Technical white paper

Configuring RAID with HP Z Turbo Drives



HP Workstations



This document describes how to set up RAID on your HP Z Workstation, and the advantages of using a RAID configuration with HP Z Turbo Drives. These advantages include greater performance or greater reliability. The HP Z Turbo Drive G2 products were used to create this document, but any HP Z Turbo Drive can use this same process to create a RAID configuration.

Before you begin

To view QuickSpecs and determine the compatibility of this product with your HP Z Workstation, see <u>hp.com/go/</u><u>productbulletin</u>.

If installing the HP Z Turbo Drive for the first time, check the installation guide and verify that the BIOS revision is greater than or equal to the minimum BIOS revision.

Install the HP Z Turbo Drive(s) following the directions in the installation guide. Make sure to install the appropriate drivers as found on the <u>hp.com/support</u> website. The workstation model can be found on the front of the system chassis.

Benefits of HP Z Turbo Drives using software RAID configurations

HP Z Turbo Drives use the built-in capabilities of the operating system (OS) to support a RAID configuration (also known as a software RAID). In order for the RAID volume to be correctly managed, the system must first boot to the OS. As such, the HP Z Turbo Drive family currently only supports data RAID configurations. Use of HP Z Turbo Drives in an OS RAID or Boot RAID configuration is not supported. This limitation applies to all PCIe connected SSD components today.

Configuring the HP Z Turbo Drives into a RAID 1 (mirror) will provide data redundancy for those customers concerned about data loss, but provides no performance improvement. Configuring the HP Z Turbo Drives into a RAID 0 (striped volume) provides additional performance that scales as shown below.



Figure 1. Software RAID 0 performance

Configuring RAID with HP Z Turbo Drives using Microsoft Windows

Once the HP Z Turbo Drives are installed in the system and the system has been rebooted, launch Disk Management.

- For Windows 7 systems, click Start, right-click on Computer, select Manage, select Disk Management.
- For Windows 8 and later systems, hit the Windows+X keys on the keyboard, select Disk Management.

If the HP Z Turbo Drives are new, you will be asked to initialise the drives.

- Choose either Master Boot Record (MBR) or GUID Partition Table (GPT).
- You can use MBR or GPT for arrays smaller than 2.2 TB (e.g. the array size for two 512 GB drives in a RAID 0 is equal to 1 TB; the array size for two 512 GB drives in a RAID 1 is equal to 512 GB).

- GPT must be used for arrays larger than 2.2 TB (e.g. the array size for four 1 TB drives in a RAID 0 is equal to 4 TB).

• Click **OK**.

Figure 2. Initialise disk

File Action View Help	
Computer Management (Local Volume Layout Type File System Status Actions	
A 👔 System Tools Simple Basic Healthy (Recovery Partition)	
D Task Scheduler Simple Basic Healthy (EFI System Partition)	
Event Viewer COVERY (D:) Simple Basic Healthy (OEM Partition) More Actions	•
Shared Folders Area Participation - Simple Basic NTFS Healthy (OEM Partition)	
Local Users and Groups Groups	
> No Performance	
A Device Manager Initialize Disk	
a 🔄 Storage You must initialize a disk before Lonical Disk Mananer can access it	
Disk Management Select disker:	
Services and Applications	
Use the following partition style for the selected disks:	
MBR (Master Boot Record)	
GPT (GUID Partition Table)	
447.01 GB Note: The GPT partition style is not recognized by all previous versions of TES	
Online Twindows. It is recommended for disks larger than 21B, or disks used on EM Partitio	
OK Cancel	
Colored Disk 1	
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476.94 GB 476.94 GB	
Not initialized Unallocated	
Unknown	
476.94 GB 476.90 GB	
Not Initialized Unallocated *	
< III b Unallocated Primary partition	

The drives are now initialised but unallocated.

