
*For the Complete Technology & Database Professional*

# THE PETABYTE CHALLENGE:
## 2011 IOUG DATABASE GROWTH SURVEY

By Joseph McKendrick, Research Analyst
Produced by Unisphere Research, A Division of Information Today, Inc.
August 2011

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## EXECUTIVE SUMMARY

In this day and age, for many organizations, data is not only crossing into the hundreds of terabytes, but into the near-petabyte (PB) and multi-petabyte range.

Data is streaming into, out of, and through enterprises from a dizzying array of sources—transactions, remote devices, partner sites, websites, and non-stop user-generated content. Not only are the data stores resulting from this information driving enterprise data stores—both in core, mission-critical databases as well as other environments—to scale into the terabyte and petabyte range, but they occur in a multitude of formats, ranging from traditional structured, relational data to message documents, graphics, videos and audio files.

In a new survey conducted by Unisphere Research among members of the Independent Oracle Users Group (IOUG), close to one out of ten respondents report that the total amount of online (disk-resident) data they manage today—taking into account all clones, snapshots, replicas and backups—tops a petabyte.

The IOUG survey, conducted in partnership with Oracle Corporation, included input from 611 data managers and professionals. Respondents to the survey have a variety of job roles and represent a wide range of company types, sizes, and industry verticals. The greatest number of respondents have the title of database administrator, followed by director or manager. Close to one-third come from very large organizations with more than 10,000 employees. The largest industry segments in this survey are represented by software and tech companies, government agencies, financial services, healthcare, and utilities and telecommunications companies. (See Figures 50-52 at the end of this report.)

**Key findings:**

The following summarizes the survey results, which explore issues and solutions around managing fast-growing database environments. Key highlights and findings include:

- Almost all respondents report data growth over the past year and one-third of respondents report the amount of data within their enterprises grew by 25% or more in this time period. Almost one out of ten sites now has data stores in the petabyte range.
- A number of companies are compelled to preserve data for extended periods of time, e.g., to meet compliance requirements. As a result, more data is being kept online for longer periods of time—which increases storage costs. In fact, 12% of respondents say they simply now hang on to all data "forever."
- Many respondents report increasing issues in the performance of their applications as a result of data growth. However, many still look to hardware—additional server and storage systems—as the way to handle prolific, near-petabyte or multi-petabyte data.
- As data grows, the reflex reaction by most organizations is to buy and install more disk storage. Smart approaches are on the horizon, but still only prevalent among a minority of companies. Close to one-third now embrace tiered storage strategies, and only one out of five is putting information lifecycle strategies into place to better and more cost-effectively manage their data.
- More than one-third of respondents report they manage most of their company's information—including all information types, such as text, video, or audio—within core enterprise databases.
- Data managers in the survey are struggling with rapid data growth, but few have control over the storage technologies used to manage this growth. In many cases, those respondents "close to the ground" in data sites—such as DBAs—do not have a great awareness of accumulated or projected storage costs.

For many survey respondents, the surge of near-petabyte data environments is dramatically changing the information management landscape. As one respondent, a DBA with a large financial services firm, put it: "I would not say that 'Big Data' has made it more difficult, but we have to think and plan carefully before implementing any new strategy because the impact of any decision related to this volume of data will certainly be huge."

Part of this new reality includes a need for more comprehensive training and education. "We are trying to educate our employees about the correct way of writing, uploading, updating and/or indexing our data at our servers and database machines with the purpose of easing access to other employees," says another respondent, a development manager at a small high-tech firm.

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## DATA ENVIRONMENTS

**Almost all respondents report data growth over the past year and one-third of respondents report the amount of data within their enterprises grew by 25% or more in this time period. Almost one out of ten sites now has data stores in the petabyte range. A third of respondents report the amount of data within their enterprises grew by 25% or more over the past year.**

Many organizations have vast stores of information that they are dealing with. Nine percent of respondents to this survey report there is more than 1PB (1,000TB) of online (disk-resident) data that their organization manages today, taking into account all clones, snapshots, replicas and backups. On average, organizations in the survey report maintaining close to 400TB worth of data at their locations. (See Figure 1.)

The percentage of companies with sizable data environments has grown since a similar IOUG survey was conducted in the summer of 2010. In the previous survey, 20% of respondents reported environments exceeding 100TB. That percentage has increased to 27% in the current survey (100TB was the highest threshold measured in last year's survey). (See Figure 2.)

By industry, the healthcare sector leads in prolific data environments, with 22% reporting environments exceeding 500TB of resident data. This may be related to requirements to hold data for extended periods of time, as shown later in this report. Utilities and telecom firms follow with 21%, and the tech/software sector follows with 16%, and financial services at 14%. (See Figure 3.).

What are the characteristics of 1PB-or-more organizations that separate them from the rest of the survey group? Not surprisingly, they are heavily weighted toward larger organizations —72% of this sub-segment are organizations with more than 10,000 employees, versus 30% across the entire group. By industry groups, they are most likely to be tech firms or systems integrators, telecom companies or utilities, financial services and healthcare establishments.

And the volume of data just keeps growing. Eighty-six percent of respondents say the amount of data within their enterprises grew over the past year. Close to one-third of respondents, 32%, report that their data is growing at a rate of more than 25% a year. Close to one in eight respondents, 12%, reports that their data is growing at a rate exceeding 50% a year. (See Figure 4.)

Companies in the tech and software sectors report the greatest data surges, with 18% of respondents within these organizations seeing data growth of 50% a year or greater. About 13% of financial services firms are also experiencing such growth, and utilities or telecom organizations follow closely at 12%. (See Figure 5.)

Where is all this data growth coming from? For a majority of respondents, more data is the result of growing business demands. Many companies are seeing new growth as the economic climate improves, and the result is additional data. Close to half also see additional data being created by data warehouse and business intelligence applications. More than one-third say more data is coming out of business protection (backup, recovery, replication, redundant mirroring) or through an increasing online presence. (See Figure 6.) Among organizations managing 500TB or more of data, a majority report this growth is a result of both business demand, as well as a proliferation of data warehouse and business intelligence (BI) applications. (See Figure 7.)

For different industries, there are different growth stories. For example, most manufacturers report that data warehouse and BI initiatives are the source of a lot of new data growth. For the tech industry, it's simply new business that piles on the data. Backup and business continuity requirements also add to the prolific data picture. (See Figure 8.)

Part of the challenge stems from the multiple copies of data that are generated and distributed across enterprises. A majority of respondents, 54%, reported having three or more copies outside of their production databases made for non-production purposes, which includes development, testing, backup, mirroring, standby, or training. (See Figure 9.)

Prolific data sites are more likely to have more numerous copies of production data outside their immediate data environments—which also likely contributes to the enhanced volume. About 22% of respondents in high-volume data sites (more than 500TB) report having more than five copies of production data distributed off-site, versus only 8% of low-volume data sites (managing fewer than 10TB.)(See Figure 10.)

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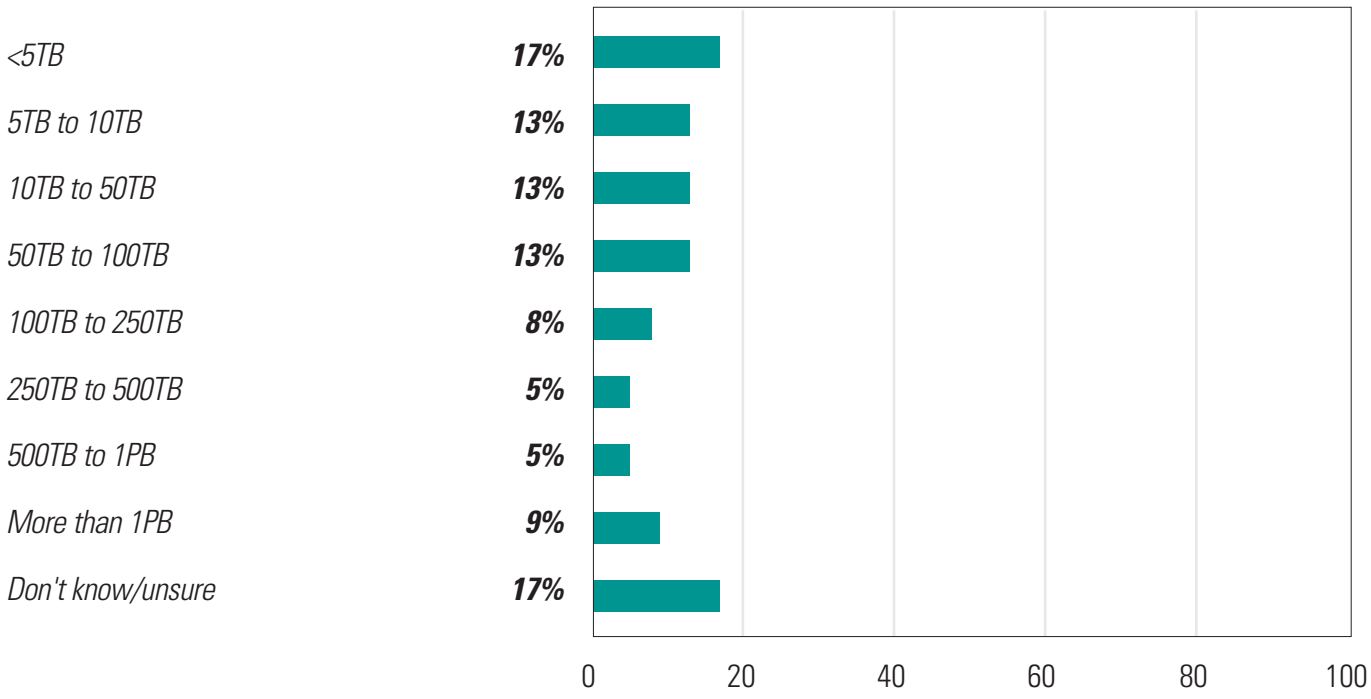
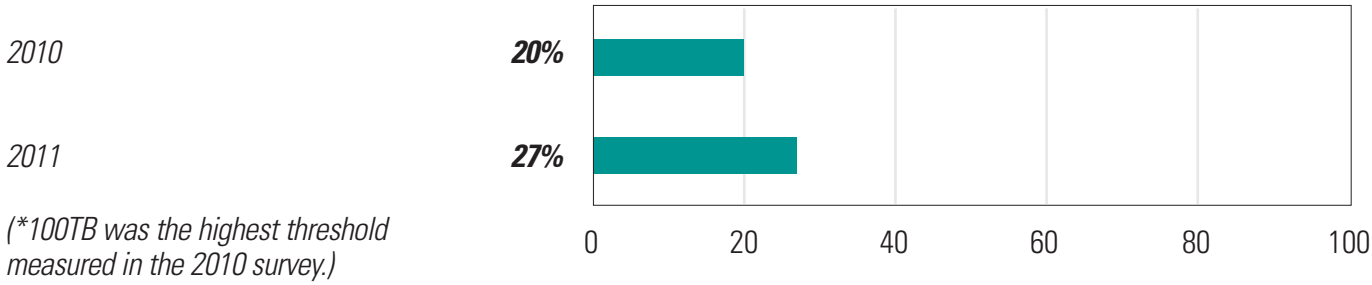
## Figure 1: Total Amount of Data Managed




## Figure 2: Prolific Data Sites—2010 vs. 2011

*(Percentage reporting more than 100TB*)*




*(*100TB was the highest threshold measured in the 2010 survey.)*

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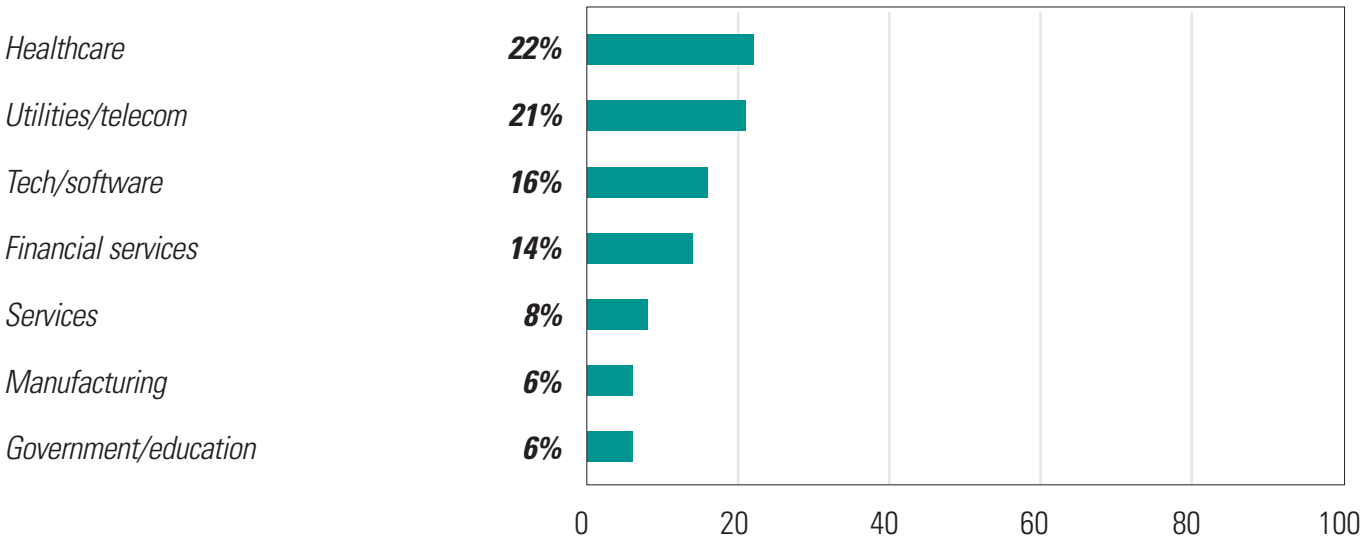
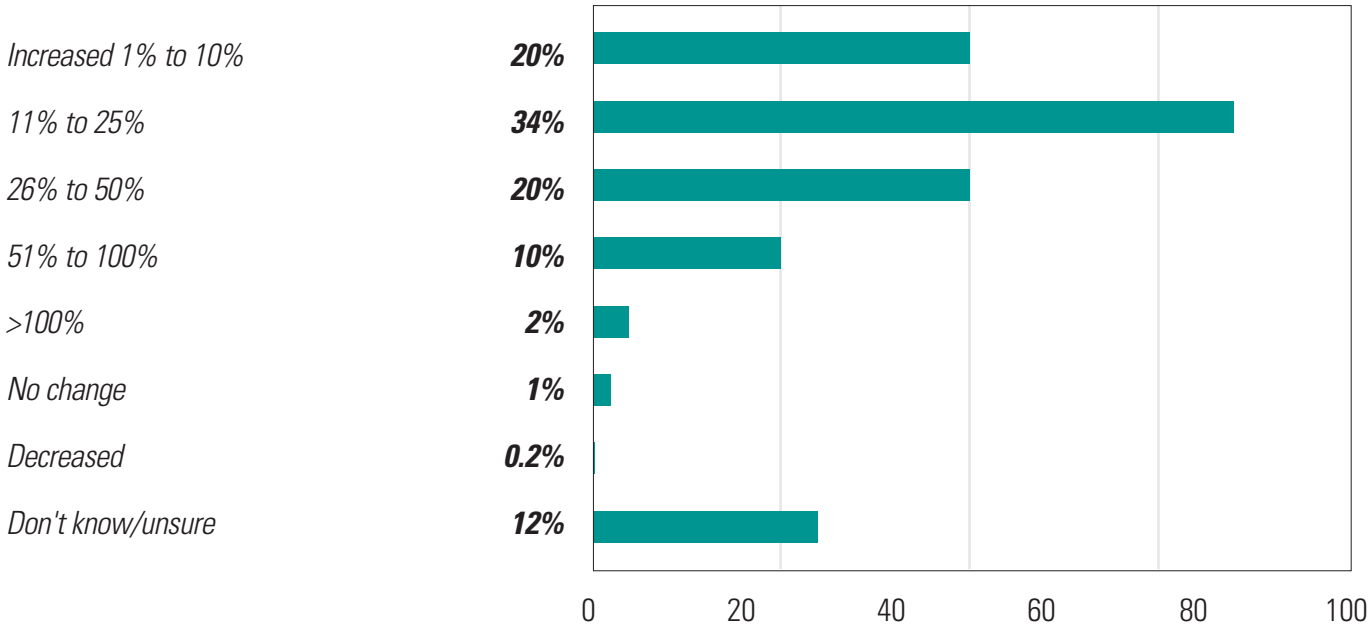
## Figure 3: Prolific Data Sites—By Industry

