

Updates and News from Canonical on Ubuntu Server for IBM Z and LinuxONE and beyond (IBM Z days - Sept 15th 2021)

What's New - September 2021

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Ubuntu on Big Iron: ubuntu-on-big-iron.blogspot.com



Canonical



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ubuntu 

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Frank Heimes,
Canonical
Tech. Lead for Ubuntu Server
on IBM Z and LinuxONE

'Ubuntu on Big Iron' blog

Ubuntu Server for IBM Z and LinuxONE (s390x)



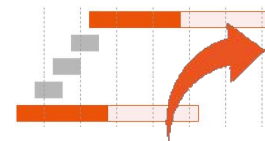
Mission and Philosophy - In a nutshell

Freedom to download Ubuntu - study, use, share, (re-)distribute, contribute, improve and innovate it!

Mapped to Ubuntu Server for IBM Z and LinuxONE (s390x) - the goal is:

- to expand Ubuntu's ease of use to the s390x architecture (IBM Z and LinuxONE)
- unlock new workloads, especially in the Open Source, Cloud and container space
- to tap into new client segments
- quickly exploit new features and components - in two ways:
 - promptly supporting new hardware
 - releases built and based on the latest kernels, tool-chain and optimized libraries
- provide parity across architectures, in terms of release and feature parity and closing gaps
- provide a uniform user experience and look-and-feel
- be part of the collective world-wide Open Source power in action
- deal with upstream work and code only - no forks
- offer a radically new subscription pricing with drawer-based pricing, or alternatively provide entry-level pricing based on up to 4 IFLs

Release Cadence - Ubuntu









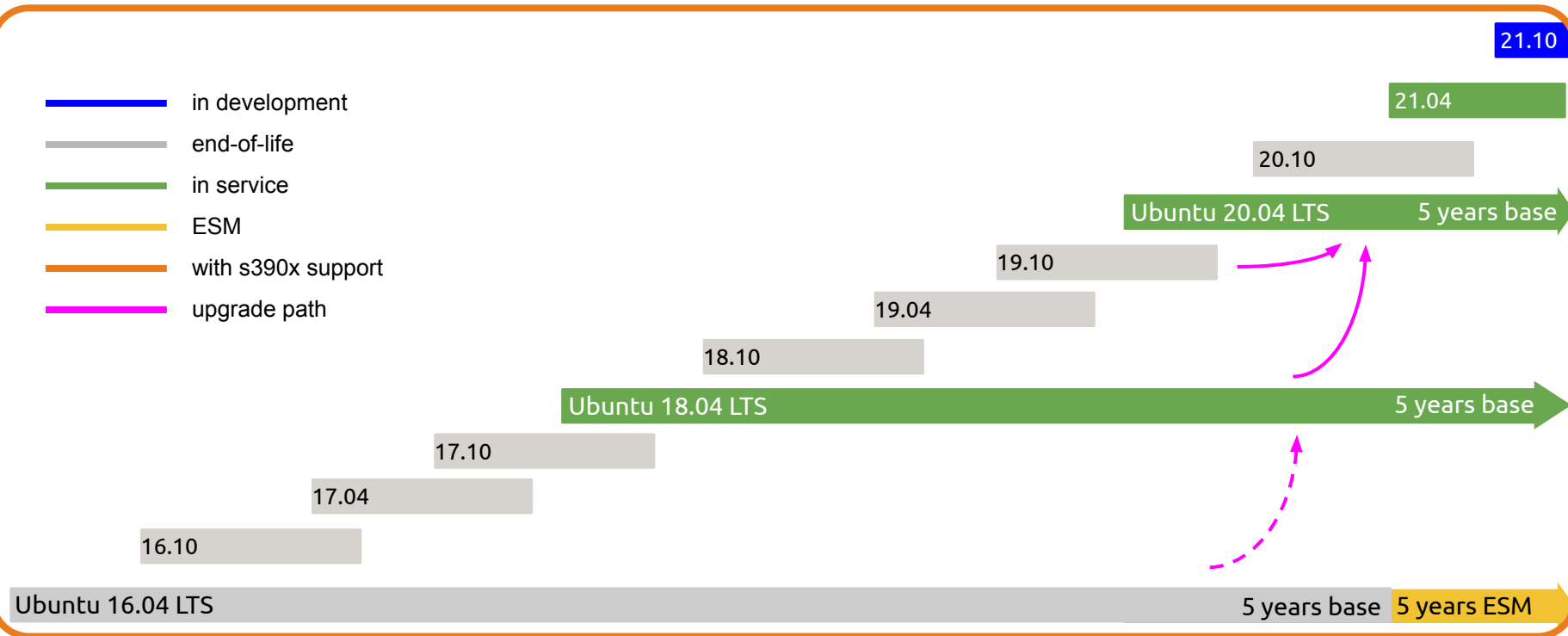
<https://wiki.ubuntu.com/Releases>

<https://wiki.ubuntu.com/LTS>

https://en.wikipedia.org/wiki/List_of_Ubuntu_releases

16.04 16.10 17.04 17.10 18.04 18.10 19.04 19.10 20.04 20.10 21.04 21.10

-  in development
-  end-of-life
-  in service
-  ESM
-  with s390x support
-  upgrade path



Ubuntu 20.04 LTS (Focal Fossa)



- The codename for 20.04 is 'Focal Fossa' or just 'Focal': <https://launchpad.net/ubuntu/focal>

- Ubuntu Server Long-Term Support (LTS) release

- Release Schedule: <https://wiki.ubuntu.com/FocalFossa/ReleaseSchedule>

Final Release: Apr, 23rd 2020 (Release Candidate: Apr 16th 2020, Beta Apr 2nd 2020)

- Release Notes: <https://wiki.ubuntu.com/FocalFossa/ReleaseNotes> (s390x-specifics)

- Major components (planned):

- Kernel 5.4
- qemu-kvm 4.2+
- libvirt 6.0+
- glibc 2.31
- binutils 2.34
- docker 19.03.8
- gcc 9.3 (default; gcc10 in universe)
- gdb 9.1
- LLVM 7,8,9,10
- python 3.8.2 / (2.7.17 in universe)
- golang 1.13
- s390-tools 2.12+
- smc-tools 1.2.2
- openssl 1.1.1f
- openssl-ibmca 2.1.0
- opencryptoki 3.13.0
- libica 3.6.1
- qclib 2.1.0
- apt 2.0.1
- snapd 2.44
- cloud-init 20.1.10
- php 7.4+

Ubuntu Server 20.04 LTS (Focal Fossa)



Non-complete list of 20.04 s390x-specific new features and enhancements (since 19.10):