Figure 3. Initialised but unallocated drives

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System Tools	•	Simple	Basic		Healthy (Recovery Partition)		795 MB	795 1	Disk Management
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B Shared Folders	Windows (C:)	Simple	Basic	NTES	Healthy (Boot, Page File, Crash Dump, Pri	imary Partition)	435.03 GB	397.4	
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	447.01 GB	795 MB		100 MB	435.03 GB NTFS	11.10 GB NTFS	(0.)		
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Mouse over one of the unallocated HP Z Turbo Drives and right-click. A menu will appear to configure a software RAID. The software RAID modes are defined as follows:

- Simple volume: No RAID, single drive.
- **Spanned volume:** A single partition that includes multiple drives. Files are not deliberately broken up among the drives. A spanned volume does not include any performance or redundancy advantages.
- **Striped volume (RAID 0):** Data and files are deliberately broken up across multiple disks in an attempt to improve read and write performance. The resulting RAID volume size is the sum of the individual drives included in the configuration.
- **Mirrored volume (RAID 1):** Data is replicated between drives, providing data redundancy but no performance advantage. The RAID volume size equals the size of the smallest drive in the array.
- **RAID 5 volume:** A RAID 5 does not replicate data between multiple drives and is more efficient at storing the redundancy information necessary to restore the RAID when a drive fails. Instead of replicating all data to a second drive, it creates a smaller parity partition to allow data recovery. RAID 5 is not available on Windows 7 or Windows 10.

Figure 4. Disk Management screen and menu choices

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Services and Applications	•		III				•		
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	Dick 1								
	Basic 476.81 GB Online	476.81 GB Unallocated		New Simple Volume New Spanned Volume New Striped Volume			н		
	Disk 2			New Mirrored Volume					
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	476.81 GB Online	476.81 GB Unallocated		Properties					
				Help					
	CD-ROM 0 DVD (E:)								
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For this document, RAID 0 is selected using HP Z Turbo Drive G2s. Microsoft Windows provides a wizard to help complete the process.

Figure 5. Microsoft Windows RAID Configuration Wizard

File Action View Help	9 10						
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Computer Management (Local Generation of System Tools Computer Task Scheduler	Volume New Striped Vo	Layout T olume	ype File System Status	7	apacity F 95 MB 7 00 MB 1	Free 795 1	Actions Disk Management
 Task Scheduler Event Viewer Event Viewer Event Viewer Event Viewer Event Viewer Event Viewer Storage Disk Management Services and Applications 	New Stripes vo Basic 40 Basic 475.81 GB Online Disk 2 Basic 475.81 GB Online Disk 2 Basic 475.81 GB Online Disk 2 Basic 0 Disk 2 Basic 0 Disk 2 Disk	476.81 GB Unallocated	Concernation of the New Striped Volume Substript of the New Striped Volume To the water helps you create stiped volumes on disk. A stiped volume dress data in stopes on two or more disk. A single or spanned volume. To continue, click Next. (Back Next) Cancel	RECOVERY (D GB NTFS althy (DEM Pa	D0 MB 1 10 06 10	E	Disk Management More Actions
• •	Unallocated	Primary partitio	n				

Click Next.

Choose the other drives to be included in the RAID array. For each drive to be added to the array:

• Select the drive.

• Click Add.

Figure 6. Drive selection

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Computer Management (Local	Volume New Striped V	ree Actions Disk Management		
P Provention P Provention P Provention P Provention	Select Dis You ca	ks n select the disks and set the disk size for this volume.	100 MB 10 11.10 GB 1 11.10 GB 1 11.10 GB 1 7 Partition) 435.03 GB 32	00 1 62 More Actions 62 62
Device Manager Storage Disk Management Services and Applications	Select 1 Availab Disk 2	he disks you want to use, and then click Add. In: Selected: 488257 MB Add Selected:		
		< Remove Al		
	Total vo Maximu	lume size in megabytes (MB): 488257 n available space in MB: 488257		▶ ▲
	4. C	e amount of space in MB: 48237 < Back	LECOVERY (D:) 10 GB NTFS althy (OEM Partition)	
	Basic 476.81 GB Online	476.81 GB Unallocated		E
	Disk 2 Basic 476.81 GB Online	476.81 GB Unallocated		
	CD-ROM 0 DVD (E:) No Media			
۰ (الا الا الح الح الح الح الح الح الح الح	Unallocated	Primary partition		

Once all drives have been added, click **Next**.

