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PRODUCT BROCHURE

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# What's new in Ubuntu Server 14.04 LTS?

Key features introduced since 12.04

April 2014



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## INTRODUCTION

Released in April 2014, Ubuntu Server 14.04 is the latest LTS release of Ubuntu Server. It includes Icehouse, the latest release of OpenStack and many new features and tools for cloud and hyperscale computing.

LTS stands for Long Term Support. It means that the release will be supported by Canonical with maintenance and security updates for five years. Canonical releases a Long Term Support Release of Ubuntu Server every two years, the last one being Ubuntu Server 12.04 LTS, released back in April 2012.

While providing an overview of the key features in Ubuntu Server 14.04, the main focus of this document is to explain the improvements that have been introduced in the last two years, for users considering the upgrade from the 12.04 release.

### UNMATCHED INTEGRATION WITH OPENSTACK

Ubuntu Server 14.04 LTS has been designed for the reality of the modern datacentre. It is built for virtualised, cloud and hyperscale infrastructure, either as a host platform or a guest OS. It is certified on a wide range of hardware from all major brands and on all the leading public clouds.

It brings all the recent improvements in the Linux kernel to Ubuntu and, unlike any of its competitors, it runs equally well on the x86, ARM64 and POWER architectures – as do its unique provisioning, deployment and management tools.

With commercial support available direct from Canonical, Ubuntu Server is the most reliable, flexible and feature-rich platform for modern enterprise deployments.

### UBUNTU SERVER 14.04 LTS AT A GLANCE

- Based on version 3.13 of the Linux kernel
- Includes the Icehouse release of OpenStack
- Both Ubuntu Server 14.04 LTS and OpenStack Icehouse are supported until April 2019
- Includes MAAS for automated hardware provisioning
- Includes Juju for fast service deployment
- Enjoys the richest cloud software ecosystem in the Linux world
- Certified for use on all leading public cloud platforms
- Runs on all key hardware architectures: x86, x86-64, ARM v7, ARM64 and Power

## NEW FEATURES IN THE CORE SERVER OS

The last two years have seen a huge effort in the development and testing of new features for Ubuntu Server 14.04 LTS, most notably in the areas of scale-out computing and the toolchain required to deploy and manage enterprise cloud workloads.

Ubuntu Server has therefore evolved to run reliably on x86, ARM64 and POWER hardware. It works equally well in containers or virtualised environments (with support for KVM on POWER coming soon) and on OpenStack clouds, not to mention all the leading public clouds – including AWS, Microsoft Azure, Joyent, IBM SmartCloud and HP Cloud. No other scale-out platform offers this flexibility.

This release is, without question, the most interoperable OpenStack platform on the market, thanks to the tests it has undergone in the Ubuntu OpenStack Interoperability Lab, where more than 3,000 test runs are undertaken each week, using different combinations of Ubuntu, OpenStack and a myriad third party technologies.

### UNDERLYING LINUX KERNEL UPDATES

Ubuntu Server 14.04 includes version 3.13 of the Linux Kernel. Since the release of Ubuntu Server 12.04 (which included v3.2 of the Linux Kernel), the following significant features have been included:

- Networking – this release adds Open vSwitch 2.0.1 support (including VXLAN), better bonding support, better bridge management and diagnosis and new buffer bloat avoidance measures. It also introduces better TCP connection management in the face of packet loss, plus TCP fastopen and improved attack tolerance. Finally it sees the first stages of the switch to nftables, which should see incremental improvements to network security.
- Virtualisation – as well as major improvements to Xen (including ARM support) and VMware support, full support has been added for KVM 2.0.0 (including QEMU KVM), version 1.2.2 of libvirt and the Microsoft Hyper-V hypervisor, alongside general performance improvements in the virtio subsystems.
- Filesystems – general performance and latency improvements have been made, plus metadata checksumming and improved quota support for file systems such as Btrfs and Ext4.
- Security – improvements to AppArmor allow more fine-grained control over applications. The Integrity Measurement Architecture has also been enabled.
- Hardware support – ARM multiplatform support has been added, enabling you to build a single ARM kernel image that can boot across multiple hardware platforms. The ARM64 and Power architectures are now fully supported.

