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HXGN MINEPROTECT OPERATOR ALERTNESS SYSTEM

Ubuntu 20.04 LTS Installation Manual

Version Control

Date	Version	Author	Description
2022-11-01	1.0	D.S.	Initial version
2023-05-01	2.0	J.V.	Only Ubuntu installation process

Contents

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1. Introduction

Welcome to the HxGN MineProtect Operator Alertness System (OAS) Ubuntu 20.04 LTS & OAS 7.2 Server Install Manual. This document is intended to serve as an installation manual for the newest Ubuntu operating system release as well as the changes related to the HxGN OAS 7.2 software release. Upon completion of this install manual, the user will have a fully operational HxGN OAS server. For upgrading an existing server for a previous OAS software version to the 7.2 release, please refer to the HxGN MineProtect Operator Alertness System (OAS) 7.2 Server Upgrade Manual.

2. Hardware requirements

To install a new OAS client to operate using Ubuntu's latest 20.04LTS release with the HxGN OAS 7.2 software, site will need to provide a server with the following specifications. For sites that do not have the on-site infrastructure to install their own server or utilize an on-site network, the HxGN OAS system can utilize a cloud-based server using the Microsoft Azure portal.

The minimum requirements in the *Table 1* are only recommended for a trial system or sites with less than 10 units. The recommended requirements are for a full deployment of up to 100 OAS units. These requirements will need to be scaled up for installs larger than 100 OAS units or if site would like extended historic capabilities on data.

Component	Minimum Required (Trial System or <10 OAS Units)	HxGN Recommended (Full Deployment <100 OAS Units)
Server Type	Physical or Virtual (ESX, Hyper V)	
Operating System	Ubuntu 20.04 64bit LTS Linux	
Database	Postgresql	
Processors	1 Quad Core	4 Quad Core
RAM	8 GB	16 GB
HDD Space	100 GB	1 TB
RAID	Not Required	1
Networking	1GB Ethernet	
Ports	USB	
Optical Drive	Not Required	

Table 1 - OAS Server Requirements

If the server requires some type of RAID configuration for an HA solution, please consult the Ubuntu documentation related to this type of configurations in the following link:

https://help.ubuntu.com/community/Installation/SoftwareRAID

To acquire the Ubuntu software, use "Option 2 – Manual Server Installation" from the following link:

https://ubuntu.com/download/server

The Hexagon Operator Alertness System is a product designed to monitoring and

3. Ubuntu 20.04 LTS Operating System Installation

To initiate the operating system installation process, boot the server from the downloaded iso file. This will start the Ubuntu install walkthrough which will take the installer step-by-step through the installation process. This section will outline the HxGN OAS specific requirements for completing this walkthrough.

3.1. Language & Keyboard Configuration

The first step to install Ubuntu is to select the language the server will utilize. For all HxGN OAS servers, regardless of the region of install, select the option for English as highlighted in *Figure 1*.

Figure 1 - Server Language Selection

If the ubuntu image being used is not the latest version of the installer, the next window to appear will ask if the user wants to update the installer or continue without updating. It is recommended to use the “Continue without updating” option if prompted. If the ubuntu image is already on the latest version, this window will not appear.

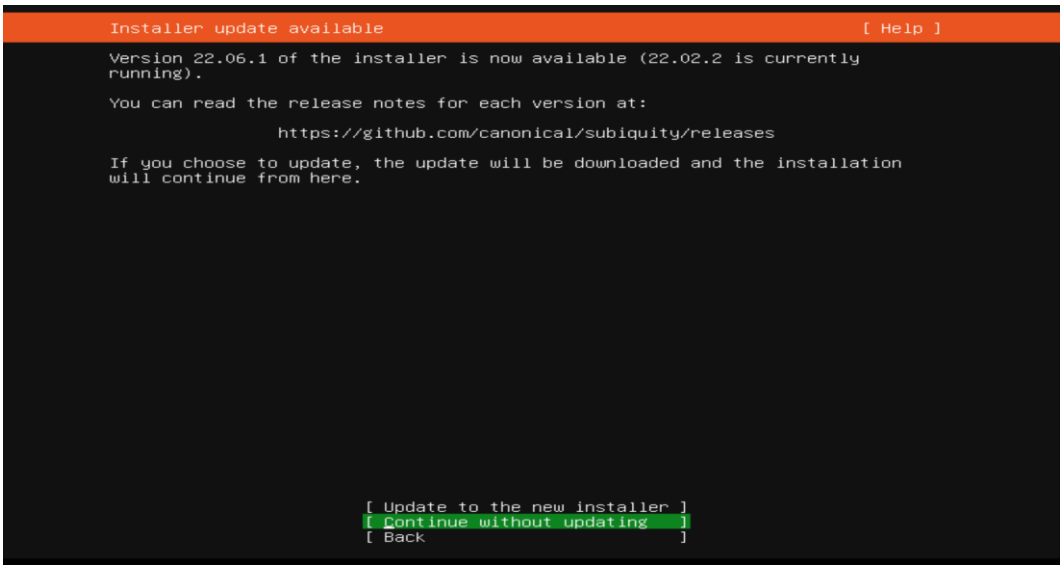

Figure 2 - Update Ubuntu Installer

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After selecting the language, the keyboard layout is requested to be chosen. If English was selected in the previous set, the default keyboard will be English (US) as shown in *Figure 3*.

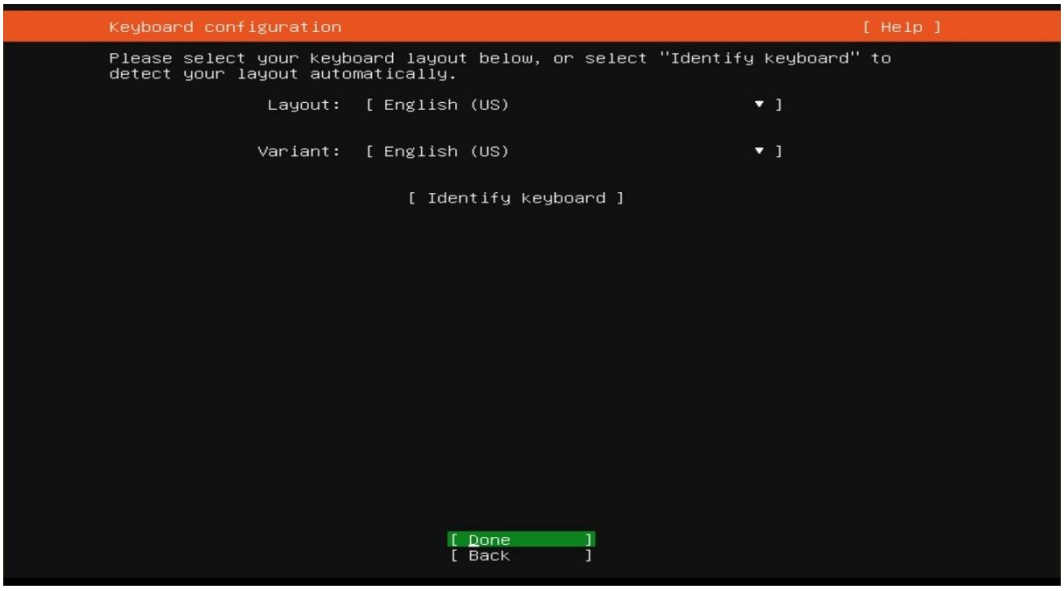

Figure 3 - Server Keyboard Configuration

3.2. Network Configuration

The next page will set-up the server's network configuration. At this stage in the installation, select the DHCP process. The site-specific network settings will be configured at a later step once the operating system has been installed. The only requirement for this step is the server must have access to the internet to install the required packages and updates.