Figure 7. Drive selection

File Action View Help					
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System Tools Tark Scheduler	New Striped	/olume	795 MB	7951	Disk Management 🔺
If Event Viewer If Event Viewer If Shared Folders If Local Users and Groups	G Select D You c	sks an select the disks and set the disk size for this volume.	11.10 GB 11.10 GB (Partition) 435.03 GB	1.62 1.62 397.4	More Actions
 Performance Device Manager Storage 	Select	the disks you want to use, and then click Add.			
📄 Disk Management	Availa	ole: Selected:			
Services and Applications		Add > Disk 1 488257 MB			
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	Total v	olume size in megabytes (MB): 976514		+	
	d Maxim	um available space in MB: 488257		L Â	
	B Select	the amount of space in MB: 488257	RECOVERY (D:)		
	d		althy (OEM Partition)		
		< Back Next > Cancel			
	d				
	Basic 476.81 GB	476.81 GB			
	Online	Unallocated			
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	476.81 GB	476.81 GB			
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Assign a drive letter for the resulting RAID volume. Notice that the RAID can be assigned to an empty NTFS folder. Choose the appropriate option, then click **Next**.

Figure 8. Assigning a drive letter

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 Fask Scheduler Event Viewer Shared Folders Are Local Users and Groups Performance 	Assign Dri For eas	ve Letter or Path er access, you can assign a drive letter or drive path to your volume.	y Partition)	11.10 GB 11.10 GB 435.03 GB	1.62 1.62 397.4	More Actions	•
Device Manager Storage Konse Kons	Assignment Assignment Assignment Dor	gn the following drive letter: T in the following empty NTFS folder: Browse ot assign a drive letter or drive path < Back Next > Cancel	RECOVERY 10 GB NTFS althy (OEM	r (D:) Partition)			
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	Basic 476.81 GB Online	476.81.GB Unallocated					
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The OS will now format the RAID volume. Select either the default stripe size, or choose an alternative size. Click **Next** to continue.

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4 🎁 System Tools	New Striped V	/olume	Andrea Anno Andrea	23		795 MB	795 1	Disk Management
Event Viewer Shared Folders	Format Ve	olume re data on this volume, you	must format it first.			100 MB 11.10 GB 11.10 GB	100 r 1.62 1.62	More Actions
Merical Users and Groups More Performance	Choose	e whether you want to forma	t this volume, and if so, what settings you wa	int to use.	y Partition)	435.03 GB	397.4	
Device Manager Storage Disk Management	0	Do not format this volume						
Services and Applications	۲	Format this volume with the	following settings:					
		File system:	NTFS -					
		Allocation unit size:	Default 💌					
		Volume label:	Z Turbo Drive G2 RAID					
	4	Perform a quick formation	t.				۲	
	c	Enable file and folder	compression		_			
	B 4				RECOVER	((D:)		
	c				althy (OEM	Partition)		
	6		< Back Next >	Cancel				
	Basic				///////			
	0nline	476.81 GB Unallocated					E	
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	476.81 GB	476.81 GB						
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4 III >	Unallocated	Primary partition						

Figure 9. Stripe size

When the RAID configuration has completed, click **Finish**.

