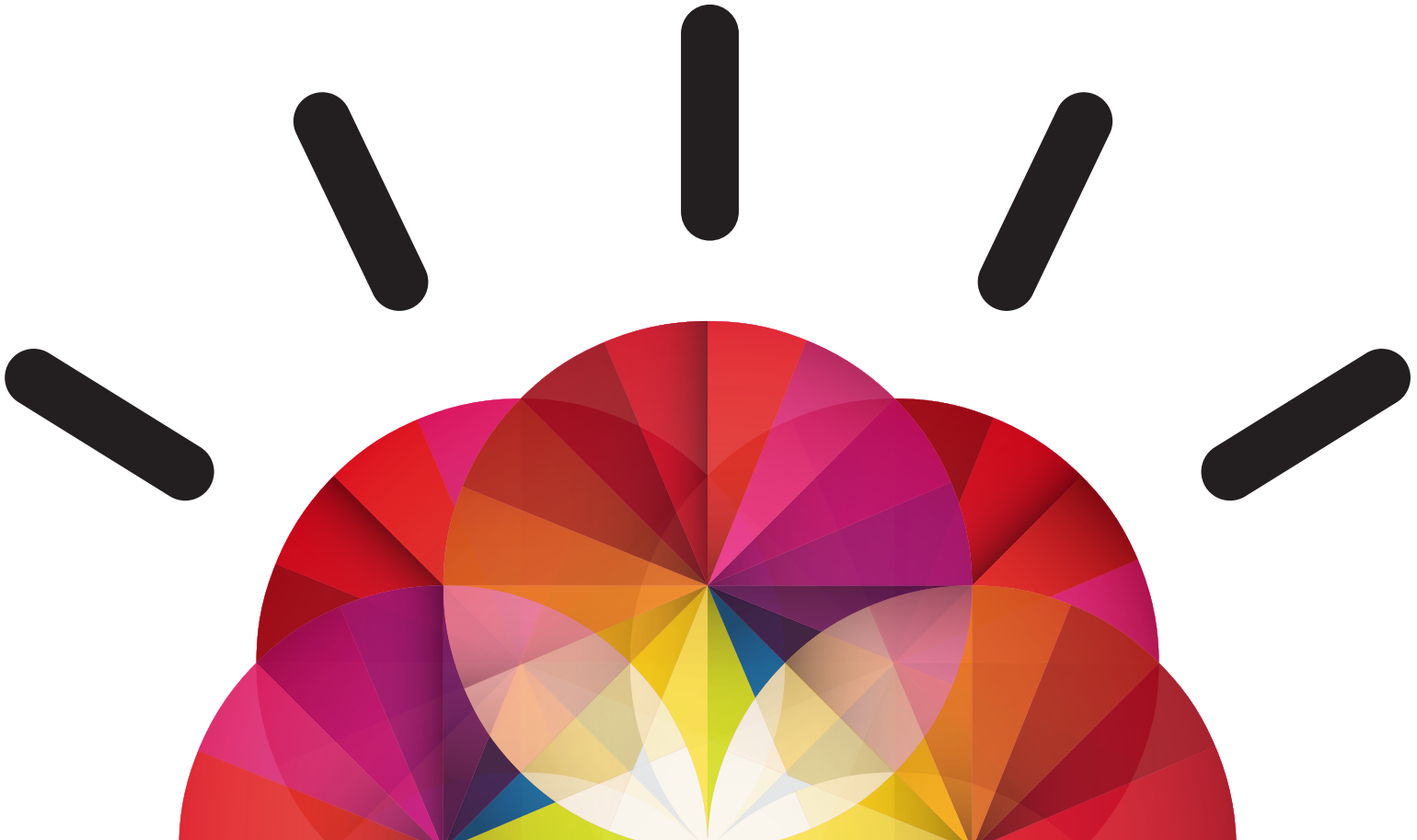
Smarter Computing

The Next Era of IT

IBM



Three years ago IBM started describing the emergence of a Smarter Planet that is fueling innovation across industries.

Every aspect of life is benefiting from the instrumentation, interconnection and the infusion of intelligence into the world's systems. Cities are getting smarter by transforming every possible form of municipal infrastructure—traffic systems, water systems, public safety. Business processes are being transformed across every industry, from banking to manufacturing to transportation. It's changing the way people live—delivering benefits from reduced congestion and pollution to new ways of communicating and collaborating.

THIS SHIFT IS DRIVING DRAMATIC CHANGE IN INFORMATION TECHNOLOGY.

The way it's accessed

Moving from attached workstations to individuals using ubiquitous, mobile devices, creating massive volumes of information every day.

