

The background of the entire slide is a dark grey field filled with a pattern of white and light blue binary code (0s and 1s). The code is arranged in a way that creates a sense of depth and movement, with some digits appearing to recede into the distance. At the bottom of the slide, there is a large, stylized white cloud shape with a soft blue gradient, which serves as a backdrop for the subtitle text.

Hunter Muller

# ON TOP OF THE CLOUD

How CIOs Leverage New Technologies to  
**Drive Change and Build Value**  
Across the Enterprise



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TOP OF THE  
CLOUD**



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to Drive Change and Build Value across  
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**HUNTER MULLER**



**WILEY**

**John Wiley & Sons, Inc.**

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Published by John Wiley & Sons, Inc., Hoboken, New Jersey.

Published simultaneously in Canada.

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***Library of Congress Cataloging-in-Publication Data:***

Muller, Hunter

On top of the cloud: how CIOs leverage new technologies to drive change and build value across the enterprise/Hunter Muller.

p. cm.

Includes index.

ISBN 978-1-118-06582-2 (hardback); ISBN 978-1-118-21443-5 (ebk);

ISBN 978-1-118-21454-1 (ebk); ISBN 978-1-118-21458-9 (ebk)

1. Information technology—Management. 2. Technological innovations—Management. 3. Cloud computing. 4. Chief information officers. I. Title.

HD30.2.M8495 2012

658!.0546782—dc23

2011038803

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

*For Sandra, Chase, and Brice*





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## FOREWORD: THE FOUR HORSEMEN

I think it's safe to say that cloud computing is emerging from a period of chaos and entering an era of increasing standardization and stability.

That doesn't mean the cloud is fully mature, but it does appear to be heading in that general direction.

Why do I believe the cloud is evolving toward maturity? There are several reasons.

First, I believe that a dominant design for the cloud has already emerged. Almost every new technology undergoes a chaotic period of rapid development, followed by the emergence of a dominant design—a set of de facto standards.

For example, when the railways were initially constructed, there was little agreement on how wide apart to place the tracks. Each railway company had its own gauge, its own standards. Eventually, the companies settled on a single standard gauge.

Sometimes an innovative design is so powerful and so compelling that it becomes an icon of the new standard. The Model T Ford is a classic example. A more recent example is the iPod.

For the cloud, this phenomenon is represented by what I call “the four horsemen of dominant design.” The four horsemen are:

1. Servers
2. Network
3. Storage
4. Software

The following table shows the dominant standards emerging in each of the four areas:

Servers	x86 architecture
Network	Internet (IP/TCIP)
Storage	Solid state (SSD)
Software	Software-as-a-Service (SaaS)

These “four horsemen” are the pillars of cloud infrastructure. They are also becoming the lingua franca of a new era in which the interplay between technology and the consumers of technology becomes much more focused on delivering value.

The emergence of a dominant design for cloud computing will likely enable a fundamental shift in information technology (IT) strategy. This shift will inevitably create challenges and opportunities.

Unlike most of our proprietary legacy systems, the cloud is a “tap into” technology. The “tap into” model is very different from the model we’ve grown accustomed to managing. As a result, IT leaders will be required to develop new skills and new capabilities. We will need to assume a more proactive leadership role in helping our companies make the most of the cloud’s potential.

Throughout our history, FedEx has been focused on making connections, all over the world. It’s the core of our business. That’s one of the many reasons we find the cloud exciting—because it’s a platform for making connections on a much larger scale than was imaginable in the past.

To me, the cloud represents the future. Here’s a quick story illustrating why I feel this way: We were on a family vacation in the countryside. We had downloaded an app onto my

digital tablet that enabled us to identify the stars in the night sky. Because the tablet has a cellular GPS, the app knows where I am. It can even tell which direction of the sky I'm pointing the tablet and the angle I'm holding it. Then it lights up a map of the sky, showing the stars and constellations. Naturally, my kids love it.

And while we're playing with the app and looking at the stars, I'm thinking, "All of the data resides somewhere else, and all of the calculations are being performed somewhere else. And I'm tapping into all that technology capability from the middle of a field."

The utility and potential of cloud computing seem virtually unlimited. Like emerging technologies of the past, the cloud is evolving from an early state of chaos into a state of greater maturity and stability. Now it's up to us, as leaders and executives, to devise practical strategies for leveraging the cloud's potential as a platform for innovation and success.