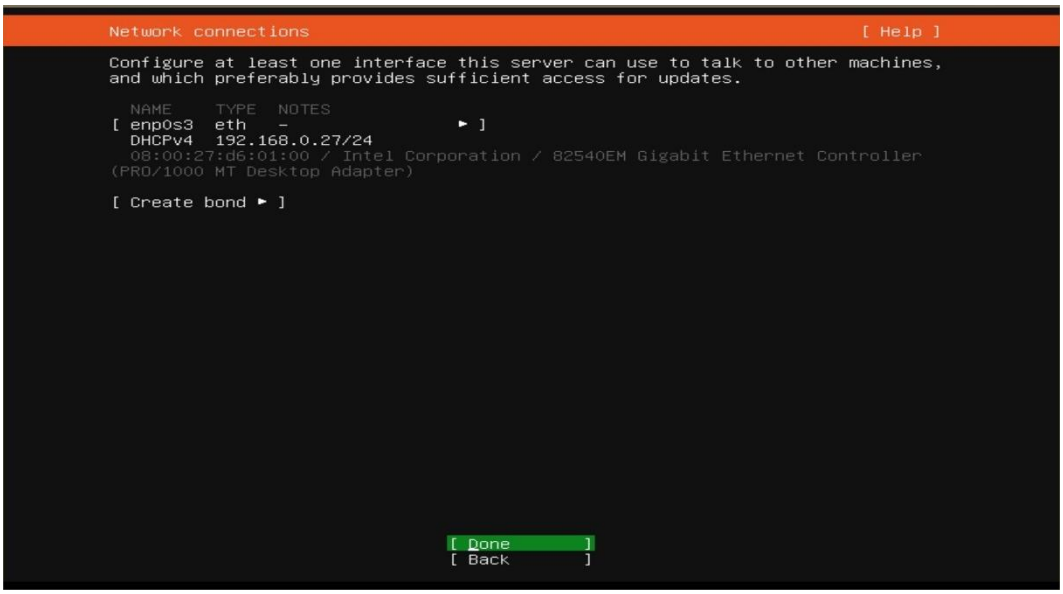

Figure 4 - Server Network Connection

After the internet connection is defined, the walkthrough will request a proxy server configuration. For most deployments, this will not be required and can be left blank as shown in *Figure 5*. However, if the site's network set-up requires a proxy server to allow a connection to the internet, please enter the proxy server's address, username, and/or password in this step.

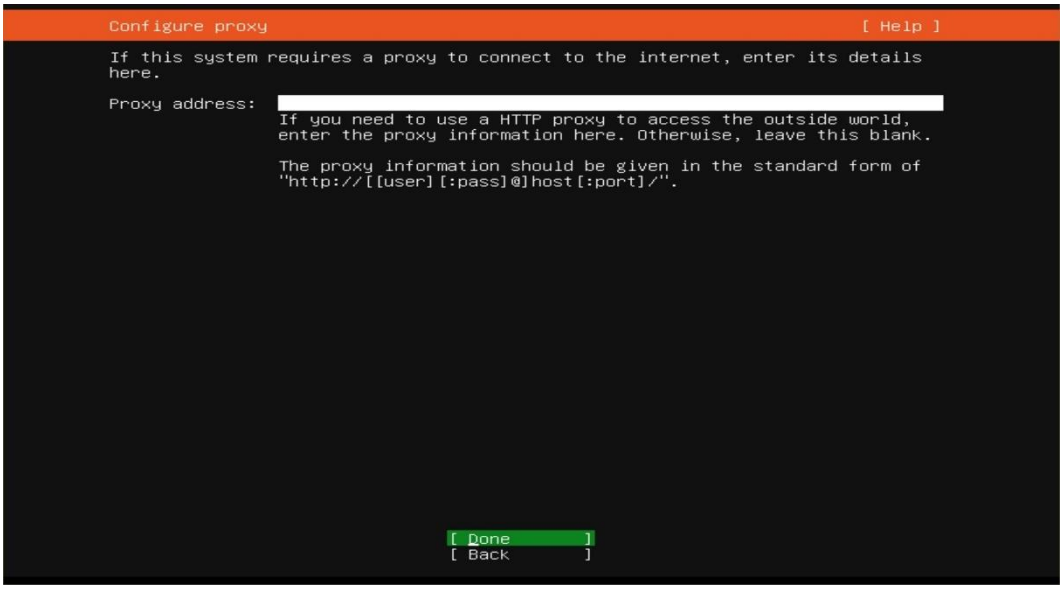

Figure 5 - Server Proxy Configuration

The server requires a mirror address to acquire the packages required to install the Ubuntu operating system. For most regions, this can be left as the default of http://archive.ubuntu.com/ubuntu as shown in *Figure 6*. However, for some regions, it may be quicker to use a local Ubuntu mirror. To find the list of official Ubuntu mirror locations, go to the following URL, https://launchpad.net/ubuntu/+archivemirrors, and search for an up-to-date mirror in the region the server is located.

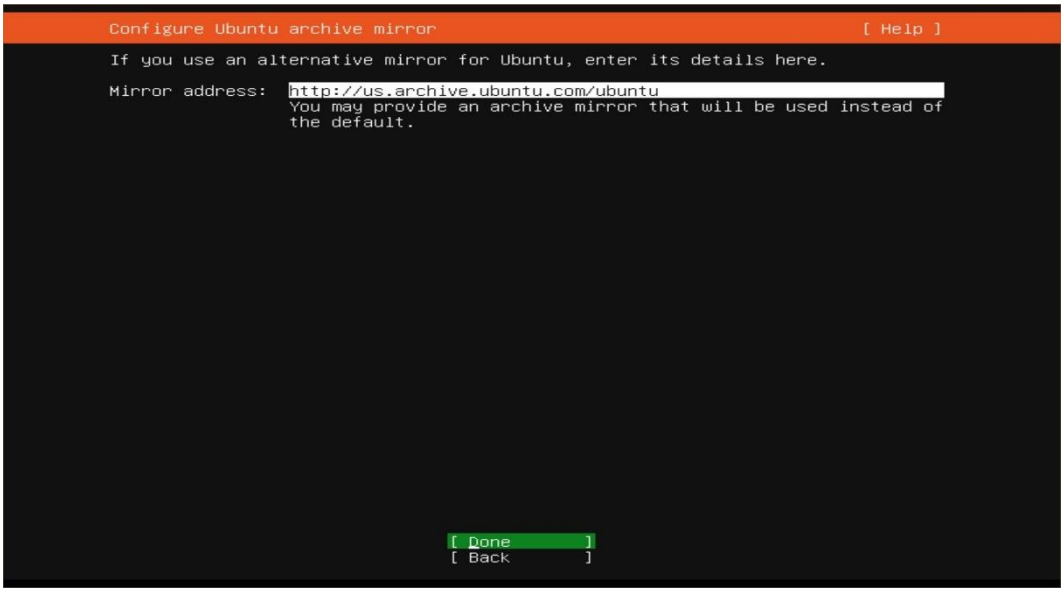

Figure 6 - Ubuntu Mirror Selection

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3.3. Server Storage Configuration

For the purposes of this install manual, the specifications for a trial server with 10 OAS units or less will be used. The partitions will be the same for both trial servers and full deployment servers with the only exception being the size of the /opt directory based on the overall size of the hard drive provided. The value in *Table 2* below outlines the specific partitions required for both a trial and full deployment.

