≡ MENU

RAID 2, RAID 3, RAID 4, RAID 6 Explained with Diagram

by RAMESH NATARAJAN *on* NOVEMBER 21, 2011

In most critical production servers, you will be using either RAID 5 or RAID 10.

However there are several non-standard raids, which are not used except in some rare situations. It is good to know what they are.

This article explains with a simple diagram how RAID 2, RAID 3, RAID 4, and RAID 6 works.

RAID 2

RAID 2 – Bits Striped. (and stores ECC)
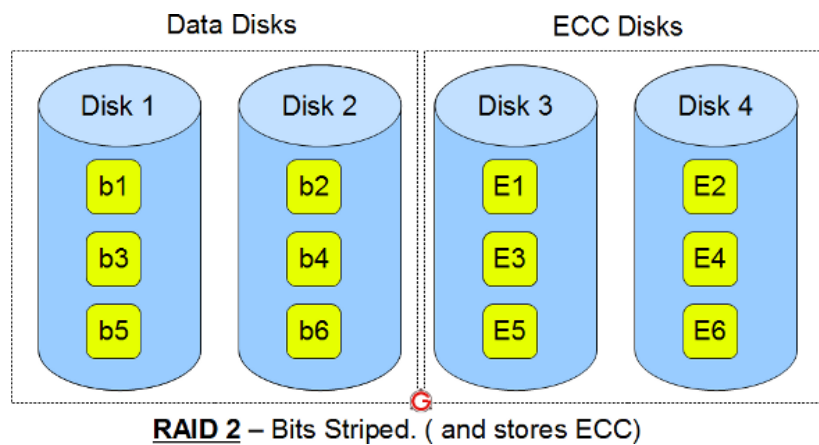
- This uses bit level striping. i.e Instead of striping the blocks across the disks, it stripes the bits across the disks.
- In the above diagram b1, b2, b3 are bits. E1, E2, E3 are error correction codes.
- You need two groups of disks. One group of disks are used to write the data, another group is used to write the error correction codes.
- This uses Hamming error correction code (ECC), and stores this information in the redundancy disks.
- When data is written to the disks, it calculates the ECC code for the data on the fly, and stripes the data bits to the data-disks, and writes the ECC code to the redundancy disks.
- When data is read from the disks, it also reads the corresponding ECC code
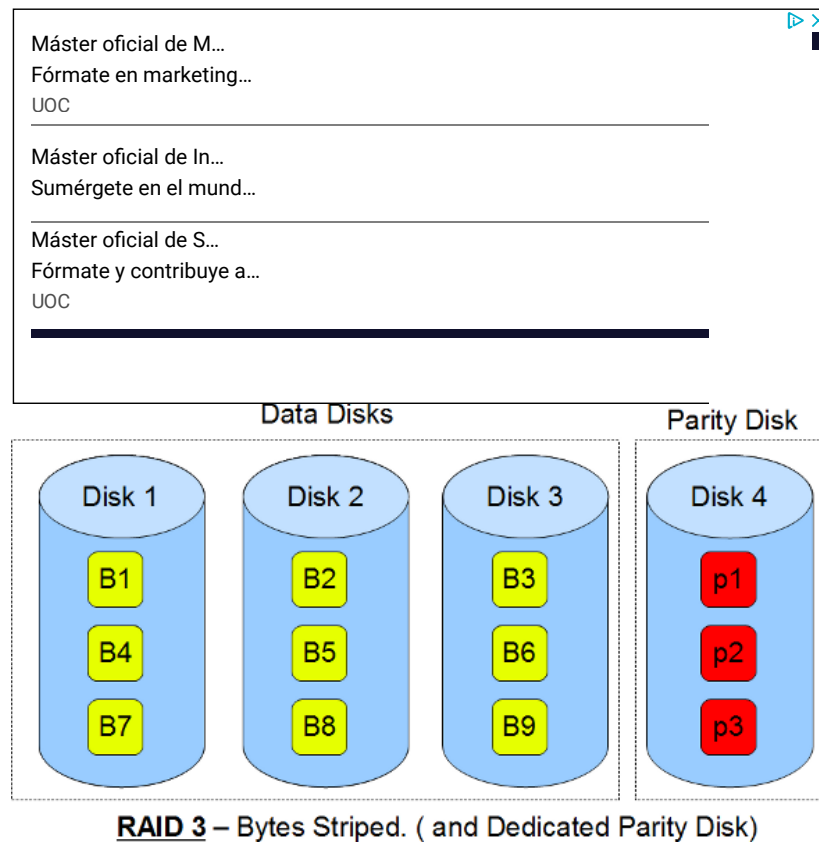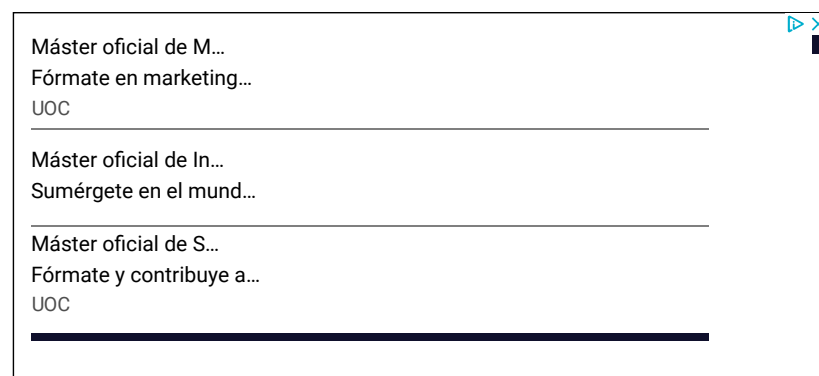
disks for data and 3 disks for ECC