Robert B. (Rob) Carter  
Executive Vice President of FedEx  
Information Services and  
Chief Information Officer of FedEx Corp.





# PREFACE

## **What's *Really* New about the Cloud?**

It seems to be a recurring phenomenon: I finish the manuscript for a book and I am ready to send it to my publisher. Then I find additional sources with fresh insights and great ideas. I call my editor, he growls at me, and we agree to extend the deadline so we can include the new material.

It happened with my first book, *The Transformational CIO*, and it happened with this book. Days before finalizing the manuscript, I was fortunate to secure interviews with three top thought leaders at IBM—Leslie Gordon, vice president, Office of the CIO, Application and Infrastructure Service Management; Jim Comfort, vice president, Integrated Delivery Platforms, Cloud Computing; and Lauren States, vice president, Enterprise Initiatives, Cloud Technology and Client Innovation, IBM Strategy.

Now my only problem was figuring out where to put their comments in the book. Fortunately, the solution to that problem became apparent almost immediately. The wisdom and insight that Leslie, Jim, and Lauren shared with me were so valuable that I knew they had to go right here, at the front of the book.

---

**“Cloud puts power in the hands of the end user, and that can lead to a better financial equation for IT because of higher adoption rates and less under-utilization of resources. Cloud is changing the way we consume IT, and we’re only at the beginning.”**

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My conversations with these brilliant people covered a wide range of topics, but the main question I put to each of them was this: *What do you say to someone who tells you there’s nothing new about the cloud?*

Here’s a summary of their responses:

***Leslie Gordon***

*Internally, we leverage cloud as an extension of existing strategy. From a technology perspective, it’s not dramatically new. It’s grounded in a lot of the same technologies that we already use. I see cloud as a natural turn of the crank. It’s another abstraction of IT services, the next generation following virtualization and optimization of the infrastructure.*

*The cloud is not a one-size-fits-all solution, and it is not a panacea. You have to ask yourself, “Where does this approach fit in my organization? Where will it help me extend my strategy?” When you look at cloud from this perspective, it represents both an opportunity and a challenge.*

*One of the opportunities we identified early on was development and testing. We intentionally began in a low-risk area so we could really explore the potential of this new approach. It’s proven to be a strong success. Now our developers can create and access test environments on demand, whenever they’re*

*ready, and wherever they are in the world—without engaging the test-build organization. We've taken the middleman out of the equation and enabled our developers to become more agile and productive.*

*We've also received tremendous positive feedback from our developers, and they've driven very high adoption of this new approach. The flexibility, speed, and freedom to do what they want really appeals to them.*

*We've also identified business analytics and storage virtualization as prime opportunities for using cloud, and we see strong potential in both areas. We've already used cloud to provide common BI services that can be applied to a large set of data warehouses. Taking that step has enabled us to analyze information more effectively, which is very valuable from a business perspective.*

*What's cool about cloud isn't the technology. What's really cool about cloud is how it changes the way people consume IT. Cloud puts power in the hands of the end user, and that can lead to a better financial equation for IT because of higher adoption rates and less underutilization of resources. Cloud is changing the way we consume IT, and we're only at the beginning.*

### ***Jim Comfort***

*The genuinely transformational aspect of the cloud is on the user side . . . the people who use IT. The cloud is about enabling developers to become five times more productive. It's about responding to market demand in hours or minutes, and not days, weeks, or months.*

*It's difficult for most CIOs to quantify those kinds of benefits. Most CIOs are great at quantifying what's going on in the IT shop. And that is the conundrum. The discussion rapidly becomes a very detailed conversation about nuts and bolts,*

*speeds and feeds. CIOs are comfortable having these conversations. But when you talk about the cloud at that level, it's hard to see its value.*

*The fundamental abstraction of cloud is separating what from how. Separating what the user is trying to accomplish from how the underlying technology works.*

*Once you've made that separation, you can focus on the user. You can start asking, "What is the user's role? What is this user trying to do? What can we do in IT to make this user more productive?"*

*You aren't giving users infinite choice, you're giving users a range of choices that will help them become more productive. That's how you leverage cloud on the user side, by increasing labor productivity.*

*On the IT side, you leverage cloud by reducing costs and complexity. You build a service catalog that is efficiently constrained, standardized, and automated. Users get a range of choice that helps them become more productive, and IT gets lower costs and less complexity.*