Component	Minimum Required (Trial System or <10 OAS Units)	HxGN Recommended (Full Deployment <100 OAS Units)
/boot	1GB	
SWAP (Use same size as RAM)	8GB	16GB
/ (root)	100GB	
/opt	Not Required	883GB (Rest of Server HD)

Table 2 - OAS Server Partition Requirements

The installer walkthrough allows the user to either configure the system using the entire disk or to manually configure the system with a custom storage layout. For a HxGN OAS server, please select the “Custom storage layout” option as shown in *Figure 7*.

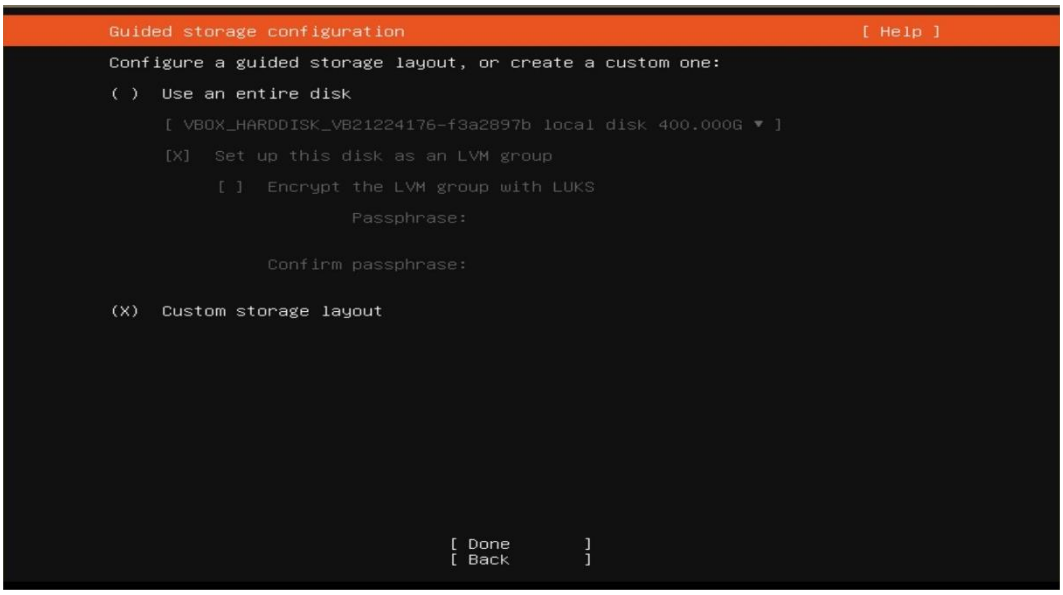

Figure 7 - Server Storage Configuration

As shown in Table 2, the server will require either three or four partitions depending on the size of the deployment. The process to create each partition is the same with the only difference being the size, format, and mount point required. It is requested that the partitions be created in the order they are listed in the table and presented below in *Figures 8 – 13*.

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The first step is to choose the available device on the server and select the “Add GPT Partition” option as shown in *Figure 8*.

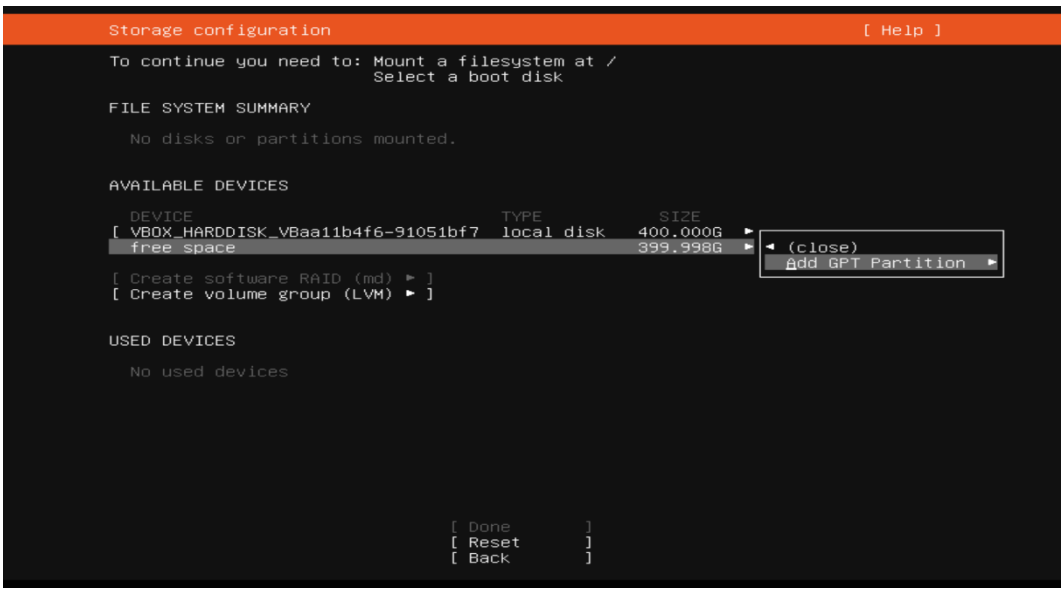

Figure 8 - Add Partition to Server

The first partition is the /boot directory shown in *Figure 9* which is recommended to be 1GB in size regardless of overall server size.

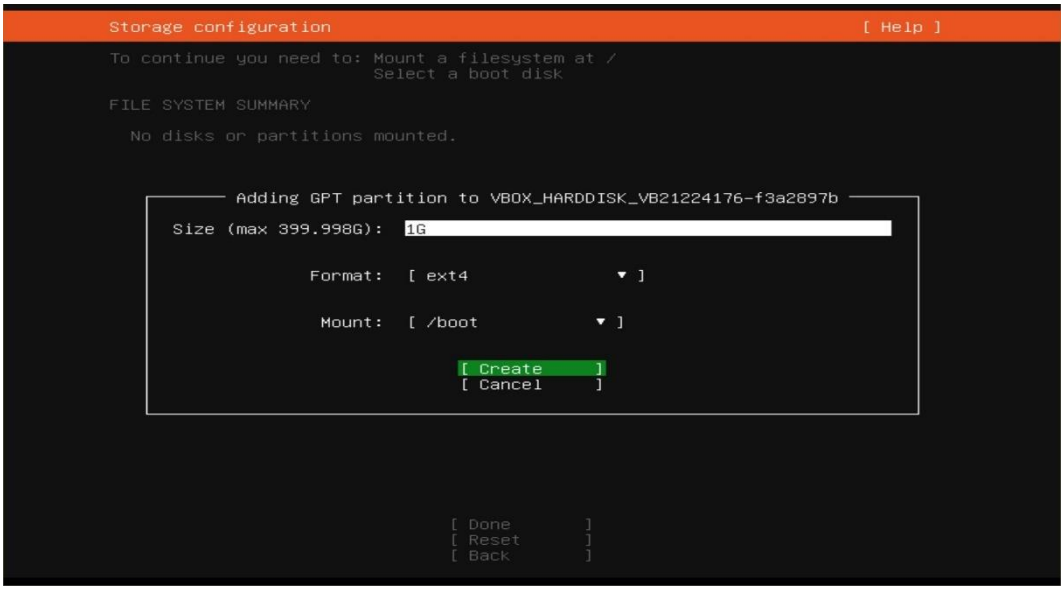

Figure 9 - Server /boot Partition

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After creating the /boot directory partition, the next partition is for the SWAP area as shown in *Figure 10*. This will vary by server and is recommended to be the same size as the RAM install on the server. For this document, 4GB was used.