*(Percentage reporting more than 500TB)*




## Figure 4: Changes in Total Data Managed Over Past Year

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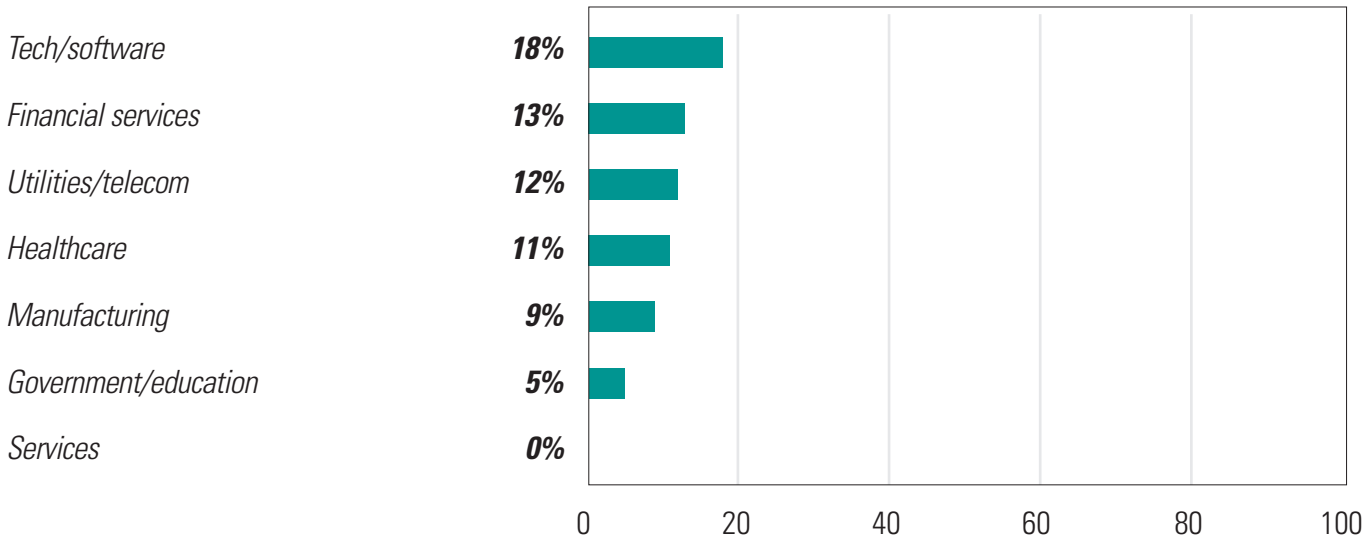
## Figure 5: Fast-Growing Data Sites—By Industry

*(Percentage reporting more than 50% growth over the past year)*

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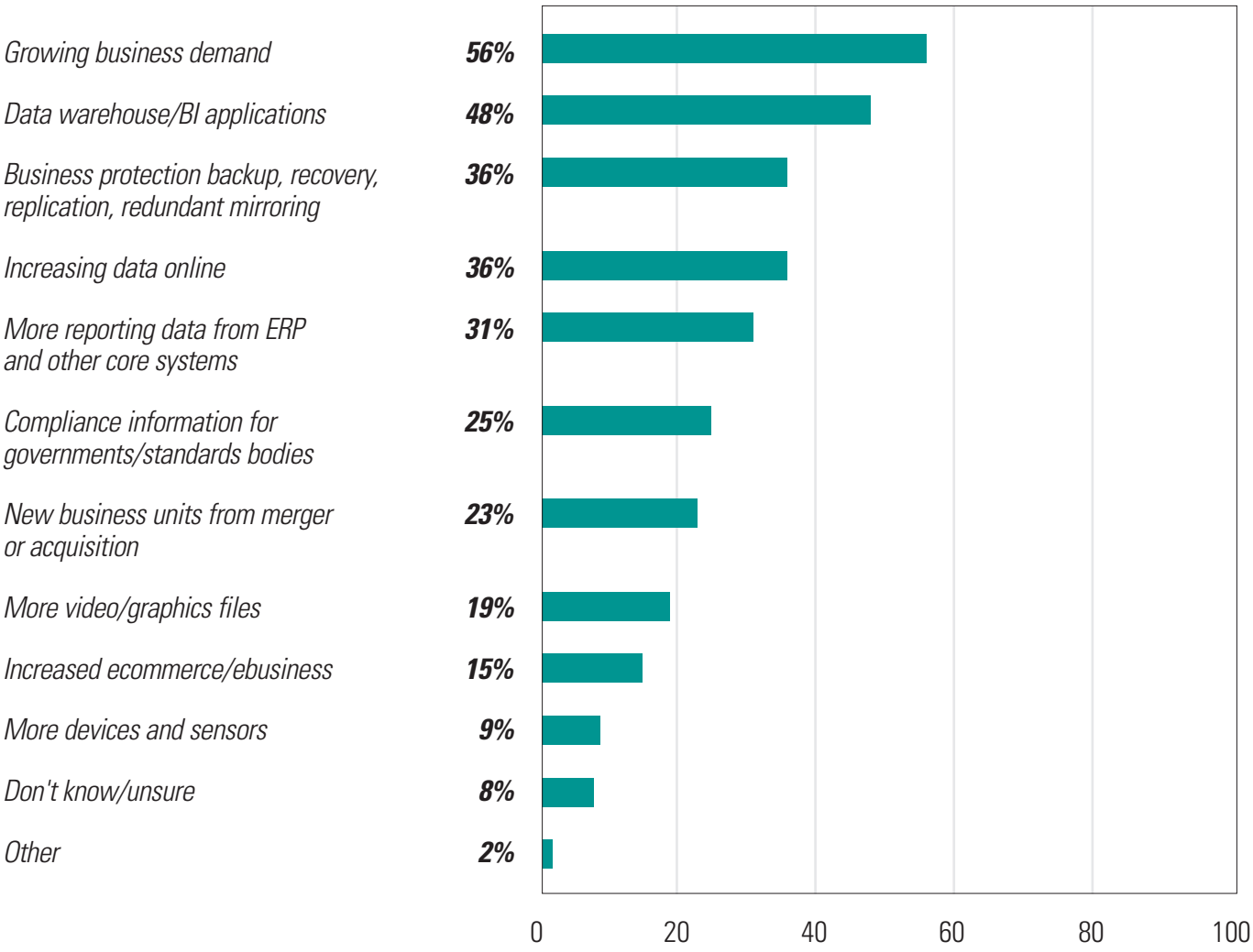
## Figure 6: Most Significant Sources of Data Growth

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## Figure 7: Leading Sources of Data Growth—By Data Volume

| | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| Growing business demand | 56% | 60% |
| Data warehouse/BI applications | 41% | 57% |
| Business protection backup, recovery, replication, redundant mirroring | 32% | 40% |
| Increasing data online | 35% | 39% |
| More reporting data from ERP and other core systems | 24% | 32% |
| Compliance information for governments/standards bodies | 20% | 32% |

## Figure 8: Top Three Leading Sources of Data Growth—By Industry

| | Growing business | Data warehouse/BI | Backup/continuity |
|---|---|---|---|
| Tech/software | 58% | 37% | 40% |
| Financial services | 68% | 62% | 30% |
| Utilities/telecom | 64% | 58% | 38% |
| Manufacturing | 48% | 68% | 27% |
| Government/education | 48% | 35% | 35% |
| Services | 42% | 25% | 17% |
| Healthcare | 51% | 56% | 36% |

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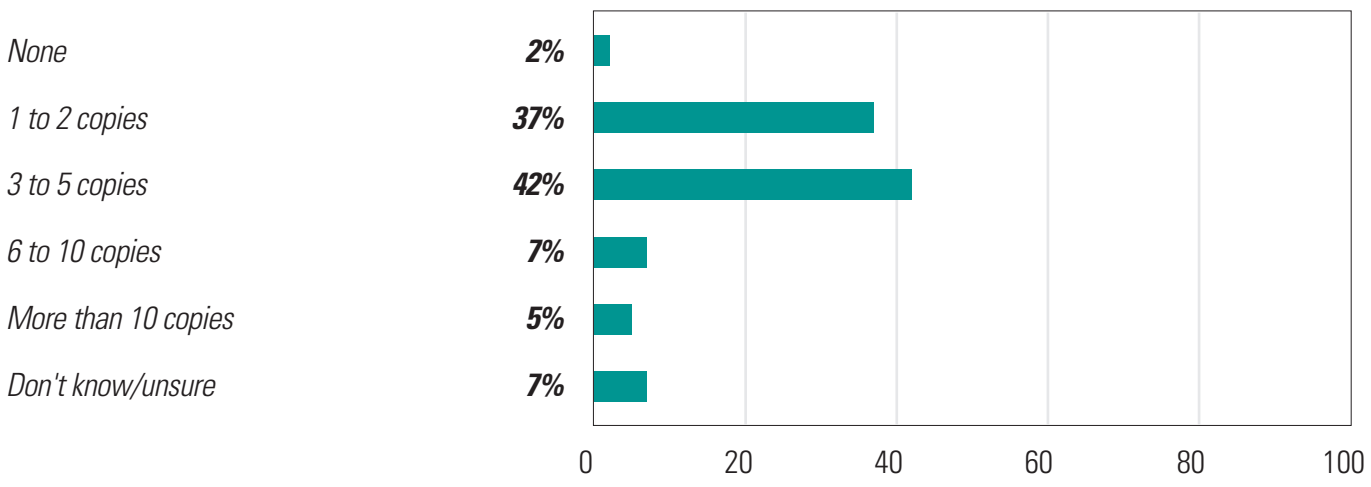
## Figure 9: Number of Database Copies Outside Production




## Figure 10: Number of Database Copies Outside Production —By Data Volume

| | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| None | 2% | 1% |
| 1 to 5 copies | 85% | 71% |
| More than 5 copies | 8% | 22% |
| Don't know/unsure | 5% | 6% |

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## REGULATORY REQUIREMENTS AND MANDATES

**A number of companies are compelled to preserve data for extended periods of time, e.g., to meet compliance requirements. As a result, more data is being kept online for longer periods of time—which increases storage costs.**

Regulations, policies and mandates are also driving the growth of near and multi-petabyte data, especially since data must be preserved in order to meet auditing requirements and in the face of potential litigation. More than one-third of the companies in this survey report that data gets stored in their archived systems for more than 7 years, either because of company policy or compliance mandates. In fact, 12% of respondents say they simply now hang on to all data "forever." (See Figure 11.)

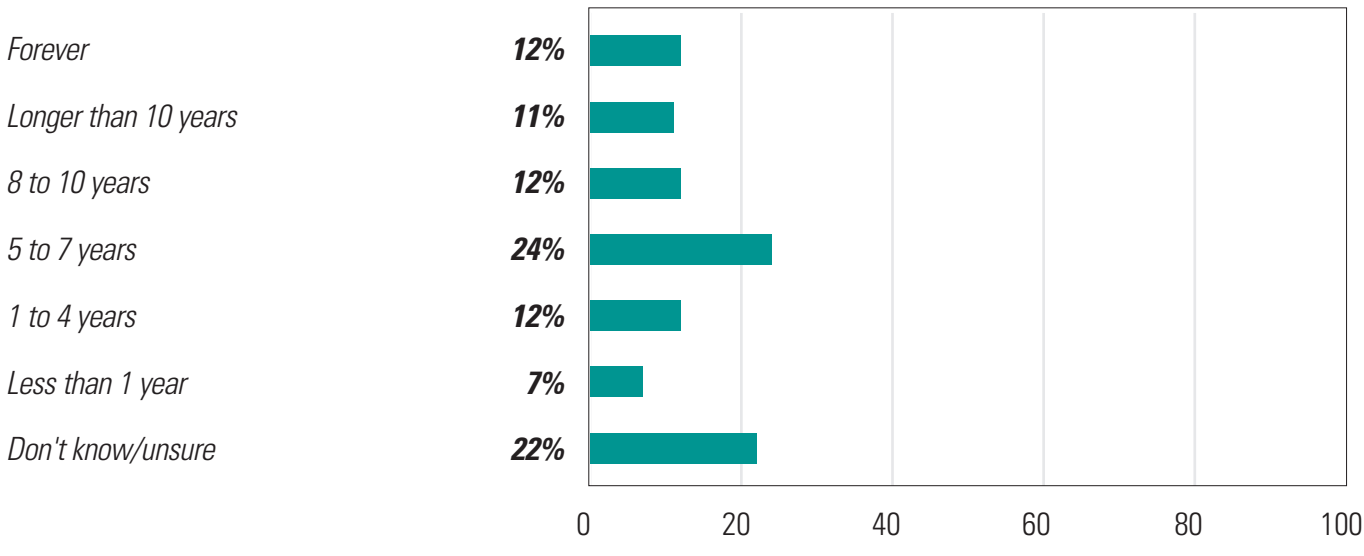
By industry, healthcare organizations are most likely to need to store data for extended periods of time—33% of the respondents in this segment indicate they store their data for more than a decade. Government and educational institutions follow at 31%. Which organizations are least likely to hold on to data for long periods of time? Manufacturers—with only 16% feeling the need to do so. (See Figure 12.)

In most cases, as cited by a majority of respondents, federal, state or provincial government compliance mandates are driving efforts to effectively store enterprise data and have it available on demand. Another 43% say there is always the potential for litigation, and for that reason, they want to keep relevant data handy. (See Figure 13.)

A large number of companies say this is affecting the way they move their data through storage tiers. Close to two-thirds say that, to some extent, they have increased the proportion of data kept online in the past 5 years (versus moving to archived tape) to address the requirements of increased information accessibility. Three out of ten say this shift has been significant. (See Figure 14.)

This creates a number of challenges, of course. Seven out of ten respondents report this has resulted in a need for more hardware resources. Close to half also cite the increased complexity of managing data that needs to be saved for years, possibly decades, yet still be accessible even with very short notice. (See Figure 15.) A small segment of respondents, 17%, are considering cloud options for the storage of archive data. (See Figure 16.)