For more information on the kernel updates introduced since Ubuntu 12.04 LTS, go to [https://wiki.ubuntu.com/TrustyTahr/ReleaseNotes#Linux\\_kernel\\_3.13](https://wiki.ubuntu.com/TrustyTahr/ReleaseNotes#Linux_kernel_3.13)

## PACKAGE UPDATES SINCE 12.04

A large number of the standard Ubuntu server packages have seen significant updates since 12.04, including control groups (with the addition of cgroup manager), Tomcat (version 6 has been replaced with version 7), PostgreSQL 9.3 (replacing version 9.1), alongside the introduction of Docker 0.9, Puppet 3.0, Qemu 2.0, Libvirt 1.2, LXC 1.0 and MySQL 5.5.

## THE ICEHOUSE RELEASE OF OPENSTACK

Icehouse is the latest release of OpenStack, the world's leading open cloud infrastructure platform. It has been part of Ubuntu Server since the project began and this release, like Ubuntu 14.04 LTS, benefits from the guarantee of five years of support. Notable improvements in Icehouse include the introduction of automated installation, a queuing and notification service and the integration of database-as-a-service features.

To learn more about the latest features of OpenStack, go to <https://www.openstack.org/software/roadmap>

## RUNS ON IBM POWER, ARM64 AND INTEL AVOTON

As a result of ongoing hardware enablement work over the last two years – notably with ARM and IBM – Ubuntu Server now supports more architectures than any other scale-out platform, adding support for ARM64 and POWER to the list of x86 and ARM chipsets supported at the last release. With a toolchain for provisioning, deployment and ongoing management that's just as flexible, the hardware on which you build your cloud no longer matters.

## EVER WIDER PUBLIC CLOUD SUPPORT

Ubuntu Server has long been the most popular choice of guest operating system on the world's leading public clouds. Official Ubuntu Server 14.04 images, delivered certified by Canonical, are now available on AWS, IBM SmartCloud, Microsoft Azure, Joyent and HP Cloud.

The Ubuntu Certified Public Cloud Programme is now being extended to smaller providers that cater to specialist audiences, so they can provide their customers with the same level of product and service quality and reliability when they offer Ubuntu Server on their clouds.



## SUPPORT FOR WINDOWS SERVER GUEST

Ubuntu is now certified by Microsoft to host Windows Server 2012 and Windows 2008 R2 as guests on any KVM-based Ubuntu deployment, be it on bare metal or Ubuntu OpenStack, under Microsoft's Server Virtualisation Validation Program (SVVP). Canonical supplies paravirtualised drivers for use with the Ubuntu virtualisation stack, giving you supported access to the latest and most popular Windows Server releases. Ubuntu Server 14.04 LTS thereby takes the interoperability that modern data centre managers expect even further, continuing Canonical's partnership with Microsoft around virtualisation and cloud.

## HARDWARE ENABLEMENT KERNELS

Every six months, a hardware enablement kernel is made available as part of the LTS point release. Matching the kernels developed for Ubuntu's regular interim releases, this brings support for the latest hardware and the newest kernel features to the stable userland of the LTS release. Where these updates are not needed and consistency is preferred, Canonical supports the original LTS kernel for the full five year lifecycle.

## CLOUDFOUNDRY

The world's most popular cloud Platform-as-a-Service is now completely compatible with Ubuntu and OpenStack. Supported by Pivotal, it benefits from a large, diverse ecosystem of cloud applications, all of which can now be integrated with cloud infrastructure built on Ubuntu Server 14.04 LTS and the Icehouse release of OpenStack.

