

OpenStack deployment starts here...



Contents

02 Everybody's doing cloud on Ubuntu

04 A vision of open cloud

05 - Supported, certified and compliant

05 - Preferred guest OS on public clouds

06 - Hybrid cloud – combining public and private IAAS

07 - More than the sum of its parts

07 - Velocity and agility in devops

08 - Leadership in physical provisioning, with MAAS

10 Building a private cloud with Ubuntu

11 - Ubuntu Cloud Infrastructure is OpenStack

11 - Compatibility, flexibility, scalability, compliance and assurance

12 - Support and assurance for your private cloud

12 - Bring your public cloud in-house

12 - Turnkey Cloud-in-a-Week with Canonical's Cloud Jumpstart

12 - Contact Canonical

13 Ubuntu is the #1 OS on public clouds

14 - Optimised for each cloud

14 - Cut the complexity with cloud-init

14 - Talk to the experts

16 Cloud orchestration with Juju

17 - A little charm goes a long way

17 - Repeatable deployments improve quality

17 - Re-use hundreds of existing charms

18 - Deploy services in seconds

18 - Speed up the pace of change

19 - Layer on top of configuration management

19 - Scale

20 - Juju in practice – some examples from the field

20 - Example 1: Deploying and scaling Hadoop

20 - Example 2: Deploying a Node.js application

22 Physical provisioning, evolved

24 - The hyperscale era

25 Compliance, Assurance, Support with Ubuntu Advantage from Canonical

25 - Smart monitoring and management with Landscape

26 Hybrid cloud with Cloud Deck from Canonical

26 - How it works

27 Ubuntu Advantage for Cloud

27 - Ubuntu Advantage Infrastructure

27 - Ubuntu Advantage on the public cloud

29 Services for public cloud providers

29 - Offering Ubuntu as a guest

29 - Building on Ubuntu and OpenStack

30 Ubuntu Cloud at a glance

Everybody's doing cloud on Ubuntu

HP, AT&T, Ericsson and Rackspace... they all build their clouds on Ubuntu plus OpenStack, the platform of choice for organisations deploying large scale cloud IAAS today.

Widely certified and supported for the long term, Ubuntu 12.04 LTS is the most reliable platform on which to move from a pilot or proof of concept to a large-scale production deployment. It offers the robustness and agility you need for rapid scaling of the underlying cloud, while offering first-class support for the key virtualisation technologies that underpin successful OpenStack deployments – with the longest track record of support for KVM and LXC.

Ubuntu is the reference operating system for the OpenStack project, making it the easiest route to an OpenStack cloud, whether for private use or as a commercial public cloud offering. And you get the latest updates and security fixes fast: OpenStack is tested every day on Ubuntu by the developers of OpenStack itself, making Ubuntu the platform with the widest testing of OpenStack's latest code.

Ubuntu is the reference operating system for the Openstack project, making it the easiest route to an OpenStack cloud





A vision of open cloud

Our partners and customers have a common vision: accelerating the move to utility-style cloud computing. They want on-demand access to the fundamental commodities of IT: network, compute and storage. They want to be able to scale that pool of resources from departmental pilot to massive infrastructure.

Most importantly, they want to cut out the fat, the complexity and the vendor lock-in that can hamper their ability to deliver fast, efficient service to their users.

Their challenge is to tame the complexity of cloud design and construction. Clouds combine many diverse infrastructure components, from hardware, networks and storage, to operating systems and applications. Those have all been developed independently, to different standards, with different configuration systems, and specialised skills needed to connect them. And they were all designed to be installed one piece at a time. But to make a cloud, those parts have to become dynamic. They need to offer true computing elasticity, automated provisioning and deprovisioning, open APIs and pay-as-you-go metering and billing. Above all, they need to go beyond open standards and be fully open source. That is the open cloud.

Supported, certified and compliant

Ubuntu Cloud is built into Ubuntu Server 12.04 LTS. Like the rest of the Ubuntu operating system, it is free from licensing restrictions, enabling Ubuntu to deliver on the promise of open-source software: you can deploy as much cloud as you want without needing to count licenses, anywhere. That flexibility has made Ubuntu the rising star of large-scale deployments, for web and big data.

Ubuntu is the rising star of large-scale deployments.



But Ubuntu, which became popular as the favourite Linux for developers and system administrators, is also available with paid certifications and compliance tools, making it useful as an enterprise solution.

Canonical, a global software vendor and the commercial backer of Ubuntu, handles the release management and maintenance of Ubuntu. As well as ensuring that every long-term support release of Ubuntu Server benefits from five years' of security updates, the company offers enterprise-ready support agreements in the form of the Ubuntu Advantage programme. Ubuntu Advantage includes compliance, audit, management and IP assurance as a package, for the portions of your enterprise infrastructure that require certification and support, turning a developer-friendly, free operating system into an enterprise-grade technology platform.

Unlike other versions of Linux, the actual bits are the same whether you are using the paid-for compliance, audit and support features, or not. So you're free to deploy Ubuntu across your organisation, choosing your level of assurance, compliance and support by team, by workload or by data center, without having to vary your technology in the process. It is this combination of licensing and commercial support that makes Ubuntu the OS of choice for organisations moving to the cloud.