- Starting with Ubuntu Server 20.04 the architectural level set was changed to z13 (LP:1836907). This has a significant impact: Ubuntu Server for s90x now has more instructions that got introduced with z13 hardware; at the same time support for zEC12/zBC12 got dropped and the minimum supported hardware is now IBM z15 and LinuxONE Rockhopper (I) and LinuxONE Emperor (I).
- Secure Execution, a Trusted Execution Environment (TEE) for IBM Z and LinuxONE is now supported. It can only be used with IBM z15 and LinuxONE III. With Secure Execution (or the new protected virtualization aka 'provtirt') workloads can run virtualized in full isolation with protection for both internal and external memory using hardware assisted memory based encryption (LP:1835531), qemu (LP:1835546) and s390-tools (LP:1834534).
- The toolchain was significantly upgraded to gcc 9.3, gdb 9.1, LLVM 10, and key library updates (LP:1830609) and (LP:1853325), enhanced handling of secure keys (LP:1853303), and fixed like extend key support AES keys (LP:1830609) and (LP:1853325), enhanced handling of secure keys (LP:1853303) and fixed like extend key support AES keys (LP:1830609) and (LP:1853325).
- Change of minimal architectural requirement to z13, with that zEC12/zBC12 support got dropped expanded hardware support for z15 in general, on-chip compression (deflate), CPACF MSA 6 and CryptoExpress CEX7 and several libraries (OpenSSL, libica3, openssl, qclib, etc.)
- Secure Execution, a Trusted Execution Environment (TEE), support for pervasive encryption using hardware assisted guest memory encryption (LP:1856683), support for full isolation of KVM guests (LP:1856683), support for full isolation of KVM guests (LP:1856683).
- addition virtualization stack updates of qemu-kvm, libvirt, incl. crypto passthrough and more (LP:1856683), support for full isolation of KVM guests (LP:1856683).
- several kernel optimizations and kernel config adjustments (LP:1856683), support for full isolation of KVM guests (LP:1856683).
- subiquity is the new default installer for Ubuntu Server for s390x (LP:1856683), support for full isolation of KVM guests (LP:1856683).
- and with that 'autoinstall' supersedes 'preseed' (LP:1856683), support for full isolation of KVM guests (LP:1856683).
- Secure boot (for SCSI IPL) and IPL from NVMe (20.04.2) (LP:1856683), support for full isolation of KVM guests (LP:1856683).
- Finally ZPCI enhancements (LP:1863768) and fixes, like write through (LP:1866162) got picked up (LP:1863768) and fixes, like write through (LP:1866162) got picked up (LP:1863768).
- CONFIRMATION_FUNCTIONS to 512, but also further kernel config option changes, like CONFIG_NR_CPUS and CONFIG_NUMA_EMU (LP:1864196), CONFIG_NET_SWITCHDEV (LP:1865452) and disabling HIBERNATION and PM (LP:1867753).



Stability



Security



Features

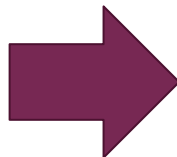
Please also see the official release notes: <https://wiki.ubuntu.com/FocalFossa/ReleaseNotes>

Ubuntu Server

Upgrade Path to 20.04



Ubuntu Server 19.10
Ubuntu Server 18.04 LTS



Ubuntu Server 20.04.x LTS

Always from **latest non-LTS to current LTS** and from **previous LTS to current LTS**.
'do-release-upgrade' is the recommended tool to use.

Join the webinar: "Migrating your infrastructure to Ubuntu 20.04 LTS - how, when and why?"

Blog: [How to upgrade from Ubuntu 18.04 LTS to 20.04 LTS today](#)

Wiki: https://help.ubuntu.com/community/FocalUpgrades#Ubuntu_Servers

Ubuntu Server - live installer (subiquity)



Willkommen! Bienvenue! Welcome! Добро пожаловать! Welkom!

[Help]

Use UP, DOWN and ENTER keys to select your language.

- [Asturianu ▶]
- [Bahasa Indonesia ▶]
- [Català ▶]
- [Deutsch ▶]
- [**English** ▶]
- [English (UK) ▶]
- [Español ▶]
- [Français ▶]
- [Galés ▶]
- [Hrvatski ▶]
- [Latviski ▶]
- [Lietuviškai ▶]
- [Magyar ▶]
- [Nederlands ▶]
- [Norsk bokmål ▶]
- [Polski ▶]
- [Suomi ▶]
- [Svenska ▶]

Ubuntu Server - live installer (subiquity)



ubuntu releases

Ubuntu 20.04 LTS (Focal Fossa)

Select an image

Ubuntu is distributed on four types of images described below.

<h4>Server install image</h4> <p>The server install image allows you to install Ubuntu permanently on a computer for use as a server. It will not install a graphical user interface.</p>	<p>64-bit PC (AMD64) server install image Choose this if you have a computer based on the AMD64 or EM64T architecture (e.g., Athlon64, Opteron, EM64T Xeon, Core 2). Choose this if you are at all unsure.</p> <p>64-bit ARM (ARMv8/AArch64) server install image For 64-bit ARMv8 processors and above.</p> <p>PowerPC64 Little-Endian server install image For POWER8 Little-Endian computers, such as Power Systems S8xxL/LC Linux-only servers.</p> <p>IBM System z server install image For IBM System z series mainframes, such as IBM LinuxONE.</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<https://ubuntu.com/download/server/s390x>

Installer update available [Help]

Version 20.03.1 of the installer is now available (19.12.1.5 is currently running).

You can read the release notes for each version at:

<https://github.com/CanonicalLtd/subiquity/releases>

If you choose to update, the update will be downloaded and the installation will continue from here.

[Update to the new installer]
[Continue without updating]
[Back]

<https://ubuntu.com/server/docs/install/general>

<https://ubuntu.com/server/docs/install/autoinstall>

Ubuntu Server - live installer 'Zdev' (subiquity)



```
Zdev setup [ Help ]

0.0.0400 ▶
0.0.0592 ▶

qeth
0.0.0600:0.0.0601:0.0.0602 enc600 ▶
0.0.0603:0.0.0604:0.0.0605 ▶

dasd-eckd
0.0.1607 ▶
  ◀ (close)
  Enable
  Disable

zfcp-host
0.0.f00b online ▶
0x50050763060b16b6:0x4026400600000000 sdb sg1
0x50050763061b16b6:0x4026400600000000 sda sg0
0.0.f10b online ▶
0x50050763060b16b6:0x4026400600000000 sdd sg3
0x50050763061b16b6:0x4026400600000000 sdc sg2

[ Continue ]
[ Back ]
```



Ubuntu Server - live installer (subiquity)

```
Installer shell session activated.
```

```
This shell session is running inside the installer environment. You will be returned to the installer when this shell is exited, for example by typing Control-D or 'exit'.
```

```
Be aware that this is an ephemeral environment. Changes to this environment will not survive a reboot. If the install has started, the installed system will be mounted at /target.
```

```
root@ubuntu-server:/# uname -a
```

```
Linux ubuntu-server 5.4.0-42-generic #46-Ubuntu SMP Fri Jul 10 00:21:32 UTC 2020  
s390x s390x s390x GNU/Linux
```

```
root@ubuntu-server:/# lsdev --online
```

TYPE	ID	ON	PERS	NAMES
zfcplib	0.0.f00b	yes	yes	
zfcplib	0.0.f10b	yes	yes	
zfcplib	0.0.f00b:0x50050763060b16b6:0x4026400600000000	yes	no	sdb sg1
zfcplib	0.0.f00b:0x50050763061b16b6:0x4026400600000000	yes	no	sda sg0
zfcplib	0.0.f10b:0x50050763060b16b6:0x4026400600000000	yes	no	sdd sg3
zfcplib	0.0.f10b:0x50050763061b16b6:0x4026400600000000	yes	no	sdg sg2
qeth	0.0.0600:0.0.0601:0.0.0602	yes	no	enc600
generic-ccw	0.0.0009	yes	no	

```
root@ubuntu-server:/#
```



