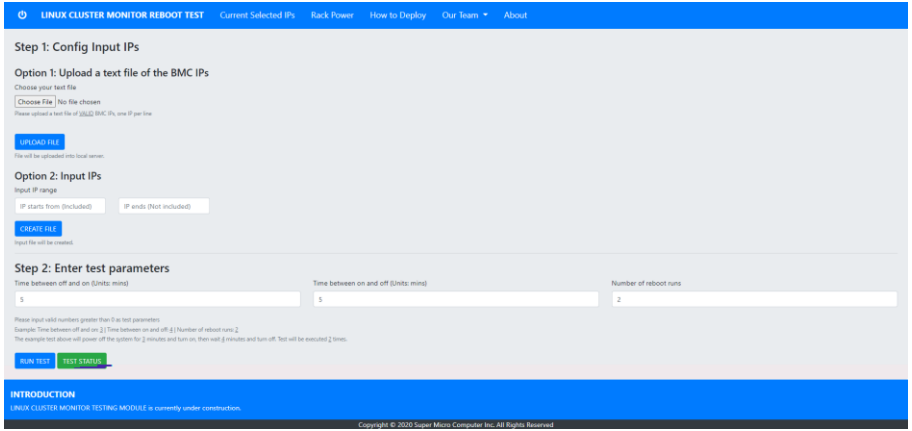
1. **Settings are obtained real-time.**
2. **Golden sample is the settings of the node which is consistent with most nodes.**
3. **Comparison result only shows the different settings.**

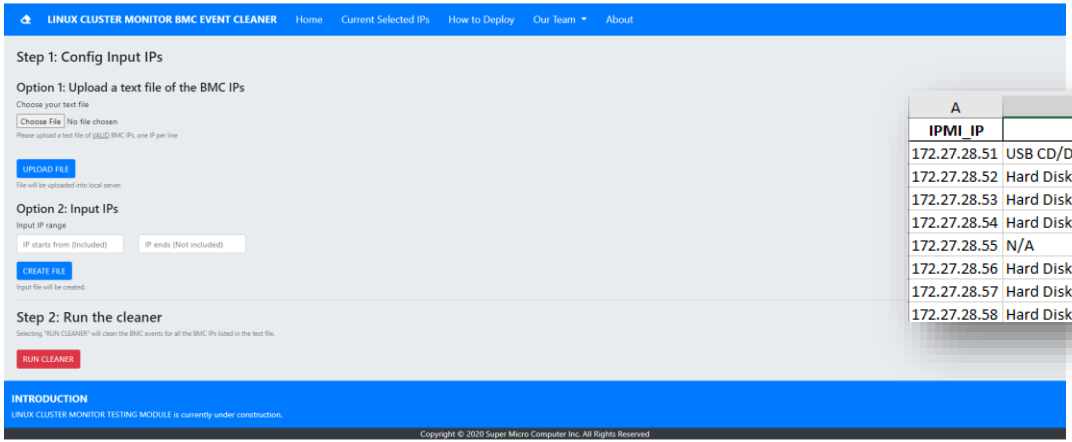
All the settings of golden sample.

$replace: additional items.
$delete: non-exist items.
Golden Sample: Sample node sharing the highest number of identicle settings with other nodes.
Different Node: Node with different BIOS setting compared to golden sample node.
No Settings Obtained!: no attribute found in the bios setting, might be due to all defaults or error 403.