Preferred guest OS on public clouds

Across all the major public cloud offerings – from Amazon, Rackspace, HP and others – the number one guest OS is Ubuntu. Whether you measure by the total number of instances running, or the diversity of customised images available from vendors, Ubuntu is the preferred guest OS on the public cloud, for large institutions and startups alike.

That success is based on a commercial service Canonical offers public cloud providers, to ensure that their users have a high quality guest OS that can be consumed easily and freely. Public cloud providers engage Canonical to design, build and certify the Ubuntu Guest experience on their public clouds, to ensure that their cloud meets the high standards set on AWS, Rackspace and elsewhere and offers complete compatibility with Ubuntu when used on any other certified cloud.

Canonical invests in the Ubuntu experience on those public cloud infrastructures to ensure it provides the most complete combination of performance, update handling, compliance and reliability on those public clouds. Canonical also extends its commercial offerings of certification, management, audit compliance and IP assurance to paid contract customers using Ubuntu on certified clouds.

That huge lead in adoption means the ecosystem of software solutions, tools, developers and administration skills is deeper with Ubuntu than any other OS. In turn, this means that choosing Ubuntu as a guest on your private cloud aligns you perfectly with established best practice on the public cloud. Using Ubuntu from the start makes it easier to blend private and public infrastructure as a service later.

Hybrid cloud – combining public and private IAAS

Today's institutions want the best of both the private and the public cloud. Private cloud provides control, regulatory compliance, cost management and security. Public cloud offers economic efficiency, burst capacity and disaster recovery. But they are not exclusive to one another: with careful planning and the right tools, it's possible to scale your private cloud into the public cloud – and stay in control.

This is hybrid cloud computing, and it is the essential value proposition of Ubuntu in the cloud. We make it possible to deploy private clouds that can be connected to all the major public clouds: Rackspace, Amazon, HP and many more.

We make it possible to deploy private clouds that can be connected to all the major public clouds: Rackspace, HP and many more.



Customers also have access to Cloud Deck, a hybrid cloud dashboard, compliance and control system. It provides a simple graphical interface for managing multiple clouds, and managing the access of diverse teams and users to a wide range of internal and external clouds. Cloud Deck provides a solution to the key problem facing IT managers around the world – how to enable self-service public cloud adoption while retaining the ability to audit, manage and ensure compliance of that use. Public clouds enabled teams to use the corporate credit card to bypass central provisioning bottlenecks; Cloud Deck lets you provide the freedom and flexibility your users have come to expect, while taking back the management and audit control necessary for regulatory compliance and good practice.

Canonical uniquely ensures that your private cloud can support the same core infrastructure APIs across all private and public clouds. We lead the development of a connector which provides access to OpenStack clouds through APIs that are also implemented by Amazon's EC2 and S3 IAAS. For companies that want the benefits of a private OpenStack cloud, access to OpenStack-based public clouds like Rackspace, AT&T and HP, access to Amazon's public cloud and common tools for deployment across all of them, Ubuntu offers unbeatable value and capability.

More than the sum of its parts

The Ubuntu cloud proposition comprises Ubuntu Cloud infrastructure (based on OpenStack) and Ubuntu as a cloud guest OS running on top of that infrastructure, whether private or public.

Public cloud providers can build out their cloud on Ubuntu and then offer a certified Ubuntu guest as part of a single commercial engagement with Canonical. This greatly simplifies the process of bringing up a public cloud that will be competitive with current offerings from the major vendors.

For those creating private clouds, the ability to build a cloud out of the same components, at the same versions, with the same tools as the major public cloud vendors offers a convenient assurance of practical – rather than theoretical – compatibility between their private clouds and the public clouds they might engage for burst and disaster recovery. It means that investments in tooling, training and software development will pay dividends in the long term, regardless of changes in the market for public cloud services.

Velocity and agility in devops

In addition to the economic efficiencies of utility computing, the cloud should deliver both increased velocity of development and improved agility in deployment.

Canonical leads the market in providing tools for the cloud, taking advantage of the extraordinary popularity of Ubuntu with developers. Ubuntu includes a micro-cloud capability on every developer workstation, enabling developers to work on precisely the same configurations they will hand over to ops for deployment.

Juju, the service orchestration tool, dramatically reduces the friction in handovers from development to testing to production deployment. Developers use Juju with the micro-cloud on their workstations, to ensure they are working in a microcosm of the production test and deployment systems. If they are building a complex multi-tier application, they can create nodes in their workstation micro-cloud for each equivalent node in the production deployment. The changes they make to their code, especially changes in the required configuration, can be communicated instantly for test and production deployments.

Companies that embrace these tools see dramatic improvements in the re-use of deployment patterns and components between teams, and equally dramatic reductions in deployment time – making it easier to support agile development processes with very quick iterations.

Canonical's leadership in the public cloud, together with Ubuntu's diversity of developers, provide a fertile environment for innovation and the imperative for rigorous engineering needed for production-quality tools that work across the fast-moving cloud landscape.

Leadership in physical provisioning, with MAAS

The race to the cloud is driven by virtualisation. But cloud thinking can inform better practices for traditional on-the-metal deployments, too.

For example, modern hyperscale deployments of parallel-compute services like Condor and Hadoop have a great deal in common with cloud-style architecture. Each node is cheap, no node is special, reliability is achieved through redundancy and throughput is achieved by spreading the problem out across more nodes, rather than buying a faster node. While those big data deployments are typically still unvirtualised, running directly on the metal, we can think of them as cloud-like environments. And with tools from Canonical, we can use exactly the same processes to manage those hyperscale deployments as we use for deployments on the cloud.