Ubuntu Server - live installer (subiquity)

```
Installer shell session activated.
```

```
This shell session is running inside the installer environment. You will be returned to the installer when this shell is exited, for example by typing Control-D or 'exit'.
```

```
Be aware that this is an ephemeral environment. Changes to this environment will not survive a reboot. If the install has started, the installed system will be mounted at /target.
```

```
root@ubuntu-server:/# lsb_release -d
```

```
Description:    Ubuntu 20.04.1 LTS
```

```
root@ubuntu-server:/# uname -a
```

```
Linux ubuntu-server 5.4.0-42-generic #46-Ubuntu SMP Fri Jul 10 00:21:32 UTC 2020  
s390x s390x s390x GNU/Linux
```

```
root@ubuntu-server:/# snap list
```

Name	Version	Rev	Tracking	Publisher	Notes
core18	20200724	1884	latest/stable	canonical*	base
snapd	2.45.2	8539	latest/stable	canonical*	snapd
subiquity	20.07.1+git2.5de9df3e	1969	latest/stable/...	canonical*	classic

```
root@ubuntu-server:/# █
```

Ubuntu Server - autoinstall (user-data 'yaml')



```
$ cat /var/log/installer/autoinstall-user-data
```

```
# cloud-config
autoinstall:
  version: 1
  refresh-installer:
    update: yes
  reporting:
    builtin:
      type: print
  apt:
    preserve_sources_list: false
    primary:
      - arches: [amd64, i386]
        uri: http://archive.ubuntu.com/ubuntu
      - arches: [default]
        uri: http://ports.ubuntu.com/ubuntu-ports
  keyboard:
    layout: en
    variant: us
  locale: en_US
  identity:
    hostname: zvmguest
    password: "$6$ebJ1f8wxED22bTL4F46P0"
    username: ubuntu
```

```
user-data:
  timezone: America/Boston
  users:
    - name: ubuntu
      password: "$6$KwuxED22bTL4F46P0"
      lock_passwd: false
  early-commands:
    - chzdev dasd -e 1f00
  network:
    version: 2
    ethernets:
      enc600:
        addresses: [10.11.12.23/24]
        gateway4: 10.11.12.1
        nameservers:
          addresses: [10.11.12.1]
  ssh:
    install-server: true
    allow-pw: true
    authorized-keys: ['ssh-rsa meQwtZ
user@workstation # ssh-import-id lp:user']
```

⇒ /var/log/installer/autoinstall-user-data

Ubuntu Server Live Installer (subiquity / autoinstall)



The installation process changed with 20.04 for s390x (further improved with every point release), and the documentation was reworked and updated and can now be found here:

The landing page is the official **Ubuntu Server Guide for 20.04 LTS** (chapter 'Installation'):

Ubuntu Server Guide - 20.04 LTS:

- [http: https://ubuntu.com/server/docs/install/general](https://ubuntu.com/server/docs/install/general)
- [pdf: https://assets.ubuntu.com/v1/10d22089-ubuntu-server-guide.pdf](https://assets.ubuntu.com/v1/10d22089-ubuntu-server-guide.pdf)

The step-by-step examples from the Ubuntu Server guide about the **live installer** (subiquity) can also be found as separate documents at 'discourse', where it's possible to comment:

- [Interactive live server installation on IBM Z LPAR \(s390x\)](#)
- [Interactive live server installation on IBM z/VM \(s390x\)](#)

There also also step-by-step guides for **autoinstall**, the new way of doing non-interactive installations (succeeding preseed):

- [Non-interactive IBM Z LPAR \(s390x\) installation using autoinstall](#)
- [Non-interactive IBM z/VM \(s390x\) installation using autoinstall](#)



HW compression (NXU) support in Ubuntu 20.04



- Ubuntu Server 20.04 LTS advantages:
 - Hardware assisted compression supported is built-in.
 - Hence tools like gzip/gunzip, tar -czf, compression in IBM Java 8 SR6+, and everything that uses zlib (since it's a user space instruction) - even your kernel decompress after each boot - gets a nice speed up out of the box.
 - Significant speed-ups of 20x to 40x (zlib/DEFLATE) - *for free* (on z15) !
- Latest supported hw compression function is DEFLATE, which is supported by default with Ubuntu 20.04 (s390x), too: `CFLAGS="-O2 -DDFLTCC and -DDFLTCC_LEVEL_MASK=0x7e"` is used (means hardware acceleration compression is enabled for compression levels 1-6).

- If unsure check with:

```
$ strings /usr/bin/gzip | grep DFLTCC$  
DFLTCC
```

```
$ strings /usr/lib/s390x-linux-gnu/libz.so* | grep DFLTCC$  
DFLTCC
```





Hardware cryptography with Ubuntu on s390x

Enable hardware assisted cryptography support on Ubuntu Server for s390x with a few easy steps (same for all Ubuntu Server for s390x releases)

Install the **packages** needed for the hardware crypto support:

```
sudo apt-get install libica-utils libica? openssl-ibmca
```

Optional: Create a backup of the default openssl configuration file:

```
sudo cp -p /etc/ssl/openssl.cnf{,_${date +%Y-%m-%d_%H:%M:%S}.backup}
```

Append the **ibmca** related **configuration** lines to the OpenSSL configuration file (one line):

```
sudo tee -a ibmca section /etc/ssl/openssl.cnf <  
/usr/share/doc/openssl-ibmca/examples/openssl.cnf.sample
```

Make sure that only **one** "**openssl_conf = openssl_def**" configuration **entry** exists in the config file at line 10, hence comment out any potential entries and insert an active entry at line 10:

```
sudo sed -i 's/^\(openssl conf = openssl def.*$\)/# \1/g' /etc/ssl/openssl.cnf  
sudo sed -i '10i openssl_conf = openssl_def' /etc/ssl/openssl.cnf
```


Hardware cryptography with Ubuntu on s390x

What does "icainfo" show on z15 CPACF + CEX7S + Ubuntu Server 20.04 LTS



Cryptographic algorithm support

function	hardware		software
	dynamic	static	
SHA-1	no	yes	yes
SHA-224	no	yes	yes
SHA-256	no	yes	yes
SHA-384	no	yes	yes
SHA-512	no	yes	yes
SHA-512/224	no	yes	yes
SHA-512/256	no	yes	yes
SHA3-224	no	yes	no
SHA3-256	no	yes	no
SHA3-384	no	yes	no
SHA3-512	no	yes	no
SHAKE-128	no	yes	no
SHAKE-256	no	yes	no
GHASH	no	yes	no
P_RNG	no	yes	yes
DRBG-SHA-512	no	yes	yes
ECDH	yes	yes	no
ECDSA Sign	yes	yes	no
ECDSA Verify	yes	yes	no
ECKGEN	yes	yes	no
Ed25519 Keygen	no	yes	no
Ed25519 Sign	no	yes	no
Ed25519 Verify	no	yes	no
Ed448 Keygen	no	yes	no
Ed448 Sign	no	yes	no
Ed448 Verify	no	yes	no
X25519 Keygen	no	yes	no
X25519 Derive	no	yes	no
X448 Keygen	no	yes	no
X448 Derive	no	yes	no
RSA ME	yes	no	no
RSA CRT	yes	no	no
DES ECB	no	yes	yes
DES CBC	no	yes	yes
DES OFB	no	yes	no
DES CFB	no	yes	no
DES CTR	no	yes	no
DES CMAC	no	yes	no
3DES ECB	no	yes	yes
3DES CBC	no	yes	yes
3DES OFB	no	yes	no
3DES CFB	no	yes	no
3DES CTR	no	yes	no
3DES CMAC	no	yes	no
AES ECB	no	yes	yes
AES CBC	no	yes	yes
AES OFB	no	yes	no
AES CFB	no	yes	no
AES CTR	no	yes	no
AES CMAC	no	yes	no
AES XTS	no	yes	no
AES GCM	no	yes	no

No built-in FIPS support.