- The number of interconnected devices has grown from **700 million** in 2004 to **5 billion** in 2010.
- The number of RFID tags has grown from **1.3 billion** in 2005 to **30 billion** in 2010.
- **300 million** smart meters are projected to be deployed by 2015.

The way it's applied

Moving from core business applications focused on productivity to the creation of real-time insight about and for individual users.

- **15 petabytes** of new information is being generated every day—80% of which is unstructured.
- **1 in 3** business leaders frequently make decisions based on information they don't trust or don't have.
- **1 in 2** business leaders say they don't have access to the information they need to do their jobs.

The way it's architected

Moving from heterogeneous silos to integrated, flexible infrastructures composed of workload-optimized systems.

- Networking fiber bandwidth has increased from **60 gigabytes** per second in 2005 to **300 gigabytes** per second in 2011.
- Computing power is projected to increase from **10 million** computations per second per $1,000 in 2005 to **10 trillion** computations per second per $1,000 by 2015.

On a Smarter Planet, successful companies are taking a new approach to designing their IT infrastructures to create new opportunities.

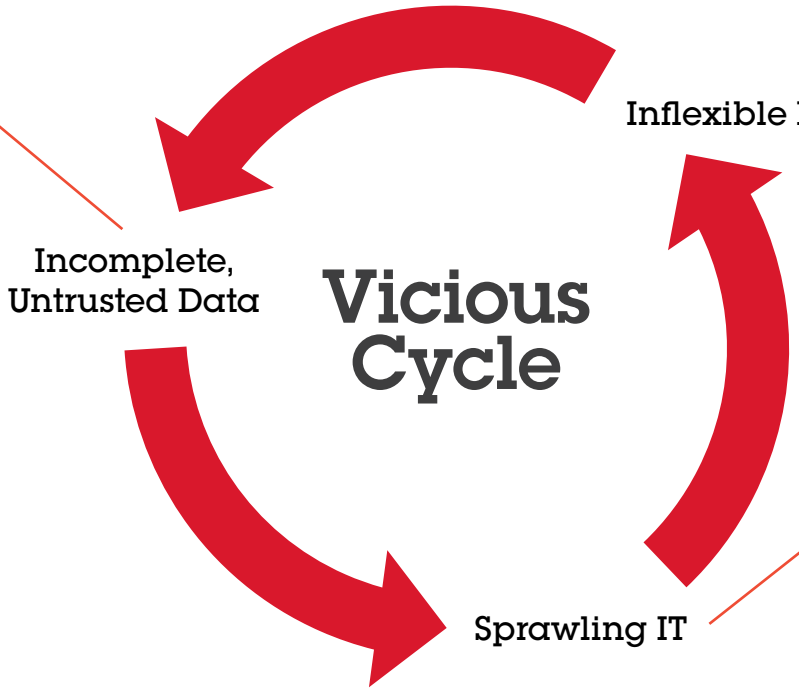
Create new markets in a fraction of the time	**Univerista di Bari** reduced time to market for fishermen and farmers with a cloud-based solution for real-time trading.
Deliver new services more quickly	**Citigroup** reduced provisioning times from 45 days to 20 minutes, improving their ability to deploy new banking services to clients.
Identify new trends before the competition	**Acxiom** improved capacity five-fold with no new floor space with a cloud-based model that improved customer retention and captured new business.
Utilize IT resources more efficiently	The **City of Norfolk, Virginia**, improved storage performance by 40% and cut power consumption in half, enabling it to deploy automated parking systems and police in-car video surveillance.

By thinking differently about computing, these leaders have addressed the IT conundrum—meeting exploding demand for service on a flat budget.

This conundrum traps IT organizations in a vicious cycle in which a rigid infrastructure and lack of trusted data lead to reactive decision-making. Meanwhile, attempts to overcome these challenges through additional IT investments result in a more sprawling and costly infrastructure.

Always Guessing

Decisions are made on incomplete data, big ideas are seen as risky and small decisions aren't optimized.



Reactive

Inflexibility of infrastructure limits integration across silos and responsiveness to customer demands.