Canonical's Metal as a Service (MAAS) provides a physical management layer that serves up machines on demand. Together with Juju, it enables you to deploy workloads onto physical metal that have all the same behaviours as workloads in the cloud, without the virtualisation layer.

So, for example, one can design Condor workloads iteratively on a workstation, test them in the cloud on sample data, and then run them at scale on private metal with confidential data. And with Juju, that entire cycle can happen with the same Juju charm configuration and very tight handovers between developers and ops.

Ubuntu includes a micro-cloud capability on every developer workstation, enabling developers to work on precisely the same configurations they will hand over to ops for deployment.





Building a private cloud with Ubuntu

Ubuntu provides the simplest route to deploying an OpenStack cloud. OpenStack is built into Ubuntu Server and Ubuntu is the reference platform for Openstack deployments. Ubuntu 12.04 LTS is a long-term stable release of Ubuntu on which each release of OpenStack between 2012 and 2014 will be certified. An enormous amount of work has gone into the integration of OpenStack in Ubuntu to create the standardised Ubuntu Cloud Infrastructure – work that’s been done so you don’t have to do it yourself.

While proprietary offerings increase vendor lock-in, Ubuntu helps organisations retain full control over their cloud infrastructure.

Ubuntu Cloud Infrastructure is OpenStack

OpenStack, the open-source project founded by Rackspace Hosting and NASA, provides the software components required to build scalable cloud infrastructure.

OpenStack has become the de facto standard for open cloud infrastructure. All OpenStack code is freely available under the Apache 2.0 licence, so anyone can run it, build on it, or contribute to the project. This development model has fostered a vibrant community, with the largest ecosystem of tools, solutions and service providers.

The relationship between Ubuntu and OpenStack is significant – both brands are focused on high quality governance, platforms for mass computing, predictable schedules and robust releases. The release schedules of the two projects are synchronised, ensuring that OpenStack updates and releases are immediately available on widely deployed releases of Ubuntu.

Ubuntu has included IAAS since 2009. That’s why more clouds are built on Ubuntu than any other platform. Since 2011, we’ve included the latest version of OpenStack in every Ubuntu release, as well as making it available for the most recent LTS. So once you’ve deployed OpenStack on an LTS release of Ubuntu, you can move to newer versions of OpenStack without changing the production OS.

More clouds are built on Ubuntu than any other platform.



Compatibility, flexibility, scalability, compliance and assurance

In the interests of learning quickly, you might want to do a quick pilot of private cloud. Ubuntu has everything you need, built-in, and Canonical offers a Cloud Jumpstart service to deliver a seed cloud at short notice, if you prefer to have an expert on hand for initial consulting, training and setup.

But Ubuntu also has the depth and quality to stand up a large-scale cloud. Whether you are focused on moving grid applications to a cloud, or finding efficiencies in your central IT provisioning systems, Ubuntu has been used by companies like yours to achieve their goals for private cloud.

The key benefits of choosing Ubuntu are:

- Compatibility with established cloud standards including the Amazon EC2 and OpenStack APIs. This gives organisations the freedom to move between cloud providers, or push private workloads out to public clouds on demand.
- Freedom of choice with support for a wide range of hypervisors, network components, storage components, presentation technologies and more.
- Massive scalability based on fast, lightweight messaging between cloud components.
- High availability with features such as node evacuation, that keep the cloud running normally if a component fails.
- Backing from a worldwide community that incorporates more than 70 leading technology companies and tens of thousands of developers. This community delivers new, value-added features regularly and fixes issues as they arise.
- Access to management tools like Landscape which provide reporting and monitoring on your workloads wherever they are running – in the public cloud, private cloud, or plain old on-the-metal deployments.
- Use of Cloud Deck for hybrid cloud coordination, giving your organisation a single set of credentials for employees that can give controlled access to multiple public and private cloud regions through a single cloud API, with quotas and reporting.

Support and assurance for your private cloud

Ubuntu Advantage covers the deployment of your own IAAS cloud. It is offered with two levels of support: Standard and Advanced.

Standard cloud support is ideal for organisations considering cloud computing, along with those who have just begun deploying a private cloud for evaluation purposes. Standard cloud support provides business-hours support for a small base of machines. It offers support per physical machine and an unlimited number of additional Ubuntu machine images.

Advanced cloud support provides 24-hour support for production IT environments. It provides complete and comprehensive coverage of the Ubuntu Cloud Infrastructure platform – including all physical machines and an unlimited number of additional Ubuntu machine instances. Customers get direct support from Canonical’s cloud experts – ensuring critical applications and services are constantly available.

“Ubuntu is the de facto standard for cloud building...
...with seamless scalability and no additional licensing costs for additional servers and instances, it provides all the flexibility and scalability we need.”

Alejandro Comisario, Senior Analyst and Cloud Builder, Mercadolibre

Mercadolibre is one of many organisations getting results by using Ubuntu Cloud. For more case studies, see www.canonical.com/about-canonical/resources/case-studies

Bring your public cloud in-house

Ubuntu’s OpenStack IAAS covers compute, storage and networking, just like Amazon’s EC2 and S3. The Awsome component from Canonical provides APIs for OpenStack that are also implemented by Amazon’s Web Services. Awsome ensures that your tools can work with both Amazon Web Services and OpenStack-based clouds, private or public. If you care about moving workloads between Amazon’s cloud, other OpenStack-based public clouds and your private cloud Awsome is essential.