Legends of comparison results

Other Advanced Features



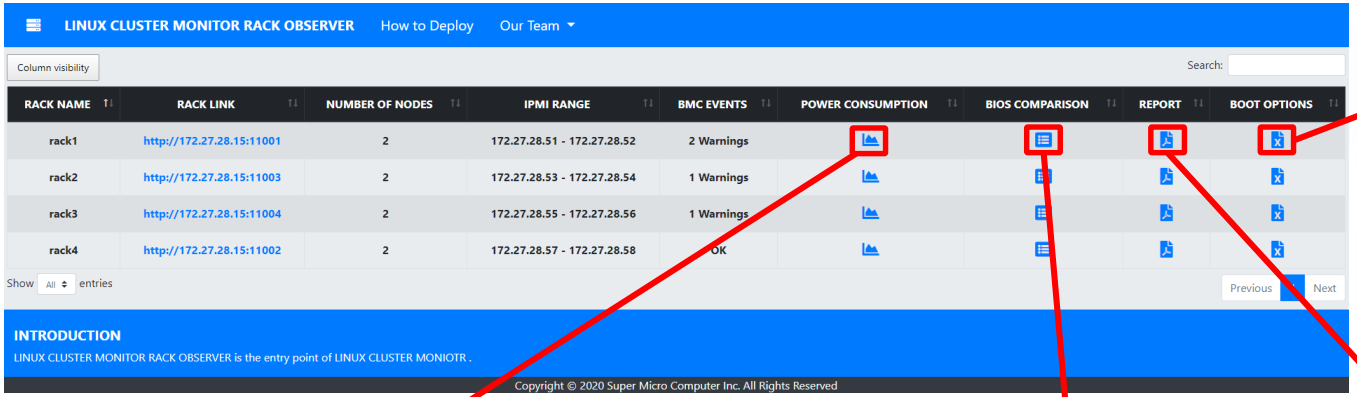


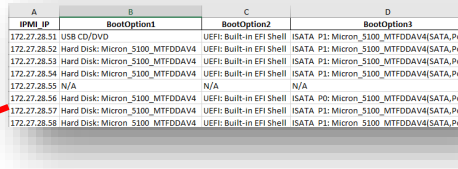
LCM also have:

1. **Power Recycle Tests**
2. **BMC events cleaner**
3. **Boot option spread sheet generator**

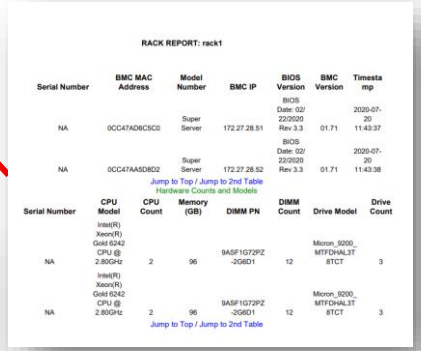
A	B	C	D
IPMI_IP	BootOption1	BootOption2	BootOption3
172.27.28.51	USB CD/DVD	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,Port:1)
172.27.28.52	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,Port:1)
172.27.28.53	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,Port:1)
172.27.28.54	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,Port:1)
172.27.28.55	N/A	N/A	N/A
172.27.28.56	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P0: Micron_5100_MTFDDAV4(SATA,Port:0)
172.27.28.57	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,Port:1)
172.27.28.58	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,Port:1)

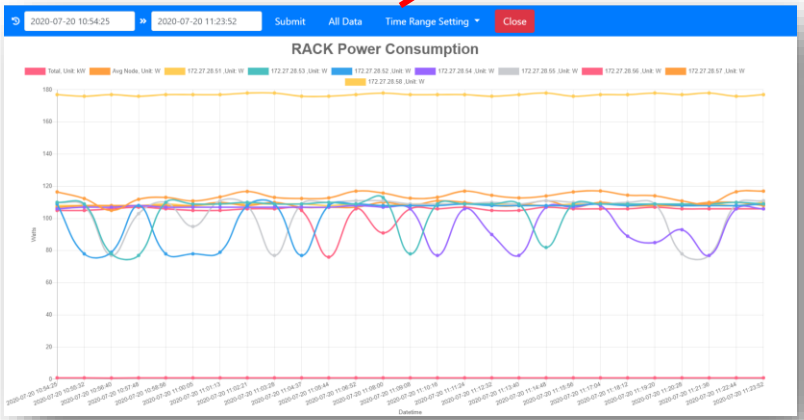
Home Page: Rack View

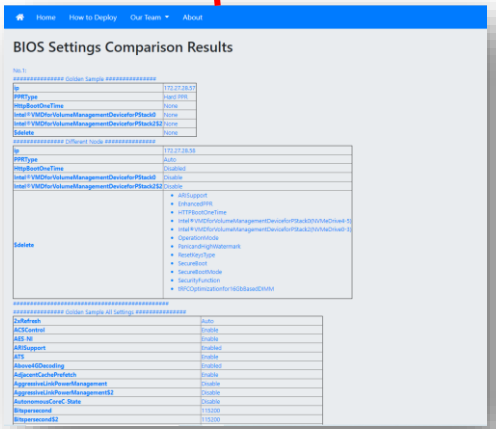




IPMI_IP	BootOption1	BootOption2	BootOption3
172.27.28.51	USB CD/DVD	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,P
172.27.28.52	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,P
172.27.28.53	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,P
172.27.28.54	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,P
172.27.28.55	N/A	N/A	N/A
172.27.28.56	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P0: Micron_5100_MTFDDAV4(SATA,P
172.27.28.57	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,P
172.27.28.58	Hard Disk: Micron_5100_MTFDDAV4	UEFI: Built-in EFI Shell	ISATA P1: Micron_5100_MTFDDAV4(SATA,P







