



# RAID

## Technical Note

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# 1 Introduction

Redundant Array of Independent Disks (RAID) is a data storage virtualization technology that combines multiple physical disk drive components into one or more logical units for the purposes of performance improvement, data redundancy, or both.

Data is distributed across the drives in one of several ways, referred to as RAID levels, depending on the required level of redundancy and performance. The different schemes, or data distribution layouts, are named by the word "RAID" followed by a number, for example, RAID 0 or RAID 1. Each schema, or RAID level, provides a different balance among the key goals; reliability, availability, performance, and capacity. RAID levels greater than 0 provide protection against unrecoverable sector read errors, in addition to protection against failures of whole physical drives.

Kemp LoadMasters that have a RAID controller installed receive notifications from the RAID disk relating to the current status of the physical disks on the hardware appliance.

This document outlines the various options, notifications, and messages relating to RAID disks on LoadMasters.

## 1.1 Important Notes

Some important notes to be aware of are below:

- The disk size shown in the examples in this document may be different from yours, depending on the model you receive. This does not affect any of the messages other than the size.
- RAID disks must be the same size, no greater or smaller. This is because of RAID1 mirroring. If they are not the same size, the rebuild LED does not come on because it is not the correct size.
- It is best practice to have both disks of the same manufacturer and model.
- If you replace one disk, rebuilding begins. If the source disk (the one that was not replaced) is then removed before rebuilding is done, you risk losing data.
- If a disk fails, a "degraded" message alert appears in the syslog.

# 2 View RAID Information

This section outlines the RAID options available in the LoadMaster Web User Interface (WUI). To display information relating to the RAID controller and disks, follow the steps below:

- 1. In the main menu of the LoadMaster WUI, go to **System Configuration > Logging Options > System Log Files**.

Disk Usage

/var/log

1%

Action

Boot.msg File

View

Warning Message File

View

System Message File

View

Nameserver Log File

View

Nameserver Statistics

View

Audit LogFile

View

Action

Selection

Clear Logs

Clear All

▶

Save Logs

Save All

▶

Debug Options

- 2. Click **Debug Options**.

## 2 View RAID Information

Debug Options

Disable ALL Transparency	Disable Transparency
Enable L7 Debug Traces	Enable Traces
Enable Extended L7 Debug	Enable Extended Debug
Enable IRQ Pinning	Enable IRQ Pinning
Perform an l7adm	l7adm
Enable WAF Debug Logging	Enable Logging
Enable IRQ Balance	Enable IRQ Balance
Enable TSO	Enable TSO
Enable TCP SACK	Enable TCP SACK
Enable Layer 4 IPv6 Forwarding	<input checked="" type="checkbox"/>
Disable CLI VS Management	Disable CLI VS Management
Enable Bind Debug Traces	Enable Bind Traces
Perform a PS	ps
Perform Top	top Iterations <input type="text" value="10"/> Interval <input type="text" value="1"/> sec <input type="checkbox"/> Show Threads <input type="checkbox"/> Sort by Memory usage
Include Top in Backups	<input type="checkbox"/>
Display Meminfo	Meminfo
Display Slabinfo	Slabinfo
Perform an Ifconfig	Ifconfig
Perform a Netstat	Netstat
Include Netstat in Backups	<input checked="" type="checkbox"/>
Reset Statistic Counters	Reset Statistics
Flush OCSPD Cache	Flush Cache
Enable SSOMGR Debug Traces	Enable Traces
Flush SSO Authentication Cache	Flush SSO Cache
Linear SSO Logfiles	<input type="checkbox"/>
Start IPsec IKE Daemon	Start IPsec IKE Daemon
Perform an IPsec Status	IPsec Status
Enable IKE Debug Level Logs	Enable Logs
Netconsole Host	<input type="text"/> Interface <input type="text" value="eth0"/> <input type="button" value="Set Netconsole Host"/>
Ping Host	<input type="text"/> Interface <input type="text" value="eth0"/> <input type="button" value="Ping"/>
Ping6 Host	<input type="text"/> Interface <input type="text" value="Automatic"/> <input type="button" value="Ping6"/>
Traceroute Host	<input type="text"/> <input type="button" value="Traceroute"/>
Kill LoadMaster (395722)	<input type="text"/> <input type="button" value="Kill LoadMaster"/>
Enable DHCPv6 Client	<input type="checkbox"/>

3. Click **RAID Info** to display the RAID controller details.

4. Click **RAID Disks Info** to display details about each RAID disk in the controller.

The **Display RAID Information** and **Display RAID Disks Information** buttons only appear if a RAID controller is installed on the LoadMaster.