Awsome is a separate server component that acts as a proxy between AWS and OpenStack. It provides a protocol compatible with the Amazon EC2 and S3 protocols, enabling it to take AWS requests on the front end and translate them to OpenStack’s native protocols on the back end, simplifying cloud migration significantly.

Turnkey cloud-in-a-week with Canonical’s Cloud Jumpstart

Canonical’s Cloud Jumpstart is a fast, low-risk route to deploying private cloud infrastructure on your premises. Jumpstart builds your private cloud on your own hardware over the course of five days of on-site training, delivered by a Canonical services engineer. The engagement includes:

- A planning framework in which to make essential, core architecture decisions
- A seed Ubuntu OpenStack Cloud deployment, on up to 20 of your servers
- Training on tools and processes to support your cloud

Compatible with the Rackspace, HP and Amazon public clouds, Jumpstart starts from \$9,000 and is guaranteed to take just five days, delivering a usable cloud that you can scale by adding additional nodes for compute and storage.

Contact Canonical

To arrange your Jumpstart engagement or to talk to Canonical’s cloud experts, contact us now on:

nadeem.butt@canonical.com
+44 (0)207 630 2471

You can learn more about Ubuntu Cloud Infrastructure at www.ubuntu.com/l-cloud or by scanning the code below.



Ubuntu is the #1 OS on public clouds



If you use a public cloud service, Ubuntu provides the ideal guest OS on which to build and manage your cloud services. It's the number one guest OS across all the major public clouds – the most popular choice for businesses and developers alike.

As the open-source operating system with the widest selection of pre-packaged software, Ubuntu supports common standards, reducing the risk of lock-in to proprietary solutions. It's also completely free from licensing restrictions – which, in the elastic world of the cloud, gives you the much-needed freedom to spin up as many server instances as you need, whenever you need them. Best of all, Ubuntu 12.04 LTS will be supported by Canonical until 2017 across all certified public clouds, so you can deploy your cloud workloads on Ubuntu in the knowledge that they'll be supported in the long term.

Being the leading cloud guest, we also benefit from a very wide range of innovation and contributions from many end-users. That gives Ubuntu the best selection of tools – both from Canonical and third-party vendors.

Optimised for each cloud

Every public cloud is different. When you choose Ubuntu on that cloud, you can be certain that key elements of the Ubuntu experience will perform consistently well.

For example, each cloud infrastructure makes its own decisions about kernel and virtualisation. When we certify a public cloud, we ensure that Ubuntu is optimised for it.

We also design and implement an optimal update mechanism for that cloud. So, for example, on AWS it's now possible to get updates at very low cost from S3, which is infrastructure that is unique to Ubuntu and AWS, designed to ensure a great experience for Ubuntu users on that cloud. Similarly, we engage with the cloud architects on all certified clouds to provide a first class update experience.

Compliance, audit, assurance, support

Canonical's Ubuntu Advantage subscription provides the same benefits for public cloud deployments as for traditional server installations. Whether your cloud comprises 10 Ubuntu instances or a thousand, we'll cover your need for compliance, and give you access to all the consultancy, technical support, online resources and management tools you need to succeed.

"...Ubuntu is by far the best option for running fully virtualised infrastructure in the public cloud... it offers great native support for Amazon EC2 and other cloud platforms, as well as true computing elasticity with no licensing costs whatsoever."

James Loope, Head of Operations, Janrain

Janrain is one of many organisations getting results by using Ubuntu Cloud. To see more case studies, go to

www.canonical.com/about-canonical/resources/case-studies

Cut the complexity with cloud-init

Canonical pioneered cloud-init, a mechanism to customise standard images to specific needs dynamically on startup, as a way to reduce the complexity of managing large numbers of custom images for specific workloads. Today, cloud-init is widely recognised as the best tool for boot-time workload customisation. Canonical's tools make for easier, more manageable and more standardised deployment processes.

Instead of maintaining one image per workload (or worse, one image per node), you maintain service descriptions. Your standard image is then customised at start-up to suit that service description and security requirements. Early adopters of cloud complained of image sprawl – with cloud-init, you can avoid the problem entirely.

Correct and complete support for cloud-init is a requirement for public clouds publishing Ubuntu images, ensuring that your deployments can work well across all certified clouds.

Talk to the experts

We'd be glad to discuss your public cloud strategy, and way Canonical can support your needs. Please contact us at:

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To find out more about Ubuntu as a guest on public and private clouds, go to www.ubuntu.com/l-cloud-jumpstart or scan the code below with your phone.





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Cloud orchestration with Juju

The speed with which capacity can be provisioned in the cloud shifts the bottleneck on efficiency from the provisioning stage to the deployment stage. For devops, the speed with which new iterations of business applications can be developed, tested and deployed is a critical measure of competence, competitiveness and effectiveness.

Canonical leads the cloud deployment market with Juju, a single orchestration tool that works on public and private clouds, on physical deployments, and on developer workstations.

