## **About This User Guide**

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# **Volume Expansion User Guide**

With ThecusOS<sup>m</sup> 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 心+ Shutdown 🕂 Logout
J System Information		
💥 System Management 🗈	Expansion Management	Expansion Member Creation
System Network ±	Using connected volumes to build	Provide volumes under high speed
🗐 Storage 🖃	Expansion Management	inetwork.
NAS Stacking NAS Stacking ISO Image Mounting Share Folders FISCSI High-Availability Volume Expansion Management	Expansion Management RAID ID: Stripe (KB): File System: RAID Status: Capacity: RAID Status: Capacity: Refresh @ Create \$ Expand @ Remove @ Suspend	₽ Resume
	IPv4 Host Name RAID ID RAID	Level Capacity Spare Status
User and Group Authentication 2 Network Service 3 Application Server 2 Backup 2		
Backup +	Applu Canet	

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

<b>[</b> ]	E Using	connected Expansion Ma	anagemer volumes to anagement	nt build	Expansi Provide vo	on Member Creation lumes under high spee network.
pansion Memb	er Creation	n Refresh 🛈 Di	sconnect ,	/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.

	Disk	Model	Capacity	Bad Block	Avail	Spare
The lists of system hard disk	⊟ N890	(4Disks)				
	5	Hitachi HDS72101	932 GB		V	
	6	Hitachi HDS72101	932 GB			
	7	Hitachi HDS72101	932 GB			177
	8	Hitachi HDS72101	932 GB		V	100
RAID Property Setup RAID System Setup						
	Descripti	on:				
RAID Volume Creation Confirmation		let has letad installed	hard disk with its	status and usage.		

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



3. Give a name to the RAID ID.

Total volume creation		
Disks List	RAID ID: RAID01	
RAID Property Setup     Setup RAID property in varies     stuation per needed	Description: RAID ID: allow 0-9, a-z, A-Z and which is required and unique.	
RAID System Setup		

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.

Deks List	RAID Volume Creation	Confirmation	
RAID Level Selection	Field	Value	
	Disks List	5,6,7,8	
North Mobility Setup	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 ubmit configuration	<b>Pr</b> il		

6. Click finish to confirm the RAID volume creation.

RALD Volume Creation		\$
KALD Volume Creation Close Lat RAD Level Salection RAD Evel Salection RAD System Setup RAD System Setup Contraction Confirmation Contraction Fire all is setup complete	The RAID volume creation will start after  Finish  button pressed. During the RAID volume creation period all of active services will be stopped.	
	Finish	

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

Expansion Management Using connected volumes to build Expansion Management Ansion Member Creation	er Creation er high speed
ansion Member Creation	
) Create 🤤 Remove 💲 Refresh 💷 Disconnect 🖋 Reconnect	
RAID ID RA Tray Capacity Spare Status Network Int Target Connection	ction
1 RAID01 5 5, 2787 GB N/A Building (0.3 192.168.5.2 Please input Disconnected	inected

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.

			reatio	Expansion I Using connected Expansion	<b>Hanageme</b> I volumes to Management	nt build	580	Expansion Provide vol.	n Member Creation Imes under high spee network.
0	Create 🤤	Removi	S R	efresh 🗰 Oisc	onnect 🍠	Reconnect			
0	Create 🤤 RAID ID	Remov	C R	efresh 🗰 Oise Capacity	onnect 💋 Spare	Reconnect Status	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.

			Us	Expansion M sing connected Expansion M	anagemen volumes to b anagement	nt vuild	580	Expansion I Provide volum n	Member Creation les under high speed letwork.
pan O	I <b>sion Mer</b> Greate 🤤	nber C	c <b>reatio</b>	efresh 🕕 Disc	onnect 🖋	Reconnect			
pan O	Greate Create	nber C Removi RA	reatio	efresh 🚯 Disc Capacity	onnect 🖋 🛙	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.