## Figure 11: Long-Term Data Storage

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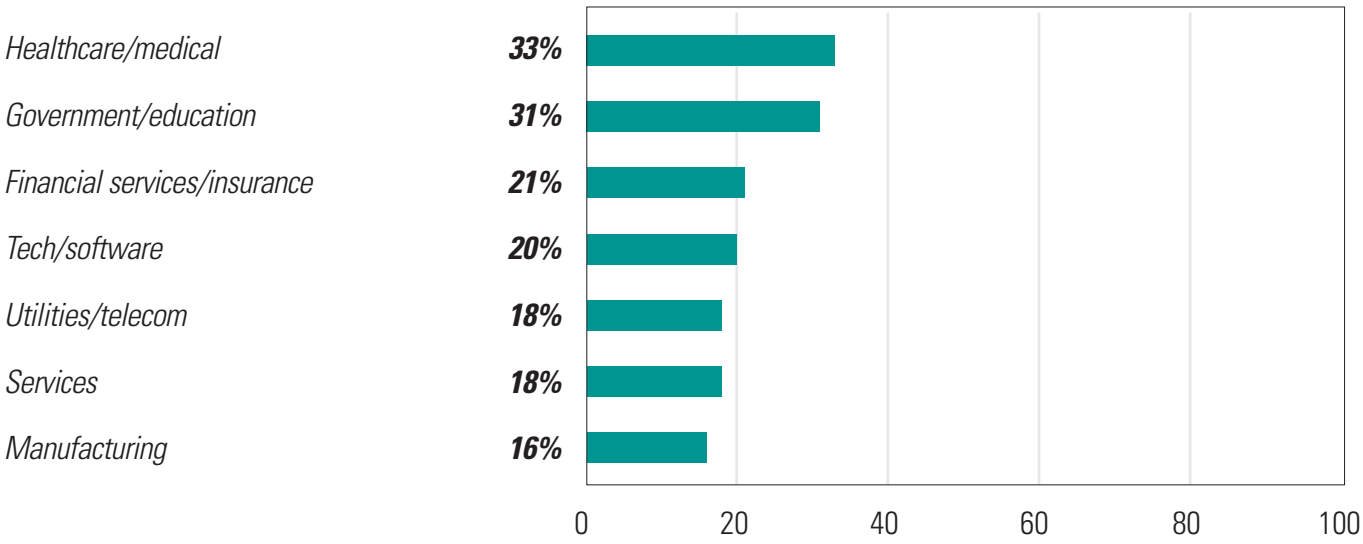
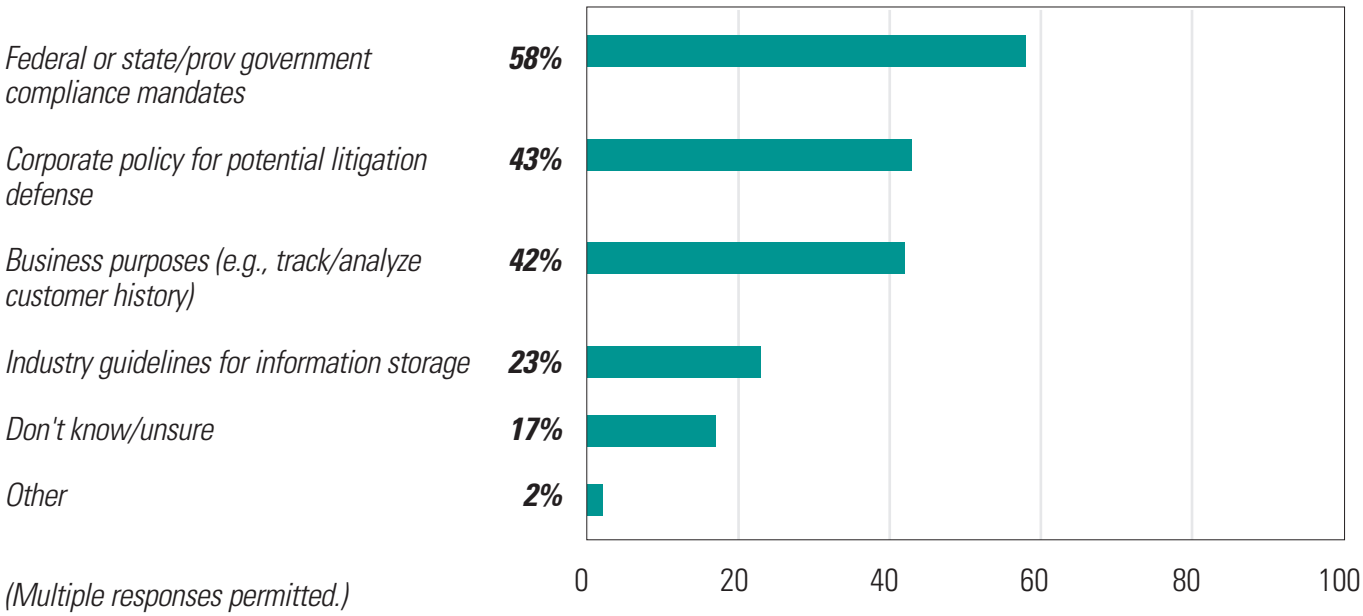
## Figure 12: Long-Term Data Storage—By Industry

*(Percentage storing data longer than 10 years for compliance/legal purposes)*




## Figure 13: Reasons for Long-Term Data Storage




*(Multiple responses permitted.)*

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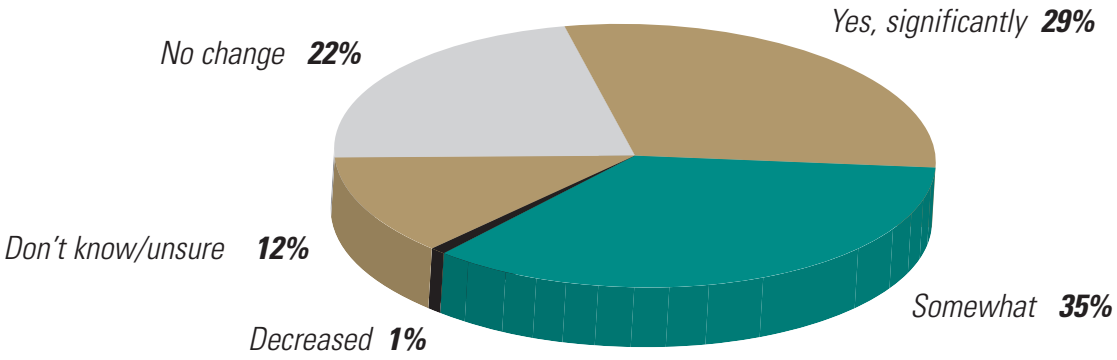
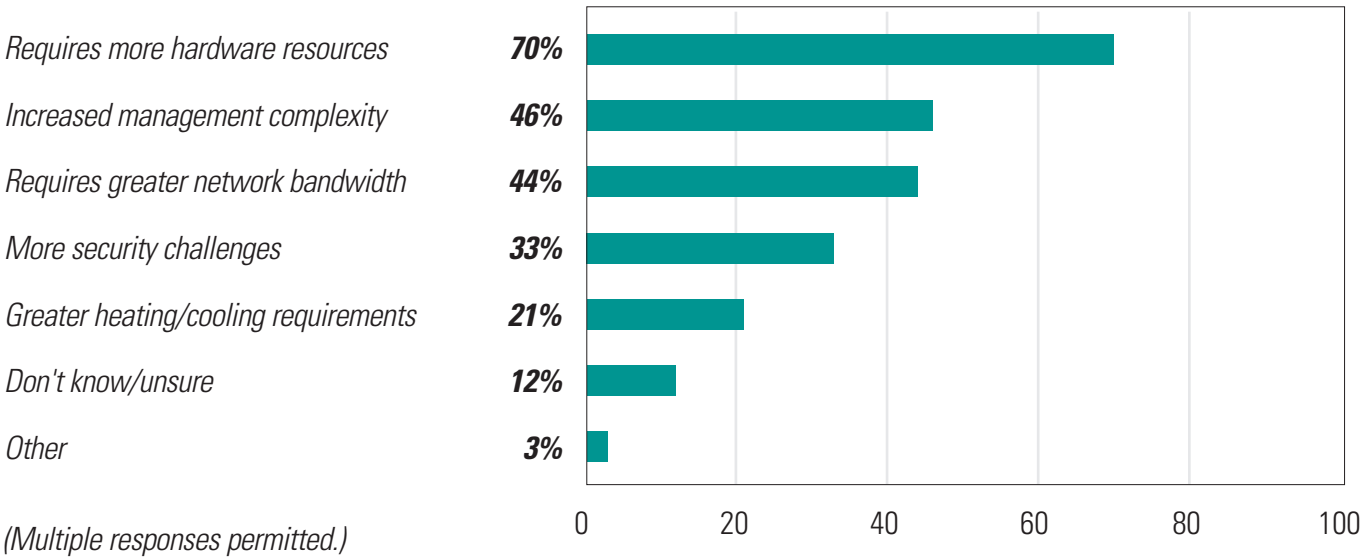
## Figure 14: Increase Proportion of Data Kept Online in Past 5 Years?




*(Total does not equal 100% due to rounding.)*

## Figure 15: Main Challenges of Data Accessibility

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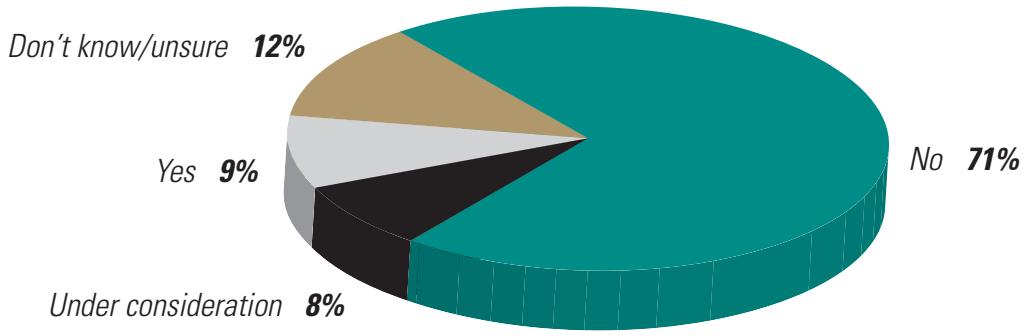
## Figure 16: Outsource Archive Data Storage to Service/Cloud Provider?

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## APPLICATION AND PERFORMANCE ISSUES

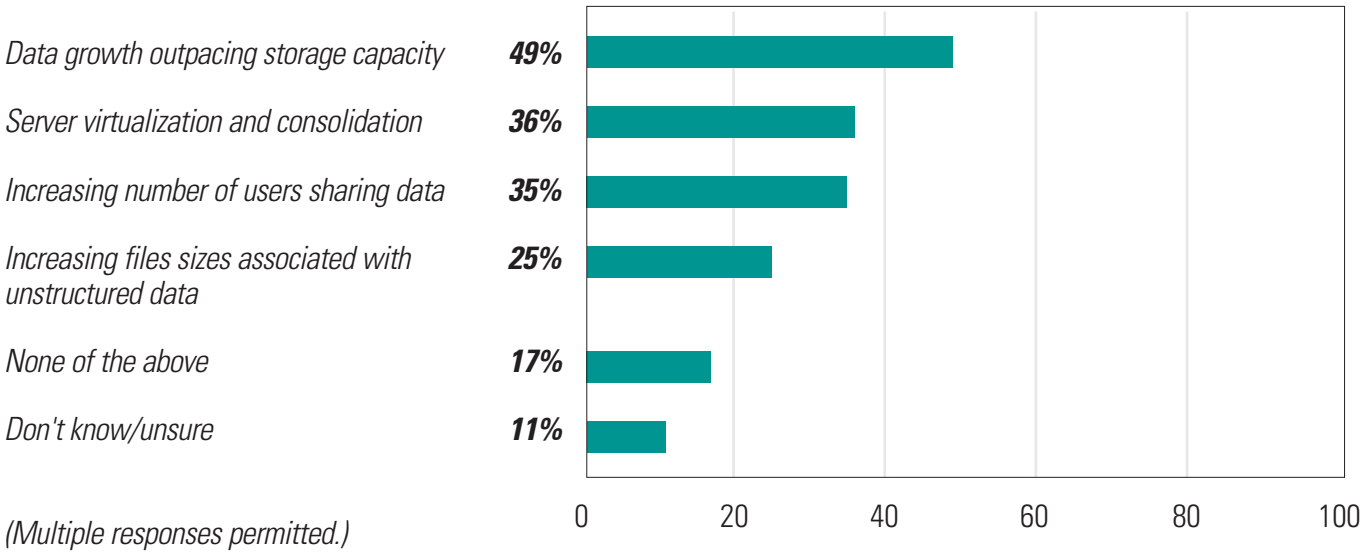
**Many respondents report increasing issues in the performance of their applications as a result of data growth. However, many still look to hardware—additional server and storage systems—as the way to handle prolific, near-petabyte or multi-petabyte data.**

One of the casualties of prolific data is performance—across applications, systems and networks. In many cases, today's IT infrastructures simply are not ready for the large amounts of data to be processed, managed, stored or archived. Half of the respondents, in fact, say data growth is currently outpacing storage capacity. (See Figure 17.)

Frequent responses to application performance issues are the same as those to managing the bits and bytes of prolific data in general—attempt to scale with new hardware purchases. Database tuning is the leading option that is being implemented. However, two out of three respondents say they normally react to performance issues by upgrading their server hardware and processors. A majority, 53%, upgrade or expand storage systems themselves. (See Figure 18.)

Some respondents are already looking at solutions or products that will enable their users to analyze massive volumes of structured and unstructured data exceeding 50TB. About 10% say they either already have installed or will be implementing these solutions within the next 12 months, with another 20% considering such solutions. (See Figure 19.)

## Figure 17: Application Performance Issues

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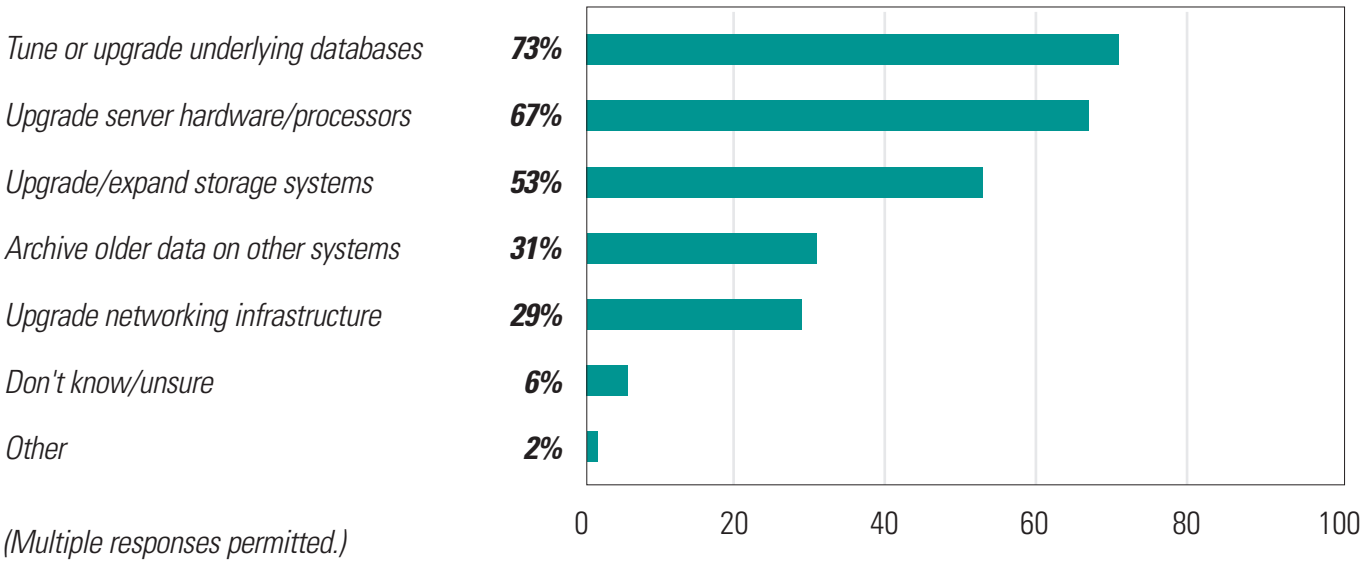
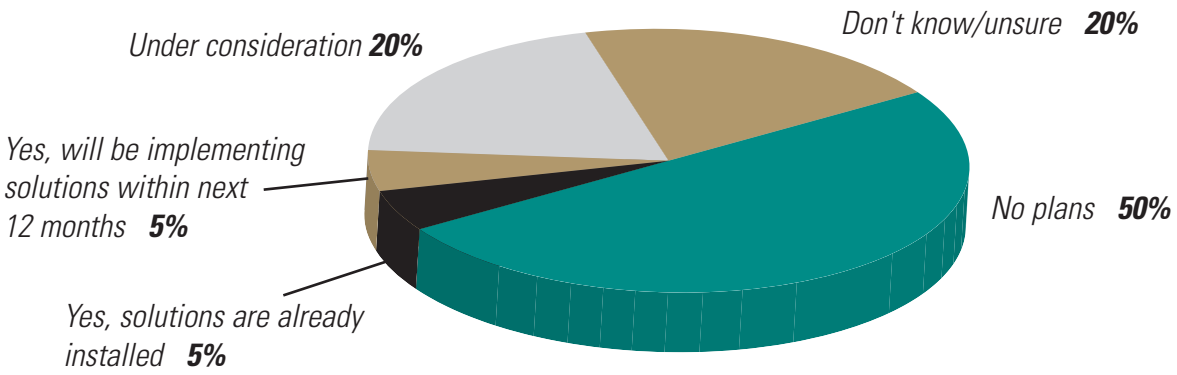
## Figure 18: How Performance Issues are Addressed




*(Multiple responses permitted.)*

## Figure 19: Solutions Enabling Users to Analyze Massive Volumes of Structured and Unstructured Data

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## STORAGE STRATEGIES

**As data grows, the reflex reaction by most organizations is to buy and install more disk storage. Smart approaches are on the horizon, but still only prevalent among a minority of companies. Close to one-third now embrace tiered storage strategies, and only one out of five is putting information lifecycle strategies into place to better and more cost-effectively manage their data. A sizable segment of respondents report that a majority of their data is managed within core enterprise databases.**

For a majority of respondents, the natural solution to managing data storage growth is to purchase and implement more hardware—particularly disk storage. Seventy-eight percent indicate they add more disk storage in response to data growth, far outpacing what can be considered "smart" data management approaches, including tiered storage, in which data sets are progressively moved out to less expensive, but also less accessible systems (31%), and database-level compression (30%). Another 20% are also putting formal information lifecycle management (ILM) processes into place. (See Figure 20).

