# WHY THE FUTURE OF THE CLOUD IS OPEN

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**EXECUTIVE SUMMARY**

Choosing how to build a hybrid cloud is perhaps the most strategic decision IT leaders will make this decade. It's a choice that will determine their organization's competitiveness, flexibility, and IT economics for the next ten years.

That's because, done right, a cloud delivers strategic advantages to the business by redirecting resources from lights-on to innovation. But only an open cloud delivers on the full strategic business value and promise of cloud computing. Only by embracing clouds that are open across the full gamut of characteristics can organizations ensure that their cloud:

- Enables portability of applications and data across clouds

- Fully leverages existing IT investments and infrastructure and avoids creating new silos

- Makes it possible to build a hybrid cloud that spans physical servers, multiple virtualization platforms, and public clouds running a variety of technology stacks

- Allows IT organizations to evolve to the cloud, gaining incremental value at each step along the way

- Puts the customer in charge of their own technology strategy Introduction

## INTRODUCTION

When the term "cloud computing" first appeared on the scene, it described a computing utility. The clear historical analog was electricity. Generated by large service providers. Delivered over a grid. Paid for when and in the amount used. This concept has given rise to public clouds that deliver computing resources in the form commonly called Infrastructure-as-a-Service (IaaS).

Many characteristics of these public clouds are compelling relative to some traditional aspects of enterprise IT. Cost per virtual machine is much lower. Users, such as developers, can use a credit card to get access to IT resources in minutes, rather than waiting months for a new server to be approved and provisioned. All this in turn leads to new applications and business services coming online more quickly and reducing the time to new revenue streams.

However, at the same time, most organizations are not yet ready to move all of their applications onto public cloud providers. Often this is because of real or perceived concerns around compliance and governance, especially for mission-critical production applications. Nor do public clouds typically provide the ability to customize and optimize around unique business needs. Whatever the reasons in an individual case, there is great interest in the idea of building hybrid clouds spanning both on-premise and off-premise resources to deliver the best of both worlds: public cloud economics and agility optimized for enterprise needs such as audit, risk management, and strong policy management.

Choosing how to build this hybrid cloud is perhaps the most strategic decision IT leaders will make this decade. It's a choice that will determine their organization's competitiveness, flexibility, and IT economics for the next ten years.

That's because, done right, a cloud delivers strategic advantages to the business by redirecting resources from lights-on to innovation. It lets organizations:
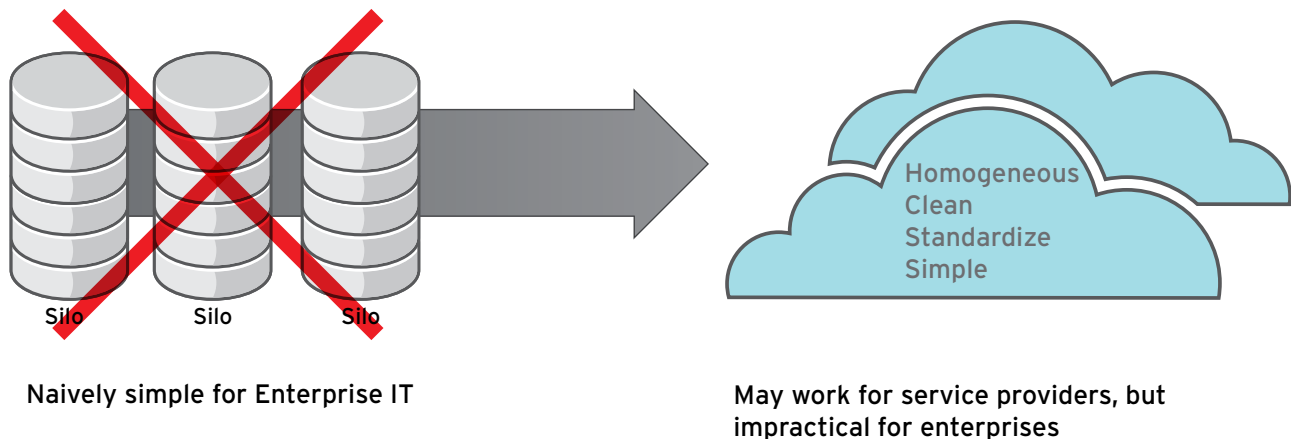
- Bring new applications and services online more quickly for faster time-to-revenue

- Respond more quickly to opportunities and threats

- Reduce risk by maintaining ongoing compliance and runtime management while preserving strategic flexibility

## THREE APPROACHES TO BUILDING A CLOUD

The typical IT operation can be thought of as consisting of a set of silos. Some of these silos may be the result of deliberate plan—perhaps to meet a regulatory requirement that certain internal businesses be firewalled from each other. However, more commonly, they come about through the accretion of new technologies, products, and organizations. They're often aligned with applications or groups of applications. All these silos create complexity. One goal of implementing a cloud is to reduce this complexity.