You can also view this information using Application Program Interface (API) commands. Refer to the relevant Kemp API documentation for further information on this.

Refer to the sections below for some example output relating to RAID states.

## 2.1 RAID Info States

This section provides examples of the normal, degraded, and rebuilding states that you may see when you click **RAID Info**.

### 2.1.1 RAID Info Normal State

The following example shows the normal state.

```
-----
Controller details
-----
- Chip ID.....: 10
- Parent Controller Index: 255
- OS Physical Name.....: /dev/sda
- Serial Number.....: 427491329
- AES Power on State.....: 0
- Sata Ports.....: 2
-----

Raid Port 0 details
-----
- Raid Model Name.....: H/W RAID1
- Raid Serial Number.....: OUEYEXCXTQ53GE1BSOSN
- EZBackup Disk Support.....: 0
- Port Multiplier port.....: 0
- Raid Capacity.....: 953 (29 GB)
- Raid Capacity low word.....: 0
- Raid State.....: 1 (Active)
- Raid Status.....: 3 (Normal)
- Raid Level.....: 1 (Raid 1 (mirror))
- Mark Type.....: 0
- Active Member.....: 15
- Active Level.....: 0
- Rebuild Priority.....: 3
- Standby Timer.....: 0
- Total members in the RAID.....: 2
Member disk 0
- Ready.....: 1
```

## 2 View RAID Information

- Lba 48 Bit Support.....: 1
- SATA Page.....: 0
- SATA Port.....: 0
- SATA Base.....: 0
- SATA Size.....: 953

### Member disk 1

- Ready.....: 1
- Lba 48 Bit Support.....: 1
- SATA Page.....: 0
- SATA Port.....: 1
- SATA Base.....: 0
- SATA Size.....: 953

### 2.1.2 RAID Info Degraded State

The following example shows the degraded state when the bottom disk is removed.

#### Controller details

- Chip ID.....: 10
- Parent Controller Index: 255
- OS Physical Name.....: /dev/sda
- Serial Number.....: 427491329
- AES Power on State.....: 0
- Sata Ports.....: 1

#### Raid Port 0 details

- Raid Model Name.....: H/W RAID1
- Raid Serial Number.....: OUEYEXCXTQ53GE1BSOSN
- EZBackup Disk Support.....: 0
- Port Multiplier port.....: 0
- Raid Capacity.....: 953 (29 GB)
- Raid Capacity low word.....: 0
- Raid State.....: 1 (Active)
- Raid Status.....: 1 (Degraded)



## 2 View RAID Information

- Raid Level.....: 1 (Raid 1 (mirror))
- Mark Type.....: 0
- Active Member.....: 15
- Active Level.....: 0
- Rebuild Priority.....: 3
- Standby Timer.....: 0
- Total members in the RAID....: 2

### Member disk 0

- Ready.....: 1
- Lba 48 Bit Support.....: 1
- SATA Page.....: 0
- SATA Port.....: 0
- SATA Base.....: 0
- SATA Size.....: 953

### Member disk 1

- Ready.....: 0
- Lba 48 Bit Support.....: 0
- SATA Page.....: 0
- SATA Port.....: 0
- SATA Base.....: 0
- SATA Size.....: 0

### 2.1.3 RAID Info Rebuilding State

The following example shows the rebuilding state when the bottom disk is put back in.

#### Controller details

- Chip ID.....: 10
- Parent Controller Index: 255
- OS Physical Name.....: /dev/sda
- Serial Number.....: 427491329
- AES Power on State.....: 0
- Sata Ports.....: 2

#### Raid Port 0 details

## 2 View RAID Information

```

-----
- Raid Model Name.....: H/W RAID1
- Raid Serial Number.....: OUEYEXCXTQ53GE1BSOSN
- EZBackup Disk Support.....: 0
- Port Multiplier port.....: 0
- Raid Capacity.....: 953 (29 GB)
- Raid Capacity low word.....: 0
- Raid State.....: 1 (Active)
- Raid Status.....: 2 (Rebuilding)
- Raid Level.....: 1 (Raid 1 (mirror))
- Mark Type.....: 0
- Active Member.....: 1
- Active Level.....: 316
- Rebuild Priority.....: 3
- Standby Timer.....: 0
- Total members in the RAID....: 2
Member disk 0
- Ready.....: 1
- Lba 48 Bit Support.....: 1
- SATA Page.....: 0
- SATA Port.....: 0
- SATA Base.....: 0
- SATA Size.....: 953
-----
Member disk 1
- Ready.....: 1
- Lba 48 Bit Support.....: 1
- SATA Page.....: 0
- SATA Port.....: 1
- SATA Base.....: 0
- SATA Size.....: 953
-----

```

## 2.2 RAID Disks Info States

This section provides examples of the normal, degraded, and rebuilding states that you may see when you click **RAID Disks Info**.