Effective approaches require intelligent management—strategies such as cloud computing may come into play, when companies decide they need a better way to manage and share resources like data and storage. However, as one respondent lamented, some organizations are not ready to take this step. "My organization is not very effective in managing storage well while incurring significant data growth," says a data architect with a large oil and gas company. "We simply acquire new storage to handle."

Data reduction technologies such as deduplication, compression and partitioning across storage tiers all reduce the amount of active data. "Many files are identical across the enterprise. To reduce storage, the implementation of a deduplication solution is going to be the key factor," says the DBA for a large services firm.

Among the high-volume data sites, there is a greater tendency to adopt smarter approaches to data management, the survey reveals. For example, close to half of the near- or multi-petabyte, prolific data sites report they have implemented tiered storage, versus only 16% of the low-volume data organizations. Also more prevalent at prolific data sites are database-level compression (45%, versus 25%) and ILM (31% versus 17%). (See Figure 21.)

When it comes to data compression approaches, most respondents say they would get the most mileage out of database backups and exports (61%), followed by relational table data (45%). (See Figure 22.)

Even backups alone can be cumbersome in prolific data settings. Can an organization effectively back up a 500TB environment without data reduction technologies in play? As a DBA with a large systems administrator says: "Our challenge has been backing up databases. They have grown so large that there is not enough time during the day to get a complete copy."

With the additional disk space made available for data storage as a result of data compression, a majority of respondents say there will be room for future data growth. About one-fourth say they also see potential for increasing the level of online data protection and availability. (See Figure 23.)

There are other emerging strategies, such as thin provisioning or copy-on-write technologies, that can be deployed to cut storage requirements where databases are cloned for development, testing, or QA environments. About one out of five respondents say they use such approaches, in at least a partial way. With thin provisioning, organizations tackle another space hog—storage systems—by employing a multi-tier strategy to "thin provision" gigabytes, which is essentially a form of just-in-time storage, versus allocating blocks of storage up front for systems or business units. Copy-on-write or the ability to snapshot at a point in time is a resource optimization strategy in which a private copy of a data set is only made for a single user's modifications. Another 11% are considering either thin provisioning or copy-on-write approaches. (See Figure 24.)

For a large swath of respondents, a significant portion of the data across their environments is "active," or predominantly read-write (such as OLTP data) versus "less active" or read-only (such as data warehouse or archival data). Forty percent report that more than one-fourth of the data at their sites is active, read-writable data. (See Figure 25.)

Only 17% of respondents could say that their organizations have a clearly defined ILM strategy—aligning information with the most appropriate and cost-effective IT infrastructure from creation through final disposition. Another 28% report that such an approach is "partially implemented," while 16% say they are considering such approaches. (See Figure 26.)

The use of columnar storage databases is another mechanism that can be employed within data warehouse environments to improve performance and reduce storage consumption. However, this is still unknown or unrealized for most organizations—only 9% have implementations in place, with another 18% considering this technology. (See Figure 27.)

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A sizable segment of respondents report that a majority of their data is managed within databases—versus outside in other environments, such as file servers. Thirty-eight percent of respondents say they manage most of their company's information—including all information types, such as text, video, or audio—within core database environments. (See Figure 28.)

For those respondents responsible for data stored outside a traditional database, most are charged with overseeing data about the data environment—such as configuration logs and audit data. PDF files are also a growing concern, as well as standard business documents, such as word processing documents and spreadsheets. Still low on the list, and cited by only 6% of respondents, is social media-generated data—from collaboration software, social networking sites, or wikis and blogs. (See Figure 29.)

The key, as pointed out by one respondent, is to be proactive when it comes to preparing for the data surge. "Big Data definitely makes storage management more difficult," says the DBA for a large business services firm. "Getting in front of the growth curve rather than reacting to shortages is at the heart of all the best strategies to address this challenge."

Collaboration is the key, says the DBA for a large financial service firm. "Trying to get a grasp on the whole environment, taking history into account and planning for the future would be the best strategy. To ensure the plan is bought into, get input from all areas that use the storage so that as many needs are met as possible."

We may be in an online world, but many enterprises still rely on tape to archive and back up their data. Close to half of the respondents in this survey report that the bulk of their backup data is tape-based (see Figure 30), and almost one-third say their archived data is stored on tape. (See Figure 31.) Use of tape for both backup and archiving is much more pronounced at near- or multi-petabyte data sites, suggesting that much of the large volumes of data are being stored on the most low-cost media available. (See Figures 32 and 33.)

Private clouds offer another way that data can be moved to storage environments. In total, about 29% of survey respondents say at least some of their backup data is stored in an internal, private or hybrid cloud, with storage resources directly managed by the organization. At least 14% say the majority of their data is now backed up this way. (See Figure 34.) The amount of data going into private cloud backup is consistent across both low-volume and high-volume data sites. (See Figure 35.)

At this time, there is little support for the idea of using public cloud services (storage resources managed by a third-party offsite service) as a way to back up enterprise data. Only 12% of respondents report backing up at least some of their data using a public cloud service, and in most cases, this involves just a small portion of their data. (See Figure 36.)

Still, even with the promise that cloud technologies may hold, some respondents say managing prolific data is all but impossible without the proper tooling. "The explosion in the average size of storage objects—mixed media, XML and unstructured data types—means predicting storage requirements is more difficult than ever, as compression ratios vary widely and policies for archiving data across storage tiers become very complex," says one respondent, an IT manager with a mid-sized systems integrator. "There are few tools that provide a single solution to storage for various file formats and database types, so the best policy at this stage is to choose policies appropriate to each data type."

As another respondent, a developer with a manufacturing company, put it: "With the increase in data growth, certainly the data storage management is more difficult. As the volume of file data increases rapidly, so does the cost and effort of managing that data. Storage infrastructures are complex and inflexible, making it more difficult than ever for our IT teams to access, move and manage data without disrupting users or business operations. For relief, many organizations are turning to file virtualization solutions."

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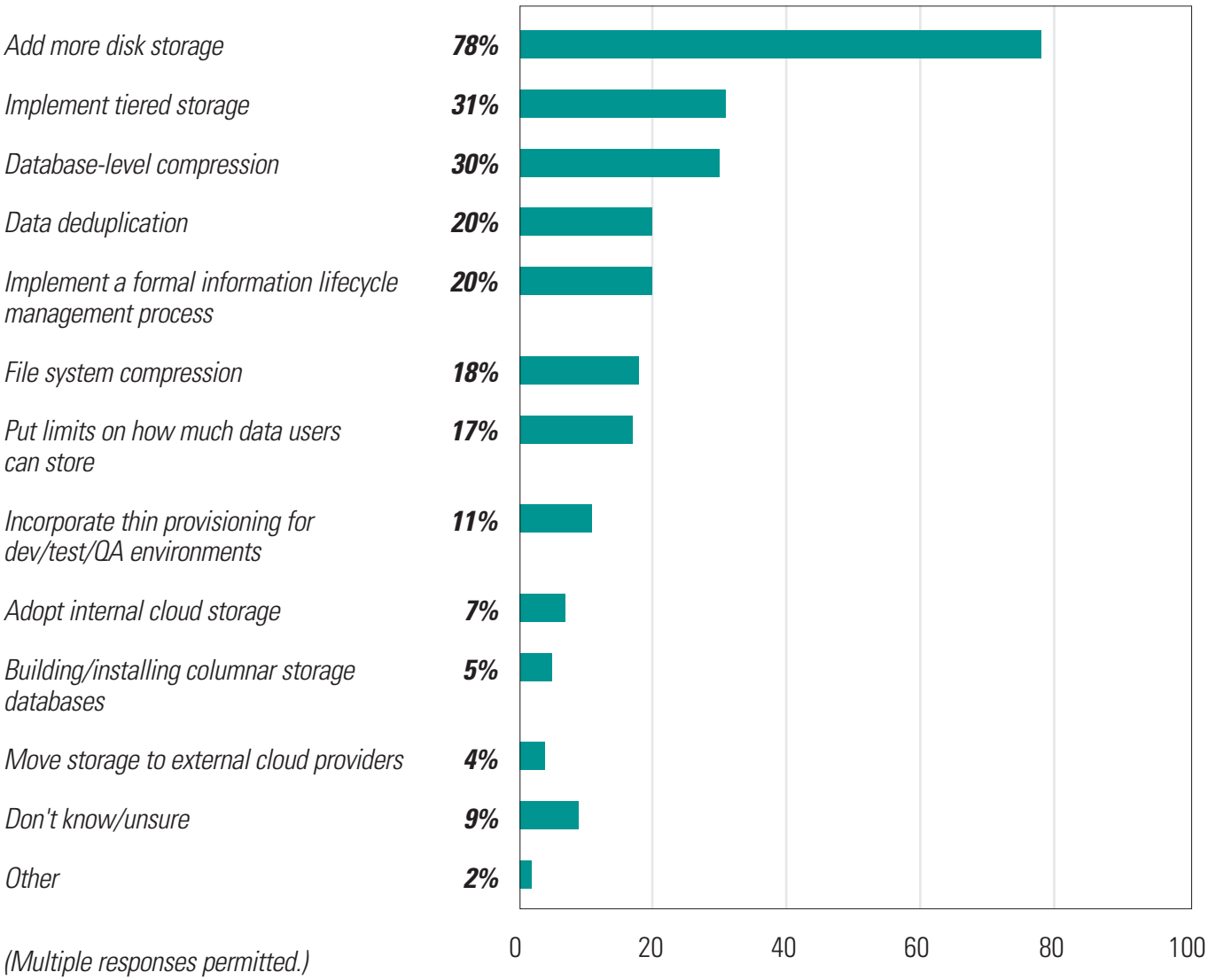
## Figure 20: Primary Approaches to Managing Storage Growth

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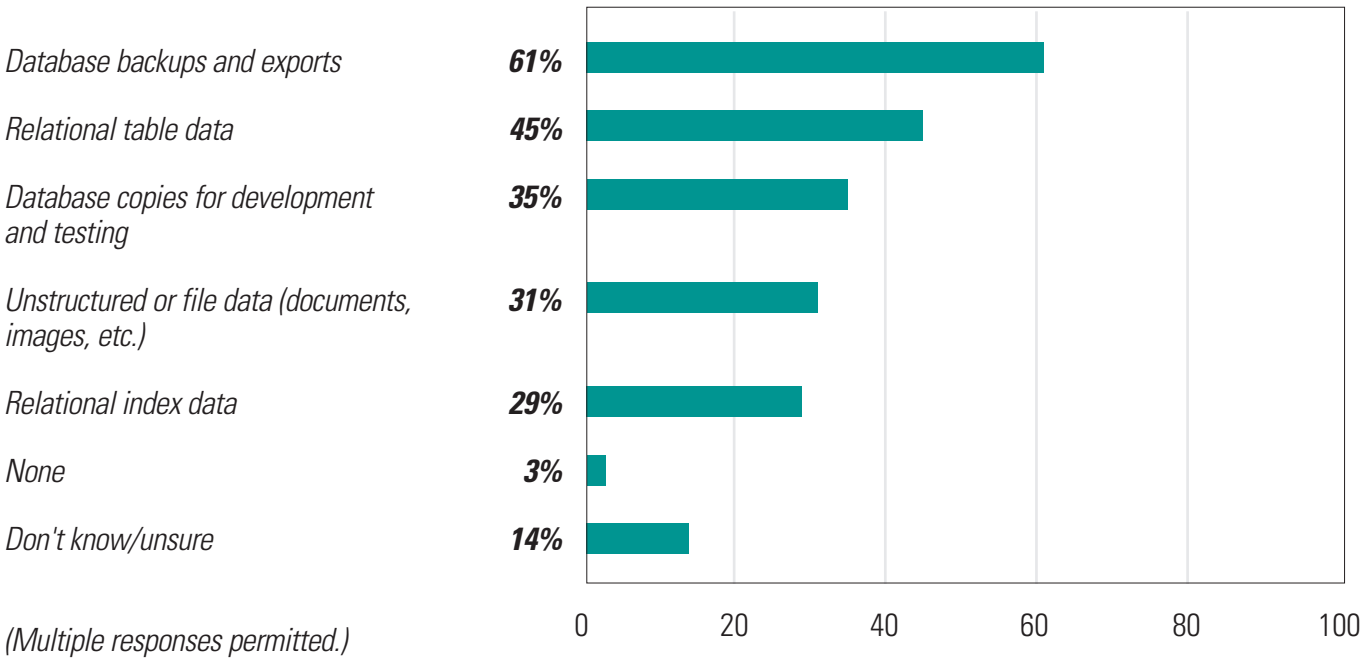
## Figure 21: Leading Approaches to Managing Storage Growth —By Data Volume

| (Multiple responses permitted.) | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| Add more disk storage | 82% | 78% |
| Implement tiered storage | 16% | 48% |
| Database-level compression | 25% | 45% |
| Data deduplication | 16% | 23% |
| Implement a formal information lifecycle management process | 17% | 31% |
| File system compression | 18% | 15% |
| Put limits on how much data users can store | 16% | 13% |

## Figure 22: Data Types Saving Space via Compression?




(Multiple responses permitted.)

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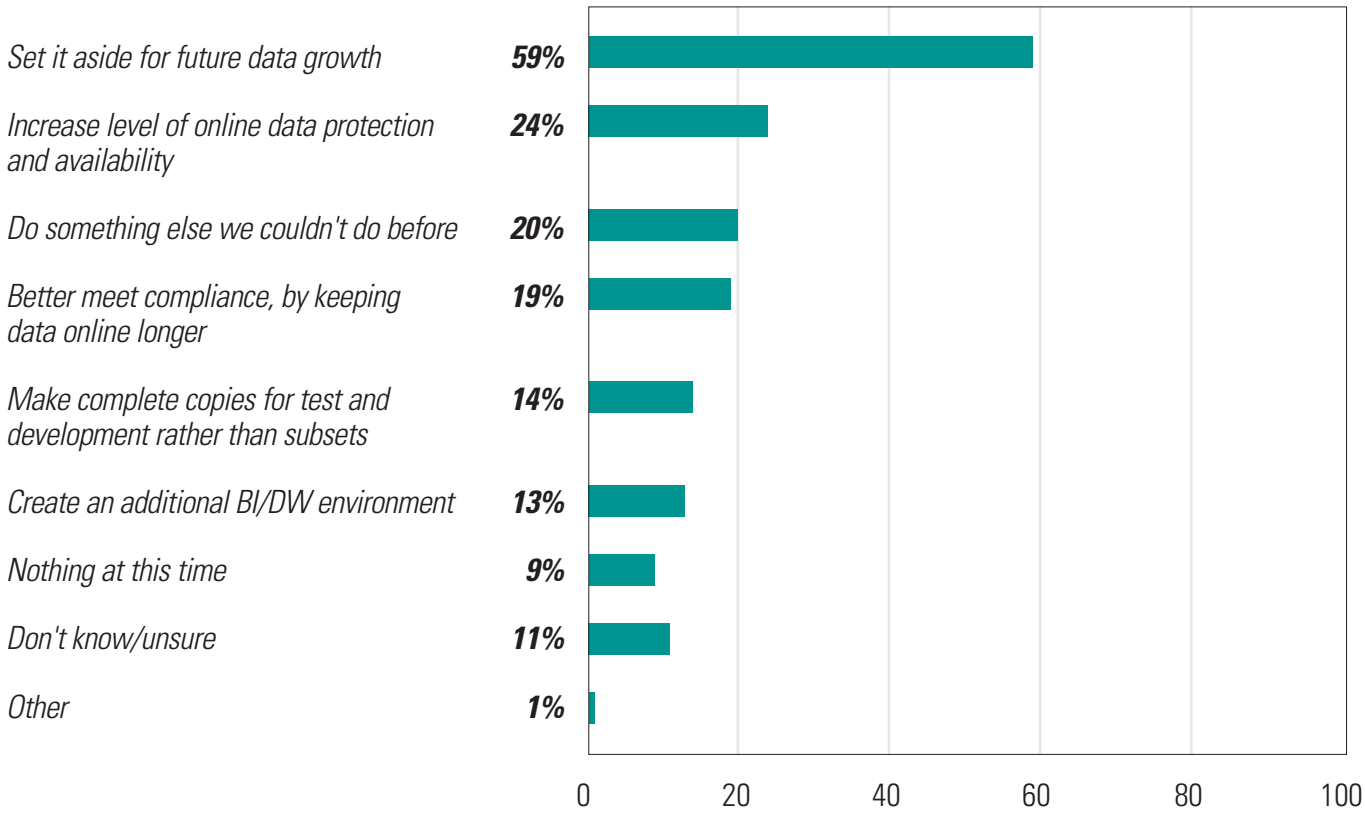
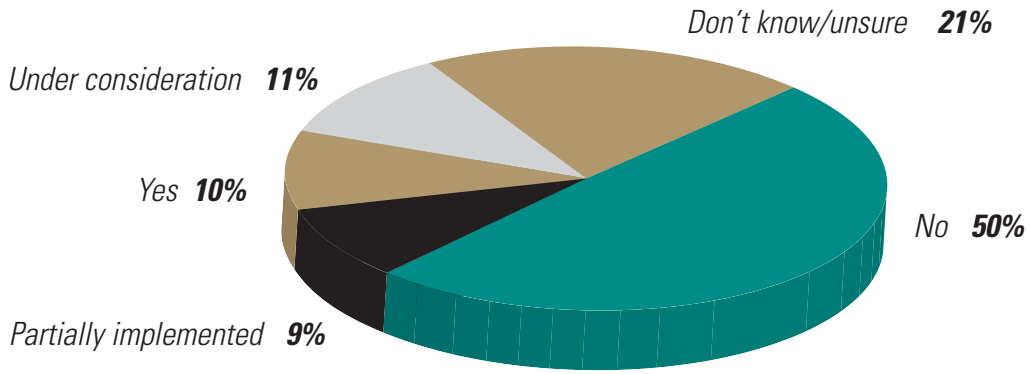
## Figure 23: How Additional Space from Compression Would be Utilized