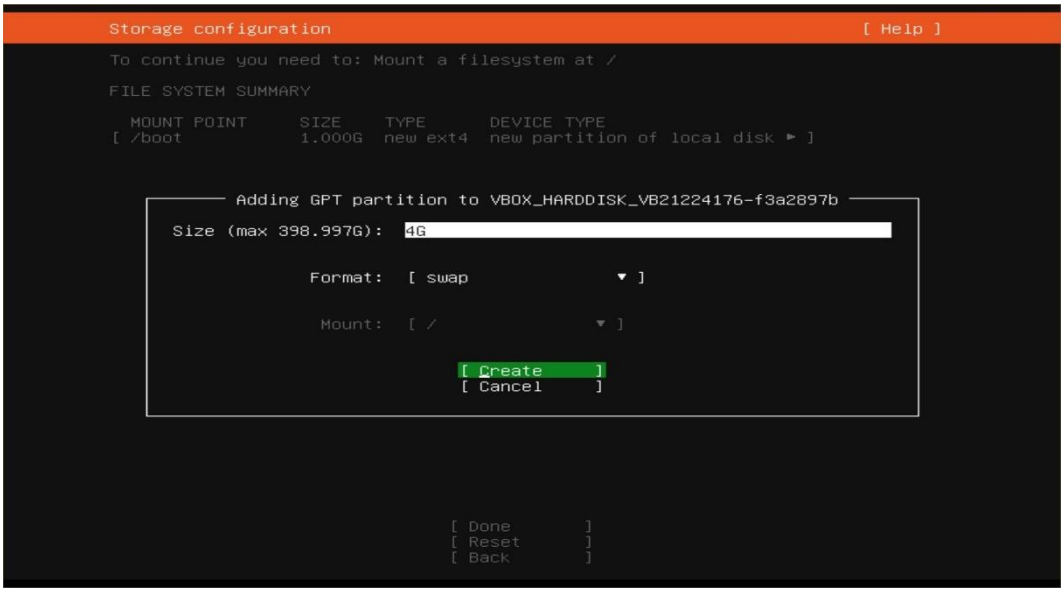

Figure 10 - Server SWAP Partition

The next partition is for the / (root) directory's mount point as shown in *Figure 11*. This is recommended to be 100GB regardless of the overall server size. However, for trial servers that have provided a total of 100GB, this partition can be reduced slightly to use the remaining hard drive space left after creating the /boot and SWAP partitions.

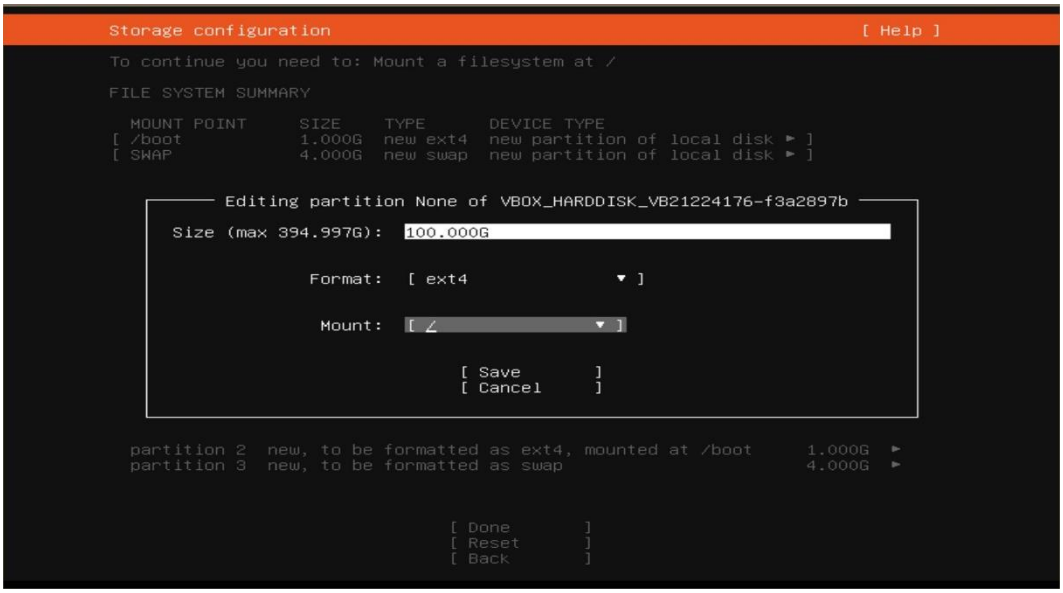

Figure 11 - Server / (root) Partition

The final partition, although not required for a trial server, is still recommended. For a full deployment of the HxGN OAS system, the /opt partition is required as it is the main storage location for all data and event footage. This partition will vary significantly based on the site's deployment size, but for the purpose of this document, a 295GB /opt was created as shown in *Figure 11* for a total server size of 400GB.

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The /opt directory is not one of the default directory mount point options, but it can still be configured by using the “Other” option from the mount point drop down menu. This will provide a text window under the mount point drop down menu where the /opt directory can be defined.

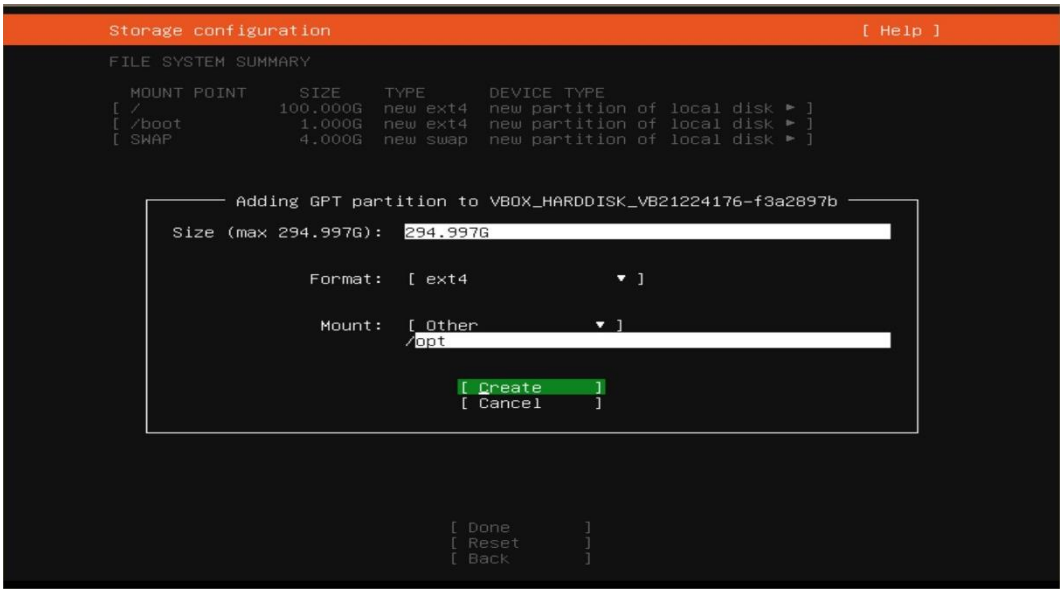

Figure 12 - Server /opt Partition

Once the partitions have been created, they can be reviewed prior to being applied to the server. Take this opportunity to verify the partitions are the desired mount points and sizes as this is the easiest time to correct any size discrepancies. After confirming the partitions are correct, select the “Done” option highlighted in *Figure 13* to apply the changes and configure the server’s hard drive.

