About This User Guide

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Volume Expansion User Guide

With ThecusOS^m 5.0, one of the greatest feature is Dynamic Volume Expansion. With Volume expansion, the user has the choice to expand its storage capacity whenever required. A total of 8 physical volumes can be added for expansion and become on large logical volume to be managed under one system only.

To start with volume expansion, in the user UI, go to the **Storage** menu, choose the **Volume Expansion Management** item and the **Volume Expansion Management** screen appears. From here, you can see 2 major categories, "Expansion Management" and "Expansion Member Creation".

Expansion Management: This is going to manage the joined volume members.

Expansion Member Creation: This one is to create a volume member from the current system. Each system is only allowed to create one volume member.

The volume expansion is only supported with 10G NIC, installed and connected. If no 10G NIC is found, the message below will appear.



Expansion Member Creation If your 10GbE is installed and connected then let's start with volume member creation.

×	Home > Storage > Volume Expansion Management	⑦ Help ♡+ My favorite 🔱 • Shutdown 🕂 Logout
System Information		
🗙 System Management 🖭	Expansion Management	Expansion Member Creation
System Network 🙂	Using connected volumes to build Expansion Management	Provide volumes under high speed network.
Storage 🖃	Expansion Management	inetwork.
Disk Information RAID Management NAS Stacking ISO Image Mounting Share Folders SisCSI High-Availability Volume Expansion Management	Expansion Management RAID ID: Stripe (KB): File System: RAID Status: Capacity: RAID Status: Capacity: Refresh @ Create \$ Expand @ Remove The Suspend	€ Resume
	IPv4 Host Name RAID ID RAID	Level Capacity Spare Status
User and Group Authentication User and Group Authentication Application Server Backup		
	Apply, Cancel	,

Click on "Expansion Member Creation", and then select "Create" to start.

	Using co	ansion Management onnected volumes to t pansion Management			on Member Creation lumes under high spee network.
pansion Memb		esh 🗊 Disconnect 🐊	Reconnect		

The volume creation wizard appears and leads you to complete the volume creation.

1. Select the available disks from the system. Please be notified that the volume has to be RAID5, RAID6, RAID10, RAID50 or RAID60.

Disks List	Disk	Model	Capacity	Bad Block	Avail	Spare
The lists of system hard disk	□ N8900	(4Disks)				
	5	Hitachi HDS72101	932 GB		V	
	6	Hitachi HDS72101	932 GB			
	7	Hitachi HDS72101	932 GB			177
	8	Hitachi HDS72101	932 GB		V	
RAID Level Selection						
RAID Property Setup						
RAID System Setup						
RAID Volume Creation Confirmation	Descripti	on:				
	According	list has listed installed to the selected disk(JD 6.RAID 10		status and usage. aid level(s) as the following:		
) Final	INTED STR	ab 0,010 10				
) Final						

2. Choose the desired RAID mode from the available RAID type.



3. Give a name to the RAID ID.

CALD VOIUME Creation		
Disks List RAID Level Selection	RAID ID: RAID01	
3 RAID Property Setup Setup RAID property in varies tuation per needed	Description: RAID ID: alow 0-9, a-z, A-Z and which is required and unique.	
RAID System Setur		

4. Specify the stripe size. The file system is "VE" as default and can't be changed.



5. After confirmation, the RAID volume settings information will appear.

Defa List	RAID Volume Creation	Confirmation	
RAID Level Selection	Field	Value	
RAID Property Setup	Disks List	5,6,7,8	
Second contract and the	RAID Level	RAID 5	
RAID System Setup	RAID ID	RAID01	
	Quick Raid	No	
~	Stripe Size(KB)	64 KB	
5 RAID Volume Creation	File System	VE	
Confirmation			
Listed RAID creating configuration for	r i		

6. Click finish to confirm the RAID volume creation.

RAID Volume Creation		×
Diver Lat RAID Level Selection	The RAID volume creation will start after Finish button pressed. During the RAID volume creation period all of active services will be stopped.	
RAID Property Selup	in another m	
🔘 RAID System Betup		
RAID Volume Greation Confirmation		
6 Final		
RAID volume creation has all its setup complete		
	Finish)

7. Volume creation is started. It may take a few hours depending on the HDD capacity.

1				Expansion M g connected Expansion M	volumes to	build		Provide volum	Member Creation les under high speed etwork.
	nsion Mer					Reconnect			
				Capacity		La contracta de	Network Int	Target	Connection
1	RAID01	5	5,	2787 GB	N/A	Building (0.3	192.168.5.2	Please input	Disconnected
						🗘 Data Processir	g		

8. After volume creation is completed, the volume will be listed as below and ready to join as a member on the volume expansion group.

	sion Mer			- 80	1000	buid	580	Provide volu	Member Creation mes under high spee network.
100									
0	Create 🤤	Removi	a R	efresh 🎛 Olso	onnect 🍠	Reconnect			
0	parties and			efresh 🗰 Oise Capacity	onnect 💋 Spare	Reconnect	Network Int	Target	Connection

Now, we have successfully created a volume expansion member. This will be our sample unit 1, WAN/LAN1 IP 172.16.64.191, 10G NIC IP 192.168.5.254 and RAID5.