## Figure 24: Employ Thin Provisioning or Copy-on-Write Technology?




*(Total does not equal 100% due to rounding.)*

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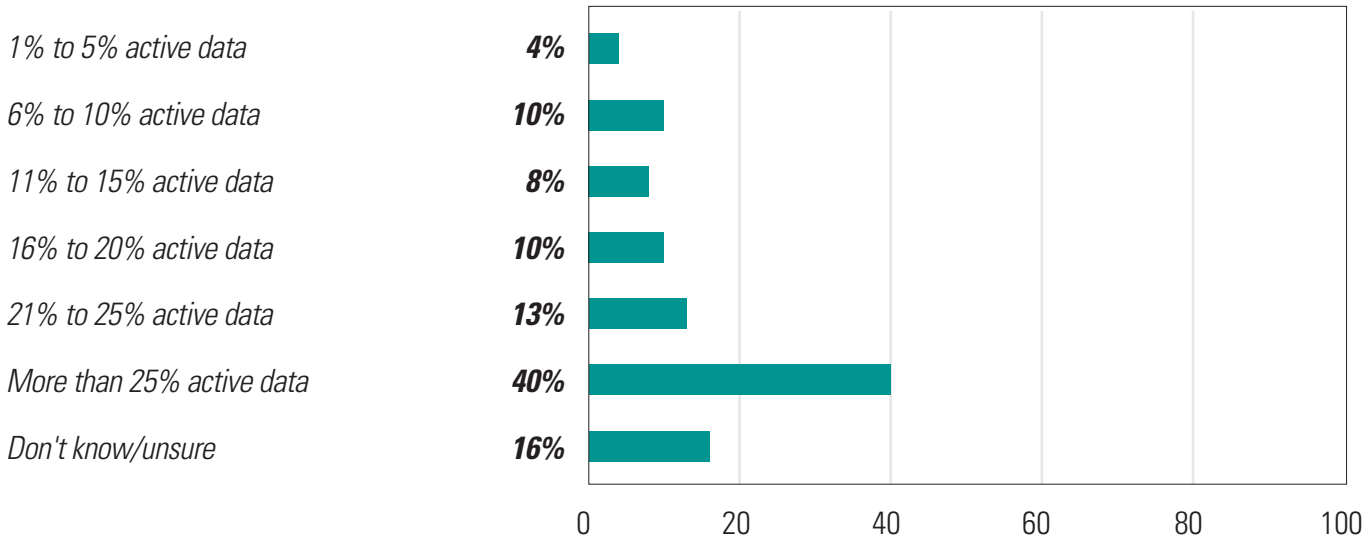
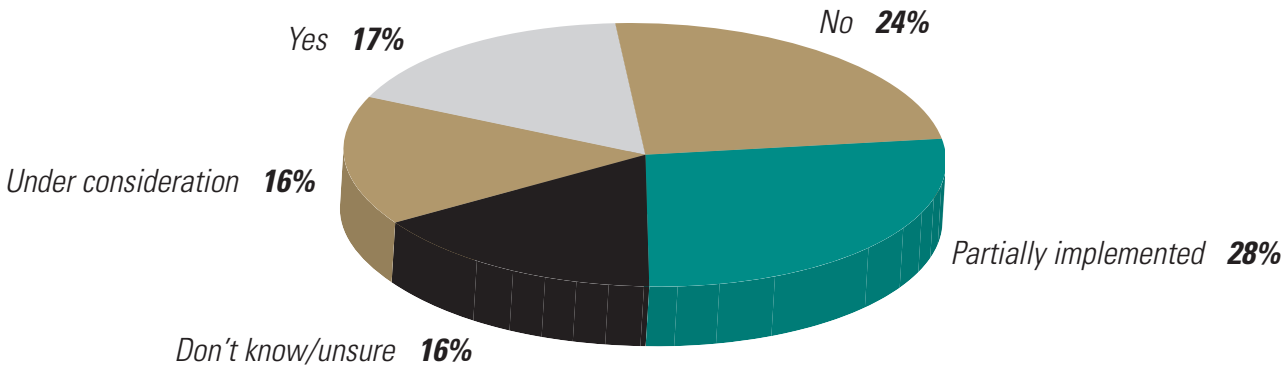
## Figure 25: Percentage of Data That is "Active" or Predominantly Read-Write




## Figure 26: Have Information Lifecycle Management Strategy?




*(Total does not equal 100% due to rounding.)*

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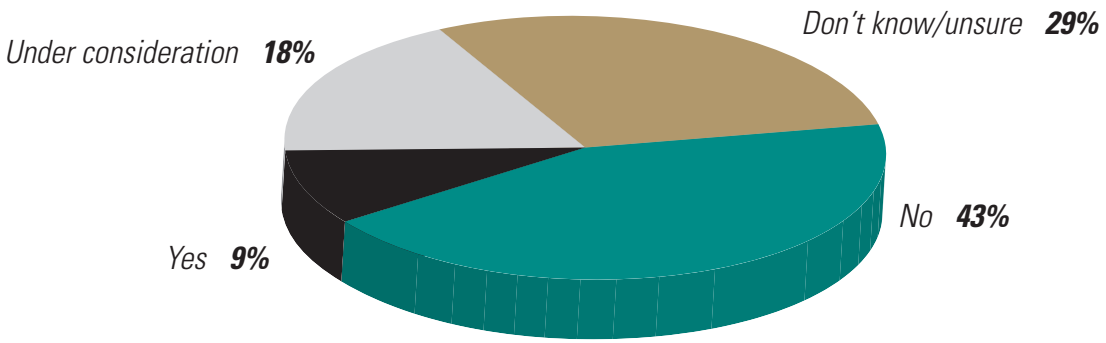
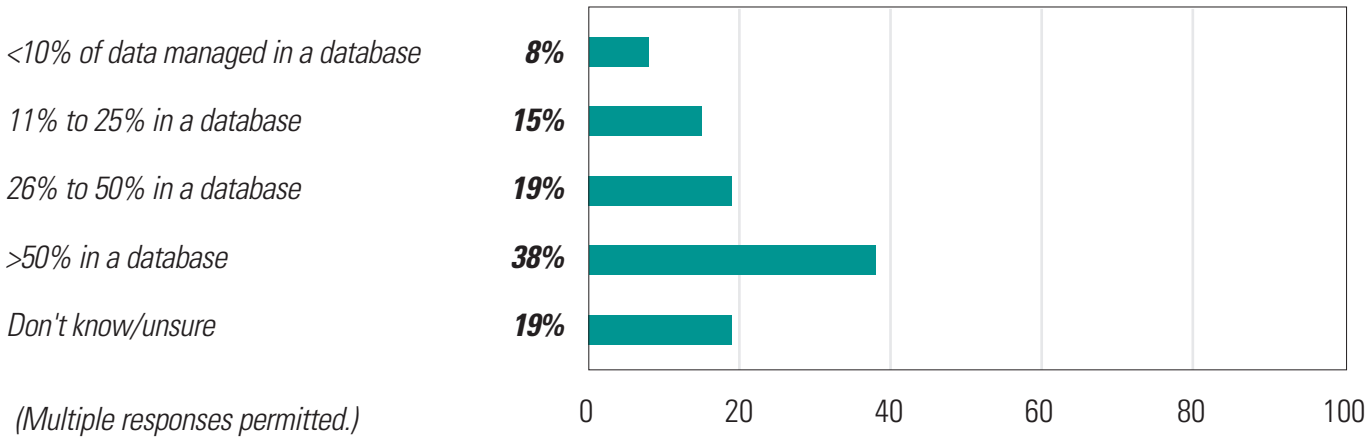
## Figure 27: Employing Columnar Storage Databases?




*(Total does not equal 100% due to rounding.)*

## Figure 28: Proportion of Data Managed in Databases




*(Multiple responses permitted.)*

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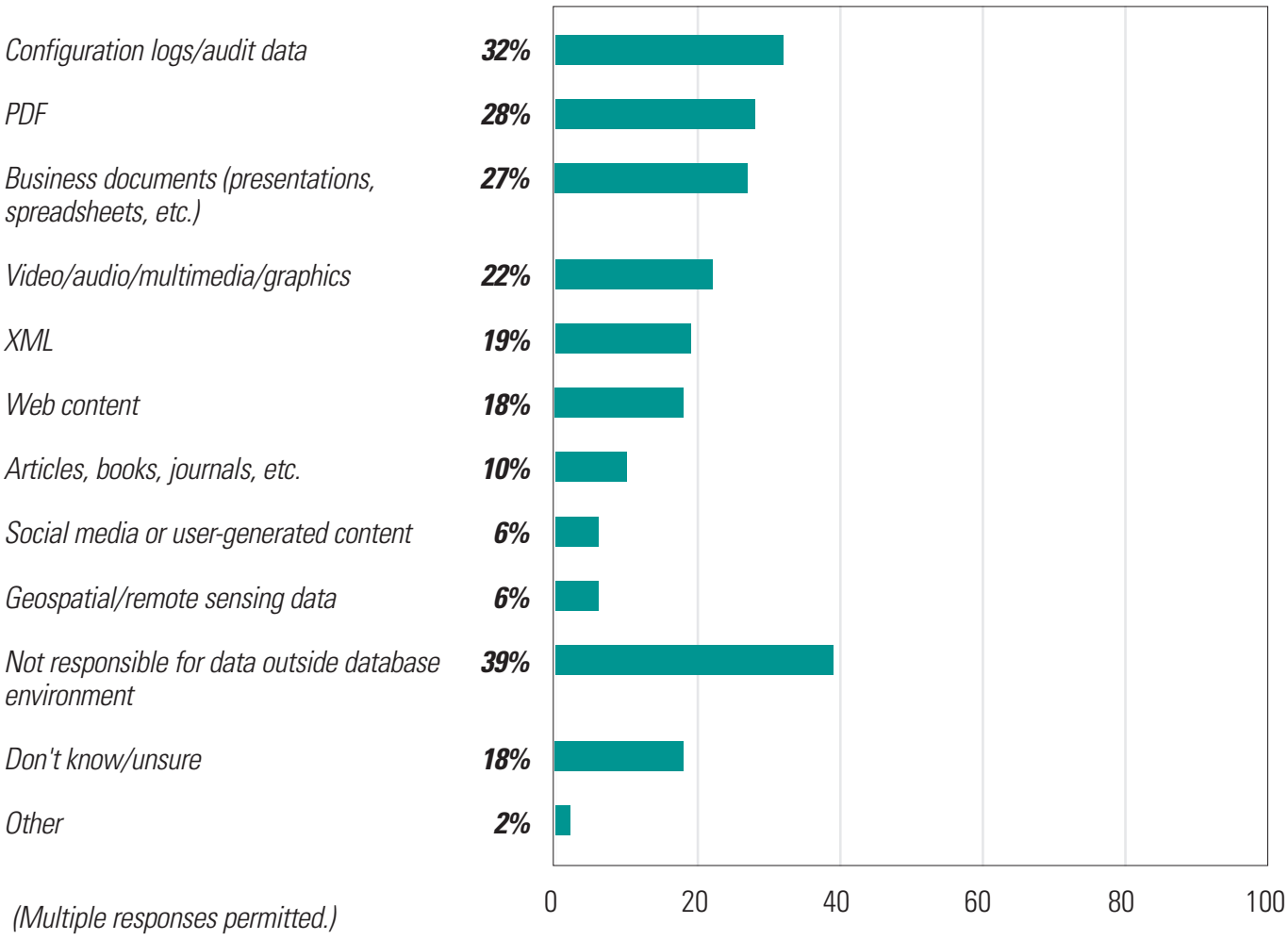
## Figure 29: Data Overseen Outside Databases




*(Multiple responses permitted.)*

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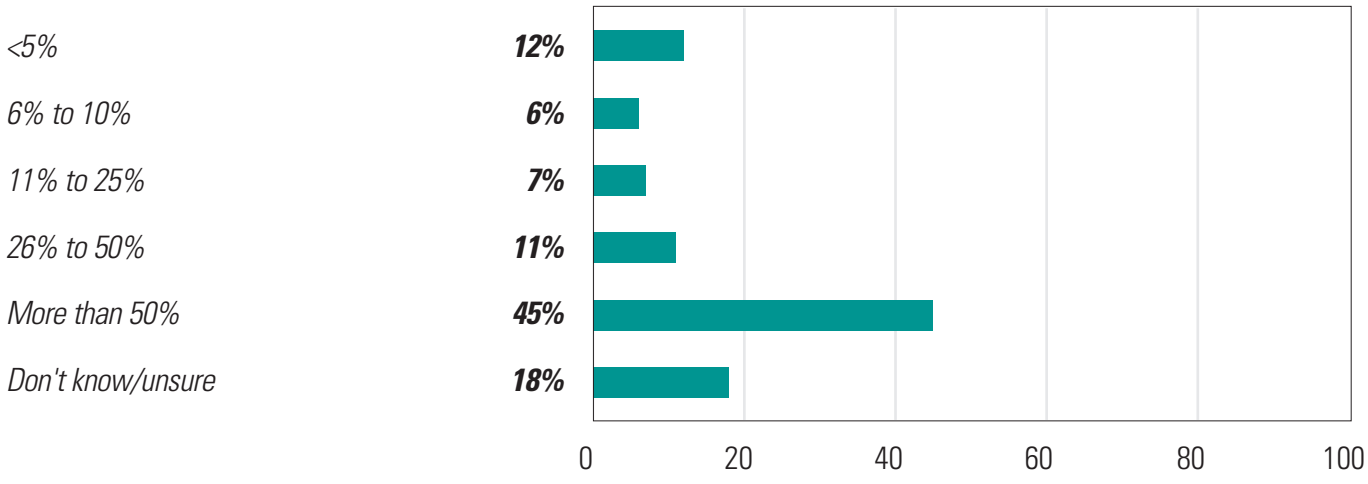
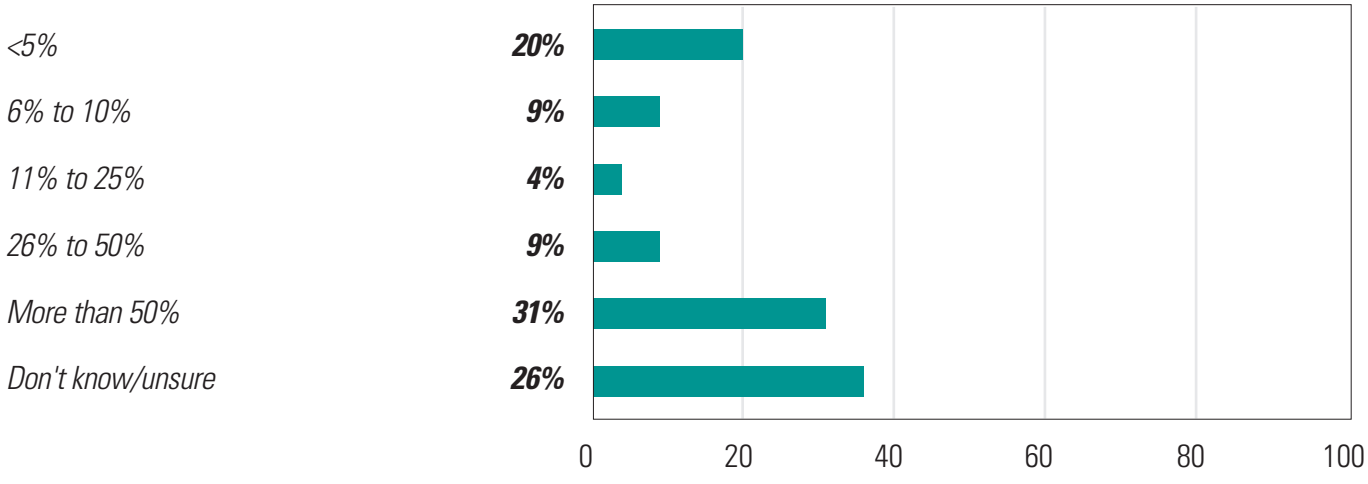
## Figure 30: Percentage of Backup Data Stored on Tape