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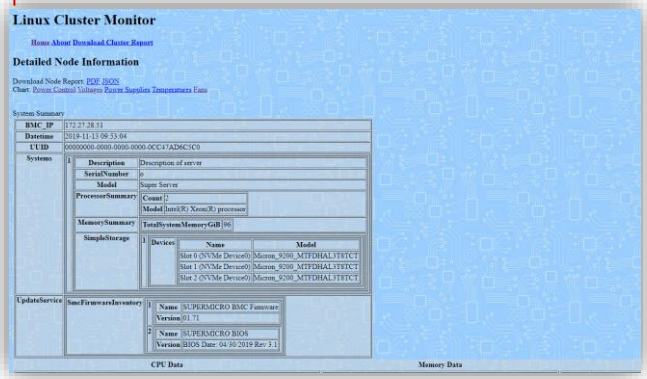
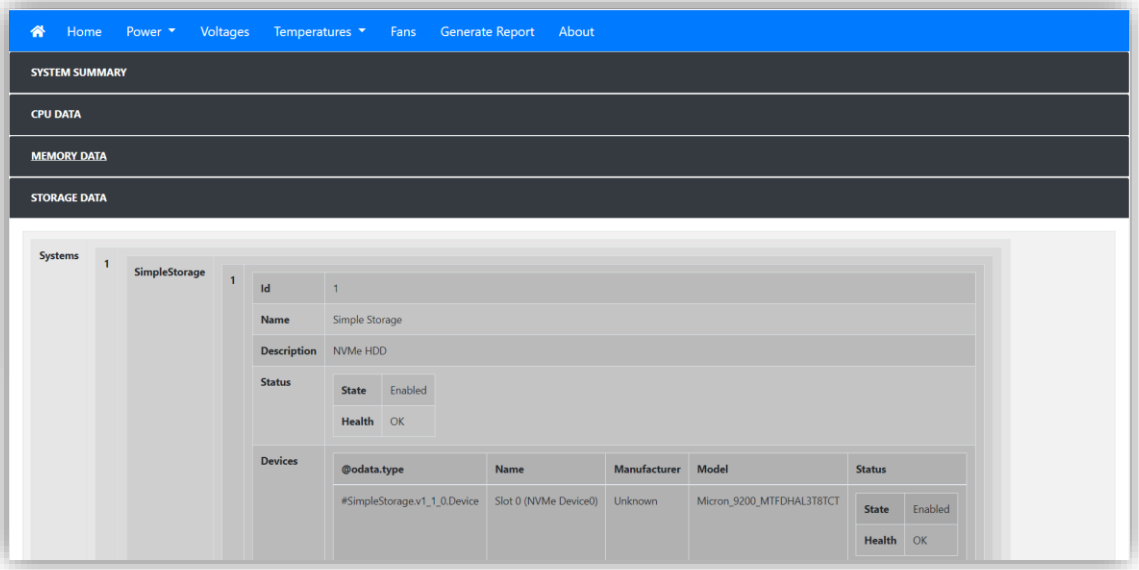
Details Page