More Cost

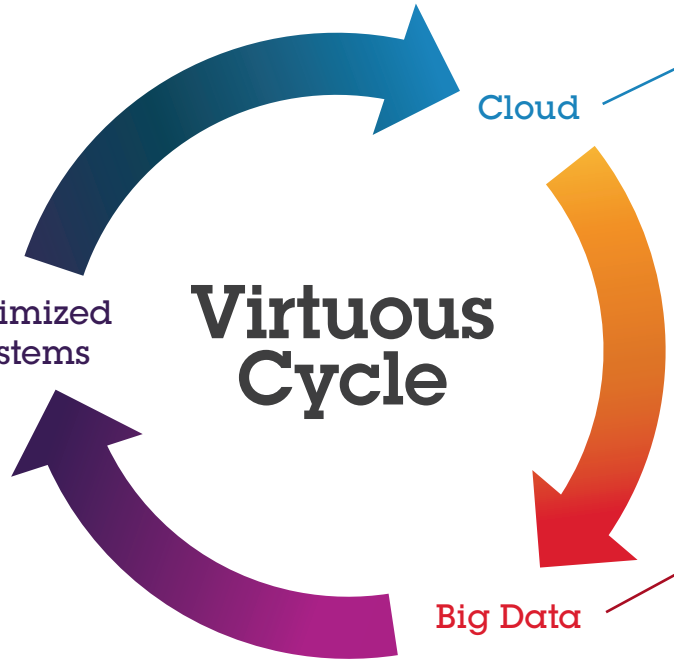
Every IT investment leads to more sprawl, which drives up infrastructure and management costs.

Any enterprise can reverse the IT conundrum by designing, tuning and managing their IT infrastructure in this new era we call Smarter Computing.

This new era is realized by designing IT as a system that incorporates Big Data for better decision making, Optimized Systems for superior economics and Cloud to reinvent business processes and drive innovation. Any enterprise can enter this new era by architecting an IT infrastructure that is designed for data, tuned to the task and managed in the cloud.

Tuned to the task

Remove financial barriers by driving greater efficiency and performance for each workload.



Managed in the cloud

Remove barriers to rapid delivery of new services and realize IT without boundaries to reinvent business processes and drive innovation.

Designed for data

Remove barriers to harnessing all available information and unlock insights to make informed choices.

Smarter Computing is an IT infrastructure that is designed for data, tuned to the task, and managed in the cloud.

Designed for data: Big Data

Big Data and information integration capabilities make it possible to generate insight from vast quantities of data—fundamentally changing the way organizations use information. It means filtering petabytes of data per second from almost any connected device, analyzing the data while still in motion, deciding what, if any, data must be stored, and even using analytics tools to virtually integrate the data with data stored in traditional warehouses. Organizations can integrate and analyze unstructured data wherever it lives—including the Internet—without overwhelming enterprise data warehouses. One financial services company was able to improve fraud detection by comparing tens of millions of individual transactions against 7 years worth of customer data in real time, rather than 30 days—without overwhelming the data warehouse or incurring prohibitive expense. IT departments integrating Big Data with already-stored data can enable new forms of analysis such as forecasting and predictive modeling.

- Better understand customer behavior and needs
- Optimize decisions in real time
- Foster collaborative decision making
- Continually assess enterprise risk

Tuned to the task: Optimized Systems

Generating insights from the exploding volume, velocity and variety of data requires Optimized Systems specifically architected for that task. To maximize performance and efficiency, these systems must be optimized at every layer of the technology stack to exploit unique processor, memory and storage characteristics. The increasingly-sophisticated workloads generated by a smarter planet require systems built with domain knowledge and understanding of workload characteristics, hardware with multi-core architectures and advanced threading, and software tuned from the operating system through the middleware stack.

- Reduce deployment times from months to days
- Improve performance with utilization rates up to 90%
- Reduce floor space, power consumption, labor and total cost per workload by 55%

Managed in the cloud: Cloud

Organizations in every industry, regardless of size or geography, are embracing Cloud computing as a way to reduce the complexity and costs associated with traditional IT approaches. This reality is driven by three related shifts. Customer, employee and partner expectations are changing as self-service consumption of technology and services becomes the norm. The economics of computing are changing as organizations access world-class computing power, now available anytime, anywhere. Faster delivery of higher-value products and services is now mandatory to address formidable competition and escalating customer and shareholder expectations. In the era of Smarter Computing, any enterprise can apply the transformative power of cloud computing to reinvent the way they do business and improve economics. For instance, cloud-based, real-time analytics can save over 50% in business insight-related costs, and collaborative business process services can increase employee productivity by 25%.

- Capture new value by creating new offerings and services
- Deliver IT without boundaries by breaking down silos and simplifying access to information
- Improve speed and dexterity with new models of self service and deployment

IBM can help any enterprise proceed with a strategic, staged approach. Each step leads to an IT infrastructure that is integrated, automated and secured. IBM has identified projects that any client can initiate to start a journey to realize Smarter Computing.

To create advantage by serving customers in new ways, start with **Big Data** and information integration.