## Figure 31: Percentage of Archived Data Stored on Tape

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## Figure 32: Percentage of Backup Data Stored on Tape —By Data Volume

| | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| <5% | 21% | 3% |
| 6% to 10% | 8% | 5% |
| 11% to 25% | 9% | 9% |
| 26% to 50% | 11% | 12% |
| More than 50% | 35% | 58% |
| Don't know/unsure | 16% | 14% |

## Figure 33: Percentage of Archived Data Stored on Tape —By Data Volume

| | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| <5% | 27% | 11% |
| 6% to 10% | 10% | 6% |
| 11% to 25% | 7% | 6% |
| 26% to 50% | 7% | 8% |
| More than 50% | 28% | 38% |
| Don't know/unsure | 21% | 32% |

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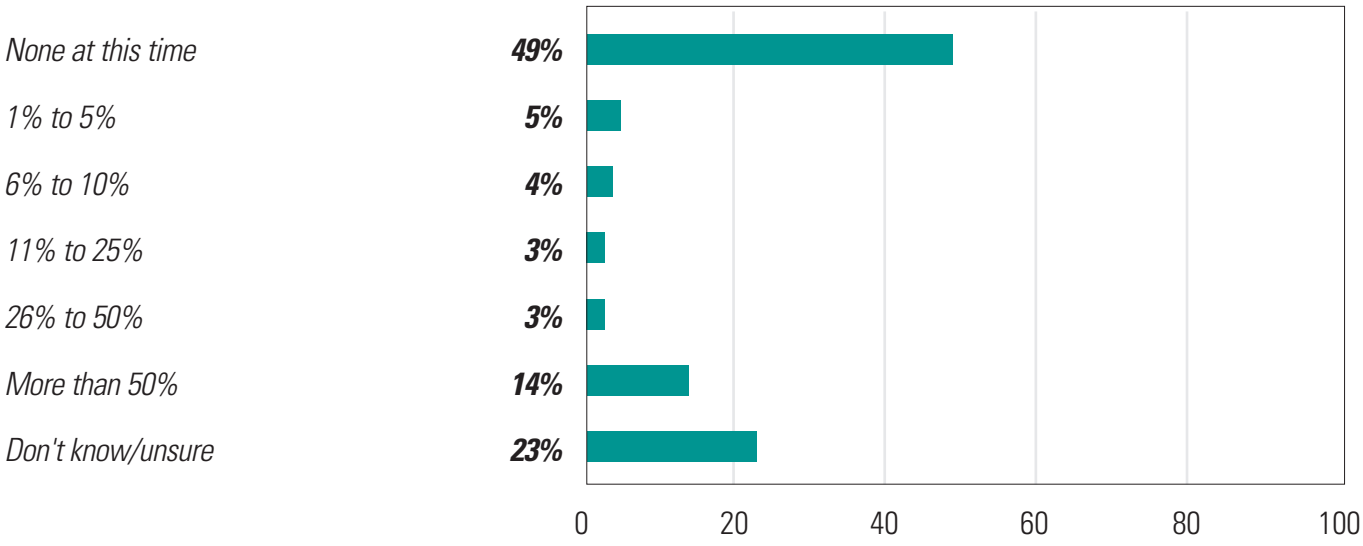
## Figure 34: Percentage of Backup Data Stored in Internal, Private or Hybrid Clouds




## Figure 35: Percentage of Backup Data Stored in Internal, Private or Hybrid Clouds—By Data Volume

| | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| None at this time | 56% | 45% |
| 1% to 5% | 2% | 6% |
| 6% to 10% | 5% | 3% |
| 11% to 25% | 1% | 2% |
| 26% to 50% | 2% | 5% |
| More than 50% | 15% | 12% |
| Don't know/unsure | 20% | 27% |

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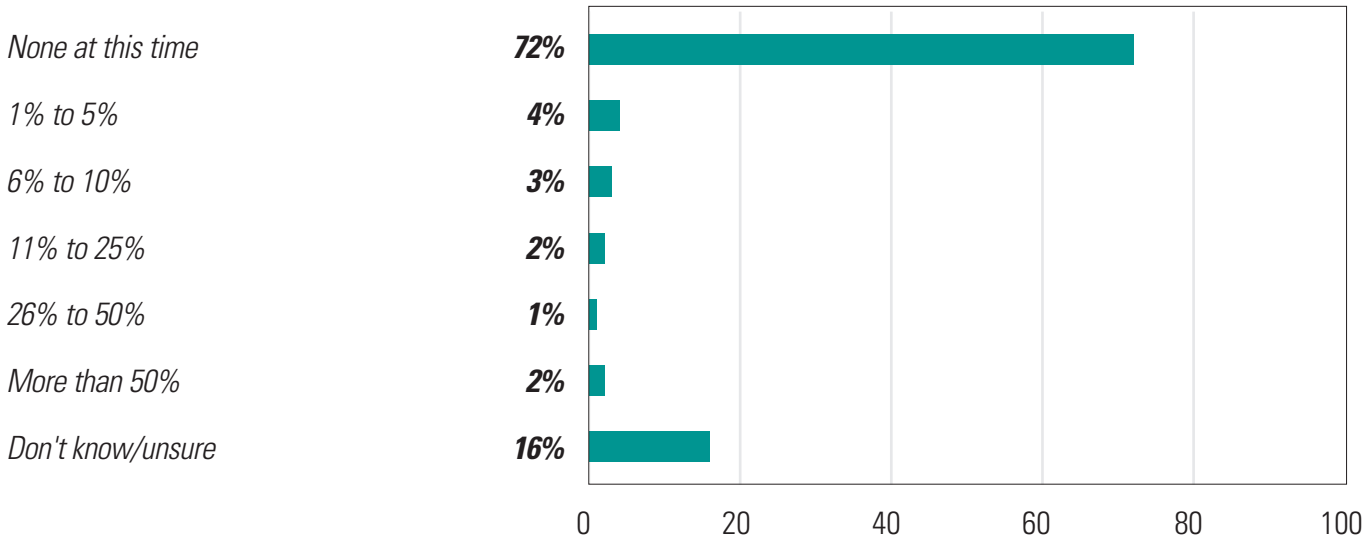
## Figure 36: Percentage of Backup Data Stored in Public Clouds

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## MANAGEMENT AND ORGANIZATIONAL ISSUES

**Data managers in the survey are struggling with rapid data growth, but few have control over the storage technologies used to manage this growth. In many cases, those respondents close to the ground in data sites—such as DBAs—do not have a great awareness of accumulated or projected storage costs.**

As prolific, near- or multi-petabyte data increasingly moves into their enterprises, respondents are focusing heavily on making sure their data environments are operating at peak performance levels. Optimizing database performance and database migrations top the list of database project priorities for the year ahead. (See Figure 37.)

For a large number of organizations, storage costs are an ambiguous part of their information technology budgets. Half of respondents, in fact, simply don't know what percentage of their IT budgets are spent on storage, when hardware, software, services, and management are considered. Among those that are aware of these costs, the majority (33% out of the 50% reporting cost estimates) say they typically comprise between 5% and 25% of their total budgets. (See Figure 38.)

Storage costs as a percentage of IT budgets escalate for prolific data organizations. About 22% of those with high volumes of data report spending more than one-fourth of their IT funds on storage requirements, versus only 6% of low-volume data sites. (See Figure 39.)

The direction that storage budgets have been taking in recent times is also a great unknown for many respondents, reinforcing evidence of a disconnect between management and IT in terms of dealing with the prolific data wave. More than four out of ten respondents aren't aware if there have been more funds made available for burgeoning storage requirements. (See Figure 40.) As noted earlier in this report, 86% of respondents reported that the volumes of data in their organizations grew over the past year, and close to one-third say this growth is significant.

The reliance on storage hardware to address data growth issues, discussed earlier in this report, has its costs. Companies with fast-growing data volumes are ramping up their storage budgets at a far greater rate than low-growth companies, the survey confirms. Forty-one percent of companies with substantial data growth report storage budgets going up by more than 10% over the previous year. By comparison, only 2% of low-data-growth companies have seen such expansion in their storage budgets. (See Figure 41.)

The year ahead in terms of storage funding is also a great question mark for many respondents—48% are not aware of what funding will be made available. Still, at least 38% anticipate an increase to meet their expanding data requirements. (See Figure 42.) Spending will track similarly, whether among the prolific data companies (with more than 500TB already onsite) or smaller data shops. (See Figure 43.)

However, the difference will be seen among companies with higher rates of data growth. The rate of storage increase will be far more pronounced among high-data-growth organizations—20% of those with significant growth also expect to ramp up storage spending in the double-digit percentages, compared to only 5% of low-data-growth companies. (See Figure 44.)

Demonstrating the communication gap between management and IT, managers in the survey were far more aware of storage spending patterns than DBAs. While six out of ten DBAs were not aware of the extent of storage spending as a portion of budget, a majority of the managers (76%) did know what the costs are and will be over the coming year. (See Figure 45).

Part of the disconnect in terms of awareness of storage budgets may be the fact that in close to half of the organizations surveyed, storage acquisition falls under the domain of storage administrators. Database administrators themselves are in charge only about one-fourth of the time. (See Figure 46.)

Storage administrators may have the final word when it comes to decisions about disk, tape, and other hardware, but no one is really in charge yet when it comes to cloud-based storage. Four-tenths of respondents can't identify who in their organization is in charge of cloud-based storage decisions. In many cases, the CIO or leading IT executive is in control (24%), with some organizations deferring to storage administrators (20%). DBAs play a very peripheral role when it comes to the cloud—as cited by only 11% of respondents. (See Figure 47.)

There is greater clarity about roles and responsibilities when it comes to who manages decisions about storage which is part of a grid and/or cluster architectures. In close to half the cases, it is up to storage managers, and four-tenths of respondents also say DBAs have a say in choices here. (See Figure 48.)

One respondent notes that his operation is "constrained by low budget, and sometimes sadly 'ill' upper management." The analyst for a large government agency reports that he is addressing the challenge by "continuing to make proposals for modernization and improvements in environment, and attempting to influence the money holders."

In two out of three cases, respondents' organizations employ a Fibre Channel-based storage area network to make effective use of storage resources. Close to half say data gets stored on direct-attached or on network-attached storage devices. One-fourth employ tiered storage strategies with a combination of disk and tape. (See Figure 49.) There remain multiple options available for managing storage environments, and enterprises are taking a variety of approaches to address the growing proliferation of data.

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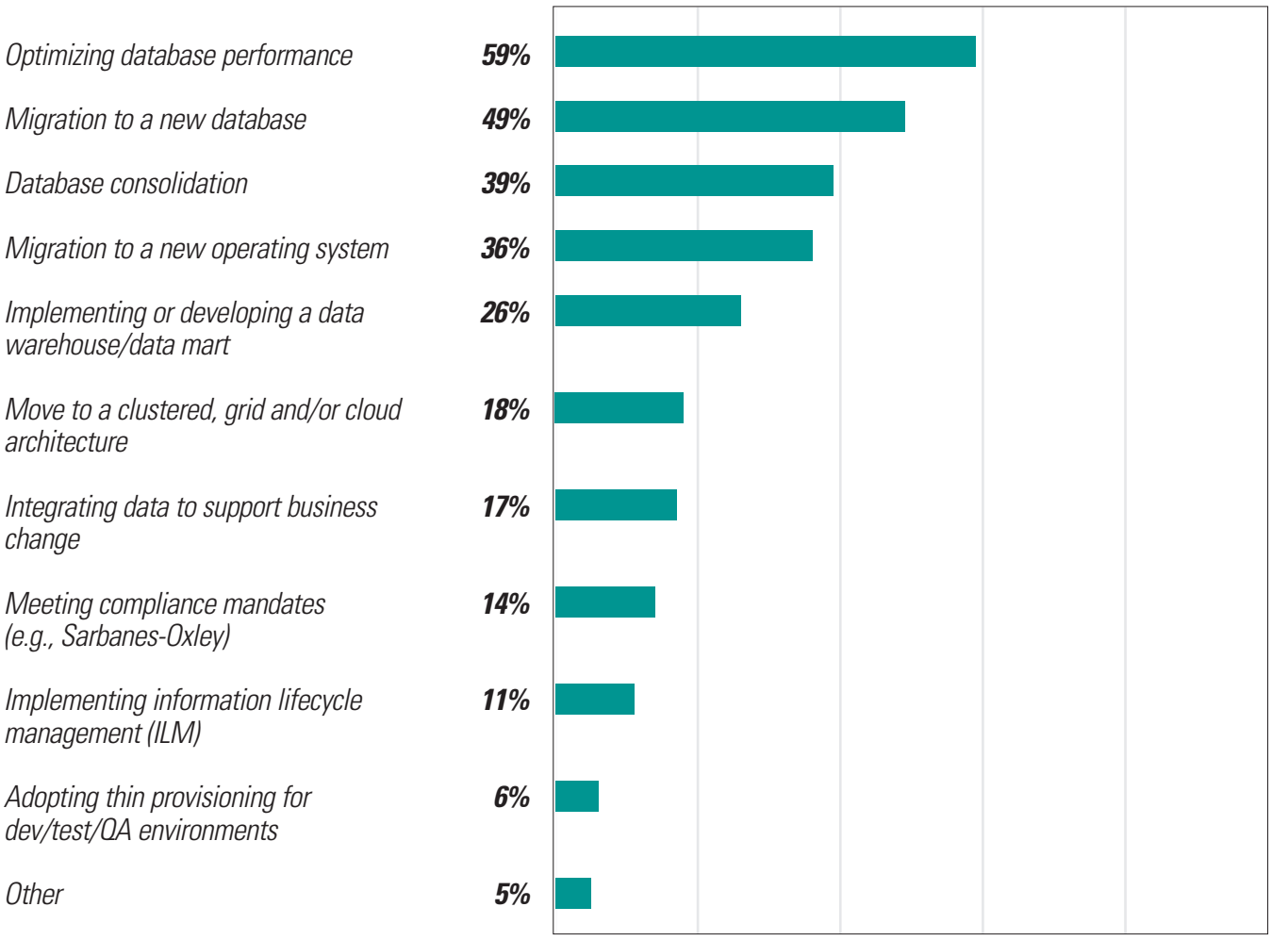
*Data collection and analysis performed with SurveyMethods.*