Pervasive encryption: Protecting data at rest



Optimistic Usage of zkey in Ubuntu Server (subiquity live) Installer (20.04 or newer)

- Protecting data at rest in the context of Pervasive Encryption is very popular and well documented:
 - Pervasive Encryption for Data Volumes: [HTML](#) or [PDF](#)
- It is straight forward, but requires manual steps to setup - even just for supplemental (data) volumes.
- But it becomes much more challenging in case the **root** filesystem (and **swap**) should be encrypted the same way!
- But here is where the ***optimistic usage of zkey*** of the **installer** (subiquity) of **Ubuntu Server 20.04.1** (or higher) simplifies this **root and swap encrypted setup** *tremendously*!
- **pre-reqs** for the optimistic usage of zkey in Ubuntu's installer (debian-installer aka d-i) is:
 - CryptoExpress adapter (5S or higher) with at least one domain
 - an initial master key configured (either with TKE or the 'IBM CCA Host Libraries and Tools')
 - and either ECKD/DASD or an zFCP/SCSI disk storage

Pervasive encryption: Protecting data at rest

Optimistic Usage of zkey in Ubuntu Server (subiquity live) Installer (20.04 or newer)



```
Guided storage configuration [ Help ]
Configure a guided storage layout, or create a custom one:
(X) Use an entire disk
    [ 0x6005076306 multipath device 64.000G  ]
      ffd6b6000000
      0000002606
[X] Set up this disk as an LVM group
    [X] Encrypt the LVM group with LUKS
        Passphrase: *****
        Confirm passphrase: *****
[ Done ]
[ Back ]
```



Pervasive Encryption: Protecting Data at Rest

How does it look like using optimistic zkey usage (in Ubuntu Server 19.10 and higher)

```
$ lszcrypt -V
```

CARD.DOMAIN	TYPE	MODE	STATUS	REQUESTS	PENDING	HWTYPE	QDEPTH	FUNCTIONS	DRIVER
00	CEX5C	CCA-Coproc	online	4	0	11	08	S--D--N--	cex4card
00.000a	CEX5C	CCA-Coproc	online	4	0	11	08	S--D--N--	cex4queue

```
$ sudo dmsetup ls --tree -o nodevice
```

- vgs1lp15-root
 - └─mpatha5_crypt
 - └─mpatha-part5
 - └─mpatha
- mpatha-part2
 - └─mpatha
- mpatha-part1
 - └─mpatha
- vgs1lp15-swap_1
 - └─mpatha5_crypt
 - └─mpatha-part5
 - └─mpatha

```
$ sudo cryptsetup status $(awk '{ print $1 }' /etc/crypttab )
```

/dev/mapper/mpatha5_crypt is active and is in use.

type: **LUKS2**
cipher: **paes-xts-plain64**
keysize: 1024 bits
key location: keyring
device: /dev/mapper/**mpatha-part5**
sector size: **4096**
offset: 32768 sectors
size: 132683776 sectors
mode: read/write
flags: discards



Secure Boot (aka Secure IPL)

- Secure boot attributes to the Pervasive Encryption effort
- The IBM z15 and LinuxONE III hardware introduce secure boot (for SCSI IPL): requires a Kernel 5.3+ and s390-tools 2.9 (rec. 2.11) → Ubuntu 20.04 LTS
- HMC's Load task and Activation Profile come with a new check-box: 'Enable Secure Boot for Linux' in case 'SCSI Load' is selected.
- For Linux (on s390x) two new sysfs entries got introduced:
`/sys/firmware/ipl/has_secure` - "1" indicates hw support for secure boot, otherwise "0"
`/sys/firmware/ipl/secure` - "1" indicates that secure IPL was successful, otherwise "0"
- zipl bootloader supports secure-boot with the "`--secure`" argument (0: secure boot disabled, 1: enabled, `auto`: enabled if environment supports secure boot)
- Ubuntu signs the kernel and the stage3 part of zipl bootloader (using X.509)
- Ubuntu Server on s390x defaults to secure-boot (starting with 19.10) - in case the underlying environment supports it and 'SCSI Load' is used.
- Secure boot is supported by the new Ubuntu live installer (subiquity).



Secure Execution (aka protected virtualization)

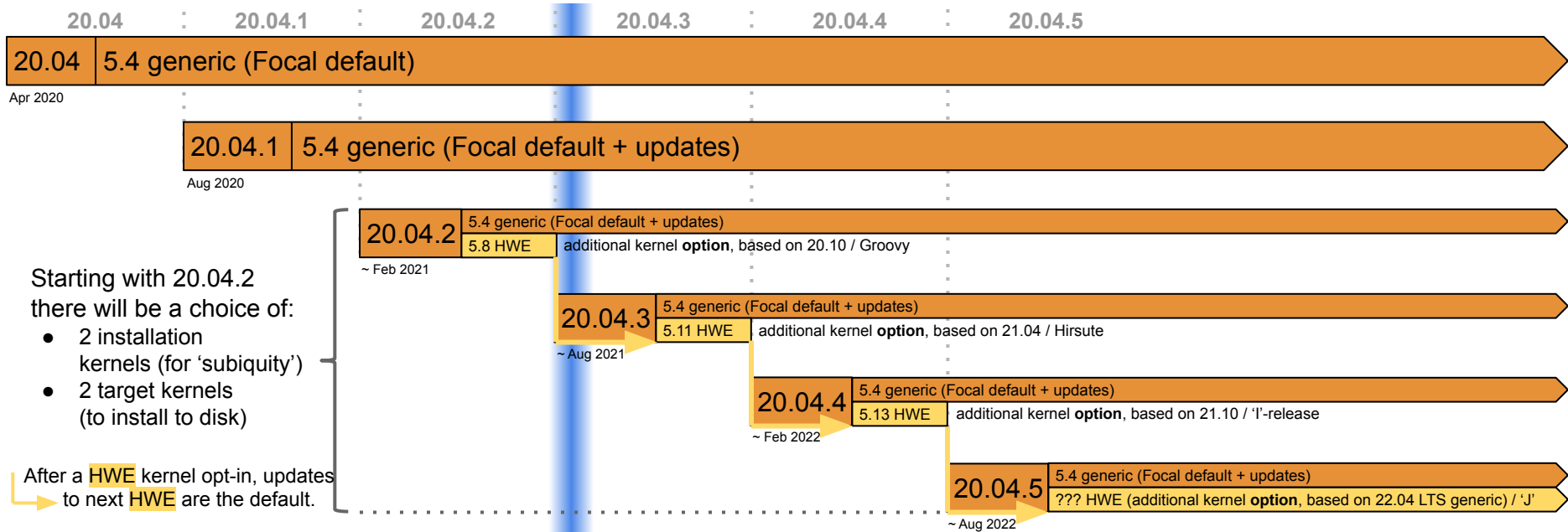
- The general idea behind secure execution is to **protect data in-use**
- It's a firmware based Trusted Execution Environment (TEE), that provides support for full isolation of KVM guests using hw assisted guest memory encryption and state protection.
- Protection is provided against guest data corruption and theft, bad and malicious console usage, bad and malicious hypervisor administrators and even buggy or compromised hypervisors and with that it's helpful to achieve compliance, especially for Cloud service providers.
- Allows customers to run their critical / sensitive workloads in house or in Clouds with the same maximum level of privacy and protection - since even admins can't access the data!
- The general idea: If you are unsure if you can guarantee or trust the hypervisor, an **Ultravisor** is needed -- the Ultravisor is largely based on firmware and uses special hardware instructions.
- Hardware z15 LinuxONE III (with FC 115 - free of charge) and kernel, qemu and (s390-)tools support.
- → Ubuntu 20.04 LTS is the first release that supports Secure Execution !