*Now you are bridging two worlds, you are connecting IT and the business in a way that makes sense to both sides of the equation. That is the CIO's role during this transformational period: building bridges between IT and the other parts of the company. The cloud can help you build those bridges, which are essential to the company's long-term health.*

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**"The fundamental abstraction of cloud is separating what from how. Separating what the user is trying to accomplish from how the underlying technology works."**

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**Lauren States**

*I think the prime focus should be on new business opportunities where the flexibility and speed-to-market advantages of the cloud delivery model can really bring value to the company.*

*We can argue about the technology itself all day long. Most of it is evolutionary. But I've seen it mature to the point where we can do things with it that we couldn't do before.*

*Virtualization is not an enabler for the business. The cloud, on the other hand, enables new business models. That's a big difference. It's not the technology that's revolutionary—what's revolutionary are the new ways we can apply the technology.*

*Where do you begin? Start by looking at your business processes, applications and workloads. Find out where it makes sense to move services into the cloud. And of course, you've got to consider data privacy, security, regulations, compliance, standards, tolerance for risk, governance, and all those requirements that are specific to your organization.*

*You'll have to negotiate with the cloud provider to make sure you get the service level agreements (SLAs) you'll need to deliver secure and reliable services to your end users, whether they are internal or external customers.*

*Some of the organizations we work with are moving into the cloud because of the economic benefits it can deliver in terms of reduced costs and added capabilities. Others see the cloud as a way to create new business services they can take to market and monetize. Those companies are saying, "With cloud, we can leverage our infrastructure and our technology to provide services to new customers and new markets."*

*In either case, you will need a new mix of skill sets in IT. Which skills will be important? Architecture, contract negotiation, governance, customer service, to name a few.*

*I recently saw a tweet listing the five stages of cloud adoption: denial, anger, bargaining, depression, and acceptance. I have it posted on my wall. It's funny, but it also reminds me that different people view the cloud differently. Most people are still in the earliest stages of adoption, and that's something you have to accept.*

*Personally, what I like best about the cloud is that I can carry it around in my handbag. The cloud delivers banking, shopping, reading, playing games, managing credit cards, talking to my family, communicating with work, building my professional network—all through mobile devices and all without me having to understand the many technologies behind it. That's really exciting.*

*I think this is driving toward a tipping point in IT, to a place where we can be much more productive and more flexible than ever before. I think this will be bigger than the transition from mainframes to client-servers, because this will enable us to do more—as companies, as consumers, and as a culture. For IT professionals, this opens up the possibilities of creating whole new sets of applications that are more collaborative, more data-intensive, more available, more networked, and much easier to use. Today, we're getting a glimpse of the future. We don't know how the story ends, but it's very exciting.*

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**“Personally, what I like best about the cloud is that I can carry it around in my handbag. The cloud delivers banking, shopping, reading, playing games, managing credit cards, talking to my family, communicating with work, building my professional network—all through mobile devices and all without me having to understand the many technologies behind it.”**

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After my conversations with Leslie, Jim, and Lauren, I came away with a much stronger belief that the cloud is revolutionary in a business sense. The cloud will enable a new generation of business models—that seems perfectly clear. The fact that cloud computing is merely “evolutionary” from a pure technology perspective does not diminish its overall impact or lessen its potential as a transformational force. At the very least, it is another arrow in the CIO’s quiver.

I was also deeply impressed by their shared insight about the cloud’s impact on the role of the CIO. At minimum, the cloud’s presence will require CIOs to develop new skill sets, whether or not they actually use cloud-based services. CIOs who do not acquire these new skills will likely find themselves at a competitive disadvantage as cloud services become more the new norm.

Leslie, Jim, and Lauren also mentioned a possibility that I hadn’t previously considered, namely, the potential of cloud computing to serve as a template for managing an increasingly virtualized portfolio of IT capabilities. In other words, the cloud can become the model for the next generation of IT management. That, from my perspective, certainly makes the cloud worthy of deeper exploration.

As most of you already know, IBM is a major participant in the emerging cloud economy. IBM has publicly stated that the cloud is one of four key growth initiatives in its 2015 Roadmap. So far, the cloud has surpassed the company’s expectations as a revenue engine. The company expects the cloud

to play an important role in achieving its 2015 operating earnings per share (EPS) target of \$20.