## Figure 37: Top Database Project Priorities




*Multiple responses permitted—respondents were asked to pick their top three.)*

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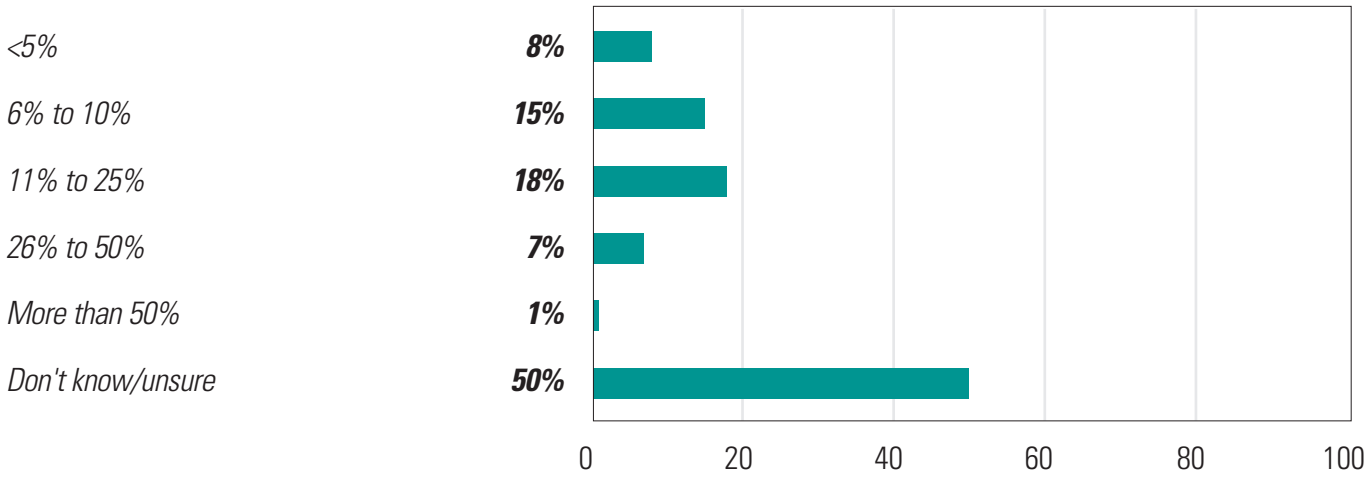
## Figure 38: Percentage of IT Budget Spent on Storage




## Figure 39: Percentage of IT Budget Spent on Storage—By Data Volume

| | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| <25% | 56% | 23% |
| 26% to 50% | 5% | 16% |
| >50% | 1% | 6% |
| Don't know/unsure | 37% | 55% |

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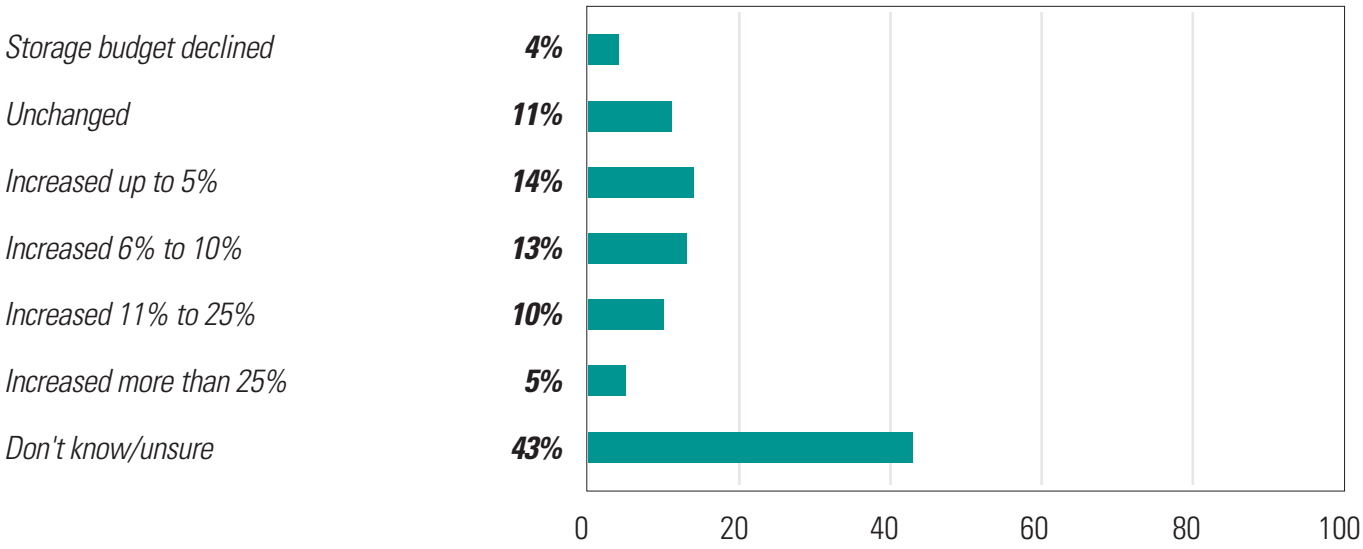
## Figure 40: Changes in Storage Budgets Over Past Year




## Figure 41: How Storage Budgets Changed—By Data Volume Growth

| | <10% data growth | >50% data growth |
|---|---|---|
| Storage budget declined | 7% | 2% |
| Unchanged | 18% | 6% |
| Increased up to 5% | 24% | 2% |
| Increased 6% to 10% | 14% | 10% |
| Increased 11% to 25% | 0% | 25% |
| Increased more than 25% | 2% | 16% |
| Don't know/unsure | 35% | 39% |

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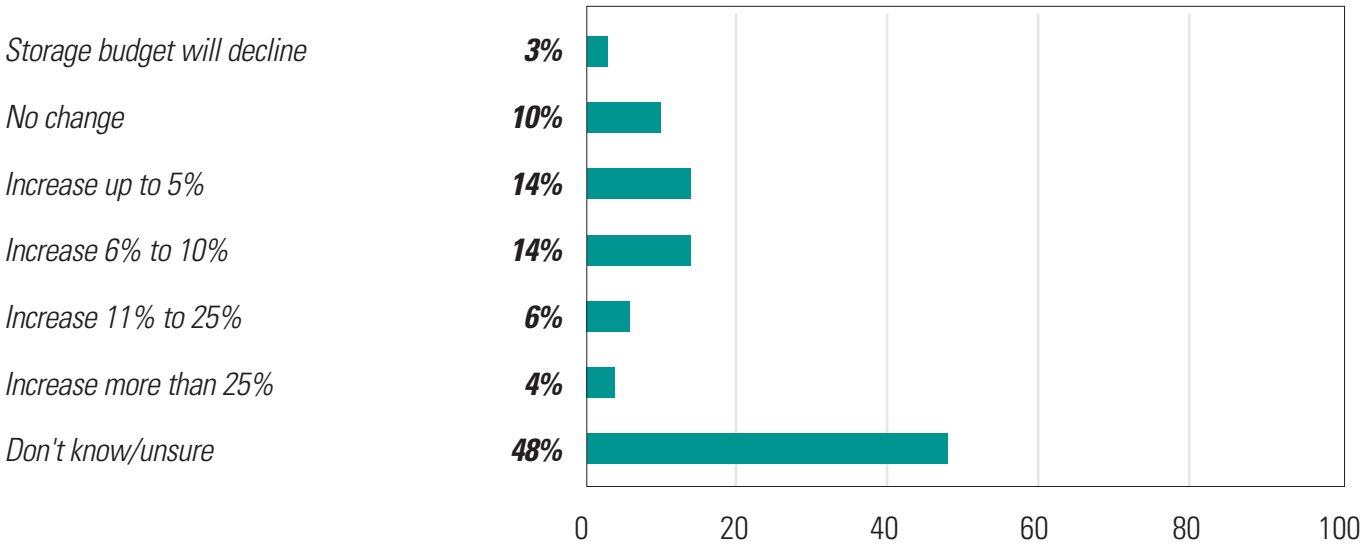
## Figure 42: Anticipated Storage Budget Spending Over Coming Year




## Figure 43: Anticipated Storage Budget Spending—By Data Volume

| | Low-Volume (<10TB) | High-Volume (>500TB) |
|---|---|---|
| Storage budget will decline | 5% | 3% |
| No change | 18% | 5% |
| Increase up to 10% | 28% | 32% |
| Increase >10% | 11% | 14% |
| Don't know/unsure | 38% | 47% |

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## Figure 44: Anticipated Storage Budget Spending —By Data Volume Growth

| | <10% data growth | >50% data growth |
|---|---|---|
| Storage budget will decline | 6% | 2% |
| No change | 17% | 8% |
| Increase up to 5% | 23% | 6% |
| Increase 6% to 10% | 11% | 21% |
| Increase 11% to 25% | 4% | 9% |
| Increase more than 25% | 1% | 11% |
| Don't know/unsure | 39% | 43% |

## Figure 45: Uncertainty Over Storage Budget Growth —Managers' Versus DBAs' Perceptions

*(Percent reporting they "don't know" about their storage budget spending.)*

| | Past year | Next year |
|---|---|---|
| Managers | 24% | 24% |
| DBAs | 59% | 54% |

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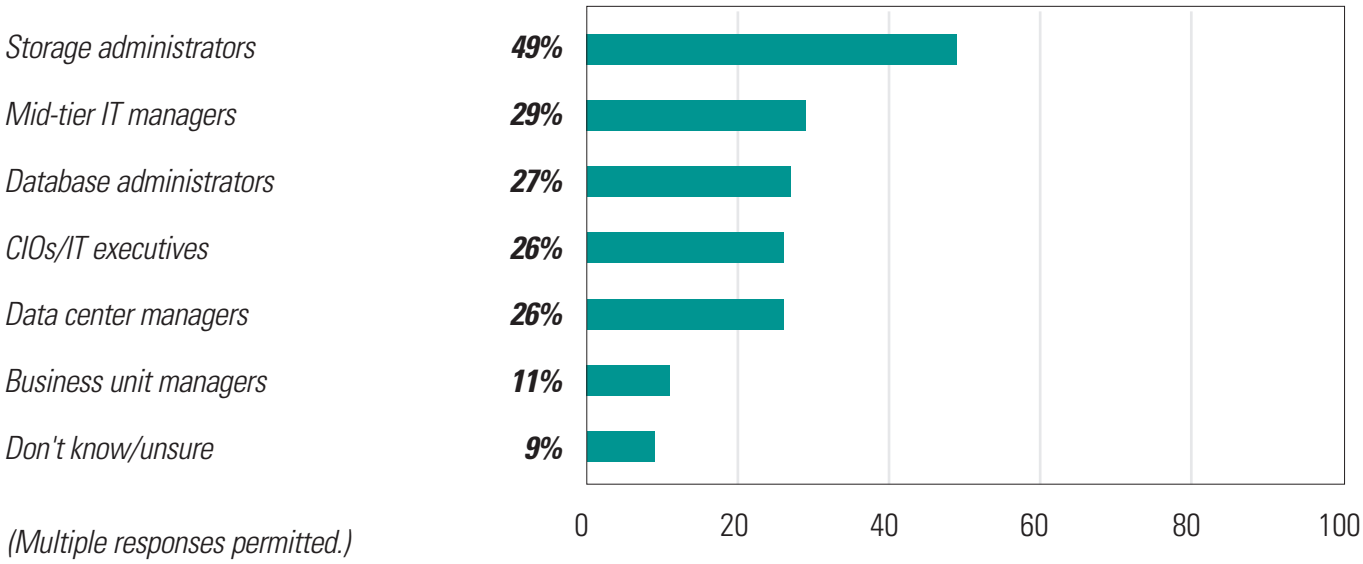
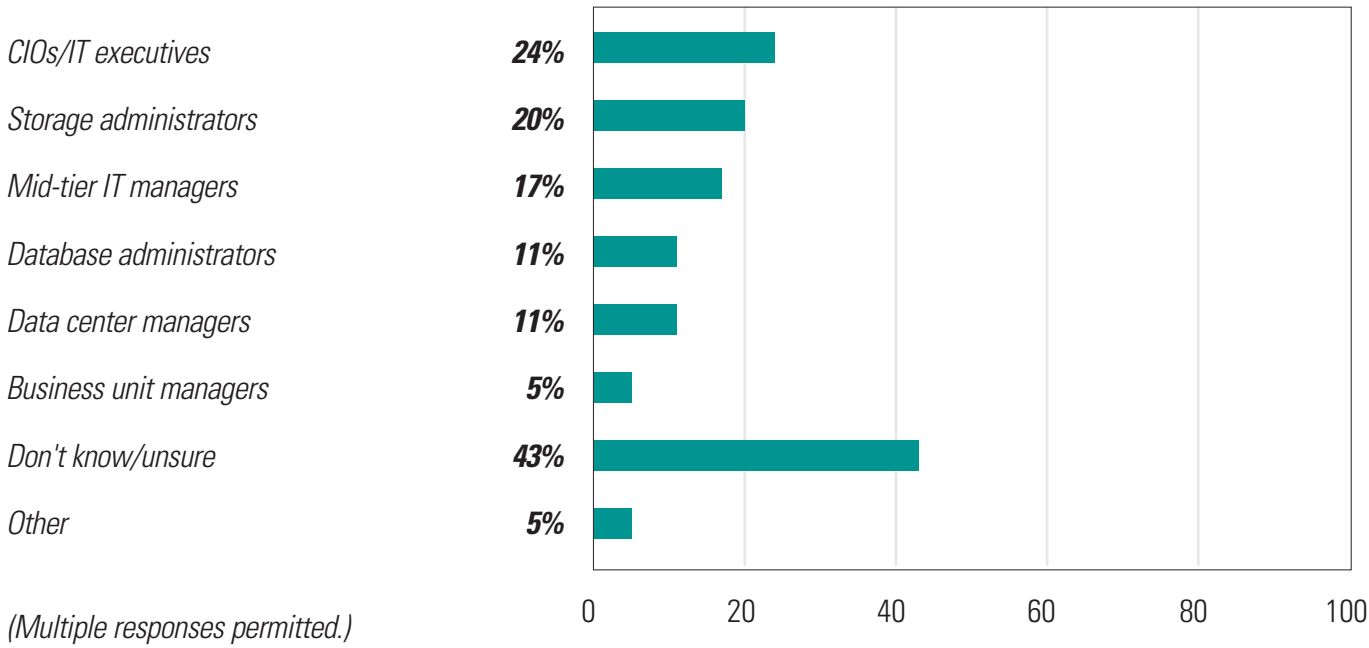
## Figure 46: Primary Decision-Makers for Data Storage Acquisition