How best to proceed?

### MIGRATION TO A HOMOGENEOUS INFRASTRUCTURE IS IMPRACTICAL

Homogeneous
Clean
Standardize
Simple

Silo    Silo    Silo

Naively simple for Enterprise IT

May work for service providers, but impractical for enterprises
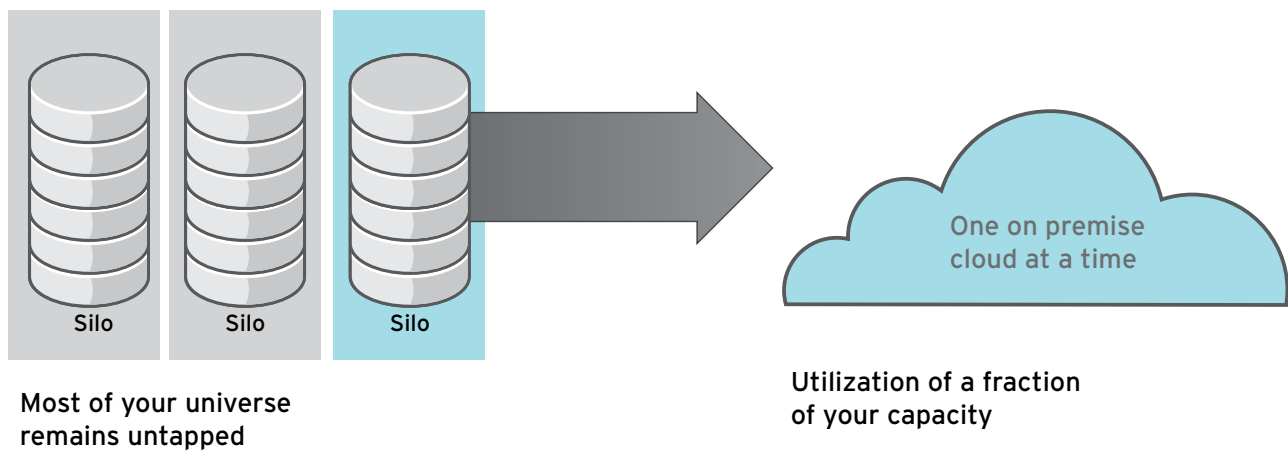
### Approach 1: Greenfield

This first approach essentially attempts to translate the "greenfield" methodology used by service providers into an enterprise environment. The thinking is that throwing out existing infrastructure and replacing it with a ground-up, homogeneous, standardized computing foundation—a "cloud-in-a-box" if you would—is a dramatic simplification relative to the typical enterprise IT infrastructure as it exists today.

In fact, this approach does dramatically simplify. It's also naively simple. For the vast majority of organizations, IT assets tarred with the pejorative "legacy" are also critical and core to the business. Furthermore, IT infrastructures typically advance in an evolutionary way rather than through wholesale replacement. Doing so keeps both risk and cost down. Cloud computing is no different.

It certainly makes a lot of sense to standardize, modernize, and simplify infrastructure wherever appropriate—such as by replacing obsolete proprietary servers with Linux on x86. However, wholesale overnight replacement is seldom a practical option.

**BUILD A CLOUD FROM A SMALL PART OF YOUR INFRASTRUCTURE**



Silo    Silo    Silo

One on premise cloud at a time

**Most of your universe remains untapped**

**Utilization of a fraction of your capacity**

## Approach 2: Add a Cloud Silo

Suppose, instead, we tackle just part of the problem. There are a couple of different ways to go about this.

We could, for example, decide to extend a single vendor's virtualization platform with some self-service and automation. This often requires that the underlying platform, whether in a private or public environment, be running a particular technology stack. Alternatively, we could roll in a dedicated, single-purpose cloud appliance designed to tackle a point function, such as a database.

Whichever of these two paths we take, the result is the same. Our IT infrastructure now has another silo. Hardly a reduction in complexity!

This is not to say that we can't start our journey to a cloud on a subset of infrastructure. In most cases, a pilot project or proof-of-concept using a subset of applications will indeed be the prudent path. The difference is that a proof-of-concept is a first step; a new silo is a dead end.