- This is not used anymore. This is expensive and implementing it in a RAID controller is complex, and ECC is redundant now-a-days, as the hard disk themselves can do this.

RAID 3

RAID 3 – Bytes Striped. (and Dedicated Parity Disk)

- This uses byte level striping. i.e Instead of striping the blocks across the disks, it stripes the bytes across the disks.
- In the above diagram B1, B2, B3 are bytes. p1, p2, p3 are parities.
- Uses multiple data disks, and a dedicated disk to store parity.
- The disks have to spin in sync to get to the data.
- Sequential read and write will have good performance.
- Random read and write will have worst performance.
- This is not commonly used.

RAID 4

Data Disks   **Parity Disk**

RAID 4 – Blocks Striped. (and Dedicated Parity Disk)
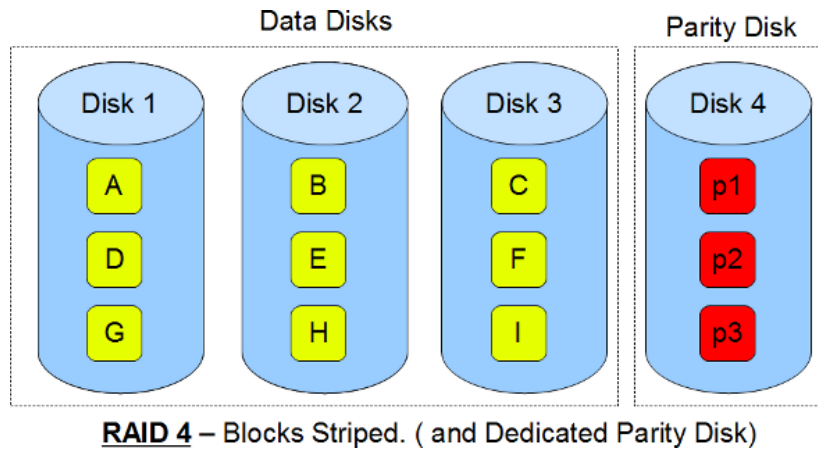
- This uses block level striping.
- In the above diagram B1, B2, B3 are blocks. p1, p2, p3 are parities.
- Uses multiple data disks, and a dedicated disk to store parity.
- Minimum of 3 disks (2 disks for data and 1 for parity)
- Good random reads, as the data blocks are striped.
- Bad random writes, as for every write, it has to write to the single parity disk.
- It is somewhat similar to RAID 3 and 5, but a little different.
- This is just like RAID 3 in having the dedicated parity disk, but this stripes blocks.
- This is just like RAID 5 in striping the blocks across the data disks, but this has only one parity disk.
- This is not commonly used.