	-8-		Us	Expansion Ma sing connected Expansion M	anagemen volumes to b anagement	t uild	580	<b>Expansi</b> Provide vo	on Member Creation olumes under high speed network.
<b>n</b> ar	ision Mon	nhor (	reatio	'n					
par O	Create	nber C	reatio	efresh Disc	onnect 🖋 F	Reconnect	Network Int	Target	Connection

#### **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	.*1	Status:		Norma	1	(	Speed:	10000Mb/s
System Network	-	MAC Add	ress:	00:14	:FD:12:F7:80		Link Status:	Connected
Networking		Jumbo Fr IPv4	ame:	1500	Y bytes		IPv6	
Criticity Hygrogouon		Enable: Mode:	5	<ul> <li>✓</li> <li>Ø</li> <li>M</li> <li>Ø</li> </ul>	anual HCP		Enable: Mode:	Manual
		IP:		192	.168.5.250		IP:	fec5::1
Storage		Netmas	sk:	255	.255.255.0		Prefix Length:	64
Ser and Group Authentication		uacom	11				occurdy.	
Network Service	.*)	Note:						

Let's add a 1<sup>st</sup> 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			U	Expansion M sing connected Expansion M	anagemen volumes to b lanagement	it uild	5 <sup>e</sup> e	Expansion N Provide volume n	lember Creation es under high speed etwork.
ar	ision Mer	nber C	reatio	on					
0	Create 🤤	Remove	e 💲 R	efresh 💶 Disc	connect 🖋	Reconnect			
0	Create 🤤	Remove	e 💲 R Tray	efresh TDisc Capacity	connect 💋 I Spare	Reconnect Status	Network Int	Target	Connection

Press "Apply" to confirm the setting.

	RAID ID	RA	Tray	Capacity	Spare	Status	Network Int	Target	Connection
Service of the servic	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".

Create ORemove Schefresh Connect	ſ	-3		Us	Expansion M sing connected Expansion M	anagemen volumes to b lanagement	t uild	<b>S</b> ed	Expansion Provide volument	<b>es under high spee</b> etwork.
RAID ID RA Tray Capacity Spare Status Network Int Target Connecti		sion Men	nber C	reatio	n					

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

( B	Expans Using conn Expar	ion Manageme ected volumes to Ision Managemen	nt build	585	Expansi Provide v	on Member Creation olumes under high speed network.
xpansion Manag	ement					
AID ID:						
tripe (KB):	~	- Ac				
le System:	~					
AID Status:						

	Expans Using conn Expan	ion Manageme ected volumes to sion Managemen	build t		Expansi Provide vi	ion Member Creation olumes under high spee network.
kpansion Manage	ment					
ID ID:						
ripe (KB):	54 💌					
System						
ID Cheby						
ID Status:						
pacity:						
pacity:	ate 😹 Expand 🌀	Remove 🛞 Su	uspend 🕞 Resume			
Pacity:	ate 😹 Expand 🌾	Remove 🔞 Sc RAID ID	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 II Suspend Resume         IPv4       Host Name         RAID ID       RAID ID         RAID Level       Capacity         Spare       Status							
RAID ID:     ve01       Stripe (KB):     64 ✓       File System:     XFS ✓       RAID Status:     Healthy       Capacity:     1855.2 GB       IPv4     Host Name       RAID ID     RAID Level       Capacity     Spare					agement	nsion Man	Expa
Stripe (KB): 64 File System: XFS RAID Status: Healthy Capacity: 1855.2 GB Refresh @ Create Strand @ Remove @ Suspend Resume IPv4 Host Name RAID ID RAID Level Capacity Spare St					ve01	ID:	RAID
File System:     XFS       RAID Status:     Healthy       Capacity:     1855.2 GB       Refresh @ Create >> Expand @ Remove @ Suspend >> Resume       IPv4     Host Name       RAID ID     RAID Level       Capacity:     Spare	Urad	- Urad			64 💌	(KB):	Stripe
RAID Status: Healthy Capacity: 1855.2 GB Refresh O Create E Expand Remove I Suspend Resume	Unused	Unuse			XFS 🛩	stem:	File Sy
Capacity: 1855.2 GB					Healthy	Status:	RAID
Refresh ③ Greate move     Remove     Image: Suspend resume       IPv4     Host Name     RAID ID     RAID Level     Capacity     Spare     Street					1855 2 GB	itv:	Сарас
Sector     Sector </td <td></td> <td></td> <td></td> <td></td> <td>1055.2 00</td> <td></td> <td></td>					1055.2 00		
IPv4 Host Name RAID ID RAID Level Capacity Spare St		sume	uspend 🕞 Resum	Remove 🕕 Si	Create 😹 Expand 🧯	Refresh 🥝	5
in the level oppore oppore	ity Spare Status	vel Capacity	RAID Level	RAID ID	Host Name	IPv4	
1 192.168.5.250 N8900 RAID02 10 1858 GB N/A He	GB N/A Healthy	1858 GB	10	RAID02	5.250 N8900	192.168	1

