AhsayUBS

AhsayUBS (Ahsay Universal Backup System) is a low price yet powerful operating system for a backup appliance to operate with. It has been optimized for AhsayCBS to run smoothly on it. With AhsayUBS, you can get AhsayCBS deployed onto a bare server hardware within a few minutes.

It is a customized version of FreeNAS firmware with AhsayCBS bundled and is specifically optimized to run AhsayCBS. Apart from AhsayCBS, it also contains some basic features that system administrator require, e.g. SSH and system monitoring tools.

Release Announcement

Notes

1. AhsayUBS is bundled with the latest version of AhsayCBS. Starting from AhsayCBS v8.1.0.0 onwards:

   All AhsayCBS installations will have the Ahsay Cloud Backup Suite NFS services installed and running by default listening on port s 111, 1058, and 2049. The NFS service is to facilitate VM Run Direct on AhsayCBS by allowing VMware vCentre/ESXi hosts to directly access the backed up VM files on AhsayCBS User Home as an NFS mount to access the guest VM for recovery.
2. AhsayUBS 8 runs only on machines installed with 64bit CPU
3. FreeBSD 11.2 is used by AhsayUBS v8.1.0.0 onwards.
4. OpenJDK8 is used by Ahsay v8.1.0.0 onwards.
5. The upgrade of AhsayUBS installations running on both the UFS storage model and the previous ZFS storage model.
6. Supports both iSCSI and Additional Storage features.
7. AhsayUBS 8 supports upgrade from AhsayUBS 2.29 (OBSR v6.29) or AhsayUBS 7.17 (CBS v7.17). It is advised you first upgrade your server to these latest released, and update your clients to matching versions; before upgrading to v8.

The UFS storage model

For backwards compatibility with older AhsayUBS versions, the UFS storage model is also supported. After upgrade, the 'geom_concat.ko', 'geom_stripe.ko', and 'geom_raid5.ko' module will be loaded by the FreeBSD to support the UFS storage model. To check if these kernel modules have been loaded correctly you can run the "kldstat" command, which will return the following output.

The 'Master Storage Device' on AhsayUBS is preserved in UFS format which is mounted on '/ubs/mnt/eslsfw' upon system boot time. The following example shows a UFS filesystem mount as '/ubs/mnt/eslsfw'.

The Optional Labelled Device in the legacy AhsayUBS will migrated in this version of AhsayUBS which is one of the storage types called "Optional Storage" inside the "Additional Storage". Volume status and UFS filesystem integrity checking (fsck) are also available in this AhsayUBS version. For details, please refer to the section [Storage].

The ZFS storage model

AhsayUBS is implemented with ZFS v5 and ZPOOL v28. The existing ZPOOL(s) will not be upgraded and only newly created ZPOOL will be applied with the ZIL (ZFS Intent Log).

As the ZFS storage model is based on a GMIRROR and ZFS design, therefore the 'geom_mirror.ko', 'opensolaris.ko', and 'zfs.ko' kernel modules will be loaded by the FreeBSD. The GEOM kernel modules used previously for UFS support 'geom_concat.ko', 'geom_stripe.ko', and 'geom_raid5.ko' will also be loaded. To check if these kernel modules have been loaded correctly you can run the "kldstat" command, which will return the following output.

The 'Master Storage Device' on AhsayUBS is configured as a ZPOOL with the following pool name 'eslsfwx{UID}' format. The ZFS pool will be mounted on '/ubs/mnt/eslsfw' upon system boot time. The following example shows a zpool volume of size 191GB "eslsfwx839830C2" mount as '/ubs/mnt/eslsfw'

For volume status and ZFS filesystem integrity checking, please refer to the section [Storage] for details

The other "esgpbt", "esosfw", and "esfmfw" System Firmware Devices are still mounted from the /etc/fstab file.

```
ahsayubs:~# cat /etc/fstab
/dev/md0            /            ufs        rw        0        0
/dev/mirror/839830C2xesosfw /ubs/mnt/esosfw ufs ro 1 1
/dev/mirror/839830C2xesfmfw /ubs/mnt/esfmfw ufs ro 1 1
ahsayubs:~#
```

The ZFS storage model is used for the following AhsayCBS locations:

1. %USER_HOME%
2. %SYSTEM_HOME%
3. %POLICY_HOME%
4. %CONF_HOME%
5. %WEBAPPS_HOME%
6. %RECEIVER_HOME%

The other "System Firmware Devices" such as "esgpbt", "esosfw", and "esfmfw" will remain unchanged as GEOM MIRROR based UFS volumes. The GEOM device names are in the following

formats:

1. GPT Boot - {UID}xesgpbt
2. Operating System Framework - {UID}xesosfw
3. Firmware Module Framework - {UID}xesfmfw

> For production AhsayUBS servers configured with ZFS volume(s). It is strongly recommended to install at least 4 GB RAM, as ZFS volumes require relatively large amount of memory to run. The amount of memory required is dependent on the size of the ZFS volume and the amount of I/O activity.

ZFS Integrity Checking

In order to safeguard the data integrity of the files on the ZFS volume, a weekly "zpool scrub" (zpool volume data integrity check) is performed starting at 00:00 every Sunday morning, to verify the checksums of all the data in the specified ZFS pools are correct.

The scheduled started time of the "zpool scrub" is currently not user configurable and it cannot be disabled in this version of AhsayUBS.

Once the "zpool scrub" job has started it is not possible to stop it.

To check the status of the "zpool scrub", you can use the "zpool status" command which will return the following output. For the following example the "zpool scrub" has checked 56.33% of the pool: eslsfwx839830C2

```
ahsayubs:~# zpool status
  pool: eslsfwx839830C2
 state: ONLINE
 scrub: scrub in progress for 0h0m, 56.33% done, 0h0m to go
config:

        NAME                      STATE     READ WRITE CKSUM
        eslsfwx839830C2           ONLINE       0     0     0
          label/839830C2xd00p04   ONLINE       0     0     0

errors: No known data errors
ahsayubs:~#
```

If an additional data integrity check is required in between the scheduled weekly checks. It is possible to initiate a manual "zpool scrub" using the "zpool scrub {% POOL_NAME%}" command.

As with the weekly "zpool scrub", the AhsayCBS service and backup/restore operations can continue to run as normal.

> There may be some performance overhead associated with a "zpool scrub", i.e. CPU utilization, memory, and increased I/O activity. The performance overhead is proportional to the amount of data on the ZFS volume.

FreeBSD and ZFS Implementation

The ZFS version 5 and ZPOOL v28 on AhsayUBS has undergone an extended period of intensive performance and load testing, which has consistently delivered superior performance and data integrity results in comparison to UFS.

Storage Model Migration

For legacy AhsayUBS environments who wish to migrate from UFS to ZFS storage model, only a manual migration method is available where you need to offload your locally stored User Home data, AhsayUBS setting, and AhsayCBS settings; to another temporary storage device, then reinstall AhsayUBS from new, then reload your data and settings back.

The migration process will generally involve:

1. Copying the existing user data from AhsayUBS server to another storage device.
   - This refers to the data in all locally stored User Homes stored on the filesystem

2. Backup your AhsayUBS configuration via the AhsayUBS Management Console
   - [System] | [Backup/Restore] | [Backup Configuration]

3. Backup of your AhsayCBS configuration (conf/*), policies (system/obs/policies/*), export your branding properties, and any non-standard customizations. If you need to retain logs (logs/*) and (system/*), exclude (system/cbs/Installers/*) which contain old branded builds.

4. Use the latest AhsayUBS installer to install a new version of AhsayUBS on the existing machine, which will overwrite all existing data, returning your server to bare state.

5. Set the AhsayUBS IP, so that you can login to the management console.

6. Restore your AhsayUBS configuration

7. Stop AhsayCBS service

8. Restore your AhsayCBS configuration

9. Copy the user data from the temporary storage device back to the AhsayUBS server.

10. Startup the AhsayCBS service, and verify AhsayCBS state is normal.

Setup Overview

The process to setup AhsayUBS firmware onto a machine is done in four stages:

1. Installer Image Deployment, installation to physical server. Deploys Ahsay Universal Backup System Installer image (ubs-installer.img) on a removable USB storage device.

2. Firmware Installation/Upgrade. Install/upgrade Ahsay Universal Backup System Firmware onto the machine.

3. Ahsay Universal Backup System Configuration. Configure the Ahsay Universal Backup System Firmware (FreeBSD).

4. Backup Server Configuration. Configure the Backup Server, Redirectors, or Replication Server (AhsayCBS)

There are different software/hardware requirements for each stage. Please ensure that all the requirements are met before deploying the AhsayUBS to the machine.