Since the volume expansion function only works in a 10G environment, a 10G IP will be needed as a key to manage the volume expansion group.

			Expansion M sing connected Expansion M	volumes to b		580	Provide volum	Member Creation les under high speed letwork.
i sîon Mer Greate 🥥			efresh 💶 Disc	onnect 🖋	Reconnect			
	Remov	e 🤤 R	efresh 💶 Disc	onnect 🖋 F	Reconnect Status	Network Int	Target	Connection

Our sample unit 2 is WAN/LAN1 IP 172.16.66.111, 10G NIC IP 192.168.5.250 and the volume used for volume expansion is created in RAID10.

Oreate Remove Refresh TDisconnect RAID ID RA Tray Capacity Spare Status Network Int Target Connection	1	8			Expansion Ma sing connected v Expansion M	volumes to b	580	on Member Creation plumes under high speed network.
Into to intervention opaic status network titter falget connection		icion Mon	nhor C	reatio	n			

Volume Expansion Management

Since the volume expansion function only works in a 10G environment, a 10G IP will be needed as a key to manage the volume expansion group. Let's use our

sample unit 2 with 10G IP 192.168.5.250 to manage the volume expansion group. The screen shot below shows the installed and connected 10G NIC with the IP 192.168.5.250.

🕖 System Information	.*)	WAN/LAN1	LAN2	LAN3	Additional LAN4	Additional LAN5		
💥 System Management	.*)	Status:		Norma	ı	(Speed:	10000Mb/s
System Network	-	MAC Add	ress:	00:14	:FD:12:F7:80		Link Status:	Connected
Networking DHCP/RADVD Linking Aggregation		Jumbo Fr IPv4	ame:	1500	Y bytes		IPv6	
Control of the second		Enable: Mode:	8	 ✓ Ø M Ø 	anual HCP		Enable: Mode:	Manual
		IP:		192	.168.5.250		IP:	fec5::1
Storage		Netmas Gatewa		255	.255.255.0		Prefix Length: Gateway:	64
Ser and Group Authentication		Garena	11				occitoy.	
Network Service		Note:						

Let's add a 1st expansion volume group member. From the expansion volume created, fill in the "Target" IP address "192.168.5.250". It means that this expansion volume is going to join the associated volume group.

Please make sure that the joined member has the same network subnet.

1	8		U	Expansion M sing connected Expansion M	volumes to b		5 ^e e	Provide volume	tember Creation es under high speed etwork.
par	nsion Mer	nber C	reatio	n					
	Create 🤤	Remove	e 💲 R	efresh 💶 Disc	connect 🖋	Reconnect			
		1		efresh TDisc Capacity	connect 💋 I Spare	Reconnect Status	Network Int	Target	Connection

Press "Apply" to confirm the setting.

			Capacity	Spare	Status	Network Int	Target	Connection
RAID02	10	1,	1858 GB	N/A	Healthy	192.168.5.250	192.168.5.250	Disconnected

After confirmation, the connection status will change from "Disconnected" to "Connected".

pansion Member Creation O Create O Remove S Refresh S Disconnect	igh speer
RAID ID RA Tray Capacity Spare Status Network Int Target Connect	

Go to the "Expansion Management" screen, click on "Create", a member is ready to be joined.

	Using conn	ion Manageme ected volumes to sion Managemen	build			ion Member Creatio olumes under high spee network.
xpansion Mana	gement					
AID ID:						
tripe (KB):	~	<i>.</i>				
le System:	~					
AID Status:						
apacity:						
RAID Status: Capacity:						
Refresh 📀 0	Create 😽 Expand 🌾	Remove 🕕 Su	uspend 🕞 Resume			
IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status

	Using conn	ion Manageme ected volumes to sion Managemen	build			on Member Creation olumes under high spee network.
kpansion Manage	ment					
AID ID:						
ripe (KB):	64 💌					
L.	XFS Y					
ID Status:						
Contrago de la						
pacity:						
pacity:						
s Refresh OCre	ate 🛼 Expand 🌾	Remove 🛞 Su	ispend 🕟 Resume			
	ate 😹 Expand 🌾	Remove 🛞 Su	RAID Level	Capacity	Spare	Status

Next, input the RAID ID (We used "ve01" as our example) and select the member to be joined by clicking on it. Confirm by pressing "Apply" to complete the Volume Expansion creation.