Prototype

By the end of Feb. 2020



Current version

By the end of July 2020

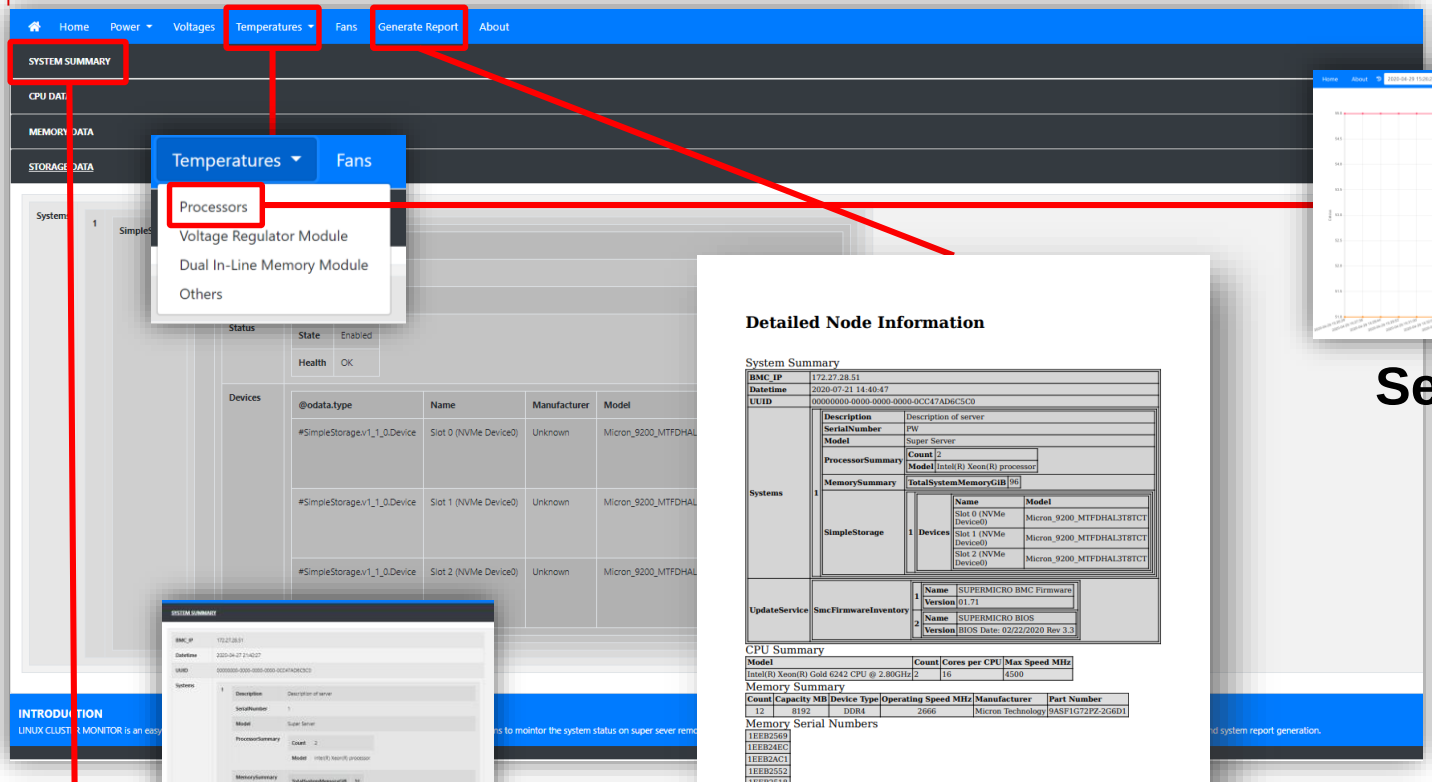
New functions:

- Report generator.
- Collapsible table.
- More diagrams.
- Foot notes.

Remake:

1. New navigation bar with dropdown menu.
2. New hardware information table.

Details Page



Collapsible table

Detailed Node Information

System Summary

BMC_IP	172.27.28.51				
Datetime	2020-07-21 14:40:47				
UUID	00000000-0000-0000-0000-0CC47AD6C5C0				
Systems	1	**Description**	Description of server		
		SerialNumber	PW		
		Model	Super Server		
		ProcessorSummary	**Count**	2	
			Model	Intel(R) Xeon(R) processor	
		MemorySummary	**TotalSystemMemoryGiB**	96	
		SimpleStorage	1	**Devices**	**Name** / **Model**
					Slot 0 (NVMe Device0) / Micron_9200_MTFDHAL3T8TCT
					Slot 1 (NVMe Device0) / Micron_9200_MTFDHAL3T8TCT
					Slot 2 (NVMe Device0) / Micron_9200_MTFDHAL3T8TCT
UpdateService	**SmcFirmwareInventory**	1	**Name**	SUPERMICRO BMC Firmware	
			Version	01.71	
		2	**Name**	SUPERMICRO BIOS	
			Version	BIOS Date: 02/22/2020 Rev 3.3	

CPU Summary

Model	Count	Cores per CPU	Max Speed MHz
Intel(R) Xeon(R) Gold 6242 CPU @ 2.80GHz	2	16	4500

Memory Summary

Count	Capacity MB	Device Type	Operating Speed MHz	Manufacturer	Part Number
12	8192	DDR4	2666	Micron Technology	9ASF1G72PZ-2G6D1