Figure 10. RAID configuration completion message

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🌆 Computer Management (Local	Volume	Layout T	ype File System Status	_	Capacity	Free	Actions
a 🎁 System Tools	New Striped Vo	olume			795 MB	795 1	Disk Management
 O Task Scheduler E Event Viewer Shared Folders E Local Users and Groups O Performance Device Manager Storage Disk Management Services and Applications 			Completing the New Striped Volume Wizard You have successfully completed the Wizard. You selected the following settings: Volume tyse: Strond Dekis selected: Diek 1. Diek 2. Volume size: Strond Devise selected: Diek 1. Diek 2. Volume size: Strond Devise teter or path. F: File system: NTFS Alocation unit size: Default Quinck format: Yes To close this wizard, click Finish.	Y Partition	100 MB 11.10 GB 11.10 GB) 435.03 GB	100 f 1.62 1.62 397.4	More Actions
			< Back Finish Cancel	RECOVE 10 GB NTI althy (OEP	RY (D:) ^{-S} M Partition)		
	Basic 476.81 GB Online	476.81 GB Unallocated				-	
	Disk 2 Basic 476.81 GB Online	476.81 GB Unallocated					
	GD-ROM 0 DVD (E:) No Media						
۰ III • •	Unallocated	Primary partitio	n			2	

Click **Yes** to continue with the RAID configuration, or **No** to abort.

Figure 11. RAID configuration confirmation

Disk Mana	gement
4	The operation you selected will convert the selected basic disk(s) to dynamic disk(s). If you convert the disk(s) to dynamic, you will not be able to start installed operating systems from any volume on the disk(s) (except the current boot volume). Are you sure you want to continue?
	Yes No

When completed, Disk Management will show all the disks configured using RAID, based on the name of the volume and the assigned drive letter. Note that in Disk Management, the volumes shown in the top pane relates to the overall size of the RAID while the disks listed at the bottom display the size of the individual drives.

File Action View Help	4 R							
Computer Management (Local	Volume	Layout Type	File System	Status		Capacity	Free 705.1	Actions
▷ ⑦ Task Scheduler ▷ ☑ Event Viewer ▷ ☑ Shared Folders ▷ ☑ Local Users and Groups ▷ ⑧ Periormance ☑ Device Manager ☑ Disk Manager ☑ Disk Managerent ▷ ⑧ ▷ Services and Applications	HP_RECOVERY (HP_RECOVERY (Windows (C:) Z Turbo Drive G;	Simple Basic Simple Basic D:) Simple Basic D:) Simple Basic Simple Basic	NTFS NTFS NTFS	Ineality (Incovery Faruttoin) Healthy (EFS)stem Partition) Healthy (OEM Partition) Healthy (OEM Partition) Healthy (Boot, Page File, Crash Dump, Pri Healthy	imary Partition)	100 MB 11.10 GB 11.10 GB 435.03 GB 953.63 GB	100 f 1.62 1.62 397.4 953.5	Disk Management
	Disk 0 Basic 447.01 GB Online	795 MB Healthy (Recovery	III 100 MB Healthy (EF	Windows (C:) 435.03 GB NTF5 Healthy (Boot, Page File, Crash Dump,	HP_RECOVER 11.10 GB NTFS Healthy (OEM	7 (D:) Partition)	F	
	Disk 1 Dynamic 476.81 GB Online	Z Turbo Drive G2 476.81 GB NTFS Healthy	RAID (F:)	1.			-	
	Disk 2 Dynamic 476.81 GB Online	Z Turbo Drive G2 476.81 GB NTFS Healthy	RAID (F:)					
	CD-ROM 0 DVD (E:) No Media						v	
< <u> </u>	Unallocated	Primary partition 📕	Striped volun	ne				

Figure 12. Disk Management with HP Z Turbo Drives in a RAID 0 configuration

Note: On completion the OS will see a new drive and may generate an AutoPlay dialogue. Either select **Open folder to view files** or close the dialogue box.

Figure 13. AutoPlay dialogue box

🗢 AutoPlay	
Z Turbo Drive G2 RAID (F:)	
General options	
Open folder to view files using Windows Explorer	
Use this drive for backup using Windows Backup	
View more AutoPlay options in Control Panel	

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