## 2 View RAID Information

From the perspective of the RAID controller:

- Top disk: Sata Port 0
- Bottom disk: Sata Port 1

### 2.2.1 RAID Disks Info Normal State

The following example shows the normal state.

```
-----
Sata Port 0 details
-----
```

```
- Disk Model Name.....: 32GB SATA Flash Drive
- Disk Serial Number.....: C0122916B01000000074
- Disk Firmware Version.....: SFDC001D
- EZBackup Disk Support.....: 1
- Port Multiplier port.....: 15
- Disk Capacity.....: 954 (29 GB)
- Port Type.....: 2 (RAID)
- Port Speed.....: 2 (GB)
- Page 0 State.....: 2
- Page 0 Raid Index.....: 0
- Page 0 Member Index.....: 0
- Page 0 Raid Name.....:
- Page 0 Raid Serial Number....:
- Page 0 Raid Segment Base.....: 0
- Page 0 Raid Size.....: 953
- Page 0 Raid EZ Backup Support: 0
- Page 1 State.....: 0
- Page 1 Raid Index.....: 0
- Page 1 MemberIndex.....: 0
- Page 1 Raid Name.....:
- Page 1 Raid Serial Number....:
- Page 1 Raid Segment Base.....: 0
- Page 1 Raid Size.....: 0
- Page 1 Raid EZ Backup Support: 0
- PortErrorStatus.....: 0
-----
```

## 2 View RAID Information

### Sata Port 1 details

```

-----
- Disk Model Name.....: 32GB SATA Flash Drive
- Disk Serial Number.....: E011321290100000005A
- Disk Firmware Version.....: SFDC001D
- EZBackup Disk Support.....: 1
- Port Multiplier port.....: 15
- Disk Capacity.....: 954 (29 GB)
- Port Type.....: 2 (RAID)
- Port Speed.....: 2 (GB)
- Page 0 State.....: 2
- Page 0 Raid Index.....: 0
- Page 0 Member Index.....: 1
- Page 0 Raid Name.....:
- Page 0 Raid Serial Number.....:
- Page 0 Raid Segment Base.....: 0
- Page 0 Raid Size.....: 953
- Page 0 Raid EZ Backup Support: 0
- Page 1 State.....: 0
- Page 1 Raid Index.....: 0
- Page 1 MemberIndex.....: 0
- Page 1 Raid Name.....:
- Page 1 Raid Serial Number.....:
- Page 1 Raid Segment Base.....: 0
- Page 1 Raid Size.....: 0
- Page 1 Raid EZ Backup Support: 0
- PortErrorStatus.....: 0

```

### 2.2.2 RAID Disks Info Degraded State

The following example shows the degraded state when the bottom disk is removed.

### Sata Port 0 details

```

-----
- Disk Model Name.....: 32GB SATA Flash Drive
- Disk Serial Number.....: C0122916B01000000074

```

## 2 View RAID Information

```

- Disk Firmware Version.....: SFDC001D
- EZBackup Disk Support.....: 1
- Port Multiplier port.....: 15
- Disk Capacity.....: 954 (29 GB)
- Port Type.....: 2 (RAID)
- Port Speed.....: 2 (GB)
- Page 0 State.....: 2
- Page 0 Raid Index.....: 0
- Page 0 Member Index.....: 0
- Page 0 Raid Name.....:
- Page 0 Raid Serial Number.....:
- Page 0 Raid Segment Base.....: 0
- Page 0 Raid Size.....: 953
- Page 0 Raid EZ Backup Support: 0
- Page 1 State.....: 0
- Page 1 Raid Index.....: 0
- Page 1 MemberIndex.....: 0
- Page 1 Raid Name.....:
- Page 1 Raid Serial Number.....:
- Page 1 Raid Segment Base.....: 0
- Page 1 Raid Size.....: 0
- Page 1 Raid EZ Backup Support: 0
- PortErrorStatus.....: 0

```

### 2.2.3 RAID Disks Info Rebuilding State

The following example shows the rebuilding state when the bottom disk is put back in.

---

Disk rebuild time is dependent on the size of the disk and disk activity. You can expect this to take hours.