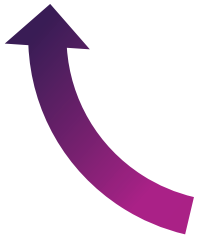
EXAMPLE PROJECTS

- Data Compression and De-duplication
- Master Data Management

To create advantage by transforming the economics of your IT, start with workload **Optimized Systems.**

EXAMPLE PROJECTS

- Workload Consolidation
- Storage Tiering and Consolidation



To create advantage by reinventing your business processes and improving the speed of your service delivery, start with **Cloud.**

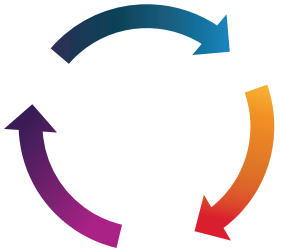
EXAMPLE PROJECTS

- Systems Virtualization
- Provisioning Automation

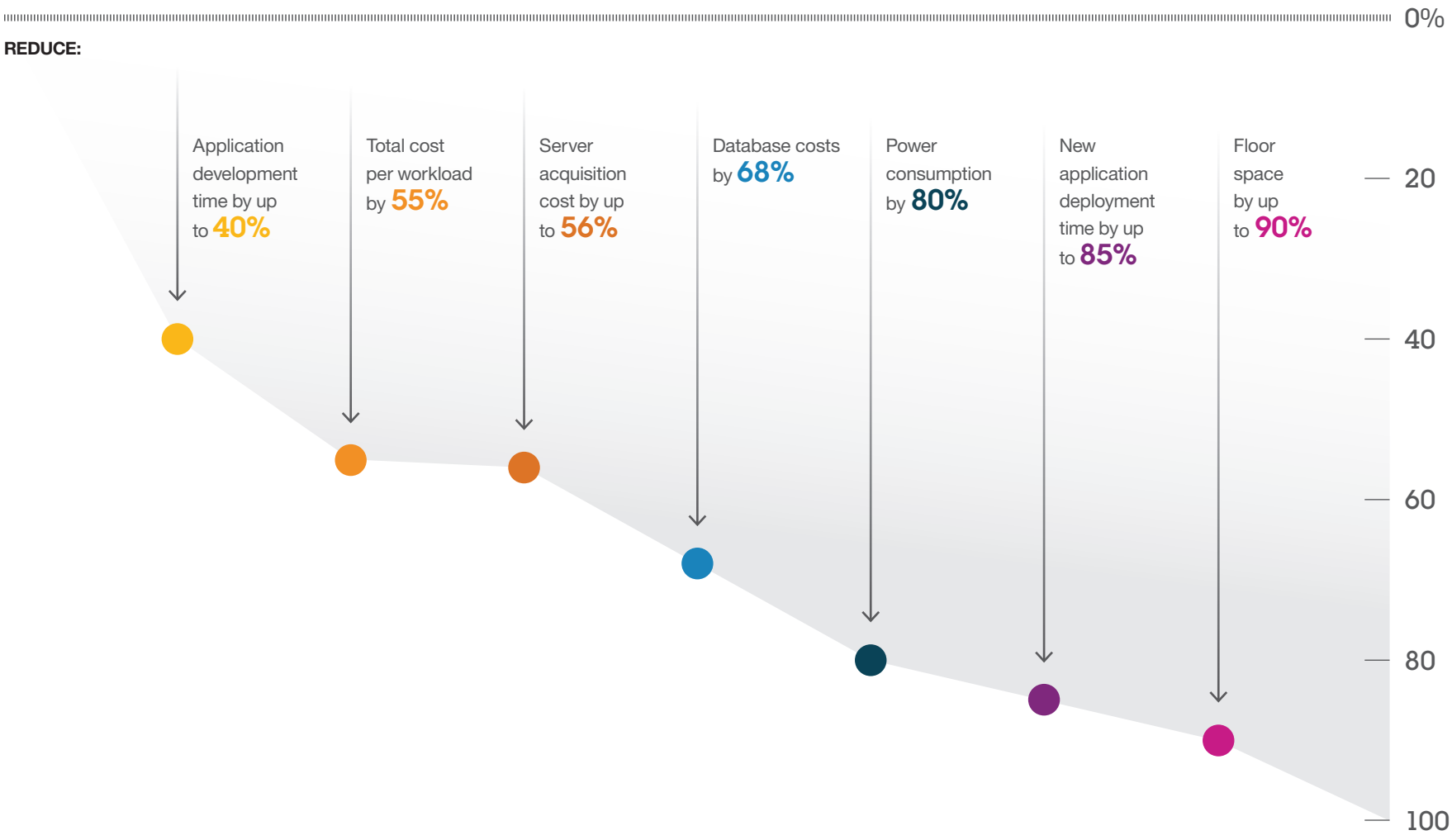
To gain real business advantage, do all three things together and design your IT as a **holistic system.**

EXAMPLE PROJECTS

- Enterprise IT and Data Governance
- Business Service Management



Smarter Computing addresses a critical challenge faced by IT organizations: increasing efficiency.