IBM's confidence in the ability of the cloud to deliver significant revenue isn't based on wishful thinking—as a cloud user, the company genuinely understands the value and the potential of the cloud as a fundamentally new model for enabling business transformation in rapidly changing markets.

In summary, what's new about the cloud isn't how it works, but what it enables us to achieve.



# ACKNOWLEDGMENTS

The contents of this book are based primarily on the deep knowledge and wide experience that I acquired over nearly three decades as a consultant in the IT industry. But this book also represents several years of persistent research, involving dozens of interviews. I could not have completed *On Top of the Cloud* without leveraging the collective wisdom of many knowledgeable sources. I thank them sincerely for their time, their energy, their intelligence, and their support.

I am especially grateful to Rich Adduci, Ramón Baez, Becky Blalock, Mike Blake, Brian Bonner, Greg Buoncontri, Rob Carter, Trae Chancellor, Nicholas Colisto, Jim Comfort, Barbra Cooper, Tim Crawford, Martin Davis, Greg Fell, Matt French, Stephen Gold, Leslie Gordon, Allan Hackney, Kim Hammonds, Tyson Hartman, John Hill, Mark Hillman, Donagh Herlihy, Michael Hubbard, Randy Krotowski, Tony Leng, David Linthicum, Tod Nielsen, Bert Odinet, Tom Peck, Steve Phillips, Steve Phillpott, Mark Polansky, Tony Scott, Esat Sezer, Dave Smoley, Randy Spratt, Lauren States, Pat Toole, Clif Triplett, and Joe Weinman.

While researching and writing this book, I received invaluable assistance and ongoing support from my colleagues at HMG Strategy, Amanda Vlastas, Kristen Liu, Cathy Fell, and Melissa Marr.

I also extend my sincere thanks to Sheck Cho and Stacey Rivera, my editors at John Wiley & Sons, who had faith in the value of the project and were patient when I missed my deadlines. Kudos to Chris Gage and his production team for producing a book that is user-friendly and looks great.

I owe a special debt of gratitude to Mike Barlow, the co-author of *Partnering with the CIO* (Wiley, 2007) and *The Executive's Guide to Enterprise Social Media Strategy* (Wiley, 2011). Mike served as project manager for *On Top of the Cloud*, and his guidance was truly invaluable. In addition to being a talented writer and editor, Mike is a genuinely nice guy. Thank you, Mike!

Most of all, I want to thank my wife, Sandra, and our two sons, Chase and Brice, who put up with long nights of writing, endless phone calls, and lost weekends of heavy editing.

# INTRODUCTION

*Many of the great things in the history of our civilization have been achieved by the independent will of a determined soul. But the greatest opportunities and boundless accomplishments of the Knowledge Worker Age are reserved for those who master the art of “we.”*

—Stephen R. Covey, from the foreword of the 2004 edition of *The 7 Habits of Highly Effective People*

About three years ago, I began writing about the convergence of three major technology trends that I believed would radically transform the role of the modern CIO.

The trends were cloud, mobile, and social computing—in that order.

Today, I would add advanced business analytics to the mix of converging trends. And I might subtract the cloud.

Why remove the cloud? Well, I don't think it's fair to call the cloud a trend any more. The word “trend” suggests a kind of impermanence. Despite its vaporous name, cloud computing has solid foundations. It is no longer mostly hype or fiction. The cloud is real. It is a fact of life.

Gartner, the world's leading information technology (IT) research and advisory company, wrote in 2011 that “almost half of all CIOs expect to operate the majority of their applications and infrastructures via cloud technologies.”

If we accept that cloud computing is here to stay, then it makes sense to get a firm grasp on what the cloud is and what it isn't.

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**“Almost half of all CIOs expect to operate the majority of their applications and infrastructures via cloud technologies.”**

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What it *isn't* is the end of IT. Why? Because the cloud is just another form of IT. As you know, IT technology tends to be additive. For example, when companies began using client-server technology, mainframes didn't suddenly vanish. The same thing happened when companies started buying PCs—they didn't throw away their client-server platforms. Some processes run better in mainframe environments, some processes run better in client-server environments, and some processes run better in desktop environments.

Part of the CIO's role is helping people figure out which technologies and which platforms do the best job of delivering the results that people need to achieve their business objectives.

Clearly, there are some parts of your IT portfolio that you will probably never put into the cloud. And there are some