Ubuntu 20.04.x LTS Kernel Support Schedule

This is a distilled view of the 20.04.x Ubuntu Kernel Support Schedule.

Depending on the installed LTS 'point' release, it's either possible to use the generic and default Kernel (always until EOL) or optionally the HWE Kernel (HWE upgrade path need to be followed, starting with '.2').



Ubuntu 21.10 (Impish Indri)

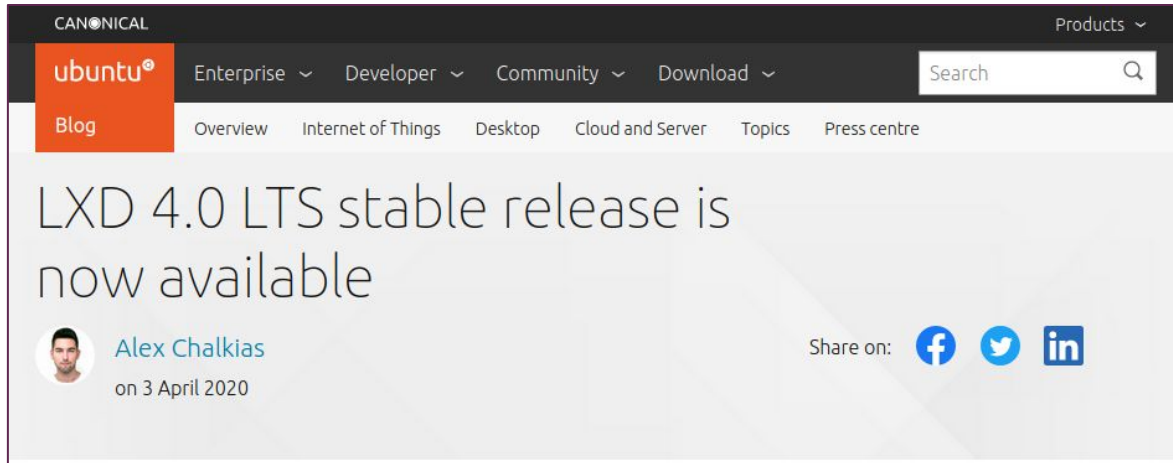


- The codename for 21.10 is 'Impish Indri' or simply 'Impish': <https://launchpad.net/ubuntu/impish>
- Ubuntu Server non-LTS aka development release
- Release Schedule: <https://discourse.ubuntu.com/t/impish-indri-release-schedule/>
Final Release: Oct, 14th 2021 (Release Candidate: Oct 07th 2021, Beta Sep 23th 2021)
- Release Notes: <https://discourse.ubuntu.com/t/impish-indri-draft-release-notes/> (draft)
- Major components:
 - Kernel **5.13**
 - qemu: **6.0**
 - libvirt: **7.6.0**
 - glibc **2.34**
 - binutils **2.37**
 - gcc-default **11.2** (8..10 in universe)
 - gdb **11.0**
 - LLVM **11** default (12, 13 in universe)
 - python **3.9.4**
 - go / golang **1.16**
 - valgrind **3.17**
 - wireshark **3.4.7**
 - openblas **0.3.13**
 - s390-tools **2.17.0**
 - smc-tools **1.6.0+**
 - openssl 1.1.1k
 - openssl-ibmca **2.2.0**
 - opencryptoki **3.16.+**
 - libica **3.8.0**
 - apt 2.3.8
 - cloud-init **21.3.1**
 - docker.io **20.10.7**
 - netplan **1.10.1**
 - util-linux **2.36.1**
 - qlibc **2.3.0**
 - systemd **248+**

**Subject to change
without further notice
- until released!**

Canonical / Ubuntu Specialties

LXD (>=4.2+) and Multipass (>=1.6.2 with LXD)



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LXD 4.0 LTS stable release is now available

Alex Chalkias on 3 April 2020

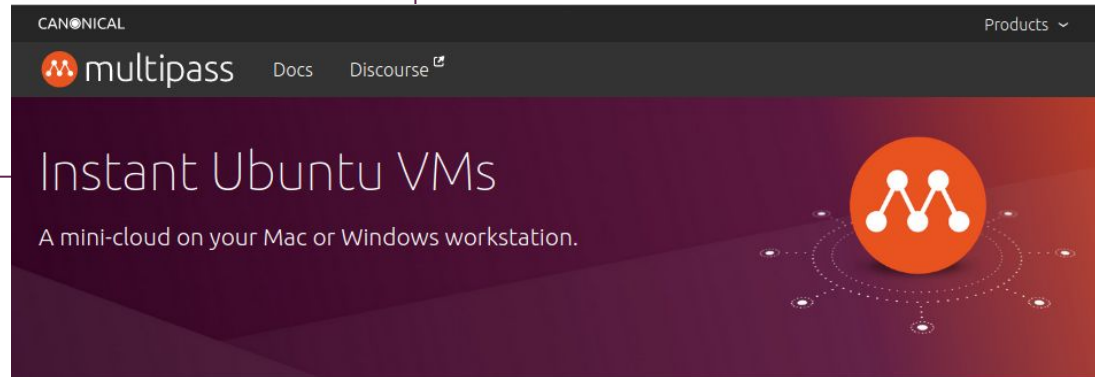
Share on: [f](#) [t](#) [in](#)

The stable release of LXD, the machine container hypervisor, is now available. LXD 4.0 is the third LTS release for LXD and will be supported for 5 years, until June 2025. This version comes with a significant amount of new features including adding virtual machines (VMs) support, the introduction of projects and improved networking, storage and security capabilities.

<https://linuxcontainers.org>

```
$ snap info lxd
$ sudo snap install lxd
$ sudo lxd init # --auto
```

<https://multipass.run>



CANONICAL Products ▾

multipass Docs Discourse

Instant Ubuntu VMs

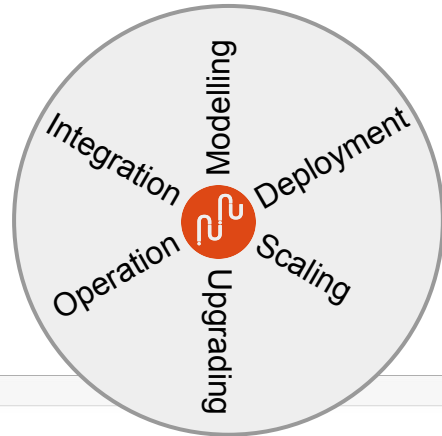
A mini-cloud on your Mac or Windows workstation.

```
$ snap info multipass
$ sudo snap install --edge multipass
```

Juju - The Services Modeling Tool

Brings all our Open Source Packages and IBM Software

Several OSS Charms & Bundles have been enabled for POWER and Z, where the code base got ported.