After the volume expansion management has successfully created and a member joined, then the VE volume "ve01" will display the information as shown below. The volume size is noted to be 1855.2GB with an Healthy RAID. The joined member is listed with information about its capacity and status.

Expansion Management RAID ID: ve01 Stripe (KB): 64 * File System: XFS * RAID Status: Healthy Capacity: 1855.2 GB Refresh @Create Expand @Remove In Suspend RAID Level Capacity I 192.168.5.250 N8900 RAID02 10	ation speed
Stripe (KB): 64 File System: XFS RAID Status: Healthy Capacity: 1855.2 GB Refresh @Create Expand @Remove II Suspend PResume IPv4 Host Name RAID ID RAID Level Capacity Spare Status	
File System: XFS Used RAID Status: Healthy Capacity: 1855.2 GB Refresh @Create Expand @Remove II Suspend Presume IPv4 Host Name RAID ID RAID Level Capacity Spare Status	
File System: XFS Unused RAID Status: Healthy Capacity: 1855.2 GB Refresh @Create Schemand @Remove @ Suspend Presume IPv4 Host Name RAID ID RAID Level Capacity Spare Status	
Capacity: 1855.2 GB	
Capacity: 1855.2 GB	
Refresh Oreate Expand Remove III Suspend Resume IPv4 Host Name RAID ID RAID Level Capacity Spare	
IPv4 Host Name RAID ID RAID Level Capacity Spare Status	
1 192.168.5.250 N8900 RAID02 10 1858 GB N/A Healthy	
)

Now let's add more members to the volume "ve01". Let's take our sample unit 1 and add the created volume from it. Please follow the procedure below.

Select the created VE volume from the system.

1	8		Us	Expansion Ma sing connected v Expansion M	olumes to b		5ªD	Provide volum	Member Creation es under high speed etwork.
		82 10 10 10 10	0004020						
	Greate 🤤			n efresh 🚺 Disc	onnect 🝠 F	Reconnect			
		Remove	e 🤤 R	efresh 💽Disc	onnect 🝠 F Spare	Reconnect Status	Network Int	Target	Connection

Input the "Target" IP address for which VE volume this unit is going to join. Click on "Please input...."

ar	ision Mer	nber C	reatio	'n					
0	Create 🤤	Remove	e 🤤 R	efresh 🕕 Disc	onnect 🝠 F	Reconnect			
	RAID ID	RA	Tray	Capacity	Spare	Status	Network Int	Target	Connection
	RAID01	5	5	2787 GB	N/A	Healthy	192,168,5,254		Disconnected

In this case, this unit is going to join the "ve01" which the IP is 192.168.5.250. So simply input 192.168.5.250, then click "Apply" to confirm.

5	8		Us	Expansion Ma sing connected v Expansion M	volumes to b		5 ^e d	Provide volur	Member Creation mes under high speed network.
	n sion Mer Create 🤤			efresh 🚯 Disc	onnect 🝠 F	Reconnect			
	Create 🔘	Remove	e 💲 R		onnect 🖋 F Spare	Reconnect	Network Int	Target	Connection

After confirmation, the status will changed from "Disconnected" to "Connected"

2	Connta 🦱	Domour	n	efresh 🗊 Disc	anna di	lacannact		
	oreate 🤘	racinova			onneer 🎤	(econnect	Network Int	

Now, go back to the system 192.168.5.250 which is our volume expansion management unit and open the volume expansion management page, click on "Expand". The available volume which can be joined as a member will be listed.

As shown in the screen shot below, it is listed that there is a VE volume from the system N8900pm (sample unit 1) available. This is the VE volume that was just generated to join "ve01", this unit IP address is 192.168.5.254.

xpansion Ma	nagement						
AID ID:	ve01						
tripe (KB):	64 💙			Used			
ile System:	XFS 🛩			Unus Unus			
AID Status:	Healthy						
apacity:	1855.2 GB						
S Refresh	🕽 Create 😹 Expand 🌘	Remove 🗰 S	uspend 🕟 Resume				
IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status	
	3.5.254 N8900pm	DATOOI		2787 GB	N/A	I I lt-b	

Click "Apply" to confirm and the display will be as shown in the screen shot below.