AhsayUBS Firmware

AhsayUBS Firmware is based on a customized version of FreeNAS firmware with AhsayCBS bundled and is specifically optimized to run AhsayCBS. Apart from AhsayCBS, it also contains some basic features that system administrator require, e.g. SSH and system monitoring tools.

AhsayUBS Storage Concepts

The AhsayUBS installer will automatically detect all available local hard disk(s) during the installation progress. The selected hard disk(s) will be partitioned to form "System Storage". Several RAID devices will be created on the "System Storage": 1. GPT Boot (GPBT) 2. Operating System Framework (OSFW) 3. Firmware Module Framework (FMFW) 4. Logical Storage Framework (LSFW)

The GPBT, OSFW and FMFW volume are configured as RAID1 mirror in UFS file system to form the core system.

The LSFW software RAID device:

- Supports JBOD, RAID0, RAID1 and RAID5 in UFS format for old version of AhsayUBS.
- Supports RAID0, RAID1 and RAIDZ in ZFS format for the new version of AhsayUBS (The raid type depends on the number of hard disks installed and selected during AhsayUBS installation, for RAID0 the minimum number of disks is required is 1 [data loss for any one failed drive], for RAID1 and RAIDZ the minimum number of disks required is 2 [data loss if more than one failed drive]).

These volumes are named "System Storage". The OSFW, FMFW devices will be created on the Unix File System (UFS). The firmware configuration files will be stored on OSFW and the AhsayCBS configuration files and backup data will be stored on LSFW.

HARDWARE RAID? For systems employing hardware RAID, you are limited to one hardware RAID presentable to the server at time of AhsyUBS installation (you may add additional hardware RAID volumes, after AhsayUBS new installation is completed.). If you have more than one hardware RAID volumes, then you will be prevented from

installation. For such systems, you will not be presented with choice of RAID settings at time of AhsayUBS installation (you only present one volume).

If the LSFW file system runs out of disk space, extra storage can be added to the system by either: 1. Adding a new block device to the system hardware. 2. Creating an iSCSI connection to a remote storage server.

The added block devices will be partitioned and formatted to form "Modular Storage (ZFS + ZIL)".

The previously supported additional storages: 'Modular Storage (ZFS)', 'Expandable Storage (ZFS)' and 'Optional Storage (UFS);' will also be listed in the summary page. However, only removal of those additional storage is allowed.

Expandable Storage volumes (ZFS) can no longer be created.

There are three types of Additional Storage: 1. Modular Storage (ZFS / ZFS+ZIL) can be created by one or more local block device to form a volume either in RAID0, RAID1 or RAIDZ (is dependent on the number of hard disks used to form the volume). Since this AhsayUBS version, the underlying ZPOOL will be added with a ZIL layer (ZIL = ZFS Intent Log). 2. Expandable Storage (ZFS) [legacy] created in the former AhsayUBS versions with a hardware RAID volume or an iSCSI initiator session connected to this AhsayUBS machine. A RAID0 ZFS filesystem will be formed for each of the Expandable Storage. It is for supporting the old migrated AhsayUBS only and cannot be created in this version of AhsayUBS. 3. Optional Storage (UFS) [legacy] called "Optional Labelled Device" on earlier AhsayUBS versions. It is for supporting the older migrated AhsayUBS installations only and cannot be created in this version of AhsayUBS. By configuring the AhsayCBS, the "Additional Storage" can be used as additional storage for storing server configuration files and backup data. Note:

Minimum size 500GB is required for the AhsayUBS Backup System block devices (i.e. System Storage and Additional Storage). Otherwise, the added block device will not be allowed for fail disk replacement and additional storage.
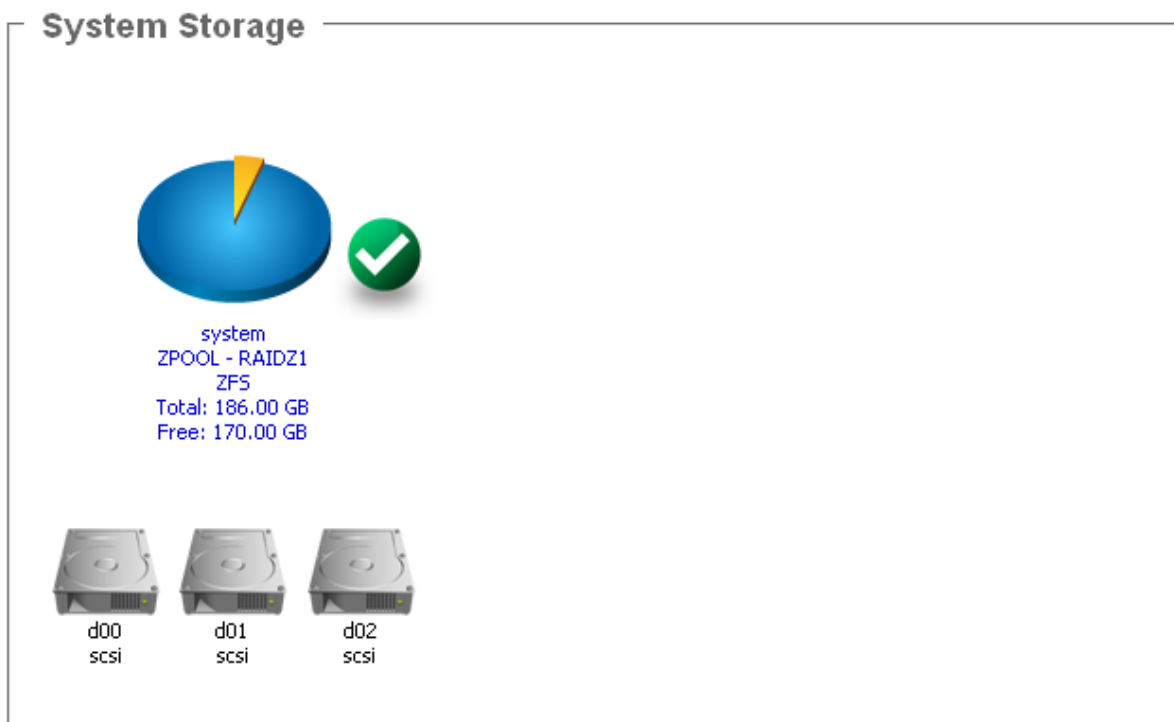
The AhsayUBS WebAdmin page, under [Storage] > [Summary] will show the overview of the volumes created on AhsayUBS.

Important Notice

AhsayUBS provides console access to the "System Management Console" by connecting a keyboard and a VGA monitor to the physical machine.

To prevent unauthorized access to the AhsayUBS System Management Console, it is advised to change the default AhsayUBS administrator password.

System Requirements

This section describes the system requirements for the Installer Image Deployment, Backup System firmware Installation/ Upgrade, Backup System and Backup Server Configuration.

Backup System Requirements

The selected machine must meet the following requirements:

- CPU: At least 1 CPU that is FreeBSD i386 / amd64 compatible.
- Memory Size: 4 GB minimum. If the AhsayUBS installer detects the machine is installed with less then 2GB RAM the installation or upgrade process will be aborted.
- Disk Storage Space: 1000GB per disk minimum. (If your users will store backup data onto the AhsayUBS server, you should plan for the largest drives allowable by your system, as future drive upgrade will be difficult.)
- Network interface card (NIC): At least 1 NIC that is FreeBSD 11.2 i386/amd64 compatible.
- Motherboard: If the motherboard supports Unified Extensible Firmware Interface (UEFI) standard. The boot mode **must be set to BIOS boot manager** and the AhsayUBS installed hard disk specified as the first the boot device.

For production AhsayUBS servers configured with ZFS volume(s). It is strongly recommended to: 1. Install AhsayUBS on a 64bit machine. 2. Install at least 8 GB RAM, as ZFS volumes require relatively large amount of memory to run. The amount of memory required is dependent on the size of the ZFS volume and the amount of I/O activity.

Firewall Settings

Please ensure you have updated your network firewall settings to allow network traffic through the following ports to your AhsayUBS server:

Port	Description
80	HTTP port for incoming backup and restore traffic, browsing the AhsayCBS web interface. [Port number can be customized]
443	HTTPS port for incoming backup and restore traffic, browsing the AhsayCBS web interface. [Port number can be customized]
25	Outgoing SMTP port to the SMTP server.
8080	AhsayUBS web administration console. [Port number can be customized]
111	Port Mapper
1058	Mount Port ** Required for Run Direct on AhsayCBS
2049	Port for NFS Service
Any incoming TCP port(s)	Any incoming TCP port(s) used by previous version of replication receiver(s), e.g. 9444, 9445…

AhsayUBS Processor Configuration

AhsayUBS supports up to a maximum of 32 virtual processors for both i386/amd64 compatible CPU's.