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			Us	Expansion Ma sing connected v Expansion M	anagemen volumes to b anagement	t uild	5 <sup>e</sup> d	Expansion I Provide volum n	Member Creation es under high speed etwork.
		82 10 10 10 10	0004020						
par O	Create 🥥	nber C	reatio	n efresh 🚺 Disc	onnect 🝠 F	Reconnect			
oar O	Create 🤤	Remove	reatio	n efresh 💽 Disc Capacity	onnect ØF 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....."

•	Create 🤤	Remove	e 🤤 R	efresh 🗊 Disc	onnect 🝠 🖡	Reconnect	,		_
	RAID ID	RA	Tray	Capacity	Spare	Status	Network Int	Target	Connection
	RATD01	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			Us	Expansion Ma sing connected v Expansion M	anagemen volumes to b anagement	t uild	5 <sup>e</sup> d	Expansion Provide volur	Member Creation nes under high speed network.
						1			
par	n <b>sion Mer</b> Create 🥥	Remove	reatio	efresh 🕕 Disc	onnect 🝠 F	Reconnect			
par O	Create ORAID ID	Remove RA	reatio	efresh 💽 Disc Capacity	onnect 🖋 F Spare	Reconnect Status	Network Int	Target	Connection

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

xpan	ision Men	nber C	reatio	n					
0	Create 🤤	Remov	e 🧣 R	efresh 🗊Disc	onnect 🥖	Reconnect			
	RAID ID	RA	Tray	Capacity	Spare	Status	Network Int	Target	Connection
1	RAID01	5	5,	2787 GB	N/A	Healthy	192.168.5.254	192.168.5.250	Connected

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	ed	
AID Status:	Healthy					
apacity:	1855.2 GB					
💲 Refresh 🌾	🕽 Greate 😹 Expand 🌾	Remove 🔞 S	uspend 🕟 Resume			
IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status
		mulaine and a second second				

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 Management		⑦ Help	<b>♡</b> • My f	avorite	U. Shutdow	n <i>s</i> ∰ Log	ut
	•	Expans Using conn Expan	ion Management ected volumes to buil sion Management		<sup>B</sup>	3	<b>Expar</b> Provide	<b>ision Member</b> volumes under l network.	Creation	
xpar	nsion Managem	ent								
		9.4.								
Stripe File Sy RAID S Capaci	(KB): 64 stem: XF Status: He ity: 46.	althy 39.5 GB	Remove 🗊 Suspe	nd © Resume		Jsed Jnused				
Stripe File Sy RAID S Capaci	(KB): 64 stem: XF Status: He ity: 46 Refresh @Create	althy 39.5 GB	Remove 🕡 Susper	nd Resume RAID Level	Capacity	Jsed Jnused	Spare	Status		
Stripe File Sy RAID S Capaci	KB:         64           stem:         XF           Status:         He           ity:         46           Refresh         Create           IPv4         192.168.5.250	althy 39.5 GB Solution Control	Remove III Susper RAID ID RAID02	nd Resume RAID Level 10	Capacity 1858 GI	Jsed Jnused	Spare I/A	Status Health		