- MySQL
- MariaDB
- OpenStack
- RabbitMQ
- Wordpress
- HaProxy
- MemCache
- Kubernetes ...



<https://jujucharms.com/q/?tags=ibm>
<https://jaas.ai/u/ibmcharmners>

Canonical Distribution of OpenStack (CDO)

Management &
Automation

Infrastructure
Services



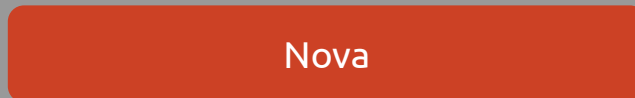
Landscape &
Autopilot



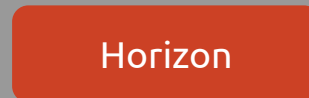
Juju



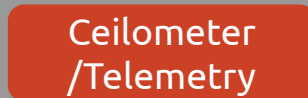
MAAS



Nova



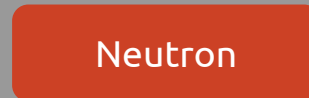
Horizon



Ceilometer
/Telemetry



Keystone



Neutron



Swift



Cinder

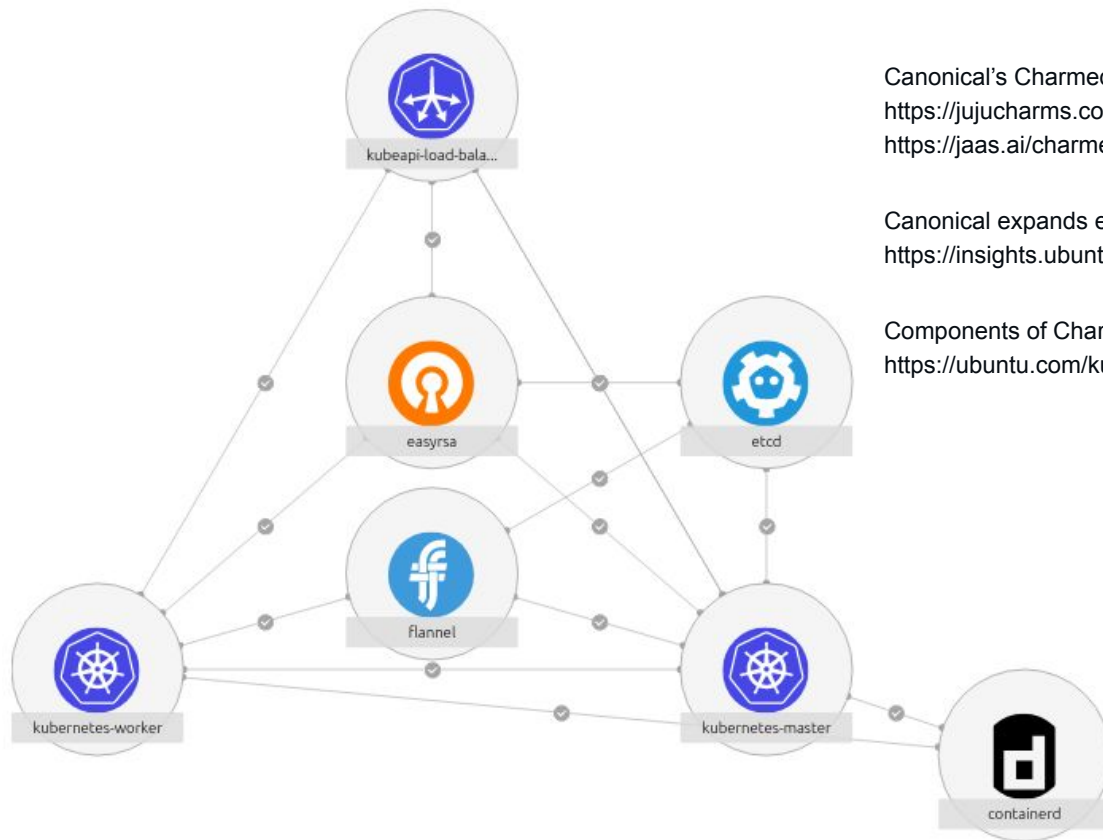


Glance

Ubuntu Server 16.04 LTS / 18.04 LTS / 20.04 LTS



CDK - Charmed Distribution of Kubernetes



Canonical's Charmed Distribution Of Kubernetes (CDK):

<https://jujucharms.com/canonical-kubernetes/>

<https://jaas.ai/charmed-kubernetes>

Canonical expands enterprise container portfolio:

<https://insights.ubuntu.com/2016/09/27/canonical-expands-enterprise-container-portfolio/>

Components of Charmed Kubernetes 1.20

<https://ubuntu.com/kubernetes/docs/1.20/components>



kubernetes



Kubernetes/CDK - juju status (cli)

```
Terminal File Edit View Search Terminal Help
ubuntu@silp15:~$ juju status
please enter password for admin on lxd-controller:
Model Controller Cloud/Region Version SLA Timestamp
cdk lxd-controller localhost/localhost 2.6.5 unsupported 03:01:24-04:00

App Version Status Scale Charm Store Rev OS Notes
containerd active 5 containerd jujucharms 2 ubuntu
easysrsa 3.0.1 active 1 easysrsa jujucharms 254 ubuntu
etcd 3.2.10 active 3 etcd jujucharms 434 ubuntu
flannel 0.10.0 active 5 flannel jujucharms 425 ubuntu
kubeapi-load-balancer 1.14.0 active 1 kubeapi-load-balancer jujucharms 649 ubuntu exposed
kubernetes-master 1.15.0 waiting 2 kubernetes-master jujucharms 700 ubuntu
kubernetes-worker 1.15.0 active 3 kubernetes-worker jujucharms 552 ubuntu exposed

Unit Workload Agent Machine Public address Ports Message
easysrsa/0* active idle 0 10.220.114.37 Certificate Authority connected.
etcd/0* active idle 1 10.220.114.150 2379/tcp Healthy with 3 known peers
etcd/1 active idle 2 10.220.114.39 2379/tcp Healthy with 3 known peers
etcd/2 active idle 3 10.220.114.132 2379/tcp Healthy with 3 known peers
kubeapi-load-balancer/0* active idle 4 10.220.114.188 443/tcp Loadbalancer ready.
kubernetes-master/0 waiting idle 5 10.220.114.92 6443/tcp Waiting for 6 kube-system pods to start
  containerd/4 active idle 10.220.114.92 Container runtime available.
  flannel/4 active idle 10.220.114.92 Flannel subnet 10.1.9.1/24
kubernetes-master/1* waiting idle 6 10.220.114.164 6443/tcp Waiting for 6 kube-system pods to start
  containerd/3 active idle 10.220.114.164 Container runtime available.
  flannel/3 active idle 10.220.114.164 Flannel subnet 10.1.47.1/24
kubernetes-worker/0 active idle 7 10.220.114.207 80/tcp,443/tcp Kubernetes worker running.
  containerd/0* active idle 10.220.114.207 Container runtime available.
  flannel/0* active idle 10.220.114.207 Flannel subnet 10.1.12.1/24
kubernetes-worker/1 active idle 8 10.220.114.105 80/tcp,443/tcp Kubernetes worker running.
  containerd/2 active idle 10.220.114.105 Container runtime available.
  flannel/2 active idle 10.220.114.105 Flannel subnet 10.1.93.1/24
kubernetes-worker/2* active idle 9 10.220.114.113 80/tcp,443/tcp Kubernetes worker running.
  containerd/1 active idle 10.220.114.113 Container runtime available.
  flannel/1 active idle 10.220.114.113 Flannel subnet 10.1.28.1/24

Machine State DNS Inst id Series AZ Message
0 started 10.220.114.37 juju-85c847-0 bionic Running
1 started 10.220.114.150 juju-85c847-1 bionic Running
2 started 10.220.114.39 juju-85c847-2 bionic Running
3 started 10.220.114.132 juju-85c847-3 bionic Running
4 started 10.220.114.188 juju-85c847-4 bionic Running
5 started 10.220.114.92 juju-85c847-5 bionic Running
6 started 10.220.114.164 juju-85c847-6 bionic Running
7 started 10.220.114.207 juju-85c847-7 bionic Running
8 started 10.220.114.105 juju-85c847-8 bionic Running
9 started 10.220.114.113 juju-85c847-9 bionic Running

ubuntu@silp15:~$
```