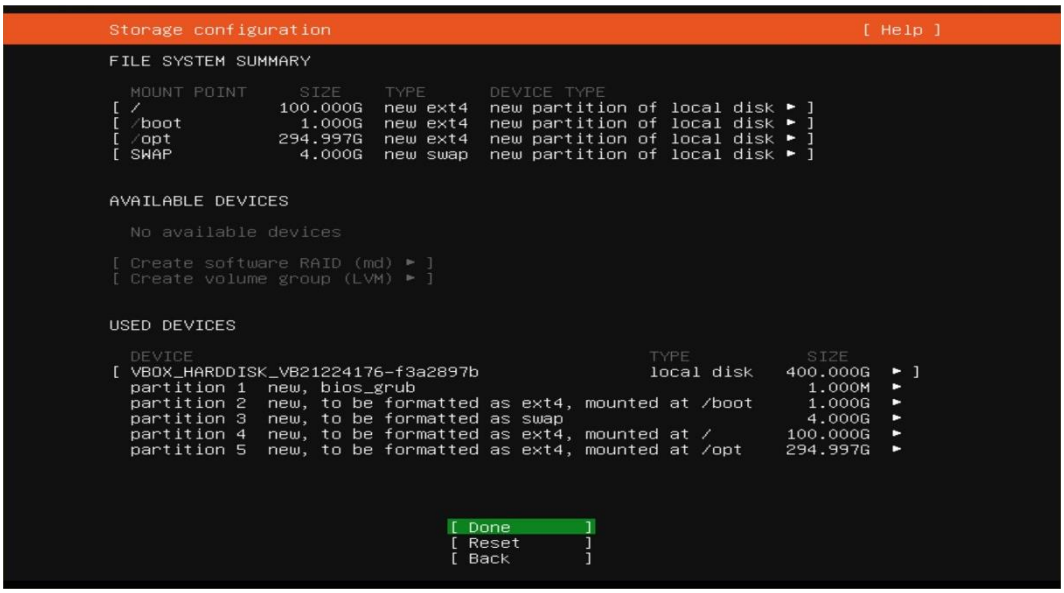

Figure 13 - Server File System Summary

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This will bring up a pop-up window asking to confirm the hard drive formatting and apply the settings to the server's hard drive. Select the "Continue" option to apply the server partitions configuration.

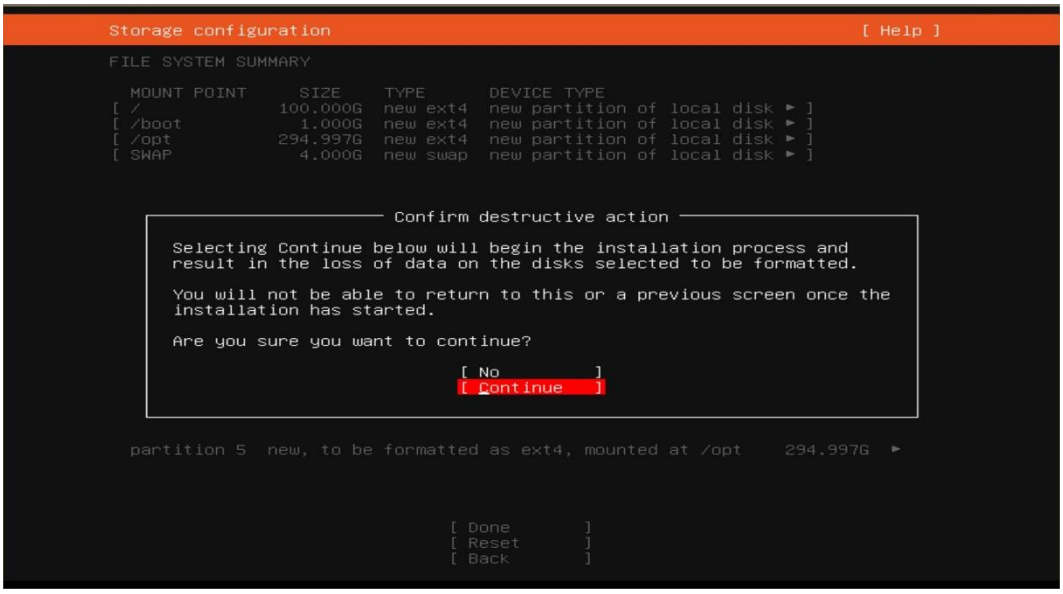

Figure 14 - Confirm Server Partition Formatting

3.4. Profile Setup & Final Server Installation

After formatting the server partitions, the next step is to define the server user, name, username, and password. Sites can utilize a unique site-specific password, however, during the installation process it is recommended to use the HxGN OAS default password. The server's name will be site specific and will need to be verified with the client. The inputs shown in *Figure 15* below are also defined in *Table 3* due to the password being hidden in the installer walkthrough.

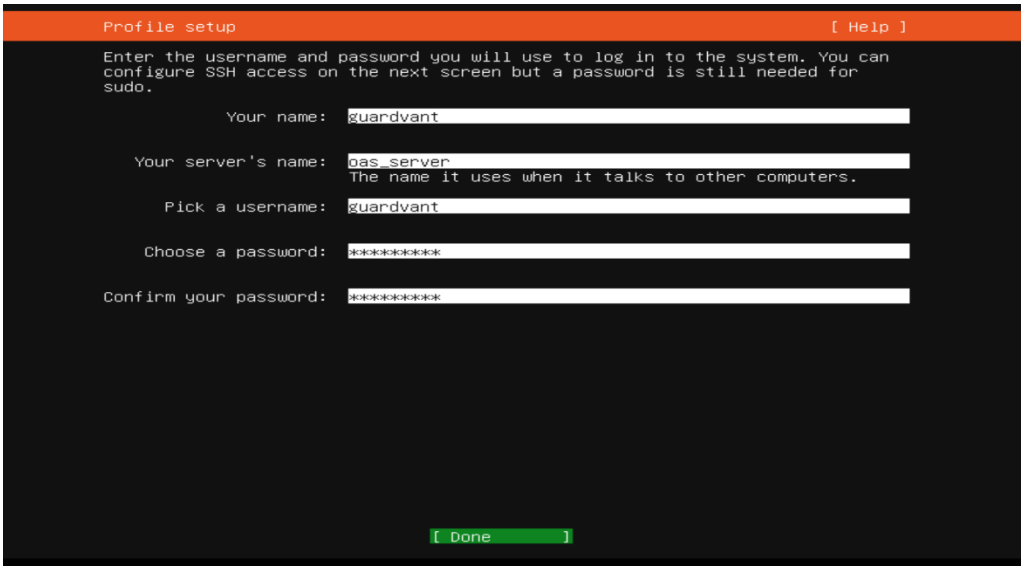

Figure 15 - Server Profile Setup

Field	Value
Name	guardvant
Server Name	Site Specific
Username	guardvant
Password	guard4640

Table 3 - Server Profile Requirements

After defining the login information, the system will ask if the user wants to import an Ubuntu Advantage token. As of the release of V7 of the OAS software, this feature will not be used and should be left blank as shown in *Figure 16*.