**BUILD AN OPEN CLOUD OUT OF ALL YOUR RESOURCES, INCLUDING PUBLIC OPTIONS**



Physical          Multi-Vendor Virtual                    Public Clouds
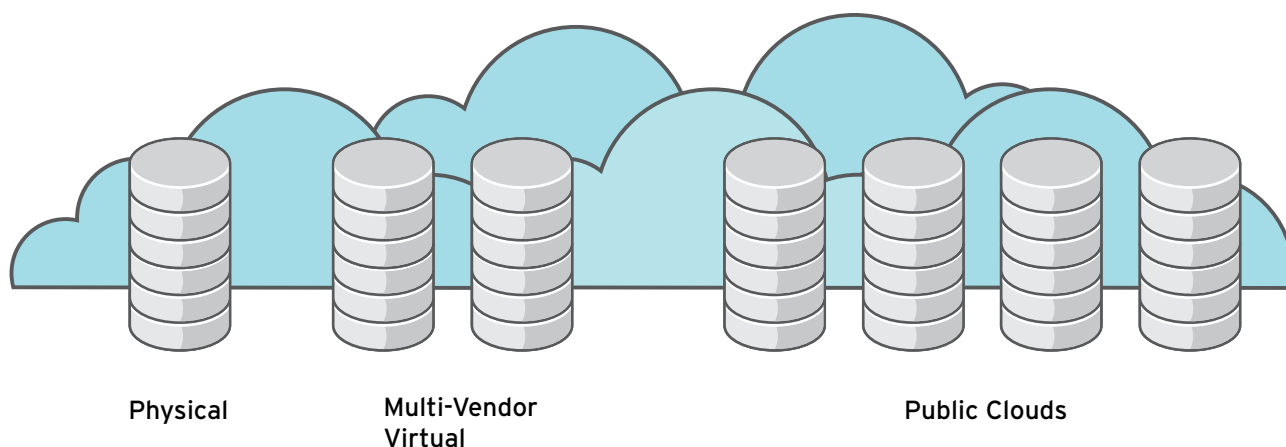
Make a cloud out of what you have
LEVERAGE EXISTING INVESTMENTS

## Approach 3: Open Cloud Everywhere

The final approach, and the one that Red Hat advocates, is to bring the broadest set of IT assets under a cloud management framework. A few existing—often static—workloads may be kept separate for a variety of reasons. But such decisions should come about because they make the most sense from an IT operational perspective, not because of restrictions imposed by technology or product.

Taking this approach and supporting these capabilities requires an open cloud.

## WHY AN OPEN CLOUD

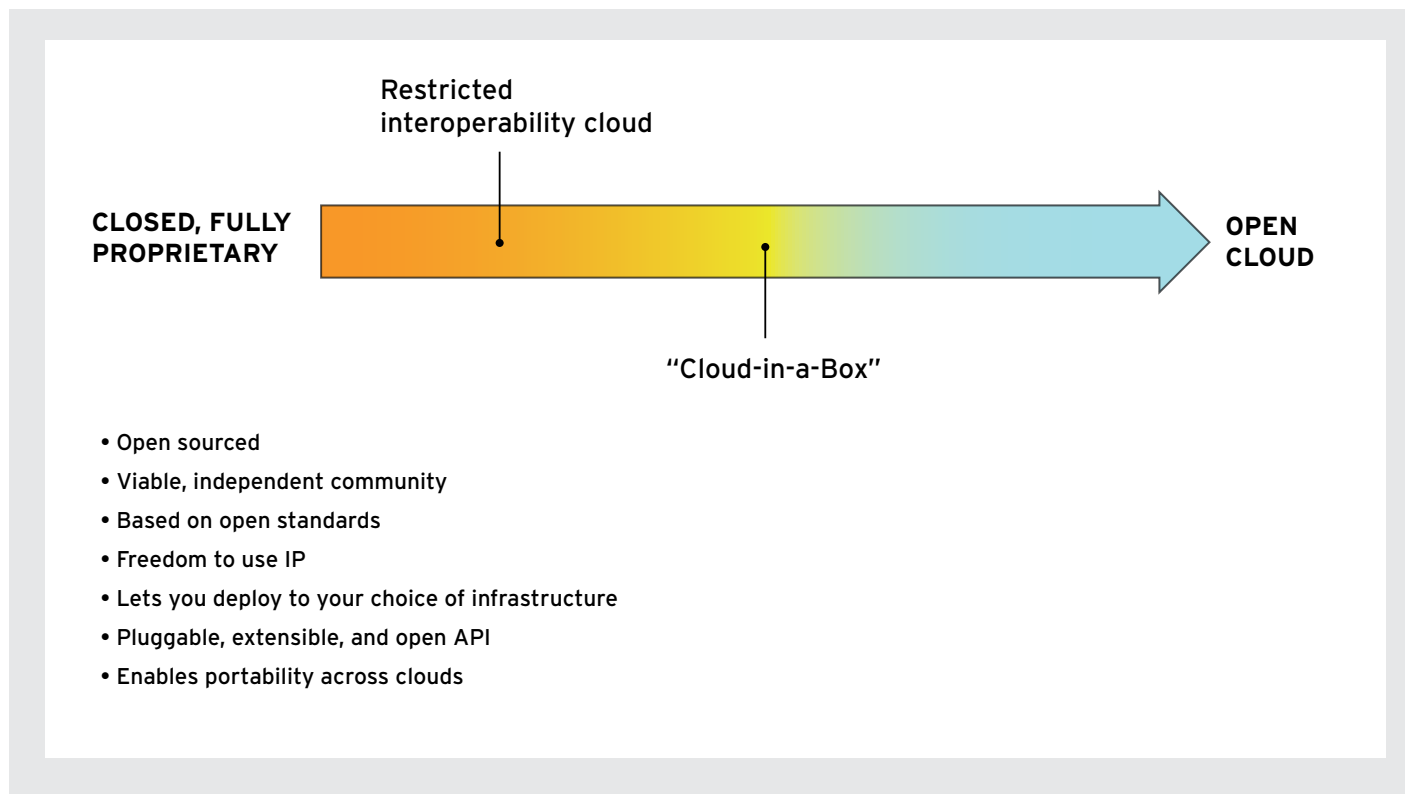Only an open cloud delivers on the full value and promise of cloud computing.