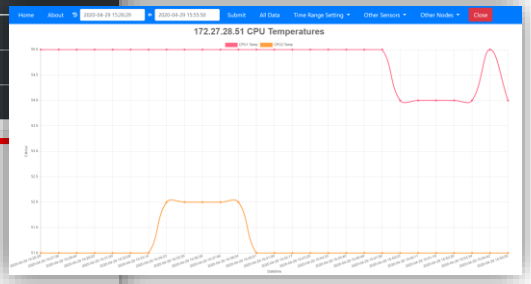
Memory Serial Numbers

1EEB2569
1EEB24EC
1EEB2AC1
1EEB2552
1EEB2518
1EEB2A79
1EEB2B0D
1EEB285F
1EEB2A02
1EEB2B04
1EEB2167
1EEB2145

Storage Summary

Description	Drive Count	Model
NVMe HDD	3	Micron_9200_MTFDHAL3T8TCT

PCIe Summary



Sensor diagram

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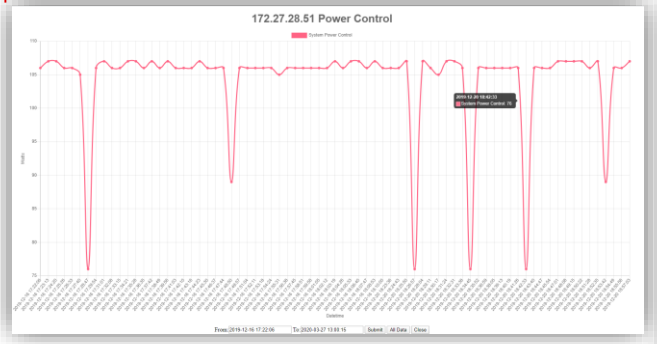
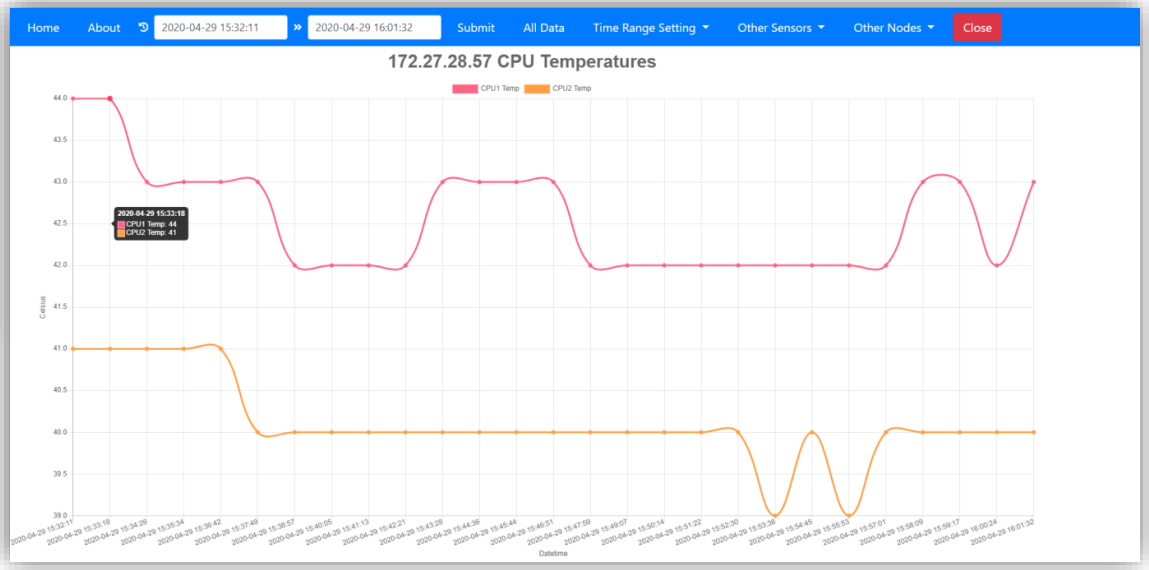
Sensor Diagram Page