Enterprises across all industries are already undertaking this transformation to drive breakthrough innovation.

Smarter Computing capabilities can help you meet the challenges and take advantage of the opportunities.

FINANCIAL SERVICES

The Central Depository Company of Pakistan saw a **98%** improvement in service level agreements with a **50%** reduction in time required to support new lines of business.

CUSTOMS BROKERAGE

GHY International reduced server management by **90%,** enabling an IT infrastructure capable of tracking cross-border shipments in real time.

SERVICES

Call & Call Holdings consolidated 1,200 computers to one operating system image, realizing **50%** operational savings while meeting increased customer demand.

HEALTHCARE

Virginia Commonwealth University reduced cost per terabyte by **50%** while enabling anywhere, anytime access to clinical applications and patient information.

MEDIA & ENTERTAINMENT

Mac Guff reduced energy costs by **66%** and delivered a cloud-based solution for large animation-rendering projects for feature films.

FINANCIAL SERVICES

Visa enhanced information service delivery while reducing total cost of ownership, enabling real-time fraud detection on credit card transactions.

Smarter Computing transforms the University of Pittsburgh Medical Center's IT system to overcome cost challenges and deliver better patient care.

CASE STUDY

An $8 billion global healthcare enterprise with more than 50,000 employees was challenged to lower the cost of its IT infrastructure.

Over the last 5 years, UPMC has doubled its computing capacity while holding IT costs flat by embracing the Smarter Computing approach. Data center space has been converted to hospital space and the construction of a new $80 million data center was avoided. Because of its architected approach to integrating, automating and securing its IT infrastructure, UPMC can now invest in next-generation clinical systems. The Smart Room automatically provides the clinician with relevant, real-time patient information pulled from electronic medical records, including allergies, vital signs, test results and medications that are due. These innovations are helping to improve the quality of the care that UPMC delivers to ensure better patient outcomes.

Project-Based Transformation

- Optimized workloads by consolidating across Power, x86 and System z environments—reducing server volumes by up to 80%
- Implemented standard deployments and virtualization across all environments
- Implemented master data management to integrate patient data for electronic patient medical records
- Automated storage tiering, service provisioning and centralized discovery to reduce management
- Implemented event correlation to predict and eliminate service problems
- Adopted enterprise data governance processes to ensure availability of trusted data
- Implemented an IT Architecture Board to review new workload deployment requests

Delivered innovation by enabling investment in next-generation clinical systems

Transformed IT for improved economics

2x	Doubled its computing capacity
$0	No increase in IT costs
—	Eliminated the need for $80 million data center

Why IBM for Smarter Computing?

- **We've been a proven innovator for 100 years.**
- **We're extending our portfolio to address the biggest challenges in computer science.**
- **Our approach is flexible and inclusive—there's no need to rip and replace.**
- **We have the experts and expertise required for transformation.**

For 100 years, IBM has been at or near the center of every major turning point in computer science—but we haven't remained in the forefront by clinging to the past, and over the last decade we've reinvented our portfolio through industry-leading R&D investments and targeted acquisitions.

Today, IBM designs and builds products for nearly every element of an organization's computing portfolio, from microprocessors, servers, and storage devices to operating systems, software programming tools, middleware, business intelligence applications and industry-specific software frameworks. More importantly, IBM can help any organization build on their existing capabilities and apply these principles—no forced rip-and-replace required.

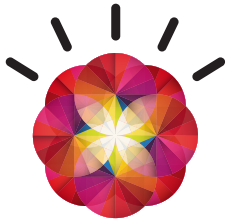
Our clients benefit from these capabilities every day—and so does IBM. Take IBM's newest data center in North Carolina's Research Triangle Park, where more than 40,000 sensors monitor equipment to improve energy efficiency and utilization, reducing capital and operating costs by as much as 50%.

For organizations seeking to transform their IT we offer the services, technologies and capabilities that can be applied to their unique strategy and needs. IBM can help any organization realize Smarter Computing—the next era of IT.

Welcome to Smarter Computing.

Clients benefit from Smarter Computing—double capacity for IT services, hold IT costs flat and implement breakthrough new services.

IBM knows how to get you there. Let's build a smarter planet.



"As our planet becomes instrumented, interconnected and intelligent, the computing model is evolving to support it."

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