- An open cloud brings the efficiency, agility, and cost benefits of cloud to more of your IT infrastructure, to more applications, and to more users by allowing you to build a cloud out of heterogeneous systems including physical servers, multiple virtualization platforms, and public options—independently of the underlying technology stack.

- An open cloud leverages your existing IT investments in hardware, software, and training— allowing you to build a cloud in an evolutionary way, reducing costs and risks.

- An open cloud ensures you can select the best technologies for your users, now and in the future. It prevents one vendor from controlling your access to the greatest innovation, the lowest costs, and the best economic model.

- An open cloud provides application portability across clouds, ensuring that applications can be deployed on the optimal platforms for any stage in their lifecycle without costly and time-consuming rewriting or recertification.

Even if a closed cloud solution introduces a degree of heterogeneity of platforms it runs on and application types that it supports, it's still the vendor that's making decisions for you. It's the vendor that chooses the technical options and roadmap for the user. A "restricted interoper-ability cloud" may be better than one that's completely closed, but it's still restricted.

An open source "cloud-in-a-box," on the other hand, puts users in control through open source and open standards. However, because this approach treats specification, implementation, virtualization management, and cloud abstraction as all part of one big project, it's really only suitable for a homogeneous, "green field," service provider type of computing model. Furthermore, it makes taking individual elements—such as APIs—and combining them with other technologies from other projects much more difficult. This ultimately constrains the paths avail-able to users.

Only a fully open cloud truly puts the user in control just as Linux puts the user fully in control of their operating system environment. An open cloud puts users in control of their infrastruc-ture rather than allowing their vendor to choose the options they can implement. An open cloud puts users in control of their future, their technology roadmap. An open cloud is the only way to deliver the full business value that the cloud promises.

**redhat.**

But what is "open"? (Other than a term adopted by even the most proprietary of vendors with great gusto.)

Restricted
interoperability cloud

CLOSED, FULLY
PROPRIETARY

OPEN
CLOUD

"Cloud-in-a-Box"

• Open sourced

• Viable, independent community

• Based on open standards

• Freedom to use IP

• Lets you deploy to your choice of infrastructure

• Pluggable, extensible, and open API

• Enables portability across clouds

## REQUIREMENTS FOR AN OPEN CLOUD

"Open" gets applied to cloud computing with a ferocity seemingly calculated to wear the term out. But not all "open" is created equal. Openness doesn't stop and end with the submission of some format to a standards body or with the announcement of partners endorsing some specific technology platform. Open source is (or should be) a given.[1] But it's more than that.

An open cloud isn't about having some singular characteristic. It's about having a wide range of attributes that push the needle from wholly closed to truly open. Just because a cloud avoids being a walled garden in some respects doesn't mean that it delivers the full business value of an open cloud.