System administrators and developers distill their deployment expertise into charms, which can be re-used by other teams and which encapsulate your institutional knowledge about that particular workload or service. Charms are used with Juju to spin up workloads across all the deployment environments – development, test and production. When developers make a change in the deployment process as part of the development cycle, that change is passed on to system administrators when their code is handed over.

Using a single framework for development, test, staging and production dramatically reduces the friction associated with the development cycle. That suits the move to cloud computing perfectly, because it matches the reduction in friction from automated and virtualised provisioning.

Cloud also creates whole new challenges for IT governance. Workloads can be spun up on public services, they can be created without management oversight and they can be created at an enormous scale. To make things worse, customised images in public clouds become unmaintainable very quickly, leaving IT managers with the mess. Early adopters of cloud struggled to manage the snowballing accumulation of custom images they were depending on. Canonical's investment in cloud-init and Juju, which together eliminate the need for custom images in favour of dynamic specialisation on startup, has solved this issue.

A little charm goes a long way

A Juju charm is a collection of instructions that deploys, updates and scales a particular cloud service. When you define a new workload or service, you create a charm for it using whatever system works best for you. It can be a shell script, it can use puppet, or it can use any other framework you like. We designed it to make it easy to re-use existing tools or expertise you may have in-house, wrapping it up in a way that will work on the cloud.

Most services can be charmed in an hour or two, at least for initial testing. And investments in a charm pay off every time it is re-used. Charms encapsulate everything a service needs to know about itself, or tell other services about itself, so it's very easy to re-use them in a different team or environment.

Repeatable deployments improve quality

The widely recognised best practice for deployment is to "automate everything and iterate quickly". The rule used to be "build in one command" to ensure quality. Today, that rule is "deploy with one command". That's because fast iterations are the only way to ensure that quality is maintained in a fast-moving environment like the cloud.

Re-use hundreds of existing charms

Canonical maintains a collection of public charms that are developed in the open, under the same transparent governance that has made Ubuntu the leading cloud OS. Each charm distills best practice from the leading devops for that particular service, worldwide. Juju puts them all at your fingertips.

Those charms continue to improve and evolve, meaning that your cloud deployments get smarter, more efficient and more reliable every time you update them. In a recent example, work done to reduce the cost per day of a very high-traffic cloud-hosted website was shared immediately with other websites using the same cloud stack. In an enterprise setting, an improvement to the charm for a component in many cloud stacks brings benefit to all users.

The collection of Juju charms includes all the common components of typical cloud deployments – popular databases, web application servers, load balancing systems, computational frameworks; everything from game servers to finite element analysis is ready for off-the-shelf deployment in your cloud.

Everything from game servers to finite element analysis is ready for off-the-shelf deployment. 

Just as Ubuntu includes the widest selection of pre-packaged software, the collection of Juju charms represents the deepest selection of ready-to-deploy cloud workloads and services. It's the best way to start any deployment – because you can get the backbone up and running quickly, adding and customising only the parts you need to specialise.

And it's all cloud-neutral: those charms work as well on EC2 as on Rackspace or your private cloud. Each Juju charm defines a workload that can be used on any public, private or micro-cloud (developer workstation), or even on physical deployments.

A key design goal for Juju was to improve the rate of reuse of internally-developed deployment recipes and practices in Canonical; our customers report the same result. Teams share charms, letting expertise percolate through the company much faster than before.

Deploy services in seconds

Juju automates deployment. Most importantly, it ensures that developers and ops are using exactly the same tools, recipes and patterns at every step in the journey. So the ops see what the developer saw. In the past, handovers between teams were fraught with manual steps – opportunities to forget a critical piece. With Juju, the entire deployment process can be automated, whether its for a new developer setting up their workstation on day one, or an ops wizard deploying the third iteration of the day in production. And the charm used by each of these colleagues is exactly the same – all of the deployment expertise is distilled in one, reusable place.

Each component of your cloud deployment is deployed with a single command. Each component can be scaled up or down, with a single command. Each relationship between a component is a single command. And all of those can be saved as a reusable stack.

Juju dramatically simplifies the process of bringing up “yet another JBOSS app server” or “yet another Condor node”. But it really shines with complex, multi-tier stacks that involve multiple simultaneous inter-related deployments. And what it saves in time goes straight to the bottom line, an effect that is amplified as more teams adopt it.

Speed up the pace of change

Beyond initial deployment, the long-term costs of change management in the cloud are very high unless your tools support organic extension of the service workloads. In other words, if you can't easily add to, or remove, services or capacity, you won't be effective in the cloud.

Juju provides a uniquely straightforward way to extend existing deployments. Unlike traditional script-based approaches, Juju deployments can grow and shrink on demand, adding layers or substituting components on the fly.

For example, if you want to shift to a different branch of code for one component in your business application stack, you can do that on the fly with Juju – first in test, then in staging and finally in production. This is the time-saving killer feature of Juju. Deployment can be automated with any number of technologies. Most ops teams have scripts to deploy a particular stack quickly. Those scripts are usually tied to a specific infrastructure – be it cloud or physical – but they nevertheless make initial deployments fast. Juju goes further, in allowing you to modify the deployment in real time, preserving your configuration and adapting to your changes intelligently.

Juju deployments can grow and shrink on demand.