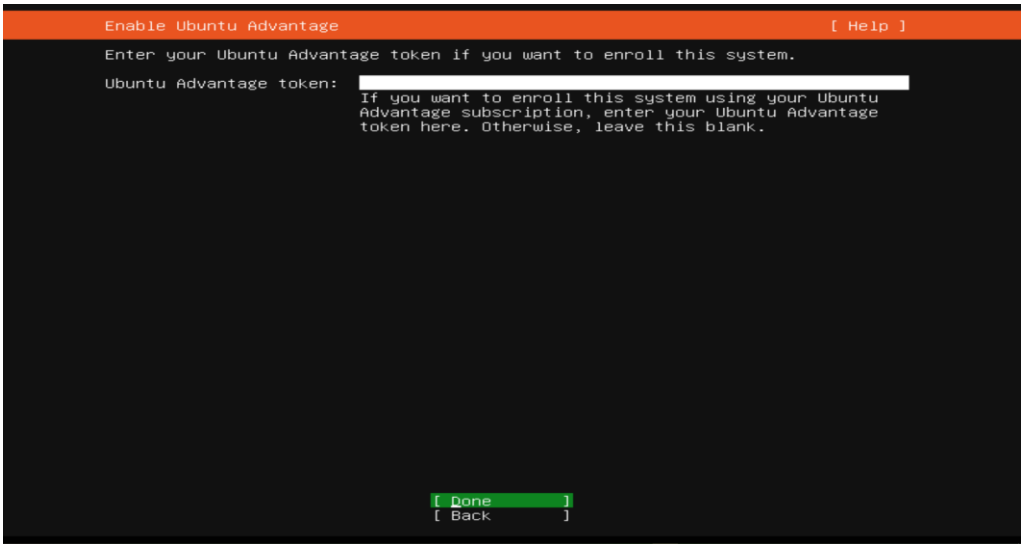

Figure 16 - Ubuntu Advantage Token

Once the Ubuntu Advantage token page is complete, the ssh interface needs to be configured. Select the “Install OpenSSH Server” option and “No” from the “Import SSH Identity” drop down menu as shown in *Figure 17*.

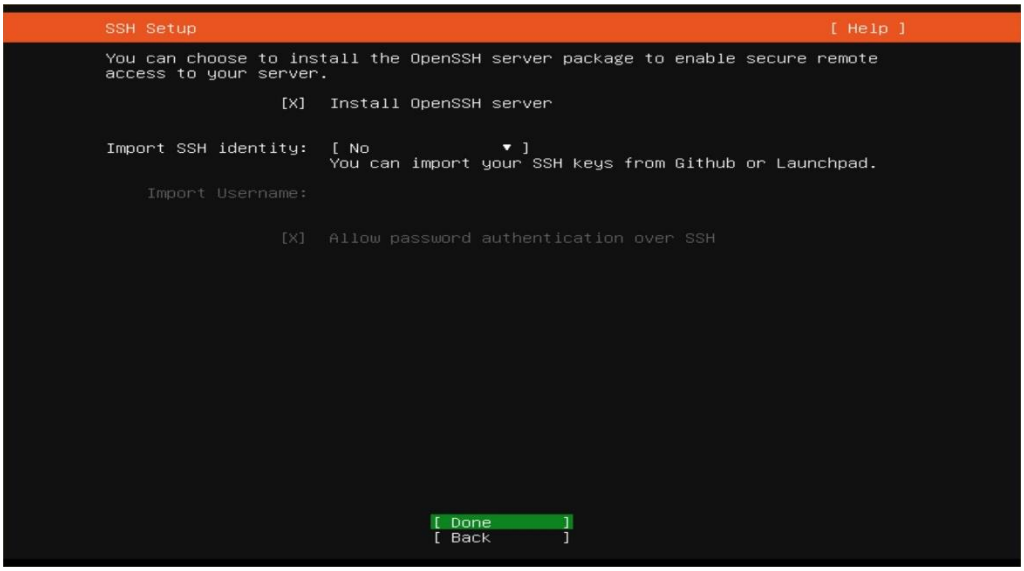

Figure 17 - Server SSH Setup

The last step prior to the final installation of the Ubuntu operating system is to select any server snaps desired as shown in *Figure 18*. At this stage, there is no need to select any of the packages listed. The specific packages required for the HxGN OAS server will be installed in the following section of this document, *Ubuntu Software Installation*.

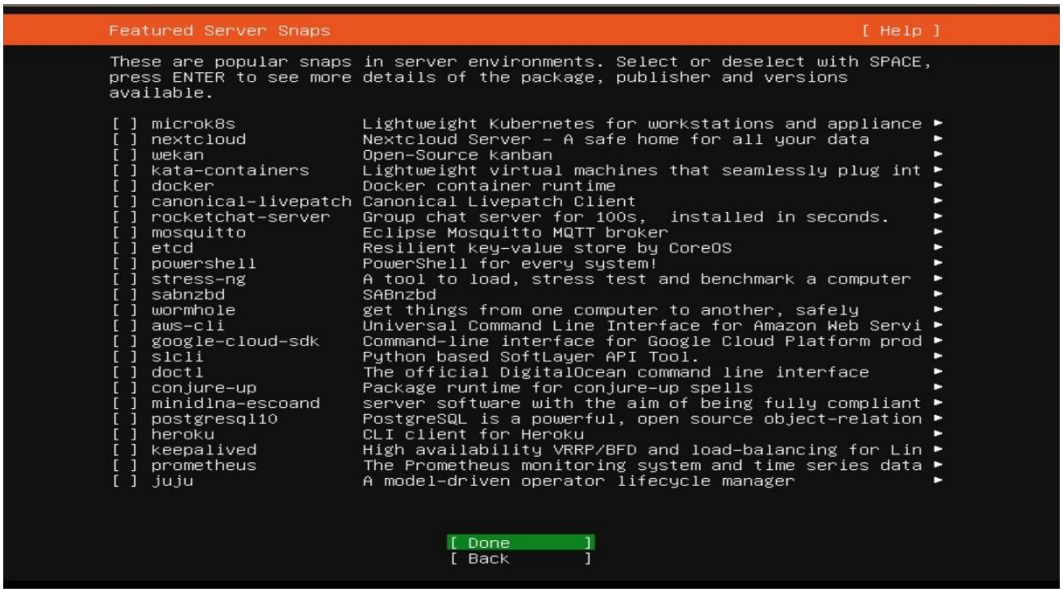

Figure 18 - Ubuntu Snaps

After continuing from the default server packages, the server will begin the installation process. This process will take a few minutes and will ask to reboot the server once the process has completed as shown in *Figure 19*.