### Suspend Volume Expansion

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

Home > Store	age > Volume Expan	sion Manageme	ent	🕐 Неф  🗘	My favorite (	り・Shutdown 3	E Log
	Expa	insion Managem innected volumes tr aansion Managemer	ent o build nt	5 <sup>8</sup> 7	Expan: Provide	sion Member Cre volumes under high network.	ation speed
Expansion M	lanagement						
RAID ID: Stripe (KB): File System: RAID Status: Capacity:	Ve01 64 × XFS × Healthy 4639.5 GB			Used	ed		
IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status	
1 192.1	68.5.250 N8900	RAID02	10	1858 GB	N/A	Healthy	
2 192.1	68.5.254 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	ion Manageme	ent	1 Help 🗘	My favorite	Ů• Shutdown	A Logou
		Expan Using con Expr	ision Managem nected volumes b Insion Managemen	ent o build at		<b>Expa</b> Provid	nsion Member C e volumes under hi network.	reation gh speed
Expan	ision Managem D:	ent						
Stripe	(KB):	¥						
File Sys	stem:	~						
RAID S	status:							
Capaci	ry:							
5	Refresh 😳 Create	Expand (	Remove 10 50	rpend 🕞 Resume				
	IPv4	Host Name	RAID ID	RAID Level	Capacity	Spare	Status	
	192,168,5,250	N8900	RAID02	10	N/A	N/A	Offine	
1	1021100101200	110000	TO SERVICE	- 10	14.12	ing ra	Onnie	

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

0	Create 🤤	Remove	t SR	enest al osc	onnect pr	Recorrect			
	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
n	sion Men	iber Ci	eatio	n					
n	sion Men	iber Ci Remove	eatio	n :fresh 🔳 Disci	nnect 🍠	leconnect			
n	sion Men Greate 🤤 RAID ID	nber Cr Remove RA	Reation	n effesh 🔳 Disc Capacity	nnest 🍠	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.

Expansion	Managem	ent					
RAID ID:	ve	91					
Stripe (KB)	: 64	~			Ilsed		
File System	: 209	5 -			Unus	ed	
RAID Statu	s: He	althy					
Capacity:	46	39.5 GB					
🔓 Refre	st 🛈 Create	Expand 🤞	Remove 🐨 SL	spend ®Resume			
S Refre	st @Create	Expand G	Remove T Su RAID ID	RAID Level	Capacity	Spare	Status
Refre IPv 1 192	4 2.168.5.250	Host Name	Remove The Sk RAID ID RAID02	RAID Level	Capacity 1858 GB	Spare N/A	Status Healthy

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

)	Create 🤤	Removi	e SR	efresh 🕮 Disc	onnect 🥖	Reconnect			
	RAID ID	RA	Tray	Capacity	Spare	Status	Network Int	Target	Connection
Í.	RAID02	10	8,	1858 GB	N/A	Healthy	192.168.5.250	192.168.5.250	Disconnected
n	sion Men	iber Ci	reatio	n					
an >	sion Men Greate 🤤	iber Ci	reatio	n efresh 🎛 Osc	onnest 💋 R	leconnect			
	sion Men Greate 🤤 RAID ID	Remove	reatio Re Tray	n effesh 🔳 🖂 🕫	onnect PR	leconnect	Network Int	Target	Connection

The volume expansion is back and ready to perform.

xpan	ision Managen	ient					
RAID I	D: 💡						
Stripe	(KB): 6	* *			Head		
	stem:	5 -			Unus	ed	
File Sy.							
File Sy	Statues			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	/		
File Sy RAID S	Status: H	ealthy					
File Sy RAID S Capaci	Status: Hi ty: 46	ealthy 539.5 GB					
File Sy RAID S Capaci	status: Hi ty: 44	ealthy 539.5 GB					
File Sy RAID S Capaci	Status: Hi ty: 44 Refresh OCree	ealthy 539.5 GB to 🔀 Expand 🍕	Remove 🗊 Sus	ppend ®Resure			
File Sy RAID S Capaci	Status: Hi ty: 44 Refiesh OCrea	ealthy 539.5 GB Expand G Host Name	Remove 🕫 Sus	pend ® Resume RAID Level	Capacity	Spare	Status
File Sy RAID S Capaci	Status: H ty: 44 Refiesh @Crea IPv4 192.168.5.250	ealthy 539.5 GB Expand G Host Name ) N8900	Remove Tous RAID ID RAID02	RAID Level	Capacity 1858 GB	Spare N/A	Status Healthy