## NEW LXC FEATURES

Linux containers are now more secure than ever on Ubuntu, thanks to new features in Ubuntu Server 14.04 LTS including updated seccomp v2 policies featuring a system call blacklist and name resolution. There are entirely new features, including snapshot clones using overlayfs, aufs, btrfs, lvm, and zfs. Meanwhile, the LXC API is now easier for developers to access, with bindings for Python 3, Go, Ruby and Lua.

## DOCKER NOW EVEN EASIER TO USE

Ubuntu offers industry-leading support for LXC containers, making Ubuntu the best Docker experience on the market. While Ubuntu has been the most popular platform for Docker users since the beginning, Canonical has recently partnered with the Docker team to make the experience consistent and even easier to use.

Docker's own image repository includes official Ubuntu images and Docker is available to Ubuntu users via apt-get. Alternatively, Docker's upstream repository now includes official Ubuntu Server 14.04 LTS images, supported by Canonical for five years. Canonical will undertake to update all packages to ensure the latest Docker innovations can always be accessed on Ubuntu and supported for our users.

## FULL KERNEL INTEGRATION OF OPEN VSWITCH

Ubuntu Server 14.04 LTS incorporates Open vSwitch version 2.0.x – essentially its first production release. It provides Native GRE and VXLAN support in the kernel, which in turn enables the support of Neutron-based Openstack Deployments.

## INTEGRATION OF SIMPLE STREAMS

Introduced a year ago in Ubuntu 13.04, Simple Streams makes the identification of Ubuntu cloud images easier, by providing more information on each download. Essentially, it is a package in Ubuntu Server that queries a corresponding store of secure json data describing Ubuntu image-ids and image-downloads. It allows programmes to download the latest version of a specific release, for example 12.04, or to identify the latest image-id of Ubuntu Server 14.04 in 'East US' on Azure.

Simple Streams allows you to query this data, maintain a file system mirror or ensure that your local cloud remains synchronised with [cloud-images.ubuntu.com](http://cloud-images.ubuntu.com)

The data is available under the streams/v1/ path at:

- Ubuntu Cloud Images: <http://cloud-images.ubuntu.com/releases/>
- MAAS Data: <http://maas.ubuntu.com/images/ephemeral-v2/>



## IMPROVED XFS SUPPORT

Improved XFS support, adding namespaces and directory entry file type, for better directory recursion performance.

## THE FASTEST PATH TO SYSTEM INSTALL

Ubuntu Server now features the Curt Installer (Curtin), the fastest way to deploy Ubuntu yet. Unceremoniously brief, Curtin has been shown in action deploying a full Ubuntu Server image up to 10 times faster than the corresponding Dpkg installation, and regularly outpaces the BIOS POST process in our test servers, with a full install well under two minutes on spinning media, and a mere 35 seconds on SSD.

## SCALABLE MULTIQUEUE BLOCK LAYER

The new multiqueue block layer eliminates the legacy throughput limits imposed by the kernel's single-lock bottleneck to the IO request queue, which were typically around 800,000 IOPS. The Multiqueue block layer can accommodate both the demands of many-processor systems and the IO speed of modern SSDs, with a design that promises to scale into the millions of IOPS and can accommodate current high-performance SSDs.

Improvements have also been made to the scalability of the underlying IO architecture, bringing improved performance to virtual machines using the virtioblk drivers.





## IMPROVED NUMA PERFORMANCE

Changes to the NUMA placement policies help maximise the locality of access, thereby boosting NUMA memory performance. Also, a number of new tunables have been exposed.

## THE FIREFLY RELEASE OF CEPH

Ubuntu 14.04 LTS will be updated shortly after release to include the Firefly version of Ceph. This will bring features including tiered storage, erasure encoding and embedded web server functions for use with the RADOS Gateway interface.