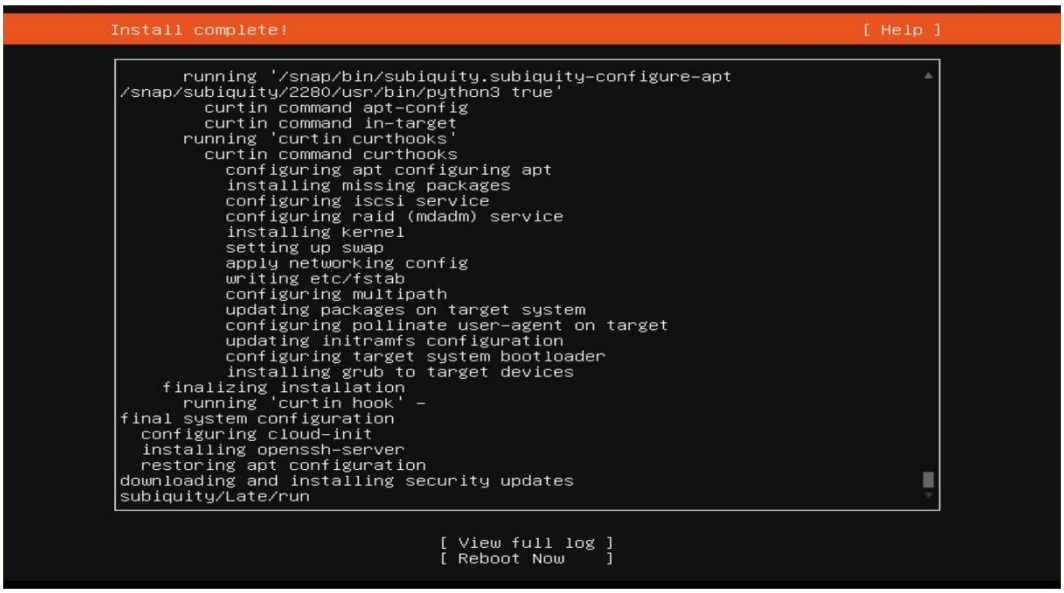

Figure 19 - Ubuntu Operating System Installation Complete

During the reboot process the server will ask to remove the installation media. If using a physical CD drive, eject the disk at that time. If using a digital ISO file, pressing the enter key when prompted will continue the reboot process and complete the Ubuntu operating system installation.

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3.5. Required Ubuntu Packages Installation

After the Ubuntu operating system has been installed, there are a few Ubuntu software packages that need to be installed before the HxGN OAS software. This section is intended to outline the process to complete the Ubuntu software portion of the server build. Use of command line terminals is required for this section.

Upon the server rebooting, the system will request the user to login. The username for a HxGN OAS server is “guardvant” as shown in *Figure 20*.

<*ServerName*> login: guardvant

Figure 20 – OAS Server User Login

After entering the guardvant username, the system will request the password for the guardvant account. The default password remains “guard4640”. The password will be hidden as it is typed out as shown in *Figure 21*.

<*ServerName*> login: guardvant
Password: guard4640 ***(this will be hidden while it is typed out)***

Figure 21 - OAS Server User Login – Password

Upon login, the server information will be displayed and a guardvant@<*ServerName*> command line will be visible as shown in *Figure 22*.

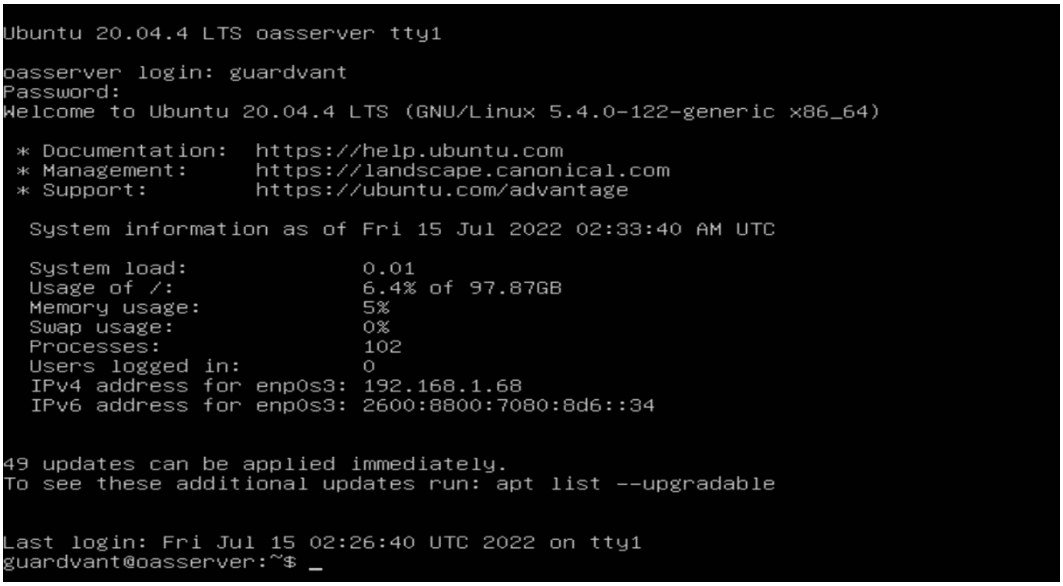

Figure 22 - OAS Server - Logged In

Ubuntu packages need to be installed on the server which are shown in *Figure 23*.

guardvant@<*ServerName*>:~$ sudo apt -y install postgresql ntp sqlite3 net-tools mosquitto mosquitto-clients libmosquitto1 nginx curl libunwind-dev openvpn bash-completion traceroute libglfw3 libmp3lame0 libasound2 mlocate ffmpeg

```
guardvant@oasserver:~$ sudo apt install postgresql ntp sqlite3 net-tools
mosquitto mosquitto-clients libmosquitto1 nginx curl libunwind-dev
openvpn bash-completion traceroute libglfw3 libmp3lame0 libasound2
mlocate ffmpeg
[sudo] password for guardvant:
```

Figure 23 - Ubuntu Packages Install

The final step of the Ubuntu package installation is to perform an update, *Figure 24*, and upgrade, *Figure 25*, of the software to ensure the latest security patches and features are installed on all Ubuntu software.

guardvant@<*ServerName*>:~$ sudo apt update

```
guardvant@oasserver:~$ sudo apt update
```

Figure 24 - Ubuntu Update

guardvant@<*ServerName*>:~$ sudo apt upgrade

```
guardvant@oasserver:~$ sudo apt upgrade_
```

Figure 25 - Ubuntu Upgrade

During the upgrade process, the system will ask to confirm the upgrade process with the list of packages to be upgraded as well as the required disk space for the upgrade. To continue, just enter a ‘y’ character as shown in *Figure 26*.