juju status or better
watch -c juju status --color
indicates that the deployment is fine.
Nothing marked in red (or yellow),
no workload states *error* or *blocked*.

Kubernetes/CDK Juju GUI - applications



File Edit View History Bookmarks

Juju GUI

https://10...

Juju

Login

Username

Password

Find your username and password with
`juju show-controller --show-password`

jujucharms.com

File Edit View History Bookmarks Tools Help

cdk - Juju GUI

https://10.220.114.76:17070/gui/u/admin/cdk

Juju / admin / cdk

7 applications 10 machines status

canonical kubernetes
Bundle details Get started

- 1 easysrsa
- 3 etcd
- 5 flannel
- 5 containerd
- 3 kubernetes-worker
- 1 kubeapi-load-balancer
- 2 kubernetes-master

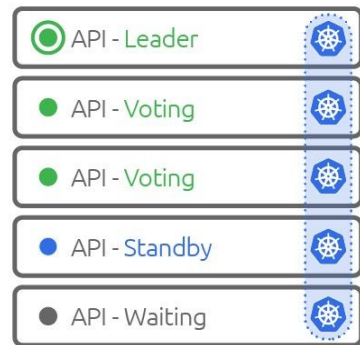
MicroK8s

MicroK8s



Low-operation, minimal production Kubernetes, for development, Cloud, clusters, workstations, servers, Edge and IoT.

- Smallest, fastest, fully-conformant Kubernetes that tracks upstream releases and makes clustering (optional) trivial.
- Default single node or optionally multi-node cluster setup possible.
- Goal is to eliminate everyday administration from Kubernetes clusters. Install, cluster, and then just watch it fly - one may alter MicroK8s configuration, but many people don't bother.
- Automatic data store, API services and leader election.
- MicroK8s also runs in an immutable container, so your Kubernetes itself is fully containerised.
- MicroK8s can update automatically, with rollback on failure.
- Defaults to the most widely used Kubernetes options, hence it 'just works' with no additional config needed.
- Try it out ([Howto](#)) - and provide some feedback (<https://github.com/ubuntu/microk8s>) !

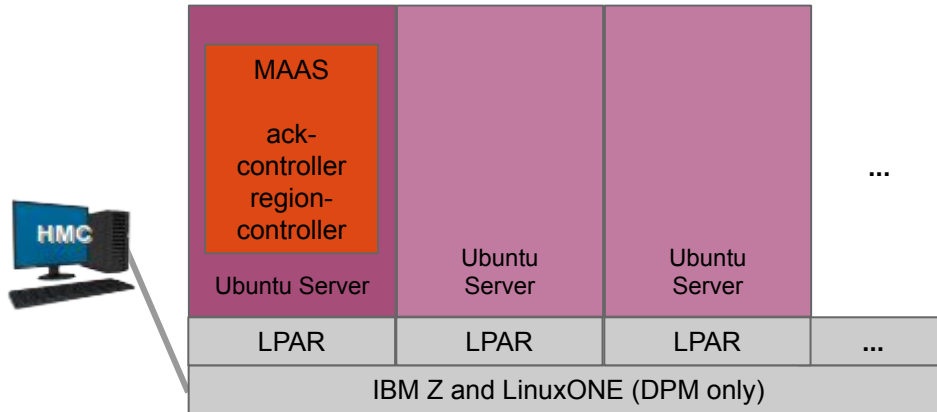


```
$ sudo snap install --edge microk8s --classic
```




MAAS DPM/LPAR

- There is no 'real' bare metal on IBM Z & LinuxONE, but LPARs are closest to bare metal that exists
- Requirements:
 - z14 GA2 (and higher), because of req. firmware features and storage groups
 - SCSI / zFCP disk storage only
 - DPM (from z14 GA2), due to rich Rest-API, (PXE-like) net-boot, storage groups, I/O auto-config
 - python-zhmcclient
- MAAS communicates with the HMC via its HMC's Rest-API (in DPM mode) using the python-zhmcclient
- MAAS (controller) itself can run on LPAR and serve other LPARs, but also on a different platform (but one may consider to limit the HMC connectivity to the Z system only - due to security reasons)
- MAAS v3.0 running on Ubuntu Server 20.04 is the minimal requirement

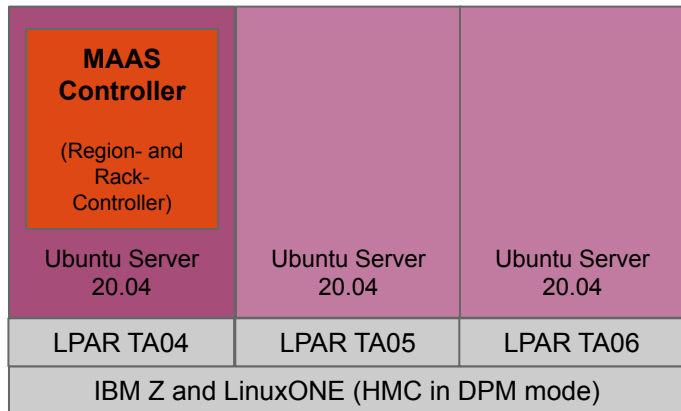


The node lifecycle

Each machine ('node') managed by MAAS goes through a lifecycle — from its enlistment or onboarding to MAAS, through commissioning when we inventory and can setup hardware-specific elements (based on an ephemeral Ubuntu image), then allocation to a user and deployment, and finally they are released back to the pool or retired altogether.