---

```

-----
Sata Port 0 details
-----

```

```

- Disk Model Name.....: 32GB SATA Flash Drive
- Disk Serial Number.....: C0122916B01000000074
- Disk Firmware Version.....: SFDC001D
- EZBackup Disk Support.....: 1
- Port Multiplier port.....: 15

```

## 2 View RAID Information

```

- Disk Capacity.....: 954 (29 GB)
- Port Type.....: 2 (RAID)
- Port Speed.....: 2 (GB)
- Page 0 State.....: 2
- Page 0 Raid Index.....: 0
- Page 0 Member Index.....: 0
- Page 0 Raid Name.....:
- Page 0 Raid Serial Number....:
- Page 0 Raid Segment Base.....: 0
- Page 0 Raid Size.....: 953
- Page 0 Raid EZ Backup Support: 0
- Page 1 State.....: 0
- Page 1 Raid Index.....: 0
- Page 1 MemberIndex.....: 0
- Page 1 Raid Name.....:
- Page 1 Raid Serial Number....:
- Page 1 Raid Segment Base.....: 0
- Page 1 Raid Size.....: 0
- Page 1 Raid EZ Backup Support: 0
- PortErrorStatus.....: 0

```

## ----- Sata Port 1 details -----

```

- Disk Model Name.....: 32GB SATA Flash Drive
- Disk Serial Number.....: E011321290100000005A
- Disk Firmware Version.....: SFDC001D
- EZBackup Disk Support.....: 1
- Port Multiplier port.....: 15
- Disk Capacity.....: 954 (29 GB)
- Port Type.....: 2 (RAID)
- Port Speed.....: 2 (GB)
- Page 0 State.....: 2
- Page 0 Raid Index.....: 0
- Page 0 Member Index.....: 1
- Page 0 Raid Name.....: H/W RAID1
- Page 0 Raid Serial Number....: OUEYEXCXTQ53GE1BSOSN
- Page 0 Raid Segment Base.....: 0

```

## 2 View RAID Information

- Page 0 Raid Size.....: 953
- Page 0 Raid EZ Backup Support: 0
- Page 1 State.....: 0
- Page 1 Raid Index.....: 0
- Page 1 MemberIndex.....: 0
- Page 1 Raid Name.....:
- Page 1 Raid Serial Number.....:
- Page 1 Raid Segment Base.....: 0
- Page 1 Raid Size.....: 0
- Page 1 Raid EZ Backup Support: 0
- PortErrorStatus.....: 0

# 3 RAID Syslog Messages

The RAID controller generates syslog events. For further details on syslog, refer to the **WUI Configuration Guide** on the [Kemp Documentation Page](#).

All syslog messages are also available in the LoadMaster **System Message File** which you can access by going to **System Configuration > Logging Option > System Log Files**.

Refer to the section below for further details on the states.

In our example:

- RAID controller: RAID port 0
- Top: Disk 0
- Bottom: Disk 1

## 3.1 RAID Syslog Degraded State

Date	Time	Priority	Hostname	Message
05-29-2018	10:47:55	User.Warning	10.0.70.218	raid_events_handler: Event RAIDSTATE_DEGRADE_UNPLUGGED: RAID port 0 is degraded - Disk 1

The above screenshot shows a syslog example when the bottom disk is ejected.

## 3.2 RAID Syslog Rebuilding State

05-29-2018	11:22:28	User.Info	10.0.70.218	raid_events_handler: Event RAIDSTATE_REBUILDING_PLUGIN: RAID port 0 - Disk 1 is rebuilding now
------------	----------	-----------	-------------	--

The above screenshot shows a syslog example when the bottom disk is put back in.

05-29-2018	11:26:04	User.Warning	10.0.70.218	raid_events_handler: Event RAIDSTATE_REBUILDING_INPROGRESS: RAID port 0 - Disk 1 rebuilding in progress
05-29-2018	11:26:04	User.Info	10.0.70.218	raid_events_handler: RAID Controller 0 Port 0 rebuilding percentage == 18

The above screenshot shows a syslog example when the bottom disk is restarting, with percentage progress over time.

---

Disk rebuilding percentage is polled at a fixed interval. Therefore, you see a 100% complete percentage unless the poll time is exactly 100% when 100% is hit. Look for the **rebuilding done** message instead to confirm completion.

---



### 3.3 RAID Syslog Finished Rebuilding State

05-29-2018	11:42:44	User.Info	10.0.70.218	raid_events_handler: Event RAIDSTATE_NORMAL_FROM_REBUILDING: RAID port 0 - Disk 0 rebuilding done
------------	----------	-----------	-------------	---

The above screenshot shows a syslog example when the disk is finished rebuilding.

---

Note that it says Disk 0, because rebuilding actually uses both disks - one to read and one to write. Therefore, it does not matter which disk number it refers to because mirroring means both disks are the same.

---

# Last Updated Date

This document was last updated on 29 July 2023.