*(Multiple responses permitted.)*

## Figure 47: Primary Decision-Makers for Cloud-Based Storage




*(Multiple responses permitted.)*

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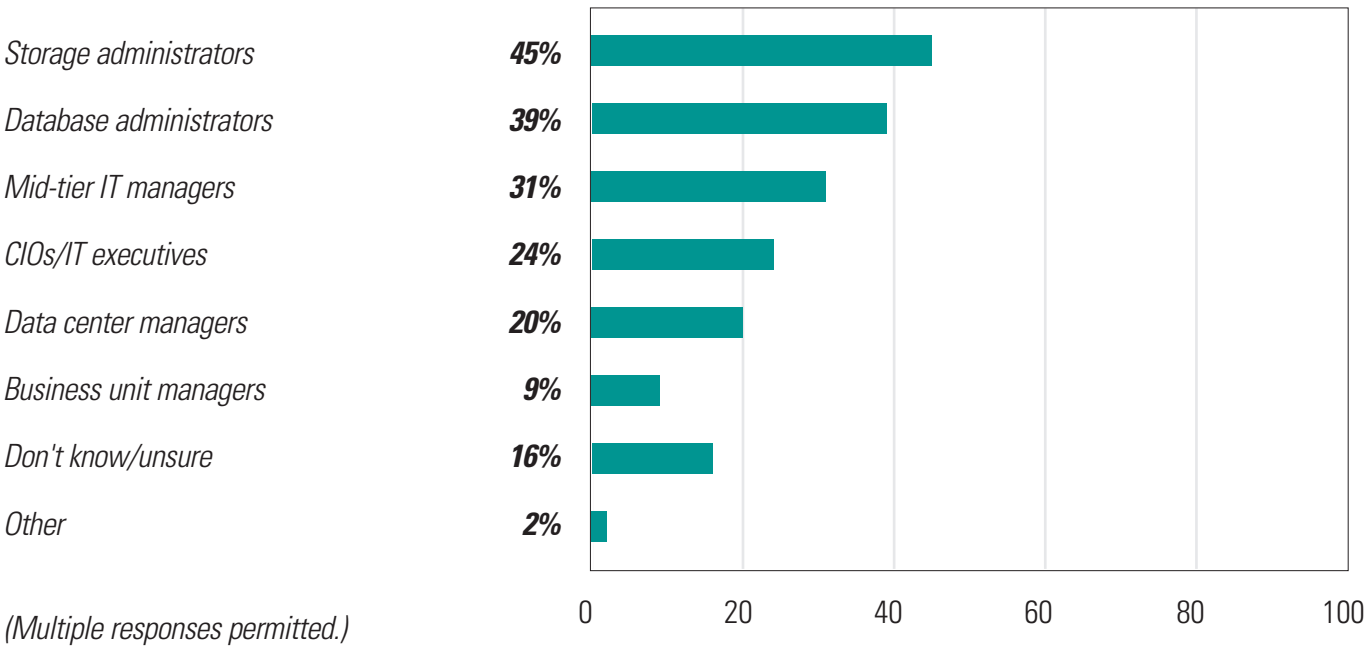
## Figure 48: Primary Decision-Makers for Grid or Cluster Architectures




*(Multiple responses permitted.)*

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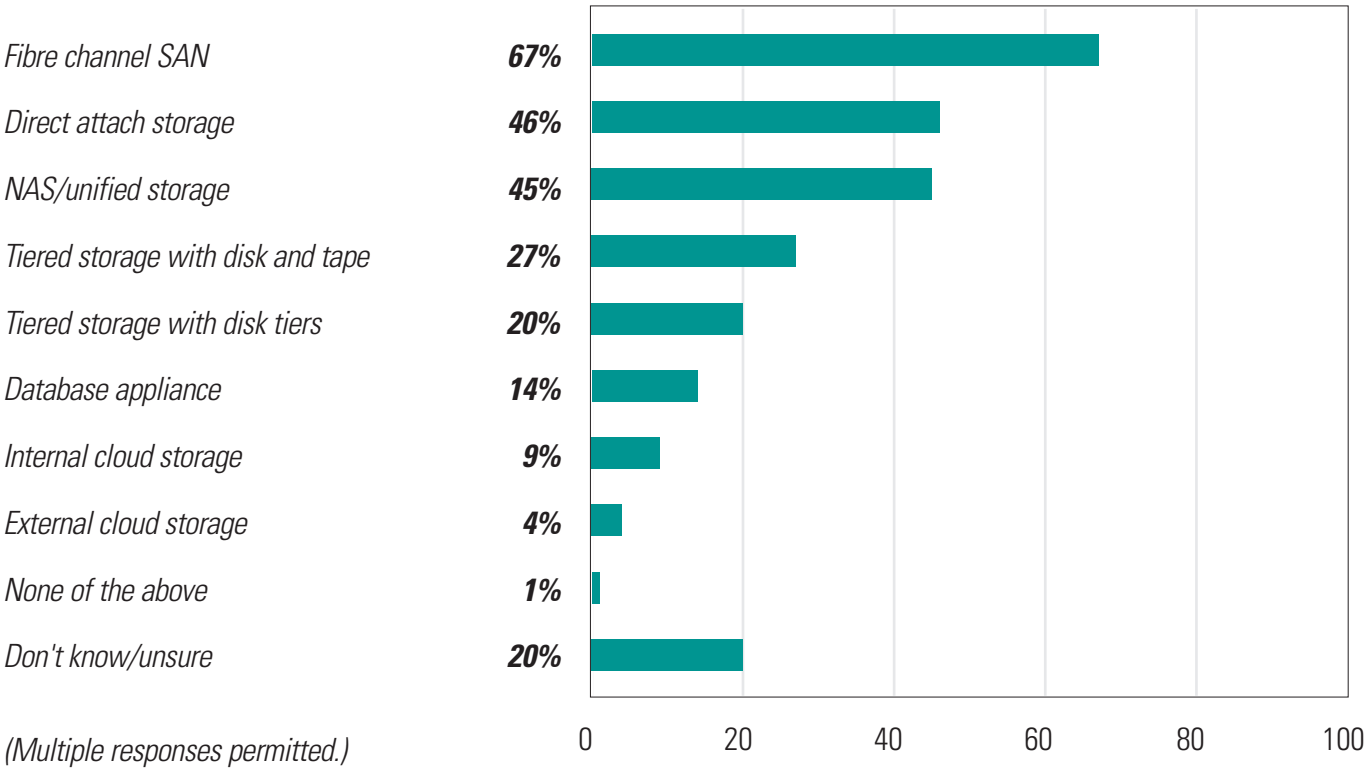
## Figure 49: Storage Architecture Components




*(Multiple responses permitted.)*

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## SUMMARY

For most organizations, it's not a question of whether they will be expanding their databases, it's a question of how much expansion to expect, and how to cope with it. The IOUG survey, conducted in partnership with Oracle Corporation and including input from over 600 data managers and professionals, finds almost all are dealing with rapid growth, driven by growth in their business, as well as data streaming in from transactions, remote devices, partner sites, websites, and non-stop user-generated content. Adding to this growth are regulatory and legal requirements that are forcing many organizations to preserve their data for seven, ten years, or even forever.

As a result, the total online data seen within organizations is not only going into the hundreds of terabytes, but now into the near-petabyte (PB) and multi-petabyte range. The reflex reaction by most organizations to this prolific data is to buy and install more disk storage. Smart approaches such as tiered data storage and ILM are on the horizon, but still only prevalent among a minority of companies. A sizable segment of respondents report that a majority of their data is managed within core enterprise databases.

As this survey shows, organizations are only just beginning to get a grasp of smarter and more collaborative approaches to better cope with the large amounts of data that need to be effectively managed, securely stored, and made accessible on demand to business users.

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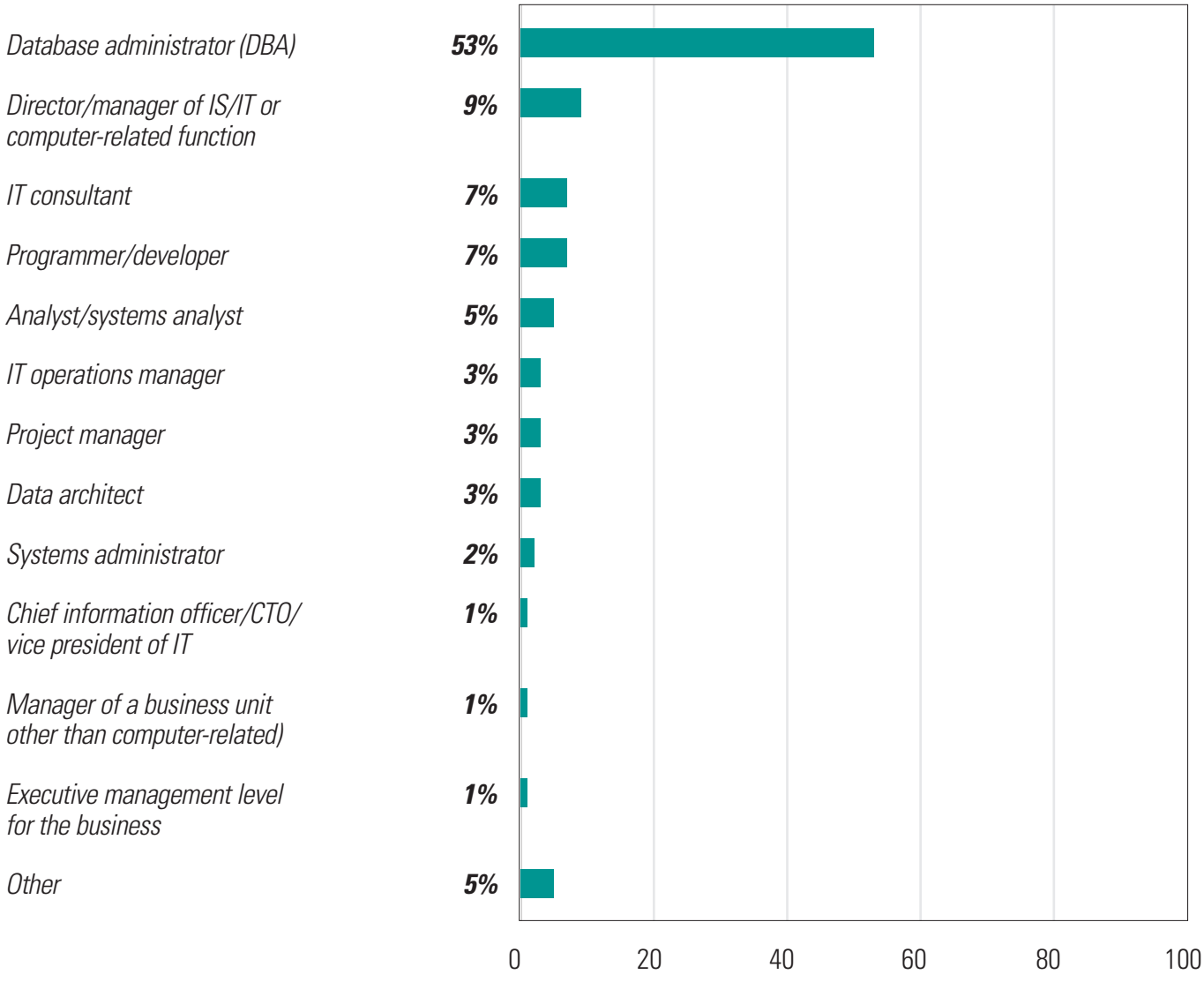
## DEMOGRAPHICS

# Figure 50: Respondents' Primary Job Titles

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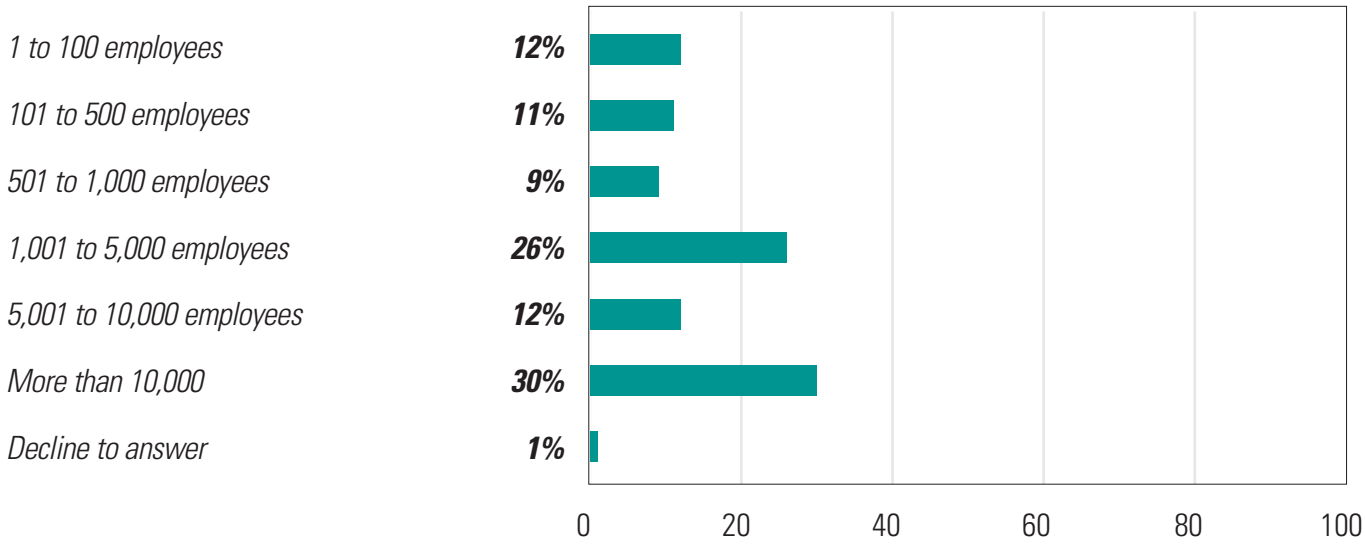
## Figure 51: Respondents' Company Sizes—By Number of Employees

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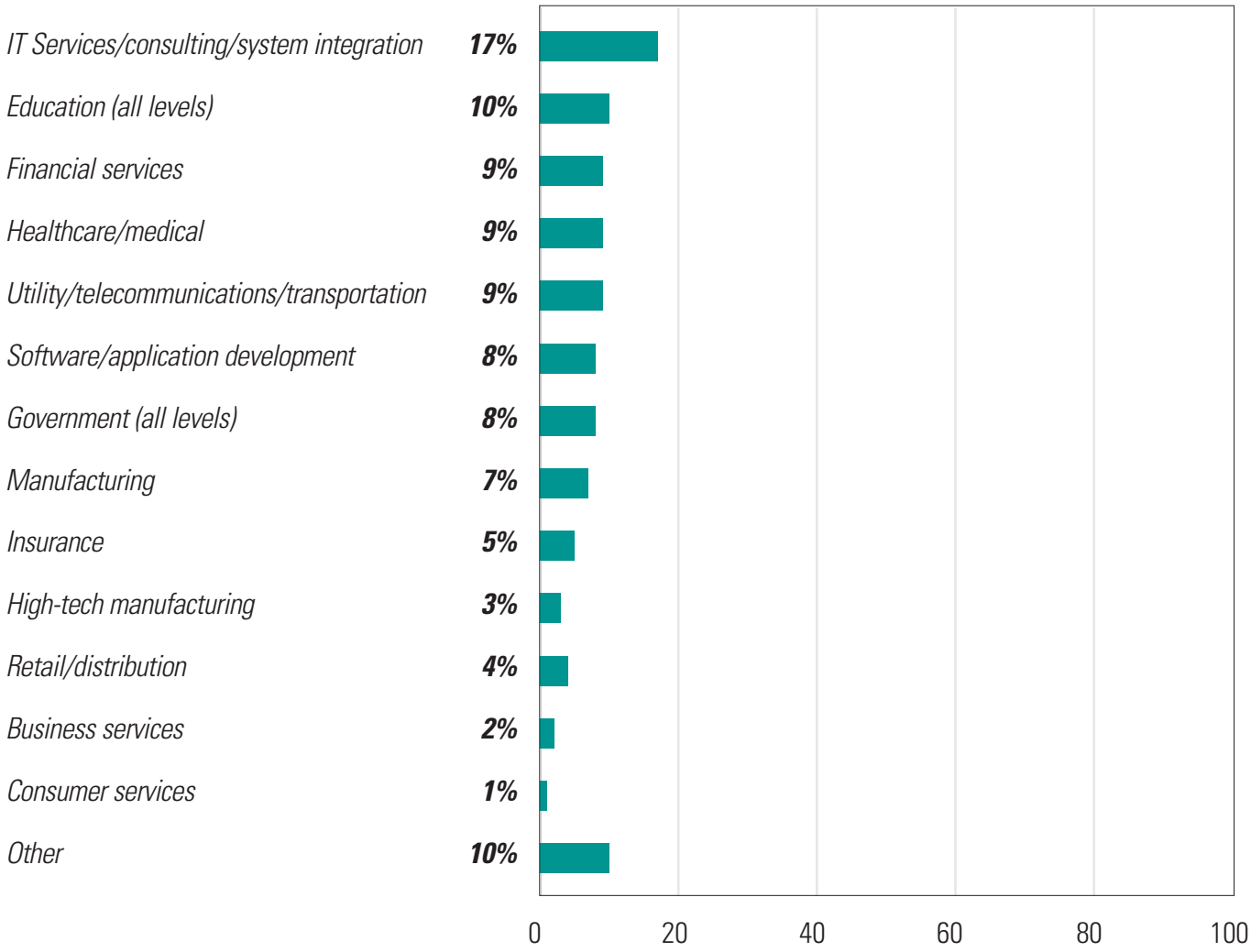
## Figure 52: Respondents' Industries

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