RAID 6

RAID 6 – Blocks Striped. Two Distributed Parity.
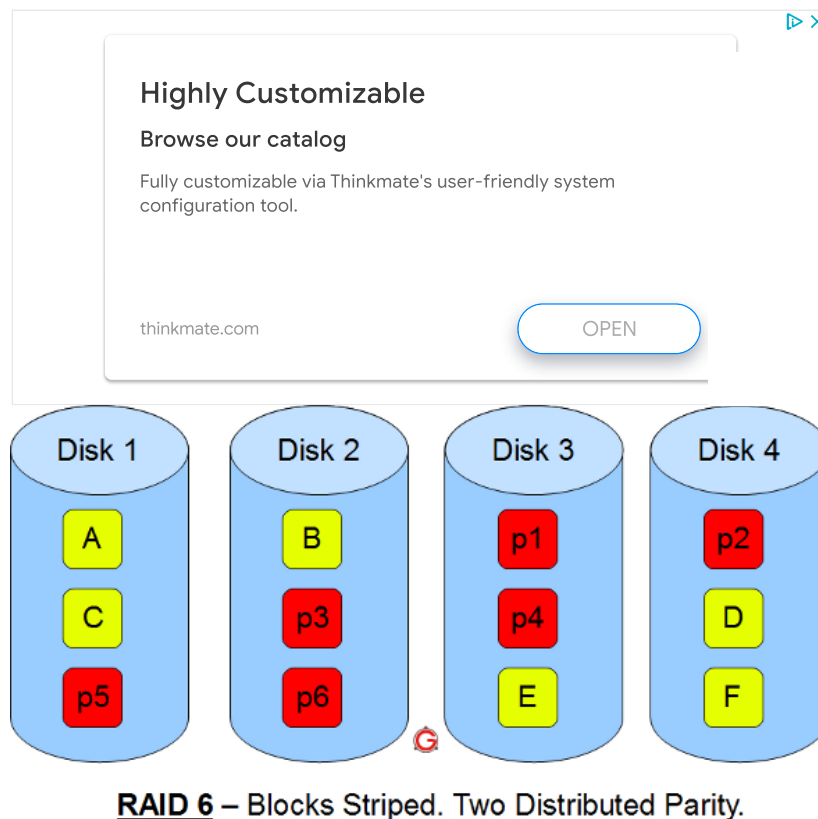
- Just like RAID 5, this does block level striping. However, it uses dual parity.

- This RAID configuration is complex to implement in a RAID controller, as it has to calculate two parity data for each data block.

Post   Add your comment

If you enjoyed this article, you might also like..

1. 50 Linux Sysadmin Tutorials
2. 50 Most Frequently Used Linux Commands (With Examples)
3. Top 25 Best Linux Performance Monitoring and Debugging Tools
4. Mommy, I found it! – 15 Practical Linux Find Command Examples
5. Linux 101 Hacks 2nd Edition eBook Free

- Awk Introduction – 7 Awk Print Examples
- Advanced Sed Substitution Examples
- 8 Essential Vim Editor Navigation Fundamentals
- 25 Most Frequently Used Linux IPTables Rules Examples
- Turbocharge PuTTY with 12 Powerful Add-Ons
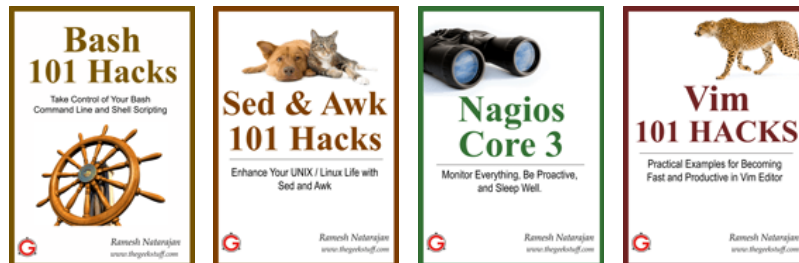
Comments on this entry are closed.

Israel Ramirez Ariza

November 22, 2011, 2:13 pm

Ramesh:

Thanks for posting valuable information. I love TGS!

Got a couple of comments regarding your post about RAID 2, 3, 4 & 6:

1) According to what I've read, it seems that none of them are suitable for ORACLE Databases. Is that right?
2) Also, would like to know some examples where such RAIDS could be used.

Thanks in advance.

∞

Jacque Benjamin

∞

Harvey Penley

June 14, 2012, 11:25 am

Israel, as long as your computer os and hardware will support the RAID
configuration then it shouldn't matter what DB you use. however for a data base
critical system I would suggest a hardware RAID controller then it should be
transparent to everything

∞

Eugene

June 30, 2012, 7:55 pm

Is there a RAI D 15

∞

atefeh

August 21, 2012, 5:23 am

thanks for your explained

∞

Staysay

September 3, 2012, 10:07 pm

These diagrams are very helpful and easy to understand. I just wanted to point out
that according to the ISM (Information Storage Management) exam, RAID-4's
primary use is for reading large sequential data. During a read with the 3 disks it
is essentially functioning as a stripe (RAID 0). So reading large files (like video or
ISO files) is a plus with this configuration.