The volume expansion has successfully expanded its size from 1855.2GB to 4639.5GB. The volume expansion group ve01 now contains 2 members (2 units).

onne p	Storage > Vo	lume Expansi	on Managemen	t	⑦ Help	Ø∙ My fa	avorite	U. Shutdown	n <i>s</i> ∰ Logo
	•	Using conn	ion Management ected volumes to bu sion Management	_	^B	6	10.17.000	ision Member (volumes under h network.	
xpar	ision Managem	ent							
AID I									
Stripe File Sy RAID S Capaci	ty: 46	s 🗸 althy 39.5 GB	Remove n Susp			Jsed Jnused			
Stripe File Sy RAID S Capaci	stem: XF Status: He ty: 46	s 🗸 althy 39.5 GB	Remove n Susp	end Resume RAID Level		Jnused	pare	Status	
Stripe File Sy RAID S Capaci	stem: XF Status: He ty: 46 Refresh @Create	althy 39.5 GB				/nused	ipare I/A	Status Healthy	

Suspend Volume Expansion

If for any reason, the volume expansion volume needs to be stoped, simply click "Suspend".

Home > Storag	e > Volume Expans	ion Managem	ent	⑦ Нер 〇	My favorite (り・Shutdown :	杞 Logo
F	Using cor	tsion Managem Inected volumes t ansion Manageme	to build	^B		sion Member Cre volumes under higt network.	
Expansion Ma	nagement						
RAID ID: Stripe (KB): File System: RAID Status: Capacity:	Ve01 64 × XF5 × Healthy 4639.5 GB	Bemove R S		Used			
IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status	
1 192.168	8.5.250 N8900	RAID02	10	1858 GB	N/A	Healthy	
2 192.168	8.5.254 N8900pm	RAID01	5	2787 GB	N/A	Healthy	

Once "Suspend" is clicked, all of its members will become offline and the VE RAID info will become blank.

lome >	> Storage > Vo	lume Expansi	on Manageme	ent	1 Help 🗘	My favorite (ታ• Shutdown	沿 Logou
	B	Using con	sion Managem nected volumes b insion Manageme	o build			sion Member Co volumes under hig network.	
Expan RAID I Stripe		ent						
File Sy	stem:	~						
	Status:							
Capaci	ty:							
69	Refresh 😗 Create	Expand (Remove 10 50	spend 🛞 Resume				
	IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status	
	192.168.5.250	N8000	RAID02	10	N/A	N/A	Offline	1.1
1	192.100.5.250	110300	101002	10	11/16	10/0	Onnie	

The members will also be shown as "Disconnected" after the volume is suspended.

9	Create 🤤	reenove			united an	CC COT PIECE			
	RAID ID	RA	Tray	Capacity	Spare	Status	Network Int	Target	Connection
1	RAID02	10	8,	1858 GB	N/A	Healthy	192.168.5.250	192.168.5.250	Disconnected
1	sion Men	iber Ci	reatio	n					
				n efresh 🗰 Disc	nnect Øf	leconnect			
	Create 🥥	Remove	Ş Re		annect 🍠 F Spare	leconnect Status	Network Int	Target	Connection

At this point, all of the joined members are off-line and their data is inaccessible.

Resume Volume Expansion

To resume the volume expansion volume, there are two ways.

1. Click on "Resume" and the system will automatically reconnect to the members every 5 minutes. If all its members can be reconnected, then the volume will resume.

Please click on "Refresh" if the information does not show in time.

Expansio	on Managem	ent					
RAID ID:	ve	01					
Stripe (K	B): 64	~			Used		
File Syste	em: XP	ed					
RAID Sta	tus: He	althy					
Capacity:	46	39.5 GB					
S Re	fresh 🛈 Create	Expand 🤞	Remove 🛞 Su	uspend ®Resume			
			D 4 10 10	mann Louis	Constitut	Contra	
в	Pv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status
	Pv4 92.168.5.250		RAID ID RAID02	10	1858 GB	N/A	Healthy

2. Click on "Resume" then manually go to each member and click on "Reconnect".

Ð	Create 🤤	Removi	e SR	efresh 🕮 Disc	onnect 🥖	Reconnect			
	RAID ID	RA	Tray	Capacity	Spare	Status	Network Int	Target	Connection
1	RAID02	10	8,	1858 GB	N/A	Healthy	192.168.5.250	192.168.5.250	Disconnected
In	sion Men	nber Ci	reatio	n					
				n efresh 🎛 Osc	annest 💋 A	leconnect			
		Remove	Ş Re	efresh 🗊 Diso		leconnect	Network Int	Target	Connection

The volume expansion is back and ready to perform.

5		Using con	sion Management nected volumes to rision Management	o build	^B C		sion Member Creation volumes under high speer network.
xpar	nsion Managem	ent		1			
AID I	ID: Ve	01					
tripe	(KB): 64	~			-		
ie Sv	stem: XF	s v			Used		
	1990 B. 199	100		1.1.1			
		althy		\sim			
apaci	ity: 46	39.5 GB					
4	Refresh OCreat	Expand (Remove 🗊 Su	spend ®Resume			
	IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status
1	192.168.5.250	N8900	RAID02	10	1858 GB	N/A	Healthy
1.4			RAID01	5			Healthy