Layer on top of configuration management

Juju lives alongside tools like Puppet and Chef. Encapsulate your existing recipes in charms to achieve greater reuse of that expertise. Configuration management tools are an excellent way to define a specific service. Orchestration tools like Juju are designed to glue those services together

In the cloud, there can be no central, master view of every configuration and deployment. You need the flexibility to deploy and connect services organically, adding layers and reshaping parts without depending on a central understanding of how all the pieces fit together. Juju keeps teams productive, it lets a deployment grow as fast as you can make decisions rather than slowing down as it gets larger.

Scale

Many organisations choose cloud for scale – the elasticity of resource allocation promoted the idea that one can scale up (and down) quickly and easily.

The key challenge of course, is how one achieves the service orchestration that underpins such elasticity. Your cloud can deliver the resources, but you have to be able to configure and manage those services in an elastic fashion.

In the cloud, scale is achieved horizontally. Rather than scaling up, we scale out. Rather than moving to a “faster node” we add more, cheaper, nodes. That’s the Google and Amazon model, and it works very well if you have the smarts to coordinate farms of servers.

Juju gives you those smarts in a neat package: each charm knows what it takes to scale the service it provides, so scaling up or down becomes a simple matter of asking the charm to do the work. If you have a tricky workload, you can encapsulate your institutional knowledge once in the charm, and share the benefits of that with other teams in the company.

Each charm knows what it takes to scale.



[Learn more about Juju](#)

For more information on service orchestration with Juju, including training and links to join the Juju community, go to juju.ubuntu.com

Juju in practice – examples from the field

To prove how quick and easy Juju is, we've created a couple of simple examples you can try. Bear in mind, these commands can work on a laptop (with lightweight containers for nodes), on the public cloud, on your private cloud, or on physical servers. Juju really is that amazing.

Example 1: Deploying and scaling Hadoop

```
# Setup the environment for deployment
juju bootstrap

# We'd like a master Hadoop node
juju deploy hadoop hadoop-master

# We'd like to start a slave cluster of 5 instances
juju deploy -n5 hadoop hadoop-slavecluster

# Tell the master to talk to the slaves.
juju add-relation hadoop-master:namenode
hadoop-slavecluster:datanode
juju add-relation hadoop-master:jobtracker
hadoop-slavecluster:tasktracker
```

Now we have a five-node Hadoop cluster. Since we define the relationship at the service level and not the machine level, we can easily add another node:

```
juju add-unit hadoop-slavecluster
```

...or, as many as we want. Let's make this a 25 node cluster:

```
juju add-unit -n20 hadoop hadoop-slavecluster
```

Example 2: Deploying a Node.js application

```
# We'd like a MongoDB replicaset
juju deploy -n3 mongodb

# Now deploy the Node.js app server, telling it about
my app's yaml
juju deploy --config node-app.yaml node-app

# Tell the app server to talk to the mongodb
juju add-relation mongodb node-app

# Open the port, serve my app!
juju expose node-app
```



Physical provisioning, evolved

The cloud has revolutionised provisioning, delivering virtual instances and storage on demand in minutes or seconds. And that new way of thinking about provisioning has had a dramatic impact on everything from development practices to the financial models of IT. At the heart of cloud is virtualisation – those resources are all virtualised, so of course they can be provisioned on demand. But what if we could bring that same dynamic thinking to physical provisioning for infrastructure where a cloud is not appropriate?

Many modern IT services are cloud-like: farms of servers, doing roughly the same thing, scaled out rather than scaled up. In those environments, it's useful to think of the collection of physical machines like a cloud, even if it isn't virtualised.

"Deploy another node in that Hadoop service" is just as valid in the cloud as on a large physical deployment with tens, hundreds or thousands of machines. And of course, your cloud itself is a large service, deployed directly onto the metal.

So Canonical has created Metal as a Service (MAAS), a system that makes it quick and easy to set up the physical hardware base on which to deploy complex services that need to scale up and down dynamically, like Ubuntu's OpenStack Cloud Infrastructure.

Most importantly, servers provisioned through the MAAS can be provisioned dynamically, just like cloud instances – only in this case, they're whole physical nodes. "Add another node to the Hadoop cluster, and make sure it has at least 16GB RAM" is easy with the MAAS. It lets you use cloud semantics, in the physical world.

Through a simple web interface or web API you add, commission, update, deploy and recycle physical servers at will. As your needs change, you can respond rapidly, by adding new nodes and dynamically re-deploying them between services. When the time comes, nodes can be retired for use outside the MAAS.

When commissioning a new node, MAAS can take care of hardware-specific tasks such as burn-in tests, firmware and RAID upgrades – and checking whether your hardware is Ubuntu certified. Together with Juju, MAAS makes it easy to turn a network of physical servers into a functioning private cloud.

Servers provisioned through the MAAS can be provisioned dynamically, just like cloud instances.



The hyperscale era

Servers used to be expensive. Precious. Distinctive. We gave them names like “Hercules” or “Unobtanium” or “Atlas” or “Hagrid” because the good ones were, well, beefy. The great ones were some combination of “faster” and “more reliable”. Big businesses bought bigger servers, with brands like POWER and Itanium and zSeries.

Those days are numbered, and the nimble companies that are setting the pace have shifted to the opposite end of the spectrum. They buy server capacity as a commodity based on the total cost of compute: the cost per teraflop, factoring in space, time, electricity. They get “faster” computing by adding more and more nodes to their clusters, and they get “more reliable” by doubling up so that services keep running when individual nodes fail. Much as RAID changed the storage game, this scale-out philosophy, pioneered by Google, has changed the server landscape.