## TCP FAST OPEN NOW ENABLED BY DEFAULT

TCP Fast Open speeds up the process of establishing a TCP connection to allow the elimination of one round time trip from certain kinds of TCP conversations – which in turn, speeds up the loading of web pages. This feature, supported by both Firefox and Chrome, was turned on by default in version 3.13 of the Linux kernel – the version used by Ubuntu Server 14.04 LTS.

## INTEL KNIGHTS BRIDGE SUPPORT

Ubuntu Server 14.04 LTS is the first release of Ubuntu to include support for the Many Integrated Core (MIC) co-processor architecture, also known as Knights Bridge. This allows for higher density computing, especially useful in High Performance Computing (HPC) applications.

## PROVISIONING AT SCALE WITH MAAS

Metal-as-a-Service (MAAS) is Ubuntu's hardware provisioning tool. Now supporting the significantly faster Curtin installer and many more enhancements, it saves time and eliminates human error in the mass provisioning of servers for scale-out computing. MAAS works with all key hardware architectures and across physical datacentres, transforming the provisioning process for cloud and hyperscale deployments.

### NEW NETWORK MODELLING TOOLS

In the 14.04 release of MAAS, network modelling tools for both physical and VLAN nodes enable you to set conditions and parameters, so you can impose acquisition constraints governing the networks to which a node must be connected. Additionally, MAAS is now able to manage multiple network interfaces on a single cluster controller.

### PHYSICAL ZONES AND NODES

To help you maximise fault-tolerance and performance of the services you deploy, MAAS administrators can define physical zones and manually assign nodes to them, making it easier to physically visualise and locate nodes in your datacentre. A node can be a server rack, a room, a data centre, machines attached to the same UPS, or a portion of your network.

### LLDP DATA COLLECTION

MAAS can now see the topology of your network, learning where every machine is attached, because it collects LLDP data on each node during its commissioning cycle. The router to which the node is connected will have its MAC address parsed out of the data and made available for using as a placement constraint (passing either `connected_to` or `not_connected_to` to the `acquire()` API call), or you can define tags using expressions such as

```
``//lldp:chassis/lldp:id[@type="mac"]/text() = "20:4e:7f:94:2e:10"``
```

which tags nodes with a router using that MAC address.

## MORE EXTENSIBLE TEMPLATES FOR DHCP, POWER CONTROL, PXE AND DNS

Templates supplied for these activities are now all in their own template file that is customisable by the user. The files now generally live under `/etc/maas/` rather than embedded in the code tree itself.

## HARDWARE-SPECIFIC KERNEL AND EPHEMERAL DOWNLOADS DRIVEN BY SIMPLESTREAMS

All boot resources and ephemeral downloads are now driven by simplestreams data published on [maas.ubuntu.com](https://maas.ubuntu.com), which includes updated hardware enablement kernels for newer hardware running on older Ubuntu releases.

## UEFI

AMD64 machines with UEFI BIOSes can be booted and installed by MAAS; there's no need to enable legacy BIOS support.

## COMPATIBILITY TESTING

To ensure that MAAS will be capable of provisioning your hardware before you begin, the new `maas-test` command automatically brings up a new VM, installs MAAS on it and tests MAAS on the machines you want to provision. As well as helping you identify any problems before they arise, the results can be fed back to the `maas-test reports` project, helping Canonical improve hardware compatibility even further.

## DEPLOYMENT AND SERVICE ORCHESTRATION WITH JUJU

Juju enables the fast deployment of services onto bare metal or a cloud. It automatically monitors and adjusts deployment parameters in real time, enabling your services to scale horizontally, on-demand and without interruption.

Ubuntu Server 14.04 incorporates more than three years of Juju development, enabling you to design, deploy and scale services in the environment of your choice.

### INTRODUCING BUNDLES

The magic of Juju comes from charms – configuration files created for each service that can be edited, re-used and shared. They include all the information a service needs to be deployed on any of the providers Juju supports. Bundles are collections of charms for groups of services that are commonly used together, for example, OpenStack or Hadoop. They simplify deployment even further by eliminating the need for you to define how your services will be deployed together.