In order to comply with the maximum supported virtual processors limit on FreeBSD, the system administrator should verify the number of virtual processors enabled on the AhsayUBS machine and apply the correct processor setup on the machines BIOS before proceeding with AhsayUBS installation or upgrade.

The maximum number of virtual processors is calculated as:

```
(No. of sockets) * (No. of cores per processor) * (Hyper Threading).
```

The following are examples of processor configurations.

Supported Processor Configurations

1. One Socket, Dual-Core Intel CPU, Hyper Threading Enabled

```
(1) * (2) * (2) = 4 virtual processors
```

2. Two Sockets, 6-Core Intel CPU, Hyper Threading Enabled

```
(2) * (6) * (2) = 24 virtual processors
```

3. Two Sockets, 8-Core Intel CPU, Hyper Threading Enabled

```
(2) * (8) * (2) = 32 virtual processors
```

4. Four Sockets, 4-Core Intel CPU, Hyper Threading Enabled

```
(4) * (4) * (2) = 32 virtual processors
```

Non-supported Processor Configurations and workarounds

1. Two Sockets, 12-Core AMD CPU, Hyper Threading Enabled

```
(2) * (12) * (2) = 48 virtual processors
```

It is recommended the number of cores per CPU be set at 8 on the machine BIOS:

```
(2) * (8) * (2) = 32 virtual processors
```

2. Four Sockets, 8-Core Intel CPU, Hyper Threading Enabled

```
(4) * (8) * (2) = 64 virtual processors
```

It is recommended that Hyper Threading is disabled on both CPU's on the machine BIOS:

```
(4) * (8) * (1) = 32 virtual processors
```

3. Four Sockets, 10-Core Intel CPU, Hyper Threading Enabled

```
(4) * (10) * (2) = 80 virtual processors
```

It is recommended that Hyper Threading is disabled on both CPU's and the number of cores per CPU be set at 8 on the machine BIOS:

```
(4) * (8) * (1) = 32 virtual processors
```

> If AhsayUBS is installed on a machine where the number of virtual processors configured exceeds the maximum supported value of 32. This will cause FreeBSD to become unstable and crash, which could result in data corruption on AhsayCBS.

Installer Media Requirements

AhsayUBS installer is available in img and ISO formats.

1. The img format is used for deployment on a USB flash drive (minimum 2GB), for installation to a physical server.

2. The ISO format is used for VMware installation/upgrades only; and is not for use on deployment to CD/DVD media.

Installer Deployment

For physical server deployment, please ensure the following requirements are met before deploying Ahsay™ Universal Backup System image to a USB flash drive.

For physical server deployment, please ensure the following requirements are met before deploying Ahsay™ Universal Backup System image to a USB flash drive.

1. The USB flash drive should meet the minimum 2GB storage size requirements.

2. Previous data stored on the USB flash drive should be backed up properly. Once the deployment process begins, all data on the USB flash drive will be OVERWRITTEN.

3. To avoid selecting the incorrect drive for deployment, it is advised to remove all other USB storage devices such as USB portable hard disk and other USB flash drive.

AhsayUBS Firmware Installation / Upgrade

Please ensure the following requirements are met before installing / upgrading AhsayUBS Firmware:

- Connect a VGA Monitor and a keyboard to the target machine.

- Make sure that there are local block devices (e.g. "ide", "scsi" disk volumes) installed in the machine.

- The new installation process will destroy all the data in the local block devices installed in the machine. To protect the data in some of the local block devices, it is recommended to remove them before the installation of AhsayUBS Firmware.

- The upgrade process requires the existing hardware/software RAID storage configuration to be healthy.

> The upgrade process will not be able to continue on system configuration with one or more DEGRADED RAID devices.

Documentation

- AhsayUBS Administrator's Guide

FAQs

- How to install the latest patch set for AhsayUBS v7?

Issues

- Cannot download AhsayOBM install file for Linux / Unix platforms via the AhsayCBS console (AhsayCBS installation on AhsayUBS)

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