Prototype
By the end of Feb. 2020



Current version
By the end of July 2020

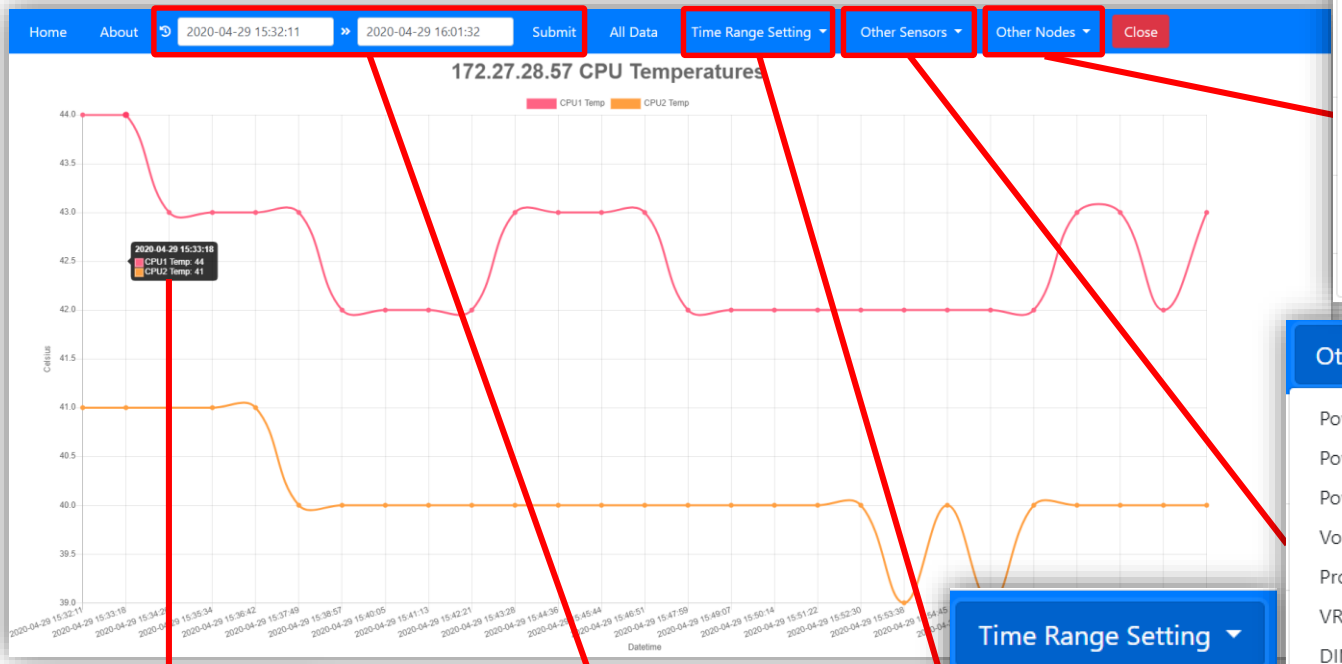
New functions:

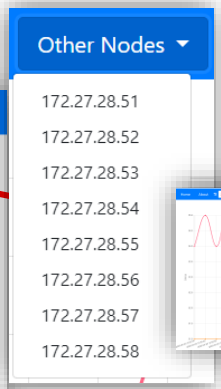
- Navigation bar.
- Auto time-range settings.
- Hyper-link to other nodes.
- Hyper-link to other sensors.
- Auto update.

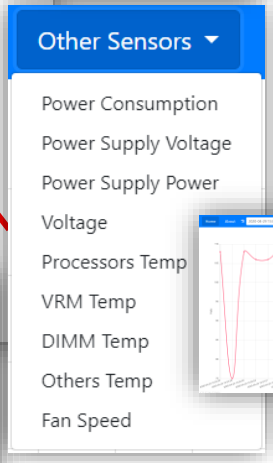
Remake:

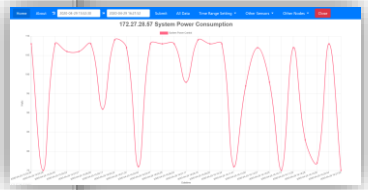
1. Performance optimization for the diagram, resolve lagging issue.
2. Adjust layout for all the buttons.
3. Remake the style to fit other pages.