In its ultimate expression, this movement arrives at the hyperscale era. Instead of managing tens of servers, people manage tens of thousands of servers – even relatively normal businesses can end up with many more nodes in their cloud/cluster than they have employees.

By hyperscale, we mean the era of nodes that are many and wimpy, cheap and unreliable (by historical standards for critical computing) individually, but unstoppable en masse. These nodes are also incredibly dense – they consume much less power than a typical traditional server board would consume, so we can pack even more of them into the data centre. The era of tens of nodes per board and thousands per rack is fast approaching.

In that hyperscale era servers are almost anonymous, with names like “node-0025904ce794”. Instead, we give names to the whole cluster – because the horsepower now rests in the cluster, rather than the node. Likewise, the reliability of the infrastructure will depend on redundancy rather than heroic performances from specific machines. There is, as they say, safety in numbers.

Today, however, each server is still provisioned, managed and configured as if it were a Hercules or an Atlas. For hyperscale to work, we need leaner operating systems and leaner provisioning processes. And we need deployment tools to match the new physical reality.

In an era in which ATOM is as important as XEON in the data centre, MAAS matters. In that world, an operating system like Ubuntu that is leaner and more cost-effective makes even more sense, because cost per node is critical to the viability of the whole exercise. Deploying nodes a few hundred at a time is a cloud-like way of thinking about the provisioning problem. MAAS brings cloud semantics to the physical world.

Cost per node is critical.



MAAS brings cloud semantics to the physical world.



Compliance, Assurance, Support with Ubuntu Advantage from Canonical

Ubuntu Cloud offers the cost-effectiveness of free open-source software and the reassurance of enterprise-friendly commercial support, in the form of Ubuntu Advantage.

Canonical's standard Ubuntu Advantage subscription provides IP assurance, compliance with government certification standards, systems monitoring, reporting and administration tools, fast problem resolution and access to Ubuntu experts. And we offer the same subscription service on the cloud. Given that cloud is a particular focus for Ubuntu and Canonical, we have specialists for both Ubuntu as a guest on public clouds, and Ubuntu-based cloud infrastructure.

Ubuntu Advantage subscription also includes access to the Canonical Support web portal, live phone and online access to cloud support engineers, plus free Ubuntu upgrades and security releases. Key benefits include:

- Cloud Deck, unifying public cloud regions from multiple public cloud providers like Amazon, Rackspace and HP, with private cloud regions from your private Ubuntu cloud infrastructure, into a single hybrid cloud with one set of quotas, credentials, compliance and reporting standards
- Landscape, a systems monitoring and management service allowing systems administrators to manage Ubuntu-based public and private cloud instances as easily as physical machines, over the web
- Access to support engineers with the skills and experience needed to resolve your issues promptly
- Online support tools that help users log requests and queries quickly and easily

- Real-time tracking of issues from initial report to resolution in our online support portal
- Availability of standard subscriptions that cover local business hours, or advanced subscriptions with 24-hour coverage for mission-critical systems
- No limit on the number of cases raised and resolved

Smart monitoring and management with Landscape

Enterprise customers with complex deployments benefit from Landscape, Canonical's enterprise management and monitoring service.

Landscape, which is included in your Ubuntu Advantage subscription, brings management tasks together into a single web console, enabling the administrator to manage thousands of Ubuntu workloads efficiently.

Landscape provides a full web services API, enabling you to automate your management processes with fine-grained customisation to the needs of each site. It ensures the security of your cloud systems by keeping them patched against the latest exploits, and it provides you with the audit and compliance reporting to support your IT governance needs.

Landscape is a full systems management solution, covering software management update compliance, hardware and software inventories, monitoring, new system deployment and more.

Hybrid cloud with Cloud Deck from Canonical

Cloud Deck from Canonical is available to Ubuntu Advantage subscribers. It is a tool that unifies a range of public and private cloud credentials into a single, hybrid cloud, and includes a graphical front-end for administration. Cloud Deck facilitates the use of multiple clouds supporting the EC2 API (OpenStack, Eucalyptus, AWS EC2) through a single, uniform API and interface.

Cloud Deck gives you the ability to synthesise multiple clouds – like Amazon, AT&T, HP, and your private clouds – into a single unified hybrid cloud. It then gives access to each of those clouds as if they were one single cloud, with access controls and policies to govern which cloud region employees can create workloads in, and what constraints or monitoring requirements you need them to meet. For example, you can limit a particular person to running no more than five instances concurrently.

Once you set up Cloud Deck, your employees have a single API, a single credential, and a single configuration that they can use to deploy workloads in any of your approved cloud regions. You can add relationships with new public cloud providers without having to create new credentials for your employees, or provide them with new configuration information. The new regions just show up in your unified hybrid cloud.

Cloud Deck manages all cloud and login credentials, as well as configuration settings such as IP addresses, storage volumes, snapshots, and more.

How it works

Public clouds are divided into regions, usually corresponding to data centres. Cloud Deck lets you synthesise each of the regions from multiple clouds, into a new cloud with all of those regions.