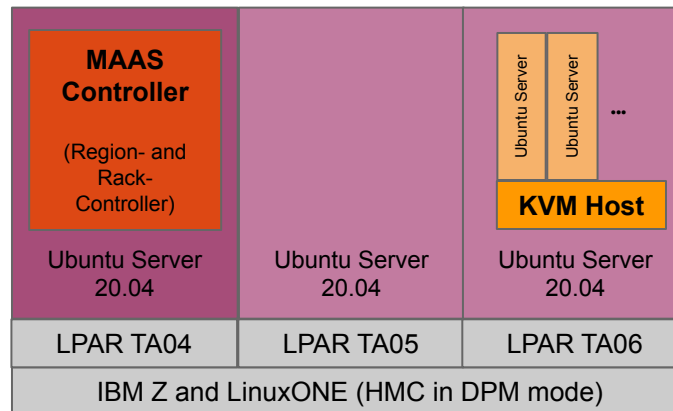


MAAS DPM/LPAR and KVM - Example Environments



Managing LPARs only.

Managing LPARs and KVM VMs





MAAS (virtual) Machine live-cycle

MAAS Machines Devices Controllers Pods Images DNS AZs Subnets Settings admin Logout

Machines 1 machine available 1 selected Add hardware Take action

1 Machine 1 Resource pool

Filters in:(Selected)

<input checked="" type="checkbox"/>	FQDN IP	MAC	POWER	STATUS	OWNER, TAGS	ZONE	CORES
<input checked="" type="checkbox"/>	humane-orca.maas 192.168.122.202 (PXE)		Off Virsh	18.04 LTS	admin virtual, pod-c...	default	1

Commission...
Acquire...
Deploy...
Release...
Abort...
Power on...
Test hardware...
Rescue mode...
Mark broken
Lock
Set zone...
Set resource pool...
Delete...

MAAS name: s1lp11 MAAS
MAAS version: 2.5.3 (7533-g65952b418-0ubuntu1~18.04.1)

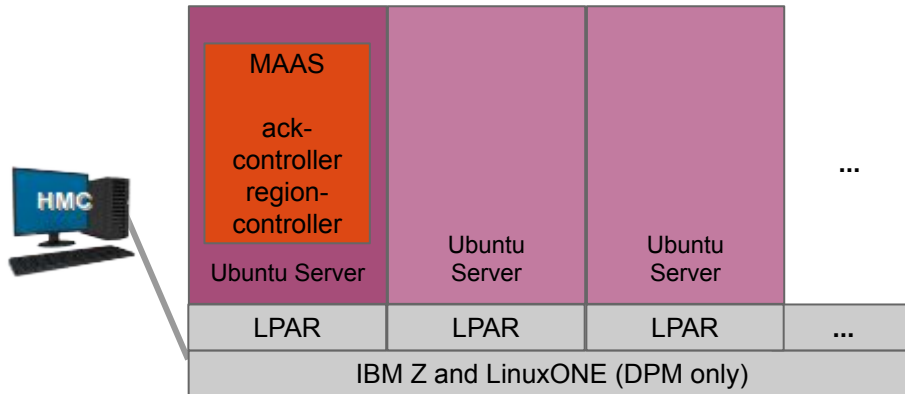
[View release notes](#) · [View documentation](#) · [Legal information](#) · [Give feedback](#)

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MAAS on IBM Z or LinuxONE - Resources

- How do I configure and use IBM Z with MAAS?
<https://maas.io/docs/snap/3.0/ui/power-management#heading--configure-use-ibm-z>
- MAAS 3.0 - What's New - IBM Z DPM/LPAR
<https://maas.io/docs/snap/3.0/ui/whats-new-in-maas#heading--ibm-z-dpm>
- MAAS on Discourse
<https://discourse.maas.io>
- MAAS on IBM Z - Show and tell (by Lee Trager)
<https://drive.google.com/file/d/1MZyhLL1znKeg4ARWePcywDOg1Wzeu4SY/view>
<https://people.canonical.com/~fheimes/maasz/MAAS%20on%20IBM%20Z.mkv> !



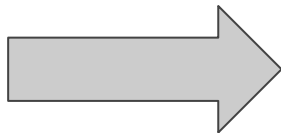


MAAS

The **API** of MAAS
Is what provides the
most value.



Service
orchestration



Machine
configuration



Manual setup

LinuxONE III Express with Ubuntu Server 20.04 LTS



- ▶ A strategic platform for confidential computing in the cloud for the most popular open source workloads
- ▶ Safeguarding data in the cloud is essential in the shifting security landscape. IBM and Canonical, the publisher of Ubuntu, together bring a cost-effective, off the shelf, pre-configured system offering the breadth of the latest open source to get clients up and running quickly and securely.
- ▶ Ubuntu Server Long Term Support (LTS) on IBM LinuxONE III Express is a flexibly-priced LinuxONE hardware that secures the full stack from infrastructure to OS, containers and VMs to apps, for the most securely performant server environment. The solution includes:
 - Cloud-native app support
 - Automation with Juju
 - Virtualisation - LPAR, VMs, containers (LXD, kubernetes)
 - Operating System (Ubuntu Server 20.04 LTS)
 - Metal as a Service (MAAS for KVM and DPM/LPAR)
 - Certified hardware

Ubuntu on LinuxONE customer case study: Phoenix

<https://www.ibm.com/case-studies/phoenix-systems>

*“Technology should support people doing their jobs,” says Thomas Taroni, CTO at Phoenix Systems. “It’s easy to lose sight of that, and chase innovation for the sake of innovation. At the end of the day – if you’re not making someone’s **life easier**, then what’s the point?”*

- Phoenix Systems, a Swiss IT services provider located in Zurich, provides high-security and fully automated cloud services offerings and solutions to customers.
- A Trusted Execution Environment (using Secure Execution) is provided, that cannot be accessed by unauthorized users or even by Phoenix Systems administrators themselves.
- The base is IBM Hyper Protect Virtual Servers running on Ubuntu Linux technology.
- Application and database data is encrypted end to end, both, for data in use and data at rest.
- This is especially important for organizations operating in regulated sectors.
- The flexibility and efficiency benefits of public cloud solutions are offered, while also facilitating compliance with strict data governance and security directives.
- In other words Phoenix Systems offers a platform for [‘confidential computing’](#).

*“I’ve been **an Ubuntu user my whole life**, so the overall package of Ubuntu plus LinuxONE was the right one for Phoenix Systems. I prefer the way you manage users, install and update packages, and so on within Ubuntu.”*

 PHOENIX SYSTEMS

Why Ubuntu Server LTS on s390x?



Any Questions?

Microk8s

snaps

OSS software stack currency

LXD included

release parity

5 years base support

ESM

level pricing (FLs)

LTS Kernel

OpenStack integration

drawer-based pricing

MAAS DPM/LPAR KVM

(HWE-) Kernel upgrade option within LTS

IBM Java available from archives

size and scope of the repositories

Ubuntu KVM

Julia, Matlab, Max/MSP

no 31-bit legacy

latest toolchain

landscape client

various repos/archives: Partner, UCA, PPAs

'point' releases with refreshed ISO and Cloud image

new software every month (non-LTS)

arch. level set to EC12+

easy availability and trial

Any Questions?

virtualization options: LPAR, z/VM, KVM, LXD + more container

new LTS OS / software every 2 years

same L&F like on other platforms

PE support

Multipass

UA-I covers the Ubuntu Server OS, but also OpenStack and Kubernetes

LTS & non-LTS mix

Thank you - Questions?

Thanks a lot - and stop by at:

<https://ubuntu-on-big-iron.blogspot.com>