∞

Jaipal

October 6, 2012, 11:40 am

The above article says RAID 4 to not used, yes, but because it is fast and used by
NetApp, with RAID 4 RAID DP

∞

Taino19xx

November 26, 2012, 8:01 pm

Ramesh,

∞

Dan Gauthier

January 15, 2013, 3:03 pm

IRT Taino19xx, he said two parity blocks per data block — but didn't define "block" where perhaps there are two definitions. Perhaps better stated as two parity blocks per data block group. The above diagrams reflect the minimum number of disks that would ever (probably not) be used. There's two parity blocks per set of two data blocks in the diagram. In reality there'd be 4, 5, 6, 8, or more data blocks plus 2 parity.

∞

A Frederick Christensen

March 21, 2013, 7:10 am

In the explanation of Raid 4, "In the above diagram B1, B2, B3 are blocks" seems it should read "In the above diagram A, B, C are blocks." It's a very good explanation article, though. Kudos. Would you perhaps consider giving a high-level, simple explanation of parity in one of these articles, too? It seems it would be more accessible to a reader on the level that needs these explained.

∞

Rakesh Pandey

March 26, 2013, 5:52 am

Hi ,
Kindly note we are looking comparison between RAID0+1 and RAID 6 . If storage requirement is of 10 TB . What will be actual required storage in both category . Applicastion is for Video Storage .

hard disc being used are 1 TB.

Regards,
Rakesh Pandey

∞

Dan Gauthier

March 28, 2013, 9:25 pm

For a 10TB array with 1TB drives, you'd need 20 drives for RAID 10 (aka 0+1, 1+0) — a stripe of 10 drives, then mirrored with another stripe of 10 drives. OR it's 5 mirrors of 2 drives, then striped. The differences are purely academic :). For RAID 6, only 12 drives are needed, but you need a RAID 6 card or a significant (couple % of your CPU?) software RAID solution. RAID 6 is a lot more CPU intensive than RAID 5 which is generally unnoticeable load on modern systems

Also performance (especially with a RAID card) should be (theoretically) higher for RAID 6.

Dan

∞

Don
June 27, 2013, 6:03 am

This is an awesome explanation, thank you so very very much. I really now feel very comfortable with understanding RAID.

∞

---

mayuresh joshi
July 14, 2013, 4:54 am

i got somthing new

∞

---

mahmoud S.Naseh
July 23, 2013, 1:17 pm

thanks for your explained

∞

Mohd Sayed
August 23, 2013, 4:28 am

RAID 10, often referred to as RAID 1+0 (mirroring and striping), data is written in stripes across primary disks that have been mirrored to the secondary disks........thanks fr your EXPLANINED...

∞

---

ma
December 16, 2013, 7:20 pm

The Other way around Mr Mohd

∞

Kandigal
December 17, 2013, 3:13 am

Here is a question regarding the RAID:

∞

---

charan

February 8, 2014, 1:21 am

hi sir u r posting a very good raid concepts

∞

George

April 3, 2014, 1:33 pm

What RAID would a server usually have?
What RAID would a normal Desktop Computer usually have?
What RAID would an ALL-IN-ONE Computer usually have?
What RAID would a normal Netbook Computer usually have?
What RAID would a normal Laptop Computer usually have?
I am trying to solve a puzzle given a lot of known factors, but I am not familiar with RAID.

The RAID's I have to choose from are RAID 0, RAID 1, RAID 5, RAID 6, AND RAID 10.

∞

W.J. Rohan

May 3, 2014, 3:44 pm

I think the Type of Raid, Which configurations would be used more than once, is dependent on Purposing Your Configurations, on Exactly Your Pen-Ultimate Mission !

∞

---

mythili

June 12, 2015, 9:00 pm

Thanks alottttttt....!!!!This article is very much useful and easy to understand and memorize 🙂

∞

Abishek

October 6, 2015, 5:11 am

Thanks alottttttt....!!!!This article is very much useful and easy to understand and memorize 🙂

∞

In raid 6, how are the parity bits calculated?