So for example, you might have one public cloud provider called “Cumulus” with three regions: cumulus-america, cumulus-emea, cumulus-asia. And a second cloud provider “Nimbus” with two regions: nimbus-north, nimbus-south. Finally, you might have your own private cloud set up in two data centres: yoyodyne-sandiego, yoyodyne-boston.

Cloud Deck would let you create a new cloud with seven regions, each corresponding to one of the underlying regions. You can issue credentials from Cloud Deck to your employees, customers or contractors which they in turn use to access all of those regions.

Cloud Deck provides full quota support, so you can control who can launch workloads in which region, centrally. You can also apply a range of policies to the use of those cloud regions by your employees.

Ubuntu Advantage for Cloud

Canonical’s subscription for assurance, support and compliance reporting, Ubuntu Advantage, covers both cloud infrastructure and the cloud guest.

Ubuntu Advantage Infrastructure		
	Cloud Infrastructure (Standard)	Cloud Infrastructure (Advanced)
Price per server per year	\$1,050	\$1,800
Landscape systems management	✓	✓
Landscape Dedicated Server	£787	£2,007
Legal assurance	✓	✓
Knowledge and support		
Knowledge base	✓	✓
Networking and network services	✓	✓
Web and application servers	✓	✓
Server security	✓	✓
Basic installation and applications	✓	✓
Custom package repository	✗	✓
Clustering	✗	✓
High-availability failover	✗	✓
Premium Service Engineer	Optional	Optional

Ubuntu Advantage Infrastructure is priced per server per year and offers two levels to choose from: Standard and Advanced.

Ubuntu Advantage on the public cloud

We provide support for public cloud deployments, too. Ubuntu Advantage includes all the same legal protection and technical support when you are running on the cloud, including the option of a contracted Premium Service Engineer.

Ubuntu Advantage in the cloud can be purchased in bulk, to cover a base number of running images across multiple clouds. Alternatively, support is available by the hour on participating public clouds.

Find out more

For more information about how Canonical can support your open cloud, contact us now on:

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+44 (0)207 630 2471

You can learn more about Ubuntu Advantage at www.ubuntu.com/l-cloud-services or by scanning the code below.



Services for public cloud providers

All major public clouds offer Ubuntu; it's the most popular guest OS, and essential to attracting both early adopters and those who are deploying substantial amounts of infrastructure on the cloud.

Offering Ubuntu as a guest

Canonical's public cloud engagement program covers the enablement, certification and standardisation of those services. That means that customers can expect their cloud deployments from one cloud to work well on another. It ensures that critical tools used by millions of Ubuntu developers work as well with your cloud as users expect.

The program entitles public providers to use the Ubuntu trademark on guest images and ensures your users a compliant, consistent experience when running Ubuntu as guests on your cloud.

Building on Ubuntu and OpenStack

If you're building a public cloud, the combination of OpenStack and Ubuntu gives you a platform that is aligned with public clouds from AT&T, HP, Ericsson and Rackspace, with many more specialised clouds in particular markets adopting the same infrastructure.

Building a public cloud means choosing a platform that has scalability and openness built in. Ubuntu Cloud, built on Ubuntu Server and OpenStack, uses technologies that have been built and deployed at scale every day around the world. Stable, reliable, scalable dependable and flexible. Openstack is built to support super-scalable cloud implementations such as those at HP and Rackspace, so when combined with Ubuntu server it is the best choice for your public cloud infrastructure.

Ubuntu Cloud supports multiple guest environments so you can be sure that whatever your customers need to run, Ubuntu Cloud will handle it. With the OpenStack API and Awsome, Ubuntu Cloud also ensures that you and your customers can choose how to develop applications for the cloud and can re-use any applications they have built for AWS.

Ubuntu Cloud is professionally supported by Canonical, so you can deploy with confidence.

"Ubuntu was the natural choice for our public cloud. Its tight OpenStack integration means we can respond to customer needs faster. As our cloud business continues to grow, this lets us focus on up-the-stack services our customers want."

Ken Pepple, Director of Cloud Development, Internap

Ubuntu Cloud at a glance

- 1. Ubuntu Cloud is open-source**, with OpenStack for infrastructure and the standard Ubuntu server as a guest, making it easy to spin up unlimited server instances without incurring additional costs.
- 2. Ubuntu Cloud is quick to deploy**, thanks to tools like Metal as a Service for bare metal provisioning, Awsome for integrating OpenStack with Amazon Web Services and Juju for service orchestration.
- 3. Ubuntu Cloud Guest** is wildly popular in the public cloud, with leading cloud providers like Amazon and Rackspace offering it to their customers.
- 4. The same tools and infrastructure can be used for private and public clouds**, making hybrid cloud architecture practical.
- 5. Ubuntu Cloud is compatible with a wide range of hardware**, with certified products from all the major server makers and unrivalled experience on the ARM platform.
- 6. Ubuntu Cloud will be supported for five years**, because it is part of Ubuntu Server 12.04 LTS.
- 7. Commercial support is available** in the form of Ubuntu Advantage, and covers IP assurance, compliance reporting, technical support and management solutions.
- 8. Ubuntu is backed by Canonical**, a global software vendor and service provider with staff in over 30 countries.
- 9. You can try Ubuntu Cloud easily**, thanks to trial offers from Canonical including Ubuntu Cloud Jumpstart and a free hour on Amazon EC2.



To find out more about
Ubuntu Cloud, go to
www.ubuntu.com/cloud

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