Do you want to continue? [Y/n] y

```
The following packages will be upgraded:
  alsa-ucm-conf apport apt apt-utils cloud-init dirmngr friendly-recovery gnupg gnupg-l10n
  gnupg-utils gpg gpg-agent gpg-wks-client gpg-wks-server gpgconf gpgsm gpgv initramfs-tools
  initramfs-tools-bin initramfs-tools-core isc-dhcp-client isc-dhcp-common landscape-common
  libapt-pkg6.0 libldap-2.4-2 libldap-common libnetplan0 libpam-modules libpam-modules-bin
  libpam-runtime libpam0g libpci3 libprocps8 libseccomp2 libssl1.1 libudev1 libxml2 netplan.io
  open-iscsi open-vm-tools openssl pciutils pollinate procps python3-apport python3-problem-report
  python3-twisted python3-twisted-bin python3-update-manager sosreport tmux ubuntu-advantage-tools
  ubuntu-keyring udev update-manager-core update-notifier-common
56 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 15.0 MB of archives.
After this operation, 3078 kB of additional disk space will be used.
Do you want to continue? [Y/n] y_
```

Figure 26 - Ubuntu Upgrade Confirmation

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To install OAS version 7.2, you must create the “oas” user in the server. Use the following commands to get the user ready. Hexagon recommends using the same password as the “guardvant” user.

```
guardvant@<ServerName>:~$ sudo adduser oas
Adding user `oas' ...
Adding new group `oas' (1001) ...
Adding new user `oas' (1001) with group `oas' ...
Creating home directory `/home/oas' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
Passwd: password updated successfully
Changing the user information for oas
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Nmber []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n]
```

```
guardvant@<ServerName>:~$ sudo usermod -aG sudo oas
```

Now, the server can be rebooted with the command shown in *Figure 27*.

```
guardvant@<ServerName>:~$ sudo reboot; exit
```

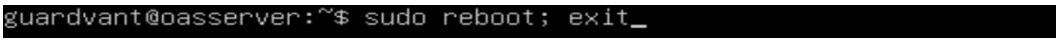

Figure 27 - OAS Server Reboot

3.6. GUI Installation (Optional)

If it is necessary to install a GUI to allow an alternative to the command line interface. There are a few options that can be used; however, the HxGN Global Team recommend either of the following.

GNOME

```
guardvant@<ServerName>:~$ sudo apt -y install xorg gnome-core gnome-system-tools
```

LDXE-LUBUNTU

```
guardvant@<ServerName>:~$ sudo apt -y install lubuntu-desktop
```

For the purposes of this document, the LXDE-Lubuntu option will be used as shown in *Figure 28*. The system will ask for the oas user's password to initiate the GUI installation.

```
guardvant@oasserver:~$ sudo apt -y install lubuntu-desktop
[sudo] password for guardvant:
```

Figure 28 - LDXE-Lubuntu GUI Install

In Ubuntu 20.04, a window will pop-up during the Lubuntu GUI installation due to there being two options for the default display manager in this version. The choice on which option to use is up to the regional Project Engineer's personal preference and can be changed at any time after the installation is complete. For the purposes of this document, the sddm GUI was selected as shown in *Figure 29*.

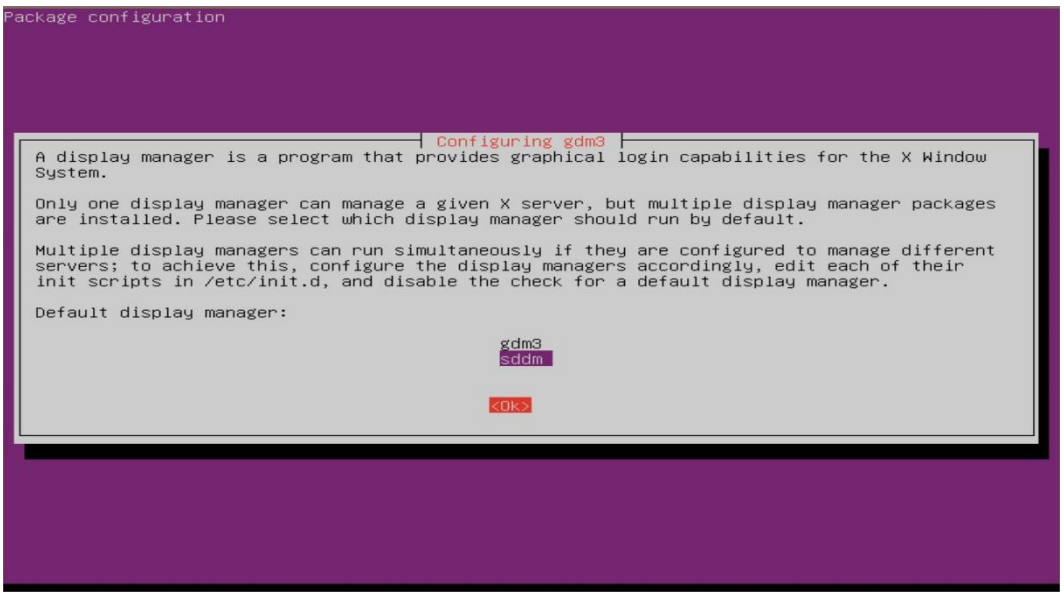

Figure 29 - GUI Default Display Manager Selection

Once the installation is complete, the server can be rebooted with the command shown in *Figure 27*.

```
guardvant@<ServerName>:~$ sudo reboot; exit
```

```
guardvant@oasserver:~$ sudo reboot; exit_
```

Figure 30 - OAS Server Reboot

After the server reboots, the GUI will be displayed with the guardvant user selected. To login to the server, enter the guardvant user's password used in previous steps as shown in *Figure 31*.

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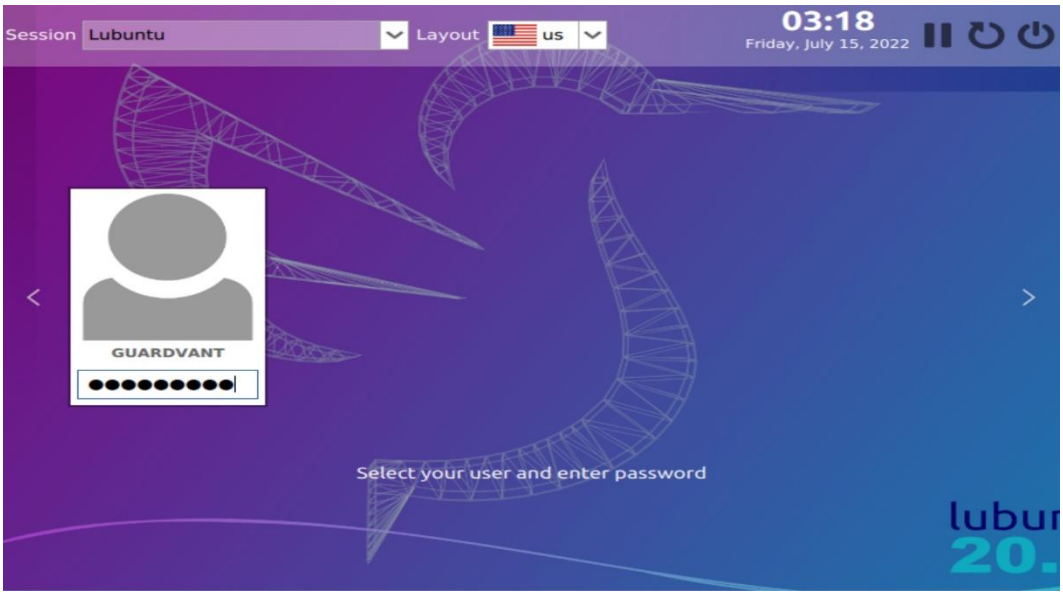

Figure 31 - OAS Server Password via GUI

Your server is ready to install the OAS system version 7.2

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About Hexagon

Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people- related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Mining division solves surface and underground mine challenges with proven technologies for planning, operations, and safety.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 22,000 employees in 50 countries and net sales of approximately 5.1bn USD. Learn more at hexagon.com and follow us @HexagonAB.

Visit us at hexagonmining.com