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1  To be clear, it's very much the user's decision what they choose to run in their cloud, including proprietary software. Such flexibility is part of the point of an open cloud. Rather, this discussion concerns the software and approaches used to build and manage a cloud.

An open cloud has the following characteristics:

- **Is open source.** This allows adopters to control their particular implementation and doesn't restrict them to the technology and business roadmap of a specific vendor. It puts users in control of their own destiny and provides them with visibility into the technology on which they're basing their business. Open source also lets them collaborate with other communities and companies to help drive innovation in the areas that are important to them.

- **Has a viable, independent community.** Open source isn't just about the code, its license, and how it can be used and extended. At least as important is the community associated with the code and how it's governed. Realizing the collaborative potential of open source and the innovation it can deliver to everyone means having the structures and organization in place to tap it fully.

- **Is based on open standards, or protocols and formats that are moving toward standardization, that are independent of their implementation.** Cloud computing is still a relatively nascent technology. As such, standardization in the sense of "official" standards blessed by standards bodies is still in early days. That said, approaches to interoperability that aren't under the control of individual vendors and that aren't tied to specific platforms offer important flexibility. This allows the API specification to evolve beyond implementation constraints and creates the opportunity for communities and organizations to develop variants that meet their individual technical and commercial requirements.

- **Gives you the freedom to use IP.** Recent history has repeatedly shown that there are few guarantees when a company owns IP on which you depend. Even if using some piece of proprietary IP is, today, tacitly tolerated, there are no guarantees for tomorrow in the event of a change of ownership or financial situation. The only guarantee is to use technology that is free from any required or potentially required licenses or other restrictions. So-called "de facto standards," which are often "standards" only insofar as they are promoted by a large vendor, often fail this test.

- **Is deployable on the infrastructure of your choice.** Hybrid cloud management should provide an additional layer of abstraction above virtualization, physical servers, storage, networking, and public cloud providers. This implies—indeed requires—that cloud management not be tied to a specific virtualization and other foundational technology. This is a fundamental reason that cloud is different from virtualization management and is a fundamental enabler of hybrid clouds that span physical servers, multiple virtualization platforms, and a wide range of public cloud providers, including top public clouds.

- **Is pluggable and extensible with an open API.** This lets users add features, providers, and technologies from a variety of vendors or other sources. Critically, the API itself cannot be under the control of a specific vendor or tied to a specific implementation, but must be under the auspices of a third-party organization that allows for contri-butions and extensions in an open and transparent manner. Deltacloud, an API that abstracts the differences between clouds, provides a good example. It is under the auspices of the Apache Software Foundation and is neither a Red Hat-controlled project nor tied to a particular implementation of cloud management.

- **Enables portability to other clouds.** Implicit in a cloud approach that provides support for heterogeneous infrastructure is that investments made in developing for an open cloud must be portable to other such clouds. Portability takes a variety of forms, including programming languages and frameworks, data, and the applications themselves. If you develop an application for one cloud, you shouldn't need to rewrite it in a different language or use different APIs to move it somewhere else. Furthermore, a consistent runtime environment across clouds ensures that retesting and requalification isn't needed every time you want to redeploy.
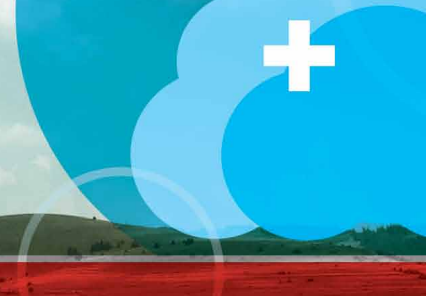
## CONCLUSION

Is a cloud that's just partially open better than one that's completely closed? Sure.

Accessibility to APIs or support for a circumscribed ecosystem of partners using a common technology stack or some open source components are all preferable to a fully proprietary solution. But partial openness only delivers partial value.

Only by embracing clouds that are open across the full gamut of characteristics can organizations ensure that their cloud:

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Which, in turn, come together to deliver the full strategic value promised by cloud computing. An open cloud isn't a nice-to-have for IT organizations. It's a must-have.

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**ABOUT RED HAT**

Red Hat was founded in 1993 and is headquartered in Raleigh, NC. Today, with more than 60 offices around the world, Red Hat is the largest publicly traded technology company fully committed to open source. That commitment has paid off over time, for us and our customers, proving the value of open source software and establishing a viable business model built around the open source way.

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