In Ubuntu Server 14.04 LTS, Juju includes a bundle for a three-shard MongoDB cluster, a Hadoop bundle that can scale out as you need it and an entire Rails stack, complete with monitoring. There are new ones being added every day and you can also create your own bundles of individual charms and share them with the community. For a full listing of current charms and bundles, go to [jujucharms.com](http://jujucharms.com).

### IVE/ACTIVE HA CLUSTERING FOR OPENSTACK JUJU CHARMS

With the Icehouse release of OpenStack, active/active High Availability (HA) is now enabled for all OpenStack Juju charms, including the charm for the RabbitMQ messaging system. Alongside the addition of the Percona XtraDB storage engine for MySQL, this paves the way for full active/active HA clustering with Juju.

### SUPPORT FOR EVEN MORE PROVIDERS

Juju's provider list grows longer with every release. Joyent has been added to a list that also includes Amazon Web Services, HP Cloud, Microsoft Azure, OpenStack, bare metal via MAAS, and LXC and KVM containers.

### MANUAL AND LOCAL PROVIDERS

Juju now enables you to deploy a workload to any Ubuntu server via ssh. This includes popular VPS providers, as well as your own hardware. And with the ability to automatically create LXC containers, automated local development via Juju has become even faster.



## MORE CHARMS AND EASIER CHARM DEVELOPMENT

Juju Charm Tools have been improved and a new testing harness, Amulet, has been developed to improve the charm development experience further. The Charm Store now includes charms for over 130 services, including MongoDB clusters, Hadoop, Cassandra, OpenStack, Ceph, MySQL (with master/slave support), PostgreSQL, ElasticSearch (with Logstash and Kibana), Jenkins, Apache Syncope and Tomcat, Redis and Varnish. Development charms for Ruby and Django are also included, with more coming soon.

## NEW GUI AND JUJU-QUICKSTART

Ubuntu Server 14.04 is the first LTS release to include the Juju GUI, helping even the most seasoned operations professional to visualise the relationships between services as they are deployed.

It also introduces juju-quickstart, a plugin that allows you to bootstrap Juju and its GUI with a single command. This feature becomes even more significant when combined with a bundle, effectively allowing you to launch a cloud environment and deploy complex combinations of services together, in a single instruction.

The Juju GUI is browser-based, so you can try it online now.  
Go to [jujucharms.com](http://jujucharms.com).



## SUMMARY

This release of Ubuntu server is all about the cloud – or, more specifically, it is all about scale out computing infrastructure. That’s why it focuses on bringing the most reliable scale-out feature set to the widest range of hardware and software platforms, from the most popular datacentre hardware to the most widely-used public clouds.

It introduces full compatibility with the latest and most innovative open-source enterprise software projects, like Docker and OpenStack – and it ensures they can be relied on in production deployments, by testing thousands of combinations in the Ubuntu Openstack Interoperability Lab, every year.

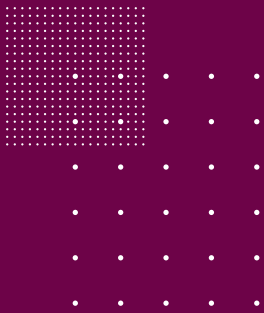
And it includes the guarantee of security and maintenance updates for the next five years – a support promise that can be bolstered by commercial support and management software direct from Canonical, the company responsible for supporting the adoption of Ubuntu in the enterprise.

At the time of writing, this guide summarises the key updates and reasons for users of Ubuntu Server 12.04 LTS to upgrade to the new LTS release.

To talk to the Ubuntu experts at Canonical about the situation in your organisation, please get in touch via our website.

For additional technical detail, please consult our complete Ubuntu Server guide at <https://help.ubuntu.com/14.04/serverguide/index.html>.

[ubuntu.com/cloud](https://ubuntu.com/cloud)



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