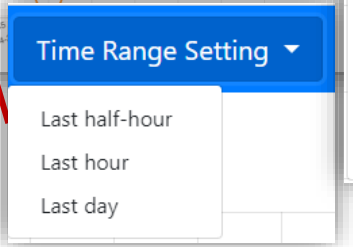
Sensor Diagram Page









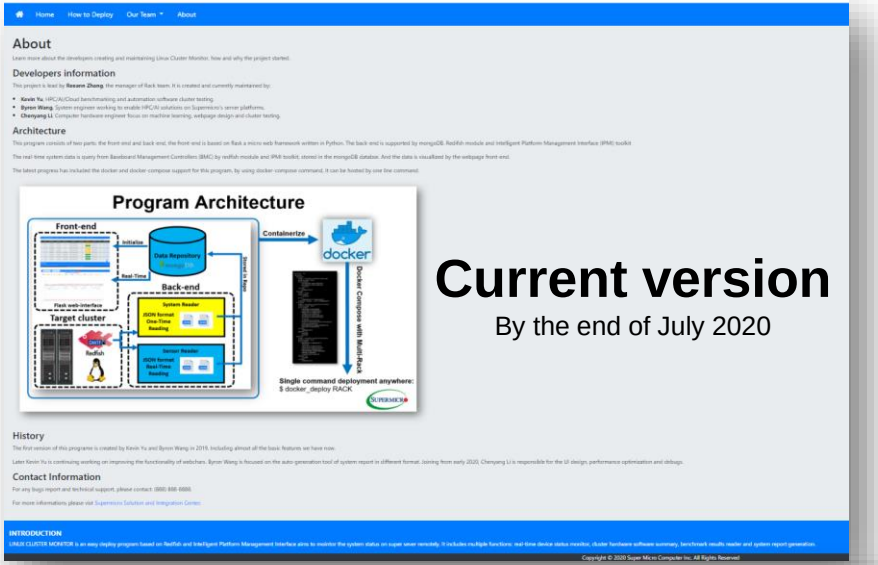


Manual Time Range

Details Reading

Auto Time Range

Other Pages



Current version

By the end of July 2020

Prototype

By the end of Feb. 2020

Current version

By the end of July 2020

Auto Deployment

1. **Containerize the program into three parts:**

   I. Front-end: web-interface and advanced features.

   II. Back-end: system access and database.

   III. Deployment tool: read from input and generate necessary files for deployment

2. **Using docker-compose to containerize different parts and set up boot up sequence:**