(a simple xor would not suffice here, because then it would not be possible to reconstruct bit A and B if drives 1 and 2 were lost)

∞

M.S.G.Balaji

February 4, 2016, 9:50 pm

this Knowledge Sharing article made me easy to understand the concept.. Thanks a load for uploading..:-)

∞

Next post: 7 Strace Examples to Debug the Execution of a Program in Linux

Previous post: Linux 101 Hacks 2nd Edition – Download Free eBook

RSS | Email | Twitter | Facebook

Visual-Click Velázquez

Marcas 100% Origina

Elija Entre Más de 100 Marcas O

ⓘ Datos de la tienda   Co

EBOOKS

Free

Linux 101 Hacks 2nd Edition eBook - Practical Examples to Build a Strong Foundation in Linux

Bash 101 Hacks eBook - Take Control of Your Bash Command Line and Shell Scripting

Sed and Awk 101 Hacks eBook - Enhance Your UNIX / Linux Life with Sed and Awk

Vim 101 Hacks eBook - Practical Examples for Becoming Fast and Productive in Vim Editor

Nagios Core 3 eBook - Monitor Everything, Be Proactive, and Sleep Well

The Geek Stuff
16.324 seguidores

Seguir página   Compartir

POPULAR POSTS

[15 Essential Accessories for Your Nikon or Canon DSLR Camera](#)

[12 Amazing and Essential Linux Books To Enrich Your Brain and Library](#)

[50 UNIX / Linux Sysadmin Tutorials](#)

[50 Most Frequently Used UNIX / Linux Commands (With Examples)](#)

[How To Be Productive and Get Things Done Using GTD](#)

[30 Things To Do When you are Bored and have a Computer](#)

[Linux Directory Structure (File System Structure) Explained with Examples](#)

[Linux Crontab: 15 Awesome Cron Job Examples](#)

[Get a Grip on the Grep! – 15 Practical Grep Command Examples](#)

[Unix LS Command: 15 Practical Examples](#)

[15 Examples To Master Linux Command Line History](#)

[Top 10 Open Source Bug Tracking System](#)

[Vi and Vim Macro Tutorial: How To Record and Play](#)

[Mommy, I found it! -- 15 Practical Linux Find Command Examples](#)

[15 Awesome Gmail Tips and Tricks](#)

[15 Awesome Google Search Tips and Tricks](#)

[RAID 0, RAID 1, RAID 5, RAID 10 Explained with Diagrams](#)

[Can You Top This? 15 Practical Linux Top Command Examples](#)

[Top 5 Best System Monitoring Tools](#)

[Top 5 Best Linux OS Distributions](#)

[How To Monitor Remote Linux Host using Nagios 3.0](#)

[Awk Introduction Tutorial – 7 Awk Print Examples](#)

[How to Backup Linux? 15 rsync Command Examples](#)

[The Ultimate Wget Download Guide With 15 Awesome Examples](#)

[Top 5 Best Linux Text Editors](#)

[Packet Analyzer: 15 TCPDUMP Command Examples](#)

[The Ultimate Bash Array Tutorial with 15 Examples](#)

[3 Steps to Perform SSH Login Without Password Using ssh-keygen & ssh-copy-id](#)

[Unix Sed Tutorial: Advanced Sed Substitution Examples](#)

[UNIX / Linux: 10 Netstat Command Examples](#)

[The Ultimate Guide for Creating Strong Passwords](#)

[6 Steps to Secure Your Home Wireless Network](#)

Vim Editor

Sed Scripting

Awk Scripting

Bash Shell Scripting

Nagios Monitoring

OpenSSH

IPTables Firewall

Apache Web Server

MySQL Database

Perl Programming

Google Tutorials

Ubuntu Tutorials

PostgreSQL DB

Hello World Examples

C Programming

C++ Programming

DELL Server Tutorials

Oracle Database

VMware Tutorials

ABOUT THE GEEK STUFF

My name is **Ramesh Nataraj an**. I will be posting instruction guides, how-to, troubleshooting tips and tricks on Linux, database, hardware, security and web. My focus is to write articles that will either teach you or help you resolve a problem. Read more about Ramesh

CONTACT US

Email Me : Use this Contact Form to get in touch me with your comments, questions or suggestions about this site. You can also simply drop me a line to say hello!.

Follow us on Twitter

Become a fan on Facebook

SUPPORT US

Support this blog by purchasing one of my ebooks.

Bash 101 Hacks eBook

Sed and Awk 101 Hacks eBook

Vim 101 Hacks eBook

Nagios Core 3 eBook

🛡️ **Configuración de la privacidad y las cookies**

Gestionado por Google Cumple el TCF de IAB. ID de CMP: 300