   I. Boot up database, mapping port, mapping local volume;

   II. Boot up backend as localhost, mapping local volume for input file;

   III. Boot up frontend as localhost.

3. **Using bash shell script to deploy LCM with multiple racks**

   I. Each csv file should contain the login information of a single rack: IPMI password is optional.

   II. Script can automatically deploy all the racks into different containers with certain rule.

Deployment Steps

1. **Install Docker, Docker-compose and ncat:**

   I. Docker: https://docs.docker.com/engine/install/centos/

   II. Docker-compose: https://docs.docker.com/compose/install/

   III. Ncat: $ yum install nmap-ncat.x86_64

   IV. Pull or build necessary images: front-end, back-end, sensor, rack observer and so on.

2. **Bash shell script for deployment:**

   https://www.dropbox.com/s/91xzx4pskjed8td/docker_deploy.sh?dl=0

3. **Create input files and start deployment:**

   I. Create a folder for input files.

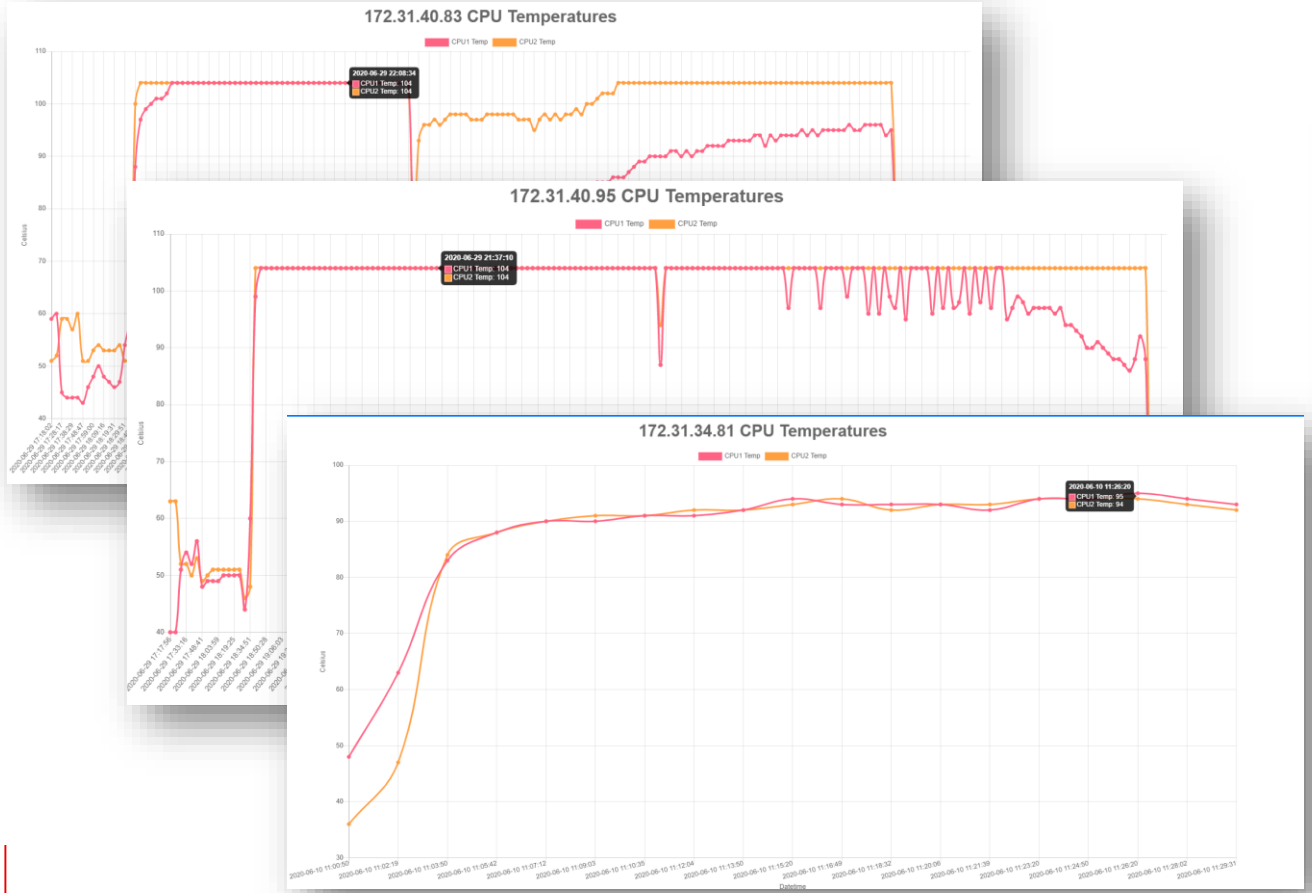
   II. Copy ".csv" files into folders.

   III. Create an "auto.env" file, example can be found below :

   https://www.dropbox.com/sh/jsgaerdl49xx6qi/AADRq3ZNG9sfdeXGP_OgLIKia?dl=0

   IV. Run: $ ./docker_deploy.sh FOLDERNAME

Projects Application: PNNL



1b | 05/11/2020 | 22:11:25 | Processor #0x01 | Throttled () | Asserted

1c | 05/11/2020 | 22:11:27 | Processor #0x01 | Throttled () | Deasserted

1d | 05/11/2020 | 22:11:28 | Processor #0x01 | Throttled () | Asserted

1e | 05/11/2020 | 22:11:33 | Processor #0x01 | Throttled () | Deasserted

1f | 05/12/2020 | 01:57:46 | Unknown #0xff | | Asserted

20 | 05/12/2020 | 02:29:52 | OS Boot | Installation started () | Asserted

21 | 05/12/2020 | 08:16:42 | Session Audit #0xff | | Asserted

22 | 05/12/2020 | 08:25:11 | Session Audit #0xff | | Asserted

23 | 05/12/2020 | 17:56:53 | Unknown #0xff | | Asserted

24 | 05/12/2020 | 20:55:59 | Session Audit #0xff | | Asserted

25 | 05/12/2020 | 20:55:59 | Session Audit #0xff | | Asserted

26 | 05/12/2020 | 22:48:02 | Unknown #0xff | | Asserted

27 | 05/13/2020 | 01:36:38 | Unknown #0xff | | Asserted

28 | 05/13/2020 | 02:24:30 | OS Boot | Installation started () | Asserted

29 | 05/13/2020 | 02:37:44 | OS Boot | Installation completed () | Asserted

CPU throttling has been recorded by LCM

Projects Application: Facebook

Future Plans

1. ~~**More advanced features:**~~

   ~~BMC firmware updating tool, redfish request tool.~~ **Done Already !!**

2. **Combined with benchmark tools:**

   Integrate generic benchmark tools into Linux Cluster Monitor:

   I. Monitor benchmark status along with system sensors.

   II. Submit/Cancel benchmark jobs.

3. **More compatibility tests:**

   The program has been successfully deployed on multiple kinds of systems: JBOD, GPU nodes, big-twin and blade with multiple projects: PNNL & GM. However, more compatibility tests are necessary.

4. **Other functions:**

   I. Max/Min sensor reading during a certain period.

   II. Display settings panel for sensor diagram.